TOLLEMACHE CONSULTANTS LTD.

Rotokauri North Private Plan Change Request

Planning Assessment: Assessment of Environmental Effects

Application to Hamilton City Council pursuant to Schedule 1 of the Resource Management Act 1991

Rotokauri North, Rotokauri

April 2019



DOCUMENT CONTROL RECORD

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DOCUMENT: Assessment of Effects on the Environment

CLIENT: Green Seed Consultants Limited

PROJECT LOCATION: Rotokauri North

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1. INTRODUCTION

1.0.1. This report documents the section 32 statutory analysis of an application for a Private Plan Change ("**PPC**") to rezone approximately 140ha of Future Urban ("**FUZ**") zoned land to Medium Density Residential Zone ("**MDRZ**") and Business 6 Zone ("**B6Z**") made by Green Seed Consultant Ltd ("**GSCL**") on an area of land known as Rotokauri North, within the Hamilton City Council's Rotokauri Structure Plan area ("**RSP**"). The application has been made to Hamilton City Council ("**Council**") under the Resource Management Act 1991 ("**RMA**").

1.0.2. This report has been prepared to support a request for a Private Plan Change ("**PPC**") to the Hamilton City District Plan ("**HCDP**"), made by Green Seed Consultants Ltd ("**GSCL**") pursuant to the First Schedule of the Resource Management Act ("**RMA**") for an area of land identified as "Rotokauri North" in the north-west of Hamilton City.

1.0.3. Rotokauri North comprises 140ha of land proposed to be zoned for urban activities, specifically;

- 137.6 hectares is proposed a Medium Density Residential zone ("**MDRZ**");
- 1.2 Hectares is proposed as Business 6 zone (Neighbourhood) ("**B6Z**");
- Amend the existing Rotokauri Structure Plan map to specifically **exclude** the Rotokauri North area;
- Insert a new Rotokauri North Structure Plan ("**RNSP**") and associated rules; and
- Retain the existing Natural Open Space zoning ("**NOSZ**") and Significant Natural Area ("**SNA**") overlay located within the site (approx. 1.2 hectares).

1.0.4. Based on the total area, the development of the PPC area could yield approximately 2,000 houses.

1.0.5. The majority (approximately 133 ha) of the area, falls within land holdings falling under the GSCL umbrella.

1.0.6. Although the land falls out of the planned sequence for development of the existing Rotokauri North area, this PPC seeks to bring forward the land for development to cater for the need for additional housing in Hamilton City in an area where infrastructure can be provided.

1.1. Necessity for a Private Plan Change

1.1.1. The PPC is required because:

i. The Rotokauri North landholdings are currently zoned Future Urban ("**FUZ**") under the HCDP, meaning it cannot be developed for residential use without a plan change process.

ii. Although the land falls within the existing operative Rotokauri Structure Plan area ("**RSP**") the land is not earmarked for release by HCC until post-2028.

1.1.2. In addition, the GSCL land has been recommended by Council (on 18 October 2017) to be identified as a Special Housing Area ("**SHA**") in accordance with the Housing Accords and Special Housing Areas Act 2013 ("**HASHAA**").

1.1.3. The proposed SHA is 133 ha in area. At the design workshop undertaken 5 to 8 August 2018 between the experts supporting GSCL and Hamilton City Council ("**HCC**") officers, it was recommended that approx. 7 ha of additional sites associated with Rotokauri North be included in the PPC request. This is to support integrated management rather than these areas remaining FUZ.

1.2. Attachments and Supporting Documents

1.2.1. Attachments to this AEE include:

(a) **Attachment 1** List of Acronyms

(b) **Attachment 2** Locality Map

(c) **Attachment 3** Certificate of Title (subject to this request)

(d) **Attachment 4** Proposed Plan Change Provisions and Structure Plan Map

(e) **Attachment 5** Section 32 Assessment

1.2.2. This PPC is supported by the following technical reports which are provided as attachment to the PPC application:

(f) **Attachment 6** Rotokauri North SHA: Archaeological Assessment prepared by CFG Heritage dated 3 December 2018

(g) **Attachment 7** the following reports relating to Geotechnical Matters:

a. Rotokauri North SHA Geotechnical Assessment Report prepared by HDGeo dated 25 October 2018

b. Rotokauri North SHA – Response to HCC Peer Review prepared by HDGeo dated 27 February 2019

(h) **Attachment 8** Rotokauri North Preliminary Site Investigation by HDGeo dated 11 July 2018

(i) **Attachment 9** Rotokauri North Sub-Catchment Integrated Management Plan prepared by Tollemache Consultants dated April 2019.

(j) **Attachment 10** Rotokauri North ICMP: Desktop Review of Hydrogeological Conditions Influencing Stormwater Design prepared by Beca dated 17 July 2018

(k) **Attachment 11** Rotokauri North Development Area: Technical review of stream classifications prepared by Tonkin & Taylor Ltd, dated 7 December 2018

(l) **Attachment 12** Receiving Environment and Rapid Erosion Assessment Rotokauri North Sub-Catchment prepared by Morphum Environmental Ltd November 2018 DRAFT ("**Morphum**")

(m) **Attachment 13** Integrated Traffic Management Report prepared by Commute Transportation Specialists dated April 2019.

(n) **Attachment 14** Economic Report by Property Economics dated 30 October 2018

(o) **Attachment 15** Urban Design Assessment by Ian Munro dated April 2019.

(p) **Attachment 16** Infrastructure Report prepared by McKenzie & Co Consultants Ltd dated April 2019.

(q) **Attachment 17** Landscape and Visual Assessment by LA4 dated April 2019

(r) **Attachment 18** Cultural Impact Assessment Working Draft for Lodgement [April 2019

(s) **Attachment 19** Summary of Consultation

(t) **Attachment 20** Legal Opinion by Berry Simons

(u) **Attachment 21** Notification Assessment

1.2.3. This report is also supported by the following technical reports (which are not provided as attachments to this report but can be provided upon request).

(v) Rotokauri Integrated Catchment Management Plan ("**Rotokauri ICMP**") prepared by Hamilton City Council;

(w) Rotokauri ICMP – Ecological Assessment and Inputs prepared by Kessels Ecology dated 31 August 2016;

(x) Mangaheka Integrated Catchment Management Plan ("**Mangaheka ICMP**") prepared by Beca; and

(y) Mangaheka Stream – Assessment of Ecological Values to inform an Integrated Catchment Management Plan, prepared by Boffa Miskell dated 27 June 2016.

1.2.4. The following reports that were prepared in conjunction with the Rotokauri Structure Plan (and associated Plan Change- Variation 18) (which are not provided as attachments to this report but can be provided upon request).

(z) Rotokauri: Inventory of natural resources and management criteria prepared by BBO 1998

(aa) Environmental protection overlay: Site assessments prepared by Downs, T & Clarkson, B 2001

(bb) Rotokauri Lake Structure Plan – Cultural assessment prepared by NaMTOK 2001

(cc) Rotokauri Structure Plan: Phase One Report Environmental Constraints/ Urban Needs Assessment Prepared by BECA June 2001

(dd) Rotokauri Structure Plan: Phase One Maps prepared by BECA 2001

(ee) Rotokauri Flood Plain Preliminary Geo- technical Investigation Report no. 2368 prepared by Opus June 2005

(ff) Rotokauri Structure Plan (variation 8) prepared by Hamilton City Council August 2005

(gg) Ecological Investigations of the Rotokauri, Te Rapa and Te Kowhai Catchments prepared by Kessels and Associates Ltd 2006

(hh) Restoring Waikato's Indigenous Biodiversity: Ecological Priorities and Opportunities prepared by Waikato Biodiversity Forum/ EW October 2006

(ii) The Distribution of fish in the urban gully system streams of Hamilton City prepared by CBER contact report 18 October 2006

(jj) Rotokauri Structure Plan Road Network-Traffic Modelling prepared by Gabites Porter 2007

(kk) Rotokauri Growth Cell; Assessment of Land Demand for New Zealand Commercial Centres May 2007 prepared by Speer & Speer Associates May 2007

(ll) Rotokauri Western Hills Landscape Study prepared by Boffa Miskell October 2007

2. DESCRIPTION OF THE SITE AND SURROUNDS

2.1. Applicant Details

APPLICANT	Green Seed Consultants Limited.
SITE ADDRESS	A Locality map is in **Attachment 2**.
LEGAL DESCRIPTION	As per below and in **Attachment 3.**
SITE AREA	140 Hectares (approximately).
DISTRICT PLAN	Hamilton City District Plan ("**HCDP**").
CURRENT ZONING	Future Urban ("**FUZ**") and Significant Natural Area ("**SNA**").
DESIGNATIONS / SPECIAL LIMITATIONS	Refer to Planning Maps.

2.2. Subject Sites

2.2.1. The below **Table 1** outlines the properties subject to this PPC request.

Table 1: Legal Descriptions

Property Address		Legal Description		CT Number	Title Area
17	Burbush Road	LOT 6	DP 359488	242207	16.48 ha
29	Burbush Road	LOT 5	DP 359488	242207	2625 m2
38	Burbush Road	LOT 4	DP S15254	SA14B-112	5.0712 ha
56	Burbush Road	LOT 4	DP 359488	242205	3.948 ha
64	Burbush Road	LOT 3	DP 359488	242204	3286 m2
76	Burbush Road	LOT 2	DP 359488	242203	3.9298 ha
82	Burbush Road	LOT 1	DP 359488	242202	2500 m2
	Burbush Road	LOT 3	DP S15254	SA14B-111	5.787 ha
	Burbush Road	LOT 9	DP S15255	SA14B-117	4.0469 ha
350	Exelby Road	LOT 6	DP S15123	SA13B-745	13.7188 ha
372	Exelby Road	LOT 5	DP S15123	SA13B-744	4.062 ha
223	Te Kowhai Road	LOT 10	DP S15255	SA14B-118	4.0469 ha
223	Te Kowhai Road	LOT 11	DP S15255	SA14B-119	4.0469 ha
223	Te Kowhai Road	PT LOT 7	DP S15255	SA14B-115	4.0823 ha
245	Te Kowhai Road	LOT 1	DP S4129	SA1263-30	1829 m2
301	Te Kowhai Road	LOT 1	DP S69074	SA55B-968	5210 m2
301	Te Kowhai Road	LOT 2	DP S69074	SA55B-968	5210 m2
301	Te Kowhai Road	LOT 1	DP S46587	SA55B-968	5210 m2
321	Te Kowhai Road	LOT 1	DP 485743	690913	4502 m2
329	Te Kowhai Road	LOT 2	DP 485743	690914	19.5514 ha
335	Te Kowhai Road	LOT 3	DP 334215	140356	5.1426 ha
341	Te Kowhai Road	LOT 2	DP 334215	140355	2.0000 ha
349	Te Kowhai Road	LOT 1	DP S72047	SA57D-840	5315 m2
353	Te Kowhai Road	LOT 3	DP 314799	58423	2.3615 ha
365	Te Kowhai Road	LOT 1	DP 314799	58421	2509 m2
371	Te Kowhai Road	LOT 2	DP 314799	58422	2.4815 ha
383	Te Kowhai Road	LOT 3	DP S15123	SA13B-742	4.2113 ha
	Te Kowhai Road	PT LOT 2	DP S15254	SA14B-110	4.4667 ha
	Te Kowhai Road	LOT 1	DP S15254	SA14B-109	4.2568 ha
		SEC 23		755895	4.2547 ha

2.3. Description of the Subject Sites

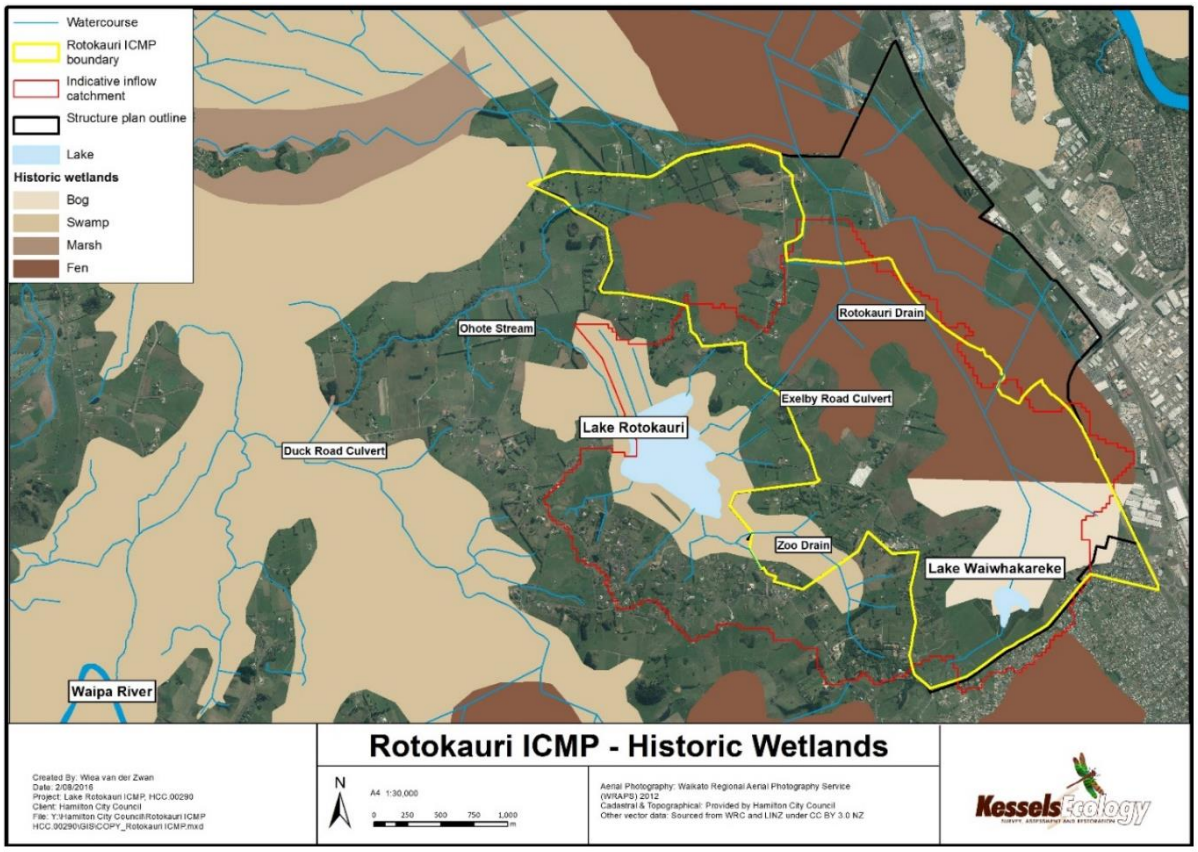
2.3.1. The site is located at the north-west extent of Hamilton City and consists of a total area of approximately 140 hectares as shown in the Locality Diagrams in **Attachment 2**. It is bounded by the Te Kowhai Road (SH39) to the north, greenfield lands to the east and south and Exelby Road to the west and south. Burbush Road runs north to south through the eastern portion of the site.

2.4. Historic and Current Land Uses

2.4.1. Historically the site was partially covered by a wetland (fen) which, as identified in the archaeology section below, was drained to make way for agricultural land practises in the early 1900s.

2.4.2. Figure 1 below is included in the Rotokauri ICMP (as Figure 2-2) and identifies the location of the fen / wetland.

Figure 1: Historical fen / wetland



2.4.3. The current land use is for agriculture, with some lifestyle dwellings. Historic uses of the site are associated with farming for livestock and dairying.

2.4.4. Vegetation on the site is mainly grazed pasture grasses and exotic tree species used for hedging and shelterbelts. Some native trees are present on the site but are generally located in amenity gardens surrounding dwellings. There is an existing significant stand of kahikatea in the north-eastern corner of the site, which is identified by the HCDP as a SNA.

2.4.5. Proportionally across Rotokauri North, the land uses are as follows:

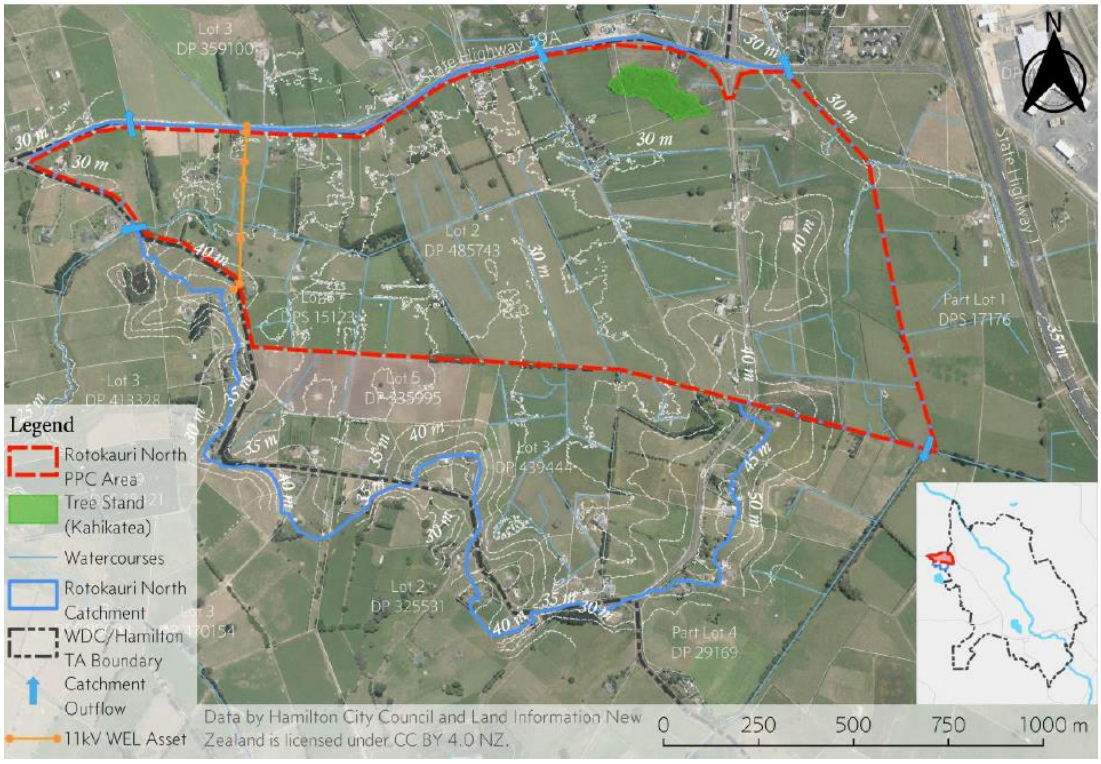
- 97.4% of land classified as exotic grassland,
- 1.6% classified as exotic forest, and
- The remaining 1.0% classified as indigenous forest as per the Land Cover Database (version 4.1).

2.4.6. The SNA, known as Burbush Road Forest or Perkins Bush is a small patch of kahikatea trees situated on private property north of Lake Rotokauri. It has been identified as an SNA under the HCDP. Kessels (2016) records it as: "*The canopy is dominated by kahikatea with emergent rewarewa, with an understorey of tawa, mahoe, white maire, pohuehue and titoki (Cornes et al. 2012). In 2011 the area was mostly fenced from stock. Weed species include woolly nightshade, Chinese privet, Tradescantia and pasture grasses are prevalent in the ground tier*".

2.5. Topography and Catchment Boundaries

2.5.1. As identified in Figure 2 below, the majority of Rotokauri North is relatively flat, generally 28-30 RL. There are some terraces along the southern and eastern edges of the development area which are up to 40 RL.

Figure 2: Topography map



2.5.2. The Rotokauri North area is within the catchments of the Ohote, Te Otamanui, Mangaheka and Rotokauri South stream networks.

2.5.3. The majority of the stormwater catchment discharge is via the Ohote catchment, which runs predominantly east-west through Rotokauri North and comprises approximately 136.7 hectares of land. The Ohote catchment ultimately discharges to the Waipa River approximately 6 kilometres downstream. The catchment drains through a culvert located at Exelby Road, which is also the eastern catchment boundary.

2.5.4. Te Otamanui catchment falls south of Te Kowhai Road within the HCC territorial boundary, with the northern portion of the catchment (outside of Rotokarui North area) within the Waikato District Council ("**WDC**") territorial boundary. Land within this catchment comprises approximately 46.2 hectares. Two culverts under Te Kowhai Road convey flow from the south to north. One culvert services the western area (6.9 ha) and the other the eastern area (39.3 ha). Te Otamanui catchment discharges north-westerly to the Waipa River approximately 8 kilometres downstream.

2.5.5. The Mangaheka catchment flows from south to north, with the portion falling within Rotokauri North being 14.9 hectares and is the upper portion of the catchment. The catchment eventually discharges to the Waipa River approximately 2.5 kilometres south of Ngaruawahia. This catchment has an approved Mangaheka ICMP.

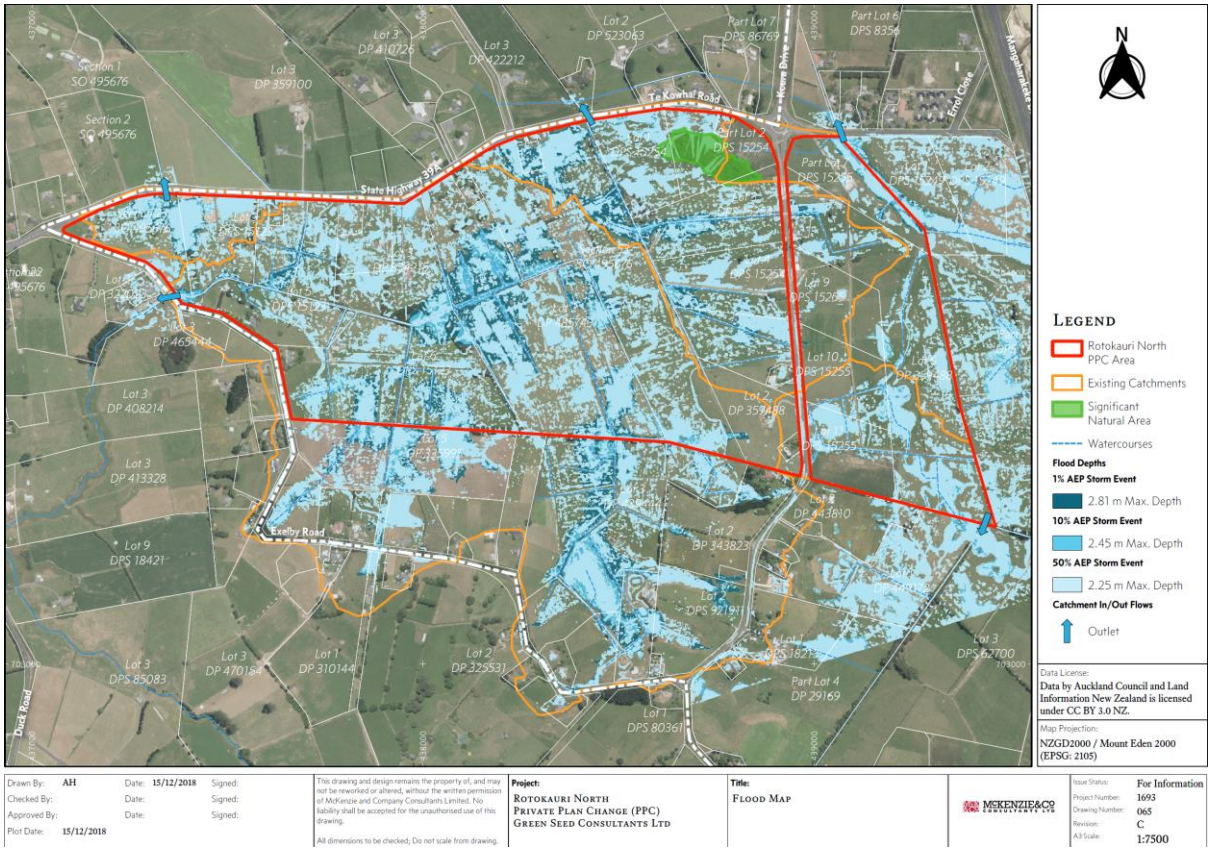
2.5.6. The portion of Rotokauri North within the upper reach of the Rotokauri South catchment comprises approximately 14 hectares. The catchment flows south-westerly to Rotokauri Lake approximately 1.5 kilometres away. The Rotokauri South catchment also has an approved Rotokauri ICMP.

2.5.7. The majority of the land is currently used for farming, with minimal impervious areas.

2.6. Overland Flowpaths and Flooding

2.6.1. The above Figure 2 also shows the overland flowpaths and watercourses on the site. Classification of modified and artificial watercourses is in accordance with the Tonkin & Taylor stream classification memo (2018) in **Attachment 11**. Figure 3 shows the existing flood extent and indicates that part of the site is subject to flooding.

Figure 3: Flooding Extent



2.6.2. The site is located roughly central to the broader Hamilton Basin which is characterized by low rolling hills (Hamilton Hills) and plains with low terraces and gullies draining into the Waikato and Waipa Rivers (Hamilton Lowlands) as described below (HDGeo, 2018, in **Attachment 7**):

- The Hamilton Hills are linear, sinuous hills and ridges that are remnant of an older erosion surface. They consist of alluvial material and non-welded ignimbrites (Walton Subgroup) and are typically overlain by a number of metres of airfall volcanic ash (Kauroa Ash and Hamilton Ash).

- The Hamilton Lowlands are a broad, low angle alluvial fan created by the Waikato River in the Late Quaternary. The fan materials are derived from rhyolitic eruptions in the central North Island and generally consist of late Pleistocene primary and secondary volcaniclastic sediments with a wide variety of grain sizes (Piako Subgroup and Hinuera Formation). Deposition of the fan materials ceased when the Waikato River entrenched into its current course approximately 17 ka and thin airfall tephra layers accumulated on the fan surface (Hinuera Surface).

2.6.3. The New Zealand Geological map (QMap) for the Waikato Region shows that local soils within Rotokauri North consist of the Walton Subgroup, the Hinuera Formation, and Piako Subgroup materials. The Walton Subgroup falls predominantly along the ridges west, south, and east of the Rotokauri North area and are described as Early Pleistocene to Middle Pleistocene alluvium dominated by primary and re-worked non-welded ignimbrite. The main basin within the Rotokauri North area consists of the Hinuera Formation and Piako Subgroup.

2.6.4. The Hinuera Formation makes up the majority of the low- lying areas of site, with small areas in the south and southeast of the site described as the Piako Subgroup. The Hinuera Formation is described as Late Pleistocene cross-bedded pumice sand, silt and gravel with interbedded peat. The Piako Subgroup is described as Late Pleistocene locally derived mud, silt, gravel and peat.

2.6.5. Site conditions encountered by HD Geo were typically consistent with the mapped geology.

2.6.6. The low-lying portions of the site contain sand and silty soils with a high groundwater table, which can be susceptible to liquefaction under earthquake-induced cyclic loading.

2.6.7. Liquefaction of this magnitude is not uncommon in the Waikato, but it does have the potential to affect options for stormwater management, specifically, chosen options must consider the potential for "lateral spreading". Lateral spreading is a phenomenon were liquefied material allows the soil above to move horizontally towards a free face, such as a stream bank.

2.6.8. HD Geo have indicated that the site currently has an isolated lateral spreading risk adjacent to the Mangaheka stream near Te Kowhai Road in the north-eastern corner of site.

2.6.9. Potential mitigation from liquefaction and lateral spreading is addressed in the assessment of effects section further below.

2.7. Soils

2.7.1. Landcare Research identifies the soils to be a mix of Land Use Capabilities (ranging from 1 in the flats adjacent to Te Kowhai Road to 4 towards the southern extent of the catchment).

2.7.2. Landcare Research identifies the site as having well-drained soils (along the ridges) and very poorly drained soils within the main basin (see Figure 4). The soil moisture regime ranges from moderate (along the ridges) to very high in the main basin (see Figure 5).

Figure 4: Soil Drainage

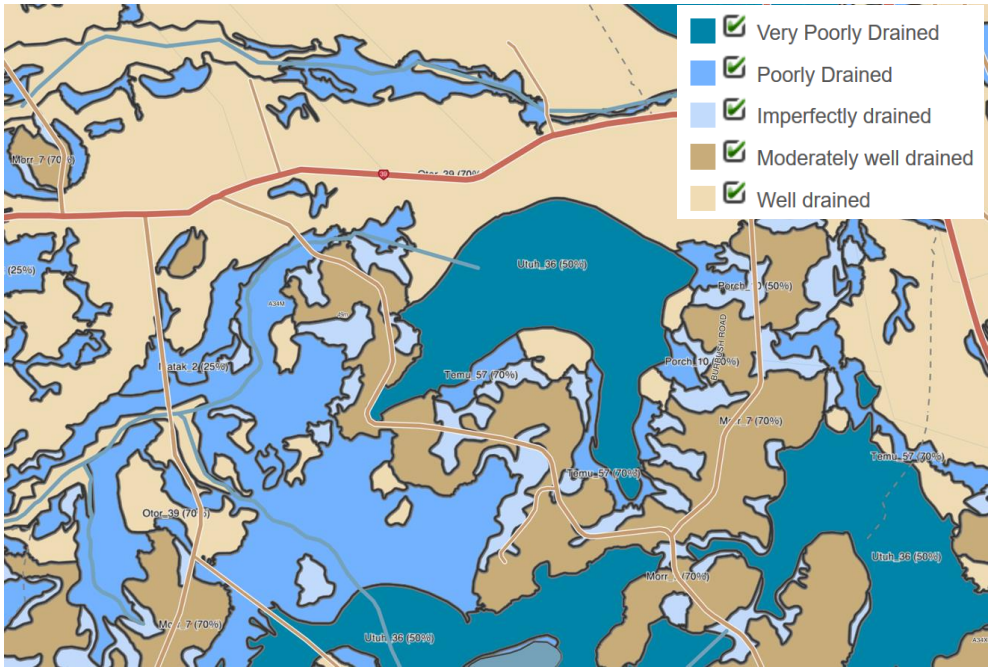
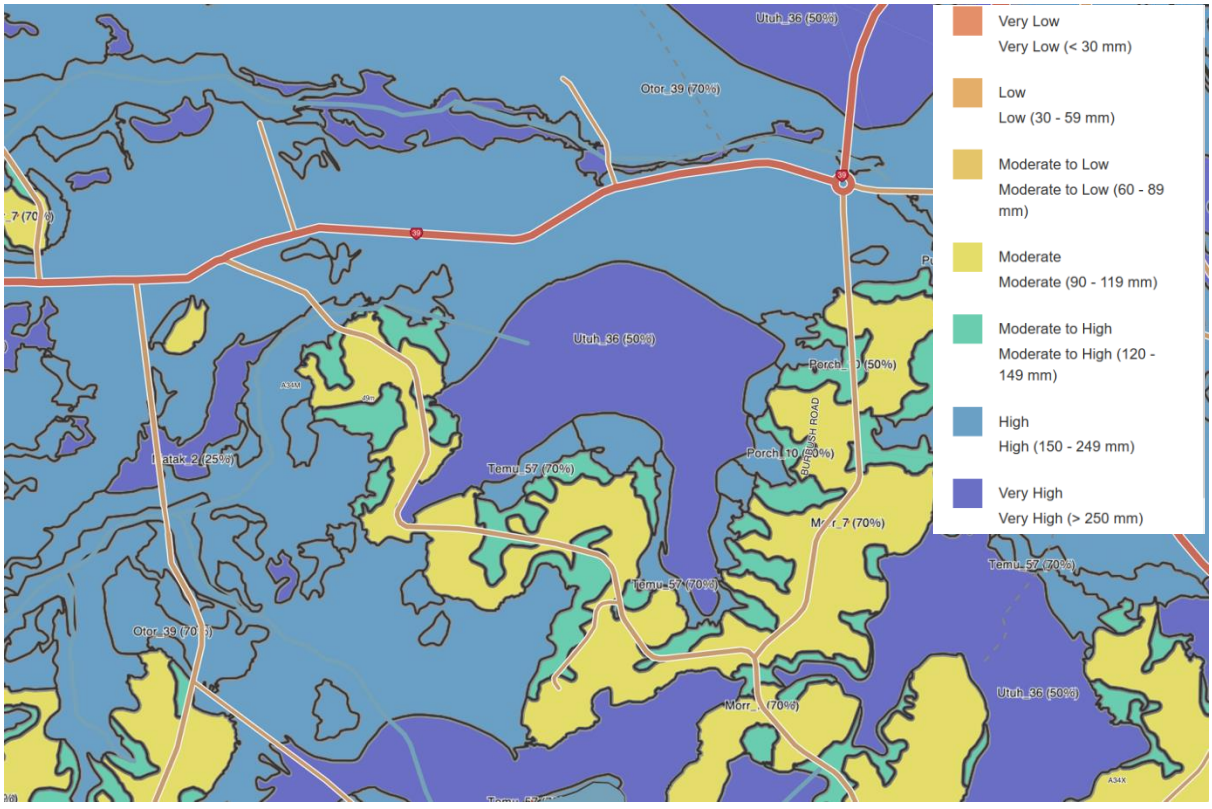


Figure 5: Soil Moisture



2.8. Hydrogeology

2.8.1. There are three significant surface water bodies within three kilometres of the Site:

- Lake Rotokauri, located approximately 1.3 km to the south from the southwestern-most extent of the Site;
- Horseshoe Lake, located approximately 2.5 km to the south/southeast from the south-eastern-most extent of the Site; and
- The Waikato River, located approximately 2.5 km from the eastern-most extent of the Site.

2.8.2. Surface water flows are expected to generally follow local topography, toward the east, north and west along drainage trenches through the site. The south-eastern corner of the site drains towards Lake Rotokauri through a network of a stream tributaries feeding into Lake Rotokauri, and then into the Waipa River. The bulk of the catchment flows westwards along a network of farm drains into the Ohote stream and then into the Waipa River. The headwaters of Te Otamanui stream fall within the central northern portion of the site. And the Mangaheka stream flows along the eastern boundary of the site. Both Te Otamanui and Mangaheka catchments floe northwards out to the Rotokauri North site and then westwards to the Waipa River. However, groundwater is likely to be largely constrained from following the same routes by the hills to the east, west and south, and is likely to travel northeast towards the Waikato River (as outlined in the Beca Memo in **Attachment 10**).

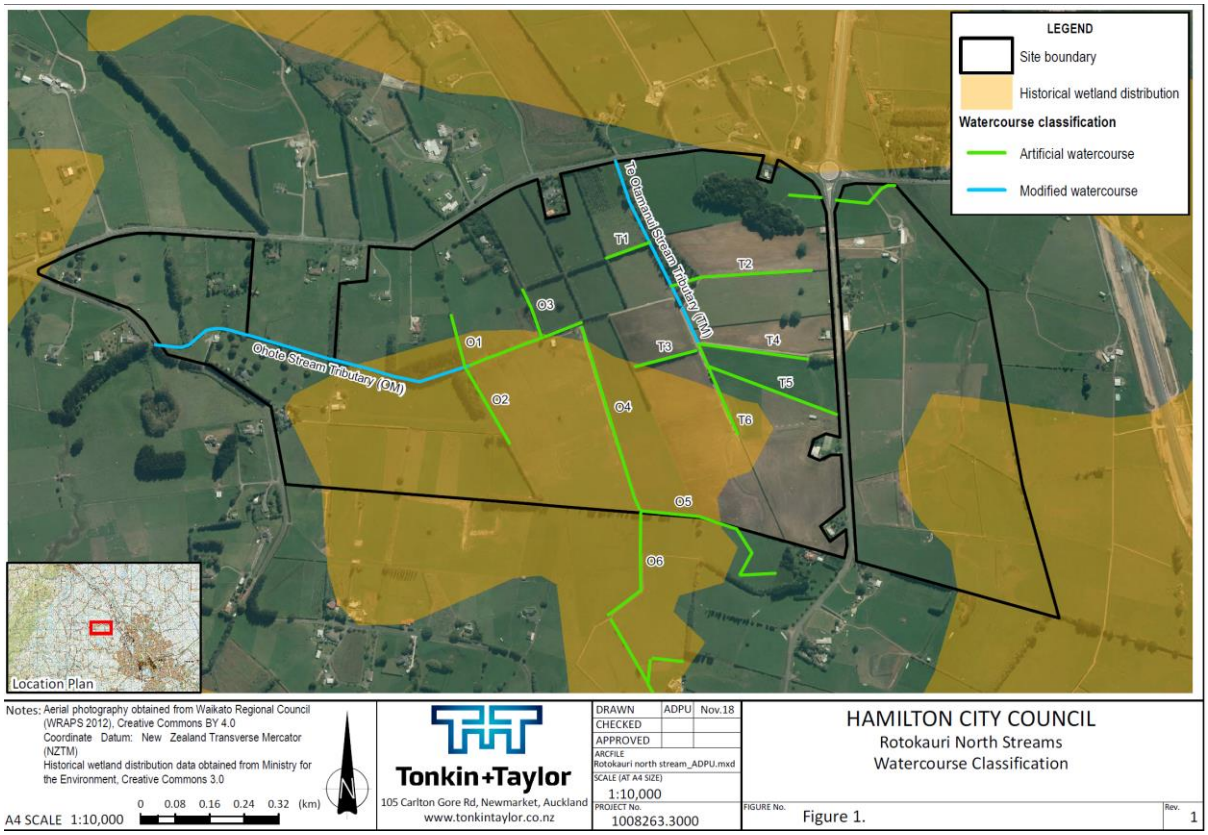
2.8.3. A groundwater investigation conducted at the site by HD Geo (2018) revealed groundwater at a depth of approximately 0.1 to 1.5m (below ground surface) in the low-lying areas and approximately 6m in the elevated areas.

2.9. Stream Locations/Classifications

2.9.1. Tonkin & Taylor undertook an assessment to identify and classify (in accordance with Waikato Regional Plan ("**WRP**") definitions) the watercourses located within the site.

2.9.2. The majority of the watercourses present within the site are consistent with the WRP definition for an "artificial watercourse", and all watercourses have been mapped as per Figure 6 below:

Figure 6: Watercourse Classification



2.10. Surrounds

2.10.1. The Rotokauri North area lies in the north-west corner of the HCC boundaries. Land on the opposite side of SH39 and Exelby Road fall under the WDC jurisdiction and are zoned under both the operative and proposed Waikato District Plans ("**WDP**") as "rural", and utilised for a mix of rural lifestyle and farming activities.

2.10.2. Land within the HCC boundary to the south and east is zoned FUZ and is also used for a mix of rural lifestyle and small scale farming activities.

2.10.3. Further east lies a developing Industrial area (rezoned as part of Rotokauri Stage 1), and further east again is The Base shopping complex.

3. PROPOSED PLAN CHANGE

3.1. Background

3.1.1. The Rotokauri growth area was brought into Hamilton City during the 1980s to provide for long-term development and city growth. The RSP (Plan Variation 18) was developed and notified in October 2007 and became operative in June 2011. The RSP includes approximately 485 hectares of residential land through the western half of the Rotokauri area but included internal staging to the release of land (to accord with the timing of available infrastructure).

3.1.2. The HCDP describes the area as:

"The Rotokauri growth cell is an area of approximately 1000 Ha on the north-west fringe of Hamilton. It was brought into the city during the 1980s to provide for long-term development and city growth. At present it is primarily in agricultural use, with the majority of the area zoned for future urban development within the District Plan."

3.1.3. The RSP outlines the release of land for development in two stages (the subject land falling within identified Stage 2): The RSP indicates that the release of land beyond stage 1A (such as the PPC area) will be contingent upon the availability of network capacity which may arise as a result of traffic generation being less than anticipated in the traffic growth assessments, or from completion of new infrastructure.

3.1.4. Specifically, section 3.6.2.9 of the HCDP states:

"a) Constraints on the availability of infrastructure and network capacity limit the extent to which land can be released for development. Until capacity and services are available, it is essential the development potential of the remaining Rotokauri area is not compromised by interim development.

b) Council's Long Term Plan or Annual Plan sets out the programme for providing infrastructure to service growth. Where a developer wishes to pursue development ahead of Council's programmes a Development Agreement will need to be entered into with Council to ensure that the infrastructure is provided in a way which is efficient and sustainable from a city wide perspective. In these cases it is anticipated that developers will bear the full cost of infrastructure provision.

This approach will enable growth in areas that are not funded for infrastructure to be funded by developers under Development Agreements between all parties."

3.1.5. The RSP indicates that the subject area will be part of the Stage 2 development and the timing will be dependent on the appropriate infrastructure being available.

3.1.6. For this reason, the subject site and the surrounding land was earmarked for future growth and was zoned FUZ.

3.2. Re-zoning Proposal

3.2.1. GSCL requests a PPC to the HCDP under the RMA to rezone 140 hectares of land and to insert a new Structure Plan and associated rules (as identified in **Attachment 4**) specific to the Rotokauri North area. Specifically, this PPC seeks to:

i. Rezone approximately 137.6 hectares from FUZ to MDR to facilitate and support residential development;

ii. Rezone approximately 1.2 hectares from FUZ to B6Z (Neighbourhood Centre);

iii. Amend the existing Rotokauri Structure Plan map area to specifically **exclude** the Rotokauri North area; and

iv. Insert a new RNSP and associated rules.

3.2.2. An area of SNA subject to the HCDP overlay (and currently subject to a NOPZ) located within the site (approx. 1.2 hectares), is proposed to be retained.

3.2.3. The Plan Change maps and text are included in **Attachment 4**. In summary, the PPC text seeks to insert:

Proposed Provisions	Reason for change
Zone Map	
Rezone the Rotokauri North area from Future Urban Zone to Medium-Density Residential Zone and a small area of Business 6 Zone for a neighbourhood centre.	To support the urban development of the land consistent with the expectations of the land for accommodating growth, the Rotokauri Structure Plan, Rotokauri North Structure Plan and urban design assessment, the proposal is to rezoned the land to provide for a range of housing typologies and densities, while providing an urban form which creates high quality amenity while utilising the land in an efficient manner.
Chapter 3: Structure Plans	
New Rotokauri North Structure Plan including roading hierarchy, key road locations and connections, and indicative open space areas, and associated modifications to insert Rotokauri North as a specific Structure Plan area and remove Rotokauri North from the Rotokauri Structure Plan Area.	The insertion of a new Structure Plan specific to Rotokauri North is based on a refinement only of the existing Rotokauri Structure Plan and has been tailored to achieved medium density living (which was not envisaged to the degree proposed by this PPC) in the original Structure Planning. Park locations on the Structure Plan are indicative as these are reliant on Council acquisition through the Local Government Act 2002 and LTP process. Although some "future reserve" features shown on the operative RSP have not been carried through onto the RNSP, this in no way impacts the ability of HCC to purchase the land for any purpose that it deems necessary to cater for parks or other reserves. Reserve features on a Structure Plan do not equate to a reserve zoning nor are they linked to any RMA expectation that the land will be "gifted" for free to the Council or any such purpose. Land for sports park facilities can be acquired by Council via the Public Works Act and designation or via a separate agreement with the relevant landowner. More specific detail on the RNSP is provided in the Urban Design Assessment by Ian Munro.
Road Cross Section Figures	These are intended to complement the minimum widths provided in Chapter 23 provisions and to

Proposed Provisions	Reason for change
	provide guidance in respect to the roading hierarchy reflected in the RNSP and ICMP BPOs.
3.6A Insert new Rotokauri Structure Plan area text	Insertion of a new section 3.6A and 3.6A.1 provides an overview of the vision and an explanation of the key structure plan elements and intended outcomes.
3.6A.2 Insert new objectives and policies	New objectives and policies are required to achieve the vision and outcomes listed in 3.6A.
3.6A.3 Insert References to other chapters	This insertion is to help guide District Plan users.
3.6A.4.1 Affordable Housing – require developments of 15 or more units/lots to provide 10% at an affordable rate to First Homebuyers.	This set of provisions implements the Hamilton Housing Accord, along with commitments made by the applicant in respect to the Statement of Intent ("**SoI**") and the Council's Policy on SHAs. The proposal also supports housing variety and choice and provides for social and cultural wellbeing of residents. Given the scale of the PPC area, along with the time required to complete its development (10 to 15 years) and the likelihood that HASHAA will expire, only a rule in the HCDP can secure long term the provision of affordable housing. The PPC proposes this method, along with objectives and policies.
Chapter 4: Residential	
4.5.1, 4.5.2 & 4.5.3 – Comprehensive Development Plan Provision: Exclude Rotokauri North from this requirement.	The Environment Court has recently (in relation to the Auckland Unitary Plan) made a declaration on the *ultra vires* status of comprehensive development plans ("**CDP**") as a tool to achieving resource management outcomes. The primary concern with a CDP is an ambiguous nature of a land use consent for a CDP as it neither allows actual subdivision or development activities and rather is an interim method to create a framework for other consents (subdivision and land use) to follow. The same can be said for the request from Council from review of the draft provisions to insert a masterplan version of the PPC in the Structure Plan text or as an Appendix – Design Guide. Neither of these outcomes serve any purpose for managing effects over and above the detailed provisions to support the urban design outcomes. In the case of the RNSP and PPC, the proposal provides a detailed structure plan maps, along with specific rules relating to the implementation of that structure plan along with the form of urban blocks and connecting roads.

Proposed Provisions	Reason for change
	A detailed ICMP has been prepared to manage stormwater treatment, detention and conveyance, along with the enhancement of streams. A rules-based framework which is based on the RNSP is more efficient and effective at supporting the integrated development of the PPC area (being through subdivision consents to establish roads, reserves, urban blocks and lots) than a two-stage process relying on a CDP. The CDP establishes a level of complexity, delay and cost which is not necessary where a more detailed RNSP and subdivision rules can direct specific outcomes through subdivision resource consent outcomes.
4.5.4 New activities for Rotokauri North MDRZ: • Permitted Activity ("**PA**") status for a specific type of ancillary residential unit • PA status for a specific type of duplex dwelling • PA status for garaging, carports and garden sheds • Restricted Discretionary Activity ("**RDA**") for any duplex not meeting the Rotokauri North Acceptable Solutions Code • **RDA** status for apartments • Discretionary Activity ("**DA**") status for noncompliance with PA or RDA standards or any other residential activity not provided for	Ancillary units: The proposed rule (in combination with its associated PA standards) provides for ancillary units to provide a diversity of housing stock and to attract different types of people, with different income brackets, tenure types and lifestyles, to be able to live in the area). These are limited to where they are above the garage within a rear lane scenario. Providing for ancillary units overlooking rear lanes provides not only an additional housing opportunity but a greater likelihood of the laneways being passively overlooked from adjacent units. Given the functional purpose of rear lanes, achieving such surveillance is likely to passively contribute to safety within the lanes based on Crime Prevention Through Environmental Design principles. Duplex dwellings & Acceptable Solutions Code: The proposed rule (in combination with its associated PA standards) provides a diversity of housing stock to support a variety of residents, with different income brackets, and lifestyles, to be able to live in the area. The proposed rule is based on a 12.5m x 28m lot, which can be developed as a duplex building (2-units), in a manner where a high-quality urban design outcome can be achieved. To avoid unintended outcomes and inferior design options (without having to default to a resource consent for all duplex dwellings), an Acceptable Solutions Code has been specified which identifies spatially how the acceptable duplex is to be designed (and which is proposed to be incorporated into the District Plan in Appendix 1).

Proposed Provisions	Reason for change
	The acceptable solutions code is proposed to establish a framework to manage the performance of specific duplex dwellings as a permitted activity. A specific approach to duplex design is recommended to support high quality built form outcomes. Other forms of duplex design which do not accord with the Code will need resource consent. The duplex code provides opportunities to establish a duplex building on 12.5m x 28m lots with a specific frontage, vehicle crossing and car parking layout. It is considered appropriate to provide for this form of building as a permitted activity as it reflects a high-quality outcome, and while other duplex designs could be appropriate for the site, these need resource consent to evaluate their design and performance.
	Apartments: This category is intended to capture "terraced housing" options which also add to a diversity of housing stock and lifestyle options. Specific lot dimensions have been required via the activity standards (Rule 4.7.12) as a "starting point" for development as a means to avoid inferior outcomes.
	Ancillary Buildings: The District Plan definition of an ancillary building (which includes garages which have internal access as well as those which are separate buildings) requires this type of activity to be addressed. The provision of separate garaging or carports is also needed for rear lane housing design options.
4.5.4 Modified more stringent activity status for dairies – proposed DA (from Controlled Activity ("**CA**"))	A Controlled Activity is considered too permissive and is not consistent with the outcomes sought for the environment. It is preferable and consistent with the policies, to encourage business activities to the local neighbourhood centre (B6Z).
4.5.4 Retained existing activity status for remainder of activities	Only those activities which need to be added to or modified to give effect to the proposed objectives and the RNSP have been amended.
4.6.3 – Height in relation to boundary ("**HIRB**"), insertion of new rule to manage sunlight/daylight effects on rear yards.	There is currently no HIRB in the MDRZ. The HIRB currently only applies adjacent to the General Residential Zone or the boundary of a CDP area.

Proposed Provisions	Reason for change
	The proposed rule encourages buildings to mass towards street frontages and rear lane edges (for rear lane accessed garages), but to otherwise provide spacious and deep back gardens that can, in turn, accommodate private outdoor living spaces. This is part of a development strategy seeking to encourage outdoor living spaces to the rear of lots where they are genuinely private and do not lead to pressure for tall fences along road boundaries. The relaxation of HIRB at the side boundaries (other than for the rear 8m of lots) is promote a denser and more urban character of 2-storey buildings on efficient, narrow-width sites. These support land efficiency, and the focus of the policies o promoting larger rear yards to support private outdoor living courts.
4.6.5 – Permeable Surface, insertion of a new rule for permeability forward of the dwelling frontage (including porch) to take into account a medium density living environment	This rule only applies to front yard landscaping. The rule has been amended to take into account the narrower road frontages that may occur in Rotokauri as a result of the intention to achieve private rear yards. As such the rule has been tailored to ensure that narrow road frontages still achieve an acceptable landscape area.
4.6.6 – Site Coverage insertion of reference to Rotokauri North for existing 50% site coverage	There is currently no control applicable to the whole zone (only applies to specific areas). A control is considered appropriate, which is consistent with the rule that has been applied in the MDRZ elsewhere in the City.
4.6.6 – Site Coverage insertion of a 60% site coverage for terrace housing (applicable to Rotokauri North only)	The proposed rule enables the efficient development of terraced housing (where no side yards are provided between units), in particular where accessed via a rear-lane and where a detached garage is typically required and where more building coverage typically results. The objectives encourage buildings to locate and mass towards street frontages, which means that where additional site coverage is proposed, it is unlikely to be occur in a manner that has readily discernible effects in the wider environment.
4.6.7 – Height, insertion of reference to Rotokauri North for 10m maximum height	There is currently no control applicable to the whole zone (only applies to specific areas). A maximum control is considered appropriate, which is consistent with the rule that has been applied in the MDRZ elsewhere in the City.
4.6.7 – Height, insertion of reference to Rotokauri North for 14m height in a Rotokauri North Additional Height Overlay	The proposed rule provides for additional building height in the eastern part of the PPC area. This reflects the accessibility advantages of this are in terms of the PPC area's neighbourhood centre (B6Z), identified

Proposed Provisions	Reason for change
	employment area east of the PPC site, and the transport links that are available. This part of the site has advantages over the western part of the site that support opportunities for intensification.
4.7.1 insert specific PA parameters for ancillary units specific to Rotokauri North	Refer to 4.5.4 above
4.7.12 Insert PA parameters for a duplex design, specific to Rotokauri North and RDA parameters for apartments.	Refer to 4.5.4 above
4.8.2 Building Setbacks insert new controls for rear yards (8m for the second storey of a building and 3m for the first storey of a building) AND provide for a porch encroachment into front yard (other provisions the same generally the as existing HCDP)	An important aspect of the PPC is the development of urban blocks and lots with private rear yards. The emphasis is on enabling building to mass towards the street while retaining larger rear yards to accommodate private outdoor living courts. This reflects best practice urban design, particularly in greenfields situations. The land use rules direct these outcomes in an integrated manner. The proposed rear yard rule requires a rear yard setback to support the overall urban form outcomes and limits what buildings can locate within it. This is to help provide a consistent placement of sunny and open corridors mid-block, placement of rear private living courts so as to cumulatively maximise spaciousness, sunlight access, and separation to manage overlooking and privacy. The setbacks with work the HIRB controls, along with the outdoor living court standards to support these outcomes. The rules are considered appropriate in medium density housing settings given the increased potential for adverse nuisance effects between neighbours to occur. The rule also enables un-enclosed, 1-storey tall porches up to 1m from the front boundary. This is intended to promote more efficient use of front yard space and promote a transitional building space which supports socialisation and interaction at the street. It also provides opportunity for secondary outdoor living spaces where the visual amenity of the street can be better taken advantage of by residents. The applicant has successfully implemented the same form of control

Proposed Provisions	Reason for change
	in their Auranga development, and this is well recognised as supporting high quality urban design outcomes. The rule also requires the garage to be setback from the street to ensure that active parts of the dwellings are located forward on the inactive garage door. This reflects best practice in urban design where garages are accessed from the street rather than from rear lanes.
4.8.3 Insert specific garage door widths for lots in Rotokauri North. • Maximum 6m for sites which have a greater width than 12.5m • Maximum 3.2m for sites with frontages less than 12.5 AND require garages or carports to be set back 1m from the front building line (or if the garage door is not facing the street require minimum glazing to the street frontage).	The proposed rule bases garage door width based on the lot frontage width. This is a simplified approach whereby certain width lots cannot accommodate a double width garage, and therefore the rules address lot widths rather than percentage of frontage. In a single-garage-width scenario, it would still be possible for a unit to accommodate two cars within a garage (stacked arrangement), and retain a parking pad for visitors in front of this. Where lanes are provided, double width garages would be possible as these have negligible effects on streetscape. Further standards are proposed to ensure garages do not dominate street frontages by requiring them to be set back from building frontages (or glazing if the door is not facing the street).
4.8.4 insert outlook space/glazing for Rotokauri North – specifically require principal living rooms or dining rooms to have outlook over front yards or rear yard.	This rule reinforces the subdivision and lot layout approach of encouraging dwellings to face streets. As it is likely that habitable windows will be predominantly orientated to the front and back, rather than the sides, a more specific outlook requirement can apply that requires smaller side setbacks. This is because the dimensions of the lots support the massing of the dwelling to the road frontage and private rear yards. Supporting rules relevant to this approach are the restriction on rear lots (subdivision) and the rear yard requirement. Rear lots create a number of potential adverse effects within blocks, including a fracturing of the consistent 'what is public / what is private' spatial delineation. When rear lots exist in blocks, access driveways introduce frequent points of public access within blocks, spoiling privacy for adjacent buildings.
4.8.5 insert specific Outdoor Living provisions for Rotokauri North • 36m2(6m shape factor); OR	General: The approach of the Rotokauri North provisions is to establish lots that are deeper than they are wider to allow buildings to mass towards the street, leaving private rear yards to accommodate outdoor living

Proposed Provisions	Reason for change
• Combined area of 30m2 (5m shape factor) and 8m2 (1.2m depth) front porch Insert above ground unit balcony sizes: • 5m2 (studio and one bedroom) • 8m2 (two or more bedroom)	courts. Rear Yard rules restrict buildings to ensure that these spaces receive sunlight, and are no dominated by buildings. In addition, no rear lots are proposed. The outdoor living space rule enables spaces that are consistent with medium density housing standards across New Zealand's urban areas. The approach is to relate the living space to the smallest housing typologies, which in this case would be terrace houses and duplexes. The PPC proposes a set of complementary rules that promote these spaces to locate in the private rear yard, mid-block, which in conjunction with the specific yard and HiRB promotes openness and solar access in these spaces. The size and dimensions are appropriate, functional, attractive and will be well-used by residents in such a manner that the reduced area will not result in a reduction in actual amenity provided to residents. The rules promote development of un-enclosed, 1-storey porches in the front yard. These provide transitional spaces with the street, promote social intersection and in themselves can be high quality amenity spaces for residents. The rules support an overall approach to outdoor living spaces which provide for a combined area, recognising the positive streetscape and public interaction outcomes possible through the provision of these spaces.
	Balcony: As medium density living often includes units above ground level, these should be treated separately to a ground floor level units. The current district plan standards do not allow for this.
4.8.6 Provide exclusion for service courts to Rotokauri North	The service court requirement is not considered necessary on lots larger than 300m2, simply as a function of the size of the site and likelihood that space will be available. On sites smaller than 300m2, the needs of affordability and promoting compact urban lots and blocks support a different approach. The requirements for outdoor living space are considered sufficient to accommodate a garden shed and fold-up washing line in a way that will not impinge on the usability of the space. It is also relevant to note that for affordable housing and medium density housing envisaged in Rotokauri North, while there will be some large multi-bedroom family homes, many future units will have two bedrooms and be occupied by a small household that

Proposed Provisions	Reason for change
	will have less service yard and storage needs than the default HCDP assumption of a 'worst case' large family dwelling and ancillary housing unit on the same lot. Furthermore, the HCCDP already contains solid waste standard 25.12.3.1 which effectively already requires development to provide for rubbish and recycling etc.
4.6-4.8.6 Retain all other provisions (not modified above) as applicable to the MDRZ	Only those activities which need to be added to or modified to give effect to the proposed objectives and the RNSP have been amended.
4.11 RDA Matters for Discretion – insert reference for Rotokauri North, and matters for discretion	Refer to Appendix 1 Assessment Matters.
Various- Other general insertions/clarifications etc. to include Rotokauri North in text	NA
Chapter 23: Subdivision	
Amendments to Objective 23.2.3 and Policy 23.2.3.a to exclude Rotokauri North from Land Development Plans and/ or Comprehensive Development Plan	Although the change affects an existing policy, this is considered a "consequential change" rather than a specific change to address the objectives sought by this PPC. The change is required to give effect to the changes in Chapter 4 whereby not Land Development Plan or Comprehensive Development Plan are required for Rotokauri North. Full justification for this has been made under the Chapter 4 provisions above.
23.3d New activities and associated activity status for RNSP area: • Subdivision not in accordance with the Structure Plan (DA) • Creation of a rear lot (NC) • Not meeting minimum lot size (NC) • Not meeting lot dimensions (DA) • Not meeting block layout dimensions (DA) • Not meeting access requirements/restrictions (DA) • Road widths not meeting required minimums (DA)	The applicant has deliberately proposed a package of rules and requirements, consistent with the proposed objectives and policies, to create certainty in respect to the urban form of development. In all cases, subdivision will precede land use consents because this is a greenfields site. The establishment of infrastructure (reticulated networks, stormwater, roading), urban blocks and green space networks is a prerequisite to establish lots for future individual houses or superlots for future comprehensive residential developments. There are certain urban form outcomes (i.e. cul-de-sacs and rear lots) that the applicant considers are undesirable in the greenfields location (particularly where there are few constraints). The provisions ensure that development creates a high quality living environment, without reliance solely on

Proposed Provisions	Reason for change
• Creation of a permanent cul-de-sac (DA) • Subdivision in accordance with a land use consent (RDA) • Subdivision of specific duplex house (RDA)	matters of discretion for subdivision. The focus on activity status rules reflects this intention. The activity status for non-compliance with key activities creates a high expectation that development delivers the key features of the RNSP. The provisions to avoid rear lots and permanent cul-de sac's are important to the creation of a walkable, legible and connected roading layout. Furthermore, for subdivision in accordance with a land use consent or a duplex, the provisions provide for a more efficient process to subdivide around approved resource consents.
23.3d Retained existing activity status for remainder of activities (the same as applicable in column 1 of Table 23.3a with the exception that the creation of new cross leases is not provided for)	Only those activities which need to be added to or modified to give effect to the proposed objectives and the RNSP have been amended. As cross leases are essentially "outdated" for and subdivision it is considered that land tenure is more appropriately managed via the fee simple subdivision provisions.
23.7.1 Insertion of 280m2 minimum lot size for Rotokauri North MDRZ	The minimum vacant fee simple lot size is driven from the required minimum lot dimension (Rule 23.7.8). See below for the reasons for the approach.
23.7.8 Insert specific lot dimensions for Rotokauri North MDRZ (with corresponding garage door restrictions) -road frontage and depth requirements: • 28m depth • 12.5m width ; OR • 10-12.49m width (where a requirement for a single garage door is registered as a consent notice)	As a result of design testing and the applicant's experience with their other developments, it was determined that the optimal lot depth would be 28m (taking into account the desire for adequate buildable footprint but also sufficient space for a private rear yard, along with the urban blocks that would result). Lot widths have taken into account likely future houses that would be designed/built (as permitted activities) on such lots. There has been careful consideration of the appropriate development controls for bulk and location and how these integrate with the specific standards proposed to apply to the lots. This approach, rather than focusing on lot area of shape factors, is focussed towards the development of an urban form which supports the overall high quality design outcomes sought in Rotokauri North. Consequently, it reflects a lifting of expectations in respect to the standards which would apply in this greenfields location. The standards are: a) Minimum dimension of 28m x 12.5m (350m2 and greater) – these lots support detached houses and also provide a lot for future duplex housing

Proposed Provisions	Reason for change
	opportunities consistent with the Acceptable Solutions Code. These lots can accommodate a double garage without the garaging and associated vehicle manoeuvring dominating the streetscape. b) Minimum 28m x 10m (280m2 and up to 350m2) – as a vacant lot, these have the potential to create adverse streetscape effects without a restriction on the garage door width – hence as well as land use rules, a consent notice must also be registered on the title of such lots restricting the garage and vehicle crossing to a single width. These lots provide opportunities to support a variety of housing typologies while recognising that urban design outcomes for certain forms of lots need to be identified at the time of subdivision and certainty established through the use of consent notices. c)
23.7.8 Insert maximum block dimensions for all subdivision in RNSP area • 250m block length • 750m block perimeter	Block dimensions have been based on the above lot dimensions and walkable catchments. Adherence to the block dimensions (combined with restriction on rear lots and cul-de sac's) ensure a highly walkable and permeable outcome eventuates. The applicant has considerable experience in delivering high quality interconnected roading networks based on a traditional grid network. These block forms are dependent on permeability, and therefore block dimensions are important to ensure the balance between the efficient use of land and accessibility is achieved. These standards reflect the strong focus on urban form and design expressed by the PPC request.
23.7.8 insert Road vesting widths and accessway width standards: • 7m two-way rear lane • 4m one-way lane with angled parking (parking angles between 0 degrees and 45 degrees) • 7m one-way rear lane with angled parking (parking angles between 46 degrees and 90 degrees) • 16m Local Road • 20m Collector Road	Specific road standards reflect a land efficiency for the developer(s) as these provide appropriate road cross-sections at a lesser width than standard roads, balancing the effect of the provision of a wider number of collector roads and the accommodation of swales. This acknowledges the hierarchy of roads proposed in the RNSP, along with ensuring that minimum standards are met. Consultation with Council highlighted concerns regarding very narrow roads, and while these may be appropriate in some circumstances, it is considered appropriate to provide for minimum standards, while also identifying roading cross-sections in Chapter 3.

Proposed Provisions	Reason for change
	For the developer(s) the land efficiencies are somewhat improved to support the greater level of permeability achieved by the anticipated urban block structure. This also supports the urban design outcomes associated with a network of local roads and interconnected urban blocks. This pattern maximises amenity, connectivity and urban form outcomes, but does impact on the total extent of land available for development when compared with lower quality subdivision outcomes which rely on cul-de-sacs and rear lots. The overall nature of the package for Rotokauri North provides an opportunity to express a reasonable balance reflecting that the priority in on a high quality street-based urban form. Specific accessway standards for "rear lanes" are also unique as these service lots, which have legal frontage, but are served from the "rear", create opportunities for garaging and service areas at the rear of dwellings. The rules also efficiently recognise that the angle of parking within the lane can significantly affect the required width for vehicle manoeuvring (and potentially create land efficiencies). The rear lane approach specifically support medium density housing opportunities such as terrace houses and provide access opportunities where restrictions on direct vehicle road access apply where lots have frontage to a dedicated cycle lane or 3m shared path. While the rear lanes have an impact of the efficient use of the land resource, their use is considered necessary and appropriate to support urban form, design and pedestrian and cyclist safety and convenience outcomes. These outcomes are necessary to enable the outcomes anticipated by the Zone.
23.5-23.7 Retain all other provisions (not modified above) as applicable and retain all provisions relating to the B6Z zone (where it relates to the PPC B6Z zone)	Only those activities which need to be added to or modified to give effect to the proposed objectives and the RNSP have been amended.
23.8 - RDA Matters for Discretion • insert reference for Rotokauri North.	Refer to Appendix 1.
Various- Other general insertions/clarifications etc. to include Rotokauri North in text	NA
Chapter 25: City Wide	
25.13.4.7 Three waters –	The first intention is to remove duplication and additional superfluous costs associated with the

Proposed Provisions	Reason for change
• Insert provisions for Rotokauri North ICMP to be treated with the equivalent status as a Council ICMP; AND • insertion of device maintenance requirements for lot owners.	current rules requiring an ICMP with every medium-large scale subdivision. The focus should instead be on showing consistency with the ICMP submitted for Rotokauri North. The provisions also effectively provide for the ongoing management of devices (which is currently not an issue addressed by the HCDP). The ICMP has been developed in collaboration with HCC. It reflects a high standard of technical detail and analysis, however, the HCDP would not recognise this because its focus is on Council developed, approved and certified ICMPs. Given the scale of the PPC area, along with the necessary level of technical information to support the request, the ICMP should be recognised in the planning framework in a manner consistent with other supporting documents. This reflects the proposed policies in Chapter 3.
25.14.4.1 Modifications to Vehicle Crossings and Internal Vehicle Access • Minimum widths between vehicle crossings = 2m • Minimum distance for a vehicle crossing from a local road intersection = 10m	The proposal is to establish a medium density residential environment, which supports comprehensive residential developments and a range of section sizes. Testing of the current rules, along with the applicant's experience with their Auranga development, that modification of the City-wide rules is required to ensure alignment between transport provisions and the densities possible with the Zone and structure plan provisions. Necessary to this is an overall approach to roading design, the hierarchy and purpose of different types of roads as outlined in the roading cross sections (see figures in Chapter 3) and structure plan, along with an emphasis on low speed environments and pedestrian and cycle safety and convenience. Designing roads to achieve a lower speed environment (i.e. target of 30km per hour along local roads) improves the operating characteristics of the road, which effectively creates flow on benefits for vehicle crossing distances from intersections. The applicant considers that these aspects work as an overall package to support medium density residential development. The modification to widths between crossings is a clarification only as the District Plan is unclear (provides two confliction options). Vehicle crossings will also largely be determined at subdivision design stage so as to not conflict with street furniture/lighting/planting parking bays etc.

Proposed Provisions	Reason for change
25.14.4.1 Modifications to Vehicle Crossings and Internal Vehicle Access • provision for a combined vehicle crossing width of 6m • provision for rear lane standards (equivalent to Rule 23.7.8)	Not providing the option to combine vehicle crossings is considered a lost opportunity. The current vehicle crossing widths do not take into account pairing opportunities, and these are important to supporting smaller lot sizes with narrower road frontages. The opportunity to combine or co-locate vehicle crossings has benefits in the design of streets, the extent of street length available for footpaths, and the location of other street furniture. The provisions directly support the level of intensity proposed with the Zone. Rear lane standards are repeated so as to avoid any confusion over their intended land use or subdivision status and to avoid confusion over Appendix 15 standards.
3.9.4.2.1(1) – Vehicle Crossings and Internal Vehicle Access • new rules to supersede equivalent in Chapter 25/Appendix 15 • Minimum widths between vehicle crossings = 2m Minimum distance for a vehicle crossing from a local road intersection = 10m	The proposal is to establish a medium density residential environment, which supports comprehensive residential developments and a range of section sizes. Testing of the current rules, along with the applicant's experience with their Auranga development, that modification of the City-wide rules is required to ensure alignment between transport provisions and the densities possible with the Zone and structure plan provisions. Necessary to this is an overall approach to roading design, the hierarchy and purpose of different types of roads as outlined in the roading cross sections (see figures in Chapter 3) and structure plan, along with an emphasis on low speed environments and pedestrian and cycle safety and convenience. Designing roads to achieve a lower speed environment (i.e. target of 30km per hour along local roads) improves the operating characteristics of the road, which effectively creates flow on benefits for vehicle crossing distances from intersections. The applicant considers that these aspects work as an overall package to support medium density residential development. The modification to widths between crossings is a clarification only as the District Plan is unclear (provides two confliction options). Vehicle crossings will also largely be determined at subdivision design stage so as to not conflict with street furniture/lighting/planting parking bays etc.

Proposed Provisions	Reason for change
25.14.4.1 Modifications to vehicle access restrictions insert new rule k) for: no direct access onto SH39, minor arterial road and collector road with a dedicated cycleway/3m shared path.	Direct vehicle access to SH39 from individual lots is not considered to be appropriate under any circumstances because of the traffic safety and road function implications. Provisions seek to prevent this outcome, which is a matter reflected in the structure plan. The other restrictions address potential safety and amenity conflicts between private vehicles and cyclists (and promote use of rear lanes which in turn supports higher density development). The applicant has highlighted a desire to achieve a high level of pedestrian and cycle convenience and safety, based on experience with their Auranga development. This is considered to be best practice design outcomes. With the provision of on-road cycle lanes and 3m shared paths, it is important to avoid conflicts across these with multiple vehicle crossings. The rule seeks to avoid vehicle crossings cross these street conditions, promoting safety and convenience. The package of rules enables rear lanes which would be the best practice outcome where vehicle access restrictions apply.
25.14.4.2(f) Clarification to ensure that permeable pavement meets the requirements for car parks to be "sealed or paved".	The clarification for pavement use is a clarification only (but also ensures that the ICMP can be implemented efficiently').
Insert new Rule 25.14.4.3 n). Require that (in addition to any other requirement for an ITA) any subdivision in Rotokauri North (other than subdivision of a duplex) must include an assessment to indicate whether the anticipated trip generation/vehicle movement and/or new roading connections require new intersections or upgrades to existing intersections identified on the Rotokauri North Structure Plan.	Feedback from HCC officers on draft provisions was the desire to have "trigger" rules in the DP for when new intersections and/or upgrades must happen. In general, the timing of upgrades works identified the ITA is dependent on overall staging of development. For example, a first stage may locationally need one intersection with SH39 for access, however, one does not trigger the other, nor is there a total cap on dwellings prior to construction as traffic may disperse across other connections created. Hence, it is not considered appropriate to specify exact dates, timing or numbers of dwelling prior to construction of each intersection upgrade. Given the above, HCC suggested that a staging plan could and/or should be provided so that rules could align with triggers. However, as this process is developer led and the onus and obligation of infrastructure funding and extension is already on the developer there is no RMA reason to unduly restrict staging to plan. It is the choice of the

Proposed Provisions	Reason for change
	developer/applicant where and what stages progress in what manner. As part of the existing HCCDP, any road construction is subject to resource consent, and the effects on the wider traffic network (and any upgrades etc. to accommodate development) falls within the scope of matters that can (and will be) considered. This adequately covers any potential for adverse effects on the timing of any nature of intersection upgrades associated with each stage of development. The proposed rule is somewhat superfluous (and the inefficiency of duplication rules is noted) given the broad scope Council have under the existing HCCDP provisions on this matter, however given the concerns of HCC (and the joint NZTA reviewer) the provision ensures that any requirement for upgrades and/or new intersection can be appropriately assessed with every stage of development in Rotokauri North.
Appendix 1.2 Information Requirements	
Insert new Information Requirements for Rotokauri North 1.2.2.24 • Exclude Subdivision of a Duplex from concept plans • Repetition of Chapter 25 changes to ICMP requirements	Excluding subdivisions occurring around duplexes from providing a site, analysis is considered a minor correction only, as there are no new effects from subdivision that require HCC discretion on a wider site analysis context. The clarification for ICMP's is also a "clarification only" to repeat Chapter 25 provisions.
Appendix 1.3 Assessment Criteria	
Insert new Assessment Criteria for Rotokauri North in 1.3.3 • Subdivision adjacent to SH39 • The creation of a rear lane • Any other restricted discretionary activity, discretionary activity or non-complying activities. • Specific limited criteria for subdivision of a duplex	The proposed specific criteria and assessment seek to address specific items such as ownership issues, ecology and buffering effects against the SH39 network. A landscape buffer against SH39 is considered appropriate. It is likely to comprise a 3m landscape buffer; the final form is dependent on the design of development. The discretion allows this matter to be considered as a consequence of the recommendations associated with the structure plan. Tailored provisions to limit discretion for duplex subdivision is considered the most efficient way to ensure that the subdivision component does not have the opportunity to re-ligate land use outcomes.
Appendix 1.4 Design Guides	

Proposed Provisions	Reason for change
Insert new 1.4.10 Design code for duplex designs also known as the "Acceptable Solutions Code".	The acceptable solutions code is proposed to establish a framework to manage the performance of specific duplex dwellings as a permitted activity. A specific approach to duplex design is recommended to support high quality built form outcomes. Other forms of duplex design which do not accord with the Code will need resource consent. The duplex code provides opportunities to establish a duplex building on 12.5m x 28m lots with a specific frontage, vehicle crossing and car parking layout. It is considered appropriate to provide for this form of building as a permitted activity as it reflects a high quality outcome, and while other duplex designs could be appropriate for the site, these need resource consent to evaluate their design and performance.
Appendix 7 Natural Environments	
Modify name of SNA 11 to TE UUHI PAA Reserve	The proposed change is a recognition of outcomes sought by the CIA prepared by the TWWG.
Appendix 15 Transportation	
Amend 15-1 Parking Insert new standard for parking: 1 carpark per duplex.	Medium density housing should optimise the potential for other modes of transport, and reduce the over reliance on private transportation by simply removing the requirement for every unit to have 2 car parks. The opportunity provided by Zone and structure plan is to accommodate a portion of the City's growth in a manner which supports a variety of housing types and price points, including affordable housing. The applicant has identified a potential conflict between the urban design, streetscape and affordability outcomes with the current rules which would require 4 car parks for each duplex building. This either creates a dominance of driveways, vehicle crossings and garages against the streetscape or effectively undermines affordability where duplexes need to occur on larger lots to accommodate these aspects as well as addressing streetscape and design matters. The duplex acceptable design code is based on maximising urban design and affordability opportunities while allowing the duplex to be configured within the standard lot, block and urban form pattern. To achieve this requires more flexibility in the provision of car parking, balancing often competing design matters to ensure convenience for occupants while maintaining high quality streetscapes that are no dominated by garaging and car parking where 4 car parks would be otherwise required.

Proposed Provisions	Reason for change

3.3. Purpose and Reasons

3.3.1. The purpose of this application is to enable urban residential development to be undertaken within approximately 140 hectares of land. The reasons for this PPC are:

i. There is an identified housing shortfall in Hamilton City which is a significant concern, and one that is generating housing affordability issues, particularly for first home buyers. In addressing this issue, Hamilton City has a Housing Accord which has been signed with Central Government to deliver additional housing. Of the 140 hectares covered by this PPC request, 133 hectares fall within a recommended Special Housing Area targeted to release land for the development of housing supply to accommodate the rapidly expanding population of Hamilton City, therefore relieving price pressure and providing more affordable housing.

ii. While the remaining 7 hectares falls outside the SHA, the land has been included in the PPC to form logical boundaries to the PPC (rather than leave pepper potted landholdings of FUZ). As discussed in the section 3 assessment (**Attachment 5**) the inclusion makes practical sense (rather than excluding minor landholdings which otherwise fall within the PPC area), but also provides for good planning and integrated management practise.

iii. The rezoning of approximately 140 hectares of land as proposed by the PPC will enable the development of new housing that will contribute towards the shortfall in the housing supply in the Hamilton City area.

iv. The land is already located within an identified growth area, and has been specifically earmarked for urban activities – notably the site has an existing FUZ (which itself signals a change in the future to "urban").

4. STATUTORY CONTEXT

4.1. Overview

4.1.1. Schedule 1 of the RMA sets out the process for changes to District and Regional Plans. Clause 21 of that schedule states that any person may request a change to a district plan or a regional plan (including a regional coastal plan).

4.1.2. Clause 22 requires that the request to change a plan must be made to the appropriate local authority in writing and:

i. *Shall explain the purpose of, and reasons for, the proposed plan or change to a policy statement or plan.*

This is as set out in Section 3.3 above.

ii. *Contain an evaluation report prepared in accordance with section 32 for the proposed plan or change*

Refer to the Section 32 (Attachment 5).

iii. *Where environmental effects are anticipated, the request shall describe those effects, taking into account clauses 6 and 7 of Schedule 4, in such detail as corresponds with the scale and significant of the actual or potential environmental effects anticipated from the implementation of the change, policy statement or plan.*

Refer Section 6.0 below for effects from rezoning the land.

4.2. Resource Management Act 1991

4.2.1. The RMA requires certain statutory requirements to be met prior to consideration of any PPC Request. The relevant sections are addressed below.

4.2.2. Clause 21 of Schedule 1 of the RMA states:

> *(1) A request made under clause 21 shall be made to the appropriate local authority in writing and shall explain the purpose of, and reasons for, the proposed plan or change to a policy statement or plan and contain an evaluation report prepared in accordance with section 32 for the proposed plan or change.*

4.2.3. Under clause 21 of Part 2 of Schedule 1 of the RMA, any person may lodge a request for a PPC. Clause 21 states:

> *"21 Requests*
>
> *(1) Any person may request a change to a district plan or a regional plan (including a regional coastal plan).*
>
> *(2) Any person may request the preparation of a regional plan, other than a regional coastal plan.*
>
> *(3) Any Minister of the Crown or any territorial authority in the region may request a change to a … policy statement.*
>
> *(4) Where a local authority proposes to prepare or change its policy statement or plan, the provisions of this Part shall not apply and the procedure set out in Part I shall apply."*

4.2.4. Clause 22 of Schedule 1 of the RMA states:

> *(1) A request made under clause 21 shall be made to the appropriate local authority in writing and shall explain the purpose of, and reasons for, the proposed plan or change to a policy statement or plan and contain an evaluation report prepared in accordance with section 32 for the proposed plan or change.*
>
> *(2) Where environmental effects are anticipated, the request shall describe those effects, taking into account clauses 6 and 7 of Schedule 4, in such detail as corresponds with the scale and significance of the actual*

or potential environmental effects anticipated from the implementation of the change, policy statement, or plan.

4.2.5. The purpose and reasons for this request have been outlined in this report. These are further supported by the accompanying Assessment of Effects, supporting expert assessment reports, and in the Section 32 Evaluation Report.

4.2.6. Under clause 25(2) of Schedule 1 of the RMA, after receiving all the necessary information, the Council has 30 working days to consider the request and how it should be dealt with. In this regard, the Council can decide to:

a) Adopt the request as a Council plan change, either in whole or in part;

b) Accept the request as a PPC, either in whole or in part;

c) Convert the request to a resource consent application; or

d) Reject the request.

4.2.7. In accordance with Clause 29 of Schedule 1, Part 1 applies to a PPC which is accepted (rather than adopted) by the Council under clause 25(2)(b) of the Schedule. The PPC will, therefore, be determined having regard to the matters outlined in sections 31, 32 and 72 to 76 of the RMA, to the extent these are relevant to the PPC. In summary, these include whether the PPC:

e) Accords with and will assist Council in carrying out its functions under section 31 of the RMA so as to achieve the RMA's purpose.

f) Accords with any regulations (including national environmental standards).

g) Gives effect to any relevant national policy statement and the regional policy statement provisions.

h) Has regard to:

i) Other higher order planning documents;

ii) Management plans and strategies under other Acts; and

iii) The actual and potential effects of activities on the environment.

i) Is the most appropriate way to achieve the HCDP's objectives, by identifying other reasonably practicable options for achieving the objectives and summarising the reasons for deciding on the provisions (including zoning) sought by the PPC.

j) Contains a level of detail that corresponds to the scale and significance of the environmental, economic, social and cultural effects that are anticipated from implementing the PPC.

4.2.8. Clause 29(4) of Schedule 1 of the RMA provides that after considering the PPC and undertaking a further evaluation of the PPC in accordance with section 32AA of the RMA, the Council:

k) May decline or approve the PPC and may make modifications if approving the PPC; and

l) Must give reasons for its decision.

4.2.9. Section 74 of the RMA outlines the matters to be considered by territorial authority in preparing and changing its District Plan, as follows:

(1) A territorial authority shall prepare and change its district plan in accordance with its functions under section 31, the provisions of Part 2, a direction given under section 25A(2), its duty under section 32, and any regulations.

(2) In addition to the requirements of section 75(3) and (4), when preparing or changing a district plan, a territorial authority shall have regard to—

(a) Any—

(i) Proposed regional policy statement; or

(ii) Proposed regional plan of its region in regard to any matter of regional significance or for which the regional council has primary responsibility under Part 4; and

(b) Any—

(i) Management plans and strategies prepared under other Acts; and ... (iia) Relevant entry in the Historic Places Register; ... ...

(c) The extent to which the district plan needs to be consistent with the plans or proposed plans of adjacent territorial authorities.

(2A) A territorial authority, when preparing or changing a district plan, must—

(a) take into account any relevant planning document recognised by an iwi authority and lodged with the territorial authority, to the extent that its content has a bearing on resource management issues of the district

(3) In preparing or changing district plan, a territorial authority must not have regard to trade competition or the effects of trade competition.

4.2.10. With respect to the content of district plans, section 75 of the RMA provides as follows:

(3) A district plan must give effect to— ...

(c) any regional policy statement. (4) A district plan must not be inconsistent with—

...

(b) a regional plan for any matter specified in section 30(1).

…

(5) A district plan may incorporate material by reference under Part 3 of Schedule 1.

4.2.11. The relevant clauses from Section 31 of the RMA are as follows:

"(1) Every territorial authority shall have the following functions for the purpose of giving effect to this Act in its district:

(a) The establishment, implementation, and review of objectives, policies, and methods to achieve integrated management of the effects of the use, development, or protection of land and associated natural and physical resources of the district:

(b) the control of any actual or potential effects of the use, development, or protection of land, including for the purpose of..."

4.2.12. The PPC adopts existing zones (MDRZ and B6Z) and existing objectives and policies relating to these zones; however, it is acknowledged that this PPC includes additional rules and objectives and policies specific to the RNSP area.

4.2.13. Section 32 of the RMA sets out how the evaluation of any proposed objective, policy, rule or other method is to be carried out. Section 32(1) requires an evaluation report to be prepared which must:

(a) examine the extent to which the objectives of the proposal being evaluated are the most appropriate way to achieve the purpose of this Act; and

(b) examine whether the provisions in the proposal are the most appropriate way to achieve the objectives by—

(i) identifying other reasonably practicable options for achieving the objectives; and

(ii) assessing the efficiency and effectiveness of the provisions in achieving the objectives; and

(iii) summarising the reasons for deciding on the provisions; and

(c) contain a level of detail that corresponds to the scale and significance of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the proposal.

4.2.14. Section 32(2) requires that the assessment must:

(a) identify and assess the benefits and costs of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the provisions, including the opportunities for—

(i) economic growth that are anticipated to be provided or reduced; and

(ii) employment that are anticipated to be provided or reduced; and

(b) if practicable, quantify the benefits and costs referred to in paragraph (a); and

(c) assess the risk of acting or not acting if there is uncertain or insufficient information about the subject matter of the provisions.

4.2.15. The benefits and costs (Section 32(2)(a) and (b)), and any potential risks from not acting or arising from uncertain or insufficient information (Section 32(4)(b)) are also relevant. A detailed section 32 has been undertaken for the PPC request (and provided in **Attachment 5**).

5. SECTION 32 EVALUATION

5.1.1. Clause 22(1) of Schedule 1 of the RMA requires that an evaluation report for the PPC be prepared in accordance with section 32 of the RMA. Section 32 sets out the matters to be considered in an evaluation report and requires that an evaluation must examine whether, having regard to efficiency and effectiveness, the policies, rules or other methods are the "most appropriate" to achieve the objectives of the PPC and the purpose of the RMA. Within this, an evaluation must take into account the benefits and costs of policies, rules or other methods. In determining the most appropriate methods, consideration of alternatives is required[1].

5.1.2. Specifically, Section 32(1) of the Act states:

(1) An evaluation report required under this Act must –

(a) Examine the extent to which the objectives of the proposal being evaluated are the most appropriate way to achieve the purpose of this Act; and

(b) Examine whether the provisions in the proposal are the most appropriate way to achieve the objectives by –

(i) Identifying other reasonably practicable options for achieving the objectives;

[1] This requirement does not extend to needing to give consideration to alternative sites.

(ii) Assessing the efficiency and effectiveness of the provisions in achieving the objectives; and

(iii) Summarising the reasons for deciding on the provisions;

(c) Contain a level of detail that corresponds to the scale and significance of the environmental, economic, social and cultural effects that are anticipated from the implementation of the proposal.

5.1.3. Any assessment under section 32(1)(b)(ii) must also identify and assess the benefits and costs of the environmental, economic, social and cultural effects that are anticipated from the implementation of the provisions, including the opportunities for economic growth that are anticipated to be provided or reduced, and employment that is anticipated to be provided or reduced. If practicable, the benefits and costs are to be quantified. An assessment of the risk of acting or not acting, if there is uncertain or insufficient information about the subject matter of the provisions, is also required.

5.1.4. Overall, three components are required for a PPC request:

- a schedule of the requested changes (with a supplementary report describing the purpose of, and reasons for, the Change);
- an Assessment of Effects on the Environment; and
- a Section 32 Evaluation

5.1.5. All three components are covered within this Plan Change request, supported as necessary by relevant specialist input (**Attachments 6 to 19**). The Section 32 evaluation is provided as an attachment (**Attachment 5**) to this report.

6. ASSESSMENT OF ENVIRONMENTAL EFFECTS

6.0.1. This AEE has been prepared in accordance with Clause 22(2) of the Schedule 1 of the RMA which requires that the request describe the effects in such detail as corresponds with the actual and potential effects anticipated from the implementation of the PPC.

6.0.2. The assessment must address the following:

(a) any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects:

(b) any physical effect on the locality, including any landscape and visual effects:

(c) any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity:

(d) any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural value, or other special value, for present or future generations:

(e) any discharge of contaminants into the environment, including any unreasonable emission of noise, and options for the treatment and disposal of contaminants:

(f) any risk to the neighbourhood, the wider community, or the environment through natural hazards or hazardous installations.

6.0.3. The following section presents an overview of the findings of the various technical reports and environmental assessments (**Attachments 6 to 19**) that have been commissioned by the applicant. The respective reports attached should be referred to for greater detail and analysis.

6.1. Alternative Locations or Methods

6.1.1. Schedule 4 of the RMA requires that, where it is likely that an activity will result in significant adverse effects on the environment, a description of any possible alternative locations or methods for undertaking the activity is included.

6.1.2. The Council's own structure planning and growth identification has identified Rotokauri as an area suitable for growth, as anticipated by the existing FUZ and inclusion in the RSP. The release of land under the operative RSP is premised on the basis that appropriate infrastructure be provided to service the development/portion of land to be released. Although release of the Rotokauri North area is proposed ahead of growth planning timeframes, appropriate infrastructure can be provided to service the development (without reliance on Long Term Plan ("**LTP**") funding being available).

6.1.3. The delivery of the RNSP area aligns with an identified housing shortage in the Hamilton City area, which is evident from the fact that HCC has a signed "Housing Accord" with Central Government to deliver new residential housing to meet a shortage in supply. Of the entire 140 hectares subject to this PPC, 133 hectares (which aligns with the land parcels falling under the GSCL umbrella) has been recommended as a "Special Housing Area". However, a PPC is unable to be advanced under the HASHAA (as only a plan change to allow prohibited activities can be made – and there are no such activities in the HCDP).

6.1.4. For the reasons set out in this report, and in the Section 32 Evaluation (in **Attachment 5**), there will be no significant actual or potential adverse effects on the environment resulting from the proposed urbanisation of the subject land. The land has been identified for urbanisation, and the land can be effectively serviced and developed for housing.

6.2. General Effects of Land Use Change

6.2.1. The Zone Map and RNSP Map (**Attachment 4**) represent a framework for the RNSP area. The area is zoned FUZ and SNA at present and is rural in character, typically rural-residential and used for agricultural purposes.

6.2.2. The PPC enables a range of residential opportunities within a logically and efficiently connected roading network. The PPC recognises that if growth is allowed to occur without any appropriate control and/or management, many of these effects can potentially be detrimental to the wellbeing of the community and environment. Conversely, with appropriate consideration and management, many effects associated with growth (and urban development) can be positive.

6.2.3. The Urban Design Assessment ("**UDA**") prepared by Ian Munro (**Attachment 15**) includes a comprehensive assessment of the existing environment, taking into consideration the physical attributes of the area in general and assessing the opportunities and constraints of the area.

6.2.4. The PPC seeks to rezone the land MDRZ and create a new RNSP applicable to include the subject land. New objectives and policies are proposed that will ensure that any potential adverse effects associated with the implementation of the Zones and RNSP are avoided, remedied or mitigated. These have been addressed in detail in the section 32 evaluation in section 8 above.

6.2.5. Overall, it is noted that the above factors will assist in providing for positive effects from the change in land use and provide for the well-being of the community.

6.3. Social

6.3.1. At present, the locality is rural and rural-residential in character and is consistent with the current FUZ zoning under the HCDP. The area has previously undergone extensive agricultural activities and is modified by artificial farm drains, farm buildings and dwellings. The existing immediate environment has no social amenities.

6.3.2. The Zoning and RNSP anticipate a small neighbourhood centre within the area (B6Z), to support local needs to residents through provision of commercial day to day conveniences. The provision of this facility is considered to have positive effects for the new development area.

6.3.3. The RNSP also includes indicative neighbourhood reserves which will contribute in a positive manner to social amenities and wellbeing. Two 5000 m2 reserves are identified to provide for the day-to-day needs of residents, and these are connected through a green-network based on the enhanced stream network.

6.3.4. Preliminary consultation with the Ministry of Education indicates that the wider area would likely require a new primary school. The Ministry is understood to be advancing land purchases to facilitate the development of a primary school within the RNSP area. The identification of a site for a primary school would be advanced through a Notice of Requirement process.

6.4. Archaeological /Cultural Effects

Archaeological

6.4.1. The area falls in drained swamp (fen) country. Archaeology reporting identified that in 1919 the area was "drained swampy country" with "undulating country in grass" to the east, in the vicinity of Burbush Road. It is believed that due to the presence of the swamp and its subsequent draining there is no evidence of the land or buildings being used for European settlers until the 20th Century. No recorded European heritage features have been identified in the vicinity of the site.

6.4.2. The closest recorded archaeological site to the development area is S14/11, 700m southwest of Exelby Road. The site is recorded as being a pre-European Maori burial site.

6.4.3. Based on the archaeological survey of the site (refer to **Attachment 6**), there is no evidence of any pre-1900 archaeology or heritage or any significant 20th century heritage.

6.4.4. No adverse effects are considered to result in respect to archaeological matters or built heritage. Accidental discovery protocols in Appendix 8-2 of the HCDP address accidental finds and these rules are considered appropriate to address these matters. No additional rules are considered to be necessary to support the rezoning of the land and implementation of the RNSP.

6.4.5. No section 6(f) RMA matters are considered to be relevant.

Cultural Heritage

6.4.6. With respect to any potential effects of the PPC on Iwi values, no evidence of pre-1900 archaeology or heritage, or significant 20th century heritage, was found in the RNSP area, either during the historic research or the field survey.

6.4.7. The HCDP does not record any cultural or archaeological sites within Rotokauri North. The Burbush Road forest (SNA) is noted to be of high value. It has been acknowledged by the work undertaken for the Rotokauri ICMP and Structure Plan (Chapter 3 of the HCDP) that the wetland areas surrounding Lake Rotokauri may contained buried taonga.

6.4.8. Cultural Values assessments and iwi engagement for this PPC are ongoing. Bi-weekly meetings are being held with Te Haa o te whenua o Kirikiriroa (**"THaWK"**) hapu to work through cultural values (general) and any specifics that may occur for the RNSP area.

6.4.9. The cultural values assessment from the RSP is included in **Attachment 18**.

6.4.10. It is considered that the objectives, policies and rules in the HCDP (including those addressing accidental discovery protocols) will sufficiently address any concerns relating to archaeological effects and mitigate any potential adverse effects of the PPC on Iwi values (relating to any features of cultural significance). Specific approaches may also be adopted via the ongoing meetings with THaWK in respect to other matters of importance to Iwi, including ecology and water resources.

6.5. Landscape and Visual Effects

6.5.1. A Landscape and Visual Assessment has been undertaken by LA4 for the PPC area (refer to **Attachment 17**).

Visual Effects

6.5.2. The viewing audience outside the PPC area will encompass the following groups:

i. Road users on parts of the surrounding road network including the SH39, Exelby Road and Burbush Road;

ii. Landowners and visitors to the properties accessed off the roads mentioned in I above; and,

iii. Landowners and visitors to the properties immediately adjoining the eastern and southern boundaries of the PPC area (not captured by ii above).

6.5.3. The proposed future development of the site enabled by the PPC raises a number of visual issues, including the potential effects on visual amenity to the following key areas:

iv. Adjoining and Adjacent properties

v. Surrounding road network

vi. Wider area

Adjoining/Adjacent Properties

6.5.4. The adjoining properties to the site will be most affected by future development enabled by the PPC. This includes the rural and rural-residential properties to the south, west, east and north of the site.

6.5.5. Notably, properties to the east and south are to remain FUZ as they fall within Stage 2 of the RSP and Chapter 3 of the HCDP. As the development with the RNSP needs to "tie into" future development it is expected that the change in land use will occur right up to the boundaries of these sites.

6.5.6. The full effects of the change brought about by the proposal will be gradual as the land is retired from productive use, modified and staged built development extends across the landform. It is anticipated that the full progression from rural to urban will take a number of years. This will reduce the impact of the change to some degree, due to the incremental nature of the changes and a general conditioning of the audience over time as development progresses.

6.5.7. The green network extending up the stream corridors and anticipated planted streets (and conveyance channels in streets) will assist in breaking the development into more discrete units and filter views so that although the view will have changed from a rural to essentially an urban one the extensive green network will assist in breaking up the expansiveness of the development. In addition, the buffer intended to adjoining SH39 will also assist in mitigating visual effects. Despite this, however, the visual effects resulting from this change for the adjoining and adjacent rural and rural-residential properties would be moderate to high.

6.5.8. Overall the existing outlook from these properties will change significantly from an open rural pastoral scene into a comprehensive urban residential view. Although this will constitute a significant change to the existing rural character and a loss of the existing spaciousness, it is not the type of change which is totally unexpected within the context of the area as the land is signalled to undergo this change by its current FUZ zoning and inclusion in the RSP. Furthermore, the adjoining southern and eastern properties are also subject to the same zone (FUZ), which will undergo the same or a similar change after its own re-zoning in the future.

Surrounding Road Network

6.5.9. For road users on the surrounding road network, in particular those who live locally in rural situations, the development of the subject site is likely to result in visual effects of some significance, particularly for SH39 and Burbush Road users.

6.5.10. For general road users the effects are likely to be of much less significance as the development will be seen as part of the pattern of land use change expected to occur under the RSP (albeit some years ahead of the HCC planned timeframe), and due to fleeting views while moving through the landscape.

6.5.11. The extensive street tree plantings will assist in integrating the built development into the landscape and provide a vegetated framework of appropriate form and scale.

6.5.12. The landscape buffer is anticipated on the RNSP adjoining SH39. This is to separate development from the state highway, and to also establish a visual transition between the anticipated residential zone and adjoining rural environment north of the RNSP area.

Wider Area

6.5.13. Any views on the site from the wider area will be peripheral in nature. Largely views from the west and south will be screened by existing ridgelines. Visual effects associated with the peripheral views will be low to negligible.

Construction Effects

6.5.14. Due to the nature and scale of the development, and the level of disturbance it will bring to the existing landscape, the visual effects will generally be high during and immediately following construction. The most significant changes and resultant effects on visual amenity will arise from the extensive earthworks associated with roading and associated infrastructure.

6.5.15. These visual effects will reduce on completion with the establishment of the green network, open space and street tree plantings assisting in integrating the residential development into the surrounding landscape.

Landscape Effects

6.5.16. In 2007, Boffa Miskell prepared the 'Rotokauri Structure Plan – Western Hills Landscape Study' that investigated the landscape significance of the rolling topography that characterises the western part of the Rotokauri Growth node. Subsequently, the operative RSP includes a series of low ridgelines that have been identified as the Rotokauri Ridgeline Character Area ("RRCA") and referred to as "The Western Hills", and the operative RSP provisions seek to retain the legibility of the ridgelines and achieve a form and density of development that enables a sense of the underlying landform to be retained.

6.5.17. However, as part of this PPC a sperate and independent review of these ridgelines have been undertaken by LA4 (refer to **Attachment 17**). The ridgelines rise up to approximately 25m above the majority of the flat PPC area.

6.5.18. LA4 finds that:

"The Western Hills do not constitute a significant landscape element or feature capable of defining a unique sense of place or identity to the RSP area.

While they provide a pleasant variation in landform they cannot be considered worthy of protection afforded by the RCCA provisions."

6.5.19. It is for these reasons that the RNSP does not include any ridgeline overlay, and overall it is not considered necessary to protect or restrict development on the ridgelines, nor is it expected that this will result in any significant adverse amenity effects on landscape values of the area.

Conclusions

6.5.20. The proposed urbanisation of the PPC area will significantly change its current open rural landscape character. The development will however be consistent with the zoning of the site, being FUZ, with urban expansion envisaged under the HCDP, RPS and Future Proof Framework.

6.5.21. Although the subject site is largely in open pasture, its rural character is lessened to a degree by the existing land uses, relatively degraded pasture, the proximity to the state highways (SH 39 and 1), and the developing industrial area to the east,

6.5.22. While the subject site includes land used for farming and agricultural purposes, it is a significantly modified degraded site with relatively low landscape values, with the exception of the existing protected SNA (which has already been identified for its significant natural value through the District Plan, and which is expected to ensure its ongoing protection).

6.5.23. The proposed urbanisation of the land will inevitably result in the transformation of the site from a rural area to a mixed density urban residential area. This will have implications on the surrounding rural and rural-residential land, with the urban development impacting on the rural qualities of these areas. Nevertheless, this is an area identified for urban expansion. Consequently, it is only the timing of that change from rural to urban which is different from the current timeframes outlined in Chapter 3 of the HCDP.

6.5.24. Because of the size and nature of the development and the anticipated eventual urbanisation of the area, rather than trying to screen the development or create significant buffers to the adjacent rural areas, the approach has been to accept the change and attempt to develop the site in accordance with accepted urban design principles to create a quality development with a high level of amenity, albeit an urban amenity. In saying this, a landscape buffer is proposed on the RNSP adjoining SH39. This is to separate development from the state highway, and to also establish a visual transition between the anticipated residential zone and adjoining rural environment north of the RNSP area.

6.5.25. The change from the existing rural character of this landscape to one dominated by the built form of a residential area will also introduce a range of beneficial effects, including:

i. Enhancement to watercourses and stream corridors;

ii. Extensive framework of planting including riparian planting, vegetated swales and conveyance channels, specimen trees in streets and open space areas, which will improve the character and amenity as well as enhance habitat values, and break up the contiguous urban expanse increasingly with time and contribute to the wider surrounding area;

iii. Opportunities to eco-source seed stock from the remaining Kahikatea stand to increase the biodiversity and extent of this forest remnant; and,

iv. Public access provided for along the streams through pedestrian and cycle paths and open space linkages that will create recreational opportunities.

6.5.26. While the proposed development will result in a significant visual change from the site's current open and undeveloped state to one with urban characteristics, particularly for some of the immediate neighbours, such visual change is anticipated and is in accordance with the key planning initiatives (including the existing RSP) for the area.

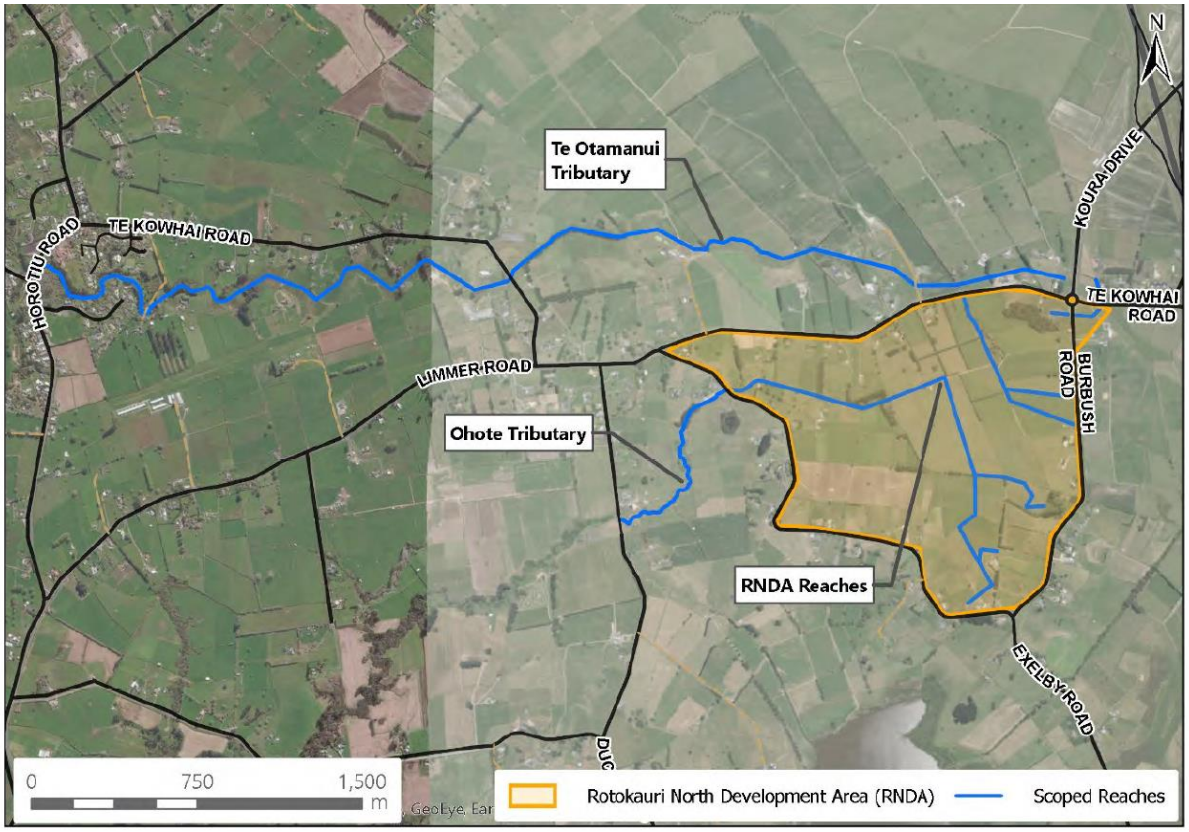
6.5.27. Despite the relatively low landscape values and limited visual catchment area, the development will initially generate landscape and visual effects of some significance. These are inevitable with urban development in a predominantly rural area at the start of a process of urbanisation. In addition, the visual effects of the development of the site apparent from the early stages will decrease over time as proposed vegetation matures.

6.6. Ecological Effects

1. Ohote and Te Otamanui Catchments

6.6.1. Morphum was engaged to undertake an ecology assessment of the Rotokauri North sub-catchment and its receiving environments of Te Otamanui Tributary and Ohote Stream, as shown in Figure 7. This was to support the development of the ICMP and resulting PPC (refer to **Attachment 12**).

Figure 7: Wider Tributaries



6.6.2. The watercourses in the sub-catchment and the receiving environments are soft-bottom streams and silt/sand are the dominate benthic substrate types. The flat topography of the area is reflected by the slow-flowing streams in the catchment.

6.6.3. The majority of the watercourses are located within agricultural pastoral land, with small areas of rural residential land use. These "agricultural streams" were found to have little to no native woody riparian vegetation and direct stock access to the stream channel is common with damage from stock, such as pugging of banks, evident along many reaches.

6.6.4. Generally, the watercourses show evidence of channel modification such as straightening, widening and deepening. Adjacent land use is dominated by agricultural, pastoral activities. Sparse vegetation consisting of gorse, barberry and poplar dominated these reaches. In the downstream reaches of Te Otamanui mixed vegetation provides moderate shading to the stream channel.

6.6.5. Erosion scarring of stream banks is largely attributed to anthropogenic activities such as 'drain cleaning', stock damage and a lack of riparian vegetation. Bank benching, bank instability and fine sediment deposition can be largely attributed to stock damage rather than erosion from high stormwater flows. In the downstream reaches of Te Otamanui, there is some evidence of fluvia erosion caused by larger flows through constricted channel.

6.6.6. No "highly unstable" banks were identified. However, nine reaches (downstream of Rotokauri North in Te Otamanui catchment) in total were found to be "unstable". Erosion hotspots were also identified downstream of Rotokauri North.

Water Quality

6.6.7. Water quality results indicate poor water quality, with five measured parameters – including nitrogen and phosphorus exceeding the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (referred to hereafter by its industry reference as "**ANZECC**") trigger values. Sediment quality was indicative of agricultural land use, with high concentrations of arsenic at one site, but relatively low concentrations of heavy metals such as zinc and lead across the sampled sites. Specifically, the Morphum reporting found:

> *"Five parameters exceeded the ANZECC trigger values set for lowland rivers and streams (protection of 95% of species) and the 'satisfactory' levels set by Waikato Regional Council for river water quality in the region (WRC, 2012)….*
>
> *Turbidity exceeded the guideline values at all five sites, and by a magnitude of five at TEOT2 (25 NTU). Turbidity indicates water clarity and studies have shown turbidity levels above 5 NTU have adverse effects on underwater light – and thus on plant and invertebrate production (Davies-Colley, 1991). Loss in water clarity also adversely impacts migration of common native freshwater fish species (Boubee et al., 1997). High sediment loads from the surrounding land use is contributing to high turbidity in the sub-catchment.*
>
> *Total nitrogen concentrations also exceeded the guideline values at all five sites. The highest concentrations were recorded in RNDA1 (4 g/m3) and TEOT1 (4.3 g/m3). Similarly, Total Kieldahl Nitrogen, which indicates the concentrations of biologically available nitrogen, exceeded guideline values at these two sites. The nitrogen concentrations results fall within the 'C' attribute state of the NPS-FM indicating an adverse effect on some sensitive species. These sites are downstream of cattle farms and stock access to the stream was recorded upstream of both these sites.*
>
> *Total phosphorus concentrations were also high in RNDA (0.18 g/m3), TEOT1(0.03 g/m3) and TEOT2 0.07 g/m3). Additionally, the site OHOTE, situated in the downstream reaches of the Ohote Stream (OHO_TRIB_1) also exceeded WRC guideline concentrations. Overall, the high concentrations of nutrients (N and P) are reflective of intensive agricultural land use in the sub-catchment."*

6.6.8. With regard to sediment quality, one site (within Te Otamanui catchment) exceeded the ANZECC Interim Sediment Quality Guidelines (ISQG) high trigger values for arsenic.

6.6.9. Overall, the guidelines proposed in the NPS-FM, ANZECC and supporting Waikato Regional Council ("**WRC**") documents suggest that the watercourses in Rotokauri North and the receiving environments are degraded.

Aquatic Ecology

6.6.10. Surveys for black mudfish were conducted at 4 sites, while sediment and water quality were conducted at five sites within the study area. No black mudfish were recorded at the sample sites.

6.6.11. No natural in-stream fish barriers such as cascades, waterfalls or dams were found in the sub-catchment, however, farm culverts within were identified as currently posing a barrier to fish passage.

2. Mangaheka Catchment

6.6.12. Boffa Miskell were engaged to undertake a watercourse ecology assessment of the receiving environments of Mangaheka Stream in conjunction with the preparation of an ICMP (prepared by Beca) for the Mangaheka Catchment. Although not specifically prepared for the PPC area, the comments made in the report relating to that part of the Mangaheka catchment falling in the PPC area are relevant and have been relied on for this assessment.

> *"Downstream of the industrial area and Waikato Expressway, artificial farm drains flow north and northwest to Koura Drive, where they meet at the drain main stem. The drain then flows northwest through farmland before transitioning to a modified stream channel with perennial flow where natural topography forms a surface drainage channel. Outside the Hamilton City boundary, the catchment of the drains is almost entirely rural (dairy farming), comprising artificial farm drains, with very little riparian vegetation"*

6.6.13. Over the majority of the Mangaheka catchment (including that part included in Rotokauri North) the reporting identifies that vegetation has been widely modified over time with historic vegetation cover, including peat bog vegetation, replaced with exotic pasture grasses or crops and with exotic shrubs and trees established as shelterbelts. Indigenous plants are recorded as virtually non-existent throughout.

Aquatic Ecology / Water Quality

6.6.14. With respect to water quality the report generally identifies that in the upper catchment the watercourse type is an artificial watercourse (excavated drain) which generally provide poor habitat for fish and aquatic macroinvertebrates. Low or no flow, high temperatures, low dissolved oxygen, and very poor water clarity are likely to present fish passage barriers in this section of the catchment.

6.6.15. With respect to aquatic life the reporting generally finds that based on a fish survey (which was conducted in 2016) a total of four native species were identified, being: shortfin eel (Anguilla australis), longfin eel (Anguilla dieffenbachii), banded kokopu (Galaxias fasciatus), and black mudfish (Neochanna diversus); and one exotic species (mosquitofish). However, it was acknowledged that prior to development of the industrial land parcels in the upper catchment area in (in approximately 2011/12), three native species (mudfish (12 individuals), longfin eel (2 individuals) and shortfin eel (16 individuals)) were caught and translocated under permit from the upper catchment to the wetland area near Crawford Road in the lower part of the Mangaheka catchment.

3. Rotokauri South Catchment

6.6.16. There is no stream within this part of the PPC area.

4. Terrestrial Ecology

6.6.17. The site comprises mostly pasture and agricultural land. As previously outlined, there is a significant stand of kahikatea Trees adjacent to the intersection of Burbush Road and SH39 which is already protected under the HCDP provisions (and has a SNA overlay applied). All other vegetation is either associated with waterways (as accounted for in the assessment above), is of a shelterbelt/hedging variety, or associated with the garden areas of the dwellings.

6.6.18. As the area is already protected by the HCDP no further assessment of the values it holds have been undertaken nor are considered warranted. It is however anticipated that this will form part of a wider "green" network within the site, as evident from the RNSP. This PPC does not seek to alter the existing zoning or identification of the SNA (although as discussed under cultural effects the name associated with this SNA has been sought to be modified).

6.6.19. Opportunities for the enhancement of terrestrial habitat are also proposed to be addressed through a specific assessment criterion for subdivision within the RNSP area.

5. Overall Assessment

6.6.20. The PPC request takes into account the ecological values PPC area and the surrounding environment. Notwithstanding the currently degraded and modified nature of the streams, the existing HCDP and WRC policies and rules, which apply to the subject land, with respect to stream retention and ecological values and acknowledge that with replanting, a quality ecological environment could be established. This existing framework provides an appropriate level of protection already, which is further enhanced via the proposed PPC text which seeks to include a specific assessment criterion associated with terrestrial habitat enhancement.

6.6.21. Furthermore, the ICMP which has been prepared alongside this request includes specific targets for water quality improvement and water quantity mitigation (through attenuation and detention to reduce downstream erosion effects) for receiving stream environments to be achieved through stormwater management devices on lots and communal devices in open spaces and roads, and described further in section 6.7.5 below.

6.6.22. Overall, and for the reasons set out above, the PPC combined with existing District and Regional Plan provisions can result in positive effects whereby stream corridors and stream health are enhanced, and existing significant vegetation is also enhanced and protected.

6.7. Effects on Infrastructure, Traffic and Development

6.7.1. McKenzie & Co Consultants Limited has prepared an Infrastructure Report (**Attachment 16**) and additional reporting associated with the preparation of a sub-catchment Integrated Management Plan (**"ICMP**") which includes an assessment on the capacity and availability of reticulated infrastructure within the wider environment, and whether rezoning the land as proposed under this PPC request is appropriate on this basis.

6.7.2. Reports on traffic have also been prepared by Commute and provided in **Attachment 13**.

1. Earthworks

6.7.3. Earthworks will be necessary to facilitate the anticipated developments within the PPC area, including the preparation of building platforms, formation of roads, and construction of infrastructure and services for the anticipated developments.

6.7.4. It is anticipated that the provision of sediment and erosion controls in accordance with current best practise and will be appropriate to manage the potential effects associated with the necessary earthworks at the time of subdivision and development. The WRP and HCDP rules provide appropriate mechanisms to address the effects of earthworks activities through the resource consent process. No further rules or requirements are considered to be necessary to manage the effects of earthworks activities resulting from the rezoning of the land.

2. Three Waters

6.7.5. An ICMP has been prepared in conjunction with this PPC (**Attachment 10**). The purpose of the ICMP is to:

i. To provide an integrated management approach based upon Best Practicable Options ("**BPO**s") to avoid as far as practicable and otherwise minimise, the cumulative adverse effects of all new stormwater activities in the sub-catchment;

ii. To provide guidance on how water, wastewater and stormwater within the catchment will be managed in an integrated way and in accordance with proposed land uses that occur within the site;

iii. To ensure the effects of stormwater discharges are mitigated in accordance with the requirements of the Rotokauri ICMP, discharge consents held/to be obtained and WRC guidance;

iv. To provide a platform for considering the implementation of water sensitive principles (including but not limited to) to reduce demand for water, minimise wastewater generation and minimise the need for three waters infrastructure where appropriate.

v. Investigating how Level of Service ("**LOS**") and industry best practice can be met; and

vi. Investigating whether and how ICMP specific issues can be addressed.

3. Water

6.7.6. Detail of the demand and modelling is provided in McKenzie & Co Consultants (2019) Infrastructure Report **(Attachment 16)**.

6.7.7. Water supply for Rotokauri North will be located within the Pukete Zone, as per HCC Water Master Plan philosophy. The same Water Master Plan has identified trunk network upgrades to service both Rotokauri North and South. However, the Master Plan had not allowed for the level of development currently being considered within the PPC within Rotokauri North at this time.

6.7.8. Rotokauri North will be serviced from the existing and master planned HCC networks at Te Kowhai Road and Wetini Drive. Water supply modelling results showed that these connections had sufficient capacity to service the area, once upgrades as programmed in Master Plan for 2061 were implemented. Modelling results for the DN350 ring main network showed that it would have sufficient capacity to meet the level of service requirements, principally firefighting demand.

4. Wastewater

6.7.9. Detail of the demand and modelling is provided in McKenzie & Co Consultants (2019) Infrastructure Report **(Attachment 16)**.

6.7.10. Wastewater networks have been designed with regard to the Regional Infrastructure Technical Standards ("**RITS**"), Waikato Local Area Shared Services ("**LASS**").

6.7.11. The existing 1050mm Far Western Interceptor ("**FWI**") is available on the western side of the Waikato expressway, some 200m south of Te Kowhai Road (SH39). The FWI is intended to service (subject to an extension to this infrastructure) Rotokauri North for wastewater. However, the proposed RNSP will impose additional demand on the Wastewater Treatment Plant ("WWTP") ahead of what is planned under the RSP of the HCDP and existing Rotokauri ICMP.

6.7.12. A wastewater impact assessment using the HCC Wastewater Master Plan model was undertaken based on the equivalent population of approximately 5,900. The assessment considered the impact of Rotokauri North on the receiving wastewater network for the 2061 horizon. It was noted that any significant increases in density, and consequently the equivalent population, will affect modelling results. Hence, further modelling may be needed to assess the network under any new density parameters.

6.7.13. Based on the model outputs, taking in to account the assumptions and limitations, it was concluded that:

i. The FWI appears to have sufficient capacity to accommodate the additional RNDA development flows without worsening, or creating any existing, or new network system performance issues, respectively.

ii. System performance results for spare pipe capacity and maximum water level were overpredicted due to the effects associated with point loading of the Rotokauri North catchments. The magnitude of over prediction could not be quantified as part of the assessment. The predicted spare pipe capacity was likely to be greater than indicated by this assessment for both modelled scenarios (with and without Rotokauri North, if the discharge enters the trunk reticulation servicing the development before entering the existing network (FWI).

iii. Rotokauri North is likely to increase pipe filling in some sections to nearly 100 percent, thereby utilising capacity as installed or master planned. However as per (b.) above, this is likely to an overestimate of actual pipe filling.

iv. Future development discharges to the FWI in addition to current allowances, and Rotokauri North, may cause new issues or worsen existing network system performance.

5. Stormwater

6.7.14. An ICMP has been prepared by Tollemache Consultants Ltd (**Attachment 10**). The ICMP adopts the approach to stream management, stormwater and flooding provisions of the HCDP and WRP. It reflects the latest best practice based on the Rotokauri ICMP (2017), guidelines from the WRC and the HCC feedback on the draft ICMP. The ICMP takes into consideration the natural hazards such as flood constraints and so forth, and proposes methods to maintain and enhance the downstream receiving environment.

6.7.15. the ICMP includes specific design parameters for development to adhere to in terms of flow, flood storage, overland flow paths, freeboard (for residential lots from flooding) and water quality targets. Water quality targets are as a minimum consistent with the National Policy Statement: Freshwater National, "bottom lines", or better (where there is a higher WRP standards).

6.7.16. A "toolbox" approach for lots is outlined, so that future lot owners can select the best option for their site. The toolbox includes (but not limited to):

- Rain tanks (for non-potable uses only) for lots greater than 280m2; and
- Permeable paving for all lots.

6.7.17. A toolbox of options for attenuating and treating stormwater from roads is envisaged combined with additional methods for communal detention from all impervious surfaces within the site (to reduce effects on downstream flooding and erosion risk) including:

- Vegetated and grassed swales;
- Vegetated Conveyance channels;
- Off-line wetlands and/or dry detention basin; and
- Riparian vegetation.

6.7.18. All devices will be sized during the resource consent stage of development in accordance with the ICMP. The existing discretions and assessment criteria of the HCDP provide the connection between ICMP best practicable options ("BPOs") and the resource consent process to implement the engineering solutions.

6.7.19. The RNSP anticipates the replanting of the sites modified watercourses (streams), along with their naturalisation. These would be vested as drainage reserve, providing opportunities to protect enhanced stream networks within the PPC area, and incorporate these into the recreation network.

6.7.20. Detail of modelling is provided in the ICMP and its attachments.

6.7.21. There is no Stormwater Discharge Consent applicable for the RNSP area, and will be sought separately from the WRC.

6.7.22. Overall, the proposed stormwater management options outlined in the ICMP are considered to be practicable and consistent with the water-sensitive design principles to ensure that the future developments can minimise and reduce effects on water quality, and downstream flooding and erosion.

6. Road Designs and Traffic

6.7.23. An ITA has been prepared by Commute Transportation Consultants (**Attachment 13**) in support of the PPC request. Key considerations as part of the ITA include accessibility via different modes of transport and the ability to progress the PPC within a safe and efficient roading network.

6.7.24. The RNSP contains a hierarchy of roads to respond to function (and desire lines for commuters/pedestrians and cyclists). These include:

- Minor arterial;
- Collector; and
- Key Local Roads.

6.7.25. Other local roads are anticipated to be incorporated into the overall hierarchy as the development progresses (and park edge roads where applicable)- however, it is not the intention of the RNSP (nor is it considered necessary) to be so overly prescriptive so as to identify every road. Key Road connections, which are existing tie in connections to the remainder of the RSP, are shown to ensure the development of the RNSP area does not undermine the ability of the remaining area to achieve the planned development of the RSP.

Access to the State Highway

6.7.26. The ITA (which is also supported by a previous memo dated August 2018 also prepared by Commute and included in **Attachment 13**) discusses the intersections with SH39, and notably assesses the difference between the intersection proposed by the RNSP when compared to those planned in the RSP.

6.7.27. As part of the master planning and structure planning process Commute undertook a sightline assessment to determine areas where proposed intersection could do (while meeting minimum safety requirements for appropriate sightlines onto the State Highway network), and re-evaluated these based on the intersection proposed by the RSP. The assessment identified that the proposed new intersection locations (as shown on the RNSP) achieve appropriate separation and sight line distances.

6.7.28. The existing Burbush Road intersection with SH39 will not be modified as a result of the PPC (although if minor improvements are required these will be facilitated at resource consent stage).

6.7.29. The ITA and the PPC do not anticipate any new driveways nor additional roads accessing the State Highway as these have the potential to cause traffic safety effects. As such, the PPC includes specific provisions to avoid new driveways/vehicle crossings on the SH39 (and inclusion of a "buffer" along this edge). These additional rules are proposed to ensure that adverse effects on the State Highway network are avoided.

Road Cross Sections

6.7.30. Although the existing RSP contains specific road cross sections this PPC does not consider it necessary to adhere to a planning rule as such for future road cross sections as these need to have some flexibility to respond specific site considerations, constraints and proposed densities/different housing typologies anticipated to be accommodated at the time of development. This is accommodated through existing HCDP provisions as provision of new roads are a "restricted discretionary activity", which gives Council sufficient discretion (and confidence) to ensure that rods are appropriately designed to meet the required development and be of appropriate dimensions to accommodate expected traffic volumes, pedestrians and cyclists.

6.7.31. However, to guide a cohesive neighbourhood, road cross sections have been included in the UDA, Infrastructure Reporting and assessed by the ITA. In addition, they have been provided indicatively as Figures in the Structure Plan Chapter of the PPC text.

6.7.32. Other specific tailored provisions for vehicle crossing locations and widths have been included in the PPC text to accommodate medium density housing, but which are also supported by the anticipation of a low speed environment (which can be achieved by the proposed road cross sections and implemented via the resource consent process for road design).

Walking and Cycling

6.7.33. Walking and cycling are generally anticipated to be provided in a consistent manner as identified in the UDA and ITA which includes the provision for cyclists and pedestrians associated with the road networks, and opportunities associated with the creation network. The specifications of pedestrian footpaths and cycleways are indicated on the road cross-section plans. Specific PPC provisions will also restrict new vehicle crossings over a dedicated cycleway to ensure that cyclists safety can be provided.

6.7.34. In addition the PPC provisions for maximum block lengths and block perimeters and restriction of use of cul-de-sac's further promotes a walkable neighbourhood.

6.7.35. These provisions are considered important to maximising positive effects associated with the provision of an interconnected roading network that promotes multi-modal transport opportunities. The applicant acknowledges that a higher level of service is proposed for pedestrian and cyclists, however this is considered to be appropriate given that a significant periods of time has elapsed between the original RSP and the PPC. In this period the community and professionals' understanding and expectations regarding pedestrian and cycling amenity and safety has changed, with higher standards expected to ensure that these modes are promoted.

Public Transport

6.7.36. Public Transport has been discussed in the ITA, and although there is no current network, the collector and minor arterial roads can be designed to accommodate bus movements. The ITA notes however that public transport is unlikely to be economical until at least 1000 dwellings are occupied.

Effects on the Wider Network

6.7.37. The HCDP requires one (1) space for apartments and ancillary units, however every "single dwelling and duplex dwellings" required two (2) spaces.

6.7.38. Specific to this PPC is the provision of a different parking rate (one space per unit) for duplex dwellings.

6.7.39. The ITA recognises that only providing one space for the duplex (and also apartments) is likely to encourage other forms of transport (other than private car). However, prior to the establishment of public transport this is likely to result in additional demand for on-street parking. As such the ITA recommends that in streets with a higher number of duplex dwellings anticipated the roads should be designed to have additional provision for on-street parking (eg closer to 1 space per 3 units rather than more typical minimum rate of 1 space per 4 units).

6.7.40. The reasons for the approach to car parking are addressed in more detail in the UDA and the Section 32, whereby positive effects on future streetscapes and the provision of a variety of housing types are balanced with the provision of a lesser car parking requirement for duplex houses. As noted above, as roads require resource consent, this affords the opportunity for the consideration of on-street parking can be addressed at resource consent/detailed design stage.

Overall

6.7.41. Overall, the full extent of development enabled by the proposal will be appropriately supported by the existing road network and upgrades to existing road network (required in conjunction with resource consents) to maintain appropriate levels of safety and efficiency on the surrounding road network. The further PPC provisions (including a requirement for specific assessments to confirm intersection performance and required upgrades with each subdivision stage) will ensure that any additional effects on safety on the SH39 or internal conflicts between road users can be appropriately managed.

7. Power, gas and telecommunications

6.7.42. These utility services can be provided in the usual manner at time of subdivision and development.

6.8. Risk from Hazards and Contamination

1. Land Stability/Liquefaction

6.8.1. A Preliminary Geotechnical Appraisal Report was prepared by HD Geo (**Attachment 7**) for the area subject to the PPC request. The Report confirms that the RNSP area is suitable for urban development.

6.8.2. As noted by HDGeo specific assessment of lateral spreading hazards will be required during detailed design. Potential mitigation options include:

- Dewatering of the adjacent ground so that liquefaction is unable to occur;
- Adoption of slope stabilisation methodologies;
- Buttress swale edges; and
- Adoption of foundation designs that are tolerant to lateral spreading.

6.8.3. The Report recommends further site investigations will be required as developments progress in stages and specific requirements for foundation designs will be required (to appropriately manage potential liquefaction risk).

6.8.4. In response to Council's peer review of the HD Geo work a further response dated February 2019 (and also provided in **Attachment 7**) also identifies mitigation utilised in the recently developed parts of Hamilton that also have a liquefaction hazard, which would be suitable for Rotokauri North. These include:

- shallow ground improvement (to separate structures from liquefiable layers);
- reinforced raft foundations (varying from simple ribraft to reinforced, resilient raft foundation piles to non-liquefying layers);
- de-watering to reduce the hazard (usually locally to a lateral spreading hazard); and,
- setbacks or barrier piles in some locations where lateral spreading was considered to be a risk.

6.8.5. Recommendations for further technical work, particularly related to geotechnical assessments, is not unusual, as detailed design always occurs prior to and conjunction with subdivision and development (just as a geotechnical completion report with additional recommendations follows an earthworks activity). Furthermore, risk of natural hazards is also a matter for consideration for subdivision under the RMA via section 106 (which gives Council the ability to decline any application that cannot address risk of natural hazards). The level of detail provided with this PPC is considered suitable to determine that the land can be rezoned.

6.8.6. In general, it is concluded that the RNSP area comprises topography and ground conditions that are considered suitable for urban use. No further rules or requirements are considered to be necessary to manage the effects of natural hazards resulting from the rezoning of the land.

2. Contamination

6.8.7. A Preliminary Site Investigation (PSI) Report has been undertaken by HD Geo Ltd (**Attachment 8**). Assessment was carried out on the following sites that the applicant has control over. The PSI concluded that specific sites within the PPC area may potentially contain sources of contamination therefore a DSI is required at time of future development. These matters would be subject to resource consent requirements under the NES at time of subdivision, earthworks or development. Therefore, any potential site contamination will be identified, and managed/remediated prior to enabling residential occupation of the land.

6.8.8. As the NES applies at a change of land use or any land modification works, any land falling outside of the applicant's control and not covered by the HD Geo work will still be required to have their own PSI undertaken in the future.

6.8.9. In light of the above, it is considered that the potential contamination of the site will be addressed through further testing and remedial works (if necessary), and therefore any health concerns resulting from the potential contamination will be less than minor upon completion of the future development.

6.8.10. No further rules or requirements are considered to be necessary to manage the effects of potential HAIL activities resulting from the rezoning of the land.

3. Flooding

6.8.11. As previously outlined under the stormwater section above, flood hazards have been taken into account in the modelling, final design and device sizing to manage potential flood risk within RNSP area and downstream.

6.8.12. Future development in the PPC area will need to establish lots and building platforms in accordance with engineering recommendations for Finished Floor Levels. This is already a requirement of the HCDP.

6.8.13. The technical work associated with the ICMP has modelled the pre and post development flooding associated with the catchments. The approach adopted by the ICMP is to utilise retention and detention to ensure that flooding is managed.

6.9. Reverse Sensitivity

1. NZTA

6.9.1. As previously outlined, intersection locations with the State Highway have been designed to avoid conflict and safety concerns. Furthermore the PPC provisions include restrictions on any further intersection (other than those identified on the RNSP) and/or new vehicle crossing. In addition, an amenity buffer (planted) is required by the RNSP against the State Highway (within adjoining lots). These measures are considered suitable to avoid potential safety and/or any other conflicts with users of the adjoining State Highway network.

2. Adjoining Future Urban Zone

6.9.2. It is acknowledged that until such time that the remaining FUZ zone is re-zoned, it will be used for rural activities. This does have the potential to create reverse sensitivity issues for future residential living on the boundary with the FUZ. Any actual potential for conflict though can be appropriately determined and addressed in future resource consents (as the exact timing of when this would actually become an issue over the lifespan on the development is unknown).

6.9.3. Furthermore, as the adjoining FUZ land will be urban in the future it is not considered appropriate to require buffer planting as part of the PPC (as this could cause integration issues later on when the FUZ land is being developed). No rules or requirements are considered to be necessary to manage the development of the land.

3. Future Industrial Area

6.9.4. The existing provisions of the HCDP address the issue of the interface between residential and industrial zoned land, establishing yard separation and noise standards at this interface, any future industrial land is also likely to be subject to this type of rule. No further rules or requirements are considered to be necessary to manage the interface between residential and (future) industrial zones.

4. Waikato Rural Zones

6.9.5. Land to the north and east falling within the WDC territory are zoned rural (and not proposed to change under the WDP review). However, both areas/zones are essentially "buffered" from the residential area proposed by this PPC by existing roads (SH39 and Exelby Road), which creates a separation distance of some 20 plus meters. This is considered sufficient to avoid reverse sensitivity effects between those rural uses and future residents of the Rotokauri North area.

6.10. Economic

6.10.1. The PPC seeks to accommodate approximately 2,000 residential dwellings within the area. At this scale it was considered appropriate to include a small neighbourhood centre for local convenience.

6.10.2. The economic assessments in **Attachment 14** takes into consideration the retail and services demand associated with the PPC.

6.10.3. The Economic Assessment considers that the total gross developable area for retail and local convenience would be around 4,000m2 (as being sustainable by the population to be contained within the RNSP). Although the RNSP shows around 1.2 hectares to be rezoned – this takes into account the land that would be required for parking/loading and stormwater management etc that are associated with convenience retail and commercial service activities (not just the total occupiable area by a business activity).

6.10.4. The economic assessment has taken into consideration the location and role of the major centres and the planned future centre in Rotokauri South, and finds that small neighbourhood centre such as that proposed would serve the immediate Rotokauri North area without jeopardising the retail or commercial provision in the future planned Rotokauri South Centre and/or the nearby facilities at The Base.

6.10.5. Furthermore, all activities will be governed by the existing HCDP provisions for the B6Z, which inherently seek to ensure that these areas are neighbourhood centres that do not undermine the large business centres.

6.10.6. For these reasons any effects generated by the proposed neighbourhood centre on the integrity of other zoned and planned centres can be adequality avoided and/or mitigated through the application of the proposed B6Z (to the land area proposed) and the existing HCDP provisions.

6.11. Positive Effects

6.11.1. Land in this location was given a "differed zoning" (i.e. FUZ) until such time that infrastructure funding was available. The PPC is aligned with a Statement of Intent between the applicant and HCC for the provision of transportation, water, wastewater and stormwater infrastructure funding to service the PPC area (without reliance on the Council Long Term Funding processes). This agreement has unlocked the potential of this land to be delivered to the market ahead of its planned time, and supports the recommendation to the Government for the SHA.

6.11.2. The delivery aligns with an identified housing shortage in the Hamilton City area, which is evident from the fact that HCC has a signed "Housing Accord" with Central Government to deliver new residential housing to meet a shortage in supply.

6.11.3. The PPC seeks to bring forward ahead of planned growth dates, the availability for approximately 2,000 dwellings across 140 hectares of FUZ land to assist in relieving pressure on the current market. Furthermore, although this PPC is sought under the RMA and not the HASHAA and therefore has no statutory obligation to provide ongoing "affordable housing", the PPC includes specific provisions to ensure that the development will deliver 10% of the total yield at an "affordable rate (as defined in the PPC text) to First Home Buyers.

6.11.4. Furthermore and as outlined in the UDA, the provision of housing in the urban form proposed is considered to have positive effects on housing supply and infrastructure provision. The form of development illustrated by RNSP and associated specific rules will create an appropriately designed community that provides high quality amenity for residents, housing supply and a proportion of affordable houses.

6.12. Overall Summary of Environmental Effects

6.12.1. The effects of the proposal are considered to be adequately addressed by the:

i. The PPC text, including the RNSP and tailored rule specific to the Rotokauri North; and

ii. The District Plan provisions of the HCDP.

6.12.2. Regional Plan matters can be dealt with by adherence to the existing WRP rules and demonstrated at resource consent stage.

6.12.3. No further rules are considered necessary to address the effects of the proposal.

7. ASSESSMENT STATUTORY DOCUMENTS

7.0.1. Section 75(3) of the RMA states that a District Plan must give effect to any national policy statement; any New Zealand coastal policy statement; and any regional policy statement. Section 73(4) of that RMA states that a District Plan must not be inconsistent with a water conservation order; or a regional plan for any matter specified in section 30(1).

7.0.2. The following assessment sets out how the proposed Plan Change gives effect to the documents set out below:

i. Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010 ("**Settlement Act**";

ii. National Policy Statement on Urban Development Capacity 2016;

iii. National Policy Statement for Freshwater Management 2014;

iv. National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health; and

v. Waikato Regional Policy Statement.

7.0.3. The following assessment also sets out how the proposed Plan Change is not inconsistent with the documents set out below:

vi. Waikato Regional Plan.

7.1. Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010

7.1.1. The overarching purpose of the Settlement Act is to restore and protect the health and wellbeing of the Waikato River for future generations. The Act recognises Te Ture Whaimana o Te Awa o Waikato (the Vision and Strategy for the Waikato River) and establishes and grants functions and powers to the Waikato River Authority. Te Ture Whaimana o Te Awa o Waikato applies to the Waikato River and activities within its catchment affecting the Waikato River, and is deemed part of the RPS.

7.1.2. Refer to sections below for an assessment on how the proposed Plan Change gives effect to the Waikato Regional Policy Statement and Te Ture Whaimana o Te Awa o Waikato.

7.2. National Policy Statement on Urban Development Capacity 2016

7.2.1. The National Policy Statement on Urban Development Capacity ("**NPS-UDC**") directs local authorities to provide sufficient development capacity in their resource management plans for housing and business growth to meet demand. Development capacity refers to the amount of development allowed by zoning and regulations in plans that is supported by infrastructure.

7.2.2. Sufficient development capacity is necessary for urban land and development markets to function efficiently in order to meet community needs. In well-functioning markets, the supply of land, housing and business space matches demand at efficient (more affordable) prices.

7.2.3. The NPS-UDC contains objectives and policies that local authorities must give effect to in their resource management decisions that provide direction on:

i. The outcomes that urban planning decisions should achieve.

ii. The evidence underpinning those decisions.

iii. Responsive planning approaches.

iv. Coordination between local authorities and providers of infrastructure.

7.2.4. The objectives of the NPS-UDC are as follows:

Objective Group A – Outcomes for planning decisions

OA1: Effective and efficient urban environments that enable people and communities and future generations to provide for their social, economic, cultural and environmental wellbeing.

OA2: Urban environments that have sufficient opportunities for the development of housing and business land to meet demand, and which provide choices that will meet the needs of people and communities and future generations for a range of dwelling types and locations, working environments and places to locate businesses.

OA3: Urban environments that, over time, develop and change in response to the changing needs of people and communities and future generations.

Objective Group B – Evidence and monitoring to support planning decisions

OB1: A robustly developed, comprehensive and frequently updated evidence base to inform planning decisions in urban environments.

Objective Group C – Responsive planning

OC1: Planning decisions, practices and methods that enable urban development which provides for the social, economic, cultural and environmental wellbeing of people and communities and future generations in the short, medium and long-term.

OC2: Local authorities adapt and respond to evidence about urban development, market activity and the social, economic, cultural and environmental wellbeing of people and communities and future generations, in a timely way.

Objective Group D – Coordinated planning evidence and decision-making

OD1: Urban environments where land use, development, development infrastructure and other infrastructure are integrated with each other.

OD2: Coordinated and aligned planning decisions within and across local authority boundaries.

7.2.5. The PCC request gives effect to the NPS-UDC objectives and policies by:

i. Hamilton is identified as being a 'high growth urban area' – as such local authorities are required to provide feasible development capacity over and above the projected demand by at least 20% in the short and medium term and 15% in the long term. The release of land for residential supply in aiding HCC in fulfilling the anticipated growth demand.

ii. Extending a residential zoning (being MDRZ) to the site, enables the continued growth of the Rotokauri area to cater for current demand and the anticipated future growth of Hamilton City;

iii. Provides for development which can be serviced by infrastructure being installed as part of the proposed growth in Rotokauri North;

iv. The use of the MDRZ will enable the efficient use of zoned urban land and (the proposed) development infrastructure; and

v. Adopts the existing District Plan zone provisions (with modifications specific to Rotokauri North), to ensure that a quality urban design outcome is achieved which will ensure that effects on the environment are appropriate to achieve the purpose of the act.

7.2.6. In addition, under the Housing Accord HCC has set a target of achieving yearly dwelling/section targets which equate to 4,200 from 2017-2019. The SHA for Rotokauri North was anticipated to occur in 2018, however delays have meant that this is not achievable. Regardless, provision of housing and sections via this PPC will contribute towards Housing Targets.

7.3. National Policy Statement for Freshwater Management 2014

7.3.1. The National Policy Statement for Freshwater Management ("**NPS-FM**") provides direction for the Council on the management of freshwater and with the 2017 amendments introduces environmental bottom lines for freshwater targets for water quality. The Regional and Local Council's must give effect to the NPS Freshwater - notably through the Regional Policy Statement and the Regional Plan (and any changes required to the District Plan by Local authorities to give effect to any changes by the Regional Council).

7.3.2. The NPS-FM endeavours to safeguard freshwater's ecological and human health values through the sustainable management of land and discharges of contaminants, manage freshwater quantity, manage by catchments, provide for integrated management of freshwater and development and provide for community and tangata whenua involvement in management. The NPS-FM also identifies tangata whenua and community values regarding freshwater and uses water quality measures to set objectives to protect these values. These are specifically reflected in the following objectives:

Objective AA1: To consider and recognise Te Mana o te Wai on the management of freshwater.

> *Policy AA1: By every regional council making or changing regional policy statements and plans to consider and recognise Te Mana o te Wai, noting that:*
>
> *a) te Mana o te Wai recognises the connection between water and the broader environment – Te Hauora o te Taiao (the health of the environment), Te Hauora o te Wai (the health of the waterbody) and Te Hauora o te Tangata (the health of the people); and*
>
> *b) values identified through engagement and discussion with the community, including tangata whenua, must inform the setting of freshwater objectives and limits.*

Objective A1: To safeguard:

(a) the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems, of fresh water; and

(b) the health of people and communities, as affected by contact with fresh water; in sustainably managing the use and development of land, and of discharges of contaminants

Objective A2: The overall quality of fresh water within a region is maintained or improved while:

(a) protecting the significant values of outstanding freshwater bodies;

(b) protecting the significant values of wetlands; and

(c) improving the quality of fresh water in water bodies that have been degraded by human activities to the point of being over-allocated.

Objective A3 : The quality of fresh water within a freshwater management unit is improved so it is suitable for primary contact more often, unless:

a) regional targets established under Policy A6(b) have been achieved; or

b) naturally occurring processes mean further improvement is not possible.

Objective A4: To enable communities to provide for their economic well-being, including productive economic opportunities, in sustainably managing freshwater quality, within limits.

Objective C1: To improve integrated management of fresh water and the use and development of land in whole catchments, including the interactions between fresh water, land, associated ecosystems and the coastal environment.

Objective D1: To provide for the involvement of iwi and hapū, and to ensure that tāngata whenua values and interests are identified and reflected in the management of fresh water including associated ecosystems, and decision-making regarding freshwater planning, including on how all other objectives of this national policy statement are given effect to.

7.3.3. The PCC recognises the policy directive set out by the NPS-FM, specifically the Plan Change:

i. Is supported by an ICMP which:

a) seeks to provide for the integrated management of three waters and development,

b) includes water quality targets which aligns with (or are higher) than the National Bottom lines.

c) Includes requirements for detention/attenuation to manage potential adverse downstream effects resulting from erosion and flooding.

d) Anticipates that stormwater management devices are to be designed in accordance with the RITS which ensures that the effects of climate change are appropriately taken into account.

ii. Has included the involvement of iwi and hapu (through a ongoing process and consultation with the Tangata Whenua Working Group ("**TWWG**") as outlined further in above) to ensure that the tangata whenua values and interests, including the principle of Te Mana o te Wai, are reflected in the outcomes associated with freshwater management.

7.4. National Environmental Standards for assessing and managing contaminants in soil to protect human health 2011

7.4.1. Under the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health ("**NES Human Health**") any sites where activities on the Hazardous Activities and Industries List (HAIL) have occurred must be identified. The NES Human Health provides a nationally consistent set of controls and soil contaminant standards to ensure land affected by contaminants in soil is appropriately identified and assessed before it is subdivided or developed.

7.4.2. The NES Human Health applies at the time of subdivision and development/land disturbance. A preliminary site investigation (PSI) (**Attachment 8**) of contaminated land within the Rotokauri North area has been undertaken as discussed in previous sections of this report.

7.5. Waikato Regional Policy Statement

7.5.1. The RPS provides a framework for promoting the sustainable management of the Waikato regions natural and physical resources by identifying issues and outlining objectives, policies and methods, including processes, for addressing these issues. The relevant policy sections (with reference to corresponding objectives) are discussed below.

1. Section 6 Built Environment

7.5.2. Section 6 of the RPS aims to ensure that the built environment is planned and coordinated, including coordination with the provision of infrastructure. This section of the RPS ensures that the Future Proof Land Use pattern is implemented through District Plan provisions, in order to provide appropriately zoned and serviced land to enable development to occur now and in the future.

7.5.3. Through Objective 3.12 and Policy 6.1, 6.3, 6.14, 6.15, 6.16 and the development principles of 6A the RPS requires development of the built environment and associated land use occurs in an integrated, sustainable and planned manner which enables positive environmental, social, cultural and economic outcomes.

7.5.4. The PPC specifically recognises this by:

i. Enabling a compact urban form by releasing land already identified for urban growth (as evident by its existing zoning as FUZ) and specifically already within the RSP (and notably within the Urban Limited indicated on Map 6-2).

ii. Releasing land for development, thereby enabling people to provide for their socio-economic wellbeing through the provision of additional housing supply. In addition, the proposal includes a portion of housing which is required to be sold at a rate which equates to a percentage of the market value/rate. Furthermore, growth in an already identified location, relieves pressure on surrounding rural areas and other less desirable area to accommodate development and growth.

iii. Table 6-1 identifies residential growth allocation and staging. Although this PPC is sought now (i.e. 2018/19), it is realistic to assume that the first residents would not "move in" to any new development until at least 2021/22 (allowing time for PPC hearings, appeal process, resource consents, implementation of subdivision and the construction of housing), which aligns with the second stage/resale of land dates under Table 6-1 – however, taking into account the direction of Future Proof (as detailed in below the Rotokauri Stage 2 land was not earmarked for release until Decade 3. Therefore, the PPC is be "out of sequence" with the RPS strategy for growth (and as such an assessment against the Development Principles of 6-A has been undertaken below).

iv. The proposed zoning (MDRZ) will ensure that the targets set by Policy 6.15 of 16 household units per hectare for Rotokauri can be achieved.

v. Existing natural features, such as the identified SNA and any biodiversity values associated with it, will continue to be protected by the PPC (no change to its protected status are proposed), and will be enhanced via the existing District Plan provisions and the PPC text. Furthermore, the cultural significance of this SNA is also enhanced via this PPC through the re-naming of the feature.

vi. It is acknowledged that the development of the PPC area will require infrastructure extensions and upgrades to service the area, as the development falls ahead of the planned sequence for infrastructure funding and development under the LTP, these extensions will not comprise the function of that infrastructure.

vii. The ICMP specifically addresses the integration of land use and water planning (as it covers three waters infrastructure).

viii. Potential for reverse sensitivity effects have been addressed via no access restriction onto SH39, and existing District Plan provisions regarding the interface of industrial zones with residential are considered suitable to avoid future reverse sensitivity effects on any future industrial re-zoning (on land to the east).

ix. The provision of a neighbourhood centre will provide for commercial development to support the wellbeing of local residents without detracting from larger centres (and specifically Hamilton City Centre).

2. Section 6A Assessment

7.5.5. With respect to the matters lists in Section 6A the PPC (in the same order (and numbered the same) as they are listed in 6A):

(a) As growth at Rotokauri North falls inside the identified Urban Limit, the growth is considered to support existing (and planned) urban areas rather than creating a new urban area.

(b) The existing road network of Exelby Road and SH39 create a clear distinction and boundary for zoned rural and urban areas.

(c) As Rotokauri is planned 'greenfield' utilising this opportunity for development is considered appropriate.

(d) The installation of new infrastructure to service the development for the RNSP area will not comprise the safe and/or efficient or effective operation of any existing or planned infrastructure. Effects on transportation infrastructure (by way of insertion of new intersections) can be managed and resource consent stage to align with specific development stages.

(e) Refer to above comments. New infrastructure connections are needed to service the RNSP area.

(f) Water demand and volume availability has been considered as per the McKenzie Infrastructure Report in Attachment 16.

(g) The efficient use of water has been taken into account in the ICMP (refer to Attachment 10).

(h) The development is not located adjacent to or in close proximity to any significant mineral resources, energy transmission corridors, regionally significant industry or high class soils. Regionally significant industry would be located in the existing Rotokauri Industrial area currently undergoing development (and located some distance from the site). Natural hazards have been taken into consideration and effects of flooding or liquefaction can be managed.

(i) The RNSP and associated PPC seeks to provide for opportunities for walking and cycling through the development (which in time will be linked to other areas as the wider network and remainder of the Rotokauri area develops).

Opportunities for public transport infrastructure (buses) have been built into the width of the anticipated minor arterial and collector road carriageways.

The PPC also seek to reduce the number of car parks associated with higher density development (including duplexes) to assist in reducing the demand or reliance on private motor vehicles.

The Rotokauri North location also provide opportunities to live and play in the RNSP area, while work opportunities are located within the wider Rotokauri area (particularly as the Industrial zoning to the east develops).

(j) Cultural heritage values have been taken into account and will continue to play a role in the development of the area through the ongoing nature of the TWWG. There is no scheduled heritage features within the RNSP area.

(k) The existing stand of Kahikatea trees already protected by the HCDP (via the application of a SNA overlay) will be protected and enhanced as development to of the Rotokauri North progresses through the existing District Plan provisions and PPC.

(l) Public access will be provided along the margins of streams.

(m) Low impact urban design and water sensitive methods have been taken into account in the development of the BPO's for stormwater management within the RNSP area.

(n) Sustainable design technologies have been identified in the ICMP such as dual plumbing for re-use tanks are anticipated for lots with sufficient back yard space to contain tanks (i.e. those over 280m2).

(o) Reverse sensitivity effects have been managed through the use of appropriate buffers and restrictions on access.

(p) The effects of climate change have been taken into account as part of the ICMP and will be taken into account in the design of stormwater management devices etc at resource consent stage.

(q) Effects on Tangata Whenua values have been taken into account and will continue to play a role in the development of the area thought the ongoing nature of the TWWG.

(r) The Vision and Strategy for the Waikato River has been taken into account (specifically refer to the ICMP) which sets water quality targets.

(s) Resource efficient design and construction methods will be considered at resource consent stage.

(t) Ecosystems within steam margins can be enhanced through riparian vegetation and removal of farm culverts etc (specifically refer to the ICMP).

3. Section 8 Fresh Water Bodies

7.5.6. It is noted that issues such as the protection of watercourses and quality of freshwater habitats are addressed through the existing provisions of the WRP, which with regard to the PPC area will be assessed through future regional consenting.

7.5.7. With regard to objectives 3.4, 3.13, 3.15 and the policies that fall under this section (and specifically Policy 8.33), the implementation of the ICMP which aligns with this PPC will manage effects on the values of freshwater bodies. Enhancement of riparian margins is also anticipated for streams which are retained through the development area (again subject to future consenting).

7.5.8. Commentary on Policy 8.5 will be discussed under the Te Ture Whaimana o Te Awa o Waikato commentary below.

4. Te Ture Whaimana o Te Awa o Waikato (the Vision and Strategy for the Waikato River)

7.5.9. It is noted above that Te Ture Whaimana o Te Awa o Waikato (the Vision and Strategy for the Waikato River) has been included in full as part of the RPS (and is also part of the District Plan). Te Ture Whaimana o Te Awa o Waikato sets out a vision whereby a healthy Waikato River sustains abundant life and prosperous communities who, in turn, are all responsible for restoring and protecting the health and wellbeing of the Waikato River, and all it embraces, for generations to come.

7.5.10. Of relevance to the PPC are: objective (a) which sets out to restore and protect the health and wellbeing of the Waikato River and objective (h) which seeks recognition that the Waikato River is degraded and should not be required to absorb further degradation as a result of human activities.

7.5.11. The PPC recognises the policy directive set out by the Te Ture Whaimana o Te Awa o Waikato, as it is supported by the ICMP for the management of three waters, and to set quality targets and flows etc.

5. Section 10 Heritage

7.5.12. The Archaeological Report prepared by CFG found no evidence of European Heritage pre 1900, and the HCDP does not identify any sites of heritage or cultural value within the PPC area.

7.5.13. Cultural heritage values associated with the site have formed part of the work being undertaken as part of the TWWP.

7.5.14. Overall is considered that the cultural values reporting has meet the intention of objectives 3.9 and 3.18 and policies 10.1, 10.2, and 10.3, and as the TWWP will continue through to consenting and implementation, will ensure continued adherence to this section of the RPS.

6. Section 11 Indigenous Biodiversity

7.5.15. Objective 3.19, Policies 11.1 and 11.2 are targeted at ensuring the importance of biodiversity is recognised and identified and maintaining the viability of ecosystems. Biodiversity tends to be lost when ecosystems are broken up or damaged by inappropriate use of land or water, invasion by exotic plants or unsustainable use of species.

7.5.16. As previously outlined there is limited vegetation with the PPC due to the sites current agricultural uses -however there is an existing SNA (already protected under the HCDP) recognised for its biodiversity values and significant vegetation (being a Kahikatea stand) which will be retained, protected, and enhanced (at development stage) under the provisions of the District Plan and those proposed by the PPC.

7. Section 12 Landscape

7.5.17. With respect to objectives 3.20 and 3.21 and policies 12.1 and 12.3 landscape/visual assessment undertaken has been undertaken by LA4 to confirm that there are no landscape character or amenity features worthy of protection within the PPC area (other than the already protected SNA).

7.5.18. With respect to Policy 12.4 the structure plan anticipates public access along retained watercourses.

8. Sections 13-14 Natural Hazards and Soils

Natural hazards (flooding and geotechnical) can been addressed through implementation of the ICMP and specialist reporting which has identified further testing for foundation designs (and mitigation of liquefaction hazards), thereby ensuring development can meet objective 3.24 and policies 13.1 - 13.3 and 14.5.

7.6. Waikato Regional Plan

7.6.1. The Waikato Regional Plan provides direction regarding the use, development and protection of natural and physical resources in the Waikato region.

7.6.2. it is noted that once subdivision and development is progressed through future consenting processes, the matters set out in the Waikato Regional Plan will be further considered through Regional consenting processes.

8. OTHER MATTERS / NON-STATUTORY DOCUMENTS

8.1. Future Proof

8.1.1. The Future Proof Growth Strategy and Implementation Plan (2009) is an inter-regional growth strategy between Hamilton, Waipa and the Waikato sub-regions, jointly developed by Hamilton City Council, Environment Waikato, and the Waipa and Waikato District Councils. The Future Proof Strategy covers four key areas of development (residential, rural, business/industrial, and retail/commercial land uses), and sets out guidelines for how these areas are anticipated develop from 2006 to 2061. A draft update to the Future Proof Growth Strategy was released for comment in June 2017.

8.1.2. The purpose of Future Proof is to provide a comprehensive and robust growth management strategy in order to ensure land use and infrastructure are managed collaboratively between the partner councils for the benefit of the whole sub-region. It is a long-term strategy that provides direction and implementation of a sub-regional settlement pattern which identifies land supply needs over the next 50 years. The Future Proof Strategy Vision is:

"In 2061, the sub-region:

Has a diverse and vibrant metropolitan centre strongly tied to distinctive, thriving towns and rural communities

Is the place of choice for those looking for opportunities to live, work, invest and visit

Is the place where natural environments, landscapes and heritage are protected and a healthy Waikato River is at the heart of the Region's identity

Has productive partnerships within its communities, including tangata whenua

Has affordable and sustainable infrastructure

Has sustainable resource use."

8.1.3. Section C of Future Proof contains the adopted settlement pattern for Future Proof and allocation of staging and growth. The settlement pattern ensures that development is to happen in a unified and coordinated way to avoid any adverse effects on the surrounding districts. Rotokauri is an identified growth cell for Hamilton City.

8.1.4. The density targets specified under Table 2 indicate that 16 household units per hectare should be achieved in Hamilton Greenfield areas. The application of the MDRZ and existing HCDP policy 4.2.1A will ensure that this target can be achieved.

8.1.5. It is the timing and staging of the release of the land that sits ahead of the predictions for Rotokauri (and Hamilton Greenfield area), as the land falls within Stage 2 of RSP and Decade 3 (2036-2045) of Appendix 1 – Allocation and Staging of Growth.

8.1.6. Section 7.5 of Future Proof identifies that things may change which affects a change in the demand of land supply, such as central government intervention in urban land use policy. Section 7.5 also outlines those matters that proposals to change the timing and staging for land development set by the Future Proof Strategy should take into account. These have been addressed below:

"Consistency with the Future Proof Strategy guiding principles and other statutory planning documents."

i. Consistency with the relevant Future Proof guiding principles is addressed further below, and assessment of other planning documents is being undertaken.

"Any proposal for change to land use or agreed timing and staging enables the Future Proof Partners to give effect to their NPS-UDC objective and policy requirements."

ii. The early release of the land subject to this PPC is not expected to affect any NPS-UDC requirements of other Future Proof Partners. Notably, the site is boarded by WDC and the nearest growth cell (in WDC territory) is Te Kowhai. WDC has recently publicly notified a Proposed District Plan which (should) take into account its obligations under the NPS-UDC.

"Existing or committed public and private sector investments in land development and infrastructure."

iii. Existing infrastructure commitments have been taken into account in the reporting for wastewater and water supply, and in both cases the works tie into larger facilities which are about to undergo planned upgrades (which can accommodate the growth projected). Furthermore, new infrastructure connections to service the PPC area are to be funded by the applicant. No infrastructure constraints with the adjoining State Highway network have been identified.

"Development must be shown to be adequately serviced without undermining committed infrastructure investments made by Council to support other growth areas."

iv. Refer to the above comments.

"The efficient and safe use of existing or planning infrastructure."

v. Refer to the above comments.

"Sustainable provision and funding of existing and future infrastructure. Development must be coordinated with the provision of infrastructure including utility services, and integrated with the transport network. The provision of infrastructure must take into account available or planned network capacity."

vi. Refer to the above comments.

"Efficient use of local authority and central government financial resources."

vii. Only those financial resources already committed to upgrades to major facilities (treatment plants) are being borne by the local authority. Furthermore, new infrastructure connections to service the PPC area are to be funded by the applicant and delivered in a manner which is coordinated with the development of the land.

"The ability for a developer to be able to pay for the necessary infrastructure."

viii. *Refer to the above comments.*

"The compatibility of any proposed land use with adjacent land uses."

ix. The potential for reverse sensitivity with adjacent land uses has been taken into account and addressed by the PPC mechanisms and existing District Plan mechanisms for land against the State Highway and industrial zones.

8.1.7. The key guiding principles are contained in section 1.3 and disused in more detail below;

Effective Governance, Leadership, Integration, Implementation and Productive Partnerships

i. These principles focus on collaboration between the regional and local authorities. Consultation associated with this PPC has included WDC and WRC.

Diverse and Vibrant Metropolitan Centre linked to Thriving Town and Rural Communities and Place of Choice – Live, Work, Play, Invest and Visit

ii. The PPC achieves the applicable principles (which are also replicated in Chapter D sections 11.4. 11.5 and 11.7) by:

(a) The application of a MDRZ in inherently promotes increased densities;

(b) The Rotokauri North area falls within the existing urban limits and while it does not immediately adjoin the Stage 1 land, the remainder of Stage 2 does fall within the lifespan of the Future Proof documentation (Decade 3).

(c) The PPC is a direct response to the need for increased demand of housing stock and land supply in the Hamilton area.

(d) The RNSP adheres to principles of good urban design, as demonstrated in the UDS in Attachment 15.

(e) Separation to the rural zones is clearly defined by key roads (SH39 and Exelby Road).

(f) Although no planned public transport is identified for Rotokauri North the development has anticipated the collector road capability to accommodate a bus route, and walking and cycling paths both on and off road have been identified for the PPC area and by the RNSP.

(g) The B6Z is intended to provide for local neighbourhood need and will not detract from evicting major commercial centres.

(h) Community facilities (i.e. recreational reserves) have been envisaged by the RNSP.

Protection of Natural Environments, Landscapes and Heritage and Healthy Waikato River as Heart of Region's Identity

iii. The PPC achieves the applicable principles (which are also replicated in Chapter D section 12.3) by:

(a) Preparing a supporting ICMP for the RNSP area, which seeks to outline the best practicable option for avoiding adverse effects on the natural hydrological characteristics, water quality and ecosystems, by setting quality and flow targets to be achieved by development.

(b) The potential for water re-use (via dual plumbing for non-potable uses) for residential homes forms part of the ICMP implementation strategy (thereby encouraging and promoting efficient use).

(c) The vision and Strategy for the Waikato River has been taken into account in setting of targets to be achieved for quality and flow by the ICMP.

(d) The applicant has formed a working group with Mana Whenua to recognise and promote the relationship that they have with the awa.

Affordable and Sustainable Infrastructure

iv. The PPC achieves the applicable principles which are also replicated in Chapter D section 12.1) by:

(a) No new major arterial roads which require funding from Council or Central Government or NZTA are required to give effect to development of the RNSP. The adjacent SH39 has sufficient capacity to accommodate the additional traffic flows, thereby the development supporting the investment already spent on existing infrastructure.

(b) Although no planned public transport is identified for Rotokauri North the development has anticipated the collector road capability to accommodate a bus route, and walking and cycling paths both on and off road have been identified for the PPC area and by the RNSP.

8.1.8. In addition, Chapter D implementation also includes principles in section 13.1 relating to Tangata Whenua through:

i. The regular meetings of the TWWG, and the ongoing commitment between the applicant and the working group to recognise and promote the relationship that Tangata Whenua have with the awa.

8.2. Hamilton Urban Growth Strategy (2010)

8.2.1. The Hamilton Urban Growth Strategy ("**HUGS**") is a long-term growth planning exercise based around delivering coordinated and sustainable growth in Hamilton. It sets a pattern of future development within the Hamilton City boundaries. HUGS specifically details how, when and where growth should occur. The outcomes and recommendations of this process have been fed into Future Proof.

8.2.2. Rotokauri is identified as Future Residential Land in HUGS. This application is assessed to be consistent with achieving a compact city and to align with strategic land use framework. Any issuing regarding out of sequence development have been covered by the RPS and Future Proof assessments above.

8.3. Waikato-Tainui Environmental Plan

8.3.1. The Waikato-Tainui Environmental Plan ("**WTEP**") was developed by Waikato-Tainui to guide development through to 2050 to ensure that the needs of the present and future generations are provided for in a manner which goes beyond sustainability, while protecting and enhancing the environment.

8.3.2. The WTEP identifies in Section D a number of objectives and policies to achieve with respect to the cultural/physical environment in the Waikato-Tainui rohe. The proposed Plan Change has acknowledged these objectives/policies, and seeks to give effect to this document in the following ways:

Chapter 6: Consultation and Engagement with Waikato-Tainui

8.3.3. This chapter sets out consultation and engagement processes and supports and encourages early involvement of Waikato-Tainui in major projects to prevent delays in the latter stages of the process.

8.3.4. For this plan change a specific Tangata Whenua Working Group has been established to provide advice and feedback from Tangata Whenua. A full copy of the CIA is provided in **Attachment 18**. As a direct rules of this feedback, the PPC includes an amendment to the listed name of the SNA in the District Plan.

Chapter 7: Towards Environmental Enhancement

8.3.5. This Chapter promotes an approach which focuses on maintaining the standard of the environment for the benefit of the present generation and for future generations to experience the same quality of land use as is currently experienced.

8.3.6. The enhancement approach is a step further than sustainability or maintenance and aims to improve the quality of the environment for future generations.

8.3.7. The ICMP document prepared alongside this PCC seeks to implement water quality targets for stormwater discharge to improve the current quality of water exiting the site (and entering the receiving environments). These standards align with as a minimum the NPS National bottom lines (and in some cases are higher).

8.3.8. Specific watercourse restoration will be addressed at resource consent stages.

Chapter 10: Tribal Strategic Plan

8.3.9. Whakatupuranga 2050 is the 'blueprint' for cultural, social and economic advancement for people of Waikato-Tainui to ensure that in the changing times, tribal identity and integrity is upheld. The vision of Whakatupuranga 2050 is "to grow a prosperous, healthy, vibrant, innovative and culturally strong iwi". The strategic objectives of Whakatupuranga are:

- Kingitanga (the king movement) remains an eternal symbol and that Waikato-Tainui remains as kaitiaki of the environment;
- Tribal identity and integrity is upheld;
- Tribal success, and
- Tribal social and economic wellbeing thrives.

8.3.10. An issue for Waikato Tainui as set out in Chapter 10 is the impact of resource use and development on the achievement of Whakatupuranga 2050. The health and wellbeing of the environment is inseparable from the social, cultural, spiritual, economic and environmental health and wellbeing of tangata whenua. Therefore, the way the environment is used and developed can have a significant impact of the achievement of Whakatupuranga 2050.

8.3.11. This has been taken into account by the TWWP and the outcomes, recommendations sought via this forum.

Chapter 11: The Vision and Strategy for the Waikato River

8.3.12. The Settlement Act gives effect to the settlement entered into between Waikato-Tainui and the Crown. An assessment against this document has been undertaken in a previous section of this report.

Chapter 14: Customary Activities

8.3.13. Access to traditional areas (e.g. Waikato River) for resource use and to undertake customary activities has been compromised in recent years which has had an impact on the ability for people of Waikato-Tainui to practice customary activities and transfer of knowledge between generations. Some examples of customary activities may include the launching of waka into the river for ceremonial, recreation, competition and sporting purposes, customary gathering and use of foods and the use of water bodies for activities relating to the spiritual, physical and cultural health and wellbeing of people (e.g. bathing and baptisms). Objective 14.3.1 of the WTEP states:

"*Waikato-Tainui access to and ability to undertake customary activities and resource use, including along the margins of waterways, is protected and enhanced*."

8.3.14. This has been taken into account by the TWWP and the outcomes, recommendations sought via this forum.

Chapter 15: Natural Heritage and Biosecurity

8.3.15. Changes in land use have gradually depleted the natural plants and native animals and ultimately decreased indigenous biodiversity in the Waikato Region. Objective 15.3.2 states;

"*Cultural, spiritual and ecological features of the Waikato landscape that are significant to Waikato-Tainui are protected and enhanced to improve the mauri of the land.*"

8.3.16. Method 'd' of this objective states:

"*Establishment and enhancement of ecological corridors linking areas of known high value indigenous habitat shall be treated as high priority for the allocation of resources by the authorities responsible. These corridors include riparian margins, gully systems, esplanade reserves, and vegetation alongside road corridors*."

8.3.17. The existing provisions of the Waikato Regional Plan (rules in Section 5.1) will ensure that future development within the Plan Change Area will be required to protect land from further erosion and ensure that any effects on the stream habitat network are appropriate in terms of the RMA and the strategic document hierarchy.

8.3.18. The existing SNA will continue to be protected under the existing operative HCDP provisions.

8.4. The Waikato Plan

8.4.1. The Waikato Plan ("the plan) is a comprehensive document that identifies and addresses issues that the region faces and seeks to take advantage of opportunities for the Waikato region. The plan identifies five key priorities with 10 key actions to address these priorities. The five priorities are as follows:

Planning for population change;

i. As previously outlined, the Rotokauri North area falls within a planned growth node. Infrastructure to service the node will be brought forward in conjunction with development of the area.

ii. The release if land is necessary to relive the housing shortfall occurring in Hamilton.

Connecting communities through targeted investment;

iii. Development will provide a roading network which integrates with the existing and wider area (including state highway network) and include pedestrian and cycling opportunities via dedicated facilities thereby features encouraging the use of alternative modes for local journeys.

Partnering with iwi/ Maori;

iv. The PPC is supported by an ongoing relationship via the TWWG to work collaboratively towards developing the RNSP area.

Addressing water allocation and quality;

v. Issues regarding water quality have been addressed via the ICMP (which sets specific water quality targets for stormwater discharge to meet, as well as options for reuse within sites).

Advancing regional economic development.

vi. The RNSP includes a small neighbourhood centre to encourage and attract local business to support the local residents of the RNSP area.

8.4.2. Based on this, the proposal is considered to support the Waikato Plans priorities.

8.5. Waikato Regional Land Transport Plan

8.5.1. The Waikato Regional Land Transport Plan ("RLTP") sets out the strategic direction for land transport in the Waikato region for 30 years, from 2015-2045. The Waikato Region has identified in a number of its plans and policies, the importance of the integration of land use with infrastructure in the region. There are a number of policies and implementation methods to ensure the development of the built environment occurs in a planned and coordinated manner to ensure that infrastructural needs of the Region are catered for.

8.5.2. Some of the key messages from the RLTP are:

- Providing an integrated and aligned land-use and transport system;
- Providing an effective and efficient land transport system that enhances economic well-being and support growth;
- Achieve a significant reduction in risk, deaths and serious injuries across the region;
- Provide an adaptable and flexible approach to managing and developing the land transport system that optimises funding options;
- Provide communities access to a multi-modal land transport system that functions effectively to meet their social, cultural and economic needs; and
- Provide an environmentally sustainable and energy efficient land transport system that is robust and resilient to external influences.

8.5.3. A number of upgrades are planned to the existing land transport infrastructure near the vicinity of the site.

8.5.4. The proposed upgrades to the existing land transport infrastructure surrounding the site will integrate and align with the current road network as well as support the proposed growth in the area, thus contributing to a safe, efficient and effective transport system within Rotokauri North and Hamilton. These upgrades will connect the proposed development with the existing Hamilton town centre community and provide access to multi-modal services such as cycling & walking.

8.5.5. As such, the PPC is considered to be supportive of the RLTP objectives.

8.6. Waikato Regional Public Transport Plan

8.6.1. The Waikato Regional Public Transport Plan 2018 - 2028 ("RPTP") outlines the strategic direction for public transport in the Waikato region over the next 10 years. The plan aims to deliver an effective, efficient and integrated public transport system for the region. The vision of the RPTP is to "build a public transport system that enhances the vitality of our communities, strengthens our economy and helps create a healthier environment".

8.6.2. The following key policy focus areas are outlined in the RPTP to support this goal:

- Plan for a layered network of public transport services made up of Mass transit, Frequent, Connector, Coverage and Targeted public transport services;
- Consider the needs of the transport disadvantaged when providing for public transport services. The following groups of people are considered transport disadvantaged:
    - People with disabilities;
    - People without a driver licence or access to a vehicle

- Children or elderly
- People with low income and/or living in 'high deprivation' neighbourhoods People living in isolated communities with no easy transport access to essential services.

- Ensure public transport services at least meet the standard service levels set out in table 3.1 for each layer where there is appropriate demand and available funding.

8.6.3. There are currently very limited public transport services available near Rotokauri North area. However, as the remainder of the structure plan area is developed, it is likely that extensions to existing bus services, or new bus services, will be introduced to connect the site with the Hamilton town centre. The HCC DP policy also includes funding for a train station at Te Rapa. Establishment of these services by Council would provide the development with improved access to public transport services and has the potential to reduce traffic flows between these areas.

8.6.4. Table 23 of the RLTP indicates that there are plans to extend the existing Frankton service into the Rotokauri development.

8.6.5. In this regard, it is expected that as the public transport services outlined in this ITA are implemented, the proposed development is considered to align well with the objectives of the RPTP.

8.7. Regional Walking and Cycling Strategy

8.7.1. The Walking and Cycling Strategy for the Waikato Region outlines the strategy for walking and cycling within the Waikato region in accordance with the RLTP. The vision of the strategy is that: "*Walking and cycling are safe, integrated and accessible activities in the Waikato region*". The strategy intends to achieve this vision with the following three policies and actions:

- Support the construction and maintenance of accessible walking and cycling infrastructure throughout the regions for all user types;
- Promote travel demand management and travel behaviour change initiatives that assist walking and cycling in relieving urban congestion and improving journey time reliability; and
- Recognise the role that walking and cycling can play in the economic development of the region.

8.7.2. The proposed development intends to provide on-road cycle paths and pedestrian footpaths along all collector roads within the development as well as along the main minor arterial road. This will provide an easily accessible path for the use of other modes of transport to and from the site and has the potential to reduce the number of vehicles on the road network. Therefore, the proposal is considered to align well with the walking and cycling strategy.

8.8. Access Hamilton

8.8.1. Access Hamilton a guide for key transport partners work together to achieve outcomes for an integrated and effective transport system. The strategic vision of this document is to deliver an affordable, integrated, safe, responsive and sustainable transport system that supports economic, social, environmental and cultural well-being of the City.

8.8.2. The three main components that make up Access Hamilton include the strategy vision, the Integrated Transport Plan and the seven action plans. Access Hamilton sets a strategic direction until 2040 and works alongside a number of other strategies that assist Council to achieve its strategic objectives and guide city development, including the RLTP and Future Proof.

8.8.3. Although no planned public transport is identified for Rotokauri North (and is unlikely to be sustainable until the population increases in the area) the development has anticipated the collector road capability to accommodate a bus route, and walking and cycling paths both on and off road have been identified for the PPC area and by the RNSP. These features are consistent with the goals that Access Hamilton is seeking to achieve across the network.

9. PART 2 OF THE RMA

9.0.1. Part 2 of the RMA sets out the purpose, and additional principles, which are to be considered when applying the RMA. The following assessment is based on the purpose of the RMA, and the guiding principles (Sections 5 to 8).

9.1. Section 5 - Purpose

9.1.1. Section 5 in Part 2 of the RMA identifies the purpose as being the sustainable management of natural and physical resources. This means managing the use of natural and physical resources in a way that enables people and communities to provide for their social, cultural and economic well-being while sustaining those resources for future generations, protecting the life-supporting capacity of ecosystems, and avoiding, remedying or mitigating adverse effects on the environment.

9.1.2. The PPC is considered to be consistent with this purpose, in particular it seeks to enable the wellbeing (social and economic) of the growing population of Hamilton City through the release (through rezoning) of land for housing.

9.1.3. At the same time, the PPC seeks to address the matters (a) to (c), in particular:

i. It seeks to ensure that the land resource is developed in a manner that achieves, and does not undermine, its potential to accommodate its share of projected growth and in particular contributes to the anticipated population growth. Growth in this location manages pressure for growth in other less appropriate parts of the Hamilton City, thereby safeguarding the needs of future generations;

ii. It seeks to safeguard the life-supporting capacity of water through the use of water sensitive design options for stormwater management and the enhancement of the stream margins; and

iii. Adverse effects of urban activities on the environment will be avoided, remedied or mitigated through the proposed provisions for land within the RNSP area and the existing HCDP rules.

9.2. Section 6 – Matters of National Importance

9.2.1. the Section 6 of the RMA sets out a number of matters of national importance, specifically;

a) The preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:

b) The protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development:

c) The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:

d) The maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:

e) The relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga.

f) The protection of historic heritage from inappropriate subdivision, use, and development.

g) The protection of recognised customary activities.

h) The management of significant risks from natural hazards

9.2.2. The PPC recognises and acknowledges these matters through the following methods;

i. The RNSP and associated ICMP envisage the enhancement of the natural character of streams via planting of the stream margins, along with the management of erosion effects of stormwater through detention measures.

ii. The site does not contain any identified "outstanding landscape" or features. The assessment of landscape and visual effects by LA4 (2019) (**Attachment 17**) does not identify the areas of sloping land as of significance in respect to the visual landscape.

iii. The site contains an existing area identified by the HCDP as a SNA, being a stand of Kahikatea trees. The SNA is subject to the existing HCDP provision for protection (these will not be modified by this PPC). The trees are included in the RNSP as an area of land to be vested with Council to ensure its ongoing protection and management.

iv. Public access to and along streams will be enhanced via provision of walkways along stream margins as outlined in the RNSP.

v. The Archaeological Assessment (**Attachment 6**) does not identify any specific archaeological or heritage sites as requiring protection.

vi. The relationship of Maori with their waahi tapu (and any customary activities) has been recognised and provided for through consultation as reflected in the CIA in **Attachment 18**.

vii. The risk from natural hazards has been addressed through the HD Geo reporting (**Attachment 7**) and ICMP which covers flooding (Attachment 10).

9.3. Section 7 – Other Matters

9.3.1. Section 7 identifies a number of "other matters" to be given particular regard to, which are:

(a) Kaitiakitanga;

(aa) The ethic of stewardship;

(b) The efficient use and development of natural and physical resources;

(ba) The efficiency of the end use of energy;

c) The maintenance and enhancement of amenity values;

d) Intrinsic values of ecosystems;

f) Maintenance and enhancement of the quality of the environment;

g) Any finite characteristics of natural and physical resources;

h) The protection of the habitat of trout and salmon;

i) The effects of climate change; and

j) The benefits to be derived from the use and development of renewable energy."

9.3.2. The PPC has taken into consideration the 'other matters', and in respect of the above the following comments are made:

i. The proposal has acknowledged the kaitiakitanga role (which is also a form of stewardship) of the local Iwi and consultation has been undertaken with respect to the PPC, RSP and RNSP. This has involved meetings with the TWWG and the discussion of the key technical reports of concern to Iwi (eg. Archaeological, ICMP and Ecology);

ii. The proposed PPC will enable an efficient use of natural and physical resources as it will utilise land already earmarked for urban development under the HCDP and enables a range of housing/lifestyle options and affordability to meet the shortfall in housing supply (and affordability) within Hamilton City;

iii. While the land will no longer be retained for its rural amenity, the amenity values and quality of the area have been recognised and will be enhanced through the implementation of RNSP and proposed provisions, in conjunction with the existing provisions of the HCDP; and

iv. Natural ecosystems can be enhanced via future development as envisaged by the retention of the SNA and riparian planting of stream (as envisaged in the ICMP).

v. No habitat of trout or salmon are identified in the PPC area.

vi. The effects of climate change have been taken into account in the stormwater modelling, and this can be confirmed via future resource consents.

9.4. Section 8 – Treaty of Waitangi

9.4.1. Section 8 requires all persons exercising functions and powers under the RMA to 'take into account' the Principles of the Treaty of Waitangi.

9.4.2. Consultation is a key principle of the Treaty and has been taken into account. Iwi have been consulted throughout the process, and consultation is ongoing via regular meetings with the TWWG (refer to the CIA in **Attachment 18**).

10. CONSULTATION

10.0.1. Key Stakeholders for consultation have included:

- HCC
- WDC
- WRC
- MOE
- Waikato-Tainui
- Te Haa o te whenua o Kirikiriroa ("**THaWK**")
- Landowners inside the PPC area
- Adjacent neighbours.

10.0.2. A summary of consultation undertaken is provided in **Attachment 19** and a copy of the CIA is provided in **Attachment 18**. Regular meetings with the THawK hapu have also occurred from November 2018 (resulting in the attached CIA).

11. NOTIFICATION

11.0.1. Under clause 25(2)(a)(i) of Schedule 1 of the RMA, Plan Changes may be limited notified. The test for notification is being able to identify all persons directly affected by the plan change. A Notification Assessment has been provided as **Attachment 21**.

12. CONCLUSION

12.0.1. The land covered by the PPC request is currently zoned FUZ and SNA under the HCDP. As such, a PPC is required in order to rezone the FUZ land for residential and neighbourhood centre use.

12.0.2. The proposed RNSP has been based on the opportunities and constraints identified from a wide range of technical inputs and analyses and is intended to replace the existing RSP for this area of land. Given the development potential of the area, a structure planning approach is adopted for the purpose of this PPC to determine the most logical locations for amenities within the RNSP area, and to preserve key linkages into the existing RSP area (so as not to comprise development in the remainder of the Rotokauri area and to ensure integration).

12.0.3. This PPC request seeks to introduce the MDRZ and B6Z, as well as a RNSP– all with the purpose of giving effect to the purpose of the RMA.

12.0.4. Included in **Attachment 5** to this document is the Section 32 assessment which demonstrates that the proposed policies and methods are the most appropriate for achieving the objectives and for achieving the purpose of RMA.

12.0.5. The AEE demonstrates that there are no significant constraints to the urbanisation of the RNSP area, and that potential adverse effects on the environment can be avoided, remedied or mitigated by the PPC provisions (or existing provisions within the HCDP).

12.0.6. Both the structure planning and rezoning process have had regard to the matters in Part 2 of the RMA, the RPS and other matters within Sections 74 to 77D of the RMA. The proposal is considered to be consistent with all of these matters.

Rotokauri North Private Plan Change – List of Attachments

Attachment 1	List of Acronyms
Attachment 2	Locality Map
Attachment 3	Map showing Titles (subject to this request)
Attachment 4	Proposed Plan Change Provisions and Structure Plan Map
Attachment 5	Section 32 Assessment
Attachment 6	Archaeological Assessment prepared by CFG Heritage dated 3 December 2018
Attachment 7	Geotechnical Assessment Report prepared by HDGeo dated 25 October 2018 Response to HCC Peer Review prepared by HDGeo dated 27 February 2019
Attachment 8	Rotokauri North Preliminary Site Investigation by HDGeo dated 11 July 2018
Attachment 9	Rotokauri North Sub-catchment Integrated Management Plan prepared by Tollemache Consultants dated April 2019
Attachment 10	Rotokauri North ICMP: Desktop Review of Hydrogeological Conditions Influencing Stormwater Design prepared by Beca dated 17 July 2018
Attachment 11	Rotokauri North Development Area: Technical review of stream classifications prepared by Tonkin & Taylor Ltd dated 7 December 2018
Attachment 12	Receiving Environment and Rapid Erosion Assessment Rotokauri North Sub-catchment prepared by Morphum Environmental Ltd November 2018 DRAFT
Attachment 13	Integrated Traffic Management Report prepared by Commute Transportation Specialists dated April 2019
Attachment 14	Economic Report by Property Economics dated 30 October 2018
Attachment 15	Urban Design Assessment by Ian Munro dated April 2019
Attachment 16	Infrastructure Report prepared by McKenzie & Co Consultants Ltd dated April 2019
Attachment 17	Landscape and Visual Assessment by LA4 dated April 2019
Attachment 18	Cultural Impact Assessment Working Draft for Lodgement [April 2019]
Attachment 19	Summary of Consultation
Attachment 20	Legal Opinions by Berry Simons
Attachment 21	Notification Assessment

ATTACHMENT 1 - List of Acronyms

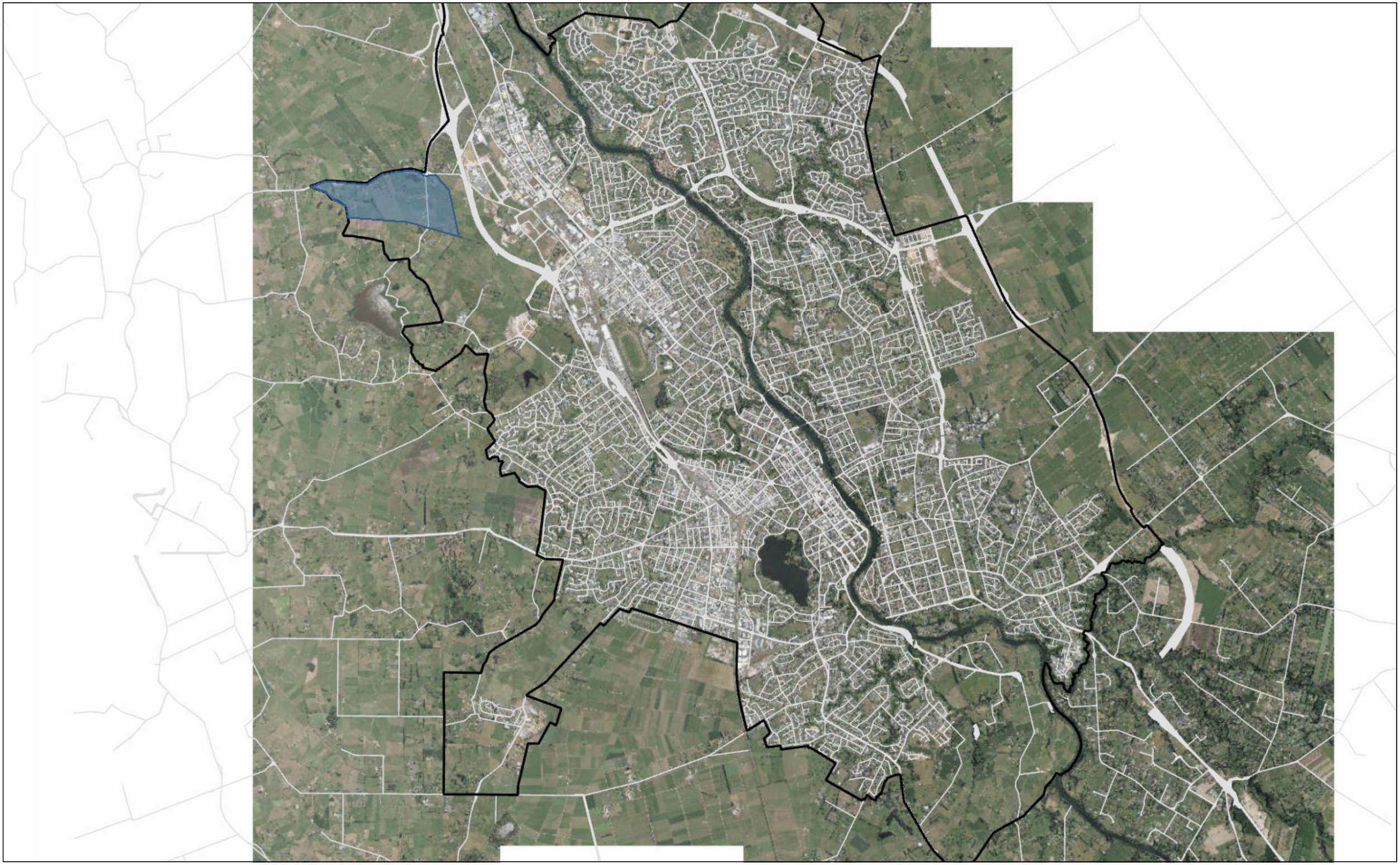
Attachment 1

Acronym Table

Acronym	Definition
ANZECC	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
B6Z	Business 6 Zone
BPOs	Best Practicable Options
DSI	Detailed Site Investigation
FUZ	Future Urban Zone
FWI	Far Western Interceptor
GSCL	Green Seed Consultants Ltd
HASHAA	Housing Accords and Special Housing Areas Act 2013
HAIL	Hazardous Activities and Industries List
HCC	Hamilton City Council
HCDP	Hamilton City District Plan
ICMP	Rotokauri North Sub-Catchment Integrated Catchment Management Plan
LASS	Waikato Local Area Shared Services
LOS	Level of Service
MDRZ	Medium Density Residential Zone
Morphum	Morphum Environmental Ltd
NPS-FM	National Policy Statement for Freshwater Management
OLFP	Overland Flowpath
PPC	Private Plan Change
PSI	Preliminary Site Investigation
RITS	Regional Infrastructure Technical Specifications
RMA	Resource Management Act 1991
RNSP	Rotokauri North Structure Plan
Rotokauri ICMP	Rotokauri Integrated Catchment Management Plan
RPS	Waikato Regional Policy Statement
RRCA	Rotokauri Ridgeline Character Area
Settlement Act	Waikato-Tainui Raupatu claims (Waikato River) Settlement Act 2010
SH39	State Highway 39
SHA	Special Housing Area

SNA	Significant Natural Area
THaWK	Te Haa o te whenua o Kirikiriroa
WDC	Waikato District Council
WDP	Waikato District Plan
WRC	Waikato Regional Council
WRP	Waikato Regional Plan
WRPS	Waikato Regional Policy Statement
WWTP	Wastewater Teatment Plant

ATTACHMENT 2 - Locality Maps



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Hamilton City Council
Te kaunihera o Kirikiriroa

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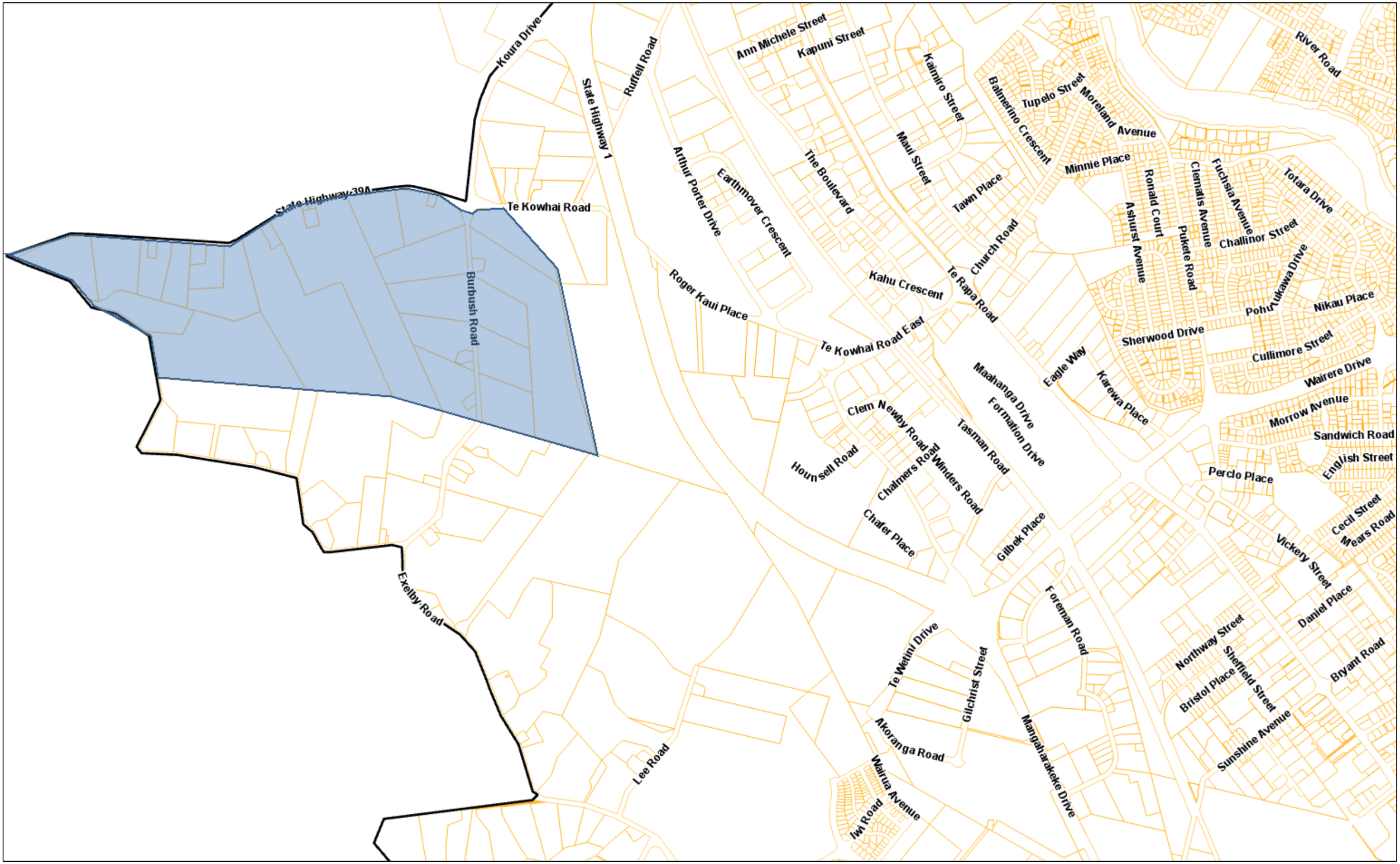

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Hamilton City Council
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Te kaunihera o Kirikiriroa

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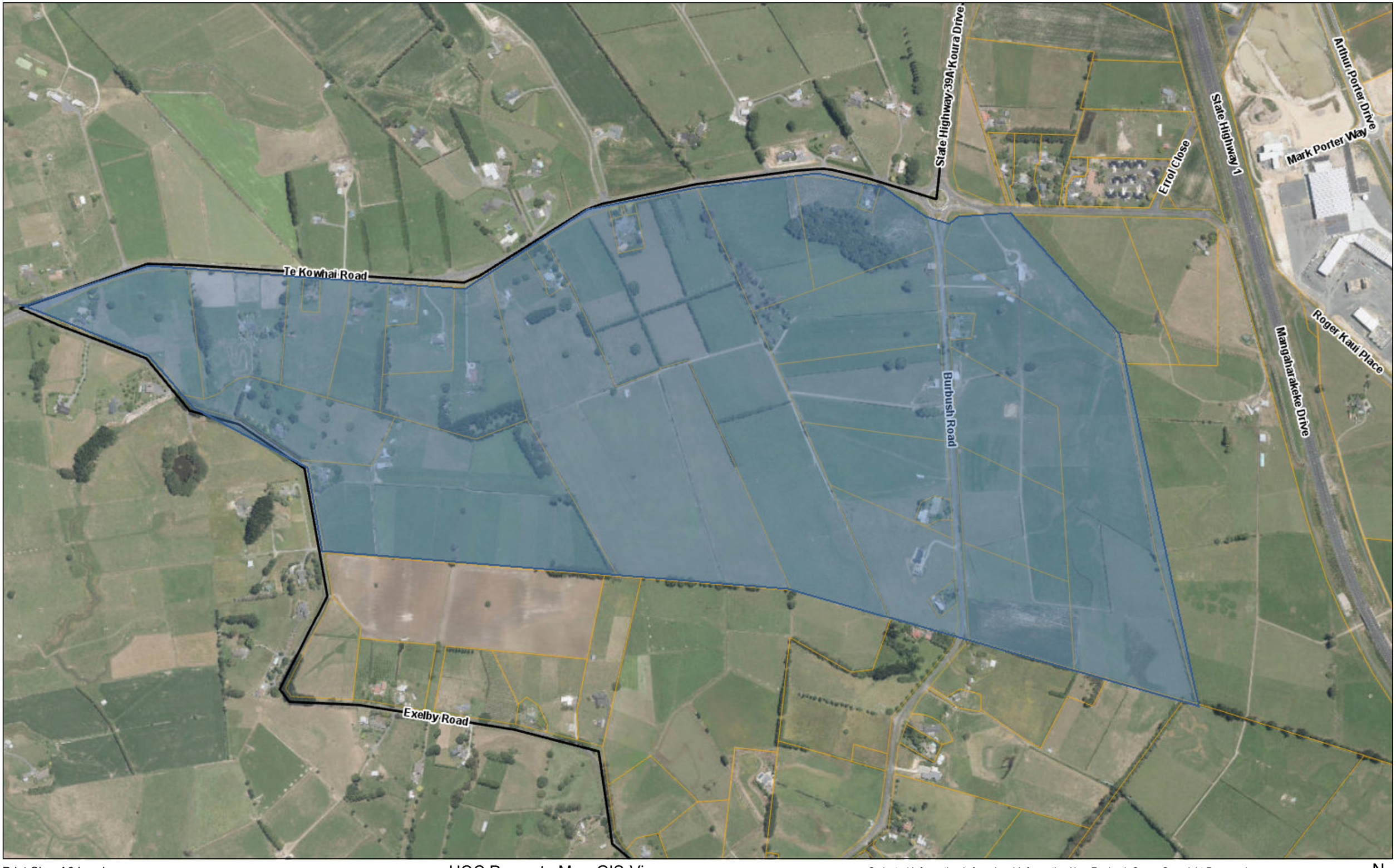

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Hamilton City Council
Te kaunihera o Kirikiriroa

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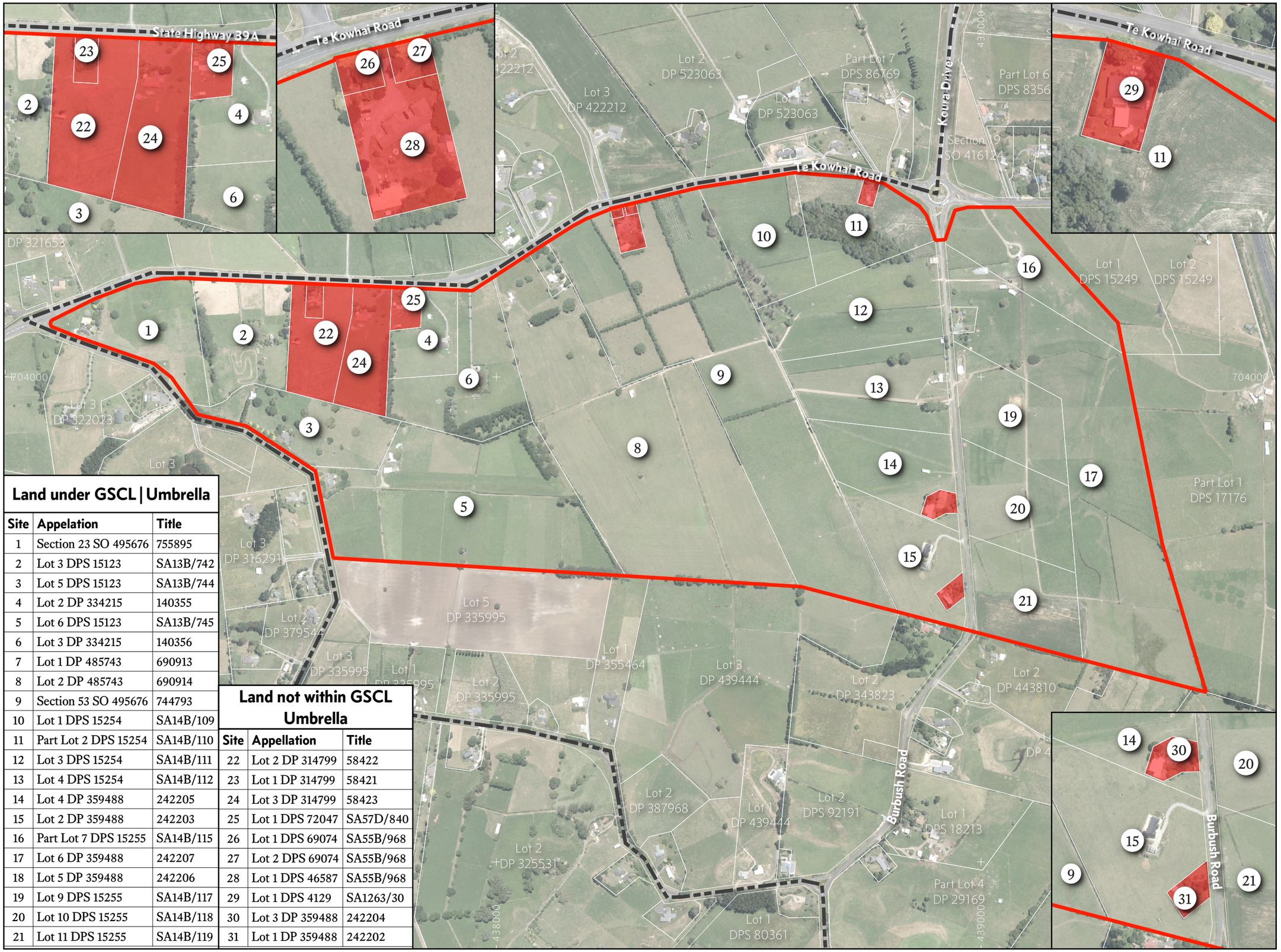
Author:

Date Printed: 29-04-2019

ATTACHMENT 3 - Map showing Titles



Land under GSCL | Umbrella

Site	Appelation	Title
1	Section 23 SO 495676	755895
2	Lot 3 DPS 15123	SA13B/742
3	Lot 5 DPS 15123	SA13B/744
4	Lot 2 DP 334215	140355
5	Lot 6 DPS 15123	SA13B/745
6	Lot 3 DP 334215	140356
7	Lot 1 DP 485743	690913
8	Lot 2 DP 485743	690914
9	Section 53 SO 495676	744793
10	Lot 1 DPS 15254	SA14B/109
11	Part Lot 2 DPS 15254	SA14B/110
12	Lot 3 DPS 15254	SA14B/111
13	Lot 4 DPS 15254	SA14B/112
14	Lot 4 DP 359488	242205
15	Lot 2 DP 359488	242203
16	Part Lot 7 DPS 15255	SA14B/115
17	Lot 6 DP 359488	242207
18	Lot 5 DP 359488	242206
19	Lot 9 DPS 15255	SA14B/117
20	Lot 10 DPS 15255	SA14B/118
21	Lot 11 DPS 15255	SA14B/119

Land not within GSCL Umbrella

Site	Appellation	Title
22	Lot 2 DP 314799	58422
23	Lot 1 DP 314799	58421
24	Lot 3 DP 314799	58423
25	Lot 1 DPS 72047	SA57D/840
26	Lot 1 DPS 69074	SA55B/968
27	Lot 2 DPS 69074	SA55B/968
28	Lot 1 DPS 46587	SA55B/968
29	Lot 1 DPS 4129	SA1263/30
30	Lot 3 DP 359488	242204
31	Lot 1 DP 359488	242202

N

Legend

- Rotokauri North PPC Area
- Land not under GSCL Umbrella
- WDC/HCC TA Boundary

Data License:
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Map Projection:
NZGD2000 / Mount Eden 2000 (EPSG: 2105)

Drawn By:	FW	Date:	26/04/2019
Checked By:		Date:	
Approved By:		Date:	
Plot Date:	26/04/2019		

Signed:

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All dimensions to be checked; Do not scale from drawing.

Project:
Rotokauri North
Private Plan Change (PPC)
Green Seed Consultants Limited

Title:
Properties Under GSCL "Umbrella"

McKENZIE&Co CONSULTANTS LTD

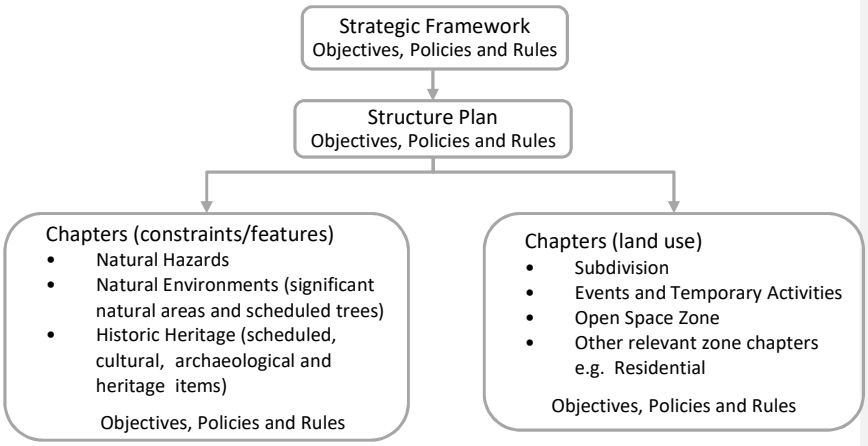
Issue Status:	For Information
Project Number:	1693-0
Drawing Number:	062
Revision:	E
A3 Scale:	1:7500

ATTACHMENT 4 - Proposed Plan Change Provisions and Structure Plan Map

3 Structure Plans

3.1 Purpose

a) This chapter contains objectives and policies relating to current Structure Plan areas (refer to Volume 2, Appendix 2). It also provides objectives, policies and guiding principles for any future Structure Plans which are predominantly within greenfield areas. This chapter must be read in conjunction with other relevant parts such as the Zones chapters.



b) A Structure Plan illustrates the proposed layout of a future development area.

c) The preparation of a Structure Plan is one of the first steps in advancing the development of new urban areas. It illustrates land uses such as residential, commercial, industrial and public open space. Structure plans usually contain broad servicing details such as transport configuration and may include other important key infrastructure features such as Three Waters networks. The level of detail can vary and may also show information such as housing density.

d) The purpose of a Structure Plan is to plan for the future in an integrated manner by:

i. Outlining a vision for the future.

ii. Setting out where growth can be accommodated and setting out a future land use pattern.

iii. Providing for staging of development.

iv. Guiding infrastructure planning including transport corridors, Three Waters, community facilities and public open space.

v. Identifying the financial feasibility of the development from a Council, Infrastructure provider and landowner perspective.

e) A Structure Plan has two main parts which must be incorporated into the District Plan:

i. Guiding principles including objectives and policies specific to the Structure Plan area.

ii. Map(s) showing the intended pattern of development. This could include information in respect of the following: transport corridor general location and hierarchy, public reserves and links, areas for preservation, protection or restoration/enhancement, development intensities for residential or other activities, if appropriate, and such other matters as may be relevant to or significant for urban development in the area.

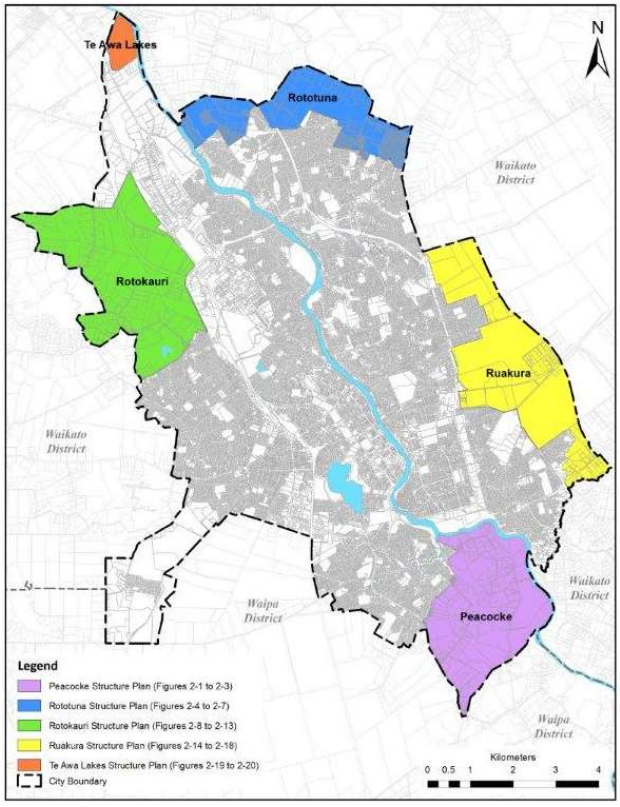
f) The maps or plans are at a high level of information and do not typically go into such detail as individual lot boundaries or the physical form of buildings and structures. Although a Structure Plan indicates future land uses, the rules that control the development of the land are contained in the District Plan zone chapters.

g) Currently prepared Structure Plans are incorporated into the District Plan. Future Structure Plans should also be incorporated into the District Plan, either through a variation or plan change.

Figure 3.1a: Structure Plan Locality Guide

Proposed Plan
Te Awa Lakes Private
Plan Change

Commented [RF1]: Map to be updated by Council or send us base map



3.2 Principles

To provide consistency across the City, Structure Plans should adopt the following principles where appropriate:

a) Outline planning outcomes for each Structure Plan area, for example:

   i. Development suitability, including any land-use constraints and opportunities such as natural hazards, topography, soil type, contamination, heritage, infrastructure, reverse sensitivity constraints.

   ii. The land uses envisaged in the Structure Plan area.

   iii. Transport network connections and indicative primary transport corridors.

   iv. Reserves (the location of these may be fixed or indicative depending on context).

   v. Other major infrastructure where relevant.

   vi. How existing features of the area, including amenity, landscape, natural character, ecological values, water bodies, high class soils and view catchments, will be managed.

b) Include indicative maps that illustrate the broad planning outcomes sought.

c) Achieve the dwelling density targets set out in the Regional Policy Statement.

d) Provide a high level of connectivity both internally and external to the Structure Plan area.

e) Recognise, protect and enhance natural, built and cultural heritage.

f) Avoid patterns of land use and development that:

   i. Puts vulnerable land uses in areas affected by natural hazards; and

   ii. Exacerbates or creates new natural hazards.

g) Integrate seamlessly into the rest of the District Plan by using District Plan mechanisms, including existing:

   i. Zones.

   ii. Overlays.

   iii. Defined terms.

   iv. Design guides.

   v. Formatting and style.

h) Give effect to the Vision and Strategy for the Waikato River.

3.3 Objectives and Policies: Structure Plans

When consent is required for subdivision and/or development within a Structure Plan area, the proposal must consider where relevant the objectives and policies below and any objectives and policies specific to that Structure Plan area (refer to 3.4 to 3.7).

Objective	Policies
3.3.1 Optimised, long-term, positive environmental, economic, social and cultural effects of greenfield development.	**3.3.1a** Development should be in general accordance with the relevant Structure Plan.
	3.3.1b Development of Structure Plan areas should aim to achieve: i. An overall residential density of 16 dwellings per hectare (excluding transport corridors).
	3.3.1c The design of development should provide population densities that support safe efficient passenger transport and opportunities for walking and cycling.
	3.3.1d Interim land use and development including low density residential development should not compromise the integrity and viability of the land use pattern for the relevant Structure Plan.
Explanation	
The Regional Policy Statement sets dwelling density targets, derived from Future Proof. These will be achieved by managing lot sizes and subdivision yields in Structure Plan areas. Future commercial and industrial land requirements are also identified in the Regional Policy Statement. The targets exclude the Large Lot Residential Zone. *Structure Plans are a mechanism for achieving the future land uses and density targets as set out in the Regional Policy Statement and Future Proof.* *Activities such as land use and subdivision need to be managed in the interim. There is the potential for these to undermine the ability of the Structure Plan area to be implemented.*	
Objective	**Policies**
3.3.2 New urban development is appropriately serviced and properly integrated to minimise City network impacts.	**3.3.2a** The use of land for urban development will not be allowed unless appropriate infrastructure is provided for and the servicing of this land will maintain the efficiency and sustainability of regionally significant existing and planned infrastructure.

	3.3.2b New development is able to be adequately serviced in terms of Three Waters and transport infrastructure.
	3.3.2c Development is co-ordinated with the provision of infrastructure and social infrastructure.
	3.3.2d Staging and sequencing is in general accordance with any staging indicated on the relevant Structure Plan.

Explanation

Infrastructure must be planned in advance of development. Infrastructure includes Three Waters and transport networks, as well as social infrastructure such as libraries and community halls. Infrastructure must be provided not only to service one development but must be of an appropriate size to integrate with the existing and future infrastructure networks.

Council's Long Term Plan or Annual Plan sets out the programme for providing infrastructure to service growth. Where a developer wishes to pursue development ahead of Council's programmes, a Development Agreement will need to be entered into with Council to ensure that the infrastructure is provided in a way which is efficient and sustainable from a city-wide perspective. In these cases it is anticipated that developers will bear the full costs of infrastructure provision.

This approach will enable growth in areas that are not funded for infrastructure to be funded by developers under Development Agreements between all parties. The reason for Council's approach is due to its inability and the inability of other infrastructure providers to invest in infrastructure necessary to support the development of the growth cells all at once. This will enable the sustainable management of growth for the social and economic well-being of the community and meeting the needs of future generations.

Objective	Policies
3.3.3 Effective and integrated management of Three Waters so as to sustainably manage the impact of development on the City's natural and physical resources.	**3.3.3a** Three Waters will be managed in accordance with the relevant Integrated Catchment Management Plan.
	3.3.3b Integrated Catchment Management Plans shall be developed to determine how to manage Three Waters in an effective and integrated manner including by: i. Minimising the effects of urban development on downstream receiving waters. ii. Managing the run-off from the different relief and soil types in an integrated manner.

	iii. Sustaining groundwater levels in peat soils as far as practicable. iv. Safeguarding and enhancing the natural functioning and ecological health of freshwater bodies and areas of indigenous vegetation, water features and habitats. v. Retaining a hydrological cycle close to the pre-development hydrological cycle as far as practicable. vi. Maintaining stormwater discharge from the catchment to at or below pre-development levels. vii. Incorporating Low Impact Urban Design and Development (LIUDD) principles. viii. Identifying and incorporating appropriate water-sensitive techniques. ix. Recognising social, economic, environmental and cultural objectives for the catchment.
Explanation	
Integrated Catchment Management Plans allow the collective consideration of all Three Waters. *Managing the stormwater effects of future subdivision, use and development is critically important. A full Integrated Catchment Management Plan should be prepared iteratively with the development of each Structure Plan.* *Effective management of stormwater will maintain or improve the quality of the stormwater entering the receiving environment. This means maintaining flow regimes, re-vegetating riparian margins, minimising the potential for contaminants to enter water bodies, reducing flows into stormwater networks through the adoption of low-impact stormwater design, and ensuring groundwater levels are maintained.*	
Objective	**Policies**
3.3.4 An integrated and efficient pattern of land use and transportation so as to sustainably manage the impact of development on existing and planned transport infrastructure.	**3.3.4a** Integrated Transport Modelling is undertaken for all Structure Plan areas.
	3.3.4b Movement routes are integrated with surrounding neighbourhoods and existing and planned transport networks.
	3.3.4c Enable connectivity with other undeveloped adjoining sites.
	3.3.4d The transport network supports efficient passenger transport and opportunities for walking and cycling.

	3.3.4e Environmental impacts of building new transport corridor infrastructure are minimised.
	3.3.4f Opportunities for improved safety, accessibility, connectivity and efficiency within the transportation network are provided.

Explanation

Integrated Transport Modelling, utilising the Waikato Regional Transportation Model, is an essential component of the Structure Plan process and land uses and the transport network should be developed iteratively, each informing the other. This modelling should inform any future Integrated Transport Assessment required in structure plan areas.

The transport system must cater for movement into the Structure Plan area from other parts of the City, as well as movement within the Structure Plan area itself.

Objective	Policies
3.3.5 Compatible buildings and activities.	**3.3.5a** Adverse effects of activities near zone boundaries are managed through setbacks, building design, and landscaping.
	3.3.5b Sensitive land uses avoid adverse effects on and from regionally significant infrastructure and regionally significant industry.
	3.3.5c Development to avoid adverse effects on the safe, efficient and effective operation and use of existing or planned infrastructure.

Explanation

This objective recognises the importance of managing both structures and activities at the interface of different land uses. This can be managed by zones through setbacks, design of buildings, and landscaping.

These policies recognise the need to manage residential and other sensitive land uses around regionally significant infrastructure and industry, existing and proposed. The purpose is to manage the effects that sensitive activities and structures can have on the infrastructure, and the adverse effects that the infrastructure and industry can have on sensitive uses.

Regionally significant industry is defined in the Waikato Regional Policy Statement.

Objective	Policies
3.3.6 Development responds to land suitability including topography, landscape, natural features, soil type, natural hazards, heritage features, adjoining land uses.	**3.3.6a** The loss of significant vegetation is minimised.
	3.3.6b Large-scale earthworks and modifications to landforms are avoided where possible to ensure development retains features of the landscape identified on structure plans.
	3.3.6c Road layouts adjacent to identified natural features recognise and retain their natural form where practicable.
	3.3.6d The scale and quantum of development and land use type recognises land characteristics and suitability and adjoining land uses.
Explanation	
Topographical features, significant vegetation, natural features such as soil type, flood hazard, heritage features, bank stability, river and gully systems, adjoining land uses should be identified through the Structure Plan process. Structure planning should acknowledge and appropriately respond to such features.	
Objective	**Policies**
3.3.7 A range of well-connected, functional public open spaces.	**3.3.7a** The location and size of public open spaces is provided in accordance with Council's Open Space Plan.
	3.3.7b Recreational activities are considered for co-location with: i. Multifunctional stormwater management. ii. Walkways and cycleways. iii. Cultural and heritage sites. iv. Significant Natural Areas.
	3.3.7c Promote appropriate and improved access to the Waikato River to better enable sporting, recreational, and cultural opportunities.
Explanation	
Public open space is usually indicative on Structure Plan maps, and exact sizes and locations will be determined at the time of subdivision consent. The Hamilton City	

Open Space Plan, September 2013 sets out a 50-year strategic direction for Hamilton's parks and open spaces. The Open Space Plan presents a series of goals, priorities and an action plan that responds to the needs, challenges and opportunities facing Hamilton's open spaces.

3.4 Peacocke

a) The Peacocke area is a 720ha area of rural land to the southeast of the Glenview suburb of Hamilton City. The land was incorporated into the City from the neighbouring Waipa District Council in 1989 for the express purpose of providing for the City's future urban growth.

b) For this reason the Peacocke Structure Plan has been prepared to provide a resource management framework to guide future use and development of the area and will be used to inform future District Plan changes, develop an infrastructure programme and a basis to provide guidance to development within this Growth Cell prior to the rezoning of the area.

c) The Peacocke Structure Plan promotes ideas regarding urban design concepts and consideration around urban form, the transport network and the natural environment. These ideas are based on the following key principles:

Contextual Design: Ensure that future development considers the natural environment, built environments and how development fits into the surrounding area as part of the design solution. This will help to establish the quality of development wanted for the area.

Concentration: Ensure that future development is undertaken at an appropriate density and intensity of use that preserves and restores the ecological integrity of the area while improving the quality of life for residents, facilitating a vital economy, and promoting the efficient use of land and community assets.

Accessibility and Connectivity: Ensure that the movement network within the area is legible, permits ease of movement and avoids severing neighbourhoods by ensuring an integrated street network that provides an appropriate block layout that is well connected and integrated with the wider environment.

Legibility and Identity: Ensuring that the future layout is easily understood, through the development of routes, neighbourhoods, nodes, edges and landmarks. Provide neighbourhoods with a distinctive character that allows people to experience, and take ownership, of their unique community.

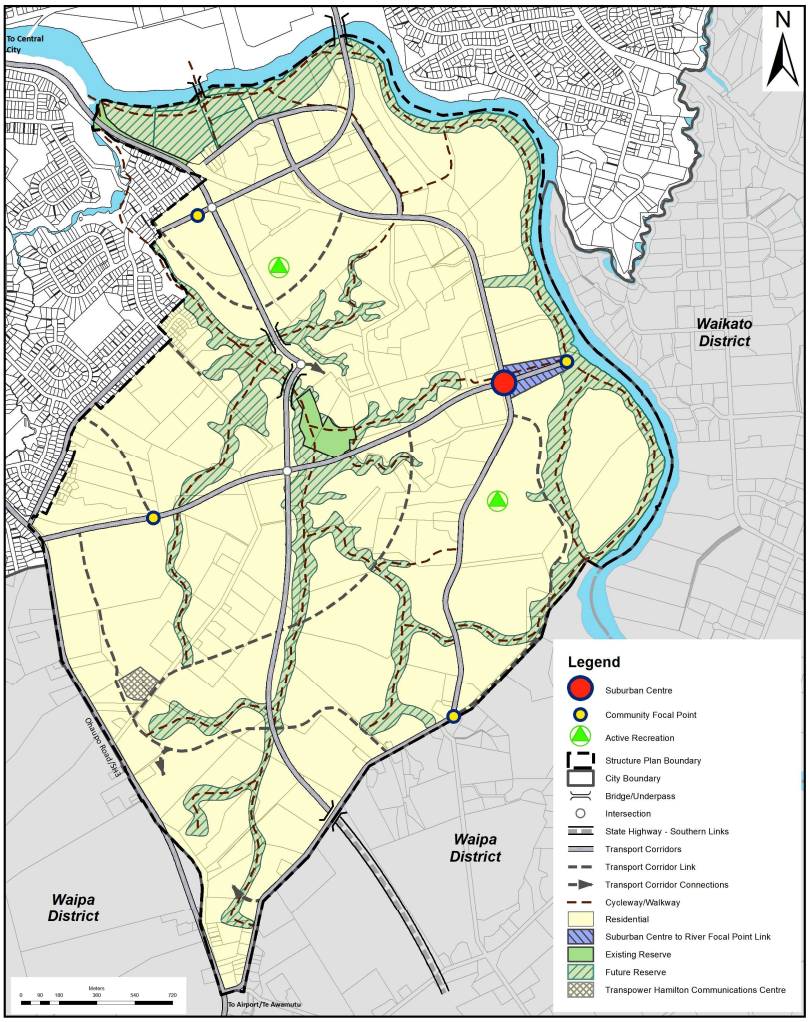
Innovation: Encourage future development within Peacocke to be innovative and implement best practise methods.

Vision

The vision for the Peacocke area is that it will become a high quality urban environment that is based on urban design best practice, social well-being, and environmental responsibility.

The goal for Peacocke is that development will respond positively to its natural setting and built form to develop a number of well connected neighbourhoods based on an urban development concept that respects and restores the area's natural environment.

Figure 3.4a: Peacocke Structure Plan – Land Use



3.4.1 Objectives and Policies

When consent is required for subdivision and/or development within the Peacocke Structure Plan area, the proposal must be in accordance with the objectives and policies below and any general objectives and policies for Structure Plan areas (refer to 3.3).

Peacocke Natural System

To strengthen the natural and ecological environment within Peacocke.

Objectives	Policies
3.4.1.1 Protect and enhance significant natural areas.	**3.4.1.1a** Protect the physical integrity and ecological and stormwater function of the Mangakotukutuku Gully and Waikato River margins.
	3.4.1.1b Provide an undeveloped open space buffer zone beyond the top edge of the Mangakotukutuku Gully and Waikato River to improve legibility from all parts of the growth cell.
	3.4.1.1c Encourage lower density development (lot sizes of 800m^2+) along the gully network.
	3.4.1.1d Provide for revegetated gullies and river margins.
	3.4.1.1e Manage stormwater to minimise the effect of urban development on Mangakotukutuku stream values and functions, maintain the ability of the stream to continue to provide habitat for threatened aquatic species and minimise adverse effects on the stream water quality and habitat.
3.4.1.2 Create ecological and open space links between gully and river.	**3.4.1.2a** Provide green corridors between the major arms of the Mangakotukutuku Gully and Waikato River.
	3.4.1.2b Align collector and local street networks to create strong physical and visual connections between the gully system and river.
	3.4.1.2c Provide a green corridor along the Waikato River that provides pedestrian and cycling facilities and amenity.
3.4.1.3 Develop only on suitable slopes and avoid modification of landforms.	**3.4.1.3a** Slopes steeper than 15 degrees are regarded as unsuitable for development given accessibility, stability and the extent of earthworks required.

Objectives	Policies
	3.4.1.3b Large-scale earthworks and modifications to landforms should be avoided to ensure development responds positively to the landscape and enables the creation of a distinctive urban form.

Peacocke Built Environment

The development of a unique and vibrant urban environment that responds positively to the natural environment, which still portrays liveability, diversity and safety.

Objectives	Policies
3.4.1.4 Integrate movement routes with surrounding neighbourhoods.	**3.4.1.4a** Extend existing primary movement routes into the growth cell and use new routes to 'stitch' these together. Use these routes to orientate the secondary street network.
	3.4.1.4b Create a high degree of connectivity both within and out of the Structure Plan area.
	3.4.1.4c Enable access to employment, entertainment, retail and recreation through the integrated transport network.
	3.4.1.4d Seek ways to reduce the impact of major movement barriers such as major arterial roads, the Mangakotukutuku Gully and the Waikato River.
3.4.1.5 Ensure that higher density development is linked to social and natural amenity.	**3.4.1.5a** Increase density around nodes, parks and riverfront areas.
	3.4.1.5b Take advantage of areas of high amenity.
	3.4.1.5c Intersect proposed passenger transport routes with nodes for critical mass of population and efficient interchange capabilities.
	3.4.1.5d Encourage urban form that reduces dependency on the car by focusing on intensification and encouraging walking, cycling and the use of passenger transport.

Objectives	Policies
3.4.1.6 Encourage an overlapping mix of land uses.	**3.4.1.6a** Provide a wide variety of land use activities within comfortable walking distance of the highest population densities and amenity.
	3.4.1.6b Use mixed use planning rules to encourage a diverse and compatible range of activities, both vertically and horizontally.
3.4.1.7 Provide a public edge to the gully and river.	**3.4.1.7a** Avoid new development 'turning its back' or privatising edges to major natural features and recreational areas.
	3.4.1.7b Avoid the creation of access barriers to allow for a wide spectrum of the resident population and visitors to physically access or visually interact with these features.
3.4.1.8 Utilise natural promontories and edges to develop distinct urban areas.	**3.4.1.8a** Use natural features to define neighbourhood edges and inform the development of a diverse range of living environments across the growth cell.
	3.4.1.8b Use these landscape qualities as generators for niche market opportunities.
	3.4.1.8c Focus on the creation of a stimulating river side urban development that is unique to Hamilton.
3.4.1.9 Locate neighbourhood centres within walking distance to recreational areas.	**3.4.1.9a** Development should be contained in distinctive neighbourhoods that are walkable and safe and linked by a high quality open space network.
3.4.1.10 Future-proof the Peacocke Structure Plan area.	**3.4.1.10a** Recognition of the role of Peacocke in the City as well as the sub-region.

Peacocke Social Wellbeing

Create an urban form and public realm that encourages strong and vibrant communities and neighbourhoods that are attractive, safe and well connected.

Objectives	Policies
3.4.1.11 Locate large recreation areas on flat sites at the periphery of dense urban areas.	**3.4.1.11a** Locate formal sports pitches on slopes less than 1:50 and of sufficient coverage to avoid large quantities of cut and fill.
	3.4.1.11b Locate large recreational areas on the periphery of higher density areas where a balance can be struck between proximity and the impact these large areas have on critical population catchments.
	3.4.1.11c Locate formal sports fields on collector or minor arterial routes to ensure the sustainable use of the roading network and limit impact on surrounding neighbourhoods.
3.4.1.12 Develop the neighbourhood as the building block of the area.	**3.4.1.12a** Establish an integrated network of neighbourhoods, each distinctive and each with its core and sense of place.
	3.4.1.12b Focus neighbourhoods around parks, schools, centres, and main streets.
3.4.1.13 Create a continuous network of open space.	**3.4.1.13a** Establish a series of green spaces providing connections and meeting places.
	3.4.1.13b Ensure a high level of public access to the Waikato River corridor.
3.4.1.14 Regenerate existing suburbs through shared amenities.	**3.4.1.14a** Utilise new investment as an opportunity to improve or develop new amenities where deficiencies are recognised and allow new residents to 'tap' into and help sustain existing community structures.
	3.4.1.14b Avoid conflicts with overprovision of amenities and undue competition with existing facilities.
	3.4.1.14c Integrate into the existing urban form and natural and built environments.

Peacocke Cultural Environment

Through urban and environmental design recognise and celebrate historic and cultural features within the Peacocke area.

Objectives	Policies
3.4.1.15 Protect historic and culturally significant sites or features.	**3.4.1.15a** Respect known pa sites, borrows pits and other cultural associations with waterways and the land, through the creation of protective reserves or enlightening developers to ways of integrating these features into new developments for the benefit of all stakeholders.
	3.4.1.15b Culture and heritage can be generally perpetuated through retaining familiar landmarks and also by non-physical means, such as place names.
3.4.1.16 Protect surrounding rural views behind ridgelines, distance views to the City and regional landscape features.	**3.4.1.16a** Maintain strategic views from Peacocke Road and the localised knoll near Peacocke Lane to areas outside the growth cell through lower density development and greater building setbacks in these locations.
	3.4.1.16b Restrict the impact of higher density areas on the rural character by generally containing visual effects within the catchment area of the Mangakotukutuku Gully.
	3.4.1.16c Provide greater building setbacks along the Ohaupo and Peacocke Road ridgelines and minimise reverse sensitivity effects of rural activities on urban land uses.
	3.4.1.16d Provide for lower density development (lot sizes of 1000m²+) in areas of undulating topography.

3.4.2 Structure Plan Components

3.4.2.1 Natural Character Areas

Development within Peacocke needs to respond to the strong landscape features; including the Mangakotukutuku Gully system, the Waikato River Terrace areas, and the

Southern Hills area as shown on Figure 2-3 Peacocke Structure Plan, Character Areas and Neighbourhoods in Volume 2, Appendix 2.

While the urbanisation of the Peacocke area will transform the existing environment, it is essential the extent of earthworks and land modification undertaken is required to ensure that the natural landforms inform the shape of urban development.

As it is the aim to create an interesting and distinctive urban form based on the underlying landform, the Structure Plan has identified three natural character areas that will guide future development of the Peacocke area. These character areas are:

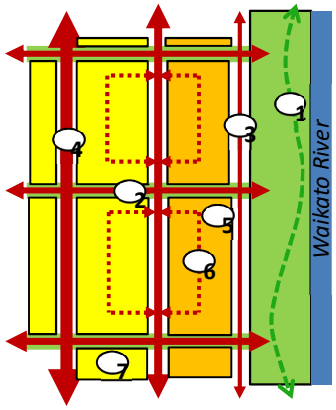
a) Terrace Area

i. This area is located adjacent to the Waikato River edge and has a high level of amenity. High density residential development would benefit from location in this area. Residential development will be a combination of general residential development, terrace housing and apartments. Development along the river will be required to create a public frontage to a river esplanade by ensuring dwellings front on to the river and the establishment of a local road or access lane that provides public access along the river will create a safe and usable river esplanade (refer to Figure 3.4.2a).

ii. Public access to the river will be maintained with the development of 'green streets'. Giving priority to pedestrian circulation and open space over other transportation uses may include sidewalk widening, landscaping, traffic calming, and other pedestrian-oriented features. A green street will enhance and expand the public open space in the immediate area, reinforce desired land use, transportation patterns, and linkages down to the river esplanade (refer to Figure 3.4.2a).

iii. A master plan will be required for the river frontage prior to any development taking place, in order to ensure the large river frontage is fully utilised, creating an interesting and distinctive urban form.

Figure 3.4.2a: Diagram showing the street pattern that encourages increased accessibility to the Waikato River Esplanade

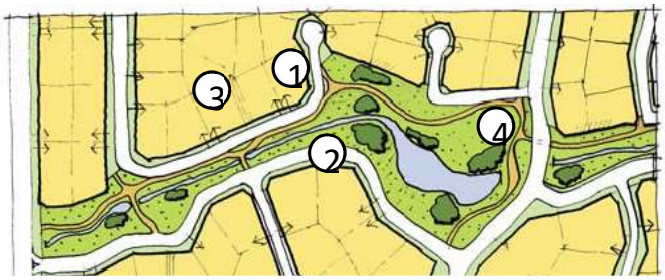


1. River Esplanade – Pedestrian/Cycle network connecting Peacocke to Suburban Centre to Central City
2. 'Green Streets' connecting neighbourhoods to the River Esplanade
3. Local road/access lane fronting River Esplanade providing public access
4. Main traffic route setback from river front
5. Higher density residential development in areas of high amenity
6. Access to residential lots from rear lanes
7. General residential development

b) Gully Area

i. The environmentally sensitive area of the Mangakotukutuku Gully network runs through the centre of Peacocke. Because of the natural sensitivity of this area lower urban densities are appropriate. Where the topography does not allow connectivity, lots should be arranged around 'cul-de-sac' spurs, limiting the need for the filling in of gullies or the re-contouring land (refer to Figure 3.4.2b).

Figure 3.4.2b: Concept illustrating the use of roading along the gully to make the gully system more legible and reduced densities around the gullies to protect the natural and ecological environment



1. Use cul-de-sacs where connectivity is constrained by topography
2. Roading and Open Space buffer along gully
3. Larger lots along gully 800m² to 1200m²
4. Gully as public reserve land creates a strong feature within the urban fabric

ii. The visual sensitivity of the Mangakotukutuku Gully network needs to be acknowledged. The heavily incised nature of the Mangakotukutuku Gully means it potentially has poor legibility and little visual relationship with the wider urban form, particularly if privatised and enclosed along its edges. To protect against this, an open space buffer running along the top of the banks,

will allow the gully system to be legible and in turn provide definition to the surrounding urban form (refer to Figure 3.4.2b).

iii. Conversely local roads should run along the gully edge in as many places as possible with houses on one side of the street only, or the gully edge be maintained as public reserve land (refer to Figure 3.4.2b).

iv. It is inevitable that some roads will have to cross the gully arms to create a well connected and integrated transport network. However it is envisaged that collector and local roads should generally be routed around the gully arms to minimise modification of the landform and limit ecological damage.

v. In terms of density of development, lot sizes of between 800m² and 1200m² would be more suitable for land immediately adjoining the gully system (refer to Figure 3.4.2b). This will ensure the amount of impervious surface is reduced and provide opportunities for water sensitive techniques to be used. A reduction in density adjoining the gully system will contribute visually to a more open and distinctive urban form, allowing the gully itself to be the dominant organising feature.

c) Hill Area

i. The undulating topography in the southern area of Peacocke is proposed for lower overall density (lot sizes of 1000m²+) with higher intensity arranged along the ridgeline. Steep slopes in this area should be kept in their natural form, through active planting of these areas with indigenous plants. Roads and access ways should follow the contours to ensure minimal disturbance of the natural topography.

ii. The elevated ridges in the southern portion of Peacocke provide a degree of physical and visual containment to the growth cell but they are not prominent skyline ridges needing preservation from urban development. However it is desirable to maintain a more generous open setting along slopes to ensure the views of the hills are not completely obscured. The elevated nature of this area can be used to create distinctiveness.

iii. The localised knoll to the east of Peacocke Lane is the main highpoint in the northern part of Peacocke. There is an opportunity to utilise this to provide a point of difference through design guidance or the possible development of specific provisions for the area to encourage development to respond to the landform. This may involve lessening the density or creating a different urban form in this area. Avoidance of significant roading through or over such features should also be part of this response.

3.4.3 Nodes

3.4.3.1 Community and Recreation Facilities

a) In order to achieve a sustainable balance of land use activities it is important to ensure that a range of formal and informal recreational opportunities are provided to meet the diverse needs of the intended growing population of the Peacocke area.

b) Community facilities such as a public library, passenger transport facilities, schools and other community facilities will be required to support this growing

community over time. When required, these facilities will be developed within or close to the commercial and community focal points identified, to ensure they are easily accessible to the residential areas of Peacocke.

c) Recreational facilities for the area, including the parks and reserves network need to meet multiple functions. Thus where possible:

   i. Neighbourhood reserves will be integrated with the gullies,

   ii. Sports parks may have natural areas, play lots and links to gullies,

   iii. Riverside reserves will provide for walkways/cycle ways, may have nodes that serve as neighbourhood parks and will incorporate protection of natural areas,

   iv. All parks will provide landscape amenity, and where possible will support environmental values, and

   v. Serve as stormwater peak flow detention basins.

d) The two major sports parks will contain a number of sports pitches (suitable for senior grade play, junior fields and training areas) and an area that serves a neighbourhood park function. Whilst they will primarily serve the local population, they will also form part of the city-wide network of sporting facilities. Two general locations have been shown, the northern park and the eastern park. The need for large, level, well-drained areas that are accessible will be significant factors in determining their precise location. Consideration will also need to be given to amenity issues with adjacent properties.

e) The sports parks are to be linked into the green corridors which will help to establish a more integrated network of facilities and improve accessibility. Together the sports parks, neighbourhood parks and major features such as the gully network and river corridor will provide a network of recreational facilities catering for the diverse needs of the local community. They will also make a significant contribution to the character and appearance of the area in line with the objectives and policies, creating public open space around key landscape features.

f) A major reserve area, on the south side of the Waikato River, will create a major recreational node along the riverbank and provide for the expansion of Hamilton Gardens.

g) Also neighbourhood parks provide a range of informal recreation facilities, including children's play areas. These will complement the range of facilities provided by the sports parks and provide a smaller scale focal point for the local neighbourhoods. They are intended to serve a catchment area with approximately a 500m radius. In order to provide appropriate levels of accessibility and an even distribution of recreational facilities, each neighbourhood should be provided with a park comprising approximately 0.8 hectare.

h) Where possible neighbourhood parks should incorporate existing natural features and be sited in prominent locations where there is scope for passive surveillance, outlooks and a high degree of accessibility. They may also act as a transitional area between different activities. Neighbourhood parks will have an informal character with little built development. Like the active recreation sports parks, they will be established within residential areas.

i) Criteria for the location of neighbourhood parks are:

i. Distribution across the growth cell,

ii. Respond to the local context and work with the existing landscape,

iii. Integrate CPTED principles into the development of the parks,

iv. Accessibility to a residential catchment,

v. Topography,

vi. Ability to protect or enhance natural features,

vii. Ability to protect cultural and heritage values,

viii. Ability to foster positive neighbourhood identity and provide community focal points,

ix. Ability to provide off-road linkages between residential neighbourhoods and facilities, and

x. Ability to link areas of natural and ecological value.

j) The exact location of neighbourhood parks will be determined in consultation with landowners at the time of subdivision, taking into account the criteria above and the local road layout.

k) The indicative riverside reserve network is intended to create a continuous walking and cycling network along the river's edge. A number of areas of particular landscape value have been identified where the reserve has been widened to indicate Council's intention to acquire the land. The desired outcome is a vegetated and accessible riverbank corridor that provides a buffer between urban development and the river. As part of the riverside reserve it is proposed that a park be established adjacent to the proposed community focal point, thus providing further recreation amenity associated within the Suburban Centre.

3.4.3.2 Neighbourhoods

a) A key urban design principle for Peacocke is well-connected and walkable residential areas. This means that individual residential neighbourhoods are linked well by local and collector roads, and via off-road walkway and cycleway links. The roading network itself should respond positively to the strong topographical features within each character area such as the arms of the Mangakotukutuku Gully.

b) Walkable neighbourhoods are also about creating attractive residential areas with legibility and clear linkages to key destinations such as the commercial/ community nodes where sports parks, schools and community facilities will be located. Residential densities should be increased around these nodes to concentrate more of the population within easy walking distance of key community infrastructure. In this manner an urban form is more likely to be generated that encourages walking and cycling and a reduced reliance on the private car.

3.4.3.3 Commercial/Community Nodes

It is important that the day to day needs of the emerging community of Peacocke is provided for locally and within walking distance of the various residential areas. It is

envisaged that there will be five commercial/community nodes within the Peacocke area.

These Nodes are split into two categories: Suburban Centre and Community Focal Points.

a) Suburban Centre

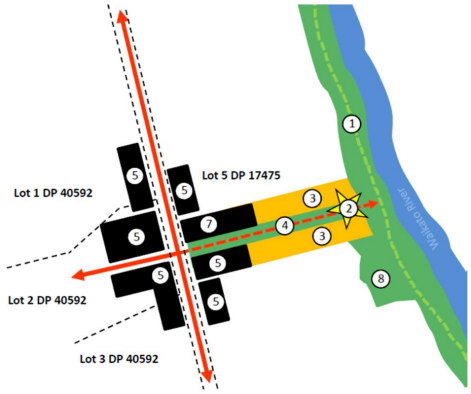
i. The Suburban Centre will be the location for a public library, schools, public transport centre and the focus for the majority of commercial activities within Peacocke. It should also be the location for a secondary school, should one be required to serve the Peacocke area. The Suburban Centre is a street-based, mixed-use centre, based around attractive and well functioning public open space and containing a mix of land uses and facilities that would be expected within a conventional suburban centre (refer to Figure 3.4.3a).

ii. The Suburban Centre's indicative location on a transport route junction will ensure it is easily accessible to the entire growth cell. The size and configuration of the Suburban Centre will be determined in more detail once a retail needs analysis for Peacocke has been developed.

iii. Residential activity is a key component of the Suburban Centre. Apartment style development will be encouraged within and beside the Suburban Centre. This could take the form of commercial activity at the ground floor with residential above. The benefit of this is that it injects activity and 'life' into these centres outside of normal working hours.

iv. The location of the Suburban Centre creates a strong link via a pedestrian orientated 'green street' to a community focal point on the Waikato River. The community focal point will focus on hospitality and small boutique retail as well as encouraging the use of the river esplanade and the river as a potential connection between the growth cell and the Central City and other key destinations (refer to Figure 3.4.3a).

Figure 3.4.3a: Concept plan showing the proposed Suburban Centre and its relationship to the river and distribution of land uses



1. River Esplanade – Pedestrian/Cycle network
2. Land Use that focuses on the river and hospitality
3. Mixed Land Use along link between Suburban Centre and River node
4. Pedestrian orientated 'Green Street'
5. Retail and traffic orientated activities located along arterial routes
6. Suburban Centre located at intersection of Arterial routes to provide greater accessibility
7. Community Facilities and Passenger Transport node
8. River reserve providing Suburban Centre with recreational facilities

Figure does not define the exact location and extent of the suburban centre and is indicative only.

b) Community Focal Points

i. These are small in size and serve a local function only. The locations have been chosen to provide a wide distribution across the growth cell maximising the amount of residential land within a five minute walking distance of the centres. The centres are located at junctions to facilitate public transport and accessibility, and adjacent to neighbourhood parks or other open space. These are intended to be the location for future schools in the Peacocke area making them easily accessible from adjoining residential areas. The final make up and location of these community focal points within the neighbourhood will be finalised through the Master Plan process outlined in Volume 2, Appendix 1.2.2.3.

3.4.4 Transport Network

a) A fundamental urban design principle is the ease of movement to ensure well connected communities. It is essential that transportation routes are designed to give priority to walking and cycling, and facilitate a seamless web of direct and efficient passenger transport routes that connect neighbourhoods with the central area of the City and other key destinations. In considering the final alignment of the Transport Network the alignment of transport routes needs to be taken into account, as identified in Volume 2, Appendix 2, Figure 2-2 Peacocke Structure Plan Staging and Transport Network.

b) The transport network (refer to Figure 3.4.4a) shown on the Structure Plan is indicative and not intended to show exact alignments. Collector roads in particular are shown conceptually to provide key linkages between different residential neighbourhoods. Their precise alignment will be largely determined as individual subdivisions are progressed.

c) The transportation network is made up of the following:

i. A walkway/cycleway network which wherever possible has been developed as a segregated network (i.e. separated from the carriageway),

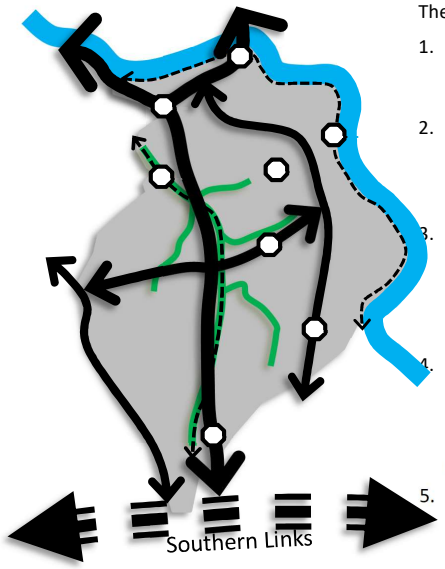
ii. An arterial transport network which links destinations, and

iii. A collector road network which serves to connect residential neighbourhoods together as well as to the arterial roading network.

d) The distribution of roads across Peacocke is based on this hierarchy through linking key nodes and provides a logical passenger transport network. While in the foreseeable future this will be based on buses, it is intended that the arterial routes can potentially accommodate alternative modes of transport such as light rail.

e) Furthermore uncertainty around the precise form and function of the Southern Links state highway network also means the roading network needs to be responsive to changing circumstances and priorities. The final alignment of the arterial network within Peacocke will be established through the designation process. Therefore the alignment of some of the arterial routes is highly indicative, especially the southern section of the central major arterial route (refer to Figure 3.4.4a below).

Figure 3.4.4a: Proposed Transport Corridors



The key features of the network are:

1. Walkway and cycleway route linking all parts of Peacocke to the Central City via the Mangakotukutuku Gully and Waikato River corridor
2. 'City Link' major arterial route which traverses through the central portion of Peacocke and links with Cobham Drive at the Cobham Bridge, to provide a direct route to the Central City and hospital
3. 'Eastern Link' major arterial route which branches from the City Link route and crosses the Waikato River near Echo Bank Place linking with Cobham Drive and the Hamilton Ring Road, thus providing a direct route to the eastern side of the City
4. 'City Link' major arterial route forms part of the 'Southern Links' network that will likely connect with Kahikatea Drive in the west, and the Waikato Expressway in the east which provides strong connectivity in all directions
5. Minor arterial network that provides a link between the western and eastern sides of the growth cell, and the main north-south corridor for the eastern part of the growth
6. Collector road network that links individual residential neighbourhoods with each other and with the arterial roading network

3.4.5 Interim Subdivision

a) The Structure Plan sets the overarching structure and pattern of development, to which an eventual infrastructure programme will need to reflect. While the concepts are flexible in their application to some extent, there are critical elements of infrastructure that must be provided for, within defined corridors.

b) The probability of the key urban design concepts of the Structure Plan being realised decreases exponentially as the size of allotments decreases. Smaller blocks of land will not be able to achieve the critical mass required to enable neighbourhood centres, or different residential densities to be developed, in a coherent and integrated manner. Essentially this means that the urban form promoted by the Structure Plan may become unachievable if wide-scale interim subdivision occurs.

c) There is however no fundamental objection to interim development of future growth areas provided the ability for further urban development in an acceptable form is preserved. The provisions within Chapter 23 are intended to manage interim subdivision with these principles in mind.

d) This approach will provide a more coherent and coordinated response to the interim development pressures that exist, and provide the optimum platform to manage these issues. This ensures that interim development in Peacocke still enables the City's objective of achieving full urban development in the entirety of the Peacocke area, that is based on good urban design principles and is unique in

Hamilton while still providing land owners the opportunity to manage their land sustainably.

3.4.6 Indicative Infrastructural Development Programme

a) Council's Long Term Plan sets out the infrastructure programme for the City. The infrastructure provision for Peacocke detailed in the Long Term Plan is a programme of roading upgrades, a wastewater storage facility or similar wastewater solution, and extension of water and stormwater services to the area shown as Stage 1 on the Staging plan contained in Volume 2, Appendix 2, Figure 2-2.

b) Stage 2 of the growth cell does not have an established infrastructure programme within the Long Term Plan. Generally however, it is anticipated that over a 20-25 year period once the necessary bulk trunk infrastructure and transport network has been established (i.e. the installation of a bulk wastewater connection to the existing reticulated network to the north of the Waikato River, and a bridge and transport corridor connection constructed across the Waikato River) to join Peacocke to the City's existing infrastructure networks, development will start. However the development of Stage 2 could be brought forward if the necessary bulk infrastructure and transport networks are constructed outside of the Long Term Plan programme.

c) The development of Stage 2 is to be staged from the north in the vicinity of the Water Treatment Plant and then proceed in a southerly direction along Peacocke Road.

3.4.6.1 Rule - Proposed Staging of Residential Development

a) Volume 2, Appendix 2, Figure 2-2 sets out the intended staging of development for Peacocke which at this time consists of a Stage 1 of approximately 85 hectares. The remainder of the growth cell (Stage 2) does not have a staging proposed as infrastructure provision for this area is not within the Long Term Plan.

b) Development within Stage 1 will be staged as follows:

Stage 1a and Stage 1b will be required to meet the following:

i. Stage 1a

Number of dwellings shall be limited to 500.

ii. Stage 1b

The development of Stage 1b shall not commence prior to a solution being implemented to mitigate the adverse effects that the combined traffic volumes within Stage 1a and 1b will have on the Dixon Road and State Highway 3 intersection, to the satisfaction of Council.

c) Any development on Sec 1 SO 57582 or the balance of this parent lot shall be required to:

i. Upgrade the existing wastewater network to accommodate any development on the site.

ii. Implement a solution, which is acceptable to Council, to address the adverse transport effects on Dixon Road/State Highway 3 Intersection from the potential traffic volumes from within Stage 1.

d) Any development that does not comply with the above will be a non-complying activity.

3.4.7 Provisions in Other Chapters

The provisions of the following chapters apply to activities within this chapter where relevant.

- Chapter 2: Strategic Framework
- Chapter 5: Special Character Zones
- Chapter 23: Subdivision
- Chapter 25: City-wide
- Volume 2, Appendix 1: District Plan Administration

3.5 Rototuna

a) The Rototuna Structure Plan area is approximately 490 hectares, and was part of land brought into the City in 1989 to facilitate the City's expansion. The Structure Plan has been developed in order to facilitate an integrated, sustainable approach to the management of the natural and physical resources of the Rototuna growth cell.

b) The Structure Plan promotes urban design concepts and considerations around urban form, identifying proposed land use elements, key natural and physical resources, transport and other infrastructural requirements, parks and reserves, and any potential constraints to development. The Structure Plan considers treatment of key physical features such as gully systems, ridgelines and naturally elevated topography and the river bank, and management options to protect significant features.

c) The Structure Plan provides the basis for discussion of development proposals between council and developers. It is not intended to act as a blueprint, but creates a framework to guide development to ensure that the Rototuna area develops in an integrated and sustainable way in line with the Vision for the area, acknowledging that the final form of development of the area will be determined by the physical development within the parameters of the Structure Plan as set out in the District Plan.

d) The Structure Plan (including the Rototuna Town Centre Concept Plan) needs to be read in conjunction with the Rototuna Town Centre Design Guide, relevant rules, and objectives and policies in the Proposed District Plan. All of these elements must be read and interpreted together to give full understanding and effect to Council's vision for the sustainable management of the natural and physical resources of Rototuna.

Vision

A high quality urban environment that has a local focus, well connected transport modes, a choice of living environments and densities, achieves urban design excellence, and retains significant natural features.

3.5.1 Objectives and Policies

When consent is required for subdivision and/or development within the Rototuna Structure Plan area, the proposal must be in accordance with the objectives and policies below and any general objectives and policies for Structure Plan areas (refer to 3.3).

Objective	Policies
3.5.1.1 Minimisation of stormwater quantity and increased stormwater quality.	**3.5.1.1a** Development should minimise the amount of stormwater entering the piped drainage system and aid in the replenishment of natural reserves.
	3.5.1.1b Promote onsite management and disposal of stormwater wherever practicable.
	3.5.1.1c Minimise the effects of urban development on the values and functions of the existing hydrological network, water quality and natural habitats.
	3.5.1.1d New development should incorporate a natural environment-based stormwater system.
3.5.1.2 Incorporate low impact urban design measures into developments.	**3.5.1.2a** Avoid or minimise impervious surfaces, minimise earthworks during construction and utilise vegetation for trapping sediments and pollutants.
3.5.1.3 Create a multi-modal transport network.	**3.5.1.3a** Provide a transport network which encourages a choice of transport modes which is well connected and fit for purpose.
3.5.1.4 Create high quality urban developments.	**3.5.1.4a** Encourage increased densities in areas of high amenity and close proximity to community and commercial nodes.
	3.5.1.4b Encourage urban form that reduces dependency on private vehicles.

Objective	Policies
	3.5.1.4c New development should incorporate urban design principles and create high quality and high amenity residential and commercial areas.

3.5.2 Structure Plan Components

The specific land use proposals consist of:

3.5.2.1 Rototuna Town Centre (refer to the Rototuna Town Centre Design Guide in Volume 2, Appendix 1.4.4)

a) The Rototuna Town Centre is to be located at the corner of Resolution Drive and Borman Road. A Concept Plan for the Rototuna Town Centre has been included within the Structure Plan (refer to Chapter 13 and Volume 2, Appendix 7), which is intended to guide the development of the Rototuna Town Centre. Any development in the Centre is required to be in general accordance with the Concept Plan. In addition, the Rototuna Town Centre Design Guide (Volume 2, Appendix 1.4.4) will be an important tool in guiding design-led development in this area.

3.5.2.2 Rototuna West Neighbourhood Centre

a) The Rototuna West neighbourhood centre is located at the intersection of Borman Road and Hare Puke Drive, adjacent to the local sports fields and medium density residential. It is intended to be highly accessible to the local population.

b) The Rototuna West neighbourhood centre is expected to provide for a small number of local convenience stores. Residential accommodation can be located on the first floor to provide added surveillance. The ground floor level will have active frontages facing the street, including extensive use of windows with facades designed to create visual interest and character.

c) A small amount of convenience parking will be located along the frontage with larger parking areas positioned at the rear of the building/s.

d) An area of land zoned Medium Density Residential is located around the western sports park and neighbourhood centre. To ensure quality design outcomes and developments that meet residents' living requirements, development in the Medium Density Residential Area can only take place once Council has approved a Comprehensive Development Plan for a specified area. These Plans need to be in general accordance with the Rototuna Structure Plan and the Rototuna Town Centre Design Guide (Volume 2, Appendix 1.4.4).

3.5.2.3 Rototuna North East Character Zone

The Rototuna North East Zone provisions are designed to provide for a mix of densities that are sympathetic to the specific rolling topography of the area, being a mixture of ridgelines, gullies and flat land; along with recognising the relationship of the area to both the Waikato Expressway designation (Designation E90) and the City. This area is the northern most point of the City forming, through its elevated and prominent landscape a defined boundary edge between the City and Waikato District.

Development within this area should adopt urban design principles to achieve residential development with high levels of amenity that responds to the natural landform, without excessive modification of the ridgelines and gullies, as well as to the presence of the future Waikato Expressway along its southern edge. Principles to be adopted include:

- Responding to the context and existing landform of the area
- Avoiding excessive earthworks and landform modification on steeper land
- Locating roads on ridges or in valleys where possible in order to avoid significant areas of cut or fill in these areas
- Locating roads and reserves in locations that provide maximum benefit for public experience and assist with the creation of place and amenity
- On steeper areas achieving areas to the front of sites with less slope to facilitate building development and access, and accommodating the steeper areas through the rear of sites
- Creating block patterns where lots front streets and back onto the backs of other lots
- Achieving a permeable public network in both the street and reserves
- Incorporating visual buffers, including planting, between the Expressway and residential activities
- Utilising land adjacent to the Expressway for public utilities where practicable.

3.5.2.4 Reserves Network

While providing for local and city-wide recreation needs, reserves also form an important part of the walkway/cycleway network.

a) Sports Parks

These provide for formal active recreation at a level to meet the current standard of provision within the City for the anticipated population of the Rototuna Structure Plan area. Each park provides sports fields suitable for senior grade play, junior fields and training areas, and an area that serves a neighbourhood park function. Whilst they will primarily serve the local population, they will also form part of the city-wide network of sporting facilities.

b) Neighbourhood Reserves

These provide a range of informal recreation facilities including children's play areas and will be required as part of the subdivision process and the establishment of residential neighbourhoods. As such they are not indicated specifically on the Structure Plan map. Neighbourhood reserves complement the range of facilities provided by the Sports Parks and provide a smaller scale focal point for the local community. They serve a catchment area of approximately 500m radius and provide for both local amenity and passive recreation.

In order to provide appropriate levels of accessibility and an even distribution of recreational facilities, each neighbourhood should be provided with a park comprising approximately 0.5 hectares.

In the Rototuna North East Character Zone a neighbourhood reserve along the northern edge of the Waikato Expressway is to be established as part of any subdivision. The reserve is to accommodate stormwater treatment ponds and flood control devices, walking and cycling paths across its length (complemented by landscape planting between the paths and the Waikato Expressway designation) and areas for informal recreation, including a children's play ground.

c) Natural Features

Te Awa O Katapaki Gully, Waikato River and local hills including ridgelines to the north and east, are identifiable landscape features within the Rototuna Structure Plan area. The Te Awa O Katapaki Gully has multiple purposes including acting as an ecological corridor, a stormwater management area and a walkway/cycleway. The local hills provide opportunities for open space vistas. Another important landscape feature is the nationally significant Waikato River. A continuous esplanade reserve beside the Waikato River will provide for an extension of the riverside walkway/cycleway network, ecological enhancement and riverbank stabilisation.

New development will not be allowed to privatise the edges of major natural features and recreational areas such as gullies and the Waikato River. Retention of existing vegetation features will be encouraged where these can help structure and characterise the layout of new developments and create an established character to the growth cell, and required where they embody existing indigenous values or contribute to the viability of ecological fragments.

d) View Points

Specific areas have been identified as view points. Where a view point has been identified, it is anticipated that this land will be acquired as reserve, probably with neighbourhood reserve functions, as part of the subdivision and establishment of residential neighbourhoods.

3.5.2.5 Transportation Network

a) The Structure Plan indicates the location of the minor and major arterial transport corridors. These transport corridors are either existing, designated or yet to be upgraded/constructed.

b) The Waikato Expressway cuts through the north eastern area of the growth cell. The Expressway corridor is approximately 100m wide, however it is prudent to provide for further mitigation and ensure housing is sited away from the immediate boundary through special setbacks and larger site area requirements. It is expected that Kay Road and Horsham Downs Road will continue to provide access to properties to the north east of the Expressway, while pedestrian/cycle access is anticipated in the location shown on the Rototuna Cycle and Walking Network Plan to link this area to the Rototuna Town Centre, recreation areas and schools to the south of the Rototuna North East Character Zone. It is anticipated that in the long term Resolution Drive will connect to the Expressway.

c) The Access Hamilton Strategy recognises a future arterial link from the central interchange on the Te Rapa section of the Waikato Expressway to Resolution Drive, being a "Future Northern River Crossing". Its alignment and connections to other networks will be determined by a future notice of requirement process.

d) Some flexibility is afforded in the alignment of collector streets, but as they have a key role in providing for bus route services, directness will be an important design element to ensure their convenience for bus services. Where possible, use is made of the existing ridgeline transport corridors as future collectors as they provide good connectivity within the area and will help to define local neighbourhoods.

e) The alignment, form and function of Kay Road has potential to change as part of planning for future expansion. It is therefore desirable that proposed land development accessing or fronting Kay Road is developed in close consultation with City Council staff to enable options for future City expansion. The potential future closure of Kay Road is dependent on surrounding development and alternative property access arrangements. Although it is indicated that parts of Sylvester Road are to be closed in the future, it is important that alternative networks are provided in order to achieve a high degree of connectivity.

f) It is essential that all necessary transport corridors within developments are formed and vested as part of the initial stage of site development to ensure good connectivity between adjoining sites and the wider Structure Plan area. All transport corridors shown on the Structure Plan are considered to be critical linkages and developments must show how these connections are to be provided in a timely manner such that there is no interim period where a critical connection is not in place despite adjacent land having been developed.

g) The transport network will be designed to ensure it supports passenger transport services, cycle and pedestrian facilities. In addition, off-road cycle and pedestrian facilities will be integral to the development of the area and a network of off-road facilities is indicated on the Structure Plan.

3.5.2.6 Stormwater

a) Rototuna is made up of four main catchments, including the Te Awa o Katapaki catchment which is the main catchment, the Kirikiriroa catchment, the Otama-ngenge catchment and the Waikato River.

b) Integrated Catchment Management Plans (ICMPs) for all areas of Rototuna will be finalised and will provide a strategic approach to stormwater management throughout the area to ensure that individual stormwater discharge proposals do not adversely affect the ecological values of the receiving water courses. The ICMPs will provide a management framework that ensures that stormwater discharge proposals avoid, remedy or mitigate any adverse effects on the environment.

c) In the interim, indicative locations for centralised key stormwater management facilities are shown on the Structure Plan. The precise location of these stormwater management facilities will be finalised via detailed catchment management planning and modelling at the time of consent. Stormwater management must provide for the management of all stormwater within the land being developed, together with drainage from the entire catchment upstream of the proposed system as per the requirements of the Hamilton City Council Infrastructure Technical Specifications. Developers will need to demonstrate how stormwater from a development will be discharged to the centralised stormwater management facilities, indicated on the Structure Plan.

d) There are a number of high level stormwater principles which form the basis for the approach to stormwater management in the Rototuna area:

i. Stormwater is managed in a manner that minimises the effects of urban development on downstream receiving waters.

ii. Stormwater run-off from the different relief and soil types is managed in an integrated manner.

iii. Stormwater should, as far as practicable, be used to sustain groundwater levels in peat soils.

iv. Stormwater management should seek to safeguard and enhance areas of indigenous vegetation, water features and habitats.

v. Stormwater discharges should, as far as practicable, result in a hydrological cycle as close to the pre-development hydrological cycle as possible.

e) **Te Awa o Katapaki Upper Catchment**

In the upper catchment area, appropriate stormwater treatment will involve stormwater management facilities shown indicatively on the Structure Plan, and a centralised drainage reserve/watercourse through the Rototuna Town Centre, with appropriate flow attenuation measures, along with ground soakage.

The central drainage reserve/watercourse of the Rototuna Town Centre has a principal stormwater function but also provides a key green corridor and walkway/cycleway link, and must be designed as an attractive feature. To the north, the watercourse/drainage reserve will connect with the Active Recreation Reserve and provide a green edge to the playing fields and the secondary school to also accommodate shared pedestrian and cycle routes. The Rototuna Town Centre Design Guide refers to requirements around the design of the drainage reserve/ watercourse corridor through the Rototuna Town Centre. The precise form and function of the drainage reserve/watercourse and corridor will be determined by hydrological requirements and controls. Developments must demonstrate how stormwater will be directed to the drainage reserve/watercourse and stormwater management facilities shown on the Structure Plan (refer to Volume 2, Appendix 2, Figures 2-4, 2-5, 2-6 and 2-7) and Concept Plan (refer to Volume 2, Appendix 7, Figure 7-1).

f) **Te Awa o Katapaki Lower Catchment**

In the lower catchment (the south western area of Rototuna) stormwater must be discharged directly to the Te Awa o Katapaki stream or to ground soakage.

g) **Otama-ngenge Catchment**

The area immediately to the south of Kay Road is a separate catchment which drains north into Waikato District. The proposed location of a main centralised pond in the vicinity of the Rototuna West neighbourhood centre is shown on the Structure Plan map. The proposed pond is required in order to facilitate development of the wider area, and will provide an amenity function for the medium-density housing to be located adjacent.

h) **Kirikiriroa Catchment**

Subdivisions for most of this catchment have been consented. The Council's Te Manatu Drive Management Facility will receive stormwater from the remaining undeveloped areas of the catchment and no further key stormwater facilities are anticipated to be needed.

i) **Waikato River**

Some direct private stormwater discharge occurs to the Waikato River currently and further subdivision of the existing, predominately large sections would result in applications for new discharges to the River.

3.5.2.7 Water and Wastewater

a) A new reservoir is planned to be located on Kay Road and connected to the existing bulk water supply network in Wairere Drive. Trunk water networks from the new reservoir to existing Rototuna trunk networks are planned and will progressively be constructed as development occurs. This water network will improve the security of supply and match the demand for all of the Rototuna Structure Plan area.

b) A wastewater trunk network has been planned to provide wastewater supply for the whole Rototuna Structure Plan area. These networks include other facilities such as pumping station and rising mains. The networks will be progressively constructed as development occurs.

c) Development of both the water and wastewater trunk networks will be timed to occur with urban development, by both the private sector and the HCC network programmes.

d) Early interaction with Council by developers is encouraged to enable the construction of these assets to occur in association with proposed urban development.

3.5.2.8 Schools

a) Within the Rototuna Structure Plan area there are four existing schools, including Rototuna Primary, Waikato Waldorf School, Te Totara School and Hamilton Christian School. There is an existing designation for a secondary school between the sports fields and the Waikato Expressway designation. The location of this secondary school is significant in terms of the role it will play in providing surveillance of the proposed active recreation reserve. Provision of safe walking, cycling and passenger transport links is also critical to the successful functioning of the school.

3.5.3 Provisions in Other Chapters

The provisions of the following chapters apply to activities within this chapter where relevant.

- Chapter 2: Strategic Framework
- Chapter 4: Residential Zones
- Chapter 13: Rototuna Town Centre Zone
- Chapter 16: Community Facilities Zone
- Chapter 23: Subdivision
- Chapter 25: City-wide
- Volume 2, Appendix 1: District Plan Administration

3.6 Rotokauri

a) Development of the Rotokauri Structure Plan has been guided by the following vision:

> "The sustainable expansion of the City into Rotokauri, through a coherent, integrated and people-focused mixed-use development based on best practice urban design principles."

b) In addition to a Structure Plan map indicating the eventual pattern of development within Rotokauri, there are maps indicating the nature and extent of the proposed transportation hierarchy, proposed reserve and open space network, staging plans and a Concept Plan illustrating the relationship between land uses within the suburban centre and future commercial/community focal point.

c) The Rotokauri Structure Plan provides for urban growth with an eventual population of between 16,000 and 20,000 people. It also provides 280ha of industrial land, employment areas, and a neighbourhood centre in Stage 1 that will act as the principal community focal point based around a suburban shopping centre.

d) Chapter 3.6A refines the Rotokauri Structure Plan with respect to the northern area (approximately 140 hectares of land), and in all aspects will supersede the Rotokauri Structure Plan for any land identified in the "Rotokauri North" area.

Proposed Plan Change XX- Rotokauri North Private Plan Change

3.6.1 Objectives and Policies

When consent is required for subdivision and/or development within the Rotokauri Structure Plan area, the proposal must be in accordance with the objectives and policies below and any general objectives and policies for Structure Plan areas (refer to Rule 3.3).

Objective	Policies
3.6.1.1 Preservation of key natural features and topography that are characteristic of Rotokauri.	**3.6.1.1a** Development shall maintain the natural ridgelines.
	3.6.1.1b The central green corridor shall function as the principal stormwater drainage channel and a recreational and transportation corridor connecting the wider network of open spaces and natural features.
Explanation	

The ridgelines of Rotokauri contribute significantly to local character and identity. The relationship of the elevated areas to the flat land containing Lake Waiwhakereke is particularly strong.

The flat land is currently crossed with numerous agricultural drains and the extent of these indicates a high water table throughout the lower-lying areas that will need careful and comprehensive management. The proposed central green corridor will be a main feature of future stormwater management.

Objective	Policies
3.6.1.2 New urban development in Rotokauri is appropriately serviced.	**3.6.1.2a** Land for development shall not be released until it can be adequately serviced.

Explanation

Development of the Rotokauri area requires major new infrastructure services and arterial transport network. Provision has been made for this through Council's Long Term Plan and through the programmes of others, such as the NZ Transport Agency. Controls on the release of land are necessary to ensure that development can be adequately serviced and will not have an adverse effect on network services for the remainder of the City.

3.6.2 Structure Plan Components

3.6.2.1 Suburban Centres Concept Plan

a) Volume 2, Appendix 2, Figure 2-11 Rotokauri Neighbourhood Centre sets out the elements in proximity to the suburban centre area that are to be specifically considered during the development of the area, to ensure the provision of the interface areas and primary frontages, along with the relationship the area is to have with other key activities.

3.6.2.2 Residential

a) Residential development is indicated in four distinct residential environments.

   i. Lake Waiwhakareke Landscape Character Area, which seeks to retain the existing landform and create a strong relationship between residences, the lake and to the Waiwhakareke Heritage Park.

   ii. The Ridgeline Character Area, which seeks to retain legibility of these locally important landforms in a suburban context.

   iii. Medium Density and Interface Areas, for localities within walking distance of the suburban centre. Volume 2, Appendix 2, Figure 2-12 Rotokauri Interface Areas illustrates interface areas in which design controls are imposed to ensure that private development enhances the setting of the adjacent public spaces and provides for increased safety through passive surveillance. The specific standards bring development closer to the public spaces, establish strong visual connections and ensure a visual relationship between the public and private realm. The provisions to manage this interface area are set out in Chapter 4: Residential Zones.

iv. General Residential.

3.6.2.3 Suburban Centre

a) The suburban centre is intended to provide for a wide range of activities but with an emphasis on retailing.

b) The requirement for a Comprehensive Development Plan will ensure that development is fully integrated and will not create areas or features that might present a threat to public safety.

c) Volume 2, Appendix 2, Figure 2-13 Rotokauri Suburban Centre Primary Frontages identifies primary frontages, within which design controls are imposed to ensure that private development enhances the setting for the adjacent public spaces while providing increased safety through passive surveillance. The provisions to manage these primary frontages are set out in Chapter 6: Business 1 to 7 Zones.

d) In addition to the suburban centre area, a future neighbourhood centre node is shown in Stage 2 to serve the day-to-day needs of the future residential community within Stage 2.

3.6.2.4 School Sites

The completion of Stage 1 will likely generate a need for a new primary school at a site in an accessible and convenient location. Secondary schooling serves a wider catchment area and a new school is likely to be needed to serve the future population. Accessibility to the catchment is a critical requirement and therefore a position at the hub of the roading network is ideal. To reduce reliance on car travel the location also needs to be well connected by opportunities for walking and cycling and public transport. The site should relate well to the growth of the southern Neighbourhood Centre. It is anticipated that the Ministry of Education will use the designation process to determine precise site boundaries and to fix the location of school buildings.

3.6.2.5 Open Space Network

a) The open space network develops and connects existing natural features. The Rotokauri open space network comprises:

i. Waiwhakareke Natural Heritage Park – this park will re-create a range of eco-systems characteristic of the Waikato before human intervention. It will be of city-wide significance and include habitat creation, research, and provide for public access to a natural environment.

ii. Sports parks – each will provide sports fields suitable for senior grade play, junior fields and training areas, and an area that serves a Neighbourhood Park function.

iii. Neighbourhood reserves – these provide a range of informal recreation facilities, including children's play areas. As they will be required as part of the subdivision and establishment of residential neighbourhoods, they are not indicated specifically on the Structure Plan map. These will complement the range of facilities provided by the sports parks and provide a smaller scale focal point for the local neighbourhoods. They are intended to serve a catchment area with approximately a 500m radius. In order to provide appropriate levels of accessibility and an even distribution of recreational facilities, each neighbourhood should be provided with a park comprising approximately 0.5 hectare.

iv. Neighbourhood centre green – this will provide for a range of informal leisure and recreational activities and provide the commercial centre and high density residential areas around it with access to amenity open space.

b) Connectivity between these recreational nodes will be provided by a network that will also serve as a stormwater drainage route. The central green corridor, based on the general alignment of the existing main drain, will be a major feature within the Rotokauri environment. The central north-south collector corridor also has a role in providing connectivity between these nodes.

3.6.2.6 Passenger Transport Facility

a) Stage 1 will be the most sufficiently served by the extension of bus services as the road network is progressively constructed. It is envisaged that longer term, development could support a connection to rail. A location on Tasman Road, adjacent to The Base has been identified as the preferred site to accommodate the progressive development of a bus-based passenger transport facility (PT Facility) and its longer term integration with rail.

b) There is also the potential for a second PT facility further north at the junction of Te Kowhai Road and Tasman Road, to integrate the passenger transport network with the surrounding land use activities.

c) Figures 3.6.2a and 3.6.2b illustrate how the establishment of an integrated bus/rail facility could be achieved in the Tasman Road location adjacent to The Base. The illustrations provide for an eventual facility accommodating:

i. Space for three urban bus and two long distance coach platforms.

ii. Space for a covered waiting area, with conveniences and kiosk.

iii. Space for a rail platform.

iv. A bus turning circle (in advance of completion of the surrounding road network).

d) Both of the illustrated locations would eventually require land outside of the current road and rail reserve. Consequently, it is anticipated that the additional land requirements may need to be safeguarded through the designation process. A decision of the timing of each facility and any progress associated with the designation of land will be made through the Long Term Plan process, taking account of projected growth within the area.

3.6.2.7 Transportation Network

a) The transportation network is based on a hierarchy at the top of which are State Highways and the rail corridor providing for high volume inter-regional traffic and freight movements.

b) Next in the hierarchy, the arterial transport corridor networks are designed to cater for high-volume traffic and provide the key connections with the wider City and regional network, including the Te Rapa section of the Waikato Expressway. Development of the arterial network is likely to be staged, reflecting the growth in traffic volumes as development occurs. While the necessary transport corridors will be secured in advance, the final design and construction of roads within them will be timed to coincide with demand.

c) It is anticipated that Council will use the designation process to determine the precise alignment and design of new arterial corridors. Illustrations of the possible road cross-sections in the vicinity of the suburban centre are provided in Figures 3.6.2c-3.6.2g. The locations of where the various cross sections apply are shown on Figure 2-8 and Figure 2-11.

d) Some collector transport corridor through the Residential zone will be designed to accommodate stormwater swales on the lower-lying areas. An illustration of the possible cross-section for this street is provided in Figure 3.6.2e.

3.6.2.8 Industrial

a) The Structure Plan provides for two areas of industrial activity separated by the Te Rapa section of the Waikato Expressway. To the east of the Te Rapa section the area is separated from sensitive uses and relates to the existing industrial zone in the Te Rapa/Wairere/Mangaharakeke corridor.

b) To the west, in the Employment Area, the physical environment includes the central green stormwater and recreational corridor linking Lake Waiwhakareke and Lake Rotokauri. Large parts of the area adjoin the residential zone and have a direct interface with it.

3.6.2.9 Staging

a) Constraints on the availability of infrastructure and network capacity limit the extent to which land can be released for development. Until capacity and services are available, it is essential the development potential of the remaining Rotokauri area is not compromised by interim development.

b) Council's Long Term Plan or Annual Plan sets out the programme for providing infrastructure to service growth. Where a developer wishes to pursue development ahead of Council's programmes a Development Agreement will need to be entered into with Council to ensure that the infrastructure is provided in a way which is efficient and sustainable from a city wide perspective. In these cases it is anticipated that developers will bear the full cost of infrastructure provision.

This approach will enable growth in areas that are not funded for infrastructure to be funded by developers under Development Agreements between all parties.

Figure 3.6.2a: The Base Site Layout Plan Stage 1

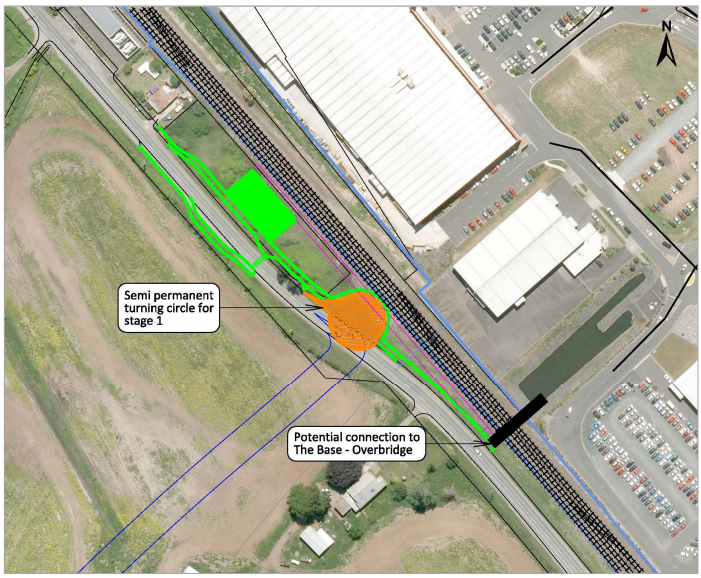
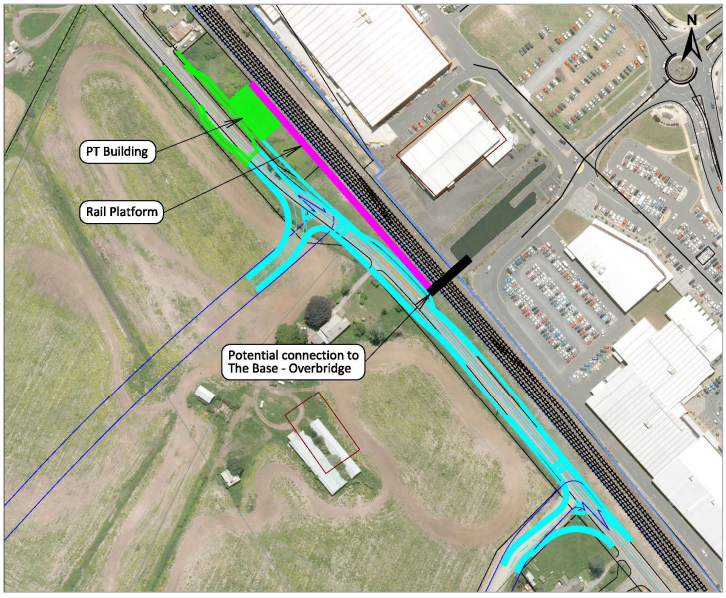


Figure 3.6.2b: The Base Site Layout Development Complex



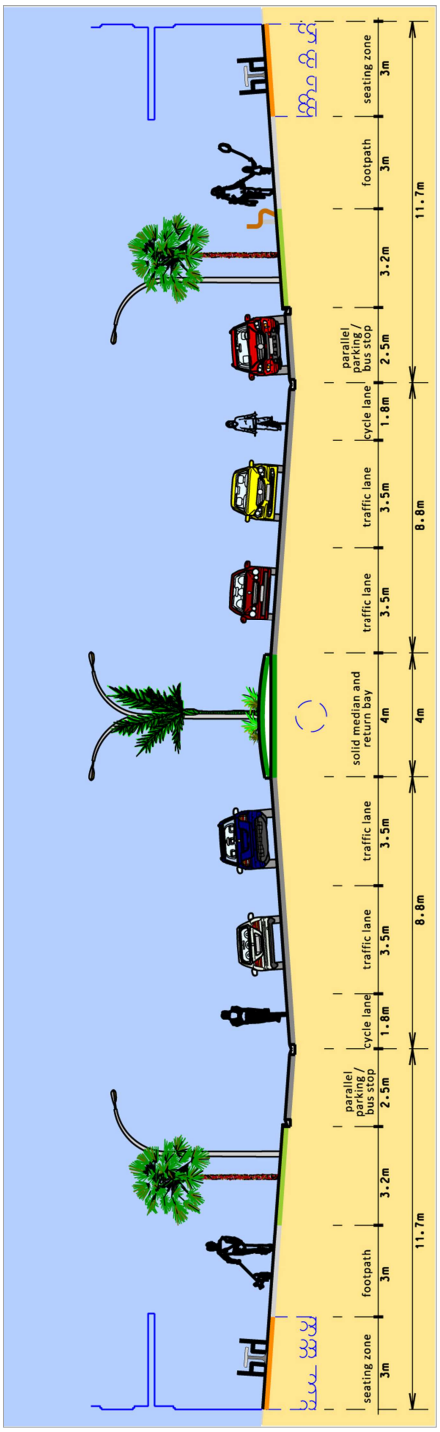


Figure 3.6.2c: Rotokauri Cross-sections – Major Arterial

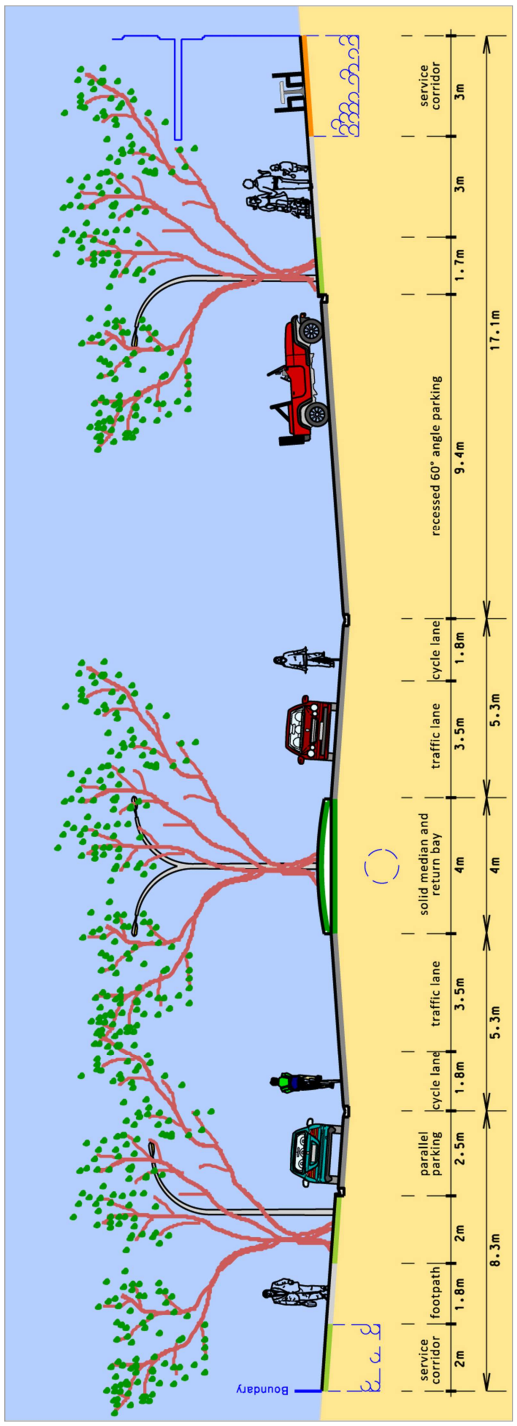
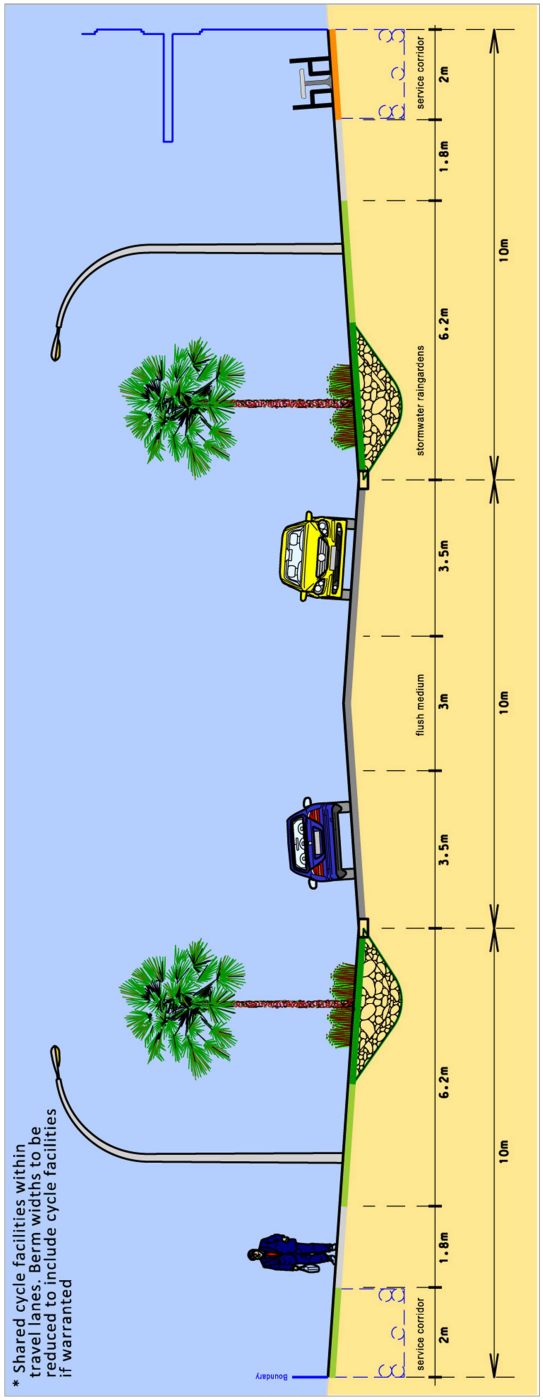


Figure 3.6.2d: Rotokauri Cross-sections – Minor Arterial


service corridor
2m
1.8m
stormwater raingardens
6.2m
10m
3.5m
flush medium
3m
3.5m
6.2m
1.8m
service corridor
2m
10m
10m
10m
Boundary
* Shared cycle facilities within travel lanes. Berm widths to be reduced to include cycle facilities if warranted

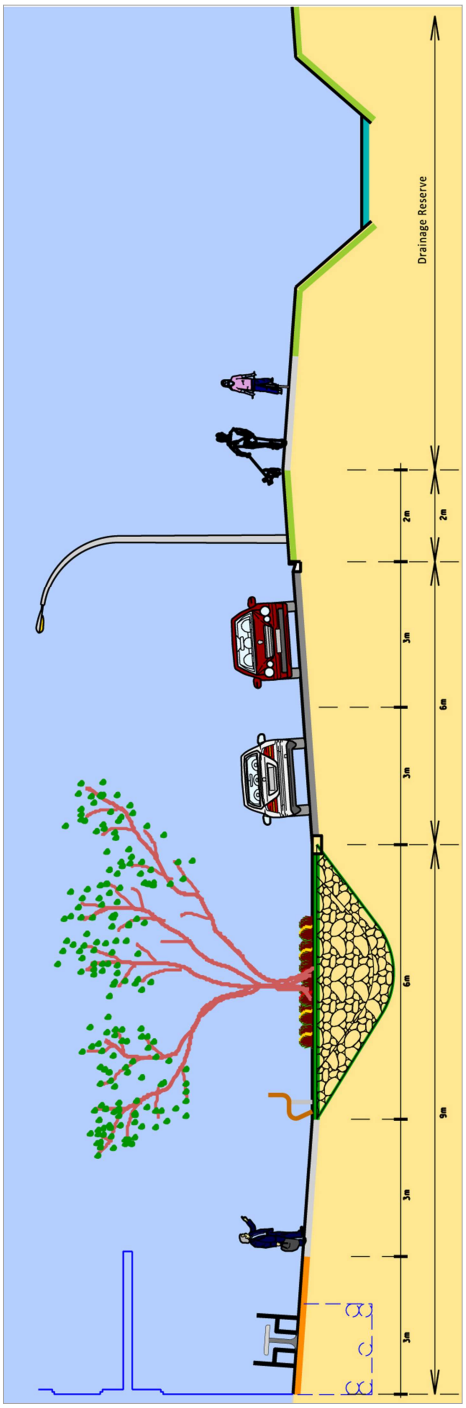


Figure 3.6.2f: Rotokauri Cross-sections - Local

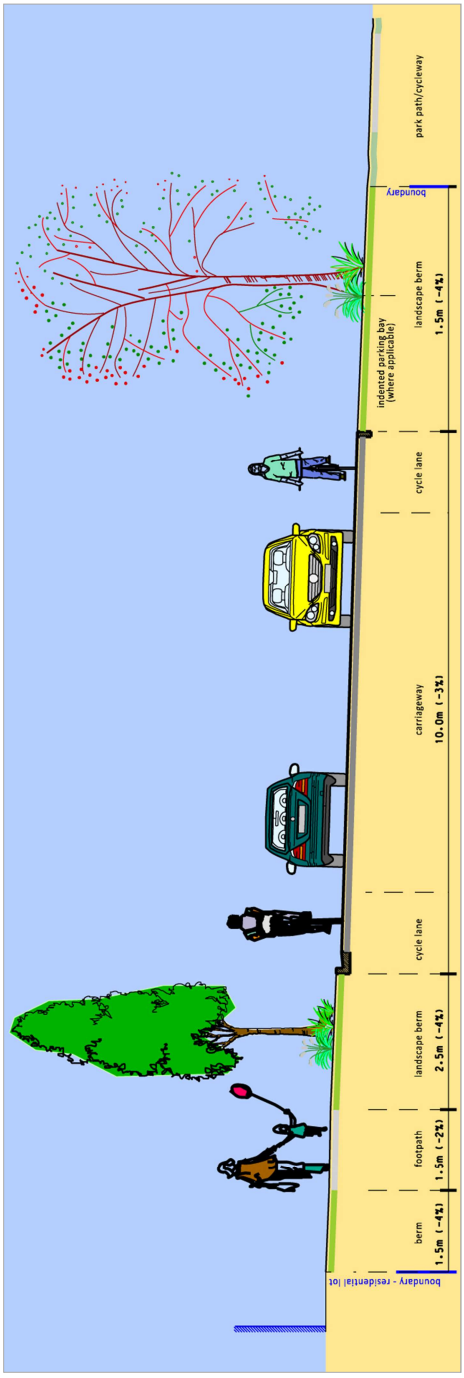


Figure 3.6.2g: Rotokauri Cross-sections – Park Edge Street

3.6.3 Indicative Infrastructural Development Programme (Volume 2, Appendix 2, Figure 2-9)

3.6.3.1 Water, Wastewater and Stormwater Services

a) Progressive development will be serviced by generally extending water supply, wastewater and stormwater services as indicated in the following sections. There is a strong relationship between the routes needed for the three water services and the alignment of proposed roads, as the programme aims to align works as closely as possible to deliver a coordinated and efficient infrastructure programme.

b) Water Supply

i. The Rotokauri area is characterised by elevated hill terrain with several high areas above ridge line (RL) 50 metres. These elevated areas require a higher pressure water supply than is typically required in Hamilton, so it is intended that a special high-pressure water supply zone will be created to provide an adequate level of service. A pressure boost pumping station will be built near the intersection on Baverstock and Brymer Roads with the high-pressure zone pipeline extending northwards along Brymer, Rotokauri and Exelby Roads, and eastwards as necessary to supply the areas of hill terrain.

ii. The flat low lying terrain will be supplied by extending existing watermains northwards and westwards from Rotokauri Road, the intersection of Te Wetini Drive/Arthur Porter Drive/Wairere Drive, Tasman Road, and the Te Kowhai Road Tasman Road intersection. Generally the new pipelines required will be installed in conjunction with roadway construction.

c) Wastewater

i. A new wastewater interceptor pipeline has already been laid from the Pukete Wastewater Treatment Plant westwards across the railway line and along the Te Rapa section of the Waikato Expressway. This pipeline is intended to be the main wastewater pipeline for the whole of the Rotokauri area. The pipeline will be extended westwards beyond the Te Rapa section to Te Wetini Drive, and then southwards. Ultimately this pipeline will also be used to supplement the western interceptor in its role of conveying wastewater from southern and western parts of the City. Lateral pipelines laid both westwards and eastwards to this interceptor pipeline will provide servicing to the proposed employment and residential areas. The laterals may require pumping stations to traverse the central green drainage corridor.

d) Stormwater

i. Rotokauri poses some special challenges in managing stormwater; there are no natural outfalls for stormwater in the area. Rotokauri has three main sub-catchments:

- Mangaheka
- Lake Rotokauri
- Ohote

Figure 3.6.3a identifies the indicative location of the boundaries of the three sub-catchments within the broader Rotokauri Catchment. The final location of these sub-catchments' boundaries will be determined following the completion of the full Integrated Catchment Management Plan (ICMP) for the Rotokauri catchment, in accordance with the Council's Comprehensive Stormwater Discharge Consent.

The integrated catchment management plan for Rotokauri will be developed to include the strategic and integrated approach to stormwater management throughout the Rotokauri growth cell. The integrated catchment management plan will provide a management framework that ensures that individual stormwater discharge proposals will not adversely affect the ecological values of the receiving watercourses and lakes. The following principles will be used to guide the formulation of the integrated catchment management plan.

- Stormwater is managed in a manner that minimises the effects of urban development on downstream receiving waters.
- Stormwater is managed to ensure that water being disposed of into Lake Rotokauri does not further degrade that water body.
- Areas of significant indigenous vegetation, water features and habitats will be safeguarded and enhanced.
- A combination of low impact stormwater design solutions and conventional piped drains will be utilised in an integrated manner to suit the soil and topographical characteristics of particular areas.

ii. **Mangaheka Catchment**

This catchment comprises land to the east of the Te Rapa section. The Mangaheka catchment stormwater management will comprise the following key elements:

- Managed flows will be directed into the existing Mangaheka Stream drainage network;
- A series of open swales discharging into a stormwater detention wetlands with individual lot and piped trunk drainage directed into the swales.

iii. **Lake Rotokauri Catchment**

This catchment comprises the bulk of the Rotokauri Structure Plan area to the west of the Te Rapa section, extending north to the northern-most extent of the central green corridor. A key part of the stormwater drainage plan is to provide constructed floodways through the area. Overland-flow swales, wetlands and conventional piped drains will collect stormwater and discharge to the floodways. The floodways will be sized to store stormwater during storms with controlled release to receiving waters in Lake Rotokauri, and Te Kowhai and Te Rapa streams. The flat topography will be characterised by shallow drains and high groundwater levels. Conventional piped stormwater drains will be used on the hill terrain discharging to the collector swales on the flat land.

The existing open drain from Lake Waiwhakareke to Lake Rotokauri will serve as the main drain in the greater part of the developed Rotokauri catchment, although it will be subject to some adjustment to its alignment to achieve an improved relationship to eventual land use. This floodway is intended to be a

component of an 'ecological corridor' between the two lakes effectively linking Waiwhakareke heritage reserve with Lake Rotokauri. The ecological corridor will also provide planted open space, walking and cycling pathways. The improved drainage channel and ecological corridor will be formed as development takes place along its length. The floodway needs to have continuity of shape and alignment from one property to the next.

iv. **Ohote Catchment**

The Ohote Catchment comprises an area at the northern extent of the structure plan area, to the west of the Te Rapa section and north of the central green corridor. This catchment will be treated similarly to the Lake Rotokauri catchment except its discharge location is to the existing culvert to the northern end of Exelby Road. The east-west green drainage corridor parallel to Te Kowhai Road will be sized to accommodate the full Ohote catchment.

Figure 3.6.3a: Rotokauri Catchment Boundaries

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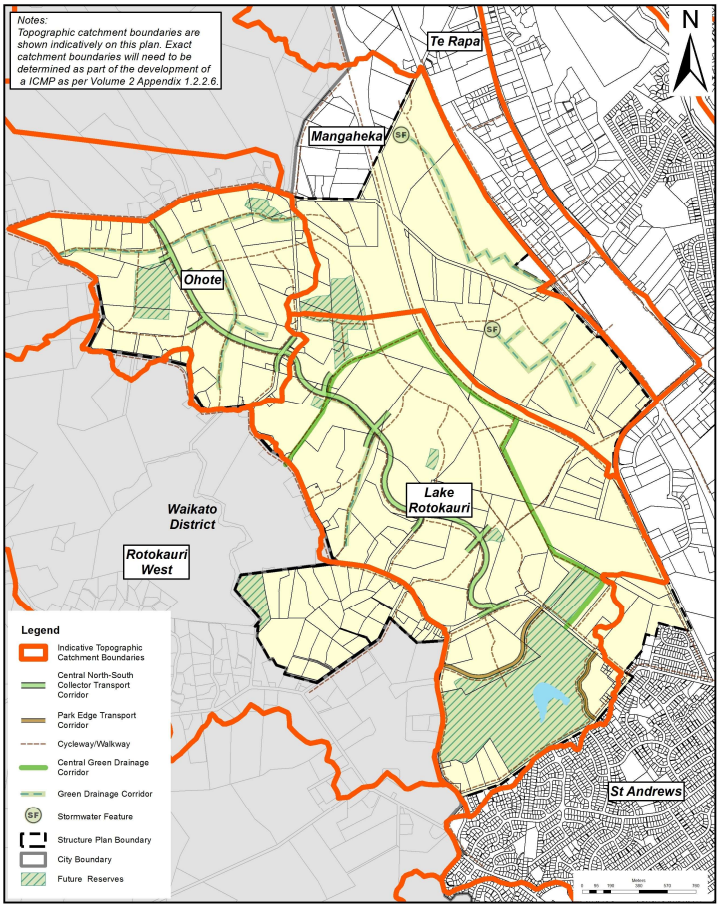

3.6.3.2 Roading

a) The Rotokauri Structure Plan area has a critical relationship to the City's arterial transport network. Te Rapa Road, Wairere Drive and Mangaharakeke Drive are heavily trafficked and growth is anticipated as the routes are the key corridors to the City's industrialised 'western corridor' and direct access to key regional facilities such as the Central City, the hospital, educational campuses and the inland freight village at Crawford Street.

b) Traffic growth assessments support the development of Stage 1A based on specific transport corridors and connections being in place.

c) The works necessary to support the development of State 1A consist of the following package.

i. Collector Road connection between Ruffell Road and Te Kowhai Road. (Developer to provide.)

ii. Collector Road connection between Te Wetini Drive/Arthur Porter Drive/Wairere Drive intersection and Te Kowhai Road at a point 300m west of the North Island Main Trunk Railway (NIMTR). (Developer to provide.)

iii. Te Wetini/Akoranga intersection to Rotokauri Road arterial connection.

iv. Rotokauri Road urban upgrade between Baverstock Road and new Rotokauri residential arterial.

d) The release of land beyond Stage 1A will be contingent upon the availability of network capacity which may arise as a result of traffic generation being less than anticipated in the traffic growth assessments, or from completion of new infrastructure. Proposals for the development of land in 'Area B' on Figure 15-8a will require careful scrutiny to ensure that adequate network capacity exists to support the development, or will be provided as part of the development and they will not compromise the development of land in 'Area A' on Figure 15-8a. Development will require:

i. Construction of the Rotokauri Minor Arterial Road northwards from the neighbourhood centre, to connect with the extension of the Te Kowhai Road arterial shown on Diagram 15-8b.

ii. The following roading upgrades will be required to service the specific residential growth cells adjacent to Baverstock Road, Brymer Road, Exelby Road, Rotokauri Road and Lee Road. The works are to be undertaken in generally the following sequence as identified on Figure 15-8b:

A. Upgrade of western end of Baverstock Road including the intersection of Brymer Road and north to the Hamilton Zoo entrance.

B. Upgrade of Rotokauri Road between the new residential arterial transport corridor and Brymer Road.

C. Upgrade of Brymer Road from the Hamilton Zoo entrance, northwards to Lee Road.

D. Upgrade of Lee Road.

e) The development of land outside Areas 'A' and 'B' (Figure 15-8a) will need to coincide with the northwards extension of Rotokauri Minor Arterial Road to connect with Te Kowhai Road at the City Boundary.

3.6.4 Provisions in Other Chapters

The provisions of the following chapters apply to activities within this chapter where relevant.

- Chapter 2: Strategic Framework
- Chapter 4: Residential Zone
- Chapter 15: Open Space Zones
- Chapter 20: Natural Environments
- Chapter 21: Waikato River Corridor and Gully Systems
- Chapter 22: Natural Hazards
- Chapter 23: Subdivision
- Chapter 24: Financial Contributions
- Chapter 25: City-wide
- Volume 2, Appendix 1: District Plan Administration

3.6A Rotokauri North

Proposed Plan Change XX- Rotokauri North Private Plan Change

Overview & Vision

The Rotokauri North Structure Plan area is approximately 140 hectares, which previously fell within the Rotokauri Structure Plan area. This chapter refines the Rotokauri Structure Plan with respect to the northern area, and in all aspects will supersede the Rotokauri Structure Plan for any land identified in the "Rotokauri North" area.

The Rotokauri North Structure Plan resulted from the majority of this area being recommended by Council as a Special Housing Area in accordance with the Housing Accords and Special Housing Areas Act 2013. It brings forward the planned growth area associated with part of Stage 2 of the Rotokauri Structure Plan, establishing a new structure plan specific to Rotokauri North, along with objectives, policies and rules. Rotokauri North provides for a Medium Density Residential Zone, and a neighbourhood centre (Business 6 Zone). Rotokauri North is also identified as providing 10% of its housing yield as affordable housing.

It is intended to be a medium density residential community, centred on opportunities to establish a neighbourhood centre, connect to surrounding employment opportunities and provide a connected roading, pedestrian and cycle network. Urban design and form outcomes are prioritised through specific rules relating to this Structure Plan which seek a higher quality of subdivision outcomes, with urban blocks, the avoidance of rear lots and cul-de-sacs wherever possible, and the establishment of an interconnected urban roading network.

A number of specific methods are proposed for Rotokauri North. These implement the Rotokauri North objectives and policies outlined in this chapter. For simplicity, these new objectives and policies are included in Chapter 3, however are implemented through the methods in Chapters 3, 4, 23 and 25.

In the event that there is a conflict between the outcomes and objectives and policies of 3.6A and any other objective/policy in the District Plan, the outcomes sought for Rotokauri North and described in section 3.6A.1 and the objectives and policies in 3.6A.2 shall be afforded a greater weighting.

3.6A.1 Structure Plan Components

3.6A.1.1 Residential

a) Residential development is planned across the majority of the Structure Plan area via the Medium-Density Residential Zone to provide for a variety of site sizes and housing typologies, creating a community with a mixed demographic and opportunities for more affordable living. The Rotokauri North area also includes specific rules to contribute "affordable" housing for First Home Buyers.

b) A Medium Density Overlay A is included on the Structure Plan for sites within 400m of the Business 6 Zone (being a convenient walkable distance). Within the Overlay a greater building height is enabled to support opportunities for intensification of housing opportunities, along with providing a wider range of housing typologies.

c) Duplex dwellings are encouraged across the residential area, as a specific means to achieve land efficiencies to give effect to the affordable housing requirements and elsewhere to provide a variety of housing typologies. An acceptable solution code approach has also been development for a specific high quality duplex

typology to ensure that these integrate with the planned form of development. The specific duplex typology is a permitted activity on eligible lots, while all other designs for duplexes require resource consent.

d) The integration of specific subdivision and land use controls for the Structure Plan area creates a traditional neighbourhood character which comprises public fronts and interface with the street. Specific subdivision controls to ensure high quality urban form outcomes, including establish urban blocks that relate to an interconnected roading network and avoid rear lots. This ensures that all lots have an appropriate frontage to a street, maximising opportunities to create high quality streetscapes and public places. Minimum lot and urban block dimensions ensure that each lot is capable of accommodating an appropriate dwelling that achieves a high quality interface with the street, supporting building massing towards the street to provide opportunities for rear yards to accommodate private outdoor living courts. Controls to achieve this outcome start at the subdivision stage, where the lot and block shape and dimensions are controlled to ensure that the intended urban form outcomes can be achieved when applying the development controls for residential dwellings.

3.6A.1.2 Neighbourhood Centre

a) A neighbourhood centre of approximately 1.14 hectares is shown within the Structure Plan area, which utilises the Business 6 zone provisions.

b) The neighbourhood centre is intended to serve the day-to-day needs of the residential community.

3.6A.1.3 Open Space Network

The open space network shown on the Structure Plan is intended to provide for a range of functions including stormwater and ecology, and neighbourhood reserves for passive and informal recreation. The following are key components of the open space network as shown on the Structure Plan:

i. Significant Natural Area protection – open space is shown in the vicinity of (and including the existing scheduled SNA 11, being Burbush Road Forest/Perkins Bush).

ii. Neighbourhood reserves – two (3) neighbourhood reserves are shown in indicative locations on the Structure Plan. The intention of the neighbourhood reserve is to provide for a range of informal recreation facilities and provide small focal points for the neighbourhood.

iii. Streams and stormwater networks – corridors are shown along identified permanent streams within the site, and along major overland flow conveyance channels. It is anticipated that the corridors will be primarily used for stream enhancement and stormwater management purposes (conveyance, treatment and detention) as required by the sub-catchment ICMP, and may as a secondary function provide opportunities for informal and passive recreation.

The final design, location and extent of the open space network will be determined at detailed design stage which accompanies subdivision. The provision of a sports park is a matter to be pursued through Council's powers and functions within the Local Government Act 2002 to acquire land for district-wide recreational purposes.

3.6A.1.4 Transportation Network

a) The transportation network is based on a hierarchy which includes (in order):

i. State Highway 39 (upgrades proposed as new intersections with the Structure Plan area);

ii) Minor Arterial Road;

iii) Collector Roads; and

iv) Local Roads.

b) The road network is also anticipated to include cycling facilities (either via off road shared paths or on-road) for Minor Arterial and Collectors, and all roads are expected to have pedestrian facilities. Where dedicated cycle facilities or 3m shared paths are proposed, no vehicle crossings over these facilities can be established. This is to support the development of these facilities and to establish safe and convenient pedestrian and cycle networks. Alternative vehicle access using rear lanes, access lots or access from side roads is required.

c) Roads may also be designed to accommodate a swale on the lower lying areas (and in lower parts of the catchment).

d) Illustrations of the road cross-sections are provided in Figures 3.6A-1 to 3.6A-7. These are expected to work in tandem with the Chapter 23 – Subdivision Rules (and take precedence over Appendix 15 guidelines).

3.6A.2 Objectives and Policies

When consent is required for subdivision and/or development within the Rotokauri North Structure Plan area, the proposal should be in accordance with the objectives and policies below and any general objectives and policies for Structure Plan areas (refer to Rule 3.3).

Objective	Policies
3.6A.2.1 Development within the Rotokauri North Structure Plan area achieves a medium density residential environment which has high levels of amenity and allows for a range of housing densities and typologies.	**3.6A.2.1a** Enable a medium density residential urban form and character which is defined by: i. a clear definition between public and private spaces, including roads, recreation reserves and drainage reserves; ii. building bulk and massing is focused towards the road frontage and side boundaries of lots, with less development within the rear yards (excluding rear lane accessed garaging); iii. ensuring there is sufficient space between the rear of opposing dwellings to provide privacy and rear yards for outdoor living, along with maintaining reasonable solar access to rear yards; iv. ensuring opportunities for convenient, comfortable and safe interaction at the public / private road boundary interface through the provision of low fence heights, and enabling visually open porch structures extending into the front yard. v. a reliance on high quality and safe interconnected roads and public open spaces in preference to large private outdoor spaces.

	3.6A.2.1b Enable a diverse range of options for residential development (including smaller vacant lots, duplexes and multi-unit apartment residential developments) which: i. is encouraged by a height overlay on the Structure Plan where in proximity to the Business 6 Zone ii. outside of the overlay is encouraged in close proximity to collector roads and recreation reserves; iii. is supported by the opportunity to reduce dependence on cars by a reduction in the number of onsite car parks for duplexes and apartments; and iv. acknowledge that additional site coverage is required to achieve higher density outcomes, particularly where onsite parking is accessed by a rear lane.
	3.6A.2.1c Enable appropriate duplex housing that support an urban street frontage character: i. on sites with a sufficient road frontage width; ii. where there is a combined vehicle crossing; iii. the dominance of car parking is minimised; and Otherwise evaluate other duplex housing opportunities based on their ability to minimise the adverse effects of car parking on building setbacks and the dominance of these elements to an urban streetscape.
	3.6A.2.1d Control road façade elements to ensure dwellings relate to the road, including height controls, presence of a front door, sufficient glazing, ability to establish verandas / porches, landscaping provision, fencing heights, garage setbacks, and the control of garage in proportion to the façade width.
	3.6A.2.1e Enable the development and use of rear lanes, including opportunities for rear garaging/parking and habitable areas above the garage, especially where lot or dwelling frontage widths are narrow.
	3.6A.2.1f Enable outdoor living spaces which: i. Are commensurate with medium density development, ii. Are primarily focused at the rear of dwellings for privacy

	iii. Are supported by opportunities to utilise front porches for outdoor living (as transitional spaces and to enable interaction with the street)
	3.6A.2.1g Recognise the opportunity for service functions within side yards, garages and rear lanes.
3.6A.2.2 Opportunities for a neighbourhood centre are enabled	**3.6A.2.2a** The neighbourhood is supported by a neighbourhood centre to service the day-to-day needs of the residents and future employees of adjoining industrial areas, and to enable local employment.
	3.6A.2.2b Support the neighbourhood centre by directing retail activities to the Business 6 Zone and discouraging them within the residential zones.
3.6A.2.3 Subdivision shall be designed comprehensively to deliver a well-planned medium density environment	**3.6A.2.3a** Subdivision in the Rotokauri North Structure Plan supports medium density housing and is designed to: i. Create lots which are rectangular in shape and have a greater depth than width. ii. Enable superlots (i.e. large vacant lots) of suitable shape and size to provide for apartment developments; ii. Form a well-connected block structure that avoids rear lots wherever possible and minimises cul-de-sac streets to only where there is no practical alternative or where adjoining the green spine, and where pedestrian connectivity can still be achieved; iii. Maximises street or pedestrian frontage to public open spaces, and where possible at least one side of streams or any drainage reserves longer than 250m; iv. Maximises land efficiency so as to promote affordable housing whilst achieving clauses i and ii above; v. Enables subdivision of a permitted activity duplex dwelling; vi. Enables subdivision around an approved land use consent; vii. Is consistent with the Rotokauri North Structure Plan.
3.6A.2.4	**3.6A.2.4a** The roading network maximises vehicular, cycling and pedestrian amenity, connectivity and permeability wherever possible, consistent with the roading hierarchy, and that the

Encourage a legible roading layout that supports a range of travel modes, whilst: (a) minimising effects on the State Highway; (b) providing a strong definition of public spaces; and (c) reinforcing a clear differentiation between the private and public realm. (d) managing speeds with the Rotokauri North roading network (excluding the State Highway)	local road network is designed to achieve a low speed environment.
	3.6A.2.4b Encourage roads to form urban blocks and to front public open spaces.
	3.6A.2.4c Avoid driveway crossings over dedicated protected cycle lanes or 3m wide shared paths on the minor arterial and collector roads identified on the structure plan by enabling access from side roads, access lots or rear lanes.
	3.6A.2.4d Avoid new driveway crossings onto the State Highway, or new roading connections which are not identified on the Structure Plan.
	3.6A.2.4e Encourage vehicle crossings serving two dwellings to be combined, and otherwise co-located to maximise lengths of footpath unencumbered by crossing.
3.6A.2.5 Subdivision and development is coordinated with the delivery of infrastructure.	**3.6A.2.5a** Require subdivision and development to coordinate and undertake the commensurate level of infrastructure design, funding and implementation.
	3.6A.2.5b Require subdivision and development to implement the Rotokauri North Sub-Catchment Integrated Catchment Management Plan.
3.6A.2.6 To promote availability of affordable housing to First Home Buyers.	**3.6A.2.6a** For new developments containing 15 or more individual residential housing units or involving the creation of 15 or more fee simple titled sections, 10 percent of the new individual residential housing units should be affordable for First Home Buyers, with the purchase price to be set relative

	to the average QV house price in Hamilton at the time of sale to the First Home Buyer.

Explanation

The objectives reflect the overall design approach for Rotokauri North, which is to create a well-planned medium density living environment that enables a variety of lifestyle and housing choices (and therefore a range of price points and provision of affordable housing).

The objectives recognise that the environment must create liveable and useable spaces, and the policies and associated methods require the development of urban blocks and interconnected roading networks at the time of subdivision, and for dwellings to create public fronts which address the street and encourage interaction, whilst generally ensuring that back yards are provided for private outdoor living spaces. The achievement of this pattern of development is important to establishing a high quality medium density living environment, and ensuring the integration of subdivision and land use outcomes, particularly where these relate to the creation of vacant fee simple lots and their subsequent development with individual houses.

Subdivision need not meet policy 23.2.3a, instead the comprehensive development of the area is achieved by specific lot and urban block dimensions rules for achieving the layout on the Rotokauri North Structure Plan.

In recognition of the affordable housing requirement that underpins Rotokauri North, the rules support the development and subdivision of duplex dwellings and apartments where these have frontage to the road network and are on fee simple titles.

3.6A.3 Provisions in Other Chapters

The provisions of the following chapters apply to activities within this chapter where relevant.

- Chapter 2: Strategic Framework
- Chapter 4: Residential Zones
- Chapter 5: Business 1-7 zones
- Chapter 19: Historic Heritage
- Chapter 21: Waikato River Corridor and Gully Systems
- Chapter 22: Natural Hazards
- Chapter 23: Subdivision
- Chapter 24: Financial Contributions
- Chapter 25: City-wide
- Volume 2, Appendix 1: District Plan Administration
- Volume 2, Appendix 15 Transportation

3.6A.4 Other Specific Provisions/Rules

3.6A.4.1 Affordable Housing

1) New residential developments containing 15 or more individual residential housing units/ fee simple titled sections must provide for affordable dwellings that will meet the following requirements:

i. All resource consent applications requiring the provision of affordable individual residential housing units / fee simple titled sections must be accompanied by details of the location, number and percentage of affordable individual residential housing units / fee simple titled sections.

ii. Where parent fee simple titled sections or superlots are proposed for future duplex or terrace dwellings to meet these requirements for affordable housing, the yield and future subdivision opportunity for individual fee simple titled sections needs to be identified and included in the total yield calculation.

iii. At least 10% of the individual residential housing units in the resource consent application are to be built/ on provided on their own exclusive fee simple titled sections (and are not unit titles under the Unit Titles Act 2010).

iv. The affordable house is sold on the open market to a First Home Buyer, being a person that has not previously held a fee simple title in a residential property, either solely or jointly with another person (including as a trustee of a trust). A person is not a first home buyer if that person is directly or indirectly controlled by, or an affiliate of, a person that would not be a first home buyer.

v. Each affordable house is sold to a First Home Buyer at a price that is no more than 90% of the average Hamilton city residential house value, as shown in the most recently released June figure published by Quotable Value (www.qv.co.nz) at the date of the sale and purchase agreement (to transfer the property to the First Home Buyer).

vi. For resource consents involving stages, a proportionate number of affordable individual residential housing units and/or fee simple titled sections must be provided at each respective stage on a pro rata basis and spread throughout the development.

vii. If the calculation of the percentage of dwellings (and/or fee simple titled sections) that must be affordable dwellings (and/or fee simple titled sections) results in a fractional dwelling (or fee simple titled sections) of one-half or more, that fraction is counted as 1 dwelling (or vacant site), and any lesser fraction may be disregarded.

viii. A consent notice must be placed on the computer freehold register for the respective affordable individual residential housing units and/or fee simple titled sections at the time of subdivision s224(c) requiring the above criteria be met for three years from the date of the transfer to the eligible First Home Buyer.

ix. Any non-compliance with the above shall be assessed as a Discretionary Activity.

For the avoidance of doubt, subdivision applications creating blocks/lots which are capable of containing multiple dwellings should utilise the total expected number of dwellings to result in that stage as the total number of dwellings/lots to be created in that stage for the purposes of calculating the relevant proportional number of affordable dwellings, and allocate a specific number of affordable units to any superlot.

For the purpose of this rule, terrace dwellings mean three or more attached residential dwellings not in vertical apartment configuration.

Road Cross Section Figures

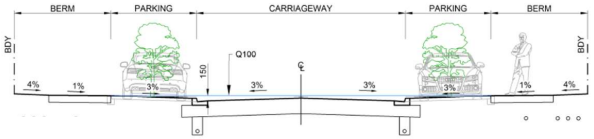

Figure 3.6A-1 **INDICATIVE LOCAL ROAD CROSS SECTION**

NOTE: THIS SECTION ONLY APPLIES FOR CATCHMENTS UP TO 1.5 ha

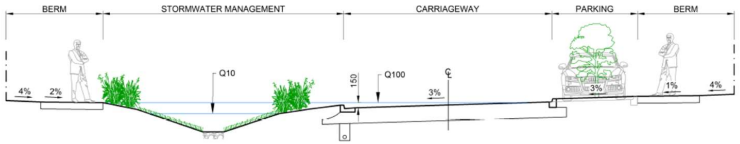

Figure 3.6A-2 **IDICATIVE LOCAL ROAD CROSS SECTION OPTION WITH PARKING ONE SIDE**

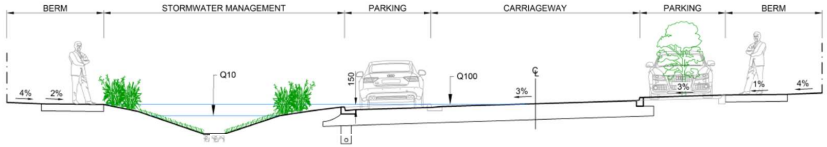

Figure 3.6A-3 **INDICATIVE LOCAL ROAD CROSS SECTION OPTION WITH PARKING BOTH SIDES**

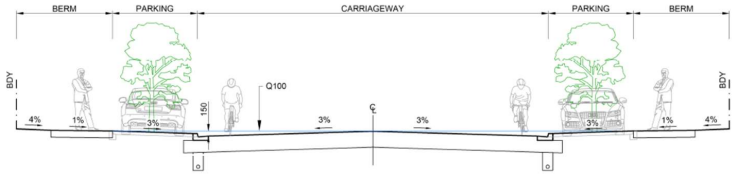

Figure 3.6A-4 INDICATIVE COLLECTOR ROAD CROSS SECTION WHERE NO SWALE IS REQUIRED

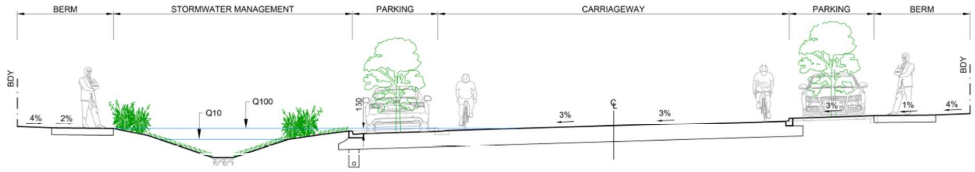

Figure 3.6A-5 INDICATIVE COLLECTOR ROAD CROSS SECTION WITH SIDE SWALE

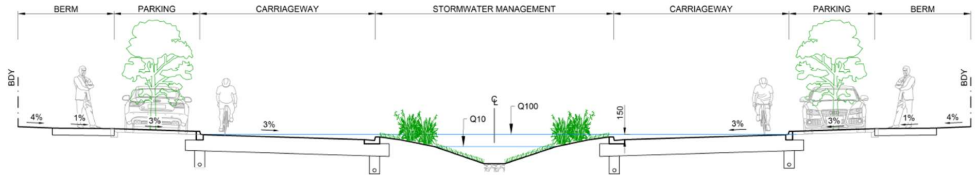

Figure 3.6A-5 INDICATIVE COLLECTOR ROAD CROSS SECTION WITH CENTRAL SWALE

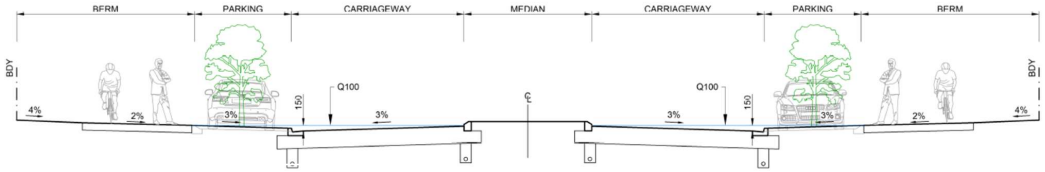

Figure 3.6A-6 **TYPICAL MINOR ARTERIAL ROAD CROSS SECTION (WHERE SWALE IS NOT REQUIRED)**

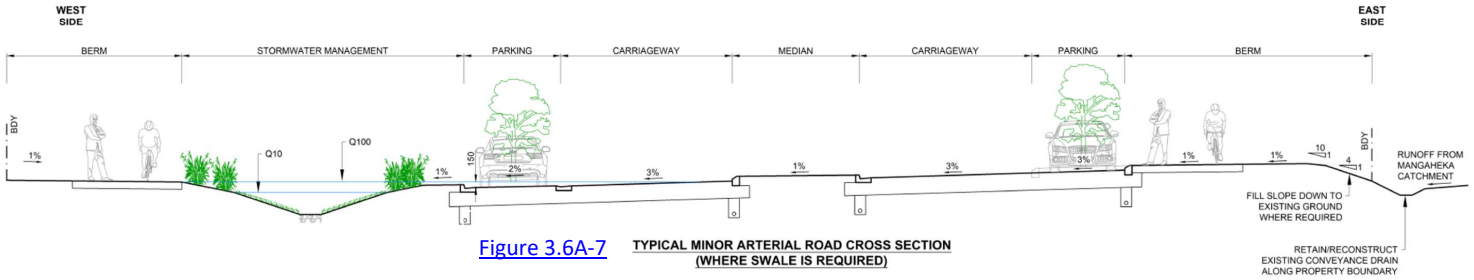

Figure 3.6A-7 **TYPICAL MINOR ARTERIAL ROAD CROSS SECTION (WHERE SWALE IS REQUIRED)**

3.7 Ruakura

The Ruakura Structure Plan area is approximately 822 hectares, the land having been transferred from the jurisdiction of Waikato District Council to Hamilton City in July 2011.

Vision

a) Development of the Ruakura Structure Plan area has been guided by the following vision.

   i. The expansion of the City to provide a significant new employment area based around the development of an inland port and regional logistics hub which will form a catalyst for further development and attract a wider range of business to the City.

   ii. Maximise the use of existing infrastructure investment, including the railway network, and align land use patterns with the area's planned infrastructure investment to achieve integrated transport and land use development; with an emphasis on logistics and freight.

   iii. Create opportunities for the ongoing development of research, learning and innovation activities and in doing so recognising the importance of the University of Waikato, the AgResearch Campus and the Waikato Innovation Park to the City and the Region.

   iv. Develop comprehensively planned areas of residential housing connecting with Fairview Downs, providing a range of housing choice.

   v. Configure land uses around a comprehensive network of well-connected open spaces that will perform a range of functions including stormwater and ecological management, providing pedestrian and cycle routes, and enabling passive and informal recreation.

   vi. An area of new development within the City which is integrated and complementary with the existing and planned land use pattern for the City.

b) The Ruakura Structure Plan area provides 405ha of employment land incorporating an inland port, regional logistics hub, industrial park and other employment land. It also provides 77ha for research and innovation activities, allowing for the expansion of the existing Waikato Innovation Park and maximising opportunities for connectivity and interaction between the University of Waikato and AgResearch.

c) The Ruakura Structure Plan area provides for an eventual population of approximately 1800 households.

d) The Structure Plan includes the development of the Ruakura Retail Centre which will have unique characteristics and functions to warrant its own classification within the business hierarchy for the City. Located within the Knowledge Zone the centre will support the zone's role as the principal focal point for research and innovation activities, provide retail services to these activities and to adjacent

suburbs and will anchor a future passenger transport interchange at its northern end.

e) The Structure Plan creates employment opportunities centred on an inland port and freight and logistics hub and is a strong economic anchor for the City and region, but does not compromise the function, viability and vibrancy of the Central City.

f) The Structure Plan sets out the development concept for the long-term growth of Ruakura over the period to 2061. The area's progressive development will be triggered by the co-ordinated provision of Ruakura Strategic Infrastructure including transport corridors, and extensions to Three Waters supply. Ruakura Strategic Infrastructure which is to be provided in advance of certain development includes:

i. A wastewater network.

ii. Water storage and supply network.

iii. Stormwater management network.

iv. Transport corridor, pedestrian and cycleway connections.

g) The relevant Ruakura Structure Plan area Figures in Appendix 2 indicate the eventual pattern of development within Ruakura whereby infrastructure and open space areas are to be confirmed through detailed design. It includes:

i. Figure 2-14 Ruakura Structure Plan – Land Use (Appendix 2 which shows the land use zoning and open space areas;

ii. Figures 2-15 A and B Ruakura Strategic Infrastructure (Appendix 2):

A shows the strategic infrastructure for the transport network within the Ruakura Structure Plan area;

B shows the strategic three waters network within the Ruakura Structure Plan area;

iii. Figure 2-16 Ruakura Land Development Plan Areas (Appendix 2) which shows the different areas for staged development within the Ruakura Structure Plan;

iv. Figure 2-17 Inland Port Building Setbacks and Landscape Controls (Appendix 2) which shows the setbacks and controls for the Inland Port; and

v. Figure 2-18 Ruakura Cyclist and Pedestrian Network Plan (Appendix 2) which shows the connectivity of the proposed and existing cycle and pedestrian network within the Ruakura Structure Plan area and to surrounding areas.

h) Explanation to Rules

i. The Land Development Consent (see Rule 3.7.4.2) is the key tool to aid the staged process for urbanisation in the Ruakura Structure Plan. All land use, subdivision and development for urban purposes will require resource consent first, being the provision of below ground or at ground infrastructure and services before built development will be considered.

ii. In addition, Staging and Traffic Requirements (see Rule 3.7.4.3) are provided that align with the strategic land allocation for industrial development in the Waikato Regional Policy Statement. This is to ensure that the arterial network has capacity and the safety, efficiency and functioning of the transport

network is maintained through the progressive release of land for development.

iii. Land use in the Ruakura Logistics Zone and Ruakura Industrial Park Zone in the Ruakura Structure Plan Area will roll out in three stages in accordance with the Regional Policy Statement's industrial land allocation in the Future Proof Area which is as follows:

Industrial Land Allocation in the Future Proof Area

Strategic Industrial Nodes located in Central Future Proof area (based on gross developable area)[1]	Industrial land allocation and staging (ha)			Total allocation
	2010 to 2021	2021 to 2041	2041 to 2061	2010 to 2061 (ha)
Rotokauri	85	90	90	265
Ruakura	80	115[2]	210[2]	405
Te Rapa North	14	46	25	85
Horotiu	56	84	10	150
Hamilton Airport	74	10	40	124
Huntly and Rotowaro	8	8	7	23
Hautapu	20	30	46	96
TOTAL HA	**337**	**383**	**428**	**1148**

[1] Gross Developable Area includes land for building footprint, parking, landscaping, open space, bulk and location requirements and land for infrastructure including transport corridors, stormwater and wastewater facilities.
[2] Development beyond the 2021 period is subject to completion of the Hamilton section of the Waikato Expressway.

a. The three stages of land use and development in the Ruakura Logistics Zone and Ruakura Industrial Park Zone in the Ruakura Structure Plan area are provided for in Rule 3.7.4.3 of this District Plan.

b. The 405ha identified above comprises the Ruakura Inland Port and Logistics Zone (approximately 195ha) and Ruakura Industrial Park (approximately 210 ha). The staging and timing identified provides for Stage 1 of the Inland Port and logistics zone (shown as A on Figure 2-16 Ruakura Land Development Plan Areas (Appendix 2)) and up to 30 hectares of industrial development within the Ruakura Industrial Park to 2021. The Ruakura Structure Plan area is linked to the development of Hamilton section of the Waikato Expressway. Further development beyond the initial 80ha identified for the 2010-2021 period should not occur until the Hamilton section of the Waikato Expressway is completed and connected to the Ruakura land in a manner that does not undermine the efficient functioning and safety of the transport network, or another infrastructure solution has been

demonstrated to satisfy the relevant criteria for alternative land release in Method 6.14.3 of the Waikato Regional Policy Statement.

iv. Land use in the General Residential Zone and the Medium Density Residential Zone in the Ruakura Structure Plan area will roll out in accordance with the provision of all necessary network infrastructure.

v. Land use in Precinct C of the Knowledge Zone in the Ruakura Structure Plan area will roll out in accordance with the provision of Ruakura Strategic Infrastructure and associated network connections.

vi. The boundaries of zones for the proposed land uses within the Ruakura Structure Plan area are defined by the planning maps. Open Space at Ruakura consists of indicative and fixed areas on Figure 2-14 Ruakura Structure Plan – Land use (Appendix 2). The final location of open space notated as indicative will be addressed as part of a Land Development Consent. Any change from the Structure Plan will need to ensure that the alternative provides for the connected and multifunctional purpose of the Ruakura Open Space Zone.

3.7.1 Structure Plan Components

This section provides an explanation of the main land use elements to achieve the Vision described in 3.7a.

3.7.1.1 Ruakura Logistics Zone – Inland Port

a) Ruakura is strategically located to satisfy increasing national demand for facilities to efficiently handle freight, particularly that originating at the Port of Tauranga and the Port of Auckland.

b) The port will be intermodal so freight can be transferred from and to rail and road transport. Railway facilities include sidings, platforms, container hardstand areas, lighting towers, security infrastructure and fire and hazardous substance management facilities and quarantine facilities. It also involves infrastructure including CCTV, communications and data management infrastructure and stormwater management.

c) A full diamond interchange from the Waikato Expressway will service the road-based freight traffic associated with the inland port. In the initial phase, it is envisaged that the inland port will consist of primarily road-based freight until the rail infrastructure is developed.

3.7.1.2 Ruakura Logistics Zone – Logistics

a) This generally comprises large warehouse buildings and large areas of hardstand. Logistics and freight-handling activities include all aspects of freight handling.

b) Due to the costs involved in developing the inland port, and the nature of the infrastructure (such as security and MAF/Customs facilities), it is important that the freight and logistics area is occupied by businesses which use the facilities provided by the inland port rather than more general industrial or employment activities.

3.7.1.3 Ruakura Industrial Park Zone

a) Beyond the area identified for the inland port and logistics is more general industrial land for a wider range of employment and economic activities. This land use is facilitated through a new Industrial Park Zone which encourages industrial activities that support the primary purpose of a port and logistic area, while avoiding offensive and noxious activities. It is intended that this industrial area will deliver a higher standard of amenity than would ordinarily be associated with an industrial zone.

3.7.1.4 Knowledge Zone

a) The Knowledge Zone provides further employment opportunities and is situated to capitalise on the location of the Waikato Innovation Park, AgResearch Campus and the University of Waikato. The Knowledge Zone is divided into Precincts which reflect these significant land uses. It will provide for a comprehensive range of education, research and development activities with supporting retail and mixed-use activities, all set within a strong landscaped precinct.

b) The Knowledge Zone is strategically important. While the existing Waikato Innovation Park, University and AgResearch Campus are all located within reasonably close proximity, they lack strong connectivity and a common focal area. There are significant opportunities to create an environment which supports the existing primary economic base of the region, along with the potential for new research and innovation activities related to the inland port and logistics hub, in a manner which does not compromise the Central City.

3.7.1.5 Ruakura Retail Centre

a) The development of the Knowledge Zone provides the opportunity to create further complementary activities in a form that can enhance connectivity and encourage better interaction between existing land uses. The key to achieving these outcomes is the creation of a new north-south link between the University and AgResearch Campus. This area will jointly link the existing activity as well as providing services and ancillary activities. Within this area, it is also proposed to make provision for a retail centre to serve Ruakura and adjacent areas while not undermining the primacy, function and vitality of the Central City, centred upon a 'main street' and public plaza, incorporating a potential passenger transport hub connecting to the Central City.

3.7.1.6 Residential Zones

a) The Ruakura residential area provides for a mixture of development that aligns with the densities proposed for General Residential, Medium-Density Residential and Large Lot Residential Zones. The intention is to provide an area with various housing choices, including site size and housing typologies. Residential development in the General Residential and Medium-Density Residential Zones is positioned to maximise existing connectivity from Fairview Downs and the Hamilton Ring Road. One Integrated Retail Development is provided for within the Ruakura Medium Density Residential Zone to serve the surrounding catchment (see Figure 2-14 Ruakura Structure Plan – Land use (Appendix 2).

b) The area bounded by Percival and Ryburn Roads and the Waikato Expressway is identified on the structure plan as future logistics area (see Figure 2-14 Ruakura Structure Plan – Land Use (Appendix 2). This is to ensure the Regional Policy

Statement's industrial land allocation requirements can be given effect to. However, the staged development of this 35 hectare area as part of the inland port is unlikely to be required during the current planning period. A Large Lot Residential Zone has been retained for this area until such time as any future plan change rezones this area for logistics purposes. Development controls apply to the Inland Port, Logistics and Industrial Park Zones to provide an appropriate level of residential amenity.

3.7.2 Ruakura Strategic Infrastructure

The Ruakura Strategic Infrastructure that is to be provided in conjunction with urban development is set out below.

3.7.2.1 Transportation Network

The transport network to service the Structure Plan area comprises the following hierarchy, which describes the form and function of the various routes (see Figure 2-15A Ruakura Strategic Infrastructure – Transport (Appendix 2):

a) The **Waikato Expressway** forms the eastern boundary of the Structure Plan area. There are two interchanges to the Waikato Expressway connecting to major arterials within the City's network at the Pardoa Boulevard interchange in the north, and the re-aligned Ruakura Road interchange in the south.

b) **Pardoa Boulevard** will initially be two-lane with provision for a four-lane major arterial City Gateway route connecting the Waikato Expressway to the City's Ring Road at Wairere Drive/Crosby Road roundabout. Access is provided via the Spine Road intersection. Strategic water and wastewater infrastructure should co-locate in this corridor.

c) The **Spine Road (North)** is a minor arterial to the north of Pardoa Boulevard and provides strategic connectivity to the future residential development in the north. This will be a two-lane minor arterial road, with direct property access on the western side and intersection only access on the eastern side of the Spine Road. The road corridor will provide for public transport, on-street parking, a shared walking and cycle path and swales for stormwater management. Strategic wastewater and water infrastructure should co-locate within the corridor, coupled with the underground 110kv Transpower transmission line.

d) The **Spine Road (Central)** will be a two-lane minor arterial road south of Pardoa Boulevard to the Fifth Avenue extension. The road corridor provides for public transport, parking, shared footpath and cycle path and a swale area for stormwater management. Strategic wastewater and water infrastructure should co-locate within this road corridor, coupled with the underground 110kv Transpower transmission line through the Medium Density Residential Zone north of Fairview Downs. There is a requirement for staged completion of sections of the Spine Road (Central) prior to development of Land Development Plans.

e) **Fifth Avenue Extension** will initially be two-lane with provision for a four-lane major arterial road extending the Cross City Connector arterial network from Wairere Drive to the Spine Road. It provides for public transport, a shared walking and cycle path and a swale area for stormwater management.

f) The **Spine Road (South)** will initially be two-lane with provision for a four-lane major arterial road from Fifth Avenue south to Ruakura Road West. This extends the Cross City Connector arterial to the Ruakura Industrial Park area. This section includes a road bridge over the East Coast Main Trunk Railway. It provides for public transport, shared footpath and cycleway and a swale area for stormwater management. Strategic wastewater and water infrastructure will co-locate within the road corridor.

g) **Ruakura Road (Urban)** will continue to function as a two-lane minor arterial road between the Wairere Drive Ring Road and the Spine Road. It provides for public transport and shared footpath and cycle path.

h) **Ruakura Road West** will initially be a two-lane minor arterial road with provision for a four-lane major arterial City Gateway route, connecting the Spine Road major arterial to the Waikato Expressway. A series of signalised intersections will provide access to the Inland Port Ruakura Logistics Zone north, Ruakura Industrial Park Zone and the proposed service centre to the south. The corridor provides for public transport, shared footpath and cycle path and swale area for stormwater management.

The Collector road network serving the arterial network shows indicative connections but will be assessed at each Land Development Plan stage to ensure transport connectivity between development areas and the greater structure plan area.

3.7.2.2 Open Space Network

Open space at Ruakura (Figure 2-14 Ruakura Structure Plan – Land Use (Appendix 2) provides for a range of functions including stormwater and ecological management, a well-connected pedestrian and cycleway network linking open space land, neighbourhood reserves for passive and informal recreation, and amenity strips between different areas. The following are key components of the open space network:

a) Greenway – the green corridor that runs from the north west along Pardoa Boulevard and down adjacent to the Spine Road to link to open space along Silverdale Road and the Mangaonua gully to the south. The greenway includes linear wetlands and vegetated margins, storage basins, low-flow channels, indigenous vegetation plantings, and buffer and interface amenity planting. The greenway will also provide for other functions including pedestrian and cyclist paths, and passive recreation such as seating areas.

b) Gullies – at the northern end (Kirikiriroa Stream headwaters) and southern end (Mangaonua gully) of the structure plan area are gullies which will be protected in the same manner as those across the rest of the City in accordance with Chapter 21 Waikato River Corridor and Gully Systems.

c) Visual amenity and buffer between incompatible activities – open space areas and planting shall provide an effective/suitable buffer, between different types of land uses.

d) Neighbourhood reserves - these provide a range of informal recreation facilities including children's play areas, and spaces for passive and active recreation. Each neighbourhood reserve is expected to provide an area of 0.5 ha and serve a population of 500m radius.

e) Connectivity – open space at Ruakura is intended to contribute to a well-connected network for pedestrians and cyclists.

3.7.2.3 Stormwater

a) The structure plan sits across four hydrological catchments, being the Kirikiriroa, Komakorau, Hamilton East and Mangaonua catchments. Due to the flat topography, most public stormwater devices will be provided for within the swale/linear wetland network adjacent to the transport network or underneath the national grid transmission lines where opportunities for other land uses are limited. In addition to these linear wetlands and swales, on-site stormwater management devices will also be required to mitigate effects of development. The precise nature and location of these stormwater facilities will be finalised through detailed catchment management planning and modelling undertaken as part of preparing Land Development Consent applications for the growth cell (through Water Impact Assessments) or arising from a full Integrated Catchment Management Plan.

b) Stormwater must be managed in an integrated manner across all catchments with individual developments contributing towards wider network and catchment outcomes.

c) Figure 2-15B Ruakura Strategic Infrastructure – Three Waters (Appendix 2) shows the recommended stormwater discharge points to three of the four catchments (excluding Komakorau). Discharge consents will be required from the Waikato Regional Council prior to the discharge of any stormwater into these catchments from the Structure Plan area.

3.7.2.4 Water and Wastewater

a) A single reservoir is proposed to meet the demand and level of service requirements for the entire development of the structure plan. The single reservoir will also need to support the wider existing and future City needs. Figure 2-15B Ruakura Strategic Infrastructure – Three Waters (Appendix 2) shows an indicative location for a reservoir, at the highest point of the structure plan area within the existing AgResearch site, and indicative bulk mains connecting to the City network at Wairere Drive and Peachgrove Road. The bulk and trunk network shall be located within the vested road corridor.

b) Any Land Development Consent application will need to be supported by an assessment of options taking account of the whole of life costs for any proposed public infrastructure.

c) The strategic wastewater solution at Wairere Drive/Crosby Road has been developed to service future development needs for the Ruakura Structure Plan area. This wastewater interceptor is to be extended east and then south along the Spine Road to a point south of the East Coast Main Trunk railway line. Beyond the Ruakura Structure Plan area the wastewater interceptor will continue to service growth areas for the City.

d) It is Council's expectation that the entire structure plan area will be serviced in a manner that seeks to avoid the need for any vested pumping stations.

3.7.2.5 Indicative Infrastructure Development Programme

a) Figures 2-15A and B Ruakura Strategic Infrastructure (Appendix 2) illustrate the Ruakura Strategic Infrastructure. Rules 3.7.4.3 and 3.7.4.4 detail the nature and staging of transportation and three waters infrastructure requirements. Land

Development Consents are expected to further refine these transportation and three waters infrastructure needs. It is expected that the provision of the strategic three waters infrastructure network would be integrated, constructed and vested concurrent with the development of the transport network including the incremental development of the Spine Road.

b) Where strategic infrastructure is developed on land not held by Council, easements in favour of Hamilton City Council will be required to secure access to any public infrastructure. It is Council's expectation that all Ruakura Strategic Infrastructure will be vested in Council.

3.7.2.6 Connections to Ruakura Strategic Infrastructure

a) The Structure Plan sets the overarching pattern of development, which is supported by strategic infrastructure. While the concepts are flexible in their application to some extent, the pattern of development shall be sequenced in accordance with the Ruakura Strategic Infrastructure as shown on Figures 2-15A and B Ruakura Strategic Infrastructure (Appendix 2). There are critical elements of strategic infrastructure that must be provided for within defined corridors and locations.

b) There is no interim water capacity for the remainder of the Ruakura Structure Plan. Once the reservoir is operational, existing and subsequent development within the Structure Plan will be required to connect to the distribution network from the reservoir which will be serviced from both the existing main connections at Wairere Drive and Peachgrove Road.

c) There is no interim wastewater capacity within the City's existing wastewater network to accommodate growth in the Ruakura Structure Plan area. All wastewater is to be disposed via a wastewater service which will be extended south along the Spine Road corridor through Land Development Consent applications. All Land Development Consent applications shall demonstrate how they provide for immediate and or future connections to the Ruakura Strategic Infrastructure.

3.7.3 Objectives and Policies

When consent is required for subdivision and/or development within the Ruakura Structure Plan area, the proposal must be in accordance with the objectives and policies below and any general objectives and policies for Structure Plan areas (refer to 3.3).

Objective	Policies
3.7.3.1 Land within the Ruakura Structure Plan area will be developed in accordance with the vision for the Ruakura Structure Plan area set out in 3.7 and 3.7.1.	**3.7.3.1a** The expansion of the City to provide a significant new employment area based around the development of an inland port and regional logistics hub which will form a catalyst for further development and attract a wider range of business to the City.
	3.7.3.1b Maximise the use of existing infrastructure investment, including the railway network, and align land-use patterns with the area's planned

Objective	Policies
	infrastructure investment to achieve integrated transport and land use development; with an emphasis on logistics and freight.
	3.7.3.1c Create opportunities for the ongoing development of research, learning and innovation activities; recognising the importance of the University of Waikato, the AgResearch Campus and the Waikato Innovation Park to the City and the Region.
	3.7.3.1d Develop comprehensively planned areas of residential housing connecting with Fairview Downs, providing a range of housing choice.
	3.7.3.1e Configure land uses around a comprehensive network of well-connected open spaces that will perform multiple functions including recreation, stormwater management, cycle ways and walkways, ecological and amenity.
	3.7.3.1f An area of new development within the City which is integrated and complementary to the existing and planned land use pattern for the City.
3.7.3.2 Development and land use activities provide for urbanisation in the Ruakura Structure Plan area and are designed, developed and implemented in a manner which protects the amenity values of surrounding communities and facilities.	**3.7.3.2a** Development and land use will: i. For existing and future residential activities ensure an appropriate level of amenity; and ii. Ensure an appropriate level of amenity in relation to existing and future facilities in the University of Waikato, Waikato Innovation Park and AgResearch. This will be achieved by: i. Mitigating the adverse effects of noise, vibration, lighting, glare, odour, dust, and air emissions; and ii. Ensuring attractively designed buildings and landscaped frontages to key public frontages; and iii. Screening and landscaping adjoining sensitive activities.

Objective	Policies
	3.7.3.2b Land use, subdivision and development of the Ruakura Structure Plan will be undertaken in accordance with Figures 2-14, 2-15A and B, 2-16, 2-17 and 2-18 outlined in Appendix 2 Structure Plans.
	3.7.3.2c Interim land use and development long-term will not compromise the integrity and viability of the land use pattern of the Ruakura Structure Plan area.
	3.7.3.2d The positive effects of logistics, industry, knowledge, residential and open space activities on economic, cultural, social and environmental wellbeing will be encouraged and promoted by providing for these activities.
	3.7.3.2e Logistics, industry, knowledge, residential and open space land zoned as identified on Figure 2-14 will be safeguarded for these purposes.
	3.7.3.2f Industrial land to support the inland port will be released in stages to ensure that co-location and agglomeration benefits of the Inland Port are realised.
3.7.3.3 New urban development within the Ruakura Structure Plan area is serviced by and integrated with the existing and future infrastructure network (Ruakura Strategic Infrastructure – See Figure 2-15 A and B)	**3.7.3.3a** Land within the Ruakura Structure Plan will not be developed until adequate infrastructure is provided and a commitment to the development of the Ruakura Strategic Infrastructure is secured by an appropriate legal mechanism.
	3.7.3.3b Staging and sequencing will ensure the capacity of roading and Ruakura Strategic infrastructure is not exceeded.
	3.7.3.3c The use and development of land for urban development is appropriate when a Land Development Consent has been granted by the Council.
	3.7.3.3d Development will not result in incompatible adjacent land uses with respect to existing or planned infrastructure.

Objective	Policies
3.7.3.4 An integrated and efficient pattern of land use and transportation.	**3.7.3.4a** Integrated Transport Assessments will be undertaken for each Land Development Plan area, and for high traffic generating activities, to manage impacts on existing and planned transport infrastructure including Ruakura Strategic Infrastructure.
	3.7.3.4b The transport network supports efficient passenger transport and walking and cycling, including dedicated facilities on arterial routes.
	3.7.3.4c Development is staged to coordinate with the extension and/or construction of the Spine Road and provides ongoing connectivity to the existing and future transport network.
	3.7.3.4d When road stopping procedures for parts of Ruakura Road and Percival Road are initiated under the Local Government Act to enable the expansion of the Inland Port alternative access proposals shall accord with the following principles: i. A route which provides for travel in the general direction of Hillcrest and Silverdale without significant detours in terms of distance, travel times or connectivity; ii. A route which enables use of alternative modes of transport (particularly walking and cycling); and iii. A route which avoids severance effects for the Percival / Ryburn Road community. iv. A route which maintains north-south connectivity for all modes across the East Coast Main Trunk railway line for Percival Road and Ryburn Road properties until an appropriate connection via the Spine Road is operational. v. A route that avoids direct connection to industrial or logistics properties from Percival Road or Ryburn Road.

Objective	Policies
	3.7.3.4e There will be no direct connection to properties in the Ruakura Logistics Zone (Land Development Plan Area P) and the Ruakura Industrial Park Zone (Land Development Plan Area F) from the currently formed Percival and Ryburn Roads north of the East Coast Main Trunk railway.
	3.7.3.4f Opportunities for improved safety, accessibility, connectivity and efficiency within the transportation network are provided including dedicated facilities on arterial routes.
3.7.3.5 Development maintains or enhances indigenous biodiversity values and mitigates adverse effects on indigenous biodiversity.	**3.7.3.5a** Development will avoid adverse effects on significant indigenous biodiversity in the first instance, and where effects cannot be avoided, they should be remedied, mitigated or offset in order to maintain indigenous biodiversity values.
	3.7.3.5b Protect, and where appropriate enhance, the water quality of adjacent streams and gully systems in order to maintain or enhance indigenous biodiversity values.
	3.7.3.5c Encourage improved indigenous biodiversity outcomes through restoration and enhancement.
	3.7.3.5d Create a greenway which provides opportunities for improved habitat and ecological benefits in the Ruakura Structure Plan and in the downstream receiving environment. The greenway open space and road corridor shall include linear wetlands, their vegetated margins, storage basins, low flow channels, indigenous vegetation planting and amenity planting.
	3.7.3.5e Retain and re-establish viable populations of the black mudfish, longfin eel, shortfin eel, and indigenous lizards within the Ruakura Structure Plan, by the establishment and management of linear wetlands and riparian vegetation.

Objective	Policies
	3.7.3.5f The Land Development Consent will include methods to ensure maintenance or enhancement of indigenous biodiversity values and mitigation of adverse effects on indigenous biodiversity.
3.7.3.6 Land use and development in the Ruakura Structure Plan occurs in a manner which does not compromise the vitality, functions and amenity of the central city and maintains a hierarchy of business centres in Hamilton.	**3.7.3.6a** The distribution, type, scale and intensity of commercial development in the Ruakura Structure Plan will not undermine the vitality, functions, and amenity of the central city.
3.7.3.7 The creation of a regionally significant inland port and logistics hub in Hamilton.	**3.7.3.7a** Logistics, freight handling services and supportive activities and infrastructure shall be provided for in the Ruakura Knowledge Zone.
	3.7.3.7b The positive environmental economic and social effects of logistics and freight handling activities and infrastructure shall be recognised and supported.
3.7.3.8 The continued development of a research, education, innovation and technological activity precinct in a manner which does not compromise the Central City.	**3.7.3.8a** Research, education, innovation and technological activities and supporting activities and infrastructure shall be supported and co-located within the Ruakura Knowledge Zone.
	3.7.3.8b The manufacture and development of prototype goods, where such activities will complement the primary role of research, education and innovation, shall be provided for.
	3.7.3.8c Activities ancillary to and which support the primary purpose of the zone, such as retail and community activities, shall be recognised and provided for.
	3.7.3.8d The shared use of infrastructure, including car parking and buildings to maximise efficiencies of use, shall be encouraged.

Objective	Policies
3.7.3.9 The creation of a high quality Industrial Park in Ruakura.	**3.7.3.9a** Industrial development shall be well designed and of high quality in the Ruakura Industrial Park Zone.
	3.7.3.9b No provision is made for noxious or offensive industrial activities within the Ruakura Industrial Park Zone.
3.7.3.10 An integrated, well-planned residential environment.	**3.7.3.10a** Residential areas shall be comprehensively planned and developed in co-ordination with transport network connections.
	3.7.3.10b Residential areas shall be integrated with and connected to Fairview Downs.
	3.7.3.10c A range of housing choice shall be provided.
3.7.3.11 A centre for locally based retail facilities capable of meeting the day to day needs of the immediate surrounding neighbourhoods.	**3.7.3.11a** Activities within the neighbourhood centre shall principally serve the immediate neighbourhood.
	3.7.3.11b The scale and nature of activities within the neighbourhood centre shall not generate significant adverse amenity effects on the surrounding residential area and transport network.

3.7.4 Rules

3.7.4.1 Ruakura Structure Plan Area

All land use and development within the Ruakura Structure Plan area shall be in accordance with:

a) The Ruakura Structure Plan area as set out in section 3.7 of this Chapter, and

b) Ruakura Structure Plan area Figures in Volume 2, Appendix 2, Figures 2-14 to 2-18.

c) Land Development Rules 3.7.4.2

d) Staging and Traffic Rules 3.7.4.3

e) Ruakura Strategic Infrastructure Rules 3.7.4.4

f) General Matters 3.7.4.5.

3.7.4.2 Land Development Rules

a) A resource consent for a restricted discretionary activity is required for the following activities in the Ruakura Structure Plan:

i. Preparation of land for development purposes including earthworks and vegetation removal.

ii. Construction of roads, pedestrian paths and cycle routes.

iii. Installation of Three Waters infrastructure (including linear wetlands and storage basins).

iv. Works related to the establishment of open space areas.

v. Screen planting associated with the Inland Port (Sub Area A (Inland Port) - see Figure 2-17 Inland Port Building Setbacks and Landscape Controls (Appendix 2)).

b) Land Development Consent shall be obtained for the entire Land Development Plan Area as shown in Figure 2-16, in conjunction with land use, subdivision and development consent under any other rule of the Ruakura Structure Plan. Alternatively, Land Development Consent for activities listed in Rule 3.7.4.2 a) may be applied for in relation to part of a Development Plan Area shown on Figure 2-16 or in combination with all or part of any other Land Development Plan Area : provided that the indicative information for the balance areas of each Land Development Plan Area is included in the application, as detailed in Appendix 1. The boundaries of the Land Development Plan (as shown on Land Development Plan which is submitted as part of any Land Development Consent application) may differ from the areas shown on Figure 2-16, except that for an application for any part of Land Development Plan Area D or F, the full extent of the Spine Road included in those Areas as shown on Figure 2-16 must be included in the Land Development Plan and the Land Development Consent application.

c) A Land Development Plan shall provide the following information as detailed in Appendix 1.2.2.25 Information Requirements – Land Development Plans.

d) Land Development Consent applications will be assessed in accordance with the functions of the Hamilton City Council prescribed in Section 31 of the Resource Management Act. Consents may also be required from Waikato Regional Council under the Waikato Regional Plan e.g. for stormwater discharge.

e) Except as provided for by sections 95A(2)(b) and (c), 95B(2) and (3) and 95C(1) to (4) of the Act applications for any Restricted Discretionary Activity identified with an asterisk (*) in the relevant zone chapter shall be considered without notification or the need to obtain approval from affected persons except that applications for all:

i. Land Development Consents under Rule 3.7.4.2; and

ii. Activities generating 1500 or more vehicle movements per day

shall be limited notified to the following unless they have given their affected party approval:

- New Zealand Transport Agency provided that the requirement for affected party approval shall not apply to activities with an asterisk (*) in the Residential Zones with the exception of LDP Area O.

f) Further to clause (e), all activities within the Inland Port (Sub Area A (Inland Port)- see Figure 2-14 Ruakura Structure Plan – Land use (Appendix 2) classified as a

Restricted Discretionary Activity by Rule 25.8.3.14a) shall be considered without notification or the need to obtain approval from affected persons.

3.7.4.3 Staging and Traffic Rules

3.7.4.3.1 Spine Road Construction Trigger

a) The full extent of that section of the Spine Road (Figure 2-15A Ruakura Strategic Infrastructure-Transport (Appendix 2)) that is within or abuts LDP Area (Figure 2-16 Ruakura Land Development Plan Area (Appendix 2)) shall be constructed as part of the development authorised by the Land Development Consent for that LDP Area; and

b) Development shall not commence in LDP Area I until the Spine Road is constructed along the full extent of LDP Area M; and

c) Development shall not commence in LDP Area K until the Spine Road is constructed along the full extent of LDP Areas L and M.

d) Development shall not commence in LDP Area G until the Spine Road is constructed along the full extent of LDP Areas T, L and M.

e) Development shall not commence in LDP Area R until the Spine Road is constructed along the full extent of LDP Areas S, T, L and M; and

f) Development shall not commence in LDP Areas D, F or P until such time as the Spine Road is constructed along the full extent of LDP areas A, D, F and that part of LDP Area B that connects F to D.

3.7.4.3.2 North South Connectivity – Percival Road and Ryburn Road

a) North-south connectivity for all modes across the East Coast Main Trunk railway line shall be maintained for Percival Road and Ryburn Road properties until a connection via the Spine Road is operational. There shall be no direct connection to industrial or logistics properties from Percival Road or Ryburn Road.

b) The North-south route required under a) above shall not exceed a length of 2750 metres, measured from the intersection of the centrelines of Percival Road and Ryburn Road to the intersection of the centrelines of Ruakura Road and Silverdale Road.

Note: The north, central and south sections of the Spine Road are defined in 3.7.2.1 and shown in Figure 2-15A Ruakura Strategic Infrastructure-Transport (Appendix 2)

3.7.4.3.3 Industrial Land Stage 1 (RPS 2021 Allocation)

a) Up to 80 hectares of land within the Ruakura Structure Plan may be developed before 1 January 2021, with general industrial not exceeding 30 hectares.

This can be made up with a combination of the following land allocations:

Ruakura Logistics Zone

i. up to 20 ha of Ruakura Logistics Zone; or

ii. up to 40 ha of land in Ruakura Logistics Zone subject to:

   a. Signalisation of the existing intersection of Ruakura Road/Knighton Road;

and

b. Signalisation of the intersection of Ruakura Road/Silverdale Road; and

c. Total weekday average peak hour generation for the area for each morning and evening peak periods based on a minimum two week continuous traffic count is less than 180 vph.

iii. up to 80 ha of Ruakura Logistics Zone subject to:

a. Signalisation of the existing intersection of Ruakura Road/Knighton Road; and

b. Signalisation of the intersection of Ruakura Road/Silverdale Road; and

c. Ruakura Road being realigned and connected from the existing Ruakura Road (east of Silverdale Road) to the existing Ruakura Road (north of Vaile Road), and open to traffic; and

d. Formation of a priority controlled intersection where the realigned Ruakura Road meets the old Ruakura Road in the block between Holland Road and Vaile Road; and

e. Total weekday average peak hour generation for the Ruakura Logistics Zone for each morning and evening peak periods based on a minimum two week continuous traffic count is less than 180 vph.

Ruakura Industrial Park Zone

and/or

iv. Up to 16 ha of Ruakura Industrial Park Zone to the north of AgResearch provided the overall level of development within the Industrial Land Stage 1 shall not exceed 80 ha; or

v. Up to 30 ha of land within the Ruakura Industrial Park Zone to the north of AgResearch, provided the overall level of development within the Industrial Land Stage 1 shall not exceed 80 ha; and

a. Total weekday average peak hour generation for the Zone for each morning and evening peak periods based on a minimum two week continuous traffic count is less than 15 vph per gross developed hectare; and

b. An approved Land Development Plan for Land Development Plan Area A being stage 1 of the Inland Port, south of the East Coast Main Trunk railway and west of Percival Road, and associated logistics activities; and

c. Commencement of development within Land Development Plan Area A (being Stage 1 of the Inland Port (Sub Area A (Inland Port)) and associated logistics activities). For the purpose of this rule commencement of development will be as a minimum, water, and wastewater connections, stormwater solutions and transportation access to the Inland Port consistent with the approved Land Development Consent for the Inland Port, and consistent with any staging and interim infrastructure solution provided for in the Land Development Plan. These connections will be identified in the Land Development Consent.

3.7.4.3.4 Industrial Land Stage 2 (RPS 2021 - 2041 Allocation)

a) An additional 115ha of land within the Ruakura Logistics Zone and Ruakura Industrial

Park Zone may be developed post 1 January 2021 subject to:

i. The Waikato Expressway (Hamilton section) having been completed and directly connected to the Ruakura Structure Plan area, via an interchange at a realignment of Ruakura Road and the direct connection between Pardoa Boulevard Interchange and Wairere Drive.

ii. Weekday average peak hour traffic volume, including the traffic generated by the proposed development, not exceeding 1,200 vehicles per hour (vph) (one way) on Ruakura Road (east of Wairere Drive) and 1,400 vph (one-way) on Wairere Drive (south of Ruakura Road). Where the volume is in excess of either of these thresholds this area can be developed only when the Spine Road is connected and open to traffic from Ruakura Road to Fifth Avenue Extension.

iii. The traffic generation and network performance for Stage 1 Activities is in accordance with Rule 3.7.4.3.3.

3.7.4.3.5 The Knowledge Zone Precinct C (including the Ruakura Retail Centre, but excluding Precincts A, B and D) Staging

a) Up to 16 ha of land within Precinct C (including the Ruakura Retail Centre) may be developed subject to:

i. A connection being formed between Precinct C and Ruakura Retail Centre and the signalised intersection of Ruakura/Knighton Roads.

ii. Weekday average peak hour traffic volume, including the traffic generated by the proposed development, not exceeding 1,200 vehicles per hour (vph) (one way) on Ruakura Road (east of Wairere Drive) and 1,400 vph (one-way) on Wairere Drive (south of Ruakura Road). Where the volume is in excess of either of these thresholds this area can only be developed when the Spine Road is connected and open to traffic from Ruakura Road to Fifth Avenue Extension.

Or

iii. Suitable arterial network capacity can be demonstrated or established in a manner that maintains the efficiency, safety and functioning of the transport network.

Provided that:

iv. No more than 5ha can be developed unless the Spine Road is connected and open to traffic from Ruakura Road to Fifth Avenue Extension.

3.7.4.3.6 Staging Activity Status

a) Any application for resource consent not in accordance with Rules 3.7.4.3.1 – 3.7.4.3.5 is a discretionary activity.

The Council's discretion shall include, but not be limited to, the following assessment criteria:

i. Consistency with the Industrial Land Allocation or alternative land release criteria specified in any operative or proposed Regional Policy Statement including any approved alternative land release provided for.

ii. Mitigation works to ensure that development does not result in long term adverse effects on the efficiency, safety and functioning of the transport network.

iii. The timing of any other planned local network upgrades that would contribute to the offset of the effects of traffic generation.

iv. Certainty of timing over the construction of the Hamilton section of the Waikato Expressway and the extent to which this enables a departure from the provisions of Rule 3.7.4.3.1.

v. The ITA matters for discretion set out in Appendix 1.3.3 N Ruakura.

vi. For industrial development in excess of 16ha in the Industrial Park Zone in LDP Areas B and D or for any industrial development outside of this area: whether a Land Development Consent for Area A (being Stage 1 of the Inland Port (Sub Area A (Inland Port)) and associated logistics activities) has been approved and the necessary infrastructure connections for the Inland Port are in place.

vii. Where the boundaries of a Land Development Plan Area in an application for Land Development Consent differ from those shown on Figure 2-16, the extent of the Land Development Plan Area shall be developed in an integrated manner. This shall include the provision for and connectivity to infrastructure, and ensure that key transport infrastructure such as the Spine Road is developed in a manner that provides at least the same levels of efficiency, effectiveness and safety anticipated through a land development consent in accordance with Figure 2-16. Where an application includes part of a Land Development Plan Area in Figure 2-16 it shall be demonstrated that granting consent to that part will not prevent the integrated development of the balance of that Area.

b) Except as provided for by Section 95A (2)(b) and (c), 95B(2) and (3) and 95C(1) to (4) of the Act, an application under this rule shall be considered without notification or the need to obtain approval from affected persons except that the application shall be limited notified to the following unless the persons have given their affected party approval:

- New Zealand Transport Agency.

3.7.4.3.7 Traffic Generation

a) Any activity generating 1500 or more vehicle movements per day (vpd) requires resource consent as a restricted discretionary activity.

b) This rule does not apply to events and temporary activities where a temporary traffic management plan has been approved by the relevant road controlling authority.

c) If an affected party under Rule 3.7.4.2e) has provided their written approval for a Land Development Consent then no further approval is required for any additional Integrated Transport Assessment for activities generating 1500 or more vehicle movements per day, except where the trip generation was not considered as part of the original Integrated Transport Assessment.

3.7.4.3.8 Explanation to Rules

a) The staging conditions relate to the provisions of the RPS and in particular Table 6-2 which sets out the strategic industrial land allocation for the Waikato Region. Ruakura is identified for the staged release of land to provide for up to 405ha of

industrial land by 2061. The rules are aimed at ensuring compliance with this land release but still picking up key triggers and levels of tolerance where network upgrades and other constraints lie.

b) Due to the size of the site and the development timescale the roll out, and specific mix of Ruakura Logistics and Ruakura Industrial Park land uses are not yet understood. Ruakura Logistics activities are expected to have a significantly lower level of traffic generation than Industrial Park Activities. Rules accommodate a range of development options and environmental effects. While the location and final layout of these activities are fixed, the take up of the land will depend on the market demand and, so some staging flexibility is appropriate.

c) The Industrial Stage 2 development and the Precinct C development within the Knowledge Zone are subject to the Waikato Expressway (Hamilton section) being completed and connected to the Ruakura Structure Plan area or suitable arterial network capacity being demonstrated or established in a manner that maintains the efficiency, safety and functioning of the transport network. Where construction is underway and a completion date is available some flexibility on further land release may be appropriate to ensure benefits are obtained from infrastructure at the earliest possible date and development to cater for market demand is not unduly delayed.

3.7.4.4 Ruakura Strategic Infrastructure Rules

All land use and development within Land Development Areas shall meet the following performance standards.

3.7.4.4.1 Potable Water Supply

a) Connection to the Ruakura water reservoir via a new distribution network in a manner consistent with the Ruakura Strategic Infrastructure as provided for in Figure 2-15B Ruakura Strategic Infrastructure – Three Waters (Appendix 2), with the following exception:

   i. Prior to the operation of the Ruakura reservoir, up to 1250 residential lots in the Ruakura Structure Plan may be serviced from the existing Pardoa Boulevard / Wairere Drive water connection. Once the Ruakura water reservoir is operational, all existing and proposed residential development within the structure plan area shall be connected to the reservoir via a new distribution network.

3.7.4.4.2 Wastewater Network

a) The wastewater network shall be extended along the Spine Road corridor to the full extent of the Land Development Plan Area boundary in accordance with Figure 2-15B Ruakura Strategic Infrastructure (Appendix 2).

b) The wastewater network shall discharge into the Ruakura Strategic Infrastructure wastewater network.

3.7.4.4.3 Stormwater Network

a) All stormwater management infrastructure shall be in accordance with an approved ICMP where available, or with an approved Water Impact Assessment. In particular,

in absence of a relevant ICMP, stormwater management infrastructure shall be subject to specific catchment management planning through a Water Impact Assessment and be consistent with the stormwater discharge points shown on Figure 2-15B Ruakura Strategic Infrastructure – Three Waters (Appendix 2).

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3.7.4.4.4 Explanation to Rules

Refer to 3.7.2. Ruakura Strategic Infrastructure

3.7.4.5 General Matters

All land use and development within the Ruakura Structure Plan area shall be subject to all infrastructure requirements identified as part of the assessment criteria set out in the relevant rules of:

a) Chapter 4: Residential Zones

b) Chapter 8: Knowledge Zone

c) Chapter 10: Ruakura Logistics Zone

d) Chapter 11: Ruakura Industrial Park Zone

e) Chapter 15: Open Space Zones

f) Volume 2, Appendix 1.3.3 Restricted Discretionary Activity – Matters for Discretion and Assessment Criteria

3.7.5 Provisions in Other Chapters

The provisions of the following chapters apply to activities within this chapter where relevant.

- Chapter 4: Residential Zone
- Chapter 8: Knowledge Zone
- Chapter 10: Ruakura Logistics Zone
- Chapter 11: Ruakura Industrial Park Zone
- Chapter 15: Open Space Zones
- Chapter 20: Natural Environments
- Chapter 21: Waikato River Corridor and Gully Systems
- Chapter 22: Natural Hazards
- Chapter 23: Subdivision
- Chapter 24: Financial Contributions
- Chapter 25: City-wide
- Volume 2, Appendix 1: District Plan Administration

3.8 Te Awa Lakes

The Te Awa Lakes Structure Plan area is approximately 62ha and is bounded by the Waikato River, the Waikato Expressway, Te Rapa Road, and Hutchinson Road. It lies at the northen gateway to Hamilton.

Vision

a) Development of the Te Awa Lakes Structure Plan Area is guided by the following:

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i. Enabling the establishment of a regionally significant tourist destination comprising an adventure park, short stay accommodation and tourism/cultural facilities.

ii. Creating a comprehensively designed residential development to support an active community, integrated with the adventure park.

iii. Providing appropriate commercial and community facilities to provide services to the local community and visitors.

iv. Creating an attractive northern urban gateway to Hamilton City.

v. Achieving innovative and efficient repurposing of a site that has been heavily modified by sand quarrying.

vi. Integrating the development with the Waikato River, and the Te Awa River Ride path, through open spaces, public access and sensitive residential development.

3.8.1 Objectives and Policies

Objective	Policies
3.8.1.1 Enable development of a tourist and recreational attraction in a regionally strategic location.	3.8.1.1a Allocate an area of land sufficient for a range of recreational/leisure activities in a highly visible location with ready access from the Waikato Expressway.
	3.8.1.1b Utilise land contours and geotechnically difficult land areas from the previous sand quarrying activity for adventure park and recreational/leisure activities. 3.8.1.1c Manage any adverse noise or visual effects from the recreational/leisure activities on the neighbouring residential area to achieve acceptable amenity.
3.8.1.2 Establish a high quality medium density urban residential environment.	3.8.1.2a Encourage higher densities in areas of high amenity close to lakes and open spaces. 3.8.1.2b Create a well connected open space network with public access to the Waikato River. 3.8.1.2c Use high quality design and landscaping to create an attractive and distinctive gateway into Hamilton.

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Objective	Policies
	3.8.1.2d Incorporate water bodies into the development as amenity and recreational features.
3.8.1.3 Provide additional serviced residential land capacity in a timely manner.	3.8.1.3a Utilise the existing water, wastewater and roading infrastructure for development within a short timeframe to meet Hamiltons short term housing needs. 3.8.1.3b Provide a range of housing choices to support a diverse and active community.

3.8.2 Structure Plan Components

This section provides an explanation of the main land use elements to achieve the vision described in 3.8a). These elements are incorporated in land use zones and overlays as shown on the Planning Maps.

3.8.2.1 Adventure Park

This area is a proposed regional destination adventure park. This provides for a range of outdoor and indoor recreation activities with a core of water based activities. A lake in the same location as an existing waterbody will be used as a cable ski lake with a further opportunity for an adjoining waterbody to be used as an aqua park. The adventure park is located adjacent to Te Rapa Road where it is highly visible and access can be shared with the service centre slip lane and Hutchinson Road through the mixed use area. This allows the second eastern connection to Hutchinson Road to primarily accommodate residential demands, separate from the adventure park traffic. This area will be zoned Major Facilities and a Concept Development Consent will need to be approved before any development.

3.8.2.2 Adventure Park Visitor Accommodation

This area is comprised of short stay accommodation with the objective to support the regional need for visitor accommodation. It is likely to be resort-style accommodation. The central location of the site to a number of key tourist destinations in the central North Island is strengthened by the close proximity to the Waikato Expressway and combination with the proposed regional destination of adventure park, tourist and cultural hub.

The Adventure Park Visitor Accommodation precinct is also located within the Major Facilities Zone generally between the permanent residential land uses and the Adventure Park. This forms a visual and aural buffer between the two elements spatially as well as physically to transition informally from the major recreation/leisure facility to residential.

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3.8.2.3 Mixed Use

The mixed use area contains the existing service centre and an adjoining mixed use block directly to the east. This area consolidates retail functions to the south west of the landholding utilising the direct connection to and from Hutchinson Road and Te Rapa Road and provides a buffer, along with a collection of rural/lifestyle blocks, to the Fonterra site to the south. It will include neighbourhood shops of a size and scale to service residents and visitors plus small scale offices and service industries.

Vehicular traffic will be encouraged to utilise the existing service centre and the mixed use block will serve the Te Awa Lakes community's needs and offer opportunity for live-work type units.

An existing gas easement bisects the mixed use block restricting the development potential over it. Opportunity for building frontage to the street network has been retained by positioning the block so the gas easement alignment passes through the centre where carparking, lane access or courtyards can be employed preserving the public realm quality to the street.

3.8.2.4 Medium Density Residential

The residential area consists of a medium density residential zoning in order to deliver a number and range of dwelling types to provide the needed capacity. High quality design will be achieved through a series of Land Development Plan approvals, based on eighteen separate Land Development Plan areas within the area. Each Land Development Plan area has a dwelling yield target, with a total target of 892 dwellings (plus or minus 10%), as shown on the Land Development Plan Area figure (Figure 2-20).

The blocks are typically orientated in a north-south direction allowing for east-west lots that will receive good solar access.

The street orientation and block sizes form a legible, fine grain urban fabric that encourages dwellings to have strong street frontage and provide, in combination with the open space network, a high level of permeability through the landholding. Alternative paths and greater choice are created in this movement network improving interest, directness and user safety while encouraging active healthier lifestyles.

Proposed residential dwellings are separated from the expressway by a 40m landscape setback in addition to acoustic building treatment to reduce the effects of expressway traffic noise. A walking and cycle connection through this setback provides a parallel off street route to the lake, neighbourhood park, river and Te Awa River Ride path.

Within this area clusters of higher density are likely to be established in close proximity to the mixed use area, the spine road, lake and key open space areas such as the stormwater reserve in the existing gully which will provide a high quality outlook. The Land Development Plan approach will provide flexibility in the size and location of these higher density clusters.

3.8.2.5 River Interface

This area overlooks the Waikato River and esplanade reserve which has a minimum width of 20 metres. The Te Awa River Ride path is located on the esplanade reserve. This

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development is to be of a lower density to reduce the perceived bulk of the built edge when viewed from across the river and from the river. This land will be zoned Medium Density Residential with a River Interface Overlay. It is also included in the Land Development Plan Areas (Figure 2-20). The River Interface Overlay requires a minimum lot size of 1000m^2 with a typical depth of 40m to encourage homes to be set back further from the river.

Regular breaks in the block are proposed connecting the street and open space network with the esplanade reserve, improving legibility, movement, directness, choice and encouraging community interaction with the Waikato River. These regular breaks will also further reduce the perceived bulk of the built edge along the river frontage.

3.8.2.6 Tourism and Cultural

An extension to Hutchinson Road provides access and frontage opportunity for a tourism and cultural hub near the river. This area adjoins the mixed use block extending the public attractions the length of Hutchinson Road and capitalising on the direct access from Te Rapa Road. Its extent is likely to be flexible as some of the activities may also occur in the mixed use area and it will be subject to the same Business Zone.

The proximity to the river positions the tourism and cultural facilities as a gateway to Hamilton by both land and water from the north where a showcase of regional attractions can take place and a connection to other riverside cultural institutions is made.

3.8.2.7 Main Lake

This area includes the main linear lake that extends through the residential areas and the stormwater wetland in the north. The location and orientation of this water body has been influenced by the previous quarrying activity and land contour that exists within the Structure Plan area to provide an amenity and recreational resource.

Starting at the northern end of the Structure Plan area the top of the lake is positioned in the foreground of views into the site from the southbound lanes of the Waikato Expressway. This gateway experience is the first glimpse of Hamilton City for travellers heading south.

The main lake is to be fed principally by site stormwater through stormwater treatment devices. The lake is to have informal recreation functions encouraging community activity and providing a safer alternative to the river.

3.8.3 Proposed Movement Network

The creation of a masterplanned greenfield development of 62ha size with single ownership, provides the opportunity to comprehensively design for and deliver multi-modal transport options. Within the new community the layout of the street network and the open space network has been designed to promote walking and cycling. The proposal provides a well-connected fine grain block pattern to encourage slow speeds and allow for legible connections for the community and visitors to key features of the development.

Vehicle access to the mixed use and adventure park areas is achieved via the slip lane on Te Rapa Road and two access points on Hutchinson Road. The slip lane was constructed as part of the service centre along with the first 150m of the eastern connection from Hutchinson Road.

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The proposed western connection from Hutchinson Road, in conjunction with the slip lane, will primarily service mixed use and adventure park activities. This western connection aligns with the gas easement in the adventure park area providing the opportunity to extend vehicle access into the adventure park over this, therefore efficiently utilising the land.

The residential community will be serviced via local and neighbourhood roads connecting into a main spine road that joins the existing eastern connection to Hutchinson Road. It is anticipated that this will be the primary route into and out of the Structure Plan area for the residents. By providing alternative accesses for the differing land uses the demand is shared over the network and conflict between them minimised.

Separated on road cycling is proposed from Hutchinson Road along the eastern collector road into the residential development. This crosses a proposed vehicle bridge over the main lake and terminates at the River Interface. On road cycling will take place on the smaller scale local and neighbourhood streets.

A parallel walking and cycling network is created off street providing a comfortable alternative to the street network. A setback landscape strip along the north western boundary, an open space edge to the western side of the lake and the esplanade reserve create corridors for walking and cycling trails to move through the site. Mid block connections to these main corridors create a high level of permeability and legibility throughout the Structure Plan area.

Transport assessments have confirmed that traffic generated from the Structure Plan area principally travels to and from the Hamilton Central City, and follows a number of routes, dispersing its effects. The roading network is capable of accommodating the effects except that;

- The Hutchinson Road/Te Rapa Road roundabout will need to be upgraded to accommodate full development of the Structure Plan area.
- The McKee Street/Te Rapa Road intersection will require signalisation by 2021 regardless of the Structure Plan. However full Structure Plan traffic generation is likely to exacerbate these capacity issues and bring forward the need to upgrade.
- Hutchinson Road will need to be upgraded to a minor arterial standard.

The thresholds for upgrading of these two intersections are likely to be reached when traffic generation from the Structure Plan area in either the AM or PM peak reaches 480 vehicles per hour. The development of the Structure Plan area will be subject to a series of Land Development Consents and Concept Development Consents and these will require Integrated Transport Assessments that will enable assessment and implementation of the road and intersection upgrades when this threshold is reached. A Private Developer Agreement (PDA) between the developer and the Council will allocate financial responsibility for the upgrades.

The Framework Plan (Figure 2-19 in Volume 2, Appendix 2) illustrates the proposed movement network, open space network and other key design features.

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3.8.4 Proposed Infrastructure

Water and wastewater services were installed to the site in 2014 when the service centre was developed and 30 ha of industrial development was approved. Those services were designed to service industrial development of the whole site. Similarly, a stormwater consent was obtained from Waikato Regional Council to collect, treat and dispose of stormwater from the whole site to the Waikato River. This stormwater consent has been varied to allow for the Te Awa Lakes land use mix. It is intended to utilise the capacity in this existing infrastructure to service the Structure Plan area.

Capacity is available for the required water flows with residual pressures exceeding the minimum requirements. The development is not expected to affect the water network within the City and existing water reticulation to the site is large enough to supply the development in the 2021 models with capacity left over.

Capacity is available for wastewater within the Far Western Interceptor for flows from the development. As the development progresses and flows increase a second wastewater rising main from the site to the Interceptor will be required. The second main will be required once the existing main reaches capacity which will be when the development reaches a full time people equivalent of around 2,475; approximately 50% of the total development.

The stormwater management strategy for the site addresses quantity (extended detention for erosion protection), quality (water quality volume for stormwater treatment), primary conveyance and secondary conveyance systems for overland flows. A toolbox of at source and centralised methods will be implemented to meet the land use requirements and the level of service expectations of the landowners, asset owners and end users. An integrated treatment train approach to treat the water quality volume (WQV) is proposed. This may include at source treatment services such as raingardens followed by a central wetland. In terms of extended detention volume (EDV) all runoff will be conveyed to the recreational lakes which will then discharge to the Waikato River via the existing consented stream outlet. Therefore the provision of EDV will be integrated into the stormwater management system, and in particular the design of the lakes, to protect the receiving environment from erosion.

The secondary system will be an overland flow path that largely utilises the road reserves to allow for conveyance of a 100 year rainfall event to the lakes.

3.9 Rules

3.9.1 All land use and development within the Te Awa Lakes Structure Plan area shall be in accordance with:

a) The Te Awa Lakes Structure Plan as set out in Section 3.8 of this Chapter; and

b) Te Awa Lakes Structure Plan area figures in Volume 2, Appendix 2, Figures 2-19 and 2-20.

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3.9.2 Provisions in Other Chapters

The provisions of the following chapters apply to activities within this chapter where relevant;

- Chapter 2: Strategic Framework
- Chapter 4: Residential Zones
- Chapter 15: Open Space Zones
- Chapter 17: Major Facilities Zone
- Chapter 19: Historic Heritage
- Chapter 21: Waikato River Corridor and Gully Systems
- Chapter 22: Natural Hazards
- Chapter 23: Subdivision
- Chapter 24: Financial Contributions
- Chapter 25: City-wide
- Volume 2, Appendix 1: District Plan Administration

4 Residential Zones

4.1 Purpose

a) The Residential Zones assist in creating a compact City. The Central City Zone also contributes significantly to the residential strategy by providing opportunities for higher-density living in the Central City (see Chapter 7: Central City Zone).

b) The City has a finite amount of residential land. To accommodate more people, Council needs to develop the land it has more efficiently. The key is to provide a range of section sizes and household choices, including smaller sections and more compact living environments (such as townhouses and apartments), as well as the traditional larger lots with backyards.

c) This District Plan provides for four Residential Zones (shown on the Planning Maps) that promote opportunities for different dwelling densities.

   i. General Residential Zone.
   ii. Residential Intensification Zone.
   iii. Medium-Density Residential Zone.
   iv. Large Lot Residential Zone.

d) The provisions of this chapter are designed to assist in meeting the density targets of the Regional Policy Statement.

e) The District Plan also provides for special character residential areas in Chapter 5: Special Character Zones.

4.1.1 General Residential Zone

a) The General Residential Zone provides for most of the traditional housing areas. The zone includes established residential suburbs and some greenfield areas.

b) The General Residential Zone will be an area of stability, with the current form and density of housing continuing. This zone is intended to be primarily for residential buildings and activities.

c) The building form is likely to be low (one or two-storey) single dwellings with a high ratio of on-site open space to building. There is an expectation of a high level of private, on-site amenity. Duplex dwellings are a higher density form of development but are acceptable so long as they maintain a sense of open space and private, on-site amenity.

d) Larger sites will be able to accommodate an ancillary, self-contained residential unit.

4.1.2 Residential Intensification Zone

a) The Residential Intensification Zone is applied to existing residential areas that have been identified as suitable to accommodate higher density development. The intent is to encourage site redevelopment, primarily for multi-level and

attached housing. These are expected to be on larger or amalgamated sites to allow sufficient room for good urban design.

b) The form of housing is likely to be apartments and town houses.

c) The Residential Intensification Zone has a Visitor Facilities Area (which can be found on the Planning Map 36B) which recognises the existing visitor accommodation around Ulster Street. This area includes the sites fronting Ulster Street, from Mill Street to Beetham Park and provides for a high-density mix of visitor and permanent residential accommodation in the form of multi-unit and apartment developments. Ancillary activities often accompany visitor accommodation, such as conference facilities and restaurants.

d) The Residential Intensification Zone in Hamilton East (which can be found on the Planning Maps 45B and 46B) has special rules that recognise and protect elements of the streetscape, including site coverage, building height and wall length. In this area, the focus is on the protection of amenity values – the strong 'green' backdrop – rather than the character of the existing buildings. This area is defined by that part of the Residential Intensification Zone:

i. South of Te Aroha Street, and

ii. West of Peachgrove Road, and

iii. North of Albert Street, and

iv. East of Memorial Drive to Bridge Street then east of the Waikato River.

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4.1.3 Medium-Density Residential Zone

a) The Medium-Density Residential Zone applies to identified greenfield areas within the Rototuna, Rotokauri, Rotokauri North ~~and~~ Ruakura and Te Awa Lakes Structure Plan areas. This zone recognises that medium-density housing is more easily achieved when it is comprehensively planned from the start, rather than being retrofitted into an existing urban environment.

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b) A Comprehensive Development Plan or Land Development Consent for Ruakura and Te Awa Lakes must be approved before development in this zone. These plans need to be in general accordance with the relevant Structure Plan and Urban Design Guide.

4.1.4 Large Lot Residential Zone

a) The Large Lot Residential Zone recognises that there are certain locations where a lower density is required to manage the effects of residential development in a sustainable manner. The Large Lot Residential Zone is similar in most respects to the General Residential Zone, with the obvious difference being the size of allotments within the Large Lot Residential Zone. The locations and rationale for this zone in these locations are outlined below.

i. Ruakura Structure Plan area (SH26)

This location is not serviced and is already characterised by a range of large lot residential and non-residential uses.

ii. Ruakura Structure Plan area (Percival/Ryburn Roads)

The area bounded by Percival, and Ryburn Roads, the designation for the Waikato Expressway, the East Coast Main Trunk railway (ECMT) and the approved inland port (Logistics Zone, Sub–Area A – see Figure 2-14 Ruakura Structure Plan – Land use (Appendix2)) is characterised by a range of large lot residential uses and some rural activities. This area is not serviced and is not intended to be serviced.

This area is planned in the Ruakura Structure Plan area to transition to the Ruakura Logistics Zone in future district plans. To protect amenity a buffer will be necessary at the interface between the land intended to support the expansion of the inland port and future development in the Industrial Park Zone and the residential area. Interface design control measures are therefore adopted to assist in the protection of the residential amenity resulting from the development of the inland port and related activities adjacent to the enclave. The buffer measures are to be detailed in the relevant Land Development Plan and implemented prior to the land being developed. For the avoidance of doubt, the required vegetation is to have been planted prior to development and have established heights and densities.

The conversion of the rural residential area to a Logistics zoning will require a change or variation to be made to the District Plan when there is sufficient information and certainty about the timing and need for the 'new' zoning. This is consistent with the staged industrial land allocation provided in the Regional Policy Statement.

4.1.5 All Residential Zones

a) Design and layout of residential sites and buildings are critically important. All residential development must address potential adverse environmental effects and ensure a quality urban environment is achieved through high quality urban design.

b) Good standards of amenity create a pleasant and attractive living environment, and in doing so contribute to wider neighbourhood amenity. Residential amenity means the many qualities and attributes that allow people to enjoy living where they do – such as visual attributes, sunlight, good access, low noise levels and safety.

c) All Residential Zones are intended to be primarily for residential purposes and other activities need to maintain residential character and amenity.

d) In addition to residential activities, some small-scale non-residential activities, such as home-based business and home stays, are appropriate in residential areas. A limited range of non-residential activities that support communities, such as schools and health centres, can potentially establish within the zones. However, this is subject to their compatibility with the existing and anticipated residential character and amenity.

4.2 Objectives and Policies: Residential Zones

Objective	Policies
4.2.1 A range of housing types and densities is available to meet the needs of all communities.	**4.2.1a** A variety of housing densities and types should be developed, consistent with the: i. Capacity of the existing infrastructure. ii. Target densities promoted by Future Proof and the Regional Policy Statement. Specifically this means achieving, as a minimum, the following average gross density targets (excluding transport corridors) over time in the Residential zones. 1. 16 dwellings per hectare for development (excluding the identified Large Lot Residential Areas). 2. 30 dwellings per hectare for identified intensification areas.
	4.2.1b Higher-density residential development should be located within and close to the Central City, suburban and neighbourhood centres, tertiary education facilities and hospital, and in areas serviced by passenger transport.
	4.2.1c New residential development shall be able to be adequately serviced in terms of Three Waters infrastructure, with the exception of the Ruakura Structure Plan area Large Lot Residential Zone.
Explanation	
This objective and policies recognise the need for a range of dwelling types and densities to meet the needs of all aspects of the community. These could range from a large family dwelling with plenty of outdoor space to an inner city apartment. Current projections indicate an aging population, as well as an increasing population. Different portions of the community have different housing preferences reflecting income, age, family size, number of children, and cultural factors. *The Regional Policy Statement sets out dwelling density targets, derived from Future Proof. These will be achieved by managing lot sizes in existing developed areas and subdivision yields in Structure Plan areas.* *Different density targets are set for greenfield areas and existing urban areas. Greenfield development can be designed to meet a higher-density target from the outset, whereas intensification is harder to achieve in existing urban areas with an*	

established land-use pattern. The Large Lot Residential Zone identifies areas where topography and existing land uses do not lend themselves to full urbanisation.

The policies require residential development to occur only in those areas identified. This approach ensures stability for established parts of the City and that higher density will not occur where it is not identified and provided for.

Objective	Policies
4.2.2 Efficient use of land and infrastructure.	**4.2.2a** Residential development shall use land and infrastructure efficiently by: i. Delivering target yields from housing development in both greenfield growth areas and intensification areas, as indicated by rules or Structure Plans. ii. Staging and sequencing the development as indicated by rules or Structure Plans. iii. Otherwise complying with relevant Structure Plans.
	4.2.2b New buildings and activities shall mitigate effects on and from regionally significant infrastructure.
	4.2.2c Residential land uses should be managed to avoid potential effects, such as noise, from arterial transport corridors and state highways.

Explanation

The use of land can be affected by the presence of infrastructure. Not only does residential development need to have an adequate level of servicing available, but it needs to respond to regionally significant infrastructure, such as telecommunication infrastructure or the national electricity grid, either existing or planned.

Complying with staging ensures that infrastructure can be planned in advance of development and the effects of increased densities can be better managed. Infrastructure includes Three Waters and transport networks, as well as social infrastructure like libraries and community halls.

The policies recognise the need to manage residential land uses around regionally significant infrastructure, both existing and proposed – both to manage the effects that residential activities and structures can have on the infrastructure, as well as the adverse effects that the infrastructure can have on residential uses.

Objective	Policies

4.2.3 Residential development produces good on-site amenity.	**4.2.3a** Residential design shall achieve quality on-site amenity by providing: i. Private, useable outdoor living areas. ii. Access to sunlight and daylight throughout the year. iii. Adequate service areas to accommodate typical residential living requirements. iv. Insulation to minimise adverse noise effects. v. Parking and manoeuvring areas on-site to meet the needs, safety and convenience of residents. vi. Energy-efficient and sustainable design technologies where compatible with the scale and form of residential development.
	4.2.3b Residential sites adjacent to public space shall achieve visual and physical connectivity to these areas.
	4.2.3c Building design and location shall protect the privacy of adjoining dwellings.
	4.2.3d Buildings should be designed to conform to natural topography.
	4.2.3e Development in areas identified for medium and high-density residential activities should be in general accordance with the appropriate Design Assessment Criteria.
Explanation	
Good design of housing is critically important to on-site and off-site amenity, especially where there is higher-density housing. The policies identify the features important for residential development, regardless of what form the dwelling may take, e.g. single, duplex or apartment. *Important design features include access to sunlight, outdoor living space, storage space, space for waste and recycling, visual connectivity to public spaces such as the street, privacy and off-road parking. Incorporation of these features will ensure functional and high-quality living environments for the occupants.*	
Objective	**Policies**

4.2.4 The development contributes to good neighbourhood amenity as the area matures.	**4.2.4a** The size and scale of buildings and structures shall be compatible with the locality.
	4.2.4b Buildings should be designed so they do not physically dominate or adversely affect the residential character of the neighbourhood.
	4.2.4c Significant vegetation and trees should be preserved wherever possible.
	4.2.4d Garages, carports and vehicle access points shall be sited to ensure the safety of all road users and the safe and efficient function of the transport corridor.
	4.2.4e Development in the General Residential and Large Lot Residential Zones should not detract from or degrade the existing character of the surrounding area.
Explanation	
How buildings relate to a street can have a major bearing on people's perception of the safety of an area. Cumulative effects of development should contribute positively to the streetscape and amenity. The urban amenity expected by residents can be positively or negatively altered by development. It is important that any new development is sympathetic to an area's existing character and amenity.	
Objective	**Policies**
4.2.5 Protect and enhance the character values of the Hamilton East portion of the Residential Intensification Zone.	**4.2.5a** Development shall: i. Enable redevelopment opportunities. ii. Ensure that the siting and design of development recognises the strong visual relationship with the streetscape. iii. Be provided with landscaping and planting that enhances on-site and local residential amenity. iv. Ensure that extensive areas of hard-surfacing are avoided, wherever practicable. v. Be consistent with the local context, scale and character. vi. Avoid significant adverse effects on the character of the Hamilton East Area.

Explanation	
The Hamilton East Residential Intensification Zone includes 2-storey and multi-unit accommodation in the "sausage block" format typical of the 1970s. As a result of this type of development, setbacks and separation distances are less pronounced than in other Hamilton East developments. Setbacks and separation distances are an important feature because front yard planting contributes to the amenity values the strong green backdrop of this area provides. The focus of the District Plan in this area is on the protection of these amenity values rather than the character of the existing buildings. This zone provides for higher levels of development than elsewhere in Hamilton East. The Hamilton East portion of the Residential Intensification Zone is identified in the Planning Maps.	
Objective	**Policies**
4.2.6 Residential activities remain the dominant activity in Residential Zones.	**4.2.6a** Non-residential activities should not establish in residential areas, unless the adverse effects on all zones are avoided, remedied or mitigated.
	4.2.6b Visitor facilities such as accommodation and conference facilities should be located primarily in the Visitor Facilities Area.
	4.2.6c Home-based businesses shall: i. Be ancillary to the residential activity of the site. ii. Avoid adverse effects on the neighbourhood, character, amenity and the transport network. iii. Take place within dwellings or ancillary buildings. iv. Involve no outdoor storage of vehicles, equipment or goods visible from a public place. v. Be compatible with the character and amenity of the locality, in terms of location, type and scale of activity, number of visitors to the site, and hours of operation.
	4.2.6d Community facilities and community support activities (including managed care facilities and residential centres) shall: i. Serve a local social or cultural need.

	ii. Be compatible with existing and anticipated residential amenity.
	4.2.6e Non-residential activities shall be of an appropriate size to maintain character of the site.

Explanation
Non-residential activities have the potential to generate significant adverse effects in residential areas. Provided home-based businesses – where residential uses still occupy the majority of the dwelling – do not generate off-site effects, they are an acceptable form of non-residential activity. Home-based businesses often perform an incubator role that allows small businesses to become established. Once the home-based business has become established and grown to a certain size, it is more appropriate for it to relocate in either a Business or Industrial Zone. The policy seeks to prevent conversion of sites or buildings into purely business use. *Some other non-residential activities may be appropriate in the Residential Zones. These include community facilities that perform a social or cultural function, such as schools, churches and community halls, as well as emergency service facilities.*

Objective	**Policies**
4.2.7 Activities in Residential Zones are compatible with residential amenity.	**4.2.7a** Adverse effects of activities on the amenity values of the locality shall be minimised including: i. Effects of noise, glare, odour, dust, smoke, fumes and other nuisances. ii. Effects on traffic, parking, and transport networks.

Explanation
This objective ensures that all activities in Residential Zones must be compatible with the amenity reasonably expected by residents. This covers hours of operation, as well as the by-products of the operation itself.

Objective	**Policies**
4.2.8 Residential buildings make efficient use of water and energy resources.	**4.2.8a** Development should encourage the efficient use of energy and water, by: i. Incorporating water-sensitive techniques. ii. Reducing the use of reticulated electricity.

Explanation	
This objective encourages new residential dwellings to use water and energy-efficient technologies and both will range in scale appropriate to the building. Single dwellings, for example, may wish to install solar panels on the roof and install a rainwater tank. Apartment buildings have the ability to incorporate more sophisticated technologies.	
Objective	**Policies**
4.2.9 Buildings and activities at the interface of Residential Zones with other zones will be compatible with the form and type of development anticipated in the adjacent zone.	**4.2.9a** Adverse effects of activities that cross zone boundaries shall be managed through setbacks, building design, and landscaping.
	4.2.9b Buildings and structures on the boundary between Residential Zones and public areas shall incorporate CPTED principles.
Explanation	
This objective recognises the importance of managing both structures and activities where Residential Zones adjoin other zones. In most cases this will be reducing the impact that other zones, such as commercial and industrial, have on residential amenity. This can and will be managed by both zones through setbacks, design of buildings, and landscaping. *This objective also recognises the importance of the interface between Residential Zones and public areas such as roads and reserves.*	
Objective	**Policies**
4.2.10 Protect the amenity values of the Percival – Ryburn Road Large Lot Residential Zone, while providing for the urbanisation for the Ruakura Structure Plan area.	**4.2.10a** Maintain the low density living environment by limiting the subdivision of land for further residential purposes.
	4.2.10b Maintain efficient management of water supply and the treatment and disposal of stormwater and wastewater.
Explanation	
This objective recognises that the area is an established rural residential enclave but that there is a need to manage its subdivision, use and development of future residential land uses given the area's central location and ultimately as part of an inland port which once completed will be of a scale that will make it a regionally significant facility.	
Objective	**Policies**
4.2.11 Further development within the Percival /Ryburn Road Large Lot Residential Zone does not	**4.2.11a** Manage the transition to a logistics zoning by a variation or change to the District Plan when

compromise future logistics zoning as provided for in the Regional Policy Statement.	there is sufficient information and certainty about the timing and need for this zoning.

Explanation

The large lot residential zoning for the Percival-Ryburn Road area is intended to change to adopt a zoning consistent with the zoning of the adjoining land that serves the operations of the inland port. This will occur as part of a publicly notified planning process.

Objective	Policies
4.2.12 The Ruakura Medium Density Residential Zone includes an Integrated Retail Development providing services and community facilities capable of meeting the day to day needs of the immediate neighbourhood.	**4.2.12a** An Integrated Retail Development limited in size shall be provided for in a location central to the Ruakura Medium Density Residential Development.
	4.2.12b Activities within the Integrated Retail Development shall principally serve their immediate neighbourhood.
	4.2.12c The scale and nature of activities within the Ruakura Integrated Retail Development shall not generate significant adverse amenity effects on surrounding residential areas and transport networks.

Explanation

The Ruakura Integrated Retail Development Centre will provide a range of everyday goods and services and essentially serve a walk-in population. Being situated in a planned residential area it is essential that the range and scale of activities is compatible with neighbouring residential activity and local amenity values.

Objective	Policies
4.2.13 The Te Awa Lakes Medium Density Residential Zone enables a comprehensively designed residential development integrated with the adjacent adventure park tourist and recreation attraction and the Waikato River, all contributing to an attractive gateway to the city.	**4.2.13a** A range of housing types, including higher densities, are enabled to provide a choice of living environments. **4.213b** The development achieves higher density in conjunction with high quality amenity through a masterplanned approach that informs the Te Awa Lakes Structure Plan and related rules.
	4.2.13c Development is sensitive to the Waikato River interface through lower density development and building setbacks.

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	4.2.13d The development manages its proximity to the adventure park, the Waikato Expressway and industrial areas through setbacks, building design, open space and landscape treatments.
Explanation	
This objective and policies reflect the unique location of the Te Awa Lakes Medium Density Residential Zone and its integration with the adventure park, the masterplanning that underpins it and the opportunity afforded for it to integrate into its surrounding activities and features, while achieving high levels of residential amenity. The zone is consistent with the purpose and principles of the Te Awa Lakes Structure Plan.	

4.3 Rules – General Residential, Residential Intensification and Large Lot Residential Zones

4.3.1 Activity Status Table – General Residential Zone, Residential Intensification Zone and Large Lot Residential Zone

Activity	General Residential Zone	Residential Intensification Zone	Large Lot Residential Zone
Residential Activities and Structures			
a) Accessory building	P	P	P
b) Apartment building i. On Lot 2 DP492571 (see Figure 4.3.1) ii. Percival and Ryburn Road enclave	D RD -	RD - -	D - NC
c) Ancillary residential unit	P	NC	P
d) Ancillary residential structures	P	P	P
e) Single dwelling: first residential unit per site	P	D	P
f) Single dwelling: second and subsequent residential unit per site	RD*	D	RD*
g) Duplex dwellings i. Percival and Ryburn Road enclave	RD* -	RD* -	RD* NC
h) Integrated Residential Development	RD	NC	NC

Activity	General Residential Zone	Residential Intensification Zone	Large Lot Residential Zone
i) Managed care facilities			
i. up to 9 residents	P	P	P
ii. up to 10 residents (excluding emergency housing)	D	P	D
iii. 11 or more residents (excluding emergency housing)	D	D	D
j) Emergency housing for up to 10 residents	P	P	P
k) Papakainga	RD*	RD*	RD*
l) Residential activities	P	P	P
m) Residential centre	D	D	D
n) Rest home	RD*	RD*	RD*
o) Farming activities	NC	NC	P
p) Rural industry	NC	NC	D
q) Produce stalls	NC	NC	P
r) New building for the purpose of Health Care Services identified in 4.3.1x)	RD	-	-
ra) The use of buildings for any residential activity in the Percival/Ryburn Roads Ruakura Structure Plan Area where the site **is** subject to a restrictive no-complaint covenant in favour of adjoining Industrial Park and Logistics Zoned land (see Note 4 below).	-	-	P
rb) The use of buildings for any residential activity in the Percival/Ryburn Roads Ruakura Structure Plan Area where the site **is not** subject to a restrictive no-complaint covenant in favour of adjoining Industrial Park and Logistics Zoned land (see Note 4 below).	-	-	D
Commercial Activities and Structures			
s) Childcare facility			
i. up to 5 children	P	RD	P
ii. six or more children	RD	RD	RD
t) Conference facility	NC	D	NC
u) Conference facility in Visitor Facilities Area	-	P	-
v) Dairy	RD	NC	D
w) Health care service	D	D	NC
x) Health care services on Lot1 DP S2537, Flat B DP S43060, Flat 1 DP S43568, Flat 2 S67794 (being at 452, 448B, 444A and 444B Ulster Street), Lot 28 DP S4185 and Lot 27 DP S4185 (being at 3 and 5 Urlich Avenue)	P	-	-

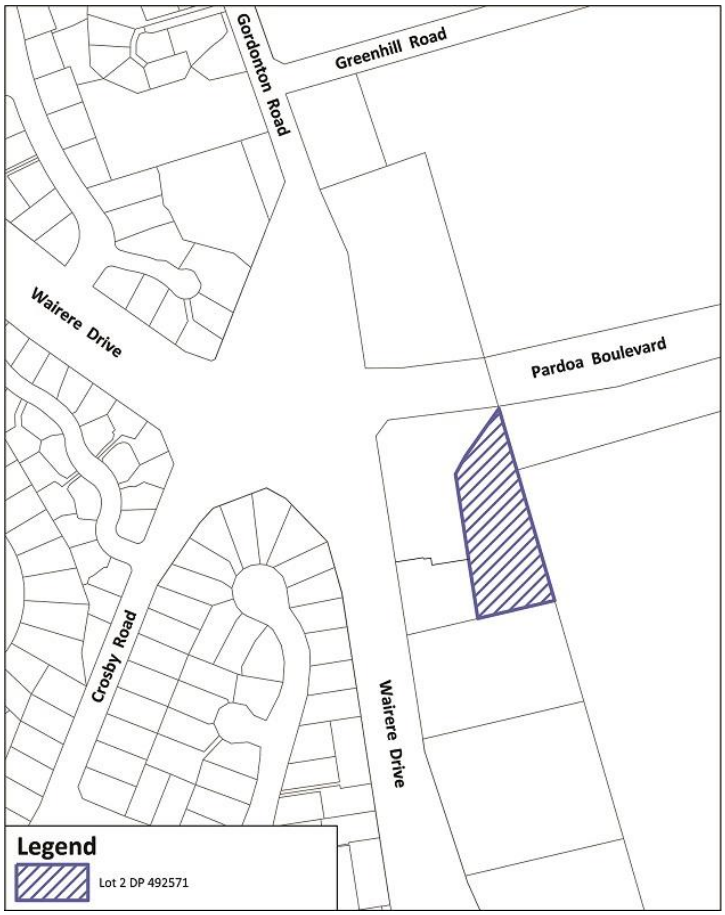
Activity	General Residential Zone	Residential Intensification Zone	Large Lot Residential Zone
y) Home-based business	P	P	P
z) Homestay accommodation	P	P	P
aa) Office, other than as a home-based business	NC	NC	NC
bb) Places of assembly	D	D	NC
cc) Restaurant	NC	D	NC
dd) Restaurant ancillary to visitor accommodation in Visitor Facilities Area	-	P	-
ee) Show homes	P	D*	P
ff) Tertiary education and specialised training facility	RD	D	NC
gg) Visitor accommodation	RD	D	D
hh) Visitor accommodation in Visitor Facilities Area	-	P	-
Community Activities and Structures			
ii) Community centre	RD	D	D
jj) Informal recreation	P	P	P
kk) Marae	D	D	D
ll) Organised recreation	P	P	P
mm) Places of worship	RD	D	D
nn) School	D	D	NC
All Activities and Structures			
oo) Demolition or removal of existing buildings (except heritage buildings scheduled in Volume 2, Appendix 8, Schedule 8A: Built Heritage)	P	P	P
pp) Maintenance, repair and alterations and additions to existing buildings (except heritage buildings scheduled in Volume 2, Appendix 8, Schedule 8A: Built Heritage)	P	P	P
qq) Relocated buildings	P	P	P
rr) Emergency service facilities	RD	D	D
ss) Any activity not listed above	NC	NC	NC

Note

1. For activities and buildings in the Electricity National Grid Corridor see Chapter 25.7: City-wide – Network Utilities and the Electricity National Grid Corridor.
2. Refer to Chapter 1.1.9 for activities marked with an asterisk (*)
3. For any activity not identified above see Section 1.1.8.1.

4. For the purposes of this rule a "restrictive no-complaint covenant" is defined as a restrictive covenant registered on the Title to the property or a binding agreement to covenant, in favour of the adjoining Industrial Park and Logistics Zoned land by the landowner (and binding any successors in title) not to complain as to effects generated by the lawful establishment and operation of the Industrial Park and Logistics Zoned land (including the inland port).

Figure 4.3.1: Lot 2 DP 492571 (see Rule 4.3.1b)i.)



4.3.2 Rules – Ruakura Structure Plan Area General Residential – Staging

a) Activities listed in 4.3 Rules – Activity Status Table – 4.3.1 General Residential Zone and Residential Intensification Zone which are undertaken in the Ruakura Structure Plan Area shall comply with Rules 3.7.4.1, 3.7.4.2, 3.7.4.3, 3.7.4.4, 3.7.4.5 and 3.7.5 in Chapter 3: Structure Plans.

4.4 Rules – General Standards – General Residential, Residential Intensification Zones and Large Lot Residential Zone

a) The following standards apply in the General Residential, Residential Intensification Zones and Large Lot Residential Zone only.

4.4.1 Density

a) The minimum or maximum area of land (net site area) required in respect of each residential unit (or resident in the case of residential centres, rest homes and managed care facilities) shall be:

Activity	Net site area (minimums unless otherwise stated)		
	General Residential Zone	Large Lot Residential Zone	Residential Intensification Zone
i. Single dwellings (per residential unit)	400m^2 per residential unit 1000m^2 per residential unit for lots adjoining Waikato Expressway (Designation E90 and E90a)	2500m^2 (SH26) Ruakura Structure Plan area 2ha (Percival/ Ryburn Roads) Ruakura Structure Plan area*	350m^2 maximum per residential unit
ii. Duplex dwellings	400m^2 per duplex (200m^2 per unit)	2500m^2 per duplex (1250m^2 per unit)	300m^2 per duplex (150m^2 per unit) 600m^2 maximum per duplex (300m^2 maximum per unit)
iii. Apartment building	-	-	Average net site area of 150m^2 per residential unit
iv. Single dwellings with an ancillary residential unit	600m^2 total for both dwelling and ancillary residential unit	3500m^2 total for both dwelling and ancillary residential unit 2ha for both dwelling and ancillary residential unit (Percival/Ryburn Roads) Ruakura Structure Plan area.*	-
v. Integrated Residential Development	300m^2 per single dwelling unit 400m^2 per duplex (200m^2 per unit) Apartments – Average net site area of 150m^2 per residential unit	-	-

vi. Relocated dwellings	400m^2 per residential unit	2500m^2 per residential unit 2ha per residential unit (Percival/Ryburn Roads) Ruakura Structure Plan area.*	-
vii. Residential centres	75m² per resident	300m² per resident	50m² per resident
viii. Rest homes	75m² per resident	300m² per resident	50m² per resident
ix. Managed care facilities	100m^2 per resident	400m^2 per resident	50m² per resident

b) Dwellings in the Percival/Ryburn Roads Ruakura Structure Plan area not complying with the density standards in 4.4.1 shall be a non-complying activity.

c) The minimum net site areas marked with a "*" in rule 4.4.1 a) above shall not apply to the property at 23 Ryburn Road (lot 8, DP 9210) where one additional dwelling is permitted with a minimum net site area of 5,000m^2.

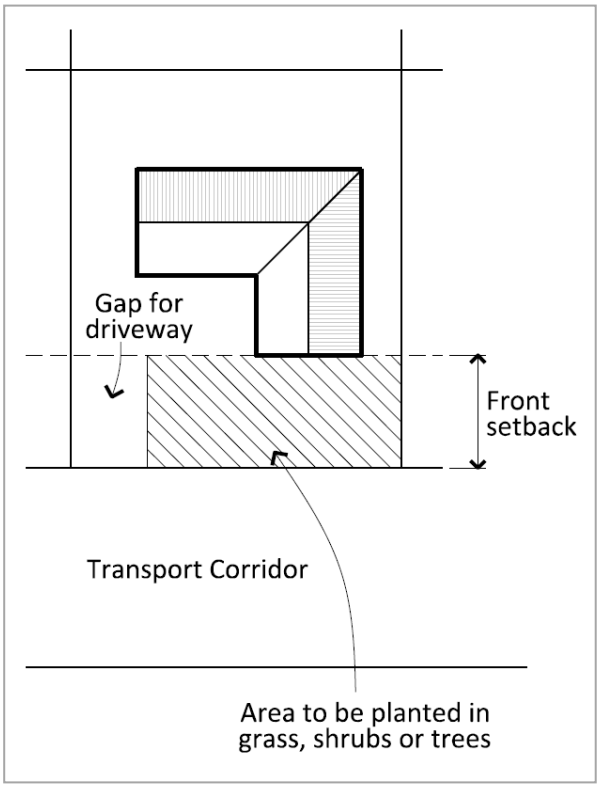
4.4.2 Site Coverage

	General Residential Zone	Large Lot Residential Zone	Residential Intensification Zone
a) Site coverage	Maximum 40%	Maximum 20%	Maximum 50% Hamilton East: Maximum 45%

4.4.3 Permeable Surface

	General Residential Zone	Large Lot Residential Zone	Residential Intensification Zone
a) Front sites, corner sites, through sites only: permeability of the front setback, excluding vehicle and access provisions (required by Rule 4.4.6) be planted in grass, shrubs or trees (see Figure 4.4.3c)	100%	Minimum 70%	100%
b) Permeability across the entire site (can include area required by Rule 4.4.3(a) above)	Minimum 30%	Minimum 70%	Minimum 20%

Figure 4.4.3c: Planting requirement in the Front Setback



4.4.4 Building Height

	General Residential Zone	Large Lot Residential Zone	Residential Intensification Zone
a) Height of buildings	Maximum 10m	Maximum 10m	Maximum 12.5m Hamilton East: 10m Opoia Road: 16m

4.4.5 Height in Relation to Boundary

a) No part of any building shall protrude through a height control plane rising at an angle of 28 degrees between northwest (315 degrees) and northeast (45 degrees), and rising at an angle of 45 degrees in all other directions. This angle is measured from 3m above ground level at all boundaries (see Figure 4.4.5d below).

Except that:

i. Where buildings are attached, no height control plane is required between those buildings.

ii. Where a boundary adjoins a transport corridor or access way, the 45-degree angle applies to that boundary, measured 3m above the boundary (see Figure 4.4.5c below).

iii. Where there are two or more dwellings on the same site, the plane shall be measured at a line midway between the two dwellings rising at an angle of 45 degrees and with this angle measured from 3m above ground level at the midway line.

b) In the Residential Intensification Zone, the height control plane applies only along a zone boundary adjoining the General Residential Zone or any of the Special Character Zones.

Figure 4.4.5c: Height control plane for a boundary adjoining a transport corridor or access

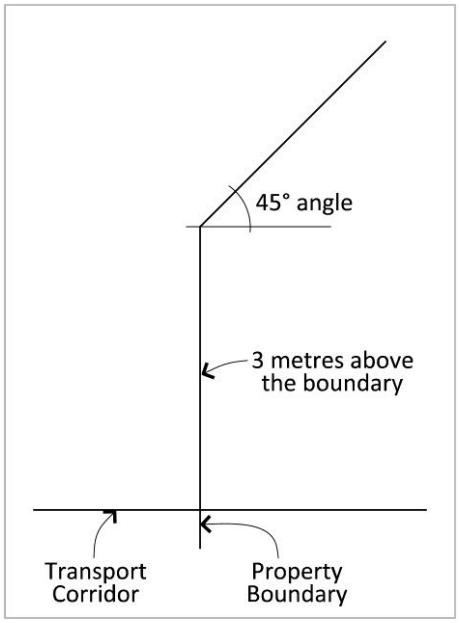
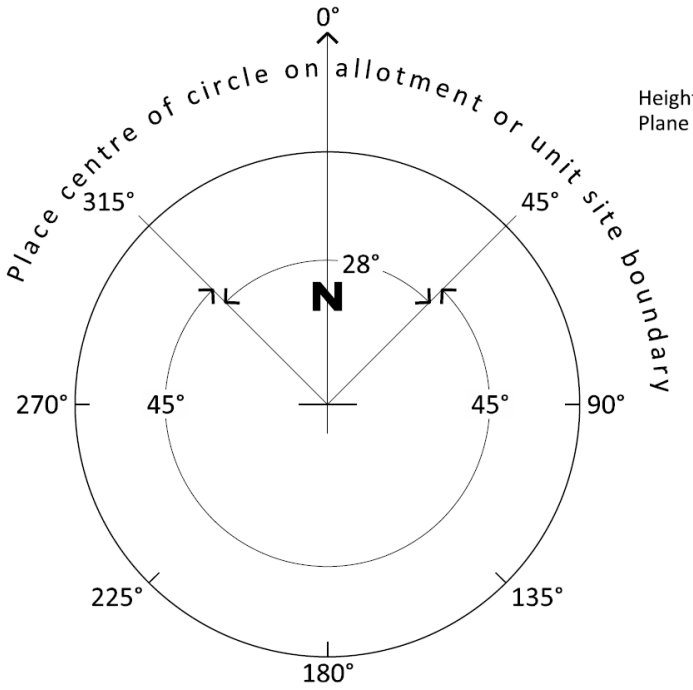


Figure 4.4.5d: Height Control Plane

HEIGHT CONTROL PLANE

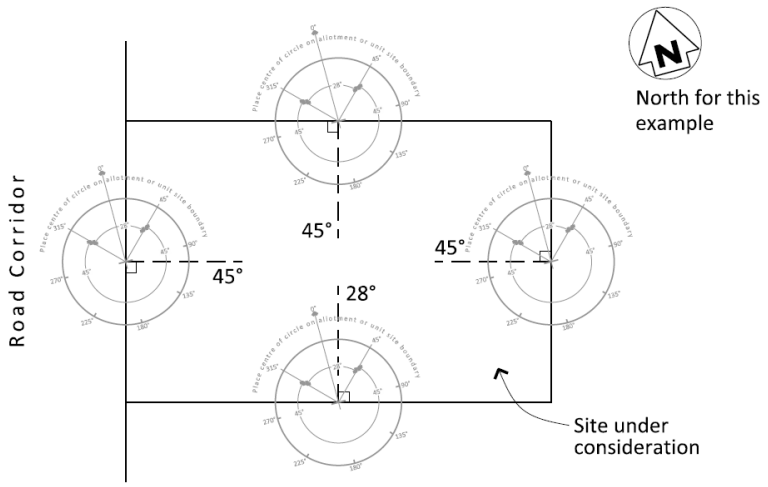
The height in relation to boundaries of the allotment or unit site area shall vary with the direction or bearing of each allotment or unit boundary according to the diagrams below.



Height Control Plane Indicator

NOTE: North is True North

The height control plane shall be calculated by orientating both the site plan and height control plane indicator to true north, and placing the height control plane indicator over the site plan with the centre of the circle touching the allotment or unit site boundary under consideration. The height control plane angle shall be that indicated by that sector of the diagram within which a line drawn at right angles to the allotment or unit site boundary from the centre of the circle lies.



4.4.6 Building Setbacks

Building setback from	Minimum distance
a) Transport corridor boundary – local and collector transport corridors	3m 5m Large Lot Residential Zone
b) Transport corridor boundary – arterial transport corridors	5m Except that any garage or carport facing the transport corridor shall be set back a minimum of 8m
c) Waikato Expressway (Designation E90 or E90a)	i. 35m from the designation boundary, or ii. 40m measured from the actual carriageway edge of the Waikato Expressway if: 1. The location of the carriageway within the designation corridor of the Waikato Expressway has been confirmed in writing by the Requiring Authority; or 2. Construction is underway or completed.
d) Internal vehicle access serving more than one residential unit on a site (excluding access to an ancillary residential unit)	1.5m or setback may be reduced where the written consent of the owners and/or occupiers of the shared site is obtained.
e) Any other boundary	1.5m or setbacks may be reduced where: i. Buildings on adjoining sites are attached, no setback is required along that part of the boundary covered by such a wall; or ii. The written consent of the owners adjoining the relevant setback or setbacks is obtained. For Large Lot Residential Zone: iii. 5m setback for SH26 and Percival/Ryburn Roads iv. 50m for buildings and outdoor hardstands used for housing and feeding animals, including milking sheds and shearing sheds. v. 250m for residential units set back from the operational area of an existing intensive farm on any other site. vi. 25m from any water body.

Note

1. See 22.5.6 for setback from the Waikato Riverbank and Gully Hazard Area.

4.4.7 Interface Between Public and Private

a) These standards only apply to front, corner and through sites.

b) Location of accessory building:

i. All detached accessory buildings shall be located no further forward of the front building line of the dwelling than 0.5m (see Figure 4.4.7f);

ii. Accessory buildings that are an integral part of the design and construction of the dwelling shall, if the garage door is to face the street, be located no further forward of the front building line of the dwelling than 0.5m (see Figure 4.4.7e);

iii. Accessory buildings that are an integral part of the design and construction of the dwelling, if the garage door is 90 degrees to the street, shall be forward of the front line of the dwelling (see Figure 4.4.7e), by no more than 8m.

c) At least one habitable room shall have a clear-glazed window facing the transport corridor. For corner and through sites this shall be required only on the frontage from which vehicular access is provided.

d) Residential Intensification Zone – Hamilton East only: No wall of any building parallel to or up to an angle of 30 degrees to any external boundary except the transport corridor frontage shall exceed 15m in length without there being a step in (or out) plan of at least 2m depth and 5m length.

Figure 4.4.7e: Setback for accessory buildings – example of an accessory building that is an integral part of the design

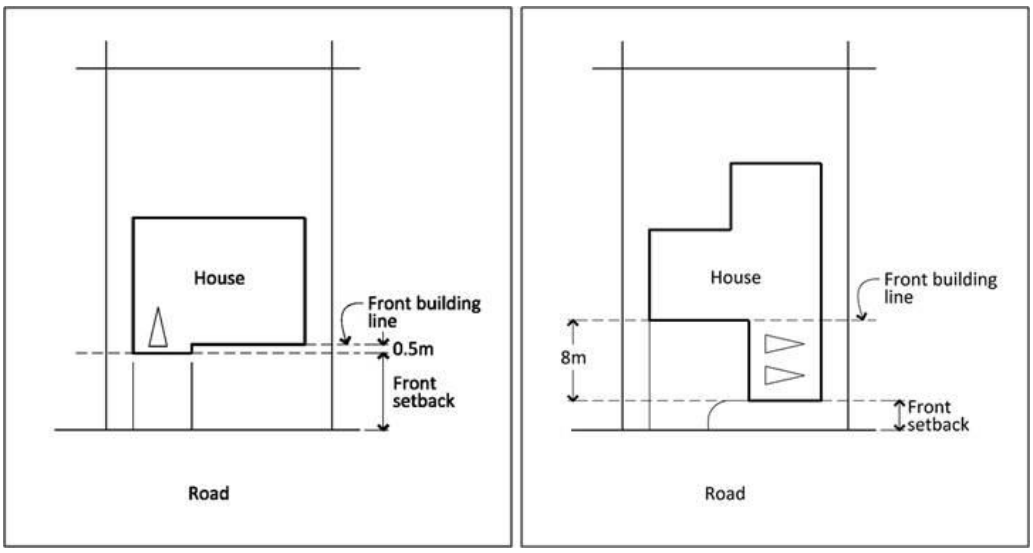
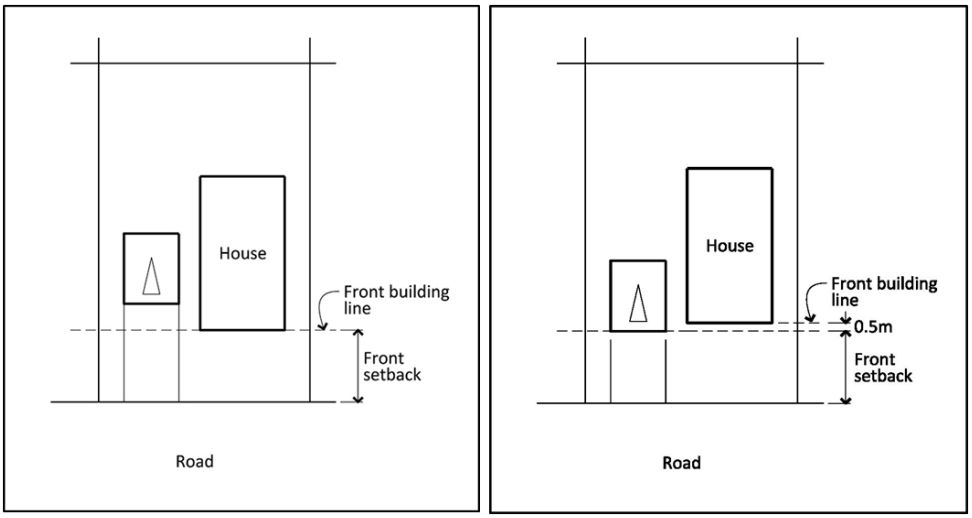


Figure 4.4.7f: Setback for accessory buildings – example of a detached accessory building



4.4.8 Fences and Walls

a) Fences and walls shall have a maximum height of 1.8m.

4.4.9 Residential Buildings – Separation and Privacy

a) Residential buildings shall be set back at least 3m from the nearest part of any other residential building on the same site, except:

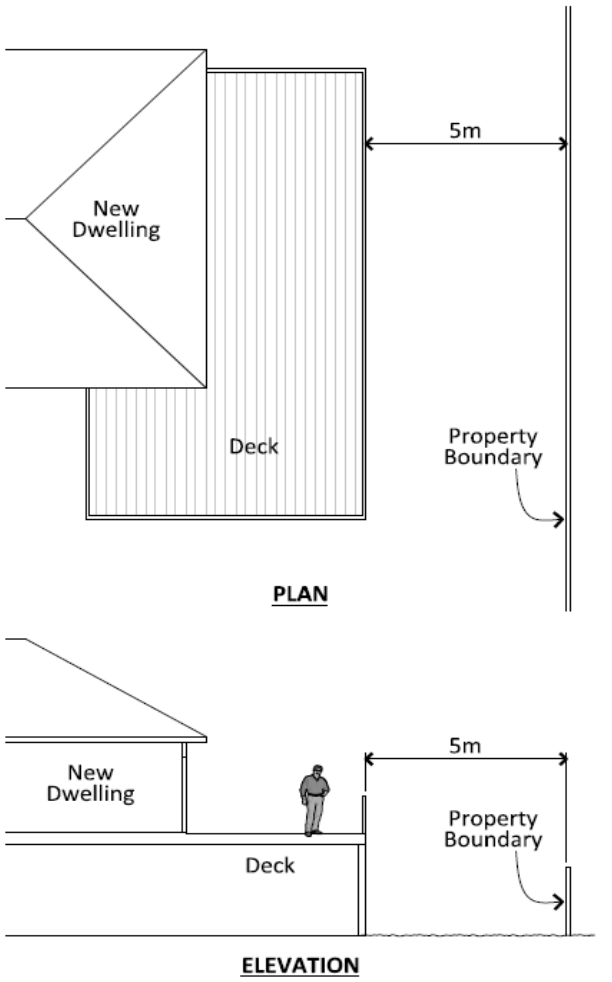
   i. No separation is required between buildings that are attached.

   ii. Where windows are located and designed (including by glazing) to avoid views between rooms in different buildings on the same site, separation distance is a minimum of 1.5m.

b) A balcony at upper-floor level shall be set back at least 5m from all boundaries (see Figure 4.4.9c).

   This does not apply to a boundary along a transport corridor, access way, right-of-way, private way, access lot, or entrance strip, less than 6m wide.

Figure 4.4.9c: Upper-floor setbacks for separation and privacy



4.4.10 Outdoor Living Area

a) These standards do not apply to managed care facilities or rest homes.

b) Each residential unit, except for when a communal area is provided, shall be provided with an outdoor living area that is:

i. For the exclusive use of each residential unit.

ii. Readily accessible from a living area inside the residential unit.

iii. Free of driveways, manoeuvring areas, parking spaces, accessory buildings and service areas.

iv. Located on a side of the residential unit which faces north, east or west (refer Figure 4.4.10h). For the purpose of this standard, a side that faces north, east or west means the area to the:

- West of the westernmost and/or easternmost corners of the dwelling, and/or

- West of the west facing façade aligned at no more than 15 degrees to the north-south axis, and/or
- East of the east facing façade aligned at no more than 15 degrees to the north-south axis.

c) Communal open space for 4 or more residential units and apartment buildings shall comply with 4.4.10b) iii) and iv) as well as being:

i. For the shared use of all residents on site, and

ii. Readily accessible from all residential units on site.

d) Outdoor living areas shall have areas and dimensions as follows.

Residential units	Outdoor living area per residential unit	Shape
i. Including single residential dwellings and duplex dwellings	60m²	Capable of containing a 6m diameter circle No dimension less than 2.5m
ii. Ancillary residential unit	12m²	No dimension less than 2.5m
iii. Communal open space for 4 or more residential units for the exclusive use of the residential units	12m²	Capable of containing a 8m diameter circle No dimension less than 4m
iv. Apartment buildings and duplex dwellings in the Residential Intensification Zone, where communal open space is not provided	12m²	No dimension less than 2.5m
v. Communal open space for apartment buildings in the Residential Intensification Zone	Up to 7 residential units – 12m² per unit 8 or more residential units – 8m² per unit	Capable of containing a circle with the following diameter: • 4-7 residential units – 6m • 8 or more residential units – 8m No dimension less than 2.5m

e) The outdoor living area for an ancillary residential unit shall be separate from the outdoor living area provided for the principal residential unit.

f) In the General Residential Zone, any communal open space shall be optional but cannot contribute more than 50% of the above provisions.

g) Communal open space is an alternative to, and not in addition to, individual outdoor living areas for each residential unit.

Figure 4.4.10h: Outdoor living area – north, east or west

OUT DOOR LIVING AREA

The location of the outdoor living area for a dwelling will vary based on the dwelling's orientation.

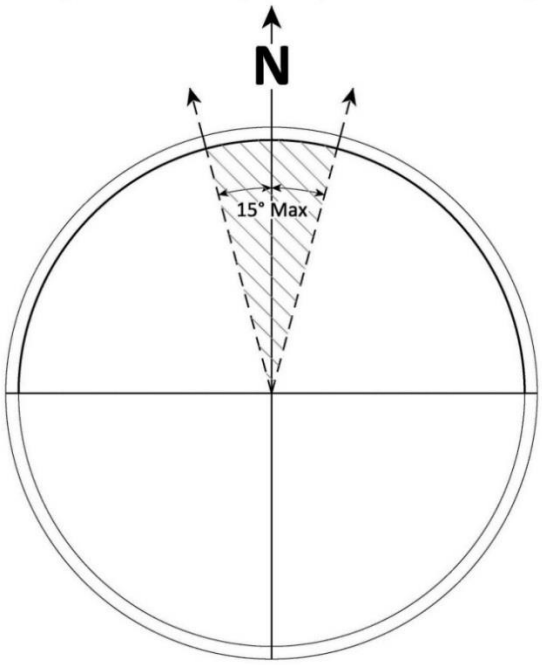
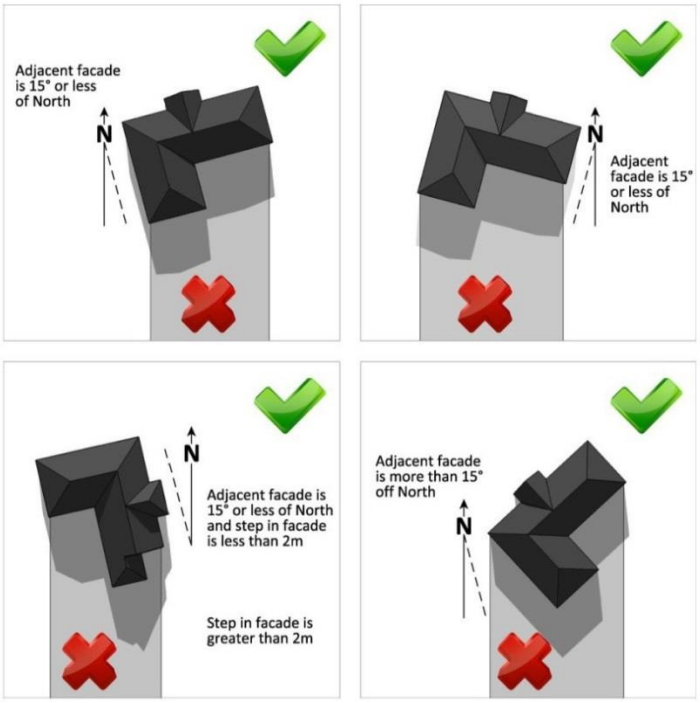


Diagram A: Outdoor Living Area indicator

Note: North is True North

To determine if a dwelling's façade is aligned no more that 15° to the north-south axis, the north point of the Outdoor Living Area Indicator (Diagram A) should to be aligned with the north point shown on the site plan. If façade is within the 15° off set, then that façade should be included as part of the area used to locate outdoor living areas (See diagrams below). If a façade has an in step or out step of more than 2m the façade south of that point should be excluded.



4.4.11 Service Areas

a) These standards do not apply to managed care facilities or rest homes.

Description	Minimum requirements per Residential Area
b) Every site, including first single dwelling but excluding 4.4.11(d) – (f)	i. At least $20m^2$ ii. Minimum dimension 3m
c) Second and subsequent residential units, including duplex dwellings	i. Additional $20m^2$ for second and each subsequent residential unit ii. Minimum dimension 3m
d) Service area per ancillary residential unit	i. Additional $10m^2$ ii. Minimum dimension 2.5m
e) Apartments	Individual or communal: i. $10m^2$ ii. Minimum dimension 2.5m
f) Community centres, visitor accommodation, conference facilities	i. $10m^2$ ii. Minimum dimension 2.5m
g) Dairies (may be indoor or outdoor)	i. Minimum $10m^2$ ii. Minimum dimension 2.5m iii. Readily accessible to service vehicles iv. Indoor service area separately partitioned v. Outdoor service area; all-weather dust-free surface
h) All service areas	i. Readily accessible from each residential unit ii. Not visible from a public place

4.4.12 Residential Unit Size – Residential Intensification Zone

a) The minimum floor area required in respect of each residential unit in the Residential Intensification Zone shall be:

Form of residential unit	Floor area
i. Studio unit	Minimum $35m^2$
ii. 1 bedroom unit	Minimum $45m^2$
iii. 2 bedroom unit	Minimum $70m^2$
iv. 3 or more bedroom unit	Minimum $90m^2$

b) In any one residential apartment building, containing in excess of 20 residential units, the combined number of one-bedroom units and studios shall not exceed 70% of the total number of apartments within the building.

4.4.13 Provisions in Other Chapters

The provisions of the following chapters apply to activities within this chapter where relevant:

- Chapter 2: Strategic Framework
- Chapter 3: Structure Plans
- Chapter 19: Historic Heritage
- Chapter 20: Natural Environments
- Chapter 21: Waikato River Corridor and Gullies
- Chapter 22: Natural Hazards
- Chapter 23: Subdivision
- Chapter 24: Financial Contributions
- Chapter 25: City-wide

4.5 Rules – Medium-Density Residential Zone

Proposed Plan Change 2-Te Awa Lakes Private Plan Change

4.5.1 Comprehensive Development Plan Process

a) The Medium-Density Residential Zone is divided into a number of Comprehensive Development Plan Areas (as shown in Appendix 3). This excludes the Ruakura Structure Plan where Figure 2-16 Ruakura Land Development Plan Areas (Appendix 2) identifies Land Development Plan Areas which are subject to Rules within 3.7.4.2 and the Te Awa Lakes Structure Plan where Figure 2-20 identifies Land Development Plan Areas which are subject to Rules within 4.5.6.

b) Development in the Medium-Density Residential Zone should only occur once a resource consent for a Comprehensive Development Plan for the whole subject area has been granted by Council (refer to Volume 2, Appendix 1.2.2.8 for what is required in a Comprehensive Development Plan). However, there are some activities that can occur as Permitted Activities, subject to compliance with relevant standards in Rule 4.6, before the approval of a Comprehensive Development Plan. These are:

   i. Maintenance, repair and minor alterations or additions to existing buildings (except heritage buildings in Volume 2, Appendix 8, Schedule 8A: Built Heritage).

   ii. Informal recreation and ancillary buildings.

   iii. Residential activities.

   iv. Temporary activities.

   v. Demolition or removal of existing buildings (except heritage buildings scheduled in Volume 2, Appendix 8, Schedule 8A: Built Heritage).

c) A Comprehensive Development Plan must be for a whole Comprehensive Development Plan Area as identified in Volume 2, Appendix 3. Activities within an area can proceed on a staged basis if stages have been defined as part of the consent granted.

d) Unless otherwise stated, a Comprehensive Development Plan for each area identified requires resource consent as a discretionary activity.

e) The activity status of a Comprehensive Development Plan application will be classified as non-complying if one or more activities that form part of the application:

i. Are identified as a non-complying activity in column two of the Activity Status Table (refer to Rule 4.5.3), or

ii. Fail to meet one or more of the standards in Rule 4.6 or Rule 4.8.

f) All activities listed in column one of Rule 4.5.3 are non-complying activities in the absence of an approved Comprehensive Development Plan unless the activity is listed as permitted in 4.5.1(b).

g) These rules do not apply to the Rotokauri North Structure Plan area.

Proposed Plan Change XX- Rotokauri North Private Plan Change

4.5.2 Comprehensive Development Plan Process Once Consent Has Been Granted

a) All development in an area subject to a Comprehensive Development Plan that has been granted consent is authorised. Changes to the conditions of a Comprehensive Development Plan consent will be considered as a discretionary activity under section 127 of the Act, except where the proposed changes involve different scale, intensity or character or extend the scope of the original application, in which case a new Comprehensive Development Plan consent is required (refer to 4.5.2b).

b) For a Comprehensive Development Plan that has been granted consent, any changes in use or changes that involve materially different effects or extend the scope of the original application, will require a new Comprehensive Development Plan consent and will be assessed as the same activity status in the original application for a Comprehensive Development Plan. There are some changes that can occur as permitted activities without the need for a new Comprehensive Development Plan consent, subject to compliance with relevant standards in Rule 4.6.

c) The activity status of changes in use requiring a new Comprehensive Development Plan consent will be classified as non-complying if one or more activities that form part of the application:

i. Are identified as a non-complying activity in column two (refer to Rule 4.5.3), or

ii. Fail to meet one or more of the standards in Rule 4.6 or Rule 4.8.

d) See Chapter 3.7.4.2 for Land Development Consent process in Ruakura. The activity status for Land Development Consents is identified in Rule 4.5.4.

e) These rules do not apply to the Rotokauri North Structure Plan area.

Proposed Plan Change XX- Rotokauri North Private Plan Change

4.5.3 Activity Status Table – Medium-Density Residential Zone (excluding Rotokauri North, Ruakura and Te Awa Lakes)

Proposed Plan Change XX- Rotokauri North Private Plan Change

Activities	Activity Status for a Comprehensive Development Plan and changes in use once consent has been granted ***Note**: See Rule 4.5.2(a) for once consent granted*
Residential Activities and Structures	
a) Accessory buildings	D
b) Apartment buildings	D
c) Ancillary residential unit	D
d) Ancillary residential structures	D P for changes in use
e) Single dwelling	D
f) Duplex dwellings	D
g) Maintenance, repair, minor alterations and additions to existing buildings (except heritage buildings scheduled in Volume 2, Appendix 8, Schedule 8A: Built Heritage)	P
h) Managed care facilities	D
i) Papakainga	D
j) Residential activities	P
k) Residential centre	D
l) Rest home	D
Commercial Activities and Structures	
m) Childcare facility i) up to 5 children ii) six or more children	 D D P for changes in use
n) Dairy	D
o) Tertiary education and specialised training facility	NC
p) Health care services	NC
q) Home-based business	D P for changes in use
r) Homestay accommodation	D P for changes in use

Activities	Activity Status for a Comprehensive Development Plan and changes in use once consent has been granted ***Note**: See Rule 4.5.2(a) for once consent granted*
s) Offices	NC
t) Places of assembly	NC
u) Show home	D
v) Visitor accommodation	D
Community Activities and Structures	
w) Community centre	D
x) General recreation	NC
y) Informal recreation and ancillary buildings	P
z) Marae	D
aa) Places of worship	D
bb) School	NC
All Activities and Structures	
cc) Demolition or removal of existing buildings (except heritage buildings scheduled in Volume 2, Appendix 8, Schedule 8A: Built Heritage)	P
dd) Relocated buildings	D
ee) Emergency service facilities	D
ff) Temporary activities	P

Note

1. For activities and buildings in the Electricity National Grid Corridor see Chapter 25.7: City-wide – Network Utilities and the Electricity National Grid Corridor.
2. For any activity not identified above see Section 1.1.8.1.

Proposed Plan Change 2-Te Awa Lakes Private Plan Change

Proposed Plan Change XX- Rotokauri North Private Plan Change

4.5.4 Activity Status Table – Rotokauri North Medium-Density Residential Zone, Ruakura Medium-Density Residential Zone and Te Awa Lakes Medium Density Residential Zone

Activities	Activity Status Ruakura and Te Awa	Activity Status Rotokauri North
Land Development Activities (refer Rule 3.7.4.2 for the Ruakura Medium-Density Residential Zone and Rule 4.5.6 for the Te Awa Lakes Medium-Density Residential Zone)	RD*	NA
Residential Activities and Structures		
a) Single dwelling	P	P
b) Duplex dwellings and apartments excluding Rotokauri North	RD*	See ee) below
c) Maintenance, repair, minor alterations and additions to existing buildings	P	P
d) Managed care facilities	D	D
e) Papakainga	RD*	RD*
f) Residential activities	P	P
g) Residential centre	D	D
h) Rest home	D	D
Commercial Activities and Structures		
i) Childcare facility for up to five children	C	C
j) Childcare facility for six or more children	D	D
k) Dairy	C	D
l) Tertiary education and specialised training facility	D	D
m) Health care services	D	D
n) Home-based business	P	P
o) Homestay accommodation	P	P
p) Places of assembly	D	D
q) Show homes	P	P
r) Visitor accommodation	D	D
s) One Integrated Retail Development in accordance with the general location identified on Figure 2.14 Ruakura Structure Plan – Land Use (Appendix 2).	RD*	NA
t) One Service Station (fronting Pardoa Boulevard)	D	NA
u) Community centre	C	C

Activities	Activity Status Ruakura and Te Awa	Activity Status Rotokauri North
v) General recreation	D	D
w) Informal recreation and ancillary buildings	P	P
x) Marae	D	D
y) Places of worship	D	D
z) School	D	D
aa) Demolition or removal of existing buildings (except heritage buildings)	P	P
bb) Relocated buildings	C	C
cc) Emergency service facilities	D	D
dd) Temporary activities	P	P
Additional Residential activities (applicable to Rotokauri North only)		
ee) An ancillary residential unit (to a single dwelling) complying with Rule 4.7.1.		P
ff) A duplex building per site complying with Rule 4.7.12.a.		P
gg) A duplex building per site complying with Rule 4.7.12.a i) and ii) but not the Rotokauri North Acceptable Solutions Code in Appendix 1.4.10		RD
hh) Apartments complying with Rule 4.7.12.b.		RD
ii) Any other dwellings(s) not provided above and/or any activity listed in ee, ff, gg or hh which does not comply with the relevant standard in 4.7		D
jj) Any garage which is attached to a dwelling and has internal access to the dwelling or a carport		P
kk) Any garage or carport accessed via a rear lane		P
ll) Garden sheds		P

4.5.5 Rule – Ruakura Structure Plan Area – Staging

a) Notwithstanding Rule 4.5.1 and 4.5.2, activities listed in 4.5.4 Rules – Activity Status Table – Medium-Density Residential Zone which are undertaken in the

Ruakura Structure Plan Area shall comply with Rules 3.7.4.1, 3.7.4.2, 3.7.4.3, 3.7.4.4, 3.7.4.5 and 3.7.5 in Chapter 3: Structure Plans.

4.5.6 Land Development Plan Rules in Te Awa Lakes Medium Density Residential Zone

Proposed Plan Change 2-Te Awa Lakes Private Plan Change

a) A resource consent for a restricted discretionary activity is required for the following activities in the Te Awa Lakes Medium Density Residential Zone:

   i. Preparation of land for development purposes including earthworks and vegetation removal.

   ii. Construction of roads, pedestrian paths and cycle routes.

   Iii. Installation of Three Waters infrastructure

   iv. Works related to the establishment of open space areas.

b) Land Development Plan applications for activities listed in a) above shall be obtained for the entire development (which may be staged) of not less than one of the Land Development Plan Areas in Figure 2-20, together with any adjacent Land Development Plan Areas or parts of Land Development Plan Areas, in conjunction with land use, subdivision and development under any other rule of the Te Awa Lakes Medium Density Residential Zone.

c) A Land Development Plan application shall provide the information required by Rule 1.2.2.28.

d) Land Development Plan applications will be assessed in accordance with the functions of the Hamilton City Council prescribed in Section 31 of the Resource Management Act. Consents may also be required from Waikato Regional Council under the Waikato Regional Plan e.g. for stormwater discharge.

e) Except as provided for by sections 95A(2), 95C and 95B(2) to (4) of the Act applications for any Restricted Discretionary Activity identified with an asterisk (*) in the relevant zone chapter shall be considered without notification or the need to obtain approval from affected persons.

4.6 Rules – General Standards – Medium-Density Residential Zone

4.6.1 Comprehensive or Land Development Plans

a) All development in an area that is subject to a consented Comprehensive Development Plan shall comply with the terms of that consent.

4.6.2 Development Yield

a) Comprehensive Development Plans shall demonstrate that the yield achieves within 10% of the residential unit total identified in Comprehensive Development Area Residential Unit Yield.

Location	Comprehensive Development Area	Residential Yield – Units per Comprehensive Development Area (+ or - 10%)
Rototuna	A	84
	B	28
	C	28
	D	90
	E	36
	F	200
Rotokauri	A	162
	B	143
	C	78
	D	185
	E	44
	F	168

b) Land Development Plan applications in Land Development Plan Areas (see Figure 2-20, Appendix 2), for the Te Awa Lakes Medium Density Residential Zone shall demonstrate that the yield achieves within 10% of the residential unit total identified below.

Land Development Plan Areas on Figure 2:21	Residential Unit Yield (+ or - 10%)
A	116
B	162
C	134
D	26
E	42
F	51
G	62
H	44
I	47
J	33
K	33
L	32
M	28
N	42
O	24
P	16
TOTAL	892

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c) There is no density rule applicable in the Rotokauri North Medium-Density Residential Zone

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4.6.3 Height in Relation to Boundary

a) Where a building is on land that adjoins the General Residential Zone or a Comprehensive Development Plan Area:

i. No part of any building shall protrude through a height control plane rising at an angle of 28 degrees between northwest (315 degrees) and northeast (45 degrees), and rising at an angle of 45 degrees in all other directions. This angle is measured from 3m above ground level at all boundaries.

Except:

ii. Where buildings are attached, no setback is required between those buildings.

iii. Where a boundary adjoins a transport corridor or access, the 45-degree angle applies to that boundary, measured 3m above the boundary.

iv. Written consent from the owners and occupiers of the adjoining property or Comprehensive Development Plan area is obtained.

Note

1. Refer to Figure 4.4.5c for guidance on determining the height control plane when adjoining a transport corridor or access.
2. Rule a) is not applicable in the Rotokauri North Medium-Density Residential Zone

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b) In the Rotokauri North Medium-Density Residential Zone the following shall apply to any side boundary that is within 8m of the rear boundary, and any rear boundary.

i. The height of the building shall not protrude beyond a height control plane of 2.5m and either:

- 45 degrees (for east or west boundaries),
- 55 degrees (for north boundaries); OR
- 35 degrees (for southern boundaries).

ii. The following exemptions to the above apply:

(a) No height control plane shall apply to the transport corridor boundary or a boundary with a rear lane (access lot).

(b) No height control plane shall apply to existing or proposed site boundaries within an application area.

(c) No height control plane shall apply to site boundaries where there is an existing common wall between two buildings on adjacent sites or where a common wall is proposed.

4.6.4 Residential Unit Size

a) The minimum floor area required in respect of each residential unit shall be:

Form of residential unit	Floor area
i. Studio unit	Minimum 35m^2
ii. 1 bedroom unit	Minimum 45m^2
iii. 2 bedroom unit	Minimum 70m^2
iv. 3 or more bedroom unit	Minimum 90m^2

b) In any one apartment building containing in excess of 20 residential units, the combined number of one bedroom units and studios shall not exceed 70 percent of the total number of apartments within the building.

4.6.5 Permeable Surface

	Medium Density Zone
Permeability across the entire site	Minimum 20%
Front, Corner and Through Sites in the Ruakura and Te Awa Lakes Medium Density Residential Zone: Permeability forward of the building line of the dwelling planted in grass, shrubs and trees.	Minimum 50%
Sites in the Rotokauri North Medium-Density Residential Zone: Permeability forward of the building line of the dwelling (including porch) planted in grass, shrubs and trees: • Sites larger than 350m2 • Sites less than 350m2	 Minimum 50% Minimum 40%

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4.6.6 Site Coverage

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a.) The maximum site coverage within the Rotokauri North Medium-Density Residential Zone and Ruakura Medium Density Residential Zone is 50%.

b.) For any apartments in Rotokauri North Medium-Density Residential Zone the maximum site coverage is 60%.

4.6.7 Building Height

a) The maximum height of a building or structure in the Rotokauri North Medium-Density Residential Zone, Ruakura Medium Density Residential Zone and Te Awa Lakes Medium Density Residential Zone is 10m.

b) In the Rotokauri North Medium-Density Residential Zone, any site that is within the 'Medium Density Overlay A' as shown on the Rotokauri North Structure Plan map, the maximum height of any building or structure is 14m.

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4.6.8 Provisions in Other Chapters

The provisions of the following chapters apply to activities within this chapter where relevant:

- Chapter 2: Strategic Framework
- Chapter 3: Structure Plans
- Chapter 19: Historic Heritage
- Chapter 20: Natural Environments
- Chapter 21: Waikato River Corridor and Gullies
- Chapter 22: Natural Hazards
- Chapter 23: Subdivision
- Chapter 24: Financial Contributions
- Chapter 25: City-wide

4.7 Rules – Specific Standards – All Residential Zones

4.7.1 Ancillary Residential Unit

a) A maximum of one ancillary residential unit per site.

b) Maximum gross floor area of 60m².

c) The outdoor living area shall not be included as part of the outdoor living area provided for the principal residential building on site.

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d) In the Rotokauri North Medium Density Residential Zone, an ancillary residential unit is only applicable if it meets all of the following:

i) Be located on a site which has two transport corridor boundaries (i.e. a corner lot);

ii) The unit is located above a garage which fronts a rear lane;

iii) The rear lane must have a minimum width of 7m;

iv) The unit must have a separate pedestrian access from a transport corridor boundary.

4.7.2 Childcare Facility

a) The activity shall not be part of a multiple residential unit development.

b) The activity shall be located on a front, corner or through site.

c) The activity shall have a maximum gross floor area of all buildings of 250m^2.

4.7.3 Community Centres, Tertiary and Specialised Training Facilities, Schools and Places of Worship

a) Gross floor area of all buildings	Maximum 250m^2
b) Hours of operation	0700 to 2200 hours
c) Additional hours for special event (maximum 1 per calendar year)	2200 to 0200 hours

d) The display or storage of materials, except for permitted signage, shall not be visible from outside the site.

4.7.4 Dairies

a) Gross floor area of retail	Maximum 100m^2
b) Hours of operation	0700 to 2200 hours
c) Building setback from side or rear boundaries	Minimum 5m

4.7.5 Home-based Businesses

a) For the avoidance of doubt, if an activity does not comply with all of the standards specified, it is not a home-based business. Home-based businesses shall:

i. Employ no more than 2 people, one of whom must reside on the site on a permanent basis.

ii. Not exceed 30% of the total gross floor area of buildings on the site.

iii. Not generate any trips by a heavy motor vehicle.

iv. Not generate vehicle trips or pedestrian traffic between 2000 to 0800 hours.

v. Not display any indication of the activity from outside the site including the display or storage of materials, except for permitted signs.

vi. Retail only those goods which have been manufactured, repaired, renovated or otherwise produced on the site.

vii. Not create electrical interference with television and radio sets or other types of receivers in adjacent residential units.

viii. Not generate nuisances, including smoke, noise, dust, vibration, glare, and other noxious or dangerous effects – these shall be measured at the boundaries of the site.

ix. Have only one sign with a maximum area of 0.6m², a maximum dimension of 1m and having no part higher than 2m above the adjacent ground level. The sign must be attached to either a fence, wall or building.

4.7.6 Managed Care Facilities

a) Within one calendar month of its occupancy, the Agency/person(s) responsible for the Managed Care Facility shall provide the residents of the properties adjoining the site and Council's Planning Department a written information pack. The information pack shall include an overview of the Agency and the range of services provided (if relevant), and the type of care and programs to be provided within the Managed Care Facility and shall include the following.

i. Proposed number of residents.

ii. The anticipated number of visitors to the site per week and daily visiting hours.

iii. Anticipated full time equivalent staff at the facility.

iv. Regular and emergency contact details to enable prompt and effective contact if necessary.

v. The policies for the management of possible emergency situations including the management of neighbour relations in an emergency situation.

b) The outdoor living area shall be provided communally which shall comprise:

i. At least 15m² per resident in the General Residential Zone.

ii. At least 12m^2 per resident in the Residential Intensification Zone.

iii. A minimum dimension of not less than 4m.

iv. An area capable of containing a 6m diameter circle.

v. At least 60% at ground level, and any outdoor living space that is not at ground level is provided on upper floor decks wider than 1m.

vi. Comprise not more than 35% impermeable surface area.

vii. For the exclusive use of the residents.

viii. Readily accessible for all residents.

ix. Free of driveways, manoeuvring areas, parking spaces, accessory buildings and service areas.

c) A service area shall be provided that has:

i. A minimum area of 20m² with a minimum dimension of 3m.

ii. In cases where a fully equipped laundry (washing and drying machines) is provided, then the service area can be reduced to a minimum of 16m² with a minimum dimension of 2m.

d) Staff providing supervision for managed care facilities accommodating eight or more residents shall be present on site at all times that residents are in occupation.

e) No part of any site or premises used as a managed care facility shall contain a secure unit.

4.7.7 Relocated Buildings

a) Any relocated building intended for use as a dwelling (excluding previously used accessory buildings) must have previously been designed, built and used as a dwelling.

b) A building inspection report shall accompany the application for a building consent. That report is to identify all reinstatement works that are to be completed to the exterior of the building.

c) All reinstatement work required by the building inspection report and the building consent to reinstate the exterior of any relocated dwelling shall be completed within six months of the building being delivered to the site. Reinstatement work is to include connections to all infrastructure services and closing in and ventilation of the foundations.

d) The proposed owner of the relocated building must certify that the reinstatement work will be completed within the six month period.

4.7.8 Show Homes

a) Shall be staffed by a maximum number of two staff at any time.

b) Shall be located on a front, corner or through site.

c) Shall have a maximum activity duration of two years from the time of first occupation.

4.7.9 Rest Homes

a) Maximum occupancy shall be 10 residents (including live-in staff).

b) The maximum density for rest homes shall be:

i. One person per 75m² of net site area in the General Residential Zone; or

ii. One person per 40m² of net site area in the Residential Intensification Zone; or

iii. One person per 50m² of net site area in the Medium-Density Residential Zone.

c) An outdoor living area shall be provided that:

i. Is for the exclusive use of the residents.

ii. Is readily accessible to all residents.

iii. Is free of driveways, manoeuvring areas, parking spaces, accessory buildings and service areas.

iv. Has a maximum area of impermeable surfaces not exceeding 60% of the outdoor living area.

d) The outdoor living area shall be provided communally which shall comprise:

i. At least 12m^2 per resident.

ii. A minimum dimension of not less than 4m.

iii. At least capable of containing a 6m-diameter circle.

iv. At least 60% provided at ground level, and any outdoor living space that is not at ground level is provided on upper floor decks wider than 1m.

e) A service area shall be provided with areas and dimensions as follows:

i. Minimum area of 20m².

ii. Minimum dimension of 3m.

iii. Provided that where a fully equipped laundry (both washing and drying machines) is provided in rest home, then the service area can be reduced to a minimum of 16m² with a minimum dimension of 2m.

4.7.10 Visitor Accommodation Outside of the Visitor Facilities Area

a) Maximum occupancy for visitor accommodation shall be 12 guests.

b) Visitor accommodation shall not provide for the sale of liquor through an ancillary facility such as a bar or a restaurant.

4.7.11 Integrated Residential Development

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a) Minimum site area of 2000m²,

b) No more than 20% of residential units shall be in the form of apartments.

c) Required to undertake a Water Impact Assessment, as described in Volume 2, Appendix 1.2.2.5.

4.7.12 Specific Provisions for Rotokauri North

a) Permitted Activity standards for a duplex:

i) The allotment must be a front lot (and not a corner lot) and must have a minimum transport corridor boundary width of 12.5m.

ii) The duplex building must be served via one vehicle crossing only with a maximum width of 6m.

iii) The duplex building and layout must comply with all of the conditions specified in the Rotokauri North Acceptable Solutions Code in Appendix 1.4.10

b) Restricted Discretionary Activity standards for apartments.

i) Where access is to be located from the transport corridor boundary, the allotment must have a minimum transport corridor boundary width of 20m.

ii) Where access is to be provide via a rear lane, the allotment must have a minimum transport corridor boundary width of 15.5m.

4.8 Rules – Specific Standards – Rotokauri North Medium-Density Residential Zone, Ruakura Medium-Density Residential Zone and Te Awa Lakes Medium Density Residential Zone

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4.8.1 One Integrated Retail Development (see Figure 2-14 Ruakura Structure Plan – Land use (Appendix 2))

a) Activities shall only consist of:

- Retail
- Cafes/Restaurants
- Offices
- Healthcare services
- Community facilities
- Childcare facilities

Combined gross floor area of all tenancies	Maximum of 3500m²
Gross floor area per tenancy (excluding offices)	Maximum 399m²
Gross floor area for office tenancies	Maximum 250m²

b) Only one integrated retail development shall be provided within the Medium Density Residential Zone.

c) Maximum Building Height: 10 metres

d) Where any boundary adjoins a residential boundary, no part of any building shall penetrate a height control plane rising at an angle of 45 degrees beginning at an elevation of 3m above the boundary. Elements such as flues, flagpoles, open balustrades shall be exempt.

e) Building setbacks

Front Boundary: 5 metres when fronting an arterial road.

Side and Rear Boundaries: 1.5 metres where the boundary adjoins a residential boundary or Open Space Zone.

f) A maximum building intensity (floor area Ratio) of 1:1 shall apply.

g) Service Areas

Any building shall provide service areas as follows:

i. At least one service area of not less than $10m^2$ or 1% of the gross floor area of the building, whichever is the greater.

ii. Any additional service areas shall not:

- Be less than $5m^2$
- Have a minimum dimension of less than 2.5m

iii. Any outdoor service area shall be maintained with an all-weather, dust free surface.

iv. A service area may be located within a building provided that it is separately partitioned with an exterior door directly accessible by service vehicles.

v. Any services area shall not encroach on to areas required by this District Plan for other purposes (e.g. parking, loading, landscaping and screening).

h) Outdoor storage

Any outdoor storage area used for storage of goods and materials shall:

i. Be laid out and used in a manner that does not conflict with vehicle access.

ii. Be maintained with an all-weather, dust free surface.

iii. Be located away from public view or otherwise screened by fencing and landscaping.

iv. Not encroach on areas required by this District Plan for other purposes (e.g. parking, loading, landscaping and screening).

i) No roller doors, or similar, which may obscure windows or entranceways may be installed on the front of any building fronting a public space.

4.8.2 Building Setbacks

a) Transport corridor boundary – local and collector roads except where a garage provides access to a local or a collector road the garage shall be a minimum of 5m from that transport corridor boundary.	3m
b) Transport corridor boundary – arterial roads	5m
c) Side yards	
i. Side yard east or south	1m
ii. Side yard west or north	2m
iii. As an alternative for either i. or ii. above, a zero lot boundary may be used subject to obtaining neighbours consent which may attach to a dwelling on an adjoining allotment.	
d) Rear yard	3m
e) In the Rotokauri North Medium-Density Residential Zone the following applies:	
i. Transport Corridor boundary except where a garage provides access to a legal road the garage shall be a minimum of 5m from that transport corridor boundary.	3m
ii. Side yards	1m
iii. One side yard where legal provision is made for access for maintenance of the structure or it is a common / party wall.	0m
iv. Rear Yard for a building exceeding 5m in height	8m
v. Rear Yard for a building up to 5m in height and single storey only	3m
Exemptions: • The rear yard does not apply to a building up to a height of 7m where the site adjoins a rear lane (access lot). • A single storey unenclosed verandah / porch space attached to the building is exempt from the front yard setback provided it must not be located within 1m of the Transport Corridor boundary.	

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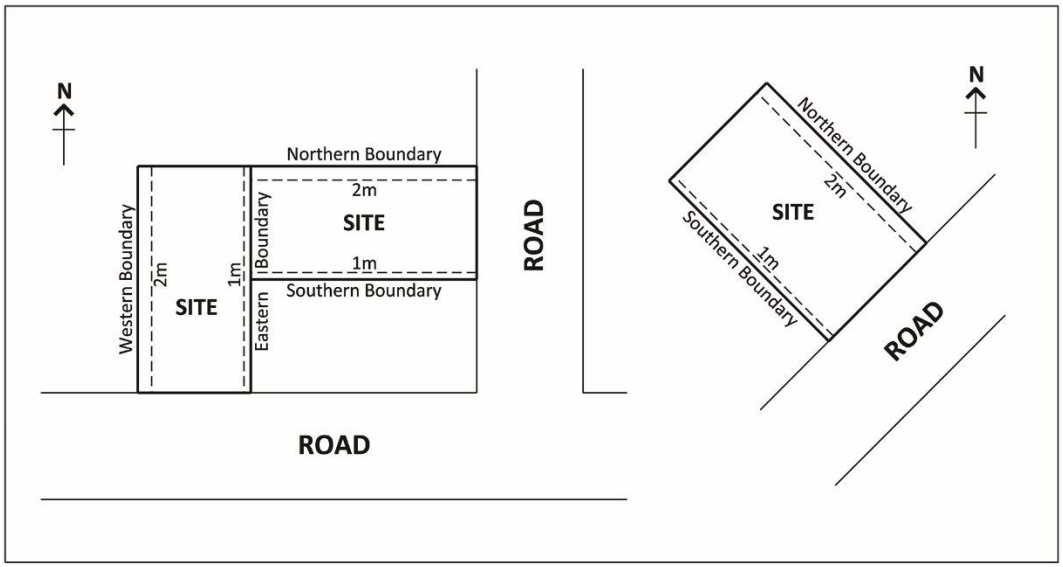
Figure 4.8.2: Side Yards



4.8.3 Interface between Public and Private

a) The front wall of all accessory buildings that are detached, including carports and garages, should be no further forward of the front building line of the dwelling than 0.5m.

aa) In Rotokauri North any garage or carport must be set back at least 1m from the front building line of the dwelling. If the garage door does not face the transport corridor, a minimum of 10% of the garage façade facing the transport corridor must be glazed. This rule does not apply to garages or carports facing a rear lane.

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b) The front wall of accessory buildings that are an integral part of the design and construction of the dwelling shall, if the garage door faces the street, be located no further forward of the front building line of the dwelling than 0.5m, except for a single dwelling on a site with a frontage less than 15m wide the garage door shall be setback a minimum of 0.5m from the front building line of the dwelling.

c) Maximum garage width of 50% of the front building line of the dwelling on a site with a frontage less than 15m wide.

d) Any wall, except the wall containing the garage door, of an accessory building facing the street must consist of at least 20% of glazed materials.

e) For front sites, the primary entrance on the ground floor shall face the street and provide pedestrian access separated from the driveway.

f) At least one habitable room shall have a clear-glazed window facing the street. For corner sites and sites with two transport corridor frontages, this is required only on the transport corridor frontage from which vehicular access is provided.

g) Maximum Fence Heights		
i.	Front and side boundary fences or walls located forward of the front building line of the dwelling.	1.2m

ii.	Front and side boundary fences or walls located forward of the front building line of the dwelling surrounding north facing Outdoor Living Areas that face a transport corridor.	1.8m (with 50% or more of the fence visually permeable).
iii.	For sites adjoining an Open Space Area as shown on Figure 2-14: Ruakura Structure Plan – Land Use (Appendix 2), fences or walls located between the dwelling and the Area boundary.	1.5m (with 50% permitted at 1.8m provided 50% of that part over 1.5m is visually permeable).
iv.	All other boundary fences or walls	1.8m.

h) clause c) above does not apply in the Rotokauri North Medium-Density Residential Zone, instead the following applies:

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i. Maximum garage door width of 6m on the front building line on a site with a frontage greater than 12.5m.

ii. No more than a single garage door up to 3.2m width of the front building line on a site with a frontage less than 12.49m.

4.8.4 Residential Buildings – Separation and Privacy

a) Residential buildings shall be set back at least 3m from the nearest part of any other residential building on the same site, except:

i. No separation is required between buildings that are attached.

ii. Where windows are located and designed (including by glazing) to avoid views between rooms in different buildings on the same site, separation distance shall be a minimum of 1.5m.

b) Clause a) does not apply in the Rotokauri North Medium-Density Residential Zone – instead the following applies:

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i. Principal living rooms or the dining room of a dwelling must have the principal glazing associated with that room facing either the transport corridor frontage, or the rear yard (or rear lane if applicable).

4.8.5 Outdoor Living Area

a) Each residential unit shall be provided with an outdoor living area that is:

i. For the exclusive use of each residential unit.

ii. Readily accessible from a living area inside the residential unit.

iii. Free of driveways, manoeuvring areas, parking spaces, accessory buildings and service areas.

iv. Located on a side of the residential unit which faces north of east or west.

b) Outdoor living areas for residential units shall be a minimum of $40m^2$ capable of containing a 6m diameter circle and for ancillary residential units shall be $12m^2$ capable of containing a 2.5m diameter circle.

c) The outdoor living area for an ancillary residential unit shall be separate from the outdoor living area provided for the principal residential unit.

d) In the Rotokauri North Medium-Density Residential Zone the following applies:

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i. Outdoor living areas for residential units shall be a minimum of 36m^2 capable of containing a 6m diameter circle; or

ii. The outdoor living area may comprise two distinct areas where a 8 m2 minimum 1.8m depth porch/verandah is provided within the front yard, and a minimum 30 m2 living court is provided the the rear yard with a minimum dimension of 5m.

For any residential unit (excluding its carparking and access) located entirely above ground:

i) The unit must be provided with an outdoor living space in the form of a balcony or roof terrace that is at least 5m2 for studio and one bedroom dwelling (including an ancillary unit) and 8m2 for two or more bedroom dwelling and has a minimum dimension of 1.8m.

Note

1. Any communal open space is optional and is additional to the above provisions.

4.8.6 Service Areas

Description	Minimum Requirements
a) Detached dwellings, duplex dwellings and dwellings in comprehensive residential developments	20m^2 Minimum dimension 3m
b) Service area for ancillary residential unit	Additional 10m^2 Minimum dimension 2.5m
c) All service areas	Readily accessible from each residential unit, not visible from a public place or in a front yard, or yard adjoining the Transport Corridor Zone or Open Space Zone. To be screened from the street and setback a minimum of 2m from primary building frontage.
d) Clauses a) to c) do not apply in the Rotokauri North Medium-Density Residential Zone.	

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4.8.7 River Interface Overlay in Te Awa Lakes Medium Density Residential Zone

a) The minimum area of land (net site area) required in respect of each residential unit adjoining any existing or proposed esplanade reserve adjacent to the Waikato River shall be 1,000m^2.

b) The maximum height of a building or structure is 8m.

c) The General Residential Zone Rules in 4.4.2, 4.4.3, 4.4.5, 4.4.6, 4.4.7, 4.4.8, 4.4.9, 4.4.10 and 4.4.11 shall apply.

4.9 Rules – Specific Standards – Large Lot Residential Zone

4.9.1 Effluent Disposal

a) Areas for the on-site disposal or storage of sewage (septic tanks) or farm effluent shall not be located within a:

i. High Flood Hazard Area.

ii. Medium Flood Hazard Area.

iii. Low Flood Hazard Area.

iv. Temple View Flood Hazard Area.

v. Culvert Block Flood Hazard Area.

vi. Waikato Riverbank and Gully Hazard Area.

vii. Significant Natural Area (refer to Volume 2, Appendix 9, Schedule 9C: Significant Natural Areas).

viii. Root protection zone of a significant tree (refer to Volume 2, Appendix 9, Schedule 9D: Significant Trees).

ix. Site in Schedule 8B: Group 1 Archaeological and Cultural Sites (refer to Volume 2, Appendix 8, Schedule 8B).

b) Facilities for the storage and disposal of sewage (septic tanks) or farm effluent shall be sited at least 25m from any natural or artificial water course or any lake.

c) Facilities for the storage and disposal of farm effluent shall be sited at least:

i. 100m from any residential unit on another site.

ii. 15m from any site boundary.

iii. 150m from any Residential Zone or Special Character Zone boundary.

4.9.2 Produce Stalls

a) One produce stall shall be allowed per site.

b) Produce stalls shall not exceed 16m^2 gross floor area.

c) Produce sold from a stall shall be grown or made either:

i. On the property on which it is offered for sale.

ii. On land owned or leased by the vendor of the produce.

iii. On land less than 3km from the property on which it is offered for sale.

d) Produce stalls shall not be established on any site having vehicular access to a major arterial transport corridor or the strategic network.

e) Produce stalls shall be located to enable two off-road hard stand areas for car parking.

4.10 Controlled Activities: Matters of Control

a) In determining any application for resource consent for a controlled activity, the Council shall reserve its control over the following matters.

Activity	Matter of Control (Refer to Volume 2, Appendix 1.3.2)
i. Childcare facility for up to five children	• F – Ruakura
ii. Dairy	• F – Ruakura
iii. Community centre	• F – Ruakura
iv. Relocated buildings	• F – Ruakura

4.11 Restricted Discretionary Activities: Matters of Discretion and Assessment Criteria

a) In determining any application for resource consent for a restricted discretionary activity, Council shall have regard to the matters referenced below, to which Council has restricted the exercise of its discretion. Assessment Criteria within Volume 2, Appendix 1.3 provide for assessment of applications as will any relevant objectives and policies. In addition, when considering any Restricted Discretionary Activity located within the Natural Open Space Zone, Waikato Riverbank and Gully Hazard Area, or Significant Natural Area, Council will also restrict its discretion to Waikato River Corridor or Gully System Matters (see the objectives and policies of Chapter 21: Waikato River Corridor and Gully Systems).

Activity Specific	Matter of Discretion and Assessment Criteria Reference Number (Refer to Volume 2, Appendix 1.3)
i. Duplex dwellings*	• B – Design and Layout • C – Character and Amenity
ii. Apartment buildings	• B – Design and Layout • C – Character and Amenity
iii. Childcare facility for 6 or more children	• B – Design and Layout • C – Character and Amenity
iv. Community centre	• B – Design and Layout • C – Character and Amenity

v. Dairy	• B – Design and Layout • C – Character and Amenity
vi. Tertiary education and specialised training facility	• B – Design and Layout • C – Character and Amenity
vii. Papakainga*	• B – Design and Layout • C – Character and Amenity
viii. Places of worship	• B – Design and Layout • C – Character and Amenity
ix. Rest home*	• B – Design and Layout • C – Character and Amenity
x. New building for the purpose of Health Care Services identified in 4.3.1v)	• B – Design and Layout
xi. Second and subsequent single dwellings per site*	• B – Design and Layout • C – Character and Amenity
xii. Visitor accommodation	• B – Design and Layout • C – Character and Amenity
xiii. Emergency service facilities	• B – Design and Layout • C – Character and Amenity
xiv. Integrated Residential Development	• B – Design and Layout • C – Character and Amenity
Ruakura Medium Density Residential Zone	
xiv. Land Development Activities*	• N - Ruakura
xv. Duplex dwellings (other than provided for in 4.5.4b) above) and apartments*	• B – Design and Layout • N - Ruakura
xvi. One Integrated Retail Development in accordance with the general location identified on Figure 2-14 Ruakura Structure Plan – Land Use (Appendix 2)*	• B – Design and Layout • H – Function, Vitality, Viability and Amenity of Centres • N – Ruakura
xvii Papakainga*	• B- Design and Layout • N- Ruakura
Te Awa Lakes Medium Density Residential Zone	

xviii Land Development Activities	• B – Design and Layout • C – Character and Amenity • G – Transportation • I – Network Utilities and Transmission • J – Three Waters Capacity and Techniques
Rotokauri North Medium-Density Residential Zone	
xix. Any restricted discretionary activity not already specified above	• B – Design and Layout • C – Character and Amenity • O – Rotokauri North

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Note

1. Refer to Chapter 1.1.9 for activities marked with an asterisk (*) except for those outlined within the Ruakura Medium Density Residential Zone which is outlined in 4.12 below.

4.12 Notification Rule for Ruakura Medium Density Residential Zone

a) Except as provided for by Section 95A(2)(b) and (c), 95B(2) and (3) and 95C(1) to (4) of the Act applications for any Restricted Discretionary Activity identified with an asterisk (*) in the table above and activity status table 4.5.4 shall be considered without notification or the need to obtain approval from affected persons.

b) Notwithstanding clause (a), where an activity identified in Rule 4.5.4 requires resource consent for a Restricted Discretionary Activity under two or more activity descriptions, and only one of the Restricted Discretionary Activities is identified with an asterisk (*), notification of the activity shall be at the Council's discretion in accordance with Section 95A, 95B and 95C of the Act.

4.13 Other Resource Consent Information

Refer to Chapter 1: Plan Overview for guidance on the following:

- How to Use this District Plan
- Explanation of Activity Status
- Activity Status Defaults
- Notification / Non-notification Rules
- Rules Having Early or Delayed Effect

Refer to Volume 2, Appendix 1: District Plan Administration for the following:

- Definitions and Terms Used in the District Plan
- Information Requirements
- Controlled Activities – Matters of Control
- Restricted Discretionary, Discretionary and Non-Complying Activities Assessment Criteria

- Design Guides
- Other Methods of Implementation

23 Subdivision

23.1 Purpose

a) Subdivision is essentially the process of dividing a parcel of land or a building into one or more further parcels, or changing an existing boundary location. Subdivision by itself is not a use of land, however it often sets the platform for future development and land use.

b) The development and use of land and buildings can be facilitated by subdivision. As such, the purpose of this chapter is to ensure that subdivision activities within the City are undertaken in a manner that supports the outcomes sought in the underlying zone. It is also to ensure the integrated management of the effects of the use, development or protection of land and associated natural and physical resources.

23.2 Objectives and Policies: Subdivision

Objective	Policies
23.2.1 To ensure that risk to people, the environment and property is not exacerbated by subdivision.	**23.2.1a** Subdivision: i. Does not result in increased risk of erosion, subsidence, slippage or inundation. ii. Minimises any adverse effects on water quality. iii. Ensures that a building platform can be accommodated within the subdivided allotment clear of any areas subject to natural hazards. iv. Ensures that any risks associated with soil contamination are appropriately remedied as part of the subdivision process. v. Ensures reverse sensitivity mitigation measures avoid or minimise effects such as noise associated from an arterial transport corridor or State Highway.
Explanation	
The policies ensure that land is suitable for subdivision and will not increase risks to people, the environment and property.	
Objective	**Policies**
23.2.2 Subdivision contributes to the	**23.2.2a** Subdivision:

achievement of functional, attractive, sustainable, safe and well designed environments.	i. Is in general accordance with Subdivision Design Assessment Criteria to achieve good amenity and design outcomes. ii. Is in general accordance with any relevant Structure Plan. iii. Is in general accordance with any relevant Integrated Catchment Management Plan. iv. Maintains and, where possible, enhances existing amenity values. v. Promotes energy, water and resource efficiency. vi. Provides for the recreational needs of the community. vii. Discourages cross-lease land ownership. viii. Ensures that any allotment is suitable for activities anticipated for the zone in which the subdivision is occurring. ix. Contributes to the achievement of identified residential yield requirements over time where appropriate. x. Avoids or minimises adverse effects on the safe and efficient operation, maintenance of and access to network utilities and the transport network. xi. Is avoided where significant adverse effects on established network utilities or the transport network are likely to occur. xii. Promotes connectivity and the integration of transport networks. xiii. Provides appropriate facilities for walking, cycling and passenger transport usage. xiv. Provides and enhances public access to and along the margins of the Waikato River and the City's lakes, gullies and rivers. xv. Facilitates good amenity and urban design outcomes by taking existing electricity transmission infrastructure into account in subdivision design, and where possible locating compatible activities such as infrastructure, roads or open space under or in close proximity to electricity transmission infrastructure. xvi. Ensures that a compliant building platform can be accommodated within the subdivided allotment outside of the National Grid Yard.

Explanation
Subdivision has a lasting impact on the built form and function of a city. These policies require that the subdivision process respond to the range of form and function matters, such as urban design and resource efficiency, identified in the policy in order to achieve good environmental and built form outcomes in Hamilton City.

Objective	Policies
23.2.3 Medium-Density Residential Zone (excluding Rotokauri North) and Rototuna Town Centre Zone areas are developed comprehensively.	**23.2.3a** Subdivision that creates additional allotments in the Medium-Density Residential Zone or the Rototuna Town Centre Zone does not occur without an approved Comprehensive Development Plan or Land Development Consents for Ruakura and Te Awa Lakes, except that this policy does not apply for development in Rotokauri North.

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Explanation
Comprehensive Development Plans are a useful tool to ensure a comprehensive approach to the layout and design of medium-density development. The Board of Inquiry Decision for Ruakura included a Land Development Consent process to ensure a comprehensive approach to layout and design within the medium density development occurs. *Rotokauri North contains specific subdivision standards for development to create high amenity design and layout which are more proscriptive in terms of urban development form and layout than other areas in the Medium Density Residential zone, so as to avoid the requiring land use consents for subdivisional layout via a Land Development Consent.*

Objective	Policies
23.2.4 To ensure the provision of infrastructure services as part of the subdivision process.	**23.2.4a** Subdivision: i. Provides an adequate level of infrastructure and services appropriate for the proposed development. ii. Takes into account and shall not compromise the infrastructural needs of anticipated future development. iii. Does not occur unless appropriate infrastructure and/or infrastructure capacity is available to service the proposed development. iv. Ensures that the capacity, efficiency, performance and sustainability of the wider infrastructure network is not compromised.

	v. Uses public infrastructure ahead of private infrastructure where appropriate.
Explanation	
Acceptable means of compliance for the provision, design and construction of infrastructure is contained within the Hamilton City Infrastructure Technical Specifications. The Ruakura Structure Plan area includes two areas of Large Lot Residential Zones which are not anticipated to be serviced with Three Waters infrastructure, and should accommodate on-site servicing. Parts of the Future Urban Zone, where rural uses are to predominate, will also contain on-site servicing.	
Objective	**Policies**
23.2.5 Subdivision occurs in a manner that recognises historic heritage and natural environments.	**23.2.5a** Subdivision avoids, remedies or mitigates adverse effects on: i. Scheduled heritage items. ii. Scheduled archaeological and cultural sites. iii. Scheduled significant trees. iv. Scheduled significant natural areas. v. The Waikato River and gullies and river banks, lakes, rivers and streams.
	23.2.5b Subdivision protects, and where possible enhances any: i. Landforms and natural features. ii. Vegetation.
	23.2.5c Subdivision of land which protects and enhances the riparian margins of the Waikato River and the City's lakes, gullies and rivers.
Explanation	
Subdivision and the associated development of land often involves modification and this has the potential to cause or exacerbate adverse effects. These effects should be managed through the location and design of subdivision.	

23.3 Rules – Activity Status Tables

Table 23.3a: General Residential, Residential Intensification, Large Lot Residential, Central City, Business 1 to 7, Industrial, Knowledge, Ruakura Logistics, Ruakura Industrial Park, Future Urban, All Open Space, Major Facilities, Community Facilities and Transport Corridor Zones and All Hazard Areas

Activity	General Residential, Residential Intensification, Large Lot Residential, Central City, Business 1 – 7, Industrial, Knowledge, Ruakura Logistics and Ruakura Industrial Park Zones	Future Urban Zone	All Open Space Zones, Major Facilities, Community Facilities, Transport Corridor Zones	All Hazard Areas
For Medium Density Residential, Rototuna Town Centre Zone and Te Rapa North Industrial Zone see Table 23.3b below. For Special Character Zones see Table 23.3c below. For Rotokauri North see Table 23.3d below.				
i. Boundary adjustments	P	RD	P	RD
ii. Amendments to cross-lease, unit-titles and company lease plans for the purpose of showing alterations to existing buildings or additional lawfully established buildings	P	P	P	P
iii. Conversion of cross-lease titles into fee simple titles	P	P	P	P
iv. Subdivision to accommodate a network utility service or transport corridor	RD	RD	RD	D
v. Fee simple subdivision*	RD*	RD*	RD*	D
vi. Cross-lease subdivision	NC	NC	NC	NC
vii. Company-lease subdivision*	RD*	RD*	RD*	D
viii. Unit-title Subdivision*	RD*	RD*	RD*	D
ix. Leasehold Subdivision	RD	RD	RD	D
x. Subdivision involving any allotment within the Electricity National Grid Corridor	RD	RD	RD	D
xi. Any subdivision of an allotment containing a Scheduled Historic Heritage Site identified in Volume 2, Appendix 8, Schedules 8A and 8B	D	D	D	D
xii. Any subdivision of an allotment containing a Significant Natural Area identified in Volume 2, Appendix 9, Schedule 9C	D	D	D	D

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Table 23.3b: Medium Density Residential Zones (excluding Rotokauri North) and Rototuna Town Centre Zones, and Te Rapa North Industrial Zone

Activity	Medium- Density Residential and Rototuna Town Centre Zones		Ruakura and Te Awa Lakes Medium Density Residential Zone	Te Rapa North Industrial Zone			
	Without an approved CDP	As part of or after a CDP has been approved	With an approved LDC or an LDC with subdivision activity	Deferred Industrial outside of Stage 1A & 1B	Within Stage 1A & 1B without a CDP	Within Stage 1A & 1B after a CDP	Te Rapa Dairy Manufacturing Site
For General Residential, Residential Intensification, Large Lot Residential, Central City, Business 1 to 7, Industrial, Knowledge, Ruakura Logistics and Ruakura Industrial Park, Future Urban, all Open Space, Major Facilities, Community Facilities and Transport Corridor Zones, and all Hazard Areas see Table 23.3a above. For Special Character Zones see Table 23.3c below.							
i. Boundary adjustments Inclusive where no LDC exists for Ruakura and Te Awa Lakes Medium Density Residential Zone	P	P	P	P	P	P	P
ii. Amendments to cross-lease, unit-titles and company lease plans for the purpose of showing alterations to existing buildings or additional lawfully established buildings	P	P	P	P	P	P	P
iii. Conversion of cross-lease titles into fee simple titles	P	P	P	P	P	P	P
iv. Subdivision to accommodate a network utility service or transport corridor inclusive where no LDC exists for Ruakura and Te Awa Lakes Medium Density Residential Zone	RD	RD	RD	RD	D	RD	RD
v. Fee simple subdivision*	NC	D	RD*	NC	D	RD*	RD*
vi. Cross-lease subdivision*	NC	NC	NC	NC	NC	NC	NC
vii. Company-lease subdivision	NC	RD	RD	NC	D	RD	RD
viii. Unit-title Subdivision*	NC	RD*	RD*	NC	D	RD*	RD*

ix. Leasehold Subdivision	NC	RD	RD	NC	D	RD	RD
x. Subdivision involving any allotment within the Electricity National Grid Corridor	NC	RD	RD	RD	D	RD	RD
xi. Any subdivision of an allotment containing a Scheduled Historic Heritage Site identified in Volume 2, Appendix 8, Schedules 8A and 8B	NC	D	D	NC	D	D	D
xii. Any subdivision of an allotment containing a Significant Natural Area identified in Volume 2, Appendix 9, Schedule 9C [1]	NC	D	D	NC	D	RD	RD

Table 23.3c: Special Character Zones

Activity	All Special Character zones				Special Natural Zone		Rototuna North East Character Zone, Special Residential Zone, Special Heritage Zone and Special Natural Zone
	Temple View Zone		Peacocke Character Zone		Lot 2 DP425316		
	Without an approved CDP	As part of or after a CDP has been approved	Without an approved Master Plan	As part of or after a Master Plan has been approved	Without an Approved CDP	As part of an application for a CDP or after a CDP has been approved	
For Medium Density Residential, Rototuna Town Centre Zone and Te Rapa North Industrial Zone see Table 23.3b above. For General Residential, Residential Intensification, Large Lot Residential, Central City, Business 1 – 7, Industrial, Knowledge, Ruakura Logistics and Ruakura Industrial Park, Future Urban, all Open Space, Major Facilities, Community Facilities, and Transport Corridor Zones, and all Hazard Areas see Table 23.3a above.							
i. Boundary adjustments	RD	RD	RD	RD	RD	RD	P
ii. Amendments to cross-lease, unit-titles and company lease plans for the purpose of showing alterations to existing buildings or additional lawfully established buildings	P	P	P	P	-	P	P
iii. Conversion of cross-lease titles into fee simple titles	P	P	P	P	-	-	P

iv. Subdivision to accommodate a: - network utility service or - transport corridor	RD RD	RD RD	RD RD	RD RD	RD NC	D D	RD RD
v. Fee simple subdivision*	NC	D	-	-	NC	D	RD*
a) Fee Simple Subdivision within the Peacocke Character Zone for lots greater than 10ha	-	-	RD	RD	-	-	-
b) Fee Simple Subdivision within the Peacocke Character Zone for lots between 10ha and 2ha in the Terrace Area and between 10ha and 5000m² in the Gully and Hill Areas	-	-	D	D	-	-	-
c) Fee Simple Subdivision within the Peacocke Character Zone for lots less than 2ha in the Terrace Area and less than 5000m² in the Gully and Hill Areas	-	-	NC	D	-	-	-
d) Subdivision within the Peacocke Character Zone to establish a Master Plan neighbourhood area according to Volume 2, Appendix 2, Figure 2-3 Peacocke Structure Plan – Character Areas and Neighbourhoods	-	-	D	D	-	-	-
e) Subdivision within the Temple View Zone to establish a CDP area according to Volume 2, Appendix 4, Figure 4-5	D	D	-	-	-	-	-
f) Boundary relocation	-	-	D	D	D	D	-
vi. Cross-lease subdivision	NC	NC	NC	NC	NC	NC	NC
vii. Company-lease subdivision*	NC	D	NC	D	NC	D	RD*
viii. Unit-Title subdivision*	NC	D	NC	D	NC	D	RD*
ix. Leasehold subdivision	NC	D	NC	D	NC	D	RD

x. Subdivision involving any allotment within the Electricity National Grid Corridor	-	-	-	-	-	-	RD
xi. Any subdivision of an allotment containing a Scheduled Historic Heritage Site identified in Volume 2, Appendix 8, Schedule 8A and 8B	D	D	D	D	D	D	D
xii. Any subdivision of an allotment containing a Significant Natural Area identified in Volume 2, Appendix 9, Schedule 9C	D	D	D	D	NC	D	D

Table 23.3d: All zones in the Rotokauri North Structure Plan area

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Activity	Rotokauri North
i. Boundary adjustments	P
ii. Amendments unit-titles and company lease plans for the purpose of showing alterations to existing buildings or additional lawfully established buildings	P
iii. Subdivision to accommodate a network utility service or transport corridor	RD
iv. Cross-lease subdivision	NC
v. Company-lease subdivision*	RD*
vi. Unit-title Subdivision*	RD*
vii. Leasehold Subdivision	RD
viii. Any subdivision of an allotment containing a Significant Natural Area identified in Volume 2, Appendix 9, Schedule 9C	RD
ix. Fee simple subdivision*:	RD*
a) Any subdivision not in accordance with the Structure Plan	D
b) Any fee simple subdivision which creates a rear lot	NC
c) Creation of any vacant lots not meeting the minimum lot size specified in Rule 23.7.1 below	NC
d) Creation of any vacant lots not meeting the minimum lot dimensions specified in Rule 23.7.8 below	D
e) Any subdivision not meeting the block layout dimensions or minimum specified in Rule 23.7.8 below	D

f) Any subdivision with access not meeting Rule 23.7.8 below	D
g) Any subdivision to create road to vest that does not meet the minimum widths in 23.7.8	D
x. Any subdivision which results in a permanent cul-de sac	D
xi. Subdivision in accordance with a land use consent	RD*
xii. Subdivision of a duplex which meets Rule 4.7.12(a) to create fee simple titles	RD*
xiii. Subdivision of apartments to create fee simple or unit titles.	RD*

Note

1. Consultation with Transpower New Zealand Limited (or its successor) is advised when considering subdivision within the Electricity National Grid Corridor. Transpower New Zealand will be an affected party for any development requiring resource consent for a subdivision under or adjacent to high voltage transmission lines.
2. Refer to Chapter 1.1.9 for activities marked with an asterisk (*).
3. For any activity not identified above, see Section 1.1.8.1.

23.4 Rules – Application of the Transport Corridor Zone

a) After 13 November 2012 land that is vested in the Council or the Crown as road pursuant to any enactment or provision in this plan, and has been formed as road to Council's required standards, then from the date of formation of the road, the land shall be subject to the rules in the Transport Corridor Zone but shall retain its current zoning.

23.5 Rules – General Standards

23.5.1 Telecommunication, Electricity, Gas and Computer Media

a) Telecommunication, electricity, gas and ducting for computer media shall be provided at the time of subdivision, in accordance with the requirements of the relevant network utility operator and the relevant standards of the applicable zone.

b) Telecommunication, electricity, gas and ducting for computer media shall be underground where possible.

Note

1. Acceptable means of compliance for the provision, design and construction of infrastructure is contained within the Hamilton City Infrastructure Technical Specifications.

23.5.2 Provision of Esplanade Reserves and Strips

a) An Esplanade Reserve or Esplanade Strip of not less than 20m measured from the edge of any river or lake shall be set aside and vested in Council in accordance with section 231 of the Act where any subdivision of land results in the creation of an allotment that adjoins the banks of:

i. The Waikato River.

ii. The margins of Lake Rotoroa (Hamilton Lake).

iii. Any watercourse where the average width of the bed is 3m or more where the river flows through or adjoins an allotment.

iv. Where a reserve or road of less than 20m width already exists along the edge of any river or lake, then additional land shall be vested to increase the minimum width to 20m.

23.5.3 Provisions in Other Chapters

a) The provisions of the following chapters apply to activities within this chapter where relevant.

- Chapter 3: Structure Plans
- Chapter 25: City-wide

23.6 Rules – Specific Standards

a) The standards of Rule 23.6 shall not apply to the subdivision of land to accommodate a network utility service.

23.6.1 Subdivision in the Ruakura Structure Plan Area

a) Any subdivision which creates new allotments in the Ruakura Structure Plan area cannot initiate land use or development which is contrary to Rules 3.7.4.1 to 3.7.4.5 and Rule 3.7.5 of Chapter 3: Structure Plans, except as provided for within the Large Lot Residential Zone.

b) A consent notice may be registered against the title of any new allotment to ensure compliance with the Ruakura Structure Plan area rules in Rules 3.7.4.1 to 3.7.4.5 and Rule 3.7.5 of Chapter 3: Structure Plans.

c) Any subdivision which creates new allotments, and is in accordance with (a) and (b) above where applicable, shall be in accordance with the zoning of the land as identified on the Planning Maps and in accordance with Rule 3.7.4.1.

23.6.2 Company Leases and Unit Title Subdivision

a) Where an allotment is subject to an application for subdivision consent by way of company lease or unit title subdivision the following rules shall apply.

i. All existing buildings to which the subdivision relates shall have:

- Existing use rights.
- Been erected in accordance with a resource consent or certificate of compliance and building consent has been issued.
- Comply with any relevant standards.

b) All areas to be set aside for the exclusive use of each building or unit shall be shown on the survey plan, in addition to any areas to be used for common access or parking or such other purpose.

c) In all staged subdivisions, provision shall be made for servicing the building or buildings and all proposed future buildings on the allotment.

d) Where subdivision consent has been approved, no alterations shall be made to the position of the boundary lines delineated on the survey plan, or otherwise defined, without further subdivision consent.

e) A design report shall be submitted detailing the effects of the proposed subdivision on the existing buildings pursuant to Section 116A of the Building Act 2004.

f) If alterations to buildings are necessary to fulfil the requirements of the Building Act or conditions of subdivision consent, they shall be undertaken in terms of a building consent and completed before the issue of a certificate under Section 224 of the Resource Management Act 1991. Such alterations shall comply with the relevant standards of the relevant zone and this chapter.

23.6.3 Amendments to a Cross-lease, Company Lease or Unit Title Plan

a) The amendments shall be for the purpose of showing alterations to existing buildings or additional lawfully established buildings.

b) The alteration shall be either permitted or otherwise lawfully established.

23.6.4 Cross-lease to Freehold Subdivision

a) The proposed boundaries shall align with those exclusive uses area boundaries on the cross-lease plan, except where there are no exclusive use areas.

b) Where required to protect services, easements shall be provided.

23.6.5 Leasehold Subdivision

Where an allotment is subject to an application for subdivision consent by way of leasehold subdivision the following rules shall apply where relevant.

a) Section 23.4 Application of the Transport Corridor

b) Section 23.5 Rules - General Standards

c) Section 23.6 Rules - Specific Standards

d) Section 23.7 Subdivision Design Standards

23.6.6 Boundary Adjustments

a) Any boundary adjustment shall not result in the creation of additional allotments, except in circumstances where a boundary adjustment creates an additional allotment or allotments which are required to be held together with another allotment or allotments by way of compulsory amalgamation condition.

b) Any boundary adjustment shall not alter the size of an existing allotment by greater than 10% of the registered allotment size.

c) Any allotment subject to a boundary adjustment shall comply with all relevant development and performance standards.

d) Where required to protect services, easements shall be provided.

23.6.7 Subdivision Activities within the Electricity National Grid Corridor

a) Any subdivision which creates new allotments within the Electricity National Grid Corridor shall identify a building envelope, compliant with the relevant zone standards and the standards of this Chapter and clear of the National Grid Yard.

b) Failure to comply with the above standard will result in the proposal being assessed as a non-complying activity.

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23.6.8 Subdivision in the Medium-Density Residential Zones and Rototuna Town Centre Zones (excluding Rotokauri North Medium Density Residential Zone)

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a) Subdivision shall only take place in conjunction with a Comprehensive Development Plan or Land Development Plan application or after a Comprehensive Development Plan or Land Development Plan application has been granted. References to Land Development Plan in this rule relate to the Te Awa Lakes Medium Density Residential Zone.

b) Allotment area and configuration shall conform to the allotment areas approved as part of the land-use consent.

c) A consent notice shall be registered against the title of each allotment to ensure compliance with the terms of the land-use consent.

d) The standards in Rule 23.6.8 a) to c) do not apply to subdivision to accommodate a network utility service or transport corridor.

Note

1. Refer to Rule 23.6.1 for Medium-Density Residential Subdivision in the Ruakura Structure Plan area

23.6.9 Subdivision in the Te Rapa North Industrial Zone

a) Subdivision occurring in Stages 1A and 1B shall only occur over the following land areas:

   i. Post the Te Rapa section of the Waikato Expressway being open for public use, and prior to 1 January 2021 no more than 714ha of land shall be able to be subdivided; 7ha only in Stage 1A and 7ha in Stage 1B.

   ii. After 1 January 2021 a maximum of 2346ha of land shall be able to be subdivided, 23ha in Stage 1A and 23ha in Stage 1B, being additional to the 7ha provided for in each of the stages Stage 1A prior to 2021.

23.6.10 Subdivision Within Stage 1 of the Peacocke Structure Plan Area

a) As part of any subdivision of Sec 1 SO 57582 or the balance of this parent lot, the following infrastructure requirements shall be met and certified by Council.

   i. Upgrading of the existing wastewater network to provide for future development on the site.

   ii. Implement a solution at the Dixon Road and State Highway 3 intersection that mitigates the adverse effects of potential traffic volumes from within Stage 1.

   iii. Any subdivision that does not comply with i) and ii) above will be a non-complying activity.

23.6.11 Subdivision in the Peacocke Character Zone

Activity	Standards	
	Terraced Area	**Gully Area and Hill Areas**
a) Fee Simple Subdivision for lots greater than 10ha	180m frontage onto a formed and sealed legal road forming part of the City's transport network	
b) Fee Simple Subdivision for lots between 10ha and 2ha in the Terrace Area and between 10ha and 5000m² in the Gully and Hill Areas	1. Lots between 10ha and 2ha i. Only applies to allotments created prior to 1 September 2011 or if the allotment was created by an acquiring authority, or by boundary adjustment ii. Limited to one new lot per parent title, other than for utility and access allotments	2. Lots between 10ha and 5000m² i. Only applies to allotments created prior to 1 September 2011 or if the allotment was created by a requiring authority, or by boundary adjustment ii. Average lot Size = 1ha iii. Limited to one new lot per parent title other than for utility and access allotments
	Note 1. A simple Integrated Transport Assessment (ITA) is required as part of the subdivision consent information requirements (refer Volume 2, Appendix1.2.2.14) 2. A Subdivision Concept Plan is required as part of the subdivision consent information requirements (refer Volume 2, Appendix 1.2.2.2d))	
c) Fee Simple Subdivision for lots less than 2ha in the Terrace Area and less than 5000m² in the Gully and Hill Areas	1. Lots Less than 2ha i. Provide full urban infrastructure ii. Connection to the existing wastewater network to the satisfaction of Council iii. Provision of a transport corridor connection across the Waikato River to join with the existing transport network	2. Lots less than 5000m² i. Provide full urban infrastructure ii. Connection to the existing wastewater network to the satisfaction of Council iii. Provision of a transport corridor connection across the Waikato River to join with the existing transport network
	Note 1. A Master Plan is required as part of the subdivision consent information requirements (refer Volume 2, Appendix1.2.2.3)	
d) Boundary Relocation Subdivision	i. Minimum lot size of 5000m² ii. Shall not create any additional certificates of title. iii. All lots involved in the subdivision shall have formed and legal vehicle access iv. A concept plan shall be prepared showing how the allotments in the subdivision can be subsequently re-subdivided in accordance with Volume 2, Appendix 1.2.2.2	

e) Any subdivision, other than for urban purposes, shall be required to have a consent notice placed on all titles issued from the subdivision (including the parent lot) requiring the payment of any outstanding development contributions prior to the subdivision of the title for urban purpose being allowed.

f) Except that the lots approved via subdivision consents (Council Consent Reference Numbers: 11.2009.20620, 11.2009.20621, 11.2099.20769, 11.2009.20770, 11.2007.18574, and 11.2011.22366) granted over the land described as Pt Lot 6 DP 34164, Lot 1 DPS 12991, Lot DPS 78023, Lot 1 DPS 76734, Lot 5 DPS 45202, Lot 2 DP 23381, Lot 5 DP 17475 Lot 8 DP 34164, Allotment 87, Pt Allotment 93 and Pt Allotment 94 Te Rapa PSH, Lot 3 DPS 45202, lots 1, 2 and 3 DPS 40592 and Lots 1, 2, 3, and 4 DPS 81210 can be used to create up to 52 lots for urban purposes without complying with Rule 23.6.10(c)1 or 2 provided that:

i. A wastewater system sufficient to service urban purposes is provided and certified by Council.

ii. A stormwater disposal solution is provided and certified by Council.

iii. A Master Plan for the area of not less than one neighbourhood, as identified within Volume 2, Appendix 2, Figure 2-3. Refer to Volume 2, Appendix 1.2.2.3 for information requirements.

iv. No further subdivision creating additional allotments is permitted unless Rule 23.6.11(c)1 or 2 is complied with.

g) Any subdivision for urban purposes that is in accordance with an approved Master Plan shall not be required to prepare an Integrated Catchment Management Plan.

h) Any subdivision for urban purposes that is in accordance with an approved Master Plan shall not be required to prepare an Integrated Transport Assessment.

i) Any subdivision within the Peacocke Character Area which does not comply with the standards in Rule 23.6.11 will be a non-complying activity.

23.6.12 Subdivision in the Rototuna North East Character Zone

a) The maximum development yield shall be 1100 residential units.

b) The provision of a neighbourhood park area:

i. The first subdivision of land adjoining the Waikato Expressway designation (Designation E90) shall submit for approval as part of the subdivision, a neighbourhood park concept plan, consisting of detailed plans and supporting documentation for the entire future reserve area as located on the Rototuna Structure Plan.

ii. The neighbourhood park shall:

- Ensure varied widths no less than 20m.
- Address and accommodate topographical constraints to ensure usability of the area for informal recreation.
- Include flat open spaces for informal recreational.

- Include one area of between 300m^2 and 800m^2 for the provision of a children's play area. The location and design of this plan area shall ensure the safe operation of the playground and shall have regard to any stormwater attenuation areas and the roading and cycling network. Where necessary, additional safety measures will be taken, such as fencing.
- Include landscaping areas to provide an interesting and varied visual amenity for the area. These areas are to include varied vegetated areas (with the exception of the proposed Cycle and Walking access point across the Waikato Expressway, stormwater attenuation areas and identified viewing areas shown on the Rototuna Structure Plan) having a minimum planting width of 2m when parallel to the boundary of the Waikato Expressway, and consisting of native vegetation capable of reaching heights of at least 8m at maturity.
- Reflect the principles of Crime Prevention Through Environmental Design (CPTED).
- Include both a walking and cycling network in accordance with the Rototuna Structure Plan.
- Show how the area will relate to its surrounding area, including the Waikato Expressway.

iii. Any subdivision of land adjoining the Waikato Expressway (Designation E90) shall have regard to and implement the portion of the approved neighbourhood concept plan over the land area the subdivision is for at the time of subdivision.

c) At the time of subdivision of land and only if either the location of the carriageway within the designation corridor of the Waikato Expressway has been confirmed in writing by the Requiring Authority; or confirmed through an Outline Plan of Works approval under S.176A of the RMA; or construction is underway or completed; the following shall be identified on the subdivision plan to be submitted for consent:

i. A 55dB$_{LAeq(24hr)}$ contour line from the Waikato Expressway carriageway boundary utilising the following criteria:

- Traffic flow of 12700 vpd
- 10%HCV
- Vehicle speed of 100km/hr (or the posted speed limit if that is lower)
- Noise mitigation as confirmed by an approved Outline Plan of Works for Designation E90
- Finished ground levels based on the proposed subdivision design

ii. Identification of all lots where any boundary is intersected by the 55 dB$_{LAeq(24hr)}$ contour line.

23.6.13 Subdivision of Lot 2 DP425316 Lake Waiwhakareke Landscape Character Area

Subdivision shall only take place in conjunction with a Comprehensive Development Plan application or after a Comprehensive Development Plan application has been granted.

23.7 Subdivision Design Standards

a) The standards of Rule 23.7 shall not apply to the subdivision of land to accommodate a network utility service.

b) The standards of Rule 23.7.1 shall not apply to:

i. The unit title subdivision of existing lawfully established buildings; or

ii. The fee simple subdivision of existing lawfully established duplex dwellings

Provided that all relevant development and performance standards are met in relation to the proposed boundaries around that building or unless otherwise authorised by resource consent.

23.7.1 Allotment Size and Shape

Zone	Minimum Net Site Area	Average Minimum Net Site Area	Max Net Site Area	Min Shape Factor
a) General Residential Zone (unless otherwise stated)	400m^2	-	-	15m-diameter circle
b) General Residential Zone (within the Rototuna Structure Plan Area)	400m^2	650m^2	750m^2	15m-diameter circle
c) General Residential Zone (adjoining the Waikato Expressway)	1000m^2	-	-	-
d) Residential Intensification Zone	350m^2	-	-	-
e) Special Residential Zone	Front, corner or through site – 600m^2	-	-	15m-diameter circle
	Rear Site – 400m^2	-	-	15m-diameter circle
f) Large Lot Residential – SH26, Ruakura Structure Plan area	2500m^2	-	-	15m-diameter circle
g) Large Lot Residential – Percival/Ryburn Rd, Ruakura Structure Plan area	2ha Except for Lot 8 DP 9210- 5000m^2	-	-	Rule 23.7.1(w) applies

Zone	Minimum Net Site Area	Average Minimum Net Site Area	Max Net Site Area	Min Shape Factor
h) Rototuna North East Character Zone	500m^2	700 m^2	-	15m-diameter circle
i) Special Heritage Zone (unless otherwise stated)	600m^2	-	-	15m-diameter circle
j) Special Natural Zone (Lake Waiwhakareke Landscape Character Area)	350m^2	-	800m^2 where a boundary to a site is adjoining the Lake Waiwhakareke Heritage Park or is separated from it only by a road reserve.	15m-diameter circle
k) Special Natural Zone (Ridgeline Character Area)	600m^2	800m^2	-	15m-diameter circle
l) Peacocke Character Zone (Terrace Area)	200m²	-	-	15m-diameter circle Medium density Residential – N/A
m) Peacocke Character Zone (Gully Area)	800m²	-	-	15m-diameter circle
n) Peacocke Character Zone (Hill Area where slopes are less than 5 Degrees)	400m²	-	800m²	15m-diameter circle
o) Peacocke Character Zone (Hill Area where slopes are greater than 5 Degrees)	800m²	-	-	15m-diameter circle
p) Temple View Zone (Within CDP Area 3)	500m²	-	-	15m-diameter circle
q) Temple View Zone (Within CDP Area 1 and CDP Area 2)	200m²	-	-	-

Zone	Minimum Net Site Area	Average Minimum Net Site Area	Max Net Site Area	Min Shape Factor
r) Central City Zone, Knowledge Zone, Business 1 to 7 Zones	1,000m^2	-	-	20m-diameter circle
s) Industrial Zone, Rotokauri Employment Area and Riverlea Industrial Area	Front, corner or through site – 1,000m^2	-	-	Rule 23.7.1(z) applies
	Rear sites – 500m^2	-	-	Rule 23.7.1(z) applies
t) Te Rapa North Industrial Zone	500m^2	-	-	Rule 23.7.1(z) applies
u) Ruakura Logistics Zone	3000m^2	-	-	Rule 23.7.1(z) applies
v) Ruakura Industrial Park Zone	3000m^2 Except up to a maximum of 20% of sites for each subdivision stage shall have a minimum net site area of 1000m^2 for front sites and 500m^2 for rear sites.	-	-	Rule 23.7.1(z) applies
w) Ruakura Industrial Park Zone LDP Areas T & G	Front, corner or through site- 1000m^2	-	-	Rule 23.7.1(z) Applies
	Rear Sites – 500m^2	-	-	Rule 23.7.1(z) Applies
x) Future Urban Zone	10ha	-	-	-
y) Te Awa Lakes Medium Density Residential Zone lots that adjoin any existing or proposed esplanade reserve	1000m^2	-	-	15m diameter circle

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Zone	Minimum Net Site Area	Average Minimum Net Site Area	Max Net Site Area	Min Shape Factor
adjacent to the Waikato River (River Interface Overlay)				
z) Rotokauri North Medium-Density Residential Zone - applies to vacant lots only	280m2	-	-	-

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y) Where the shape factor circle standard applies to any subdivision, unless otherwise specified, each allotment shall be of a shape that can accommodate a circle of the specified diameter in a position which does not infringe any required front yard requirements of the respective zone.

z) Allotments in the Industrial, Te Rapa North Industrial, Ruakura Logistics and Ruakura Industrial Park Zones shall be of such a shape as to contain a 20 meter diameter circle. The circle shall not infringe any required front setback or any setback adjoining a residential, special character or open space zone.

aa) The location of the shape factor circle for each allotment in the Rototuna North East Character Zone, in addition to Rule 23.7.1 y) shall be positioned so not to require land modification in excess of $40m^3$.

bb) Allotments in the Rototuna North East Character Zone, adjoining the Waikato Expressway Designation (Designation E90), and prior to either the location of the carriageway within the designation corridor of the Waikato Expressway has been confirmed in writing by the Requiring Authority; or confirmed through an Outline Plan of Works approval under S.176A of the RMA; or construction is underway or completed the location of the shape factor circle for each allotment shall not infringe the 65m habitable building setback (refer to Figure 5.4.6a).

23.7.2 Subdivision Suitability

a) All subdivisions creating additional allotments shall ensure that new allotments (excluding any utility, road or reserve allotment, or allotment subject to amalgamation) are of a size and shape to enable activities anticipated in the zone, and where subdivision is around existing structures that are to be retained comply with bulk and location provisions for the relevant zone.

23.7.3 General Residential Zone, and All Special Character Zones

a) Minimum transport corridor boundary length for a front site (except in the Terrace area of the Peacocke Character Zone and within CDP Area 1 and CDP Area 2 of the Temple View Zone)	15m
b) Minimum transport corridor boundary length for a front site within the Terrace area of the Peacocke Character Zone and within CDP Area 1 and CDP Area 2 of the Temple View Zone	10m

c) Minimum rear boundary length of a front site	10m
d) Maximum number of allotments served by a single private way	6
e) Minimum private way width serving 1-3 allotments	3.6m
f) Minimum private way width serving 4-6 allotments	4.5m
g) Maximum private way gradient	1:5m
h) Maximum private way length	50m
i) Maximum cul-de-sac length, including private way	150m
j) Maximum number of private ways accessing directly on to a cul-de-sac	1
k) Maximum number of culs-de-sac accessing directly on to a cul-de-sac	0
l) Maximum pedestrian accessway length through a block	80m
m) Minimum pedestrian accessway width through a block	40m or less in length: 6m wide 41m – 60m in length: 9m wide 61m – 80m in length: 12m wide

Note

1. Standard 23.7.3 only has immediate legal effect when subdivision occurs in the Special Heritage Zone or Heritage Area of the Temple View Zone, as shown on Planning Map 60B.

23.7.4 Large Lot Residential Zone

a) Minimum transport corridor boundary length for a front site	40m
b) Minimum rear boundary length of a front site	10m
c) Maximum number of allotments served by a single private way	6
d) Minimum private way width serving 1-3 allotments	3.6m
e) Minimum private way width serving 6 allotments	4.5m
f) Maximum private way gradient	1:5m
g) Maximum private way length	100m with passing every 50m
h) Maximum cul-de-sac length	150m
i) Maximum number of private ways accessing directly on to a cul-de-sac	0
j) Maximum number of culs-de-sac accessing directly on to a cul-de-sac	0
k) Maximum pedestrian accessway length through a block	80m

l) Minimum pedestrian accessway width through a block	40m or less in length: 6m wide 41m – 60m in length: 9m wide 61m – 80m in length: 12m wide

23.7.5 Residential Intensification Zone

a) Minimum transport corridor boundary length for a front site	15m
b) Minimum rear boundary width of a front site	10m
c) Minimum private way width serving 1-4 allotments	3.5m
d) Minimum private way width serving 5+ allotments	6.5m
e) Maximum private way gradient	1:5
f) Maximum private way length	100m
g) Maximum pedestrian accessway length through a block	80m
h) Minimum pedestrian accessway width through a block	40m or less in length: 6m wide 41m – 60m in length: 9m wide 61m – 80m in length: 12m wide

23.7.6 Business 1 to 7 Zones, Te Rapa North Industrial Zone, Ruakura Industrial Park Zone, Ruakura Logistics Zone and Industrial Zone

a) Minimum transport corridor boundary length	8m
b) Minimum transport corridor boundary length adjoining a major arterial transport corridor	20m
c) Minimum access or private way width serving an allotment with a net site area of less than 2000m^2	8m
d) Minimum access or private way width serving an allotment with a net site area of 2000m^2–5000m^2	10m
e) Minimum access or private way width serving an allotment with direct access to a major arterial transport corridor	10m
f) Minimum private way width serving 1-5 allotments	10m
g) Maximum private way gradient	1:8
h) Maximum private way length	100m
i) Maximum pedestrian accessway length	80m

j) Minimum pedestrian accessway width	40m or less in length: 6m wide 41m – 60m in length: 9m wide 61m – 80m in length: 12m wide

23.7.7 Ruakura Medium Density Residential Zone

a) Minimum lot width of front and rear boundary for front sites; except up to a maximum of 10% of sites for each subdivision stage shall be no less than 10m.	12m

23.7.8 Rotokauri North Structure Plan Area

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a) For vacant fee simple residential lots:

i) Minimum transport corridor boundary length	12.5m
ii) Minimum transport corridor boundary length if: • A legal mechanism (consent notice) restricts the width of a garage and vehicle crossing for any subsequent building development to a single car width up to 3.2m; OR • A rear lane provides legal vehicle access	10m
iii) Minimum lot depth	28m

b) All vacant fee simple lot subdivisions must comply with the following controls:

i) Maximum urban block length	250m
ii) Maximum urban block perimeter (bounded by roads)	750m
iii) For clarity the measurements above may be curvilinear and include frontage to a green linkage or reserve or proposed reserve	

c) All roads/accessways must be constructed to the standards:

i) Minimum legal width of a two-way rear lane	7m
ii) Minimum legal with of one-way rear lane where parking spaces accessed directly off the lane and/or any reverse vehicle manoeuvring into the lane are aligned between 0° (parallel parking) to 45° (angled parking) to the lane.	4m
ii.) Minimum legal width of one-way rear lane where parking spaces accessed directly off the lane and/or any reverse vehicle manoeuvring into the lane are aligned between 46° (angled parking) and 90° (perpendicular parking).	7m
ii) Local Road minimum width (to be vested)	16m
iii) Collector Road minimum width (to be vested)	20m

23.8 Restricted Discretionary Activities: Matters of Discretion and Assessment Criteria

a) In determining any application for resource consent for a restricted discretionary activity, Council shall have regard to the matters referenced below, to which Council has restricted the exercise of its discretion. Assessment Criteria within Volume 2, Appendix 1.3 provide for assessment of applications as will any relevant objectives and policies. In addition, when considering any Restricted Discretionary Activity located within the Natural Open Space Zone, Waikato Riverbank and Gully hazard Area, or Significant Natural Area Council will also restrict its discretion to Waikato River Corridor or Gully System Matters (see the objectives and policies of Chapter 21: Waikato River Corridor and Gully Systems).

Activity Specific	Matter of Discretion and Assessment Criteria Reference Number (Refer to Volume 2, Appendix 1.3)
i. Boundary adjustments	• C – Character and Amenity
ii. Subdivision involving any allotment within the Electricity National Grid Corridor	• I – Network Utilities and Transmission • N - Ruakura
iii. Subdivision in a Hazard Area	• F – Hazards and Safety
iv. Subdivision that may require the provision of Esplanade Reserves and Strips	• C – Character and Amenity • D – Natural Character and Open Space
v. Subdivision to accommodate a network utility service or transport corridor inclusive where no LDC exists for Ruakura Medium Density Residential Zone	• C – Character and Amenity • I – Network Utilities and Transmission • N - Ruakura
vi. Fee simple subdivision*	• C – Character and Amenity
vii. Company-lease subdivision*	• C – Character and Amenity
viii. Unit-title subdivision*	• C – Character and Amenity
ix. Leasehold Subdivision	• C – Character and Amenity
x. Fee Simple Subdivision in the Peacocke Character Zone for lots greater than 10ha	• C – Character and Amenity • E – Heritage Values and Special Character
xi. Subdivision of an allotment containing a Significant Natural Area identified in Volume 2, Appendix 9, Schedule 9C, within Stages 1A and 1B after a CDP in the Te Rapa North Industrial Zone	• D – Natural Character and Open Space

xii. Fee Simple subdivision and Boundary Adjustment (within Special Character Zones)	• C – Character and Amenity • E – Heritage Values and Special Character
xiii. Subdivision to accommodate a network utility service or transport corridor (within Special Character Zones)	• C – Character and Amenity • E – Heritage Values and Special Character • I – Network Utilities and Transmission
xiv. Any restricted discretionary activity subdivision in Rotokauri North (excluding subdivision of a duplex which meets Rule 4.7.12(a))	• **C - Character and Amenity** • **O – Rotokauri North**
xv. Subdivision of a duplex which meets Rule 4.7.12(a) – Rotokauri North only	• **O4 – Rotokauri North**

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Note

1. Refer to Chapter 1.1.9 for activities marked with an asterisk (*).

23.9 Other Resource Consent Information

Refer to Chapter 1: Plan Overview for guidance on the following.

- How to Use this District Plan
- Explanation of Activity Status
- Activity Status Defaults
- Notification / Non-notification Rules
- Rules Having Early or Delayed Effect

Refer to Volume 2, Appendix 1: District Plan Administration for the following.

- Definitions and Terms Used in the District Plan
- Information Requirements
- Controlled Activities – Matters of Control
- Restricted Discretionary, Discretionary and Non-Complying Activities Assessment Criteria
- Design Guides

Other Methods of Implementation

25 City-wide

This chapter has two roles. Firstly, it provides objectives, policies, activity status and standards for activities that are relevant across the City and are not zone specific:

- Earthworks and vegetation removal
- Events and temporary activities
- Hazardous facilities
- Network utilities and the electricity national grid corridor
- Signs
- Transportation

Secondly, the chapter provides City-wide objectives, policies and standards that are applicable to the activities in the zone chapters:

- Development suitability
- Landscaping and screening
- Lighting and glare
- Noise and vibration
- Public art
- Smoke, fumes, odour and dust
- Solid waste
- Three Waters
- Transportation
- Urban design

25.1 Development Suitability

25.1.1 Purpose

a) The purpose of this chapter is to provide guidance on the development of land when it occurs in isolation from, or in conjunction with, a subdivision of land.

b) This chapter also provides objectives and policies complementing the National Environmental Standard on Assessing and Managing Contaminants in Soil to Protect Human Health with regard to managing use, development and subdivision on land affected by, or likely to be affected by contaminants. This District Plan concentrates on contamination that poses a risk to human health. The Waikato Regional Plan manages effects on the natural environment with respect to contaminated land.

25.1.2 Objectives and Policies: Development Suitability

Objective	Policies
25.1.2.1 To ensure the provision of safe, efficient and integrated infrastructure as part of land development.	**25.1.2.1a** All development shall provide infrastructure appropriate for the activity proposed.
	25.1.2.1b New development shall be adequately serviced by suitable telecommunication, electricity, Three Waters and transport infrastructure.
	25.1.2.1c Urban development will not be allowed unless appropriate infrastructure is available, or is made available by the developer, and the servicing of this land does not compromise the safety, efficiency and sustainability of planned infrastructure.
Explanation	
Infrastructure must be planned in advance of development whether it occurs within Structure Plan areas or within the existing urban areas of the City. Acceptable means of compliance for the provision, design and construction of infrastructure is contained within the Hamilton City Council Infrastructure Technical Specifications. Additional or alternative requirements may be required by the NZTA for any infrastructure which affects a state highway. *Council's Long Term Plan or Annual Plan and the National Land Transport Programme sets out the programme for providing infrastructure to service growth. Where a developer wishes to pursue development ahead of Council's or NZTA's programmes, a development agreement will need to be entered into with Council, or NZTA, with respect to the state highway network, to ensure that the infrastructure is provided in a way which is safe, efficient and sustainable from a City-wide and network perspective. Structure plans, Integrated Transport plans, Integrated Catchment Management*	

plans, Water Impact Assessments and the Open Space Strategy will be used as reference points to assess whether a proposal will not compromise existing or planned infrastructure. In these cases it is anticipated that developers will bear the full costs of infrastructure provision.

The reason for Council's approach is due to its inability to fund infrastructure necessary to support the development of growth all at once. This will enable the sustainable management of growth for the social and economic wellbeing of the community and meet the needs of future generations.

Objective	Policies
25.1.2.2 Any development of land is carried out in a manner which reflects the physical constraints on its use and development, and minimises any adverse effects on the environment.	**25.1.2.2a** Development of land shall: i. Not result in increased risk of erosion, subsidence, slippage or inundation, ii. Wherever possible, avoid or mitigate any adverse effects on water quality and quantity, and iii. Avoid or mitigate adverse effects on significant infrastructure.
	25.1.2.2b Development shall be located and designed to maintain or enhance any: i. Scheduled built heritage item, ii. Archaeological and cultural site, iii. Significant tree, and iv. Significant natural area.

Explanation

Development of land often involves modification and this has the potential to cause or exacerbate adverse effects. These effects should be managed through the location and design of development.

Objective	Policies
25.1.2.3 Land affected by soil contaminants is identified and made safe for its intended use before any change of use, development or subdivision.	**25.1.2.3a** Any use, development and subdivision shall minimise the adverse effects that may arise from land affected by soil contaminants.
	25.1.2.3b Land affected by soil contaminants shall be remediated to a level, or managed in a way, that is suitable for its intended use.
	25.1.2.3c Exposure arising from the ongoing use of land affected by soil contaminants shall be managed to

	avoid or mitigate the risk of adverse effects on human health.

Explanation
The use, development or subdivision of land that is contaminated or potentially contaminated could expose people to levels of contaminants which may be damaging to their health. This provides an objective and policy framework for assessing Discretionary Activities under the National Environmental Standard on Assessing and Managing Contaminants in the Soil to Protect Human Health.

Note: National Environmental Standards on Assessing and Managing Contaminant in Soil to Protect Human Health

1. The Resource Management (National Environmental Standard on Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 apply to defined activities in specific circumstances.
2. Proposals to remove or replace a fuel storage system, sample soil, disturb soil, subdivide or change the use of land must consider whether this National Environmental Standard applies.
3. Council is responsible for applying and enforcing the provisions of National Environmental Standards. This National Environmental Standard provides standards relevant to managing the use, development and subdivision of contaminated or potentially contaminated land for the protection of human health. Refer to the Ministry for the Environment's website for relevant documents and guidance material.
4. This National Environmental Standard may alter the activity status of activities within this Plan, and additional standards, matters for assessment and criteria may apply. Council holds information that may assist in establishing whether activities on the Hazardous Activities and Industries List, as defined by the National Environmental Standard, currently or have previously operated on the land.
5. Activities may have other non-contaminated land related controls relevant to it that are found in other parts of the District Plan.

25.1.3 Rules – General Standards

25.1.3.1 All Development

a) All development shall comply with the relevant rules and standards of the underlying zone.

25.2 Earthworks and Vegetation Removal

25.2.1 Purpose

a) Earthworks refer to the disturbance of land by moving, removing, placing or replacing soil or earth by any means. Earthworks are a necessary part of land subdivision and development, but can result in adverse effects including accelerated erosion and sedimentation, contamination of fresh water, and increased risks from natural hazards. Earthworks can also impact on amenity values, including an unnatural look of the modified land.

b) Hamilton City is predominantly an urban environment. Trees make an important contribution to the health and wellbeing of the residents of the City and to the quality of the City's landscape. Vegetation removal can impact on biodiversity and ecosystems within the City, and the urban amenity of the City.

c) The Waikato Regional Council and Waikato Regional Plan have primary responsibility under the Act for controlling land use for soil conservation and water quality. The District Plan has a supporting role, as the District Plan controls subdivision and development of land.

d) This chapter outlines earthworks and vegetation removal rules relating to the zones, and cross-references to chapters where additional rules relating to earthworks and vegetation removal are outlined. Rules in other chapters (see Rule 25.2.3) address specific matters such as natural hazards, significant natural areas and archaeological or cultural sites and may be more onerous than those contained in this chapter which deals with earthworks and vegetation removal generally and in relation to the Electricity National Grid Corridor.

25.2.2 Objectives and Policies: Earthworks and Vegetation Removal

Objective	Policies
25.2.2.1 Minimise the adverse effects of earthworks and vegetation removal on people, property, and the environment.	**25.2.2.1a** Earthworks and vegetation removal shall occur in a way that: i. Maintains natural character and amenity values by retaining existing landforms, natural features and significant vegetation. ii. Maintains natural processes and features including natural drainage patterns and streams. iii. Does not create new, or exacerbate existing natural hazards. iv. Minimises adverse effects on land and water, especially effects such as erosion and sedimentation. v. Creates practicable building sites, efficient use of land and infrastructure, ensures effective stormwater flow paths, and a safe living and working environment. vi. Minimises dust, noise, and runoff. vii. Adopts a precautionary approach towards decisions that may result in significant adverse effects on the Waikato River and, in particular, those effects that threaten serious or irreversible damage to the Waikato River. viii. Maintains or enhances riparian vegetation on the margins of natural watercourses and wetlands.
Explanation	
The policy ensures that amenity values and the quality of the natural environment in the City are maintained or enhanced. The policy intends natural landforms (such as ridges and gullies) to be protected as much as possible to retain the natural character and amenity values. Earthworks should also limit the adverse effects of erosion and sedimentation, and minimise soil compaction. The policies aim to ensure that the positive effects of earthworks are realised in terms of practicable building sites, maintaining stormwater flow paths, efficient use of land and infrastructure, and a resulting safe living and working environment.	

25.2.3 Rules – Activity Status Table

Activity	Class
a) Earthworks (excluding earthworks covered by Rule 25.2.3 b) and i))	P
b) Earthworks and vegetation removal involving trenching, pole installation and replacement, slab foundation (not exceeding 2m in depth) and pile foundations for telecommunication masts, for infrastructure and network utilities	P
c) Trimming, maintenance or removal of vegetation or trees not otherwise mentioned in this Plan	P
d) Trimming and pruning of vegetation necessary to protect all overhead electric lines or telecommunication lines	Activity status and rules contained in Chapter 25.7: Network Utilities and the Electricity National Grid Corridor
e) Removal of vegetation or trees in the Open Space Zones	Activity status and rules contained in Chapter 15: Open Space Zones
f) Earthworks and vegetation trimming, maintenance or removal within a: i. High Flood Hazard Area ii. Medium Flood Hazard Area iii. Low Flood Hazard Area iv. Temple View Flood Hazard Area v. Culvert Block Flood Hazard Area vi. Waikato Riverbank and Gully Hazard Area	Activity status and rules contained in Chapter 22: Natural Hazards
g) Earthworks and vegetation maintenance, trimming or removal affecting: i. An archaeological and cultural site in Schedule 8B of Volume 2, Appendix 8 ii. A significant tree in Schedule 9D of Volume 2, Appendix 9 iii. A significant natural area in Schedule 9C of Volume 2, Appendix 9	Activity status and rules contained in Chapter 19: Historic Heritage and Chapter 20: Natural Environments
h) Works within the root protection zone of a: i. Significant tree in Schedule 9D of Volume 2, Appendix 9 ii. Tree within a significant natural area in Schedule 9C of Volume 2, Appendix 9	Activity status and rules contained in Chapter 20: Natural Environments
i) Earthworks associated with the replacement and/or removal of a fuel storage system as defined and controlled in the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.	P

Note

1. Earthworks and Vegetation Removal must comply with any relevant requirements of the Waikato Regional Plan and the Waikato Regional Pest Management Plan.

2. No person may destroy, damage, or modify an archaeological site without an authority from Heritage New Zealand. If items of archaeological significance are found when undertaking earthworks, authority must be obtained from Heritage New Zealand before proceeding with any further works which could potentially destroy, damage, or modify such items.
3. Activity status for earthworks relating to existing high voltage transmission lines as of 14 January 2010, identified on the District Plan Maps and forming part of the National Grid, is set out and determined within the Resource Management (National Environmental Standard for Electricity Transmission Activities) Regulations 2009.
4. The Resource Management (National Environmental Standard on Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 may alter the activity status of activities and additional standards, matters for assessment and criteria may apply. Refer to Chapter 25.1: City-wide – Development Suitability for relevant objectives (25.1.2.3) and policies (25.1.2.3a to 25.1.2.3c).
5. For any activity not identified above, see Section 1.1.8.1.

25.2.4 Rules – General Standards

25.2.4.1 Earthworks in All Zones

a) Where fill material is used it is required to be clean fill.

b) All earthworks or areas of bare earth not being worked for three months or more shall be stabilised and sown with ground cover.

c) All earthworks shall retain sediment on site through implementation and maintenance of sediment controls. This standard does not apply to the transportation of material off site.

d) All earthworks activities shall be managed to avoid material deposits on public roads from any vehicles operating on site.

e) Earthworks shall not obstruct or divert any stormwater overland flow path or result in changed stormwater drainage patterns on adjacent land in different ownership.

   i. Rule 25.2.4.1 e) does not apply within the Transport Corridor Zone

f) Earthworks outside the Residential Zone, Special Character Zone and Natural Hazard Areas:

   i. No volume restriction on earthworks within the building footprint identified on a building consent, or required outside the building footprint to maintain stable slopes for the authorised construction work; and

   ii. Any earthworks additional to those provided for in f)i above shall not exceed 1,000m^3 in any single activity or cumulative activities in any 12 month period.

g) Within any Residential Zone or Special Character Zone (outside any Natural Hazard Area) earthworks must not exceed the following maximums in any single activity or cumulative activities in any 12 month period:

   i. 500m^3 of material within the building footprint identified on a building consent that is obtained prior to any earthworks commencing, inclusive of the volume of material required for earthworks outside the building footprint that are necessary to maintain stable slopes for the construction work that has been authorised by that building consent.

ii. 100m^3 of material (excluding any volume provided for under i above), except in the Special Natural Zone and the Rototuna North East Character Zone where the maximum volume shall be 40m^3.

h) Rules 25.2.4.1 f) and g) do not apply to:

i. activities identified in Rules 25.2.3 b) and i) or within the Transport Corridor Zone; or

ii. activities authorised by a consent for a Concept Plan for a Major Facility prepared under Chapter 17, or a Concept Plan Consent for a Precinct prepared under Chapter 8, or any other land use consent, that includes conditions managing the adverse effects of earthworks.

Note

1. Refer to Chapter 22 regarding earthworks in Natural Hazard Areas.
2. Refer to *Erosion & Sediment Control: Guidelines for Soil Disturbing Activities*, which is available on the Waikato Regional Council website: www.waikatoregion.govt.nz

25.2.4.2 Earthworks Within any National Grid Yard

a) Earthworks within a National Grid Yard shall:

i. Be no deeper than 300mm within 2.2m of a transmission pole support structure or stay wire.

ii. Be no deeper than 750mm between 2.2m and 5m from a transmission pole support structure or stay wire.

iii. Be no deeper than 300mm within 6m of the outer visible edge of a transmission tower support structure.

iv. Be no deeper than 3m between 6m and 12m from the outer visible edge of a transmission tower support structure.

v. Not create an unstable batter that will affect a transmission support structure.

vi. Not result in a reduction in the ground to conductor clearance distances as required by NZECP.

Provided that:

vii. Earthworks undertaken by a Network Utility Operator are exempt from i to iv above.

viii. Earthworks undertaken as part of agricultural or domestic cultivation, or repair, sealing or resealing of a transport corridor, footpath or driveway are exempt from i to iv above.

ix. Vertical holes less than 500mm in diameter and more than 1.5m from the outer edge of a pole support structure or stay wire are exempt from i and ii above.

Note

1. Consultation with Transpower New Zealand Limited (or its successor) is advised when undertaking any earthworks under or adjacent to high voltage transmission lines. Transpower New Zealand will be an affected party for any earthworks not meeting the standards in Rule 25.2.4.2 where the earthworks occur within the Ruakura Structure Plan area. In other areas this will be determined in accordance with S95E of the RMA.

25.2.5 Other Resource Consent Information

Refer to Chapter 1: Plan Overview for guidance on the following.

- How to Use this District Plan
- Explanation of Activity Status
- Activity Status Defaults
- Notification / Non-notification Rules
- Rules Having Early or Delayed Effect

Refer to Volume 2, Appendix 1: District Plan Administration for the following.

- Definitions and Terms Used in the District Plan
- Information Requirements
- Controlled Activities – Matters of Control
- Restricted Discretionary, Discretionary and Non-Complying Activities Assessment Criteria
- Design Guides
- Other Methods of Implementation

25.3 Events and Temporary Activities

25.3.1 Purpose

a) Events such as concerts, parades, festivals, galas, meetings or exhibitions occur on a regular basis throughout the City.

b) Temporary activities include construction activities and temporary helicopter landing pads. Construction can involve temporary structures such as site offices and cranes near roads, and generate various adverse effects including unusually heavy traffic movements.

c) The temporary nature of the activities generally makes any adverse effects more acceptable to the community. Consequently, many events and temporary activities of short duration are tolerated by those affected while others enjoy what the event has to offer.

d) Events and temporary activities make a contribution to the economic, social and cultural wellbeing and help create a vibrant Hamilton.

25.3.2 Objectives and Policies: Events and Temporary Activities

Objective	Policies
25.3.2.1 Temporary activities and events are managed in a way that contributes to economic, social and cultural wellbeing and to creating a vibrant City, while adverse effects on the environment are minimised.	**25.3.2.1a** The positive effects of events and temporary activities shall be recognised and encouraged.
	25.3.2.1b Events and temporary activities shall be managed to minimise adverse effects including noise, light spill, glare, dust, odour, litter, effects on public health and safety, and the safe and efficient functioning of transport networks.
Explanation	
Events bring in thousands of visitors and significant economic, social and cultural benefits to the City and its surrounds.	
Objective	**Policies**
25.3.2.2 Temporary activities and events are located appropriately.	**25.3.2.2a** Events and temporary activities shall be located where adverse effects can be adequately managed, with particular consideration given to: i. Expected attendance numbers, the facilities provided at the site, including for entry and exit, crowd control, and health and safety. ii. The timing, duration, scale and intensity of the adverse effects, including noise, dust, odour, lighting, glare, and waste.

	iii. The safety and efficiency of transport networks. iv. The frequency of events and temporary activities at any one location and associated cumulative effects. v. Any alternative venues available and suitable for all or part of the event, with preference given to permanent venues over temporary venues.
	25.3.2.2b Temporary structures and buildings shall be sited to minimise adverse effects on surrounding property and activities.

Explanation

The adverse effects of events and temporary activities are usually mitigated by their infrequent nature, short duration, limited scale and their social, cultural and economic benefits. However, it is important to manage events and temporary activities that generate significant adverse environmental effects. For this reason some events and temporary activities will require resource consent when they exceed a certain scale or threshold of effects, which are defined by standards.

25.3.3 Rules – Activity Status Table

Activity		Class
Events		
a)	Events	P
b)	Events or activities associated with events on the Waikato River or Lake Rotoroa (Lake Hamilton) – motorised or non-motorised	P
c)	Events or activities associated with events on Lake Rotokaeo (Forest Lake) or Lake Waiwhakareke (Horseshoe Lake) – motorised or non-motorised	NC
Temporary Activities		
d)	Hot-air balloon launching	P
e)	Pyrotechnic displays	P
f)	Temporary activities in a public place	P
g)	Temporary buildings and structures ancillary to a permitted event or permitted activity in an Open Space Zone	P
h)	Temporary buildings and structures incidental to a building or construction project	P
i)	Large projection and TV screens	P
j)	Temporary landing/takeoff points for helicopters	P
k)	Temporary retail	P

Note

1. Refer to the Hamilton City Public Places Bylaw and Hamilton City Public Places Policy for other restrictions to activities in a public place.
2. Refer to the Council policy on Pyrotechnic Displays on Council-Administered Reserves.
3. Events may be required to obtain other approvals outside those required by the District Plan, e.g. temporary road closures. These approvals may be subject to timeframes of up to 60 working days.
4. Refer to Waikato Regional Council Navigation Safety Bylaw.
5. For any activity not identified above, see Section 1.1.8.1.

25.3.4 Rules – General Standards

a) All activities in this chapter shall comply with the zone lighting standards in Chapter 25.6: City-wide – Lighting and Glare.

b) In the event there is conflict between the provisions of Chapter 25.3: Events and Temporary Activities of the District Plan and the provisions of any other chapter in the District Plan, the provisions of Chapter 25.3 prevail.

25.3.5 Rules – Specific Standards

25.3.5.1 Information to be Provided with Resource Consent Applications for Events

a) Any event that is required to obtain a resource consent is also required to submit with that resource consent application a:

   i. Waste Management Plan (Appendix 1.2.2.13).

   ii. Transport Management Plan (Appendix 1.2.2.13).

   iii. Noise Management Plan (Appendix 1.2.2.13).

   Note

   1. Irrespective of District Plan requirements, all events that expect to have over 1000 people attend are required to have a Waste Management Plan under the Solid Waste Bylaw.
   2. Irrespective of District Plan requirements, all events within the Transport Corridor Zone are required to submit a Temporary Traffic Management Plan under the Local Government Act.
   3. Some permitted events may require a noise management plan to be submitted prior to the event occurring (refer to Rules 25.3.5.2(c)(vi) and 25.3.5.3(e)(vi)).

25.3.5.2 Events at Hamilton Gardens, Central City Zone – Downtown Precinct (including Garden Place, Civic Square and Hood St) and Central City Zone – Ferrybank Precinct

a) No more than 5000 people shall attend an event at any one time.

b) Events shall take place only between the following hours.

   i. 0700 and 2230 Sunday to Thursday.

   ii. 0700 and 2400 Friday and Saturday.

   Note

   1. The time periods used to set noise limits within zones may vary to the hours set for when events are allowed to take place.

c) The noise standards for the relevant zone in Chapter 25.8: City-wide – Noise and Vibration shall apply to all events except for those events on six days per calendar year when the following standards (i-vi) shall apply:

i. The noise from the event (including practice or testing) does not exceed the following noise levels at any point within the notional boundary of any other site within the:

- Future Urban Zone

Or, any point within the boundary of any other site in the:

- Residential Zone
- Special Character Zone

Time of day	Noise levels $L_{Aeq\ [15\ min]}$	Noise levels L_{AFmax}
1000 – 2400 hours	75 dB 70 dB at 63Hz 65 dB at 125Hz	85 dB

ii. Standard (i) above shall not apply to crowd noise from events.

iii. The event does not exceed six hours' duration per day.

iv. Testing or practice involving the use of electronic sound amplification does not exceed two hours.

v. The public is notified of any one-off event at least 48 hours before the event commences, including information about:

A. The nature of the event and that noise limits for general activities may be exceeded.
B. Proposed dates, start and finish time of the event itself and the expected times of any sound testing or practice.
C. Contact details before and during the event.
D. Possible alternative dates in the event of postponement.

Note

1. Suitable methods for achieving compliance with this standard are:
   a) The publishing of a public notice containing the required information in a newspaper with a circulation that covers the entire area affected by the proposal, or
   b) By placing a physical notice containing the required information at the site where the event will be held at least 48 hours before the event commences, and
   c) By written notice containing the required information being delivered to the physical address of all adjacent residents and landowners at least 48 hours before the event commences.

vi. Provide a noise management plan to Council at least 48 hours before the event commences to demonstrate compliance with these noise standards.

25.3.5.3 Events at Innes Common, Hamilton Lake Domain, Wintec (City and Rotokauri), and Within the Knowledge Zone

a) No more than 5000 people shall attend an event at any one time.

b) No more than six events per calendar year shall be held at each place.

c) No event shall exceed three consecutive days (excluding preparation and clean up).

d) Events shall take place between the following hours.

i. 0700 and 2230 Sunday to Thursday.

ii. 0700 and 2400 Friday and Saturday.

Note

1. The time periods used to set noise limits within zones may vary to the hours set for when events are allowed to take place.

e) The noise standards in 25.8.3.9a) shall apply to all events except for those events on six days per calendar year when the following standards (i-iv) shall apply:

i. The noise from the event (including practice or testing) does not exceed the following noise levels at any point within the notional boundary of any other site within the:

- Future Urban Zone

Or, any point within the boundary of any other site in the:

- Residential Zone
- Special Character Zone

Time of day	Noise levels $L_{Aeq\ [15\ min]}$	Noise levels L_{AFmax}
1000 – 2400 hours	75 dB 70 dB at 63Hz 65 dB at 125Hz	85 dB

ii. Standard (i) above shall not apply to crowd noise from events.

iii. The event does not exceed six hours' duration per day.

iv. Testing or practice involving the use of electronic sound amplification does not exceed two hours.

v. The public is notified of each event at least 14 days before the event, including information about:

A. The nature of the event and that noise limits for general activities may be exceeded.
B. Proposed dates, start and finish time of the event itself and the expected times of any sound testing or practice.
C. Contact details before and during the event.
D. Possible alternative dates in the event of postponement.

Note

1. A suitable method for achieving compliance with this standard is the publishing of a public notice containing the required information in a newspaper with a circulation that covers the entire area affected by the proposal.

vi. Provide a noise management plan to Council at least one month before the event to demonstrate compliance with these noise standards.

25.3.5.4 Events in the Destination Open Space Zone (excluding Lake Waiwhakareke), Sport and Recreation Open Space Zone (apart from those covered in 25.3.5.2 and 25.3.5.3)

a) No more than 3000 people shall attend an event at any one time.

b) No more than three events per calendar year shall be held at each place.

c) No event shall exceed two consecutive days' duration (excluding preparation and cleanup time).

d) The noise standards in 25.8.3.9 shall apply.

e) Events shall take place between the following hours.

i. 0700 and 2230 Sunday to Thursday.

ii. 0700 and 2400 Friday and Saturday.

Note

1. The time periods used to set noise limits within zones may vary to the hours set for when events are allowed to take place.

25.3.5.5 Events or Activities Associated with Events on the Waikato River or Lake Rotoroa (Lake Hamilton) – Motorised or Non-motorised

a) No motorised event shall exceed two consecutive days' duration (excluding preparation and cleanup time).

b) A maximum of three motorised events on the Waikato River shall take place per calendar year.

c) Noise generated by the event shall comply with the noise standards in 25.8.3.9.

d) Events shall take place between the following hours.

i. 0700 and 2230 Sunday to Thursday.

ii. 0700 and 2400 Friday and Saturday.

Note

1. The time periods used to set noise levels within the zone noise rules may vary to the hours set for when events are allowed to take place.

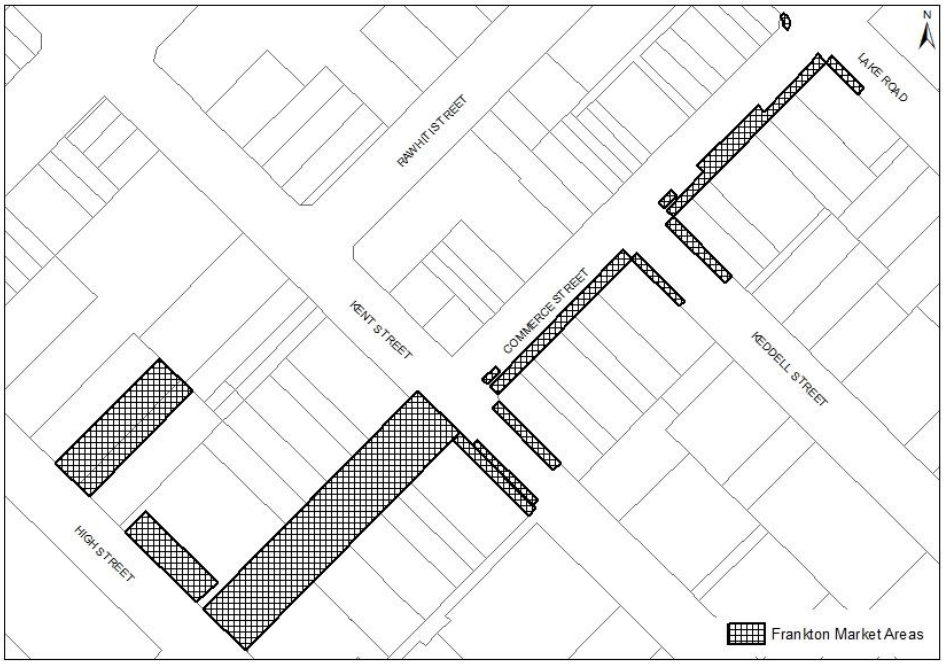
25.3.5.6 Frankton Markets

a) The markets shall operate within the areas defined in Figure 25.3.1.

b) The markets shall take place on Saturdays between the hours of 0500 and 1430 (including set up and pack down).

c) The markets require an approved Transport Management Plan.

Figure 25.3.1: Location of Frankton Markets



Note

1. Refer to the Hamilton City Public Places Bylaw and Hamilton City Public Places Policy for any further restrictions on activities in a public place, including an approved Transport Management Plan.

25.3.5.7 Events in the Rest of the City

a) No more than 1000 people shall attend an event at any one time.

b) No more than three events per calendar year shall be held at each location.

c) No event shall exceed two consecutive days' duration (excluding preparation and cleanup time).

d) Events shall take place between the following hours.

   i. 0700 and 2230 Sunday to Thursday.

   ii. 0700 and 2400 Friday and Saturday.

   Note

   1. The time periods used to set noise levels within the zone noise rules may vary to the hours set for when events are allowed to take place.

e) Noise generated by the event shall comply with the noise standards for the relevant zone in Chapter 25.8: City-wide – Noise and Vibration.

25.3.5.8 Temporary Buildings and Structures Incidental to a Construction Project

a) Temporary buildings and structures shall be removed within three months after the last day of the project or within three months of ceasing to be used, whichever is earlier.

25.3.5.9 Temporary Buildings and Structures Ancillary to a Permitted Event or Permitted Activity in an Open Space Zone

a) All buildings and structures shall be removed and the site returned to its original condition within five working days after the last day of the event or activity.

b) All buildings and structures (excluding temporary fences) shall comply with the building setback standards for the zone in which they are located.

c) All buildings and structures shall comply with the maximum building height standards for the zone in which they are located.

25.3.5.10 Temporary Landing and Takeoff Points for Helicopters

The use of temporary landing and takeoff points for helicopters shall be subject to the following standards.

Activity	Standards
a) Emergencies	None. Emergency landings and take-offs are not subject to any standards in the Plan
b) Helicopter use incidental to construction project	All takeoffs and landings shall only occur during daylight hours
c) Any other purpose	i. The site is used for takeoffs and landings on no more than five days in any 12-month period ii. The site is used for takeoffs and landings on no more than two consecutive days

25.3.5.11 Pyrotechnic Displays

a) Pyrotechnic displays shall take place between the following hours.

i. 0700 and 2230 Sunday to Thursday.

ii. 0700 and 2400 Friday and Saturday.

b) The noise standards in Chapter 25.8: City-wide – Noise and Vibration and Chapter 25.3: Events and Temporary Activities shall not apply to pyrotechnic displays.

Note

1. Pyrotechnic displays are also hazardous facilities and need to comply with Chapter 25.4: City-wide – Hazardous Facilities. Other legislation, regulations and codes of practice apply to pyrotechnic displays, for example the Hazardous Substances and New Organisms Act 1996.

25.3.5.12 Temporary Retail

a) Temporary retail sites shall be established only in the Central City, Industrial, Ruakura Logistics, Ruakura Industrial Park Zone, Knowledge or Business 1 to 7 Zones.

b) Zone bulk and location standards shall not apply (e .g. setbacks, site coverage).

c) Such a site shall operate only for a maximum of 10 days per site per calendar year.

d) Such a site shall be only a maximum of $100m^2$.

e) Temporary retail sites shall also comply with any other relevant rules in Chapter 25: City-wide.

25.3.6 Other Resource Consent Information

Refer to Chapter 1: Plan Overview for guidance on the following.

- How to Use this District Plan
- Explanation of Activity Status
- Activity Status Defaults
- Notification / Non-notification Rules
- Rules Having Early or Delayed Effect

Refer to Volume 2, Appendix 1: District Plan Administration for the following.

- Definitions and Terms Used in the District Plan
- Information Requirements
- Controlled Activities – Matters of Control
- Restricted Discretionary, Discretionary and Non-Complying Activities Assessment Criteria
- Design Guides
- Other Methods of Implementation

25.4 Hazardous Facilities

25.4.1 Purpose

a) This chapter establishes a city-wide framework for managing hazardous facilities under the Act to avoid or minimise adverse effects and the risks associated with hazardous substances.

b) "Hazardous facility" is the general term used in this District Plan to describe any site where hazardous substances are stored, used, transported or disposed.

c) Hazardous substances can be toxic, flammable, highly reactive, corrosive, ecotoxic, radioactive or explosive. Risks to people and the environment arise if the substances react, degrade or are released because of inadequate management or an accidental spill.

d) Hazardous facilities need to be managed, designed and located appropriately, as well as having processes in place for dealing with accidental spills or the release of hazardous substances.

Note

1. Some activities involving hazardous substances are excluded from the definition of hazardous facilities. Check the definitions for hazardous substances and hazardous facilities first, to see if this chapter applies. This chapter focuses on the hazardous substances part of any activity. A hazardous facility may have other controls relevant to it that are found in the relevant Zone and city-wide chapters.
2. The District Plan is not the sole mechanism for managing the risks associated with the use, storage, transportation and disposal of hazardous substances. Other legislation such as the Hazardous Substances and New Organisms Act 1996, Land Transport Act 1998, Worksafe New Zealand Act 2013 and their regulations, impose additional controls and requirements (e.g. packaging, signage and labelling, transportation).

25.4.2 Objectives and Policies: Hazardous Facilities

Objective	Policies
25.4.2.1 To protect people, property and the natural environment by avoiding or minimising the adverse effects of storage, use, disposal or transport of hazardous substances.	**25.4.2.1a** Hazardous facilities shall be located where they do not give rise to levels of risk, including residual risks, which are incompatible with the nature of surrounding land uses or natural environment.
	25.4.2.1b Hazardous facilities shall be designed, constructed and managed to avoid or minimise significant adverse effects, including cumulative effects.
	25.4.2.1c Hazardous facilities shall provide facilities and systems to avoid the contamination of air, land and water (including groundwater, potable water supplies and surface waters) in the event of an accidental spill or release of hazardous substances.

	25.4.2.1d Disposal of hazardous substances shall be undertaken in an environmentally safe manner to minimise the risk of hazardous substances being discharged into the environment.
	25.4.2.1e Hazardous facilities shall be located, designed, installed and managed to avoid adverse effects of natural hazards, e.g. flooding, on the facility so as to reduce the risk of hazardous substances being discharged into the environment as a result of a natural hazard event.
	25.4.2.1f The positive effects that hazardous facilities have on the economic and social wellbeing of the Waikato region and Hamilton should be recognised.

Explanation

While the use of hazardous substances provides benefits to communities by meeting a need for products and services, facilities involving hazardous substances also present risks to the health and safety of people, property and the natural environment, including ecosystems. Hazardous substances can escape into the environment as a result of inadequate management or from an accidental release or spillage. Hazardous facilities and their activities need to be managed well and located appropriately in response to these risks.

Reference to risks includes the consideration of residual risk. In some cases, the residual risk may be of particular concern because of the facility's proximity to sensitive ecological areas or land uses (e.g. residential areas). In these cases the risks of the hazardous facility may outweigh its potential benefits.

Hazardous facilities are spread throughout the community. Some present very low risks because of the nature or small quantities of the hazardous substances held on the site. The District Plan assigns a level of control appropriate to the scale of risk that these activities present.

Hazardous facilities close to each other may generate cumulative risks that are greater than the risk of each individual facility. Where there are multiple hazardous facilities within a constrained area, each facility is to be designed and managed in a manner to minimise adverse effects on each other, as well as beyond the area occupied by hazardous facilities.

The disposal of hazardous substances generates risks to the health of the handlers, waste management facility operators, and communities, as well as risks to the receiving environment. The disposal of hazardous substances to authorised facilities or those serviced by an approved waste contractor will minimise the risk of substances escaping into the environment and generating adverse environmental effects.

Natural hazard events can threaten the containment of hazardous substances. Hazardous facilities are discouraged from areas that are susceptible to natural hazards as a means of managing this risk.

Objective	Policies
25.4.2.2 The operations of established hazardous facilities and the areas within which these facilities are encouraged are protected from significant reverse-sensitivity effects arising from the inappropriate location of sensitive land-use activities.	**25.4.2.2a** The establishment of sensitive land uses within or near existing hazardous facilities or areas identified for such a facility shall be managed if they would create significant reverse-sensitivity effects that would limit a facility's ability to carry out its operations without unreasonable constraints.
Explanation	
Reverse-sensitivity effects arise where a new activity is introduced into an environment which has the potential to limit the operation of existing activities. These new activities are incompatible or otherwise sensitive to the effects of the existing activity. Reverse-sensitivity effects need to be taken into account, particularly for significant hazardous facilities or larger areas of smaller facilities, where residual risks cannot be reduced to insignificant levels. *Significant established hazardous facilities in the City include the Te Rapa Dairy Manufacturing Site and Crawford Street Freight Village. Industrial zoned lands are areas where hazardous facilities are expected to generally establish. Sensitive activities establishing in these areas or in close proximity to established hazardous facilities may constrain the current or future operation of such hazardous facilities.*	

25.4.3 Rules – Activity Status Table

Activity	Class
Activities Required to Use the Hazardous Facilities Screening Procedure	
a) Any hazardous facility: i. Not otherwise identified within this table ii. With a quantity ratio that is **equal to or below** the quantity ratio for permitted activities in Rule 25.4.5.1	P
b) Any hazardous facility: i. Not otherwise identified within this table ii. With a quantity ratio that is **more than** the quantity ratio for discretionary activities Rule 25.4.5.1	D
c) Teaching and research laboratories with a quantity ratio that is **more than** the quantity ratio for permitted activities in Rule 25.4.5.1 and complying with relevant standards in Rule 25.4.4. This excludes: i. Activities undertaken outside the laboratory ii. Bulk hazardous substances storage facilities iii. Field tests	C

Activity	Class
Specific Activities Not Required to Use the Hazardous Facilities Screening Procedure	
d) The retail sale of liquid fuel in underground storage tanks with a storage capacity of up to: i. 100,000 litres of petrol ii. 50,000 litres of diesel iii. Provided it can be demonstrated that compliance with relevant standards in Rule 25.4.4 and the requirements of the Hazardous Substances and New Organisms Act 1996 and regulations is achieved	C
e) The retail sale of Liquid Petroleum Gas (LPG) with storage capacity of up to: i. 6 tonnes (single vessel storage) ii. 1.35 tonnes cumulative capacity (exchange facilities for portable LPG cylinders) iii. Provided it can be demonstrated that compliance with relevant standards in Rule 25.4.4 and the requirements of the Hazardous Substances and New Organisms Act 1996 and regulations is achieved	C
Radioactive material	
f) The use or storage of radioactive materials with a radioactivity level less than that specified as an exempt activity in the Radiation Protection Regulations 1982	P
g) Any activity using, storing or transporting radioactive materials for the medical and dental treatment of patients and the use of such radioactive substances is under the control of a person licensed under the Radiation Protection Regulations 1982	P
h) The use or storage of radioactive material with a radioactivity level more than that specified as an exempt activity in the Radiation Protection Regulations 1982, but less than or equal to 1000 terabecquerel	D
i) The use or storage of radioactive material with a radioactivity level more than 1000 terabecquerel	NC
BOD_5 substances	
j) Any storage of high BOD_5 substances in quantities less than or equal to 10,000 litres (excluding the Te Rapa Dairy Manufacturing Site and Crawford Street Freight Village, Ruakura Agricultural Research Campus and Waikato Innovation Park)	P
k) Any storage of high BOD_5 substances in quantities more than 10,000 litres (excluding the Te Rapa Dairy Manufacturing Site and Crawford Street Freight Village, Ruakura Agricultural Research Campus and Waikato Innovation Park)	D
l) Any storage of high BOD_5 substances in quantities less than or equal to 100,000 kg, or 40,000 kg when within 30m of a water body (the Te Rapa Dairy Manufacturing Site and Crawford Street Freight Village, Ruakura Agricultural Research Campus and Waikato Innovation Park only)	P
m) Any storage of high BOD_5 substances in quantities more than 100,000 kg or 40,000 kg when within 30m of a water body (the Te Rapa Dairy Manufacturing Site and Crawford Street Freight Village, Ruakura Agricultural Research Campus and Waikato Innovation Park only)	D

Activity	Class
All Hazardous Facilities	
n) Any activity identified in 25.4.3(a), (c) to (g) and (j) within a: i. High Flood Hazard Area ii. Medium Flood Hazard Area iii. Low Flood Hazard Area iv. Temple View Flood Hazard Area v. Culvert Block Flood Hazard Area vi. Geotechnical Waikato Riverbank and Gully Hazard Area	D
Te Rapa Dairy Manufacturing Site and Crawford Street Freight Village	
o) Any hazardous substances that are complying with the standards in 25.4.4 and 25.4.5.2	P

Note
1. For any activity not identified above, see Section 1.1.8.1.

25.4.4 Rules – General Standards

When a Certificate of Compliance is sought a report by a suitably qualified and experienced practitioner may need to be provided to Council certifying compliance with the standards below, where appropriate.

25.4.4.1 Site Design

a) Any part of a hazardous facility which is involved in the manufacture, mixing, packaging, storage, loading, unloading, transfer, use or handling of hazardous substances shall be designed, constructed and operated in a manner which avoids:

i. Any off-site adverse effects on people, ecosystems, physical structures and other parts of the environment, unless permitted by a resource consent.

ii. The contamination of air, land and water (including groundwater, potable water supplies and surface waters) in the event of a spill or other type of release of hazardous substances.

25.4.4.2 Site Layout

a) The hazardous facility shall be designed to ensure that separation between on-site facilities and the property boundary is sufficient for the protection of neighbouring facilities, land uses and sensitive environments (excluding sites covered by Rule 25.4.5.2).

25.4.4.3 Site Drainage

a) Site drainage systems shall be designed, constructed and operated in a manner that avoids the entry or discharge of hazardous substances into the stormwater and wastewater networks unless permitted by a network utility operator.

b) All stormwater grates on the site shall be clearly labelled for stormwater only.

Note

1. Compliance can be achieved using precautionary methods, which may include clearly identified stormwater grates and access holes, roofing, sloped pavements, interceptor drains, containment and diversion valves, oil-water separators, sumps and similar systems.

25.4.4.4 Wash-Down Areas

a) Any part of the hazardous facility site where vehicles, equipment or containers that are, or may have become, contaminated with hazardous substances are washed shall be designed, constructed and managed to avoid any contaminated wash water from:

   i. Entering or discharging into the stormwater drainage or the wastewater networks unless permitted by a network utility operator.

   ii. Contaminating land, ground water, any water body or potable water supply.

Note

1. Suitable means of compliance include roofing, sloped pavements, interceptor drains, containment and diversion valves, oil-water separators, sumps and similar systems.
2. Council bylaws also apply to the discharge of contaminated wash water from the site.

25.4.4.5 Spill Containment Systems

a) Any parts of the hazardous facility site where a spill may occur shall be serviced by a suitable spill containment system that shall be:

   i. Constructed from impervious materials resistant to the hazardous substance(s) used, stored, manufactured, mixed, packaged, loaded, unloaded or otherwise handled on the site; and for above-ground storage of liquid hazardous substances:

      A. Able to contain the maximum volume of the largest tank on site plus an allowance for stormwater or fire water.
      B. For drums or other smaller containers, able to contain half of the maximum volume of substances stored, plus an allowance for stormwater or fire water.

   ii. Able to avoid any spill or other unintentional release of hazardous substances, and any stormwater and fire water that has become contaminated from:

      A. Entering the stormwater or wastewater drainage system, unless permitted by a network utility operator.
      B. Contaminating land, ground water, any water body or potable water supply.

Note

1. Suitable means of compliance include graded floors and surfaces, bunding, roofing, sumps, fire-water catchments, overfill protection and alarms, and similar systems.

25.4.4.6 Waste Management

a) Any hazardous facility generating waste containing hazardous substances shall dispose of these wastes to authorised facilities holding the necessary consents and be serviced by an acceptable waste disposal contractor.

Note

1. Hamilton City Council's Trade Waste Bylaw also applies to the management of waste from such sites.

25.4.4.7 Storage

a) Hazardous substances shall be stored in a manner that avoids:

i. The unintentional release of the hazardous substance.

ii. The accumulation of any liquid or solid spills or fugitive vapours and gases in enclosed off-site areas that could result in potentially adverse effects on people, ecosystems or built structures.

25.4.4.8 Storage Tanks – Petroleum Products

a) Tanks for the storage of petroleum products must be designed, constructed and managed to avoid leaks and spills and resulting adverse effects on people, ecosystems and property. Storage tanks shall be:

i. Constructed from impervious materials resistant to the hazardous substances to be stored.

ii. Equipped with secondary containment facilities.

iii. Serviced by a leak detection or monitoring system which is capable of detecting a failure or breach in the structural integrity in the primary containment vessel.

25.4.5 Rules – Specific Standards

25.4.5.1 Activities Required to be Assessed using the Hazardous Facility Screening Procedure

a) Hazardous facilities required to comply with this specific standard shall be assessed using the Hazardous Facility Screening Procedure explained in Volume 2, Appendix 12. This process will produce a "quantity ratio" that must be used to determine the activity status of the facility by referring to the table below.

Consent Status Matrix

Zone/Overlay	Activity Status/Consent Status Indices	
	Permitted	**Discretionary**
a) General Residential Zone b) Residential Intensification Zone c) Medium Density Residential Zone d) Large Lot Residential Zone e) Special Character Zones	≤0.02	>0.02
f) Natural Open Space Zone	≤0.05	>0.05
g) Central City Zone h) Business 4 and 5 Zones i) Transport Corridor Zone j) Rototuna Town Centre Zone k) Business 7 Zone (Frankton Living Overlay only)	≤0.1	>0.1

Zone/Overlay	Activity Status/Consent Status Indices	
	Permitted	**Discretionary**
l) Neighbourhood Open Space Zone m) Sport and Recreation Open Space Zone n) Destination Open Space Zone o) Community Facilities Zone p) Business 1, 2, 3 and 6 Zones q) Industrial Zone (Amenity Protection Area only)	≤0.2	>0.2
r) Business 7 Zone (excluding Frankton Living Overlay)	<0.4	>0.4
s) Major Facilities Zone t) Knowledge Zone (University of Waikato only)	≤0.6	>0.6
	Exception	
	Within 100m of any zone specified in a) to q) of this table, when the thresholds shall be:	
	≤0.3	>0.3
u) Industrial Zone (excluding Amenity Protection Area) v) Ruakura Logistics Zone w) Ruakura Industrial Park Zone x) Te Rapa North Industrial Zone y) Future Urban Zone z) Knowledge Zone (excluding University of Waikato)	≤1.0	>1.0
	Exceptions	
	Within 30m of any zone specified in a) to e) of this table, when the thresholds shall be:	
	≤0.2	>0.2
	Between 30m and 100m of any zone specified in a) to e) of this table, when the thresholds shall be:	
	≤0.75	>0.75
	Within 100m of any zone specified in f) to t) of this table, when the thresholds shall be:	
	≤0.75	>0.75

25.4.5.2 Te Rapa Dairy Manufacturing Site and Crawford Street Freight Village

a) The volumes and quantities of hazardous substances shall not increase by more than 20% from those existing on the sites as at 31 March 2016 and notified to the Council by 1 May 2016.

b) Any hazardous substance at the Te Rapa Dairy Manufacturing Site shall be stored or used at a minimum of 40m from the site boundary.

c) Any hazardous substance at the Crawford Street Freight Village shall be stored or used at a minimum of 65m from any boundary of the Residential, Open Space or Major Facilities Zones.

d) Where there is any non-compliance with the standards listed in a) to c) above the relevant class of the Hazardous Facility Screening Procedure set out in Volume 2, Appendix 12 shall apply.

25.4.6 Controlled Activities: Matters of Control

a) In determining any application for resource consent for a controlled activity, Council has reserved control over the matters referenced below.

Activity	Matter of Control Reference Number (Refer to Volume 2, Appendix 1.3.2)
i) Teaching and research laboratories with a quantity ratio that is **more than** the quantity ratio for permitted activities in Rule 25.4.5.1 and complying with relevant standards in Rule 25.4.4 This excludes : • Activities undertaken outside the laboratory • Bulk hazardous substances storage facilities • Field tests	A Hazardous Facilities
ii) The retail sale of liquid fuel in underground storage tanks with a storage capacity of up to: 100,000 litres of petrol 50,000 litres of diesel Provided it can be demonstrated that compliance with relevant standards in Rule 25.4.4 and the requirements of the Hazardous Substances and New Organisms Act 1996 and regulations is achieved.	A Hazardous Facilities

iii) The retail sale of Liquid Petroleum Gas (LPG), with storage capacity of up to: 6 tonnes (single vessel storage) 1.35 tonnes cumulative capacity (exchange facilities for portable LPG cylinders) Provided it can be demonstrated that compliance with relevant standards in Rule 25.4.4 and the requirements of the Hazardous Substances and New Organisms Act 1996 and regulations is achieved.	A Hazardous Facilities

25.4.7 Other Resource Consent Information

Refer to Chapter 1: Plan Overview for guidance on the following.

- How to Use this District Plan
- Explanation of Activity Status
- Activity Status Defaults
- Notification/ Non-notification Rules
- Rules Having Early or Delayed Effect

Refer to Volume 2, Appendix 1: District Plan Administration for the following.

- Definitions and Terms Used in the District Plan
- Information Requirements
- Controlled Activities – Matters of Control
- Restricted Discretionary, Discretionary and Non-Complying Activities Assessment Criteria
- Design Guides
- Other Methods of Implementation

25.5 Landscaping and Screening

25.5.1 Purpose

a) Landscaping provides a range of aesthetic, functional and ecological opportunities for environmental enhancement. This chapter includes standards for screening activities and contributing to the amenity of the streetscape. Landscaping in this context is intended to soften hard surfaces and bleak areas, reduce visual impacts and provide visual unity. The standards also recognise that landscaping can contribute towards improved ecology.

25.5.2 Objectives and Policies: Landscaping and Screening

Objective	Policies
25.5.2.1 To maintain and enhance amenity values within and around development, while contributing to local ecology and cultural connection where possible.	**25.5.2.1a** Minimise visual impacts of developments in part by providing appropriate screening and planting around activities and between zones.
	25.5.2.1b Encourage the planting of native species where appropriate.
Explanation	
Screening between zones, activities and particular development features, such as service and storage areas, helps mitigate the visual impact of development and contributes to the amenity of the streetscape.	

25.5.3 Rules – General Standards

25.5.3.1 Landscaping

Landscaping shall be provided in accordance with the following standards.

a) Activities adjacent to a major arterial transport corridor

i. A 2m wide planting strip shall be required along any boundary adjacent to a major arterial transport corridor.

ii. The requirements in (i) shall not apply in the City Centre Zone, all Residential Zones, Special Character Zones and Future Urban Zone.

b) Activities in the Industrial Zone (including Amenity Protection Area)

i. A 1.8m high close-boarded or similar solid fence or wall, and a 2m wide buffer strip shall be required along any side or rear boundary with a Residential or Special Character Zone or Open Space Zone; and

ii. Either

- A 2m wide planting strip, or
- A 1.2m or 1.8m permeable fence and 2m wide planting strip

shall be required along any boundary adjoining an Open Space Zone or transport corridor

iii. Where a site is wholly or partially within the Amenity Protection Area, a 1.8m high close-boarded or similar solid fence or wall, and a 5m wide buffer strip shall be required along any side or rear boundary with a Residential or Special Character Zone.

c) Activities in the Community Facilities and Knowledge Zones

i. A 2m wide planting strip shall be required along the boundary of a site adjacent to any Residential, Special Character or Open Space Zone, and

ii. When adjoining a transport corridor, a 30% planting area for the front setback adjoining the transport corridor shall be required.

iii. The requirements in (i) and (ii) shall not apply to the ECMT railway and private roads within the Knowledge Zone.

d) Activities in the Business 1 to 7 Zone

i. A 2m wide planting strip shall be required along the boundary of a site adjacent to, or facing, any Residential or Special Character Zone.

e) Activities in the Ruakura Industrial Park Zone

i. A 1.8m high close-boarded or similar solid fence or wall, and a 2m wide buffer strip shall be required along any side or rear boundary with a Residential or the Knowledge Zone; and

ii. Either

- A 2m wide planting strip, or
- A 1.2m or 1.8m permeable fence and 2m wide planting strip

shall be required along any boundary adjoining an Open Space Zone or transport corridor.

f) Drive-through services adjacent to a Residential or Special Character Zone

i. A 1.8m high close-boarded or similar solid fence or wall, shall be required along any side or rear boundary with a Residential or Special Character Zone, and

ii. A 2m wide planting strip shall be required along any front boundary facing any Residential or Special Character Zone

g) Ground-level parking spaces, loading spaces and vehicle storage areas adjacent to a transport corridor in all Zones (except Residential, Special Character and Future Urban Zones)

i. Where ground-level parking, loading spaces and vehicle storage areas are provided within 5m of a boundary of a transport corridor, a 2m wide planting strip shall be required between that area and the transport corridor boundary

h) External ground-level parking spaces in all Zones

i. Parking areas of more than 10 parking spaces shall be landscaped with tree planting and ground cover planting at a rate consistent with Rule 25.5.4.6

ii. Parking areas of five or more parking spaces shall have either:

- A 1.2m or 1.8m permeable fence, or
- A 2m wide planting strip

between the parking area and the boundary with any Open Space Zone; and

- A 1.8m high close-boarded or similar solid fence or wall, and a minimum 1m wide buffer strip, or
- A 2m wide buffer strip

when along the site boundary, between the parking spaces and any Residential or Special Character Zone

i) Service areas in all Zones

i. Where service areas are visible from a transport corridor, any other public space, Residential or Special Character Zones they shall be screened from view with either:

- A 1.8m high close-boarded or similar solid fence or wall, and a minimum 1m wide buffer strip, or
- A 2m wide buffer strip

j) Outdoor storage areas in all Zones

i. Where outdoor storage areas are visible from a transport corridor, any other public space, Residential or Special Character Zone they shall be screened from view with either:

- 1.8m high close-boarded or similar solid fence or wall, and a minimum 1m wide buffer strip, or
- A 2m wide buffer strip

k) Activities in the Ruakura Logistics Zone and the Crawford Street Freight Village

i. Where fencing is required to meet specialised security needs (e.g. Ministry of Agricultural quarantine specifications) a 6m high permeable fence may be used, provided that a 10m planting or buffer strip shall be provided along boundaries with any transport corridor or Open Space Zone.

- A 2m wide planting strip, or
- A 1.2m or 1.8m permeable fence and 2m wide planting strip

shall be required along any boundary adjoining an Open Space Zone or transport corridor

l) Utility Buildings/Cabinets

i. The requirements of Rules 25.5.3.1 (a) – (k) do not apply to the small utility

buildings/cabinets not exceeding 10m^2/3m high, and network utility support poles and antennas.

25.5.3.2 Implementation

All planting shall be implemented within the first planting season after any buildings and other site works are completed.

25.5.3.3 Planting Strips, Buffer Strips and Planting Areas

Planting strips, buffer strips and planting areas shall not be:

i. Required on that part of any boundary required for pedestrian or vehicle access to the site.

ii. Required within an approach sight distance triangle as outlined in Rule 25.14.4.4.

iii. Used for outdoor storage, parking or vehicle manoeuvring.

25.5.3.4 Frangible Vegetation

Where a buffer strip or planting strip is to be located within 5m of the carriageway of an arterial transport corridor with a posted speed limit greater than 70 kilometres per hour all vegetation within the strip shall be frangible.

25.5.3.5 Maintenance

All fences and planting required by 25.5.3.1 shall be maintained in a manner to ensure ongoing compliance with relevant standards in this chapter. This will require regular care of planted areas, the timely repair or replacement of damaged fences, and the replacement of dead, dying or diseased planting.

Note

1. Guidance on selecting plant species appropriate to the site conditions is available from Council.
2. Particular care needs to be taken in selecting and locating specimen trees for planting, for example tree species which tend towards an expansive root system are an inappropriate choice for planting near underground network utilities. Guidance should be sought on appropriate species and local site constraints to ensure that the tree suits the site and any constraints.

25.5.4 Rules – Specific Standards

25.5.4.1 All Fences and Walls

a) Any fence or wall adjoining a buffer or planting strip shall be located so that the buffer or planting strip is between the fence and the external site boundary, and shall be designed to enable access to plantings for maintenance purposes.

25.5.4.2 Permeable Fences

a) The following design and dimensions shall apply to permeable fences.

Design requirements	When the height of the fence or wall is:
i. Designed/constructed for less than 50% see-through visibility (e.g. close paling, masonry, or other opaque material)	1.2m
ii. Materials with 50% or more see-through visibility, or	1.8m

iii. Designed/constructed for less than 50% see-through visibility (e.g. close paling, masonry, or other opaque material) for the bottom 0.9m of the fence Materials with 50% or more see-through visibility for the top 0.9m of the fence	
iv. Materials with 50% or more see-through visibility	6m (Ruakura Logistics Zone only, see Rule 25.5.3.1k)

Note

1. Refer to Figure 25.5.4a for examples of acceptable and unacceptable fencing solutions.
2. Glass, metal bars or louvres are acceptable fence designs to achieve minimum 50% see-through visibility.

25.5.4.3 Buffer Strips

a) Buffer strips shall be of a permeable nature for stormwater purposes.

b) Buffer strips shall consist of shrub or hedge planting (hedges are recommended where buffer strip widths are less than 2m) selected and maintained in a manner to ensure a mature height of at least 1.8m and shall be at least 0.5m in height at the time of planting.

c) Shrub or hedge planting shall be selected, located, provided at a density, and maintained in a manner to ensure that, when mature, a visually impermeable screen of planting is achieved (refer Figure 25.5.4b):

i. Along the length of the buffer strip, and

ii. To a height of at least 1.8m.

d) Buffer strips shall include specimen trees at the following minimum rates:

Length of the buffer strip	Number of specimen trees
Up to 10m	1
For each additional 10m or part thereof	An additional 1

Except where frangible vegetation is required by Rule 25.5.3.4, in which case frangible trees shall be required instead of specimen trees.

e) Trees required by 25.5.4.3d)shall be selected to ensure they are capable of growing to a mature height of more than 4m and shall be at least 1.8m in height at the time of planting.

f) Where two or more trees are required by 25.5.4.3d) they shall be spaced along the length of the buffer strip to ensure they are no more than 15m or less than 5m apart (refer Figure 25.5.4c).

25.5.4.4 Planting Strips

a) Planting strips shall be of a permeable nature for stormwater purposes.

b) Planting strips shall consist of a combination of groundcover and shrub planting, with shrub planting selected to ensure they are capable of achieving a maximum mature height of 0.8m, and are least 0.4m in height at the time of planting.

c) Groundcover and shrub planting shall be maintained to ensure they do not exceed a height of 0.8m (refer Figure 25.5.4d).

d) Groundcover and shrub planting shall be selected, located and provided at a density to ensure that a minimum of 50% of the surface of the planting strip is covered from the time of planting.

e) Planting strips shall include specimen trees at the following minimum rates.

Length of the planting strip	Number of specimen trees
Up to 10m	1
For each additional 10m or part thereof	An additional 1

Except where frangible vegetation is required by Rule 25.5.3.4, in which case frangible trees shall be required instead of specimen trees.

f) Trees required by 25.5.4.4e) shall be selected to ensure they are capable of growing to a mature height of more than 4m and shall be at least 1.8m in height at the time of planting.

g) Where two or more trees are required by 25.5.4.4e) they shall be spaced along the length of the strip to ensure they are no more than 15m, or less than 5m apart (refer Figure 25.5.4c).

h) All trees shall be maintained to ensure that a clear distance of 2m is achieved between ground level and the tree canopy (refer Figure 25.5.4d). This standard shall not apply until a specimen tree reaches at least 4m high.

i) Trees within the planting strip shall be selected, located and maintained in a manner so as not to:

i. Create traffic safety problems by obscuring visibility for road users or train drivers.

ii. Obstruct traffic, official road, or hazard signage.

iii. Interfere with transport infrastructure or network utilities.

25.5.4.5 Planting Area

a) Where a planting area is required, the area shall:

i. Be of a permeable nature for stormwater purposes.

ii. Consist of a combination of groundcovers and shrubs or hedges.

iii. Include specimen trees at the following minimum rates:

Length of front boundary	Number of specimen trees
Up to 10m	1
For each additional 10m or part thereof	An additional 1

iv. Be located in the front setback between the non-residential activity and the adjoining transport corridor boundary.

v. Include groundcover, shrub or hedge planting that has been selected, located and provided at a density to ensure that a minimum of 30% of the area of the front setback requirement of the relevant zone is covered from the time of planting.

25.5.4.6 Internal Planting

a) Internal planting shall be located within the sealed area to break up the impermeable expanse of paving and hard surfaces while ensuring pedestrian and vehicle safety. For large areas this will require the internal planting requirements to be split into more than one location.

b) Internal planting shall consist of a combination of groundcovers and shrubs.

c) Internal planting shall include specimen trees at the following minimum rates:

Number of parking spaces	Number of specimen trees
Up to 20	1
For each additional 5 spaces or part thereof	An additional 1

d) Groundcover and shrub planting shall be selected, located and provided at a density to ensure that a minimum of 50% of the surface of the internal planting area is covered from the time of planting (refer Figure 25.5.4e).

e) Shrub planting shall be selected to ensure it is capable of growing to a mature height of at least 0.5m and shall be at least 0.3m in height at the time of planting.

f) Trees required by 25.5.4.6c) shall be selected to ensure they are capable of growing to a mature height of more than 4m and shall be at least 1.8m in height at the time of planting.

g) Trees shall be located within a planting space free from impermeable surfaces with a minimum dimension or diameter of 1.5m diameter.

h) All planting shall be protected from potential pedestrian and vehicle damage.

Note

1. Suitable means of compliance includes providing formalised pedestrian crossing points, ensuring plant selection and layout does not make crossing difficult, low fencing, or wheel stops (refer Figure 25.5.4f).
2. For larger external ground-level parking spaces in all zones (more than 20 parking spaces) any assessment of landscaping proposals should consider the total site area including landscaping and trees to be planted within planting and/or buffer strips.

Figure 25.5.4a: Examples of acceptable fencing or wall solutions.

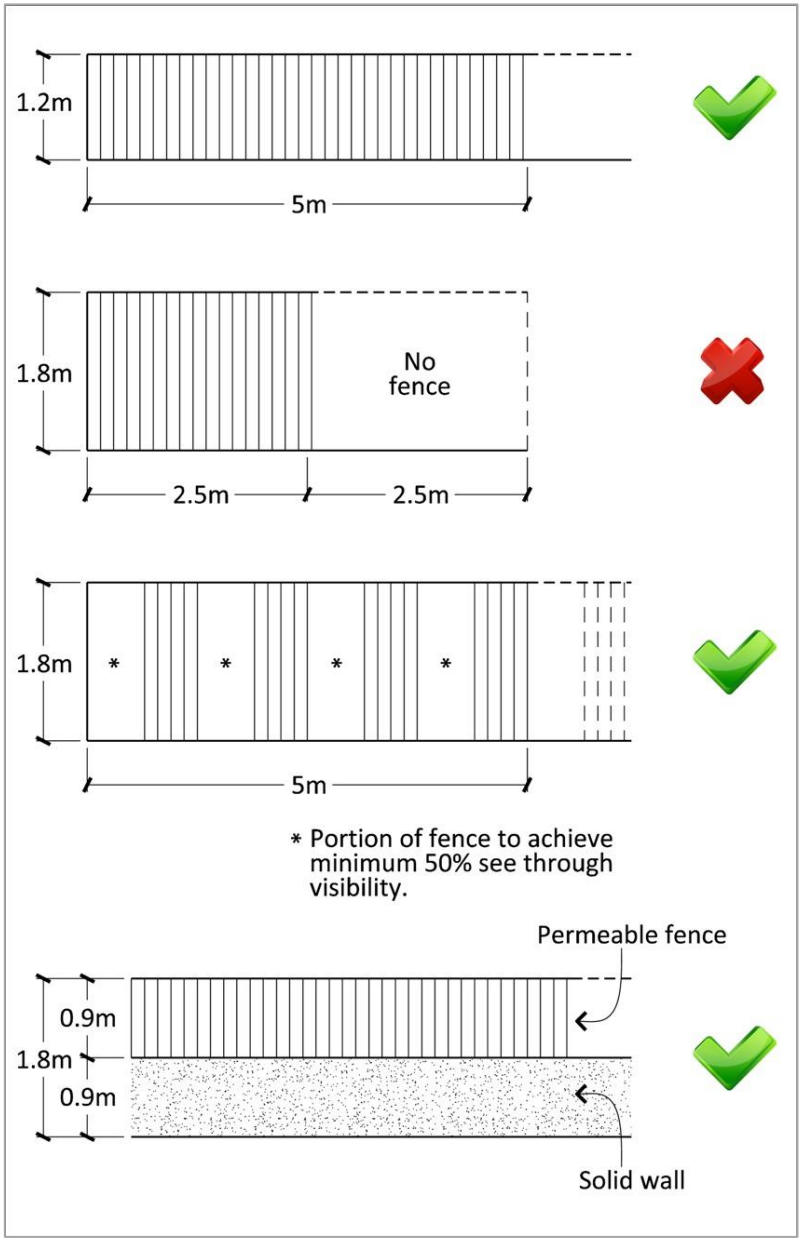


Figure 25.5.4b: Examples of shrub or hedge planting to achieve a visually impermeable screen

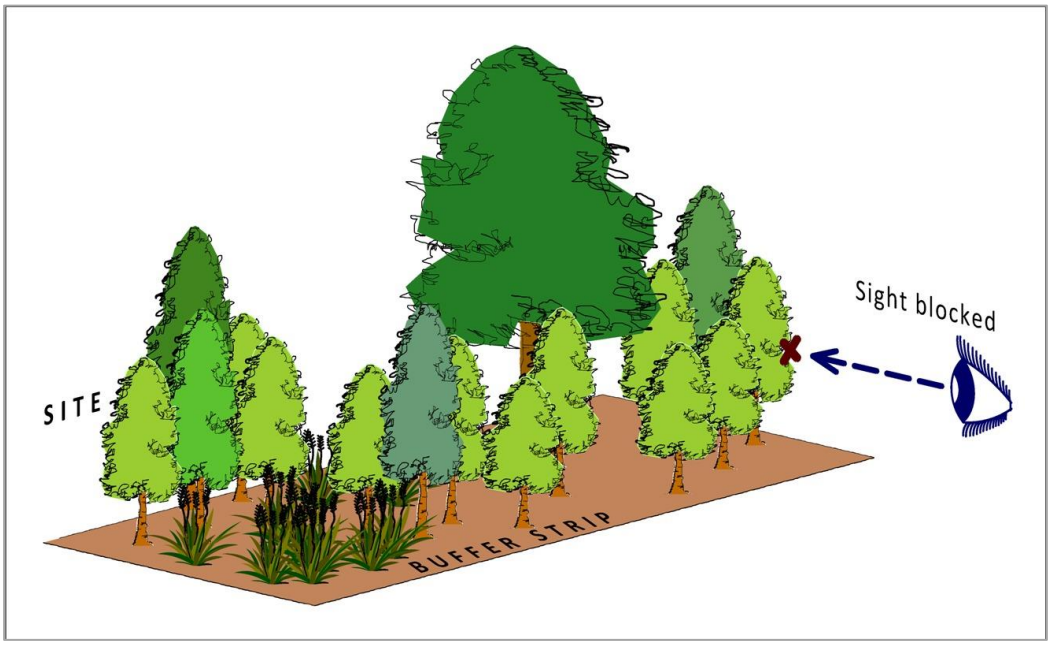


Figure 25.5.4c: Examples of achieving specimen tree spacing

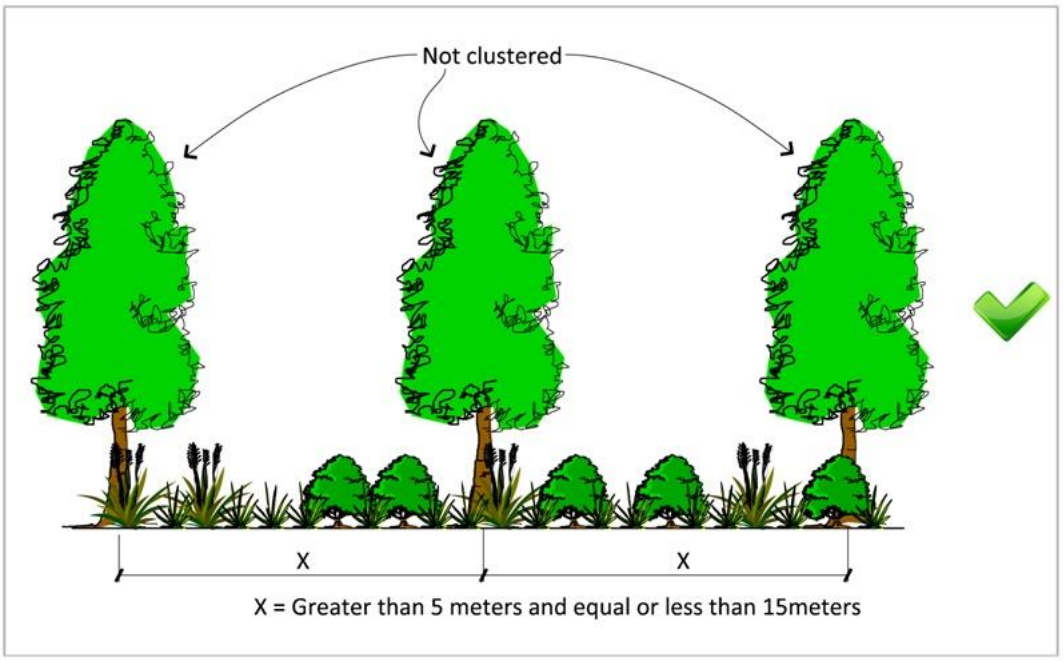


Figure 25.5.4d: Example of well-maintained groundcover

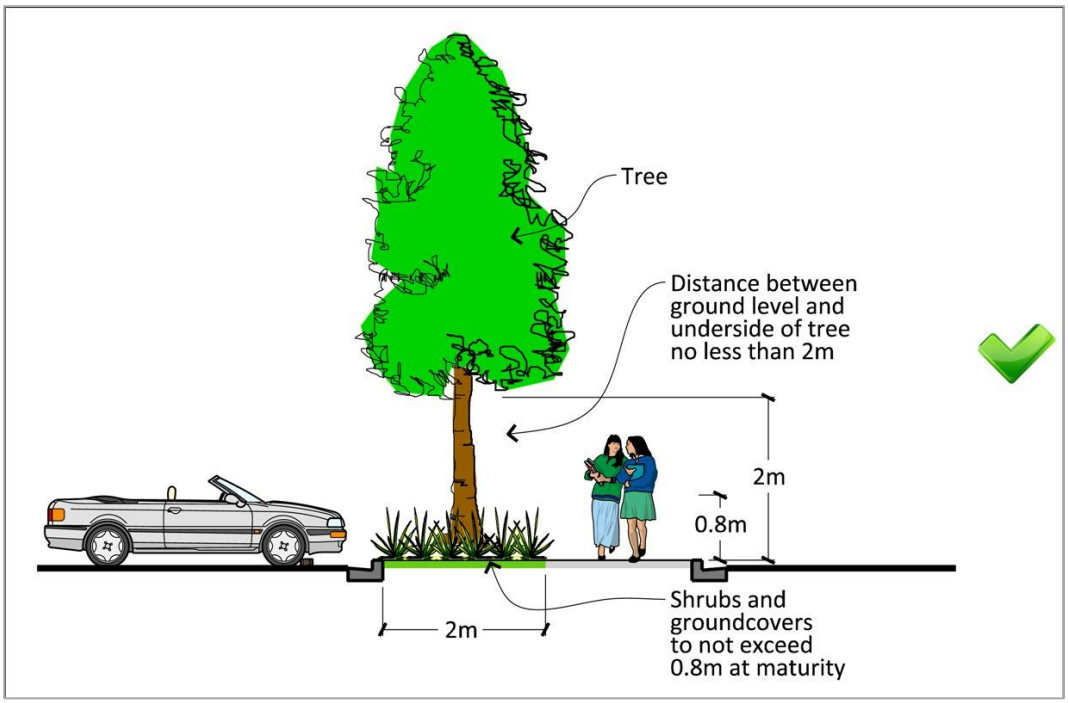


Figure 25.5.4e: Example of achieving ground coverage

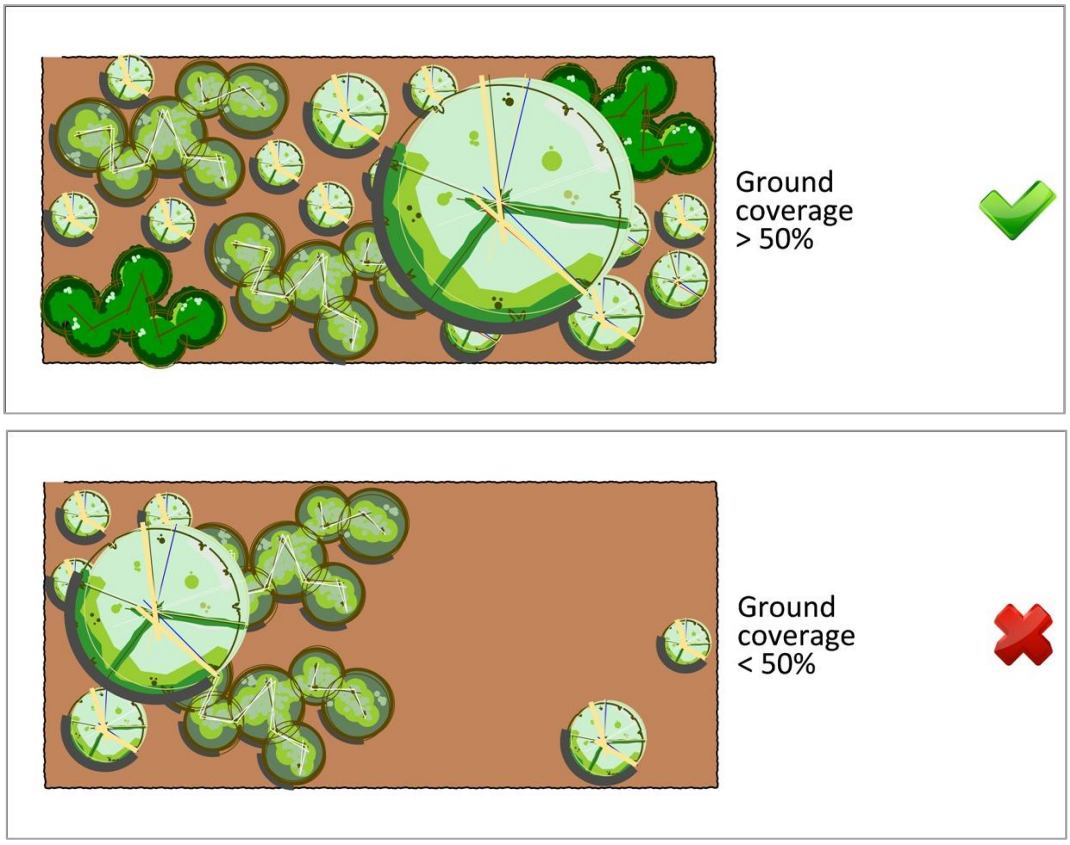
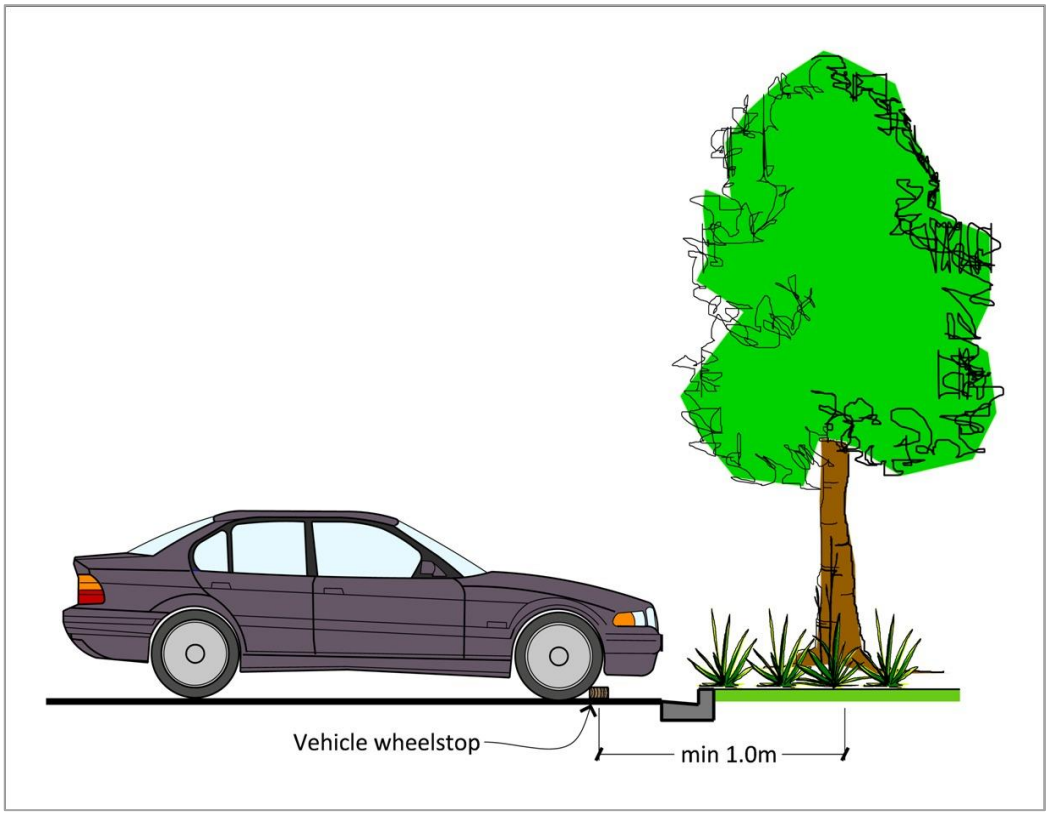


Figure 25.5.4f: Example of methods to protect trees from pedestrian or vehicle damage



25.5.5 Other Resource Consent Information

Refer to Chapter 1: Plan Overview for guidance on the following.

- How to Use this District Plan
- Explanation of Activity Status
- Activity Status Defaults
- Notification / Non-notification Rules
- Rules Having Early or Delayed Effect

Refer to Volume 2, Appendix 1: District Plan Administration for the following.

- Definitions and Terms Used in the District Plan
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- Restricted Discretionary, Discretionary and Non-Complying Activities Assessment Criteria
- Design Guides
- Other Methods of Implementation

25.6 Lighting and Glare

25.6.1 Purpose

a) Intrusive lighting is lighting that causes a nuisance to other people, usually by glare or light spill on to other people or properties. The District Plan manages these effects to protect amenity and safety values.

25.6.2 Objectives and Policies: Lighting and Glare

Objective	Policies
25.6.2.1 An environment free from the adverse effects of intrusive lighting.	**25.6.2.1a** Ensure that light spill and glare do not detract from the amenity values of other properties, compromise traffic safety, or have a negative effect on people's health and general welfare.
Explanation	
Intrusive lighting may include light from floodlights, security lights and activities such as welding. Light spill and glare have the potential to disturb people's sleep, which could adversely affect their health and general welfare. Unlike other adverse effects of activities, like smoke or noise, which are difficult to contain completely, light spill is reasonably simple to avoid by correct aiming or baffling (shading) of the light source.	

25.6.3 Rules – General Standards

a) Artificial lighting shall not result in illumination on transport corridors which may dazzle or distract transport corridor users or train drivers, or interfere with any traffic aids or signals. The relevant clauses of Australian Standard AS4282 1997 Control of the Obtrusive Effects of Outdoor Lighting shall apply with respect to the effect of artificial lighting on traffic.

b) Lighting designed to illuminate public spaces and transport corridors, including roads, public car parks and amenity areas, shall be designed in accordance with the Australian and New Zealand AS/NZS suite of standards.

Note

1. Acceptable means of compliance for the provision, design and construction of transport corridor lighting is contained within the Hamilton City Infrastructure Technical Specifications.

25.6.4 Rules – Specific Standards

25.6.4.1 Residential, Special Character, Future Urban and Community Facilities Zones

a) For any activity in any Residential or Special Character Zones, or the Future Urban or Community Facilities Zones, the spill of light from artificial lighting (excluding street and navigation lights and traffic signals) on to any other site shall not exceed 3 lux (horizontal and vertical) when measured or calculated at points 1.5m within the boundary of any other site.

25.6.4.2 Open Space Zones

a) Light spill from artificial lighting (excluding street and navigation lights and traffic signals) used in Open Space Zones shall comply with the following standards.

Location of light source (site in Open Space Zone)	Where measured	Standard
i. Sport and Recreation, Neighbourhood, and Natural Open Space Zones	Measured horizontally or vertically, at points 1.5m within the boundary of any other site	Maximum 3 lux
ii. Destination Open Space Zone	Measured horizontally or vertically, at points 1.5m within the boundary of any other site, except as stated in iii below	Maximum 10 lux
iii. Destination Open Space Zone	Measured horizontally or vertically, at points 1.5m within the boundary of any site in the Community Facilities Zone and Future Urban Zone or any Residential, Special Character or other open space zones	Maximum 3 lux

25.6.4.3 Major Facilities Zone and Knowledge Zone

a) The spill of light from artificial lighting (excluding street and navigation lights and traffic signals) in the Major Facilities Zone and Knowledge Zone on to any other site in any Residential, Special Character, Open Space, Community Facilities or Future Urban Zones, shall not exceed 3 lux (horizontal and vertical) when measured at points 1.5m within the boundary of the other site, except as provided for in Rule 25.6.4.3(c) and 25.6.4.3(d).

b) The spill of light from artificial lighting (excluding street and navigation lights and traffic signals) in the Major Facilities Zone and Knowledge Zone on to any other site in any zone not specified in Rule 25.6.4.3a shall not exceed 10 lux (horizontal and vertical) when measured at points 1.5m within the boundary of the other site, except as provided for in Rule 25.6.4.3(c) and 25.6.4.3(d).

c) Seddon Park

i. The flood lights shall not be used at more than 29 night-time events per year.

ii. The lights on the lighting towers shall not be used after:

- 2230 Monday to Thursday inclusive
- 2300 Friday to Sunday inclusive

However, the lights may remain on for the purpose of crowd dispersal for a period of up to one hour after the event or one hour after the time specified above, whichever is the earlier. Except on New Year's Eve when flood lights may be used for crowd dispersal up to 0030 on the following day (January 1).

iii. The level of lighting from Seddon Park shall not exceed 100 lux at all property boundaries.

d) Waikato Stadium

i. The flood lights shall not be used at more than 35 night-time events per year.

ii. The lights on the lighting towers shall not be used after:

- 2230 Monday to Thursday inclusive
- 2300 Friday to Sunday inclusive

However, the lights may remain on for the purpose of crowd dispersal for a period of up to one hour after the event or one hour after the time specified above, whichever is the earlier.

iii. The level of lighting from Waikato Stadium shall not exceed 100 lux at all property boundaries.

25.6.4.4 All Other Zones

a) The spill of light from artificial lighting (excluding street and navigation lights and traffic signals) on to any other site shall not exceed 10 lux (horizontal and vertical) when measured or calculated at points 1.5m within the boundary of any other site. In the case of contiguous sites held in the same ownership for the same activity, the spill of light shall be measured or calculated at points 1.5m within the boundary of any other site beyond the boundary of the land holding.

b) The spill of light from artificial lighting (excluding street and navigation lights and traffic signals) on to any site in the Residential, Special Character, Open Space, Community Facilities or Future Urban Zones shall not exceed 3 lux (horizontal and vertical) when measured or calculated at points 1.5m within the boundary of any other site so zoned.

25.6.5 Other Resource Consent Information

Refer to Chapter 1: Plan Overview for guidance on the following.

- How to Use this District Plan
- Explanation of Activity Status
- Activity Status Defaults
- Notification / Non-notification Rules
- Rules Having Early or Delayed Effect

Refer to Volume 2, Appendix 1: District Plan Administration for the following.

- Definitions and Terms Used in the District Plan
- Information Requirements
- Controlled Activities – Matters of Control
- Restricted Discretionary, Discretionary and Non-Complying Activities Assessment Criteria
- Design Guides
- Other Methods of Implementation

25.7 Network Utilities and the Electricity National Grid Corridor

25.7.1 Purpose

a) Network utilities are services and facilities such as Three Waters systems, telecommunications, radio communications, electricity and gas networks. (For roads see Chapter 25.14: City-wide – Transportation.) Network utilities are provided by public and private organisations.

b) The successful functioning of the City depends on network utilities. It is therefore vital that construction, maintenance and operation of these services and facilities be effectively provided for in the District Plan.

c) While the core function of a network utility (e.g. water supply or tele-communications) will have overall positive effects, some may incidentally have adverse effects, for example from noise, odour or visual effects. Amenity values, landscape character, streetscape, heritage values, and public health and safety are all issues managed by the District Plan, while still allowing network utilities to function efficiently.

d) The provisions in this chapter apply to network utilities in all zones. The underlying zone objectives, policies and rules do not apply unless specifically referred to. City-wide rules such as those related to noise, dust, lighting and hazardous substances will still apply.

e) The provisions relating to the Electricity National Grid Corridor in this chapter apply to all development and activities within the Electricity National Grid Corridor. The underlying zone objectives, policies, rules, city-wide rules and subdivision rules still apply.

f) District Plan rules do not cover all network utilities activities. Network utilities may be exempt from rules because they operate under designations (see Chapter 26: Designations) or national environmental standards. In addition, national policy statements (such as the National Policy Statement on Electricity Transmission) or special legislation may affect the scope and administration of the District Plan.

g) Amateur Radio is provided for within the Network Utilities section, even though it is not a Network Utility by definition. Amateur Radio is important to ensure emergency management and international communications can be maintained and provided for.

25.7.2 Objectives and Policies: Network Utilities and the Electricity National Grid Corridor

These objectives and policies apply to all zones, and need to be read alongside, the Regional Policy Statement and relevant national policy statements, including the National Policy Statement on Electricity Transmission, National Policy Statement on Telecommunications and the National Policy Statement on Renewable Electricity Generation.

Objective	Policies
25.7.2.1 The importance of network utilities to support the development and functioning of Hamilton is recognised.	**25.7.2.1a** The positive effects and importance of network utilities, including the Electricity National Grid Corridor, for the social and economic wellbeing of Waikato region and Hamilton shall be recognised.
	25.7.2.1b The operation, maintenance and upgrading of and access to existing network utilities shall not be adversely affected by subdivision, land use and development.
	25.7.2.1c Subdivision, use and development in the Electricity National Grid Corridor shall not adversely affect the safe and efficient operation, maintenance of and access to the electricity transmission network.
	25.7.2.1d Sensitive Land Uses including schools, childcare facilities, residential buildings or hospitals, shall not establish close to high-voltage electricity transmission lines.
	25.7.2.1e The alteration or extension of existing development already within the Electricity National Grid Corridor shall be provided for where it does not compromise the electricity transmission network.
	25.7.2.1f Reverse-sensitivity effects shall be avoided.
	25.7.2.1g Network utility infrastructure shall be deployed in conjunction with land development.
	25.7.2.1h All development shall be adequately serviced by network utilities including Three Waters, gas, electricity and telecommunications.
	25.7.2.1i New network utilities shall have adequate capacity to support the potential scale and timing of development to be served.
	25.7.2.1j Broadband infrastructure shall be established and operated throughout the City.

Explanation
This objective and its policies recognise that network utility structures and services are critical for the functioning of the City. The policies require that an appropriate level of services must be planned in advance of new development, which is particularly the case in greenfields. It is important that the services provided are of sufficient capacity to accommodate the level of growth proposed. *There is potential for existing network utility infrastructure to be adversely affected by subdivision, use and development of surrounding land uses. Changes in land uses can affect access to the network utility or affect its ongoing operation and maintenance. Where network utility infrastructure is already existing, surrounding land uses need to be carefully managed to protect both the functioning of the utilities and to avoid risks to people and property. Sensitive land use should not be located where future conflicts are predictable, to avoid reverse-sensitivity effects where possible.* *Reverse sensitivity effects include recognising the operation of the Waikato Hydro Scheme as it relates to Waikato River levels through Hamilton. Development and activities could compromise the operating levels for the Waikato Hydro Scheme if careful consideration of location and design of three waters infrastructure, walkways, cycleways, boat ramps, pontoons and jetties and the like are not taken into account.* *Broadband is critical to the progress of the City. The Hamilton Economic Development Strategy includes an outcome that Hamilton has leading broadband infrastructure.*

Objective	Policies
25.7.2.2 Network utilities (excluding renewable electricity generation activities) are located, designed and operated to avoid, remedy or mitigate adverse effects on amenity and the surrounding environment.	**25.7.2.2a** Network utilities shall be designed, located, installed, operated and maintained to: i. Minimise the potential discharge of contaminants to the environment. ii. To the extent practicable avoid potential adverse effects on the health, safety and wellbeing of people and communities. iii. Minimise effects on the scale and character of surrounding land uses. iv. Minimise adverse visual effects as far as practicable through design and location, landscaping and screening. v. Be placed underground where practicable, excluding stormwater. vi. Allow for the provision and efficient operation of other network utilities. vii. Co-locate or co-site where possible. viii. Minimise adverse effects to adjacent properties.

	25.7.2.2b Network utilities that generate electromagnetic or radio frequency fields shall comply with national and international standards as specified in the relevant National Environmental Standard.
	25.7.2.2c Network utility structures are to be in accordance with all relevant National Environmental Standards.
	25.7.2.2d To the extent practicable network utility structures should not be located within areas of high amenity values listed in Volume 2, Appendix 13: Areas with Historic Heritage Values or Visual Amenity Values.

Explanation

This objective recognises that network utility structures can adversely affect the environment and amenity, and seeks to manage potential adverse effects, particularly through design and location. This objective excludes renewable electricity generation activities in recognition of the National Policy Statement for Renewable Electricity Generation.

Adverse visual effects can often be managed by putting the services underground. For networks, such as those with cables, that can be located underground, this is the required approach. Where network utility structures are located above ground, particular attention should be given to their design, location and minimising of any adverse visual effects. This can be achieved in a number of ways including screening, careful placement, size and appearance.

In the case of broadband, above-ground deployment of cables will allow rapid, relatively inexpensive and less disruptive installation of fibre to areas where overhead electricity distribution lines already exist. However in the longer term, underground installation is required to reduce visual pollution.

Co-location and co-siting of network utilities may provide environmental benefits in terms of visual amenity. Where possible, opportunities for co-location should be explored. However, it is recognised that co-location is not always possible due to operational issues such as radiofrequency interference, electrical interference and structural capacity.

Health and safety effects can arise from network utilities and their structures. Where electricity national grid corridors already exist, sensitive land use should not locate in close proximity. The National Policy Statement on Electricity Transmission defines sensitive activities.

There are a number of national and international standards that are external to the District Plan but that must be complied with. These are identified in the National Environmental Standards.

Objective	Policies
25.7.2.3 Increased use and development of renewable energy resources.	**25.7.2.3a** The positive effects of using and developing renewable energy resources, for the environment and economic and social wellbeing, shall be recognised.
	25.7.2.3b The renewable energy resources of Hamilton (including geothermal, hydro, biomass, solar and wind) shall be recognised and encouraged for their potential contribution to national and local energy production.
	25.7.2.3c Investigation, identification and assessment of potential sites and energy sources for renewable electricity generation shall be encouraged.
	25.7.2.3d Renewable electricity generation activities shall be designed, located, installed, operated and maintained to: i. Minimise the potential adverse effects to the environment. ii. Avoid, reduce or displace greenhouse gas emissions. iii. Maximise the use of the renewable energy resource. iv. Offset any adverse residual environmental effects with measures or environmental compensation which benefit the local environment and community affected.
	25.7.2.3e The development and use of small and community-scale distributed renewable electricity generation shall be encouraged, subject to: i. Acceptable effects on amenity values, especially from noise, visual impacts on neighbourhoods, air emissions, glare and lighting, flicker effects on natural light, steam and odour. ii. Acceptable effects on water bodies, landscapes and significant natural areas. iii. An assured standard of long-term maintenance of sites and equipment.

Explanation
This objective and associated policies recognise that the production and use of renewable electricity resources can have positive effects on the environment and community wellbeing. However, making the best use of renewable resources may adversely impact on other resources and values, such as landscape and local amenity. *The Act requires the District Plan to have particular regard to the benefits derived from the use and development of renewable energy. Although not stated in the Act, these benefits may include security of supply and greater reliability (by diversifying sources of energy), reduction in greenhouse gas emissions, reduction in dependence on the national grid, and reduction of transmission losses. Such use will also add to electricity generation capability on a more sustainable basis.* *The National Policy Statement for Renewable Electricity Generation recognises that energy demand has been growing steadily and will continue to do so. Renewable electricity can assist in meeting this demand. Policies relating to this objective recognise and provide for renewable electricity generation at a range of scales. "Small and community-scale distributed electricity generation" are promoted by the national policy statement, subject to the local context, which in Hamilton City will involve consideration of urban and suburban amenity values.*

Objective	Policies
25.7.2.4 Efficient operation, maintenance and upgrade of the existing electricity transmission network and to enable the establishment of new electricity transmission resources.	**25.7.2.4a** The national, regional and local benefits of sustainable, secure and efficient electricity transmission shall be recognised.
	25.7.2.4b The effective operation, maintenance, upgrading and development of the electricity transmission network shall be supported.
	25.7.2.4c The technical and operational requirements of the network shall be considered.
	25.7.2.4d Adverse effects of new transmission infrastructure or major upgrades of existing transmission infrastructure shall be addressed by the route, site and method selection.
	25.7.2.4e The reasonable operational, maintenance and minor upgrade requirements of established electricity transmission assets shall be recognised.
	25.7.2.4f Substantial upgrades of transmission infrastructure shall be used as an opportunity to reduce existing adverse effects of transmission.

	25.7.2.4g Where practicable, new transmission infrastructure should be avoided in urban environments, areas of high recreational value or amenity, and adjoining sensitive land use.
	25.7.2.4h New transmission networks shall in preference be established using the designation process for efficient long-term development, operation and maintenance of electricity transmission infrastructure.

Explanation

This objective and policies gives effect to the National Policy Statement on Electricity Transmission, which is itself intrinsically linked to the National Environmental Standard for Electricity Transmission Activities. While the national policy statement provides the strategic policy framework, the national environmental standard provides rules for the existing transmission infrastructure. The NPSET has one objective with several components :

- *To recognise the national significance of the electricity transmission network.*
- *To facilitate the operation, maintenance and upgrade of the existing transmission network and the establishment of new transmission resources.*
- *To manage the adverse environmental effects of the network.*
- *To manage the adverse effects of other activities on the network.*

Objective	Policies
25.7.2.5 Amateur Radio Configurations are provided for where they do not have a significant adverse effect on visual amenity and residential character.	**25.7.2.5a** Amateur Radio Configurations are designed, constructed and located to minimise adverse effects on existing or anticipated residential character and amenity of adjoining properties or the surrounding neighbourhood.

Explanation

This objective and policy provides for Amateur Radio Configurations in the General Residential Zone and Future Urban Zone. Providing for the activity of Amateur Radio configuration is important given the role they play in emergency response and international telecommunication. However, this requires balancing between providing for Amateur Radio and protecting the community and environment from significant adverse effects on amenity values.

25.7.3 Rules – Activity Status

The rules contained in Sections 25.7.3 - 25.7.4 override all zone rules unless a particular zone rule is specifically referred to in this chapter.

Activity – All Zones		Class
All Network Utilities		
a)	The operation of existing network utilities, whether underground or above ground	P
b)	The installation and upgrading of network utilities located underground (excluding electricity transmission lines)	P
c)	The maintenance and repair of any existing network utility	P
d)	The removal of existing network utilities, whether underground or above ground	P
e)	The trimming and pruning of vegetation necessary to protect electric lines (including as required to meet the Electricity (Hazards from Trees) Regulations 2003) or telecommunication lines	P
f)	Network utility development, operation, or maintenance not otherwise mentioned in any section of this table	P
Electricity Transmission at and above 110kV		
g)	New above-ground lines and support structures (other than relocation)	D
h)	New underground lines and associated structures	D
i)	Substations	D
j)	Switching stations	D
k)	Minor upgrading of existing above-ground lines and support structures	P
l)	Upgrading of existing above-ground lines and support structures	RD
Electricity Distribution up to 110kV		
m)	Underground lines, including underground connections from buildings and sites	P
n)	New above-ground single-pole lines and support structures	RD
o)	Minor upgrading of existing above-ground lines and support structures	P
p)	Upgrading of existing above-ground lines and support structures	RD
q)	New and upgraded transformers, substations and switching stations distributing electricity at a voltage up to, and including 110kV, and ancillary buildings in the Open Space Zones and Special Character Zones (except within the Peacocke Character Zone)	D
r)	All other zones	P
Telecommunications		
s)	Underground telecommunication lines, including underground connections from buildings and sites	P
t)	Minor upgrading of existing telecommunication equipment	P

Activity – All Zones		Class
u)	New overhead connections from buildings and sites to existing overhead line networks	P
v)	New above-ground single-pole structures and associated telecommunication lines	RD
w)	New above-ground single-pole structures and associated telecommunication lines in existing overhead network areas for ultra-fast fibre installation	P
x)	Addition of telecommunications lines and fittings to existing supporting structures	P
y)	Antenna in Special Character Zones and Open Space Zones	D
z)	Antenna in all other zones	P
aa)	Amateur Radio Configuration	P
bb)	Cabinet in Open Space Zones and Special Character Zones (except within the Peacocke Character Zone)	RD
cc)	Cabinets in all other zones	P
dd)	Mast in Special Character Zones and Open Space Zones	D
ee)	Mast in all other zones	P
ff)	Up to two satellite dishes per site in all zones, except in the Industrial Zones, Business 1 to 7 Zones and Residential Intensification Zone where up to four satellite dishes per site	P P
gg)	Card and coin operated telephone booths (excluding Open Space Zone)	P
hh)	Installation of equipment internally within any telephone exchange	P
ii)	Installation of telecommunications facilities in Transport Corridor Zone within an area having historic heritage values or visual amenity values listed in Volume 2, Appendix 13.	RD
Gas		
jj)	Underground gas transmission pipelines at a pressure less than 2000 kilopascals, including aerial crossings of bridges, structures or streams, and ancillary equipment, including regulator stations, but not compressor stations	P
kk)	Underground gas transmission pipelines at a pressure of 2000 kilopascals or greater, including aerial crossings of bridges, structures or streams, and ancillary equipment, including compressor compounds with compressor houses	D
ll)	Gas valve and takeoff stations, sales gates and regulator systems	P
Water Infrastructure		
mm)	New underground pipelines conveying Three Waters and overland stormwater conveyances (open drains and channels)	P
nn)	Pump stations and aerial crossings on bridges or structures or over water courses and other depressions	RD
oo)	Water and wastewater treatment plants	D
pp)	Water supply reservoirs	RD

Activity – All Zones	Class
qq) Stormwater detention, treatment and/or soakage facilities to service more than 1 site	RD
Meteorological	
rr) Meteorological enclosures and buildings, automatic weather stations, and voluntary observer sites and associated microwave links	P
ss) Single metrological instrument sites	P
tt) Two or more meteorological instruments per site (including associated support structures)	D
Energy	
uu) Structures associated with the investigation and assessment of potential electricity generation from biomass, hydro or geothermal resources	RD
vv) Wind energy facility and windpower generators for bulk power supply	D
ww) Small scale distributed renewable energy generation	P
xx) Community scale distributed renewable energy generation	D
yy) Solar panels and solar heating systems for the purposes of serving the site on which they are located	P
zz) Solar panels and solar heating systems for the purposes of serving more than one site	RD
aaa) Temporary diesel-fuelled generation activities in all Zones	P

25.7.4 Rules – Activity Status – Electricity National Grid Corridor

Activities and Buildings within the Electricity National Grid – All Zones	Class			
	Within Greenfield Areas National Grid Yard	Within Greenfield Areas National Grid Corridor	Within Urban Areas National Grid Yard	Within Urban Areas National Grid Corridor
a) New buildings or additions to the building envelope of existing buildings for a sensitive land use	NC	P	NC	P
b) Any building associated with non-sensitive land uses (including commercial or industrial activities) on existing developed sites within urban areas	N/A	N/A	P	P
c) Any building associated with non-sensitive land uses (including commercial or industrial activities and accessory buildings) on Lot 1 DPS 75707 (1 Bisley Road)	D	P	P	P
d) Maintenance, repair and internal alterations to existing buildings that do not result in the alteration of the building envelope and/or an increase in floor space for a sensitive land use	P	P	P	P
e) Establishment of a sensitive land use and changes of activity to a sensitive land use	NC	P	NC	P
f) Any building within the National Grid Corridor, except as otherwise provided for in a) to e) above	NC	P	NC	P
g) Any building within 12m of the outer visible edge of a National Grid support structure	NC	NC	NC	NC
h) Any new building less than 2.5m high and $10m^2$ in area (excluding i) below)	P	P	P	P
i) Within the Ruakura Structure Plan area any new building less than 2.5m high and $10m^2$ in area and any fencing up to 2.5 metres high, lighting up to 2.5 metres high, and traffic management structures up to 2.5 metres high (including as required to manage activities under the lines), subject to compliance with NZECP 34:2001 and no closer than 12 metres clearance from the outer visible edge of a National Grid support structure	P	P	P	P

Activities and Buildings within the Electricity National Grid – All Zones	Class			
	Within Greenfield Areas National Grid Yard	Within Greenfield Areas National Grid Corridor	Within Urban Areas National Grid Yard	Within Urban Areas National Grid Corridor
j) In the Ruakura Logistics Zone, unloading and loading of containers, stacking containers, container stacks, operation of mobile plant associated with these activities (outside of approved crossings under l) below) in the National Grid Yard.	NC	N/A	N/A	N/A
k) In the Ruakura Logistics Zone, unloading and loading of containers, stacking containers, container stacks, operation of mobile plant associated with these activities in the National Grid Corridor.	N/A	RD	N/A	N/A
l) In the Ruakura Logistics Zone, crossings for Mobile Plant as defined in NZECP 34:2001 (does not apply to the movement of containers on trucks or trains) in the National Grid Yard.	RD	N/A	N/A	N/A
m) In the Ruakura Logistics Zone, light towers, walls and fences greater than 2.5 metres high in the National Grid Yard and National Grid Corridor.	RD	RD	N/A	N/A
n) Any activity not complying with Rule 25.7.6.1 National Grid Buildings and Structures	NC	NC	NC	NC
o) Network utilities	Refer to Rule 25.7.3 above			

Note

1. All activities or buildings within the Electricity National Grid Corridor shall have the activity class identified above, except where the class of the activity or building is more restrictive within the relevant zone or city wide rules, in which case the more restrictive activity status shall apply. Where Electricity National Grid Corridors for different lines intersect, the most restrictive Corridor will apply. Where an activity is not identified above, it shall be controlled by the relevant zone and city wide rules.
2. The controls within the Electricity National Grid Corridors do not apply to sections of a line which have subsequently been placed underground, or removed. In such cases the relevant zone and city wide rules will apply.
3. The operation, maintenance, upgrading, relocation or removal of an existing electricity transmission line and structures is largely controlled by the Resource Management Act (National Environmental Standards for Electricity Transmission Activities) Regulations 2009, separate to this District Plan.
4. The installation and operation of telecommunications facilities (antennas and cabinets in the road reserve) is largely controlled by the National Environmental Standards for Telecommunications Facilities (2008), separate to this District Plan.
5. Works in close proximity to all electric lines can be dangerous. Compliance with the New Zealand Electrical Code of Practice 34:2001 is mandatory for any construction, buildings, excavation or other work on or near an electric line.

6. Compliance with the Electricity (Hazards from Trees) Regulations 2003 is also mandatory for tree trimming and planting. To discuss works, including tree planting, near electrical lines especially within 20m of those lines, contact the line operator.
7. Network utilities that transmit radiofrequency fields or emit electromagnetic fields shall comply with the relevant New Zealand Guidelines or Legislation.
8. Network utilities that emit electro-magnetic fields shall comply with the relevant International Commission on Non-Ionising Radiation Protection (ICNIRP) Guidelines.
9. Consultation with Transpower New Zealand Limited (or its successor) is advised when considering development within the High Voltage Electricity National Grid Corridor. Transpower New Zealand Limited will be an affected party for any development requiring resource consent under or adjacent to high voltage transmission lines.
10. For any activity not identified above, see Section 1.1.8.1.

25.7.5 Rules – General Standards

25.7.5.1 Height

Zones	Maximum height
a) Maximum height of the entire structure including any attached antennas, support structures, etc (except lightning rods): All Residential, Special Character, Community Facilities, Open Space, and Future Urban Zones, and in the Transport Corridor Zone adjoining any of these zones	15m
b) Maximum height of the entire structure including any attached antennas, support structures, etc (except lightning rods): All Business 1 to 7, Industrial, Ruakura Industrial Park, Te Rapa North Industrial, Major Facilities, Central City, Ruakura Logistics and Knowledge Zones and in the Transport Corridor Zone adjoining these zones	24m
c) Maximum height of entire structure including any attached antennas, support structures, etc, where co-located on the same structure (except lightning rods): All Business 1 to 7, Industrial, Ruakura Industrial Park, Te Rapa North Industrial, Major Facilities, Central City, Ruakura Logistics and Knowledge Zones and in the Transport Corridor Zone adjoining these zones	26m
d) Maximum height of lightning rods above a structure or building: All zones	2m
e) Maximum height above a building that an antenna or dish can protrude: All Residential, Special Character and Future Urban Zones	1m
f) Maximum height above a building that a antenna or dish can protrude: All Community Facilities, Open Space, Business 1 to 7, Industrial, Central City, Ruakura Logistics and Transport Corridor Zones	4m
g) Meteorological instruments, anemometer mast: All zones	12m

Note

1. Explanation to Rule 25.7.5.1(c) above:
   Co-location refers to the shared use of a network utility for multiple purposes or by multiple providers. For example, the network utility structure may incorporate telecommunication masts and meteorological devices.
2. Transport Corridor Zone:
   Where two different zones adjoin the Transport Corridor Zone the more restrictive standard shall apply.

25.7.5.2 Cross-section Width of Antenna, Poles and Masts

Zones	Maximum cross-sectional width
a) All Residential, Special Character Community Facilities, Open Space and Future Urban Zones, and in the Transport Corridor Zone adjoining any of these zones	0.7m
b) All Business 1 to 7, Industrial, Ruakura Industrial Park, Te Rapa North Industrial, Major Facilities, Central City, Ruakura Logistics, and Knowledge Zones and in the Transport Corridor Zone adjoining any of these zones	1.3m
c) All Business 1 to 7, Industrial, Ruakura Industrial Park, Te Rapa North Industrial, Major Facilities, Central City, Ruakura Logistics, Knowledge zones and in the Transport Corridor Zone adjoining any of these zones where antennas, poles and/or masts are co-located on the same structure	2.1m

Note

1. Explanation to Rule 25.7.5.2(c) above:
   Co-location refers to the shared use of a network utility for multiple purposes or by multiple providers. For example, the network utility structure may incorporate telecommunication masts and meteorological devices.
2. Transport Corridor Zone:
   Where two different zones adjoin the Transport Corridor Zone the more restrictive standard shall apply.

25.7.5.3 Separation Distance

a) Minimum separation distance between poles and masts: All zones	15m
b) Minimum separation distance between poles and masts within 20m of the intersection of two or more roads within the Transport Corridor Zone	5m
c) Minimum separation distance between antenna: All zones	0m
d) Separation distance in respect of (a), (b) and (c) above excludes utility poles supporting overhead services in the Transport Corridor Zone.	-

25.7.5.4 Size of Panels and Dishes

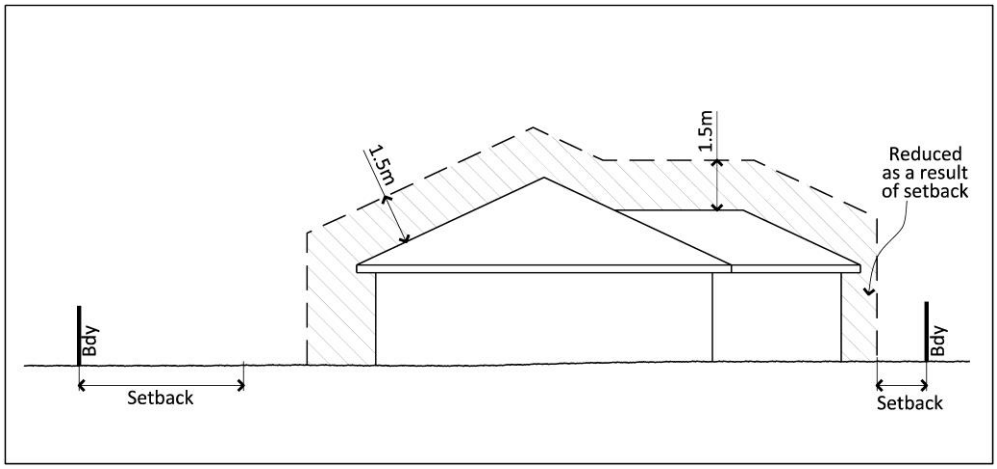
a) Maximum diameter of any dish:	
i. Industrial, Ruakura Industrial Park, Te Rapa North Industrial, Business 1 to 7, Central City, Ruakura Logistics Zones, or in the Transport Corridor Zone adjoining these zones	4m
ii. All other zones or in the Transport Corridor Zone adjoining any of these zones	2m

b) Maximum distance beyond a building profile that solar panel or solar heating structure can protrude (see Figure 25.7.5a): All zones	1.5m

Note

1. Transport Corridor Zone:
   Where two different zones adjoin the Transport Corridor Zone the more restrictive standard shall apply.

Figure 25.7.5a: Example of maximum distance beyond a building profile that a solar panel or solar heating structure can protrude



25.7.5.5 Cabinets, Equipment and Other Structures

a) Maximum volume for individual cabinets or other above ground structures for electricity and telecommunications: i. Industrial, Ruakura Industrial Park, Te Rapa North Industrial, Business 1 to 7, Central City and Ruakura Logistics zones ii. Transport Corridor Zone and all other zones	 25m^3 6.5m^3
b) Maximum volume for underground structures: All zones	40m^3
c) Maximum area for buildings housing network utility equipment: All zones	40m^2 GFA
d) Maximum height for buildings housing network utility equipment: All zones	Refer relevant zone standards

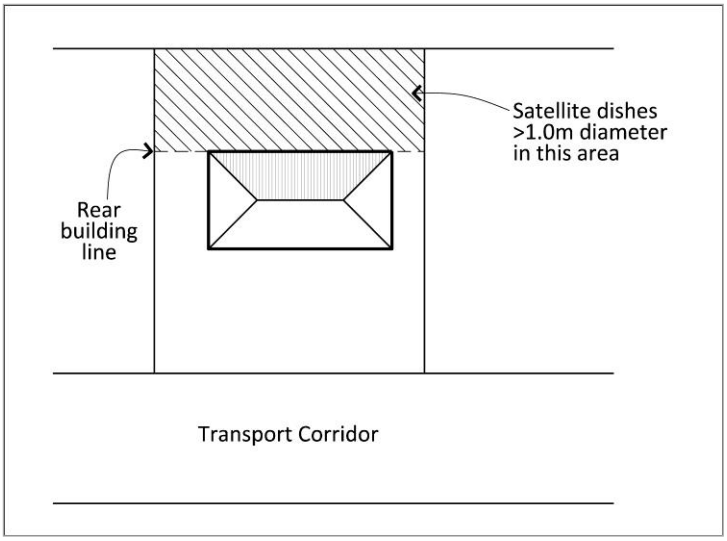
25.7.5.6 Setbacks

a) Network utilities structures with a volume greater than 6.5m^3 shall comply with the minimum building setback for the relevant zone.

b) For all Residential and Special Character zones, satellite dishes over 1m diameter shall be located behind the rear building line of the dwelling (see Figure 25.7.5a).

c) The zone performance standards for an accessory building shall apply to solar panels and solar water-heating devices not attached to a building.

Figure 25.7.5b: Setback for Satellite Dishes



25.7.5.7 Provisions in Other Chapters

The provisions of the following chapters apply to activities within this chapter where relevant.

- Chapter 2: Strategic Framework
- Chapter 19: Historic Heritage
- Chapter 20: Natural Environments
- Chapter 21: Waikato River Corridor and Gullies
- Chapter 22: Natural Hazards
- Chapter 23: Subdivision
- Chapter 24: Financial Contributions
- Chapter 25: City-wide

25.7.6 Specific Standards

25.7.6.1 National Grid Buildings and Structures

All buildings or structures permitted by 25.7.4a) and b) must comply with at least one of the following conditions:

i. A minimum vertical clearance of 10m below the lowest point of the conductor associated with National Grid lines; or

ii. Demonstrate that safe electrical clearance distances are maintained under all National Grid line operating conditions. As required by the New Zealand Electrical Code of Practice for Electrical Safe Distances (NZECP34:2001).

25.7.6.2 Amateur Radio Configuration

The following amateur radio configurations are permitted activities within the General Residential and Future Urban Zones under this Rule, unless they are proposed to be located within a site that has a Significant Natural Area, Historic Heritage Item or Significant Archaeological Site.

25.7.6.2.1 Antennas

a) Where attached to a building or other structure (including a mast) radio and telecommunications antenna up to and including 2m in diameter for an antenna dish and not exceeding 2m2 in area or 2m in any dimension for a panel antenna; provided the antenna does not overhang a site boundary; and

b) One pedestal mounted antenna per site provided that:

i. The antenna is pivoted less than 4m above the ground with a maximum diameter of 5m; and

ii. The pedestal and/or the antenna are located in accordance with the , setback and height in relation to boundary standards applying to buildings in the zone in which they are located

25.7.6.2.2 Aerials

a) Aerials that comply with the following:

i. Any of the elements making up the aerial do not exceed 80mm in diameter;

ii. For horizontal HF yagi aerials, the maximum element length does not exceed 14.9m, and the boom length does not exceed 13m;

iii. No part of the aerial (including aerial wires) overhangs a site boundary;

iv. The setback standards applying to buildings in the applicable General Residential Zone or Future Urban Zone (except that aerial wires are not required to comply with the setback standards);

v. No part of the aerial exceeds the maximum stated height applying to buildings in the applicable General Residential Zone or Future Urban Zone by more than 2m (except for vertical aerials as provided for in vi below);

vi. For vertical aerials, one vertical aerial to a maximum height of 20m, provided there is only one vertical aerial or one supporting structure (and attached aerial(s) or antenna(s) under c) below) per site that exceeds the maximum stated height applying to buildings in the applicable General Residential Zone or Future Urban Zone by more than 2m.

25.7.6.2.3 Supporting Structures

a) No more than six support poles for wire aerials of less than 115mm in outside diameter per site provided:

i. The maximum height of the support poles is the maximum building height applying in the zone in which they are located;

ii. The setback and height in relation to boundary standards shall not apply to these support poles;

iii. Where guy wires are used these must not exceed 12mm in diameter; and

b) One pole support structure (excluding support poles for wire aerials) or lattice support structure per site provided that:

i. The maximum height of the pole support structure is 9m and the maximum inscribed circle of the pole and any lowering mechanism shall be 600mm below 4m in height and 115mm above 4m; or

ii. The maximum height of the lattice support structure is 9m and the maximum inscribed circle and any lowering mechanism shall be 900mm below 8m in height and 660mm above 8m; and

iii. The pole or lattice structure is located in accordance with setback standards applying to buildings in the zone in which they are located. For the purpose of this rule the height in relation to boundary standards shall not apply to the pole or lattice support structure; and

iv. Where guy wires are used these must not exceed 12mm in diameter; and

v. At no point must any guy wire overhang the boundary.

c) For each site, one support structure can exceed the maximum stated height applying to buildings in the applicable General Residential Zone and Future Urban Zone by more than 2m, provided that:

i. The maximum height of the support structure and any attached aerials or antennas is 20m;

ii. The supporting structure may be one of the following:

1. A guyed mast. The maximum inscribed circle of the mast below 9m shall be 1000mm, and above 9m shall be 115mm; or

2. A guyed lattice mast. The maximum inscribed circle of the mast below 9m shall be 1000mm, and above 9m shall be 300mm. The mast may be of constant width or tapering; or

3. A self-supporting lattice mast. The maximum inscribed circle of the mast below 9m shall be 1000mm, and above 9m must fit within a tapering envelope with a maximum inscribed circle of 660mm at 9m and 420mm at 20m; or

4. A self-supporting tubular mast. The maximum inscribed circle of the mast below 9m shall be 1000mm, and above 9m must fit within a tapering envelope with a maximum inscribed circle of 230mm at 9m and 115mm at 20m.

iii. There may be local enlargement of support structure to accommodate a rotator mechanism;

iv. The supporting structure is located in accordance with setback standards applying to buildings in the applicable General Residential Zone or Future Urban Zone. For the purpose of this rule the height in relation to boundary standards shall not apply to the supporting structure;

v. Where guy wires are used these must not exceed 12 mm in diameter;

vi. At no point must any guy wire overhang the boundary.

25.7.6.3 Temporary Diesel-Fuelled Generators

Temporary Diesel-Fuelled Generation Activities, including associated transformers and fuel storage tanks shall:

a) Produce no greater than a combined output of 10MW per site;

b) Operate for no longer than 6 months in any calendar year.

25.7.7 Restricted Discretionary Activities: Matters of Discretion and Assessment Criteria

a) In determining any application for resource consent for a restricted discretionary activity, Council shall have regard to the matters referenced below, to which Council has restricted the exercise of its discretion. Assessment Criteria within Volume 2, Appendix 1.3 provide for assessment of applications as will any relevant objectives and policies. In addition, when considering any Restricted Discretionary Activity located within the Natural Open Space Zone, Waikato Riverbank and Gully Hazard Area, or Significant Natural Area, Council will also restrict its discretion to Waikato River Corridor or Gully System Matters (see the objectives and policies of Chapter 21: Waikato River Corridor and Gully Systems).

Activity Specific	Matter of Discretion and Assessment Criteria Reference Number (Refer to Volume 2, Appendix 1.3.3)
i. Electricity Transmission - upgrading of existing above-ground lines and support structures	• I – Network Utilities and Transmission
ii. Electricity distribution – new above-ground single-pole lines and support structures	• B – Design and Layout • E – Heritage Values and Special Character • I – Network Utilities and Transmission
iii. Electricity distribution – upgrading of existing above-ground lines and support structures	• B – Design and Layout • E – Heritage Values and Special Character • I – Network Utilities and Transmission
iv. Telecommunications – new above-ground single-pole structures and associated telecommunication lines	• E – Heritage Values and Special Character • I – Network Utilities and Transmission

v. Telecommunications – cabinet in Open Space Zones and Special Character Zones (except within the Peacocke Character Zone)	• E – Heritage Values and Special Character • I – Network Utilities and Transmission
vi. Telecommunications – facilities in the Transport Corridor Zone within an area having historic heritage values or visual amenity values as identified in Appendix 13	• E – Heritage Values and Special Character • I – Network Utilities and Transmission
vii. Water infrastructure – pump stations and aerial crossings on bridges or structures or over water courses and other depressions	• B – Design and Layout • E – Heritage Values and Special Character • I – Network Utilities and Transmission
viii. Water infrastructure – water supply reservoirs	• B – Design and Layout • E – Heritage Values and Special Character • I – Network Utilities and Transmission
ix. Water infrastructure – stormwater detention, treatment and/or soakage facilities to service more than 1 site	• E – Heritage Values and Special Character • I – Network Utilities and Transmission
x. Energy – structures associated with the investigation and assessment of potential electricity generation from biomass, hydro or geothermal resources	• B – Design and Layout • E – Heritage Values and Special Character • I – Network Utilities and Transmission
xi. Energy – solar panels and solar heating systems for the purposes of serving more than one site	• B – Design and Layout • E – Heritage Values and Special Character • I – Network Utilities and Transmission
xii. Energy – Temporary diesel-fuelled generation activities in all Zones	• B – Design and Layout • E – Heritage Values and Special Character • F – Hazards and Safety • I – Network Utilities and Transmission
xiii. In the Ruakura Logistics Zone, unloading and loading of containers, stacking containers, container stacks, operation of mobile plant associated with these activities in the National Grid Corridor	• N - Ruakura

xiv. In the Ruakura Logistics Zone, crossings for Mobile Plant as defined in NZECP 34:2001 (does not apply to the movement of containers on trucks or trains) in the National Grid Yard.	• N - Ruakura
xv. In the Ruakura Logistics Zone, light towers, walls and fences greater than 2.5 metres high in the National Grid Yard and National Grid Corridor.	• N - Ruakura

25.7.8 Other Resource Consent Information

Refer to Chapter 1: Plan Overview for guidance on the following.

- How to Use this District Plan
- Explanation of Activity Status
- Activity Status Defaults
- Notification / Non-notification Rules
- Rules Having Early or Delayed Effect

Refer to Volume 2, Appendix 1: District Plan Administration for the following.

- Definitions and Terms Used in the District Plan
- Information Requirements
- Controlled Activities – Matters of Control
- Restricted Discretionary, Discretionary and Non-Complying Activities Assessment Criteria
- Design Guides
- Other Methods of Implementation

25.8 Noise and Vibration

25.8.1 Purpose

a) Noise and vibration can have an adverse effect on amenity values, adversely affecting people's health, interfering with communication and disturbing sleep and concentration. Under the Act, noise includes vibration, so the objectives and policies on noise cover vibration as well, unless the context requires otherwise.

b) District Plan standards for noise are important in determining when resource consents will be required for land uses and the assessment of applications. The District Plan provisions are subject to Section 16 of the Act, which requires everyone carrying out activities to adopt the best practicable option to ensure that noise does not exceed a reasonable level.

c) The duty to adopt the best practicable option is not always avoided by compliance with a District Plan rule on noise. Noise may be deemed to be unreasonable even though the District Plan does not require resource consent. Enforcement action for unreasonable noise will usually be based on the noise enforcement provisions of the Act, but may be based on exceeding the District Plan standards.

25.8.2 Objectives and Policies: Noise and Vibration

Objective	Policies
25.8.2.1 Activities have minimal adverse noise and vibration effects on other activities and sites, consistent with the amenity values of the receiving environment.	**25.8.2.1a** The amenity values of the surrounding neighbourhood and adjoining activities, especially noise-sensitive activities, shall be protected from the effects of unreasonable noise.
	25.8.2.1b Construction, maintenance and demolition activities shall be required to minimise potential adverse effects on the surrounding neighbourhood and adjoining activities.
	25.8.2.1c Noise effects arising from new and altered roads should be managed using best practicable options to ensure noise levels received by existing premises and facilities that are sensitive to noise are reasonable.
	25.8.2.1d Commercial, industrial and community activities shall ensure that noise received at the boundary of Residential and Special Character Zones is consistent with the residential noise environment.

	25.8.2.1e Noise from non-residential activities in residential areas shall not unduly adversely affect residential amenity values.
	25.8.2.1f Temporary events shall minimise noise impacts on residential activities when taking into account the level and duration of the noise.

Explanation

The policies ensure that noise levels will be appropriately managed to protect the amenity values of receiving environments.

Management of the interface between areas is important to ensure that noise is within a reasonable expectation for the zoning and noise levels meet accepted minimum standards for the receiving environment. Within industrial and commercial areas, higher noise levels are accepted, but will be controlled to prevent unreasonable noise from transferring between sites.

The policies will capture changes to the noise environment arising from new and altered roads. The Plan aims to limit people's exposure to traffic noise from new transport corridors by reducing noise at the source, and requiring insulation for new development beside busy transport corridors (see Objective 25.8.2.2).

Many construction activities are inherently noisy but methods are available which can control the emission and impact of this noise. Noise experienced during construction is of a temporary nature and provided that noise at inconvenient times can be mitigated or avoided, reasonable levels of construction noise can be accommodated.

Objective	Policies
25.8.2.2 Reduce reverse-sensitivity effects arising from new noise-sensitive activities locating: i. Within the Central City, Business, Industrial, Te Rapa North Industrial, Ruakura Logistics and Ruakura Industrial Park Zones. ii. Near to transport networks. iii. Within a defined helinoise boundary. iv. Within the noise emission boundary of the Te Rapa Dairy Manufacturing Site.	**25.8.2.2a** Noise-sensitive activities locating within the Central City, Business, Industrial, Ruakura Logistics, Te Rapa North and Ruakura Industrial Park Zones or within an existing defined helinoise boundary or within the Te Rapa Dairy Manufacturing Site Noise Emission Boundary should include design and materials to reduce interior noise to acceptable levels.
	25.8.2.2b Noise-sensitive activities locating near transport corridors that carry high traffic volumes, or railways, should include design and materials to reduce interior noise to acceptable levels.
	25.8.2.2c Noise-sensitive activities located within the Rototuna North East Character Zone adjacent to the Waikato Expressway (Designation E90) within the habitable building setback should provide

	sufficient acoustic treatment to protect its residential noise environment.

Explanation

The objectives and policies recognise that some areas of the City contain a diverse range of activities, and that there is increased potential for conflict over noise, particularly when noise-sensitive activities locate near existing noisy activities.

The objective and policies recognise that noise-sensitive activities establishing in these areas will require appropriate design and materials, such as acoustic insulation, to achieve an acceptable internal noise environment.

The objectives and policies also recognise that the noise levels within the Te Rapa Dairy Manufacturing Site Noise Emission Boundary were agreed through an appeal settlement on the Waikato District Plan and the area around the Dairy Manufacturing Site was subsequently transferred into Hamilton City. Noise sensitive activities locating within the Dairy Manufacturing Site Noise Emission Boundary need to be aware of the existing noise levels within the Noise Emission Boundary.

In the Rototuna North East Character Zone, the use of a specific building setback provision pre and post the construction of the Waikato Expressway (Designation E90) negates the need for additional acoustic mitigation of dwellings beyond the setback and provides protection for the outdoor amenity of residential properties within the setback. However, habitable buildings located within the setback do have an increased potential to be affected. Accordingly noise-sensitive activities establishing in this area will require appropriate design and materials, such as acoustic insulation, to achieve an acceptable internal noise environment.

Objective	Policies
25.8.2.3 Reduce reverse-sensitivity vibration effects arising from new development locating near to the rail transport network.	**25.8.2.3a** New buildings locating near to the rail network should include design and materials to reduce vibration to acceptable levels.

Explanation

The objectives and policies recognise that in some areas of the City near to the rail network there is potential for vibration effects. The objective aims to ensure that new buildings locating near to the rail are designed to recognise the environment in which they are located.

25.8.3 Rules – Specific Standards

25.8.3.1 Measurement and Assessment of Noise

a) Noise levels shall be measured in accordance with NZS 6801:2008 “Acoustics – Measurement of Environmental Sound” and assessed in accordance with NZS 6802:2008 ‘Acoustics – Environmental Noise’. These apply unless otherwise stated.

25.8.3.2 Construction Noise

a) All construction noise shall comply with the relevant noise levels stated in NZS6803: 1999, section 7.2 'Recommended numerical limits for construction noise' and shall be measured and assessed in accordance with NZS 6803:1999 'Acoustics – Construction Noise'.

25.8.3.3 Construction Vibration

a) Construction vibration received by any building on any other site shall comply with the provisions of and be measured and assessed in accordance with German Standard DIN 4150-3:1999 Structural vibration – Effects of vibration on structures.

25.8.3.4 Design and Construction of New and Altered Roads

a) Application of this standard.

   i. This standard shall apply only to new and altered roads predicted to carry at least 2000 annual average daily traffic (AADT) at the design year.

b) This standard shall not apply:

   i. In circumstances where NZS 6806: 2010 does not apply, as listed in paragraph 1.3.1 of NZS 6806: 2010.

   ii. To local transport corridors identified within Volume 2, Appendix 15-4, Figures 15-4b to 15-4f.

   iii. To altered roads where the vertical or horizontal alignment changes relate solely to providing pedestrian footpaths, cycleways, dedicated passenger transport or high-occupancy vehicle lanes, vehicle stopping or parking whereby that part of the carriageway dedicated to usual vehicle movement does not move closer to any protected premises and facilities.

c) Road-traffic noise shall be measured and assessed in accordance with NZS 6806:2010 'Acoustics – Road traffic noise – New and altered roads'.

d) Subject to 25.8.3.4(a) and (b) above, new or altered roads are designed and constructed to mitigate road-traffic noise in compliance with NZS 6806: 2010 'Acoustics – Road traffic noise – New and altered roads'.

Note

1. This rule mainly affects road controlling authorities such as Council and the New Zealand Transport Authority, but sometimes may affect a private developer building or altering a road in a subdivision designed to carry the requisite traffic volumes. The practical effect of the standard is that traffic noise received at 'protected premises and facilities' will be reduced by design features such as quieter road surfaces.

25.8.3.5 Helicopter Landing Area Noise

a) Helicopter noise from helicopter landing areas shall be measured and assessed in accordance with NZS 6807:1994 'Noise management and land-use planning for helicopter landing areas'.

Note

1. An activity that does not comply with NZS6807:1994 in Rule 25.8.3.5 will require consent, and the operator may be required to establish a helinoise boundary around the helicopter landing area, as described in NZS 6807:1994 via a change to the District Plan in accordance with the first schedule of the Act. Any new 'noise-sensitive activities' inside a defined helinoise boundary may be subject to the noise insulation requirements of NZS 6807:1994.

2. In addition to District Plan requirements, helicopter operation is subject to civil aviation controls.

25.8.3.6 Events and Temporary Activities

a) The relevant zone noise standards shall apply to all events and temporary activities, except as provided in Rule 25.3.5.2(c) and 25.3.5.3(e).

25.8.3.7 Noise Performance Standards for Activities in all Zones Except Major Facilities, Knowledge, Open Space, Ruakura Logistics and Ruakura Industrial Park Zones

a) Activities in all Zones except Major Facilities, Knowledge, Open Space, Ruakura Logistics and Ruakura Industrial Park Zones, shall not exceed the following noise levels at any point within the boundary of any other site in the:

i. Residential Zones.

ii. Special Character Zone.

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Time of day	Noise level measured in $L_{Aeq\ [15\ min]}$	Noise level measured in L_{AFmax}
iii. 0600 – 0700 hours	45 dB	75 dB
iv. 0700 – 2000 hours	50 dB	-
v. 2000 – 2300 hours	45 dB	-
vi. 2300 – 0600 hours	40 dB	75 dB

b) Activities in all zones except the Major Facilities, Knowledge and Open Space Zones shall not exceed the following noise levels at any point within the notional boundary of any other site in the Future Urban Zone.

Time of day	Noise level measured in $L_{Aeq\ [15\ min]}$	Noise level measured in L_{AFmax}
i. 0700 – 2200 hours	55 dB	-
ii. 2200 – 0700 hours	40 dB	75 dB

c) Any activity within the Industrial and Te Rapa North Industrial zones shall not exceed a noise level of 65dBA (LAeq [15 min]) at any point within the boundary of any other site within that zone. This standard does not apply to sites held in common ownership with the site containing the activity generating the noise. This standard applies to Stages ~~and 1B~~ 1A of the Te Rapa North Industrial Zone, but does not apply to the remainder of the Te Rapa North Industrial Zone until such time as the Deferred Industrial Zone overlay is removed.

d) Activities in the Te Awa Lakes Business 6 Zone shall not exceed the following levels within any other Business 6 zoned site:

Time of Day	Limit (L_{Aeq})	Limit (L_{AFmax})
0700 – 2300 hours	60 dB	-
2300 – 0700 hours	55 dB	75 dB

	65 dB at 63 Hz L_{eq}	
	60 dB at 125 Hz L_{eq}	

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In situations where common building elements such as floors and walls connect two units under different ownership in Te Awa Lakes Business Zones, the noise (rating) level arising from any activity measured in any unit under different ownership or occupancy must not exceed the following levels.

Unit Affected	Rooms	0700 – 2300 hours	2300-0700 hours
In all units except those containing activities sensitive to noise	All Rooms	50 dB LAeq	50 dB LAeq
In units containing noise sensitive activities	Bedrooms	40 dB LAeq	35 dB LAeq 45 dB at 63 Hz Leq 40 dB at 125 Hz Leq
In units containing noise sensitive activities	All other habitable rooms	40 dB LAeq	40 dB LAeq

- The 63Hz and 125Hz octave band limits shall not apply to fixed mechanical plant.
- Adjustments for noise containing Special Audible Characteristics in accordance with New Zealand Standards NZS 6802:2008 "Acoustics – Environmental Noise" will only apply to A-weighted levels.
- A noise sensitive space means any indoor space within a unit, sensitive to noise excluding any bathroom, water closest, laundry, pantry, walk in wardrobe, corridor, hallway, lobby, stairwell, clothes drying area, kitchens not part of a dwelling, garage or other space of a specialised nature occupied neither frequently nor for extended periods.
- A unit means a defined part of a building under different ownership, including apartments and separate leased areas within a building.
- These minimum sound insulation performance standards apply in addition to the requirements of the NZ Building Code G6.

ed) Application of this standard.

i. This standard does not apply to activities provided for by Rule 25.3.5.2(c) and 25.3.5.3(e)

ii. This standard does not apply to helicopter noise at helicopter landing areas, road traffic noise, or construction noise.

iii. This standard does not apply to residential activities, including the use of garden equipment (such as lawnmowers, chainsaws or wood chippers) ancillary to residential activities. Short duration use at reasonable times will usually be acceptable.

iv. This standard does not apply to noise from temporary emergency use of generators for continued power supply provided that the best practicable option to control the noise is adopted.

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v. This standard does not apply to activities within the Te Rapa Dairy Manufacturing Site.

vi. This standard applies to all other activities, including home-based businesses, pool pumps, air conditioning units and domestic wind turbines.

Note

1. The Te Rapa North Deferred Industrial Area, excluding Stage~~s~~ 1A ~~and 1B~~, is assessed against the Future Urban noise standards until such time as the Deferred Industrial Zone overlay is removed.

25.8.3.8 Te Rapa Dairy Manufacturing Site Noise Emission Boundary

a) Any activity within the Te Rapa Dairy Manufacturing Site shall be designed and conducted so that noise from site activities, other than construction noise, measured at the Te Rapa Dairy Manufacturing Site Noise Emission Boundary shown on Planning Maps 1B, 2B, 6B and 7B and Figure 6-6 in Volume 2 shall not exceed 45 dB $L_{Aeq\ (15\ min)}$.

25.8.3.9 Noise Performance Standards for Activities in the Major Facilities Zone, Knowledge Zone and Open Space Zones

a) Activities within the Major Facilities Zone, Knowledge Zone and Open Space Zones shall not exceed the following noise levels at any point within the notional boundary of any other site within the:

i. Future Urban Zone.

Or, any point within the boundary of any other site in the:

ii. Residential Zone<u>s</u>.

iii. Special Character Zone.

Time of day	Noise level measured in L_{Aeq} [15 min]	Noise level measured in L_{AFmax}
iv. 0700 – 2300 hours	55dB	-
v. 2300 – 0600 hours	40dB	75 dB
vi. 0600 – 0700 hours	45dB	75 dB

vii. Rule 25.8.3.9(a) vi shall not apply to the Knowledge Zone and the Ruakura Open Space Zone (excluding Lot 3 DPS 66853), in which case the application of night noise limit of Rule 25.8.3.9a)v shall be extended to apply between the hours of 2300 hours to 0700 hours.

<u>viii. The noise (rating) level from any other site must not exceed 65 dB L_{Aeq} at any point within the boundary of the Te Awa Lakes Major Facilities Zone.</u>

b) Rule 25.8.3.9(a) shall not apply to crowd noise from events.

c) For Seddon Park, Waikato Stadium, Claudelands Events Centre and Te Rapa Racecourse the noise standards outlined in Rule 25.8.3.9(a) shall apply except for six days per calendar year when the following standards shall apply.

i. The noise (including practice or testing) does not exceed the following noise levels at any point within the boundary of any site in the:

- Residential Zone
- Special Character Zone

Time of day	Noise levels measured in $L_{Aeq\ [15\ min]}$	Noise levels measured in L_{AFmax}
ii. 1000 – 2300 hours	75 dB 70 dB at 63Hz 65 dB at 125Hz	85 dB
iii. On New Year's Eve these noise levels shall apply up to 0030 hours the following day (January 1).		

iv. Rule 25.8.3.9(c)i shall not apply to crowd noise from events.

v. The noise event does not exceed four hours' duration, except on two of the six occasions when the duration of the noise event must not exceed seven hours, exclusive of practice and sound checks.

vi. Practice or testing involving the use of electronic sound amplification must not exceed two hours.

vii. The public is notified at least 14 days before the noise event, including information about:

- The nature of the noise event and the fact that the noise limits for general activities may be exceeded.
- Proposed dates and start and finish time of the event itself, and the expected times of any testing or practice.
- Contact details before and during the noise event.
- Possible alternative dates in the event of postponement.

Note

1. A suitable method for achieving compliance with this standard is the publishing of a public notice containing the required information in a newspaper with a circulation that covers the entire area affected by the proposal.

viii. Provide a noise management plan to Council at least one month before the event to demonstrate compliance with the relevant noise standards.

d) Application of this standard:

i. This standard does not apply to activities provided for by Rule 25.3.5.2(c) and 25.3.5.3(e)

ii. This standard does not apply in relation to noise received from the Te Rapa Racecourse at the following existing sites on Minogue Drive.

- Pt Lot 1 DP 311765

- Lot 5 DP 443687
- Section 3 SO 318174

iii. This standard does not apply to noise from helicopter noise at helicopter landing areas, road traffic noise, or construction noise.

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25.8.3.10 Noise-sensitive Activities – Activities in all Zones except Ruakura Logistics Zone, Ruakura Industrial Park Zone and the Knowledge Zone

a) The standards in Rule 25.8.3.10(e), (f) and (g) shall apply to the construction of new and altered buildings to be used for noise-sensitive activities within:

i. The Central City Zone, Business 1 to 7 Zones, Industrial Zone, Te Rapa North Industrial Zone, the Te Rapa Dairy Manufacturing Site Noise Emission Boundary, Rototuna Town Centre Zone and the Te Awa Lakes Business 6 Zone and the Te Awa Lakes Major Facilities Zone.

ii. All sites, near existing and proposed transport corridors that carry high traffic volumes, as defined in 25.8.3.10(b), and (c) below.

iii. All sites, near a railway line, as defined in 25.8.3.10(d) below.

b) "Near existing and proposed transport corridors that carry high traffic volumes" applies to noise sensitive activities where the building line of the building containing the activity is within 40m of the nearest edge of the carriageway (not being a state highway) of:

i. All existing transport corridors, and

ii. Designated transport corridors (where the designation defines the location of the carriageway),

That are predicted to carry an annual average daily traffic level (AADT) at the design year of at least:

i. 5,000 AADT where the posted speed limit is ≤50km/hr.

ii. 2,000 AADT where the posted speed limit is >50km/hr.

c) "Near existing and proposed transport corridors that carry high traffic volumes" also applies to noise sensitive activities where the building line of the building containing the activity is within:

i. 100m of the Waikato Expressway (Designations E90, ~~and~~ E90a and E81a), except that this standard does not apply to:

1. the land zoned Rototuna North East Character Zone – see Rule 25.8.3.10(h) below; or

2. feeder roads serving the expressway interchanges where the noise sensitive activity is more than 100m from the Waikato Expressway proper or any of its interchanges; or

ii. 80m of any other state highway where the speed limit is equal to or greater than 70km/hour, or where the speed limit is less than 70 km/hour and the AADT is at least 10,000 vehicle per day; or

iii. 40m of any state highway where the speed limit is less than 70km/hour and the AADT is less than 10,000 vehicles per day;

iv. Where the distances specified in (i), (ii) and (iii) above shall be measured from the edge of the carriageway, or the designation boundary if the carriageway location has not been confirmed in writing by the Requiring Authority; and

v. Where the speed limit specified in (ii) and (iii) above shall be the posted speed limit in the case of an existing state highway, or the speed limit confirmed in writing by the Requiring Authority for a proposed state highway; and

vi. Where the AADT specified in (ii) and (iii) above shall be the current AADT for an existing state highway, or the predicted AADTin the design year confirmed in writing by the Requiring Authority for a proposed state highway.

d) "Near a railway line" applies to noise sensitive activities where the building line of the building containing the activity is within 40m of the boundary of a designation for Railway Purposes (Designations F1 and F1a).

e) Where this standard applies (as defined by Rule 25.8.3.10(a) to (d) above):

i. Any habitable room in a building shall be protected from noise arising from outside the building by ensuring the building is designed and constructed to meet an indoor design sound level of 35dB $L_{Aeq\ (24hr)}$ in bedrooms and 40dB $L_{Aeq(24hr)}$ in all other habitable rooms , or

ii. Where only 25.8.3.10(a)ii and iii apply, an acoustic design certificate shall state that the indoor design sound level of 35dB $L_{Aeq\ (24hr)}$ in bedrooms and 40dB $L_{A\ eq\ (24hr)}$ in all other habitable rooms is able to be met.

f) Compliance with Rule 25.8.3.10(e)i shall be achieved by:

i. An acoustic design certificate that describes the proposed design of the building that will achieve compliance with the internal noise design standards in Rule 25.8.3.10(e); or

ii. An existing solid building or landform blocking the line of site from all parts of all windows and doors of any new habitable room(s) to any part of the carriageway, or the designation if the carriageway location has not been confirmed in writing by the Requiring Authority, within the relevant distance specified in:

1. Rule 25.8.3.10 (b) for transport corridors that are not state highway, or

2. Rule 25.8.3.10 (c) for transport corridors that are state highway, and any habitable room is set back at least 40m from any part of the carriageway, or the designation if the carriageway location has not been confirmed in writing by the Requiring Authority.

g) Where the internal noise design standards in Rule 25.8.3.10(e) can only be achieved in a habitable room with windows and doors closed, an alternative ventilation system shall be installed that complies with the requirements of Section G4 – Ventilation of the New Zealand Building Code 2011.

h) Within the Rototuna North East Character Zone, any habitable rooms in new residential activities or the construction of new habitable rooms or extensions to habitable rooms in existing residential activities where constructed on a site within the applicable set back for the zone shall meet the following criteria:

i. Where the location of the Waikato Expressway carriageway adjacent to the site is not confirmed, any residential activity located within the habitable

building setback of 65m shall be designed and constructed to ensure that the noise level from the Waikato Expressway designation boundary is no greater than 35dB $L_{Aeq(24hr)}$ in any bedroom and 40dB $L_{Aeq(24hr)}$ in any other habitable room (the internal noise limits). The outdoor noise level shall be the level incidental on the residential activity based on the noise level prediction parameters in Rule 23.6.12 c).

ii. Where the location of the carriageway within the designation corridor of the Waikato Expressway adjacent to the site has been confirmed in writing by the Requiring Authority, or confirmed through an Outline Plan of Works approval under s176A of the RMA, or construction is underway or completed, any residential activity within the 55dB $L_{Aeq(24hr)}$ contour line from the Waikato Expressway, established via subdivision in accordance with 23.6.12 c), shall be designed and constructed to ensure that the noise level from the Expressway is no greater than 35dB $L_{Aeq(24hr)}$ in any bedroom and 40dB $L_{Aeq(24hr)}$ in any other habitable room (the internal noise limits). The outdoor noise level shall be the level incidental on the residential activity based on the noise level prediction parameters in Rule 23.6.12 c).

iii. A design report shall be prepared by a suitably qualified acoustic engineer approved by the Hamilton City Council, and provided to the Planning Guidance Manager, Hamilton City Council, that demonstrates the internal noise limits will be achieved.

iv. For those rooms where windows and doors need to be closed to achieve the internal noise limit, an alternative ventilation system that complies with the requirements of Section G4 of the Building Code shall be installed. This system shall be designed to achieve a level of no less than 10dB L_{Aeq} below the traffic design level for that room.

Note

1. If habitable rooms are located outside of the 65m setback or 55dB $L_{Aeq(24hr)}$ noise contour, no acoustic treatment is required even if one or more boundaries of the lot is intersected by either the setback or noise contour.

25.8.3.11 Noise-sensitive Activities – Ruakura Logistics Zone, Ruakura Industrial Park Zone and Knowledge Zone

a) Buildings to be used for noise-sensitive activities shall not be constructed with any part of the building within 40m of the designation for the Waikato Expressway. This requirement shall not apply to the feeder roads serving the Pardoa Boulevard and Ruakura interchanges.

b) The following standards in this rule shall apply to the construction of new and altered buildings to be used for noise-sensitive activities within:

i. The Ruakura Logistics Zone, the Ruakura Industrial Park Zone and the Knowledge Zone.

ii. All sites, near existing and proposed transport corridors that carry high traffic volumes, as defined in Rule 25.8.3.11 (c) and (d) below.

iii. All sites, near a railway line, as defined in Rule 25.8.3.11(e) below.

c) "Near existing and proposed transport corridors that carry high traffic volumes" applies to noise sensitive activities where the building line of the building containing the activity is within 40m of the nearest edge of the carriageway of:

   i. All existing transport corridors, and

   ii. Designated transport corridors (where the designation defines the location of the carriageway), that are predicted to carry an annual average daily traffic level (AADT) at the design year of at least:

      - 5,000 AADT where the posted speed limit is ≤50km/hr.
      - 2,000 AADT where the posted speed limit is >50km/hr.

d) "Near existing and proposed transport corridors that carry high traffic volumes" also applies to noise-sensitive activities where the building line of the building containing the activity is within 100m of the boundary with the Waikato Expressway designation, except for parts of the feeder roads serving the Pardoa Boulevard and Ruakura Interchanges beyond 100m from these interchanges"

e) "Near a railway line" applies to noise sensitive activities where the building line of the building containing the activity is within 40m of the boundary of a designation for Railway Purposes.

f) Where this standard applies, either:

   - Any room in a building shall be protected from noise arising from outside the building by ensuring the external sound insulation level achieves the minimum performance standard of $D_{2m,nT,w}$ + Ctr > 30 dB, or
   - Where only Rule 25.8.3.11(b)ii and iii apply, an acoustic design certificate signed by a suitably qualified acoustic engineer shall state the outdoor noise levels will not exceed 55 dB $L_{Aeq(1h)}$ for rail noise or 57 dB $L_{Aeq(24h)}$ for road-traffic noise at the building facade.

g) Where Rule 25.8.3.11(f) applies, a supplementary source of air shall be provided to achieve a minimum ventilation as specified in Section G4 Ventilation of the New Zealand Building Code 2011 and provide cooling. The ventilation system shall generate less than 35dB L_{Aeq} measured at 1 metre from the internal grill/diffuser.

25.8.3.12 Operational Vibration from Rail Lines – Activities in All Zones

a) Any new building developed for a vibration sensitive activity within 20m of a boundary of a designation for railway purposes shall comply with Class C vibration limits in NS 8176E:2005 – Vibration and Shock: Measurement of Vibration in Buildings from Land Based Transport and Guidance to Evaluation of its Effects on Human Beings.

b) Where Rule 25.8.3.12(a) applies a design report prepared by an acoustics engineer, demonstrating compliance with the vibration criteria, shall be submitted to the Council prior to construction of the building.

Note

1. Some properties more than 20m from a rail line may experience vibration from passing trains. Factors such as soil ground conditions, distance from rail lines and building design will affect the amount of vibration received. For more information, professional advice can be sought from engineers before undertaking building work near the rail corridor.

25.8.3.13 Noise Performance Standards for Activities in the Ruakura Logistics and Ruakura Industrial Park Zones

a) Activities shall not exceed the following noise limits

i. At or within the notional boundary of any residential unit on any other site within the Ruakura Logistics Zone or within the Ryburn Road and Percival Road Large Lot Residential Zone (as identified in Appendix 14-1).

ii. At or within the boundary of any site in the Residential Zones and Knowledge Zone, except as provided for in i above.

Time of day	Noise levels measured in $L_{Aeq\ [15\ min]}$	Noise levels measured in L_{AFmax}
0700 – 2000 hours	55 dB	-
2000 – 2300 hours	50 dB	-
2300 – 0700 hours	40 dB	75 dB

b) Any activity within the Ruakura Logistics and Ruakura Industrial Park Zones shall not exceed a noise limit of 70dB ($L_{Aeq\ [15\ min]}$) within the boundary of any other site within that Zone. This standard does not apply to sites held in common ownership with the site containing the activity generating the noise.

c) Application of this standard.

i. This standard does not apply to temporary activities.

ii. This standard does not apply to noise from helicopters at helicopter landing areas, road noise, or construction.

iii. This standard does not apply to residential activities, the use of garden equipment (such as lawnmowers, chainsaws or wood chippers) ancillary to residential activities. Short duration use at reasonable times will be acceptable.

iv. This standard applies to all other activities, including home-based businesses, pool pumps, air conditioning units and site based wind turbines.

v. Assessment of the standard shall be in accordance with NZS6801:2008 and NZS6802:2008 including a reference time interval (t) of 15 minutes.

d) A noise barrier shall be provided to ensure that the noise limits in Rule 25.8.3.13(a) are met and in accordance with the following:

i. The barrier shall be constructed at, or to the north of, the northern-most limit of the Inland Port operations area (Sub Area A (Inland Port)) and in any other locations necessary to ensure the noise limits in Rule 25.8.3.13(a) will be met.

ii. The barrier may be constructed in stages to suit staged development of the Inland Port (Sub Area A (Inland Port)).

iii. The barrier shall be designed and constructed in accordance with best practice and certified by a suitably qualified expert.

iv. The barrier shall be designed to avoid or minimise the reflection of noise from passing trains onto residential properties on Ryburn Road.

v. The noise barrier shall form part of the Noise Management Plan for each stage of development of the Inland Port (Sub Area A (Inland Port)).

25.8.3.14 Non-Conformity with Standards in the Ruakura Logistics Zone

a) Any activity in the Inland Port (Sub Area A (Inland Port)) which is between 40 dBLAeq(15 min) and 45 $dBL_{Aeq(15\ min)}$ between 2300 and 0700 hours when measured under 25.8.3.13a is a restricted discretionary activity. This shall be considered without notification or the need to obtain approval from affected persons, except as provided for by sections 95A(2)(b) and (c), 95B(2) and (3) and 95C(1) to (4) of the Act.

b) Any activity in the Inland Port (Sub Area A (Inland Port)) which exceeds 45 $dBL_{Aeq(15\ min)}$ between 2300 and 0700 hours when measured under 25.8.3.13a) is a non-complying activity.

25.8.4 Other Resource Consent Information

Refer to Chapter 1: Plan Overview for guidance on the following.

- How to Use this District Plan
- Explanation of Activity Status
- Activity Status Defaults
- Notification / Non-notification Rules
- Rules Having Early or Delayed Effect

Refer to Volume 2, Appendix 1: District Plan Administration for the following.

- Definitions and Terms Used in the District Plan
- Information Requirements
- Controlled Activities – Matters of Control
- Restricted Discretionary, Discretionary and Non-Complying Activities Assessment Criteria
- Design Guides
- Other Methods of Implementation

25.9 Public Art

25.9.1 Purpose

a) Public art provides an opportunity to create a sense of place, and to add to an aesthetically attractive and vibrant City. The District Plan can contribute to the inclusion of public art in public places through bulk and location standards and incentives. It is noted that questions of artistic style or taste are not addressed in the District Plan. Furthermore, art in public places will require approvals outside of processes of the Act.

25.9.2 Objectives and Policies: Public Art

Objective	Policies
25.9.2.1 Increased provision of art throughout the City that is reflective of the character and diversity of the Hamilton community.	**25.9.2.1a** Public art shall be encouraged in public places and on private land that is easily visible from public places and that has relevance to the site, history, the environment, or has cultural significance.
	25.9.2.1b Public art shall be encouraged in the Central City and at Hamilton's gateways.
	25.9.2.1c Public art shall be compatible with the amenity of the existing locality.
	25.9.2.1d Access to arts and cultural activities that acknowledge the differences in the community across age, ability and culture shall be provided for.
	25.9.2.1e The location of public art does not affect the safety or efficiency of the transportation network.
Explanation	
The District Plan can facilitate and encourage public art in the City, while managing potential effects of artwork structures. The District Plan can also provide for arts and cultural activities and facilities. The District Plan relies upon approval processes that occur outside the Act to endorse the location and form of public art.	

25.10 Signs

25.10.1 Purpose

a) Signs and other outdoor advertising displays are important for communicating information to the public. In particular they provide directions, identify premises, assist businesses in selling goods and services, and promote events and activities.

b) The quality and location of signs have the potential to contribute positively to an area but also have the potential to create adverse visual effects, particularly in areas where high amenity levels are expected. The location of signs, particularly on or adjacent to transport corridors, also has the potential to adversely affect traffic safety. The District Plan controls signs to preserve accepted levels of amenity and safety. In particular, the District Plan controls high-intensity signs in all zones, signs on historic heritage buildings and sites, and provides more permissive standards in the Central City, Business, Industrial, Ruakura Logistics and Ruakura Industrial Park Zones such as enabling signs that do not relate to the on-site activity.

25.10.2 Objectives and Policies: Signs

Objective	Policies
25.10.2.1 Provide for signs which contribute positively to an area and do not compromise visual amenity and transport safety.	**25.10.2.1a** The number, size, location and appearance of signs visible from public places shall maintain the character of the area.
	25.10.2.1b Signs shall not create adverse effects from illumination, light spill, flashing or reflection.
	25.10.2.1c Messages or images on signs visible from transport corridors shall not confuse or distract transport corridor users.
	25.10.2.1d Signs in the Central City Zone that contribute to an attractive and vibrant centre should be allowed.
	25.10.2.1e Signs on scheduled historic heritage buildings and sites and archaeological and cultural sites shall be compatible with the heritage values being protected.
	25.10.2.1f Signs shall be well maintained to minimise impacts on visual amenity values.

Explanation
Signs have the potential to create adverse effects, particularly in areas where high visual amenity standards are expected. Inappropriate signs can detract from the character and values associated with an area, as well as impacting on traffic safety. The objective and policies address the potential adverse effects of signs on traffic safety, visual amenity, light spill, character and scheduled heritage buildings. *Signs can contribute positively to a sense of vibrancy and the policies recognise the need to enable signs, particularly in the Central City Zone, where this District Plan is encouraging a vibrant Centre.* *The City has many events that require temporary signs and off-site advertising for promotional reasons. These requirements need to be managed so that the adverse visual effects created are minimised and experienced only for a short period. The policies also address impacts from a lack of maintenance when signs age, or are damaged or vandalised.*

25.10.3 Rules – Activity Status Table

Activity	Class
a) Temporary signs	P
b) Low-intensity signs	P
c) Any low-intensity sign which is not visible from beyond the site on which it is located	P
d) Traffic control devices and signs erected by a public authority	P
e) Safety signs required to meet legislative requirements	P
f) Low-intensity signs on historic heritage buildings in Volume 2, Appendix 8, Schedule 8A and archaeological and cultural sites in Volume 2, Appendix 8, Schedule 8B (except within the Major Facilities Zone – Waikato Hospital Campus)	RD*
g) High-intensity signs other than those in Rule 25.10.3h)	D
h) Any electronic sign in the Central City, Business 1-7 Zones, Industrial Zone, Ruakura Logistics Zone and Ruakura Industrial Park Zone which complies with Rule 25.10.4 and Rule 25.10.5	RD

Note

1. The erection of signs on Hamilton City Council land and public places is controlled under a bylaw for public places. Information on the size and format of traffic signs is set out in the Hamilton City Infrastructure Technical Specifications. Signs on state highways are controlled under the New Zealand Transport Agency's 'Manual of Traffic Signs' and 'Markings and Traffic Control Devices Manual'.
2. Activities (a) to (e) and (g) only have immediate legal effect if they are located in the Special Heritage Zone or the Temple View Heritage Area, as shown on Planning Map 60B.
3. Refer to Chapter 1.1.9 for activities marked with an asterisk (*).
4. For any activity not identified above, see Section 1.1.8.1.

25.10.4 Rules – General Standards

a) Signs that are not visible from outside the site on which they are located shall not be required to comply with any of the standards in Rule 25.10.5.

Note

1. Light spill shall be controlled under the relevant provisions of the District Plan, where it is from a sign not visible from any public place or nearby site.

b) Signs shall not project over a transport corridor or be located within a transport corridor (except as provided for in 25.10.5.10), other than a traffic sign or safety sign erected by, or at the direction of, a public authority or a sign controlled under a Council bylaw.

c) Signs shall not be placed so they block sight distances at intersections or driveways.

d) A sign must not display any image that:

i. Resembles or is likely to be confused with any traffic sign or signal;

ii. Contains reflective, fluorescent or phosphorescent materials that will reflect headlights, or distract and interfere with a road user's vision;

iii. Uses flashing or revolving lights or lasers or any other method of illumination that will dazzle or distract drivers.

Note

1. Where the sign is adjacent to a state highway with a speed limit higher than 60 km/h, the NZTA comments shall be taken into account.

e) Signs shall not be required to meet the setback requirements specified in the underlying zone rules.

f) Where a maximum permitted area is specified for a sign in Rule 25.10.5:

i. The area of the sign shall be calculated by measuring the rectangular area which encloses all symbols or letters which make up the sign surface (see Figure 25.10.4a).

ii. Where the sign is an uneven shape the area shall be calculated by measuring the rectangular area which encloses the uneven shape (see Figure 25.10.4b).

iii. The total area of a sign is taken to be the sum of the area of all faces of the sign.

Figure 25.10.4a: Calculating the area of a sign

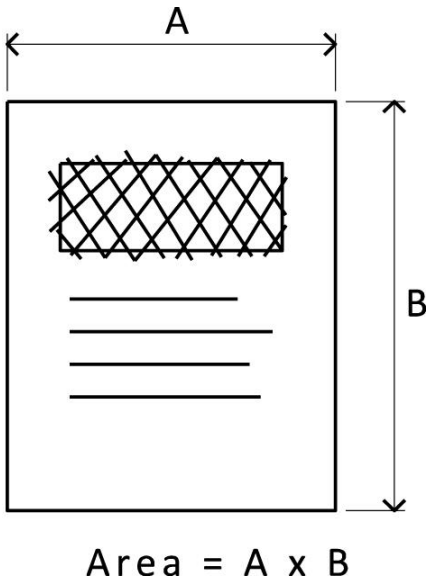
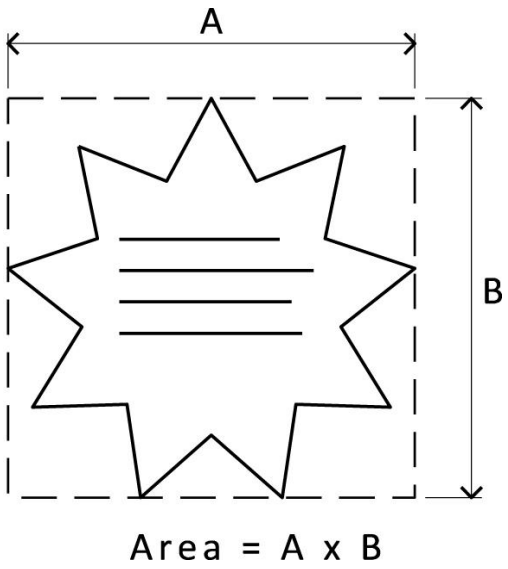


Figure 25.10.4b: Calculating the area of an uneven shaped sign



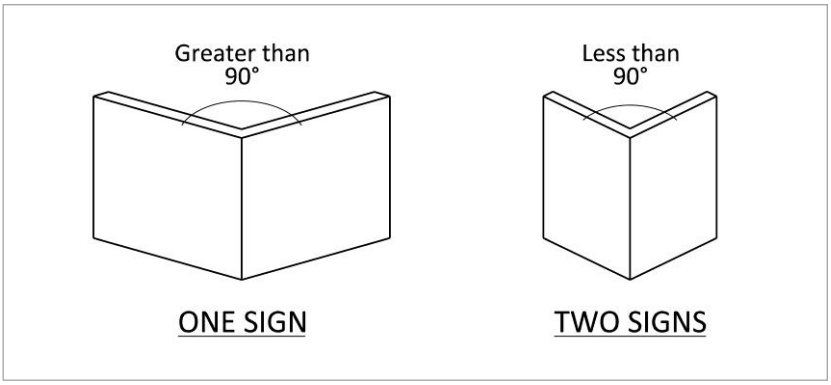
g) Where a standard is specified for a sign in Rule 25.10.5:

i. Any V-shaped sign containing an interior angle of 90 degrees or more is deemed to be one sign (see Figure 25.10.4c below).

ii. Any V-shaped sign containing an interior angle of less than 90 degrees is deemed to be two signs (see Figure 25.10.4c below).

h) Advertising signs shall not be similar in appearance to any traffic control device.

Figure 25.10.4c: V-shaped signs



25.10.5 Rules – Specific Standards

25.10.5.1 Low Intensity Signs

Illuminated, Low Intensity signs shall meet the following intensity standards:

a) Subject to Rules 25.10.5.1(b) and (c) below , no illuminated sign shall produce:

i. More than 1000 candelas/m^2 for signs less than 10m^2 in area.

ii. More than 800 candelas/m^2 for signs equal to or greater than 10m^2 in area.

b) No illuminated sign located in the Future Urban, Large Lot Residential, Residential, Special Character and Open Space zones, shall produce:

i. 600 candelas/m^2 for signs less than $10m^2$ in area.

ii. 400 candelas/m^2 for signs equal to or greater than $10m^2$ in area.

c) Any sign shall conform to the luminance levels in Rule 25.10.5.1(b) if the face of the sign is:

i. At a 90-degree axis to any transport corridor or railway line, or

ii. Within 20m of a transport corridor and 20 degrees of either side of a motorist's or train driver's line of sight, or

iii. At a transport corridor intersection or railway level crossing.

d) The lighting filament used to light any sign shall not be visible from any point measured within 2m of ground level.

25.10.5.2 Future Urban Zone

a) All signs shall be associated with the activity on the site, and shall be located on the site to which they relate.

b) Signs may provide only the property name, or the name, logo and contact information for a home-based business or other activity carried out as a permitted activity on the site, or relate to site access or safety.

c) Signs shall not advertise goods or services, other than as inherent in a business name.

d) Signs in the Future Urban Zone shall comply with the following standards.

Maximum number of signs	Maximum sign area	Maximum dimension (height or width)	Maximum sign height (from ground level)
One	$0.6m^2$	1m	2m

25.10.5.3 Open Space Zones

a) All signs shall be associated with the activity on the site, and shall be located on the site to which they relate.

b) Signs in the Open Space Zones shall comply with the following standards.

Maximum number of signs	Maximum sign area	Maximum dimension (height or width)	Maximum sign height (from ground level)
i. One directional sign at each entrance to the site	$0.6m^2$ per sign	-	1.5m
ii. One single-sided sign at each entrance to the	$3m^2$ per sign	2.5m	2m

site			
iii. One park development sign for the purpose of providing proposed park development information	2m^2	2m	-

25.10.5.4 Major Facilities Zone

a) Signs in the Major Facilities Zone shall comply with the following standards.

Maximum number of signs	Maximum sign area	Maximum dimension (height or width)	Maximum sign height (from ground level)
One double-sided sign at each entrance to the site	3m^2	3m	3m

b) Seddon Park – the rules in 25.10.5.4(b)i to vii below are in addition to Rule 25.10.5.4(a).

i. Signs that are 'inset' or attached to the exterior of buildings providing sponsors names shall not exceed an area of 40m² per building.

ii. Signs relating to activities within each building shall not exceed an area of 20m² per building.

iii. Signs under Rule 25.10.5.4(b)i or ii shall not exceed an area of 10m² on any building with frontage to Seddon Road that is directly opposite dwellings in any Residential Zone.

iv. Event advertising and City happenings signs on transport corridor frontages shall be limited to four signs, with no sign exceeding an area of 6m².

v. Venue naming signs shall be limited to one per transport corridor frontage, with no sign exceeding an area of 12m^2.

vi. No standards shall apply to signs located in the site that are directed primarily at patrons inside the venue, including signs on the perimeter of playing arenas (painted, illuminated, static, electronic scrolling).

vii. The area and height of signs shall be calculated in accordance with Figures 25.10.4a and 25.10.4b.

c) Waikato Stadium – the rules in 25.10.5.4(c)i to vii below are in addition to Rule 25.10.5.4(a).

i. Signs that are ''inset" or attached to the exterior of buildings providing sponsors names shall not exceed an area of 40m² per building. These signs may be back lit or surface lit.

ii. Signs relating to activities within each building shall not exceed an area of 20m² per building.

iii. Signs under Rule 25.10.5.4(c)i or ii shall not exceed an area of 10m² on any building with frontage to Seddon Road that is directly opposite dwellings in the Residential Zone.

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iv. Event advertising and city happenings signs on transport corridor frontages shall be limited to four signs with no sign exceeding an area of 6m².

v. Venue naming signs shall be limited to one per transport corridor frontage, with no sign exceeding an area of 12m^2.

vi. No sign area standards shall apply to signs located in the site that are directed primarily at patrons inside the venue including signs on the perimeter of playing arenas (painted, illuminated, static, electronic scrolling).

vii. The area and height of signs shall be calculated in accordance with Figure 25.10.4a and 25.10.4b.

d) Te Rapa Racecourse Thoroughbred Business Park.

i. For activities in the Thoroughbred Business Park the standards in Rule 25.10.5.7 Business and Industrial Zones shall apply.

e) Waikato Hospital –rule 25.10.5.(e)i below is in addition to Rule 25.10.5.4(a).

i. No sign area standards shall apply to signs located internally on the Waikato Hospital site that are directed at visitors inside the site, including naming and directional signs. For the purposes of this rule signs visible on Pembroke Street, between the intersection with Ohaupo Road/Selwyn Street and the second intersection with Ohaupo Road, are deemed to be internal to the Waikato Hospital site.

f) Te Awa Lakes Adventure Park – Rule 25.10.5.4 f) i-iii below replaces Rule 25.10.5.4.a)

i. Free standing entrance signs shall comply with the following standards

Maximum Number of Signs per entrance	Maximum Sign Area	Maximum Width	Maximum Sign Height from Ground Level
One free standing double sided sign per road entrance	24m	6m	16.5m

ii. No sign standards shall apply to signs that are directed primarily at patrons inside the Adventure Park.

iii. Signs shall not exceed 6m^2 on any building facing and visible from the Te Awa Lakes Medium Density Residential Zone.

25.10.5.5 Community Facilities Zone

a) All signs shall be associated with the activity on the site, and located on the site to which they relate.

b) Signs in the Community Facilities Zone shall comply with the following standards.

Maximum number of signs	Maximum sign area	Maximum dimension (height or width)	Maximum sign height (from ground level)

i. One access or safety sign at each entrance to the site	0.6m^2 per sign	-	1.5m
ii. Either One other sign at each entrance to the site, or	0.6m^2 per sign	1m	2m
One other sign per site	3m^2 (single sided)	2.5m	2m

25.10.5.6 Residential and Special Character Zones

a) All signs shall be associated with the activity on the site, and located on the site to which they relate.

b) Signs may only provide the property name, or the name, logo and contact information for a home-based business or other activity carried out as a permitted activity on the site, or relate to site access or safety.

c) Signs shall not advertise goods or services, other than as inherent in a business name.

d) Signs shall comply with the following standards.

Maximum number of signs	Maximum sign area	Maximum dimension (height or width)	Maximum sign height (from ground level)
One	0.6m^2	1m	2m

Note

1. Standard 25.10.5.6 only has immediate legal effect for activities located in the Special Heritage Zone or the Temple View Zone Heritage Area, as shown on Planning Map 60B.

25.10.5.7 Central City, Business 1 to 7 and Industrial Zones

a) Signs in the Central City, Business 1 to 7 and Industrial zones shall comply with the following standards.

Maximum number of signs	Maximum sign area	Maximum sign height (from ground level)
i. One directional sign may be displayed at each entrance to the site	1.2m^2 each	2m
ii. Any sign, whether attached to the face or roof of the building or protruding from the face of the building	1m^2 for every metre of site frontage. For rear sites 1m^2 for every metre of any single site boundary.	A maximum sign height equal to the building height of the relevant zone provided that it does not exceed the height of the parapet or facade of the building

Maximum number of signs	Maximum sign area	Maximum sign height (from ground level)
iii. Free-standing signs: One double-sided sign for each frontage	1m^2 for every metre of site frontage to a maximum of 10m^2	A maximum sign height equal to the building height of the relevant zone

b) Electronic signs shall also comply with the following standards:

i. Sign content shall be limited to static displays only.

ii. Sign content shall not change at intervals greater than once every 8 seconds.

iii. Changes to sign content shall be limited to a maximum transition time of 1 second between two messages/images. There must be no scroll, flash, type or fade between the messages/images.

iv. Maximum Electronic Luminance shall have the following limits:

Day Time Luminance: when full sunlight directly strikes the face of the sign 8000 cd/m^2 and otherwise 6000 cd/m^2

Day Time Luminance Morning/Evening Twilight and Inclement Weather: 600cd/m^2

Night Time Luminance: 350cd/m^2

Note

1. All electronic signs must also have a facility for automatically adjusting the sign luminance so that the sign brightness is always comparable with the surrounding luminance conditions and restrictions above.
2. A consent condition may be appropriate to require the review of conditions to ensure luminance levels are appropriate.

v. Minimum letter size shall comply with the following standards.

Posted speed limit (km/h)	Letter height (mm)		
	Main message	Property name	Secondary message
50	150	100	75
60	175	125	90
70	200	150	100
80	250	175	125
100	300	200	150

vi. Minimum forward sight distance to the sign shall comply with the following standards.

Posted speed limit (km/h)	Minimum Visibility (m)
50	80
60	105
70	130

Posted speed limit (km/h)	Minimum Visibility (m)
80	175
100	250

vii. A Maintenance Plan shall be developed to address procedures for maintenance and repair of any faults. The Maintenance Plan shall include provisions for automatic shutdown of the sign in the event of a fault which affects the signs performance.

25.10.5.8 Knowledge Zone

a) Signs in the Knowledge Zone shall comply with the following standards.

Maximum number of signs	Maximum sign area	Maximum sign height (from ground level)
i. Two signs affixed to the face of the tenancy or department building	10m^2 per tenancy/ department	A maximum sign height equal to the building height of the zone provided that it does not project beyond the top of the façade of the building
ii. Any directional signage	2m^2 per tenancy/ department	2m
iii. One double-sided sign at each entrance to the site	3.4m^2 per face of the sign	3m

b) University of Waikato – the rules 25.10.5.8(b)i and ii below are in addition to Rule 25.10.5.8(a):

i. No standards shall apply to signs located in the site that have been approved as part of a concept plan.

ii. No standards shall apply to signs located in the site that are located outside the Interface Area.

25.10.5.9 Ruakura Logistics and Ruakura Industrial Park Zones

a) Signs in the Ruakura Logistics and Ruakura Industrial Park Zones shall comply with the following standards.

Maximum number of signs per entrance	Maximum sign area	Maximum dimension (height or width)	Maximum sign height (from ground level)
i. Free-standing signs: One double-sided sign for each road frontage	24m^2	6m	16m

ii. One sign attached to the face of a building	24m^2	6m	A maximum sign height equal to the building height of the relevant zone provided that it does not exceed the height of the parapet or facade of the building

b) Security and directional signage shall be excluded.

25.10.5.10 Veranda Signs Above the Transport Corridor Zone

a) Signs attached beneath verandas shall leave a clearance of 2.75m to the footpath.

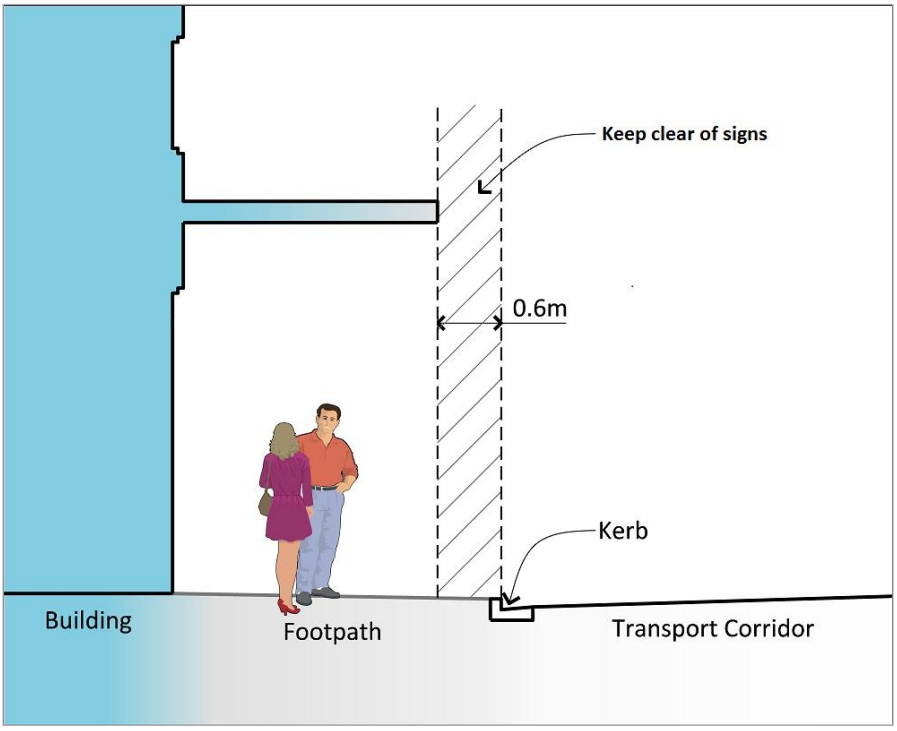
b) Signs attached beneath verandas shall be set back not less than 0.6m from a vertical line measured from the edge of the carriageway kerb (refer to Figure 25.10.5a).

c) Signs located on top and on the fascia of a veranda shall not extend beyond the fascia of the building and shall be set back not less than 0.6m from a vertical line measured from the carriageway kerb (refer to Figure 25.10.5a).

d) Veranda signs shall be restricted to signs advertising businesses, services or products located on the site associated with the sign.

e) Signs located on top or beneath verandas shall be structurally sound and affixed to the veranda in a safe manner.

Figure 25.10.5a: Area to be kept free from signs



25.10.5.11 Scheduled Historic Heritage Buildings and Sites listed in Schedule 8A and 8B of Volume 2, Appendix 8: Historic Heritage

a) All signs shall be associated with the activity on the site.

b) Signs on sites identified in Schedule 8A and 8B of Volume 2, Appendix 8: Historic Heritage shall comply with the following standards.

Maximum number of signs	Maximum sign area	Maximum dimension (height or width)	Maximum sign height (from ground level)
Two	Maximum total area per sign is 0.5m^2	1m	2m

Note
1. Signage should be consistent with the Heritage New Zealand guidelines for signage on Historic Heritage.

25.10.5.12 Temporary Signs

a) Temporary signs shall comply with the following standards.

Zone or specific site	Maximum number of signs	Maximum area per sign	Maximum total area of signage per site
i. Residential, Special Character, Future Urban and Community Facilities zones	Two signs per site, or two signs per frontage in the case of a corner site	1.8m^2	3.6m^2
ii. Business 1-7, Central City, Industrial, Ruakura Logistics, Ruakura Industrial Park and Knowledge (Precinct C only) zones	Two signs per site, or two signs per frontage in the case of a corner site	3m^2	6m^2
iii. Open Space, Major Facilities and Knowledge (excluding Precinct C) zones	Two signs per site, or two signs per frontage in the case of a corner site	6m^2	-
iv. Scheduled historic heritage building or site identified in Schedule 8A or 8B of Volume 2, Appendix 8: Historic Heritage	Two signs per site, or per frontage in the case of a corner site	1.8m^2	3.6m^2

b) Temporary signs shall not exceed the height permitted for permanent signs on the site under zone rules, except in the case of signs related to elections which may be up to 2.5m in height or the maximum sign height for permanent signs on the site under zone rules, whichever is the greater.

c) Temporary signs shall be displayed for the following time periods.

i. Real estate signs shall be removed within 14 days after the transfer of property ownership has been completed.

ii. Signs that advertise construction projects shall be located on the site to which they relate and shall be removed no later than two weeks after construction has been completed.

iii. Signs related to elections shall be displayed for no more than three months before an election and must be removed before polling, or such lesser time as may be prescribed by legislation.

iv. Signs that advertise a temporary retail activity (refer to Rule 25.3.5.12 of Chapter 25.3: City-wide – Events and Temporary Activities) shall be displayed only for the duration of that activity and must be within the site where the activity is taking place.

v. Signs for the purpose of public notification shall be displayed as prescribed by legislation.

vi. Signs that advertise any other event shall be displayed within a period of up to four weeks before to three days after the event.

Note

1. The Electoral Act 1993 and its associated regulations also specifies controls on election signs.
2. Standard 25.10.5.12(a)i only has immediate legal effect for activities located in the Special Heritage Zone or the Temple View Zone Heritage Area, as shown on Planning Map 60B.

25.10.6 Restricted Discretionary Activities: Matters of Discretion and Assessment Criteria

a) In determining any application for resource consent for a restricted discretionary activity, Council shall have regard to the matters referenced below, to which Council has restricted the exercise of its discretion. Assessment Criteria within Volume 2, Appendix 1.3 provide for assessment of applications as will any relevant objectives and policies. In addition, when considering any Restricted Discretionary Activity located within the Natural Open Space Zone, Waikato Riverbank and Gully Hazard Area, or Significant Natural Area, Council will also restrict its discretion to Waikato River Corridor or Gully System Matters (see the objectives and policies of Chapter 21: Waikato River Corridor and Gully Systems).

Activity Specific	Matter of Discretion and Assessment Criteria Reference Number (Refer to Volume 2, Appendix 1.3.3)
i. Low-intensity signs on historic heritage buildings in Volume 2, Appendix 8, Schedule A and archaeological and cultural sites identified in Volume 2, Appendix 8, Schedule 8A or 8B (except within the Major Facilities Zone – Waikato Hospital Campus)*	• E – Heritage Values and Special Character

ii. Any electronic sign in the Central City Zone, Business 1-7 Zones, Industrial Zone, Ruakura Logistics Zone and Ruakura Industrial Park Zone which complies with Rule 25.10.4 and Rule 25.10.5	• B – Design and Layout • E – Heritage Values and Special Character

Note

1. Refer to Chapter 1.1.9 for activities marked with an asterisk (*)

25.10.7 Other Resource Consent Information

Refer to Chapter 1: Plan Overview for guidance on the following.

- How to Use this District Plan
- Explanation of Activity Status
- Activity Status Defaults
- Notification / Non-notification Rules
- Rules Having Early or Delayed Effect

Refer to Volume 2, Appendix 1: District Plan Administration for the following.

- Definitions and Terms Used in the District Plan
- Information Requirements
- Controlled Activities – Matters of Control
- Restricted Discretionary, Discretionary and Non-Complying Activities Assessment Criteria
- Design Guides
- Other Methods of Implementation

25.11 Smoke, Fumes, Odour and Dust

25.11.1 Purpose

a) Under the Act, responsibility for controlling discharges to air lies with the Waikato Regional Council, managed primarily through the Waikato Regional Plan. The District Plan focuses on the control of minor nuisance effects of smoke, fumes, odour and dust. These rules are in addition to powers available to Council under Section 17 of the Act.

25.11.2 Objectives and Policies: Smoke, Fumes, Odour and Dust

Objective	Policies
25.11.2.1 Avoid adverse effects on local amenity values and people's wellbeing arising from smoke, fumes, odour and dust.	**25.11.2.1a** Adverse effects of offensive or objectionable smoke, fumes, odour or dust, shall be avoided outside the site from where they originate.
	25.11.2.1b Activities sensitive to smoke, fumes, odour or dust shall not locate where amenity values are already compromised by those effects.
	25.11.2.1c Activities that pose significant risks of major adverse effects on air quality shall not locate where high air quality is expected.
Explanation	
Impacts on amenity values from smoke, fumes, odour or dust can arise from a variety of land uses. They often cannot be contained within the site from where they originate, and some dispersal across the boundaries is inevitable and usually acceptable. There is often a subjective element in the way these effects are perceived. Policy 25.11.2.1a addresses smoke, fumes, odour or dust that is offensive or objectionable outside the originating site. What is offensive or objectionable will vary according to the characteristics of the area. Only very low levels of smoke, fumes, odour or dust will be acceptable in residential areas, while higher levels may be acceptable in industrial areas. *Policies 25.11.2.1b and 25.11.2.1c envisage that activities with similar effects or expectation of amenity should be grouped together, and those with dissimilar effects and expectations should be kept apart. This will help to reduce conflicts and the potential for reverse sensitivity, and to mitigate effects that cannot be contained on-site.*	

25.11.3 Rules – General Standards

a) No objectionable or offensive dust, smoke, fumes or odour shall have adverse effects at any other site.

Note

1. Where, in the opinion of a warranted enforcement officer, a significant nuisance is arising from smoke created by any source, Section 17 (Duty to Avoid, Remedy or Mitigate Adverse Effects) of the Act will apply and Council may use its enforcement powers under Part XII of the Act.
2. In relation to all nuisances involving smoke, fumes, dust and odour, attention is drawn to the obligation to comply with any relevant Rules in the Regional Plan, Bylaws and the provisions of the Health Act 1956 and its associated regulations.

25.11.4 Other Resource Consent Information

Refer to Chapter 1: Plan Overview for guidance on the following.

- How to Use this District Plan
- Explanation of Activity Status
- Activity Status Defaults
- Notification / Non-notification Rules
- Rules Having Early or Delayed Effect

Refer to Volume 2, Appendix 1: District Plan Administration for the following.

- Definitions and Terms Used in the District Plan
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- Design Guides
- Other Methods of Implementation

25.12 Solid Waste

25.12.1 Purpose

a) Solid waste includes domestic and commercial rubbish and more broadly means any materials left over from an activity or process that are no longer viable. Council manages many aspects of solid waste through the Waste Management and Minimisation Plan (prepared by Council to give effect to the Waste Minimisation Act 2008 and the Litter Act 1979) and through a bylaw prepared under the Local Government Act.

b) Under the Act and Waste Minimisation Act, waste is a resource to be sustainably managed, and the effects of the creation, collection, recycling, recovery, storage, treatment and disposal of solid waste may be controlled by District Plans. This District Plan policy clearly signals that sustainable solid waste principles should apply to waste disposal.

c) This District Plan requires the provision of service areas in developments to encourage appropriate solid waste disposal, and facilities that encourage the management of waste in accordance with the solid waste hierarchy, i.e. recycling before disposal.

25.12.2 Objectives and Policies: Solid Waste

Objective	Policies
25.12.2.1 Reduce the amount of solid waste generated and ultimately entering landfills.	**25.12.2.1a** Promote the reduction of solid waste volumes based on the following waste hierarchy. • Reduction • Reuse • Recycle • Recovery • Treatment • Disposal
	25.12.2.1b Promote practices that reduce the volume of solid waste generated and disposed of.
Explanation	
Solid waste can be significantly reduced, reused or recycled, so that it need not take up space in landfills. As well as being an under-used resource, waste also has adverse economic and environmental effects, in terms of costs of collection services, land for disposal, and adverse effects on the receiving environment. *Hamilton's Solid Waste Bylaw requires the licensing of persons who collect and transport waste. The granting of licenses and associated conditions include consideration of how Council's Waste Minimisation and Management Plan and waste reduction initiatives are promoted, and require information about the quantity, source, destination and types of waste involved.*	

Part of the information requirements for industrial activities requiring consent is the preparation of a Waste Minimisation Plan (refer to Volume 2, Appendix 1.2.2.15).

Objective	Policies
25.12.2.2 Solid waste activities and facilities are managed in a way that addresses adverse effects from the storage and disposal of solid waste.	**25.12.2.1a** Solid waste collection, recycling, recovery, storage, treatment and disposal activities shall be sited, designed and managed to reduce solid waste entering landfills, and minimise adverse effects on the environment.
	25.12.2.1b Ensure pleasant and functional service areas are provided in new developments for waste and recycling storage.

Explanation

Within Hamilton City there are existing services for the collection, processing, marketing and beneficial reuse of solid waste and diverted material. As a new landfill is unlikely to be established in Hamilton, more facilities such as waste transfer, reuse and recycling facilities established by Council and the private sector are anticipated and encouraged. Any waste going to a landfill should go to a landfill that is specifically designed and managed to avoid adverse effects on the environment.

Solid waste collection, recycling, recovery, storage, treatment and disposal activities can have adverse effects on the environment – including litter, smell, leachate, vermin, traffic (including heavy vehicles) and noise. The choice of location for these facilities is important, as well as management to mitigate or remedy potential adverse effects.

Activities require appropriate and functional internal and external storage space for waste and recyclables pending collection, that are easy to access by residents, businesses and waste collection agencies. The policies aim to ensure that suitable storage space is provided in these developments in a manner that recognises the amenity values of the surrounding area.

25.12.3 Rules – General Standards

25.12.3.1 Solid Waste Storage Areas

a) All activities shall provide appropriate, on-site storage areas for recycling and litter bins that are accessible for waste collection services.

25.12.4 Other Resource Consent Information

Refer to Chapter 1: Plan Overview for guidance on the following.

- How to Use this District Plan
- Explanation of Activity Status
- Activity Status Defaults
- Notification / Non-notification Rules
- Rules Having Early or Delayed Effect

Refer to Volume 2, Appendix 1: District Plan Administration for the following.

- Definitions and Terms Used in the District Plan
- Information Requirements
- Controlled Activities – Matters of Control
- Restricted Discretionary, Discretionary and Non-Complying Activities Assessment Criteria
- Design Guides
- Other Methods of Implementation

25.13 Three Waters

25.13.1 Purpose

a) This section contains objectives and policies that focus on the impact of subdivision, use and development on water resources, and on the need for an integrated provision of sustainable Three Waters infrastructure in conjunction with development. Land-use planning is critical in minimising conflicts and sustaining water quality and quantity for future generations.

b) Pressure on water resources in the region is increasing due to a growing population and the associated concentration of activities. This affects demand for water resources and Three Waters infrastructure (drinking water, wastewater and stormwater) which is managed by Council.

c) Water quality of the Waikato River has declined over time. Although point-source pollutants have reduced since the 1970s, non-point sources now comprise the majority of nutrient and sediment inputs into the Waikato River and its tributaries. Water quality in Lake Rotoroa has improved over time; however it still suffers from algal blooms attributed to high nutrient levels and from time to time is closed to contact recreation.

d) As a municipal water provider, Council has three significant resource consents for the taking of water for municipal purposes and discharging of wastewater and stormwater. In complying with these consent conditions, and as a responsible water manager, Council must impose standards and conditions on development within the City.

e) As part of the Waikato River Settlement between the Crown and Waikato-Tainui, Te Ture Whaimana o Te Awa o Waikato – The Vision and Strategy for the Waikato River has been developed and must be given effect to. It is the primary direction-setting document for the Waikato River and its catchments, which include the lower reaches of the Waipa River, and outlines the vision for the Waikato River as:

"Tooku awa koiora me oona pikonga he kura tangihia o te maataamuri

The river of life, each curve more beautiful than the last

Our vision is for a future where a healthy Waikato River sustains abundant life and prosperous communities who, in turn, are all responsible for restoring and protecting the health and wellbeing of the Waikato River, and all it embraces, for generations to come."

25.13.2 Objectives and Policies: Three Waters

Objective	Policies
25.13.2.1 Water resources are protected from the adverse effects of subdivision and development.	**25.13.2.1a** Subdivision and development is located and designed to minimise adverse effects on ground and surface water resources, particularly the life-supporting capacity of water bodies and their riparian margins.

	25.13.2.1b Subdivision and development on the margins of natural watercourses and wetlands should be located and designed to maintain, and where possible enhance: i. Riparian margins. ii. Water quality. iii. Water resources. iv. Aquatic habitats.

Explanation
This objective and policies focus on the effects subdivision and development can have on water resources, and seeks that these effects be minimised. Land-use activities can impact on water resources, for example, by increasing stormwater flows over or into land, by increasing sediment loads, and increasing the demand for water-related infrastructure.

Objective	**Policies**
25.13.2.2 Measures to facilitate the efficient use of water resources are incorporated into new subdivision and development.	**25.13.2.2a** Water-sensitive techniques are incorporated into new subdivision and development to reduce demand on water supplies, wastewater disposal and to manage stormwater.

Explanation
This objective and policy focuses on water conservation and efficiency, and in particular the incorporation of water-sensitive techniques into new subdivision and development to improve the level of water efficiency.

Objective	**Policies**
25.13.2.3 Three Waters infrastructure is provided as part of subdivision and development, and in a way that is: • Integrated • Effective • Efficient • Functional • Safe • Sustainable	**25.13.2.3a** All subdivision and development provides integrated Three Waters infrastructure and services to a level that is appropriate to their location and intended use.
	25.13.2.3b Subdivision and development shall not occur unless the required infrastructure is available to service it.
	25.13.2.3c Three Waters infrastructure is to be designed and constructed in accordance with any existing Structure Plan and relevant Integrated Catchment Management Plan.

	25.13.2.3d Large scale subdivision and development proposals are to prepare an Integrated Catchment Management Plan (where one does not already exist) or a Water Impact Assessment.

Explanation

There are servicing constraints within the City. Early discussions with Council on the serviceability of development are necessary.

Integrated Catchment Management Plans will be used as a tool to help manage the form and function of Three Waters infrastructure in an integrated, effective, efficient, functional, safe and sustainable manner.

Over time Integrated Catchment Management Plans will be developed for existing urban areas. Structure Plans and large scale activities will require an Integrated Catchment Management Plan (as outlined in Volume 2, Appendix 1.2.2.6). Until this occurs, stormwater, water and wastewater infrastructure must continue to be provided and managed. Water Impact Assessments are another complementary tool that will be used to assess and ensure Three Waters integration at a more detailed level.

Council maintains a register of all full ICMPs and can advise of any relevant to a particular development proposal and site.

Where there is conflict between a Structure Plan and an ICMP, the latter will prevail.

Water-sensitive techniques to sustainably manage stormwater, water and wastewater are included as well as minimum permeable surfaces standards, which are provided in most Zone Chapters of the District Plan.

In areas where a full Integrated Catchment Management Plan does not exist the following policies also apply:

Design
25.13.2.3e
Three Waters infrastructure is designed and constructed to:

i. Minimise the effects of urban development on downstream receiving waters and groundwater.

ii. Ensure that the capacity, efficiency and sustainability of upstream and downstream infrastructure will not be compromised.

iii. Facilitate access, maintenance and operational requirements.

iv. Cater for the potential effects of climate change.

v. Ensure appropriate standards of public health, safety and amenity.

vi. Ensure that surface water runoff is appropriately managed in accordance with the following drainage hierarchy.

1. Retention for reuse.
2. Soakage techniques.
3. Detention and gradual release to a watercourse.
4. Detention and gradual release to stormwater reticulation.

Stormwater
25.13.2.3f
Stormwater management techniques are designed and constructed to:

i. Maintain or improve the quality of stormwater entering the receiving environment.

ii. Avoid or mitigate off-site effects from surface water runoff.

iii. Sustainably manage the volume and rate of discharge of stormwater to the receiving environment.

Water Supply
25.13.2.3g
Water supply infrastructure is designed and constructed to meet consumption, hygiene, water-sensitive design and firefighting requirements.

Wastewater
25.13.2.3h
Wastewater is treated and disposed of in a way that minimises effects on public health, the environment, and cultural values.

Explanation

Three Waters infrastructure is a key component of subdivision, use and development. It needs to be developed sustainably and agreed upon at the planning stage of the development. All new greenfield areas must have a Structure Plan and an Integrated Catchment Management Plan in place before development begins. Integrated catchment management planning is a process whereby the effects of development on all Three Waters infrastructure capacity and the appropriateness and integrity of

proposed treatments and reticulation systems and networks are designed to manage the change or intensification and assessed and used to help guide decisions. This objective and policies provide support to the direction in Chapter 2: Strategic Framework and Chapter 3: Structure Plans to avoid a situation where Three Waters planning occurs independent to land-use planning.

The objective and policies also provide direction for minimum requirements for the design of Three Waters infrastructure and services in the absence of an Integrated Catchment Management Plan.

Climate change may impact on the frequency and intensity of storm events and other weather extremes such as droughts. The impact of these changes needs to be considered as part of the long term management of the Three Waters.

25.13.3 Rules – Activity Status Table

Activity	Status
a) Any activity required to prepare a Water Impact Assessment by rule 25.13.4.6	RD*
b) Any activity required to prepare an Integrated Catchment Management Plan by rule 25.13.4.1(b)	RD*

Note

1. Refer to Chapter 1.1.9 for activities marked with an asterisk (*).

25.13.4 Rules – General Standards

25.13.4.1 Integrated Catchment Management Plan

a) Where a full ICMP already applies to an area, development of Three Waters infrastructure shall be undertaken in accordance with it. This will be considered a means to achieve compliance with the standards in Rules 25.13.4.1(b) and 25.13.4.2 to 25.13.4.4.

b) In areas where an ICMP does not exist an ICMP as described in Volume 2, Appendix 1.2.2.6 shall be prepared for development or subdivision:

i. Creating more than 40 additional residential units on any site.

ii. Creating more than 40 additional allotments.

iii. Of any land involving more than 3ha.

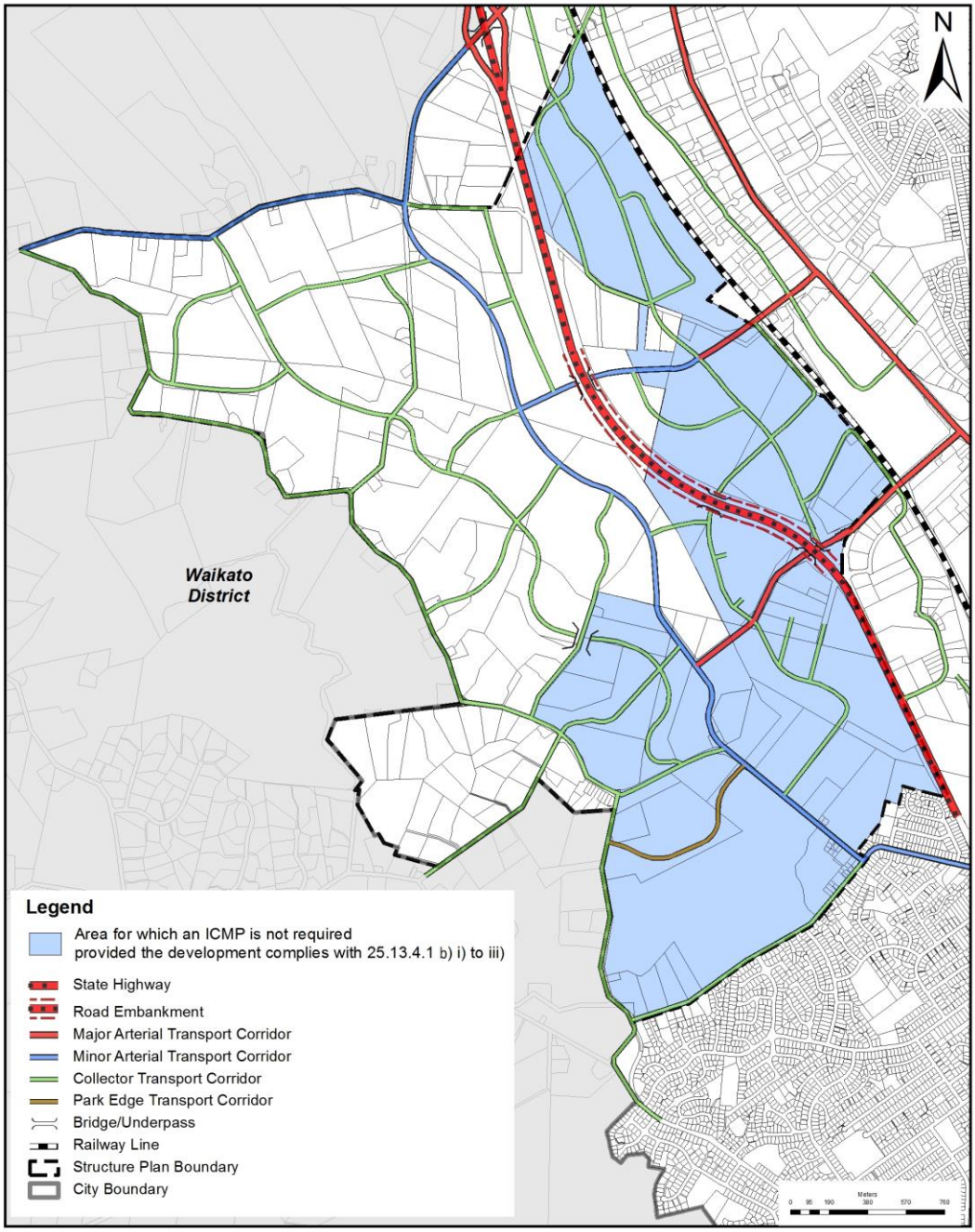
iv. For development of Stage 1 of the Rotokauri Structure Plan beyond the area identified in Figure 25.13.4a). Preparation of this ICMP shall, where relevant to the particular catchment, take into account the entire area of Stage 1 of the Rotokauri Structure Plan, including the area identified in Figure 25.13.4a).

Except that a separate ICMP is not required whe n all the information that it would otherwise include is incorporated into an approved Concept Development Consent for a Major Facility prepared under Rule 17.4 and the Concept Development Consent is accepted as satisfying the requirements of this rule.

Note

1. The 3ha trigger in Rule 25.13.4.1b)iii relates to the footprint of the proposed development or subdivision.
2. A full ICMP should be prepared at the Structure Plan stage in accordance with Chapter 3.3.

Figure 25.13.4a: Area of development within Rotokauri which is excluded pursuant to Rule 25.13.4.1 b) iv



25.13.4.2 Stormwater

a) A stormwater reticulation and disposal system shall be provided that is adequate to safeguard people from injury or illness and protect property from damage caused by surface water.

b) Stormwater management measures shall be in place and operational upon the completion of subdivision and/or development to ensure that the rate of stormwater discharge offsite is at or below pre-development rates. Stormwater management measures shall be implemented, as appropriate, in accordance with the following drainage hierarchy:

i. Retention for reuse

ii. Soakage techniques

iii. Detention and gradual release to a watercourse

iv. Detention and gradual release to stormwater reticulation.

Note

1. Acceptable means of compliance for the provision, design and construction of stormwater infrastructure, and the drainage hierarchy, are is contained within the Hamilton City Infrastructure Technical Specifications.
2. Bylaws may also impose additional controls or restrictions with regard to stormwater.
3. See Rule 25.2.4 regarding earthworks.

25.13.4.3 Wastewater

a) An adequate, reliable, safe and efficient wastewater service shall be provided.

b) Where any subdivision or development results in additional allotments or buildings to be used for urban purposes, provision shall be made for a wastewater system as follows.

i. The installation or upgrading of the wastewater network and/or wastewater pump stations to serve all proposed allotments and/or buildings, and

ii. Connection to the wastewater network from each proposed allotment or building.

c) In the Future Urban Zone and Large Lot Residential Zone (Ruakura Structure Plan area only) where network utility services for wastewater treatment and disposal are not provided by Council, each site shall adequately provide for its own on-site treatment and disposal of wastewater and provide evidence of a satisfactory wastewater system to Council: no on-site wastewater treatment and disposal system shall be allowed that services more than one site and crosses any site boundary.

d) Rule 25.13.4.3c) shall not apply to any wastewater system servicing the 7ha development within Te Rapa North Industrial Zone Stage 1A, provided for under Rule 12.6.1 c)i), and connected to the wastewater infrastructure on Te Rapa Dairy Manufacturing Site.

Note

1. Discharge of trade waste to the Council network will require approval from Council in accordance with the Trade Waste Bylaw.
2. Wastewater treatment systems may require approvals from the Regional Council.
3. Acceptable means of compliance for the provision, design and construction of wastewater infrastructure is contained within the Hamilton City Infrastructure Technical Specifications.

25.13.4.4 Water

a) An adequate, reliable, safe and efficient supply of potable water shall be provided.

b) Where any subdivision or development results in additional allotments or buildings to be used for urban purposes, provision shall be made for:

i. Water metering infrastructure, and either

ii. A connection from the public water supply reticulation to each proposed residential allotment or existing building, or

iii. A public water supply reticulation system extending from the main trunk water supply system (or from an existing water supply reticulation if appropriate) to allow a service to be connected from the transport corridor frontage of each non-residential allotment.

c) In the Future Urban Zone and Large Lot Residential Zone (Ruakura Structure Plan area only) where a water supply reticulation system is not provided, evidence of satisfactory water supply shall be provided as part of the consent application.

d) A reticulation system shall be provided which is adequate for fire-fighting purposes and for estimated domestic and commercial consumption.

e) Where a development results in high-use allocation from the water supply reticulation system, evidence of satisfactory water supply shall be provided.

Note

1. There are limitations on the City's municipal supply of potable water for industrial use other than human drinking and sanitation. Any industrial activity requiring more than $15m^3$ of water per day for purposes other than human drinking and sanitation is considered a high-use allocation and should consult Council's Infrastructure Department early in the planning process.
2. Acceptable means of compliance for the provision, design and construction of water infrastructure is contained within the Hamilton City Infrastructure Technical Specifications.
3. Bylaws may also impose additional controls or restrictions with regard to water supply.

25.13.4.5 Water Efficiency Measures

a) In addition to Low Flow Fixtures, at least one water sensitive technique for stormwater shall be incorporated, connected to, achieved or maintained as part of any new development as identified below.

Where required	Water sensitive techniques
i. New residential units ii. Other new buildings containing a kitchen, laundry or bathroom	• Detention of stormwater to 80% of pre-development runoff by an appropriate means • Permeable surfaces protected to achieve at least 20% above the minimum standard of the zone • Rainwater tank for non-potable reuse system • Other equivalent feature

Note

1. An ICMP (relevant to the site) and the Hamilton City Infrastructure Technical Specifications can provide guidance on the above water sensitive techniques and other equivalent features.
2. Council maintains a register of all full ICMPs and can advise of any relevant to a particular development proposal and site.
3. Where the site is covered by an ICMP, the water sensitive techniques required by 25.13.4.5(a) above shall be consistent with the recommendations of that Plan.
4. An ICMP may make recommendations identifying water sensitive techniques that are suitable (or unsuitable) for a particular catchment or specific Three Waters measures or targets that need to be achieved. In order for new development to comply with 25.13.4.5(a), the selection and implementation of water sensitive techniques must be consistent with any relevant recommendations.
5. To be effective rainwater tanks for new buildings should have a capacity of at least 5,000 litres or should be appropriately designed considering the specific site constraints.
6. Additional techniques are listed within the definition of "water-sensitive techniques" included in Section 1.1.2 of Volume 2 - Definitions Used in the District Plan.

b) Rainwater tanks with a capacity of <10,500 litres are exempt from the following bulk and location provisions of the relevant zone.

   i. Site coverage.

   ii. Permeable surfacing.

   iii. Rear or side boundary setbacks.

c) Low flow fixtures shall be incorporated in alterations or additions to any existing building that add an extra toilet, kitchen, laundry or bathroom.

25.13.4.6 Water Impact Assessments

a) A Water Impact Assessment, as described in Volume 2, Appendix1.2.2.5, is required for any development or subdivision:

   i. Creating four or more additional residential units on any site.

   ii. Creating four or more additional allotments (excluding lots for the purposes of reserves, network utilities or transport corridors).

   iii. Involving more than 1ha of land.

   iv. Creating a new building for industrial activities with a gross floor area greater than 1000m^2.

   v. Involving any new activity which will have a water requirement greater than 15m^3 per day.

   vi. Creating a new building for non-residential activities (other than industrial activities or as provided for in vii. below) with a gross floor area greater than 300m^2.

   vii. Within the Major Facilities Zone:

      1. Creating a new building for non-residential activities (other than industrial activities) with a gross floor area greater than 3,000 m^2; or

      2. Providing residential accommodation for more than 13 additional people, not being accommodation for hospital patients.

b) This Rule does not apply in areas where an ICMP exists and satisfies the information requirements for Water Impact Assessments in accordance with

Table 1.2.2.5b of Volume 2, Appendix 1.2.2.5, or where all the information that a Water Impact Assessment would otherwise include, or the matters it would otherwise address, are incorporated in a Water Supply Agreement with Council or other documents, assessed and approved under any other provision of this District Plan or the Waikato Regional Plan.

Note

1. As outlined in Volume 2, Appendix 1.2.2.5, Water Impact Assessments are also required as part of the information requirements for activities that do not comply with Rule 25.13.4.5 Water efficiency measures or permeable surface standards for the relevant zone.
2. The 1ha trigger in Rule 25.13.4.6(a)iii) relates to the footprint of the proposed development or subdivision.

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25.13.4.7 Rotokauri North Structure Plan Area

1. An ICMP (including sub-catchment ICMP) for the Rotokauri North Structure Plan area, which has been approved by the Council as being acceptable for meeting the standards of an "approved or full ICMP", will hold the same status as an "approved ICMP" or "full ICMP" with respect to the Three Waters provisions of this Chapter.
2. Development which accords with an ICMP (including sub-catchment ICMP) for Rotokauri North is considered a means to achieve compliance with the standards in Rules 25.13.4.1(b) and 25.13.4.2 to 25.13.4.6.
3. In addition any stormwater devices installed on private lots as a means to achieve the requirements of the ICMP (or sub catchment ICMP) must be maintained by the site owner(s) in perpetuity. A consent notice will be registered on the certificate of title to that effect at time of subdivision.
4. Where re-use is proposed/required the tank must be dual plumbed to non-potable uses such as toilet and washing machine in the dwelling.

25.13.5 Restricted Discretionary Activities: Matters of Discretion and Assessment Criteria

a) In determining any application for resource consent for a restricted discretionary activity, Council shall have regard to the matters referenced below, to which Council has restricted the exercise of its discretion. Assessment Criteria within Volume 2, Appendix 1.3 provide for assessment of applications as will any relevant objectives and policies. In addition, when considering any Restricted Discretionary Activity located within the Natural Open Space Zone, Waikato Riverbank and Gully Hazard Area, or Significant Natural Area, Council will also restrict its discretion to Waikato River Corridor or Gully System Matters (see the objectives and policies of Chapter 21: Waikato River Corridor and Gully Systems).

Activity Specific	Matter of Discretion and Assessment Criteria Reference Number (Refer to Volume 2, Appendix 1.3.3)
i. Any activity required to prepare a Water Impact Assessment as by Rule 25.13.4.6*	• J – Three Waters Capacity and Techniques
ii. Any activity required to prepare an Integrated Catchment Management Plan as by Rule 25.13.4.1(b)*	• J – Three Waters Capacity and Techniques

25.13.6 Other Resource Consent Information

Refer to Chapter 1: Plan Overview for guidance on the following.

- How to Use this District Plan
- Explanation of Activity Status
- Activity Status Defaults
- Notification / Non-notification Rules
- Rules Having Early or Delayed Effect

Refer to Volume 2, Appendix 1: District Plan Administration for the following.

- Definitions and Terms Used in the District Plan
- Information Requirements
- Controlled Activities – Matters of Control
- Restricted Discretionary, Discretionary and Non-Complying Activities Assessment Criteria
- Design Guides
- Other Methods of Implementation

25.14 Transportation

25.14.1 Purpose

a) This chapter contains city-wide objectives, policies and rules relevant to the transport network and subdivision, use and development.

b) The transport network is a significant and essential physical resource of the City that contributes to the economic, social and cultural wellbeing of residents, visitors and businesses within and outside Hamilton.

c) The transport network includes all transport corridors and infrastructure, pedestrian and cycle, passenger transport, rail and river ferry routes. Also, while Hamilton Airport is not within the City it is our closest facility for moving goods and people by air. The facility is Regionally Significant Infrastructure and with its air routes is a key component of the wider transport network.

25.14.2 Objectives and Policies: Transportation

Objective	Policies
Integrated Transport Network **25.14.2.1** An integrated multi-modal transport network that meets national, regional and local transport needs and is: • Responsive • Efficient • Affordable • Safe • Accessible • Sustainable • Integrated with land use	**Land Use Integration** **25.14.2.1a** The transportation network and related infrastructure is planned, designed, constructed and managed in a manner that: i. Is consistent with and supports the land-use spatial framework for the City (Figure 2.1a in Chapter 2). ii. Promotes vibrant business centres. iii. Contributes to safe and efficient multi-modal transport corridors serving the Central City, business centres and other key destinations. iv. Contributes to a transportation network that: A. Is accessible to all users, including transport disadvantaged and mobility impaired. B. Maximises opportunities for walking, cycling and passenger transport. C. Creates good connections between residential areas, passenger transport services, schools, employment nodes, recreation areas, shops and other destinations. D. Provides a choice of routes and transport modes for travelling. v. Recognises the need for effective long-term solutions that are affordable and practicable.

	Transport Network **25.14.2.1b** The transportation network and related infrastructure is planned, designed, constructed and managed in a manner that: i. Recognises the affordability of providing new public infrastructure and other actions to increase the capacity of the transport network to accommodate growth. ii. Enables flexible management of transport corridors to allow them to perform their function within the City's transport corridor hierarchy. iii. Promotes energy conservation and efficiency. iv. Promotes a safe and efficient transport network. v. Allows for network utility infrastructure, and streetscape amenity. vi. Provides access to and has regard for the safety and needs of the mobility impaired, transport disadvantaged, cyclists, pedestrians, passenger transport users, and others using the transport corridor to move from place to place. vii. Contributes to the social, economic, cultural and environmental needs of current and future users of the transport network. viii. Takes account of the whole of life operational and maintenance costs of the transport network.
	Adverse Effects of the Transport Network **25.14.2.1c** Adverse effects of new transport infrastructure and changes to the existing transport network are minimised while recognising: i. Amenity values of adjacent activities, ii. Cultural and heritage values, biodiversity, and iii. Safety, access and mobility of all users iv. The function and the location that that part of the transport network has within the transport corridor hierarchy. v. The character and purpose of the zone in which it is located.

	25.14.2.1d The design, location and quantity of parking infrastructure is managed in a way that: i. Provides for special design requirements of transport network users. ii. Minimises adverse effects arising from an over- or under-supply of parking. iii. Minimises adverse safety and efficiency effects on the transport network. iv. Maximises opportunities for the efficient use of existing parking infrastructure. v. Trips by active modes and passenger transport are encouraged through integration with travel demand management and passenger transport options.
	Adverse Effects on the Transport Network **25.14.2.1e** Adverse effects of subdivision, use and development activities on the transport network are avoided or minimised with particular regard to: i. Connections to, and integration with, the transport network. ii. Reverse-sensitivity effects of land uses sensitive to adverse transport effects (e.g. noise). iii. Promoting streetscape amenity. iv. Ensuring performance, condition, safety, efficiency and long-term sustainability and affordability of the transport network. v. Ensuring trips by active modes and passenger transport are encouraged through integration with travel demand management and passenger transport options. vi. Protection of strategic and arterial transport networks, including associated intersections.
	25.14.2.1f Integrated Transport Assessments shall be required for new subdivision, use or development of a nature, scale or location that has the potential to generate significant adverse transportation effects.

	25.14.2.1g Buildings, structures and trees shall not create a potential hazard to the flight paths of aircraft or any other operations associated with Hamilton Airport by intruding within the airport's airspace.

Explanation

Transport networks are complex systems that influence and are in turn influenced by subdivision, use and development. The overarching objective of creating an integrated multi-modal transport network to meet the needs of the City recognises several qualities that need to be considered and balanced when planning for, constructing and managing the transport network and in the integration of transport and land use. The policies recognise that different land use environments and parts of the transport network have different tolerances to change. For example, changes to the transport network can have a more significant effect on the amenity values of a residential environment, yet the same change in an industrial environment may not create the same impact.

The policies are grouped to recognise and respond to key transport issues: integration with land use; planning, construction and maintenance of the transport network; and adverse effects of and on the transport network.

Integrated Transport Assessments are a key method by which the transportation effects of proposals are identified and assessed. Thresholds for requiring an Integrated Transport Assessment and resource consent are set based on the location, nature and scale of activities. This provides a consistent, city-wide framework within which proposals are considered, and means by which to address adverse transportation effects, including cumulative effects, are established.

Buildings, structures and trees in certain parts of the city could protrude into the flight path of planes departing and approaching Hamilton Airport. This increases the risks to public safety both on the ground and in the air.

The policies recognise that the hierarchy of the adjacent transport corridor can influence the nature and level of impacts. For example, parking over-spill onto a major arterial transport corridor is likely to have a more significant adverse effect on the primary movement function of the corridor when compared to the effects of over-spill onto a local transport corridor, whose primary function is property access.

25.14.3 Rules – Activity Status Table

Activity	Class
a) Any activity required to prepare a simple or broad Integrated Transport Assessment by Rule 25.14.4.3	RD*
b) New transport corridors	RD

Note

1. For the following transport-related activities refer to the relevant zone chapter.
   - Parking lots and parking buildings
   - Railway line, marshalling yard, or railway station
   - Passenger transport facility
   - Heliport
   - Pontoon/jetty
2. Arterial Transport Corridor Protection Areas are shown on the Structure Plans within Volume 2, Appendix 2.
3. Refer to Chapter 1.1.9 for activities marked with an asterisk (*).
4. For any activity not identified above, see Section 1.1.8.1.

25.14.4 Rules – General Standards

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25.14.4.1 Vehicle Crossings and Internal Vehicle Access

Separation Distances	
a) Distance between vehicle crossings on the same transport corridor frontage	The distance between vehicle crossings on the same side of the road shall be either: i. Less than 2m; or ii. Meet the relevant separation requirements in the table below. iii. In Rotokauri North the minimum distance shall be 2m

Posted speed limit of adjoining transport corridor	Minimum distance between vehicle crossings
60 km/h and under	7.5m
70 km/h	40m
80 km/h	100m
90 km/h	200m
100 km/h	200m

<table>
<tr>
<td>b) Minimum distance between any vehicle crossing and a railway level crossing</td>
<td>Vehicle crossings shall be:
i. At least 30m from any railway level crossing, measured from the legal boundary of the property with railway land.
Where this cannot be achieved the vehicle crossing shall be located as close as reasonably practicable to the furthest site boundary from the railway level crossing
Note
1. Examples of exceptions can include where the property boundary frontage is less than 30m and there is no other available access point, or the topography would make it impractical to construct an access</td>
</tr>
<tr>
<td>c) Minimum distance between any vehicle crossing and a transport corridor intersection</td>
<td>Vehicle crossings shall meet the following relevant separation requirements
i. Minimum distance between any vehicle crossing and transport corridor intersection – posted speed limit 60km/h or less.

<table>
<tr><th rowspan="2">Adjoining transport corridor hierarchy (posted speed limit 60 km/h or less)</th><th colspan="4">Intersecting transport corridor hierarchy</th></tr>
<tr><th>Major arterial</th><th>Minor arterial</th><th>Collector</th><th>Local</th></tr>
<tr><td>Major Arterial</td><td>30m</td><td>30m</td><td>30m</td><td>30m</td></tr>
<tr><td>Minor Arterial</td><td>30m</td><td>30m</td><td>30m</td><td>30m</td></tr>
<tr><td>Collector</td><td>20m</td><td>20m</td><td>15m</td><td>15m</td></tr>
<tr><td>Local</td><td>20m</td><td>20m</td><td>15m</td><td>15m</td></tr>
</table>
</td>
</tr>
</table>

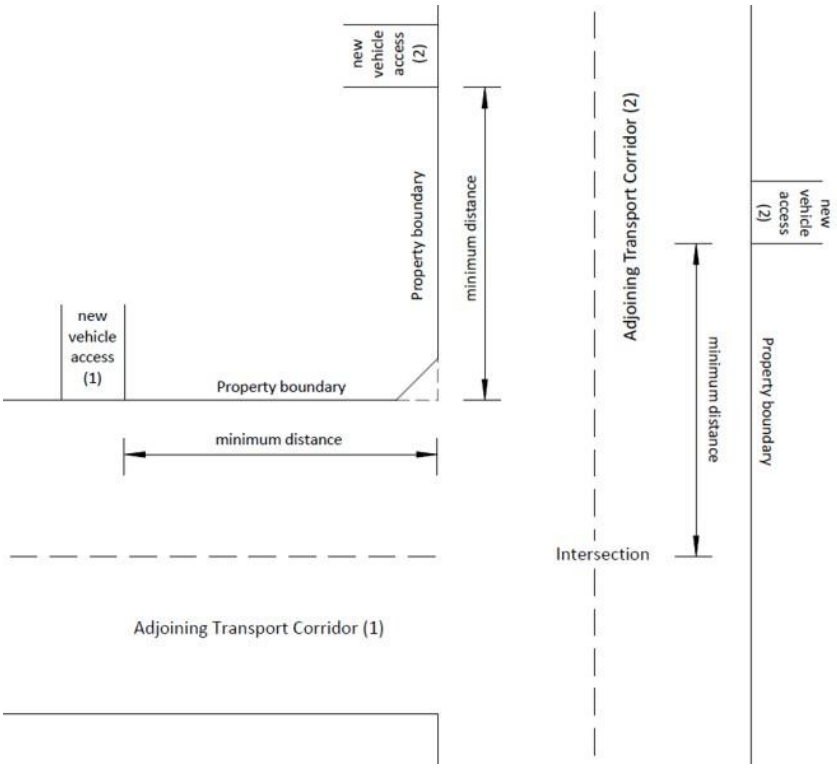
ii. Minimum distance between any vehicle crossing and transport corridor intersections – posted speed limit greater than 60km/h

Adjoining transport corridor hierarchy (posted speed limit greater than 60 km/h)	Intersecting transport corridor hierarchy			
	Major arterial	Minor arterial	Collector	Local
Major Arterial	100m	100m	100m	100m
Minor Arterial	100m	100m	100m	100m
Collector	45m	45m	30m	30m
Local	45m	45m	30m	30m

iii. Except that in Rotokauri North the minimum distance applicable to a Local road to Local road intersection (where the posted speed limit is 60km/h or less) shall be 10m.

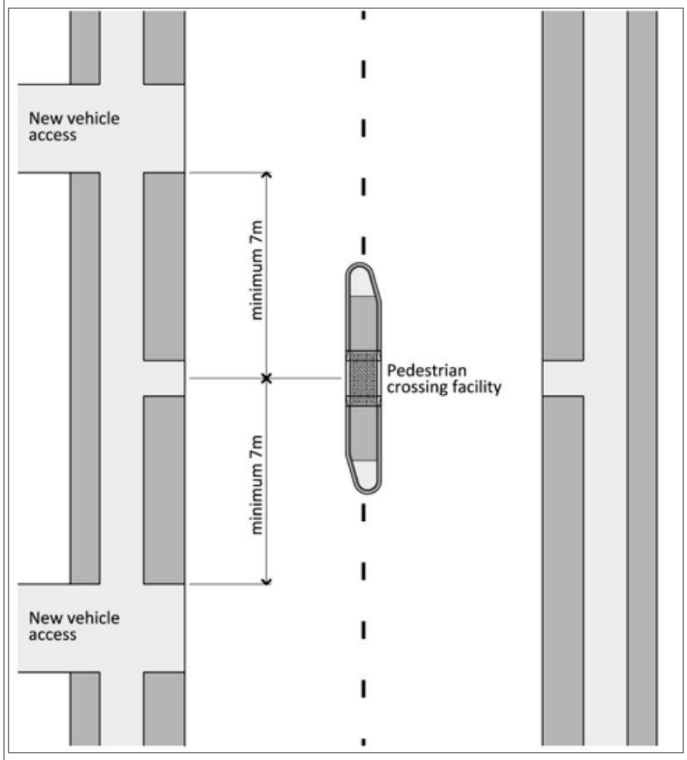
(see diagram below)

Figure 25.14.4.1a - Minimum distance between any vehicle crossing and transport corridor intersections



d) Minimum distance from a dedicated pedestrian crossing facility (e.g. pedestrian crossing, mid-block pedestrian signals, refuge islands, kea crossings)	The closest edge of the vehicle crossing shall be at least 7m from the centre of the pedestrian crossing facility measured in accordance with the diagram below.

Figure 25.14.4.1b – Minimum distance from a new vehicle access to a pedestrian crossing facility



Sightlines	
e) Minimum sight distance from any vehicle crossing	Vehicle crossings shall meet and be measured in accordance with the relevant sight distance requirements below

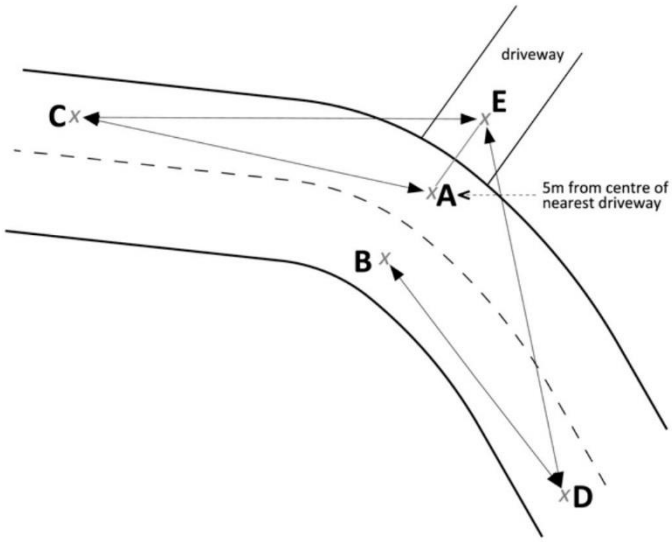
Minimum sight distance from vehicle crossings

	Frontage transport corridor hierarchy classification		
Posted speed limit	**Local**	**Collector**	**Major and minor arterials**
40km/hr	45m	50m	90m
50km/hr	60m	70m	120m
60km/hr	85m	90m	150m
70km/hr	105m	120m	185m
80km/hr	135m	145m	220m
90km/hr	160m	175m	265m
100km/hr	195m	210m	305m

Notes

1. The sight distances are based on Austroads Guide to Road Design, Part 4A: Unsignalised and Signalised Intersections (Equation 1 and 2).
2. Where there is an accepted speed survey, the operating speed and relevant equation may be used to calculate the minimum sight distance.
3. Local transport corridor sight distances are calculated based upon Approach Sight Distance (ASD) with Reaction time (R_T) of 1.5 seconds.
4. Collector transport corridor sight distances are calculated based upon ASD with R_T of 2 seconds.
5. Arterial transport corridor sight distances are calculated based upon Safe Intersection Sight Distance (SISD) with R_T of 2 seconds.
6. Grade is based on 0%. Austroads provides adjustment factors for grades.
7. Sight distances have been rounded up to the nearest 5m.

Figure 25.14.4.1d - Sight distance measurement

There should be lines of clear sight from driver's eye height to driver's eye height (1.15m above ground level) along the lines detailed below.	
Lines AC and BD	All vehicle crossings on all transport corridors
Lines EC and ED (no permanent obstructions, exclude parked vehicles which may obstruct these sight lines occasionally)	All vehicle crossings on minor arterial, collector and local transport corridors
Lines EC and ED (no obstructions, parked vehicles not excluded)	All vehicle crossings on major arterial transport corridors
Points C and D are established by measuring the sight distance from Table in 25.14.4.1e) along the centre of the appropriate lane from points A and B. For practical purposes A and B can be taken as opposite the centre of the driveway.	
	
Note 1. Derived from the New Zealand Transport Agency, "Road and Transport Standards: Guidelines for Visibility at Driveways"	

Quantity	
f) Maximum number of vehicle crossings for any site within a Residential or Special Character Zone	One
g) Maximum number of vehicle crossings for any site, not within a Residential or Special Character Zone	i. One per frontage that is equal to or less than 20m wide ii. Two per frontage that is more than 20m wide (excluding frontages to the strategic network or arterial transport corridor iii. One per frontage to a strategic network or arterial transport corridor

Design and Access Widths

h) Vehicle crossing and internal vehicle access dimensions shall:

i. Comply with the relevant dimensions identified in the Tables below

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Vehicle crossing widths

Vehicle Crossings	Width (m)[1]	
	Minimum	Maximum
Residential and Special Character Zones	3.0	5.5
Rotokauri North Medium Density Zone – applies to a 'combined' vehicle crossing intended to serve two units (including a duplex)	5.5	6
All other Zones	5.0	7.5

1. Measured along the front boundary where it adjoins the Transport Corridor

Internal vehicle access widths

Internal Vehicle Access	Use of Access	Minimum Formation Width (m)
Residential units	1-6 units	3.0
	More than 6 units	5.5
Residential centres, visitor accommodation	1-12 occupants	3.0
	More than 12 occupants	5.5
Car parking facilities	Up to 15 spaces	3.0
	More than 15 spaces	6.0
All other sites used for industrial or business activities	Up to 5 occupancies	6.0
	More than 5 occupancies	8.0

ii. Be formed and drained with a permanent sealed or paved all weather, dust-free surface and in a manner suitable for the type and quantity of vehicles using the site.

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iii – The above access widths do not apply to rear lanes in Rotokauri North. Instead the following shall apply:

i) Minimum legal width of a two-way rear lane	7m
ii) Minimum legal with of one-way rear lane where parking spaces accessed directly off the lane and/or any reverse vehicle manoeuvring into the lane are aligned between 0° (parallel parking) to 45° (angled parking) to the lane.	4m
ii.) Minimum legal width of one-way rear lane where parking spaces accessed directly off the lane and/or any reverse vehicle manoeuvring into the lane are aligned between 46° (angled parking) and 90° (perpendicular parking).	7m

Note

1. Acceptable means of compliance for the design and construction of vehicle crossings is contained within the Hamilton City Infrastructure Technical Specifications.
2. Council will apply the Local Government Act 1974 to require action to prevent damage to the berm from crossings being of inadequate width or construction.

i) Any internal vehicle access shall be provided with sufficient clearance from the edge of the formation to buildings, fences and other structures to enable the safe and unobstructed operation of the vehicle access.

j) A passing bay shall be provided along an internal vehicle access which serves more than one allotment or more than five car parking spaces, in cases where:

i. The access is less than 5.5m wide and has a length greater than 70m, or

ii. Unrestricted visibility is not available over its full length.

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k) Location Restrictions in Rotokauri North

i. No vehicle crossing(s) may be located over a dedicated cycle lane or 3m shared path. A legal mechanism (consent notice) shall restrict vehicle crossings and access to rear lanes, access lots or side roads where a dedicated cycle lane or 3m shared path is on the allotments Transport Corridor frontage.

ii. No new vehicle crossing(s) may have direct access from State Highway 39.

25.14.4.2 Parking, Loading Spaces and Manoeuvring Areas

Quantity

a) Where:

- a new building is constructed on previously vacant land, or
- a new use establishes on previously vacant land or within a vacant building, or
- an existing building is altered in a way that increases the gross floor area, or
- an existing use increases in scale (e.g. increased gross floor area), or

- the use of land or buildings changes to a use with a higher traffic generation level,

then parking facilities shall be provided on that site for the increased parking demand in accordance with the levels set out in Tables 15-1a to 15-1f of Volume 2, Appendix 15-1, as applicable to the zone and activity, with the following exceptions:

i. If the activity is required to operate under an approved Concept Plan or Concept Development Consent that includes parking requirements, the levels set out in the Concept Plan or Concept Development Consent shall be applicable and the levels set out in Tables 15-1a to 15-1f of Volume 2, Appendix 15-1 shall not apply.

Note

1. Concept Plans or Concept Development Consents are generally a requirement for use and development within the Major Facilities Zone and the University of Waikato (Knowledge Zone). Activities that are required to operate under an approved Concept Plan or Concept Development Consent use the rates in Tables 15-1a to 15-1f of Volume 2, Appendix 15-1, for guidance only. It is expected that site specific parking rates based on actual parking demand and site surveys may be more appropriate.

ii. Staff cycle spaces required by Table 15-1a of Volume 2, Appendix 15-1 shall not be required to exceed one per ten Full Time Equivalent staff.

iii. Cycle parking spaces shall not be required where:

- The building setback is 0m for the entire frontage of the subject site.
- A publicly available cluster of cycle spaces is located within 50m of the public entrance of the activity and in sufficient quantities to meet the levels otherwise required by Table 15-1a of Volume 2, Appendix 15-1.

b) In the Central City Zone and Business 1 to 7 Zones, where 10 or more staff cycle spaces are required by Rule 25.14.4.2(a), end-of-journey cycle facilities for staff shall be provided in accordance with Table 15-1g of Volume 2, Appendix 15-1.

c) For car parking required by Rule 25.14.4.2(a), for non-residential uses.

i. Accessible car park spaces for people with a disability shall be allocated and provided for in accordance with Table 15-1d of Volume 2, Appendix 15-1.

ii. Where 50 or more car park spaces are provided, accessible car park spaces for less mobile users shall be allocated and provided for in accordance with Table 15-1e of Volume 2, Appendix 15-1.

d) In Business 1 to 7 Zones, where 10 or more on-site car parking spaces are provided, the total number of spaces shall not exceed the required car parking levels identified in Table 15-1a of Volume 2, Appendix 15-1 by more than 25%. Car parks leased to or shared with other activities to meet required parking levels for the other activities are excluded from this assessment. Any lease or sharing arrangements must be ongoing, for the duration of the activity and formalised by a legally binding mechanism.

e) Where the assessment of the number of parking spaces (of any type) results in a fractional space, any fraction under one-half shall be disregarded and fractions of one-half or greater shall be considered as one space.

Design

f) Parking spaces, loading spaces and manoeuvring areas shall:

i. Comply with the relevant dimensions and layouts in Table 15-1h of Volume 2, Appendix 15-1 and are suitably designed for the vehicles and their occupants.

Note

1. Acceptable means of compliance for the design of parking spaces (including accessible parking spaces), loading spaces and manoeuvring areas is contained within AS/NZS 2890.1:2004 Parking Facilities – Part 1: Off-Street Car-Parking. Examples of acceptable configurations are also contained in Figure 15-1i of Volume 2, Appendix 15-1.
   The Hamilton City Infrastructure Technical Specifications contains acceptable manoeuvring curves to ensure on-site layouts suitably provide for vehicle dimensions and turning radii.

ii. Be formed and drained with a permanent sealed or paved all weather, dust-free surface in a manner suitable for the type and quantity of vehicles using the site.

Note

1. Acceptable means of compliance for the formation and drainage of parking spaces, loading spaces and manoeuvring areas is contained within the Hamilton City Infrastructure Technical Specifications.

2. For Rotokauri North development, permeable pavements will also be considered a means of compliance with (ii).

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g) No part of any parking space, cycle space, loading space or manoeuvring area shall be located on any outdoor living area or service area.

h) Design and layout shall meet any requirements for landscaping and screening in the applicable zones and Chapter 25.5: City-wide – Landscaping and Screening.

i) All parking space, cycle space, loading spaces or manoeuvring areas, (excluding those for residential activities), which are used during the hours of darkness shall be illuminated in accordance with NZS1158.3.1 Lighting of Pedestrian Areas (P11), during the hours of operation of the activity that the areas serve.

j) Sufficient on-site manoeuvring areas shall be provided to avoid the reversing of vehicles off a site:

i. Where any car park has vehicle access to any arterial transport corridor.

ii. Where any car parking areas with vehicle access to any transport corridor contains:

A. More than five parking spaces, or

B. Is located more than 30m from the boundary with the transport corridor.

k) Vehicles occupying any parking or loading space shall have ready access to a transport corridor at all times, without needing to move any other vehicle occupying other parking or loading spaces.

This rule does not apply to:

i. Residential units, where instead only one car parking space per unit needs to have access at all times,

ii. Loading spaces for offices less than 100m^2 gross floor area,

iii. Staff parking areas, or

iv. Where an automated parking stacking system is used.

l) Where an automated parking stacking system is used, ready access from the system's entrance or exit to a transport corridor and sufficient queuing and manoeuvring area must be maintained at all times, without needing to move any other vehicle occupying other parking or loading spaces.

Note

1. For the purpose of the standards above "automated parking stacking system" means parking facilities that are controlled by a machine that moves and organises the vehicles into an arrangement for storage by means of mechanical stacking or similar method, and where drivers are only required to manoeuvre vehicles on to a pad or into a specific position.

m) Sufficient on-site manoeuvring areas shall be provided for loading spaces to avoid:

i. Vehicles needing to reverse off site on to an arterial transport corridor.

ii. Vehicles projecting on to the transport corridor whilst loading or unloading.

n) Where on-site parking is provided, sufficient space shall be provided for vehicle queuing as follows.

i. For up to and including 30 parking spaces, a minimum on-site queuing length of 6m.

ii. For more than 30 parking spaces, the vehicle capacity of the queuing length shall be calculated as (0.03) x (number of parking spaces). The required vehicle capacity calculated shall be rounded up to the next whole number (i.e. the next whole vehicle) and a queuing length of 6m provided per vehicle.

iii. The required queuing length shall be measured from the transport corridor boundary at the vehicle entrance of the site, to the nearest vehicle control point on the site.

iv. For the purpose of assessment, where more than one vehicle crossing is provided to a site, the required queuing length may be assessed for each access point individually, with each parking space allocated to the nearest usable entry vehicle crossing.

Provided that Rule 24.14.4.2 n) shall not apply to Residential Activities and Structures in the Residential or Special Character Zones.

o) Visitor cycle parking spaces shall be located within 30m of public entrances for the activity.

p) Staff cycle parking spaces shall be located so it may be easily accessed by regular users of the activity and may be provided off-site.

q) The design of cycle parking spaces shall meet the following requirements.

i. All cycle parking is adequately spaced to allow a cyclist to manoeuvre and attach a cycle to each stand.

ii. Visitor cycle parking shall consist of stands that:

A. Are securely attached to an immoveable object such as a wall or ground.

B. Support the bicycle frame.

C. Are clearly visible or signposted to cyclists entering the site.

D. Are able to be detected by the visually impaired when in publicly accessible areas so as to not create a safety hazard.

iii. Staff cycle parking shall consist of a stand or enclosed space that:

A. Allows the bicycle to be secured.

B. Is undercover or otherwise protected from inclement weather.

Note

1. Acceptable means of compliance for the design of cycle parking spaces is contained within the Hamilton City Infrastructure Technical Specifications.

25.14.4.3 Integrated Transport Assessment Requirements

Any activity that requires an ITA under this rule is also subject to Rule 25.14.3a).

Trip Generation Triggers

a) A Simple or Broad Integrated Transport Assessment (ITA) shall be prepared for activities as required by this rule, in accordance with the following trigger thresholds.

Activity	Trip Generation of Activity (vpd = vehicles per day)[1]						
	All areas other than Sensitive Transport Network			Sensitive Transport Network			All Areas
	LOW <100 vpd	MEDIUM 100 - 499 vpd	HIGH 500 - 1499 vpd	LOW <100 vpd	MEDIUM 100 - 249 vpd	HIGH 250 - 1499 vpd	SIGNIFICANT >1500 vpd
Any permitted activity in the relevant zone	-	-	Simple ITA required	-		Simple ITA required	Broad ITA required
Any restricted discretionary activity in the relevant zone	-	Simple ITA required	Broad ITA required	-	Simple ITA required	Broad ITA required	Broad ITA required
Any activity in the Central City Zone, excluding the Downtown Precinct	-	-	-	-	-	-	Broad ITA required
Any activity in the Downtown Precinct of the Central City Zone							Downtown Precinct ITA required

[1] Table 15-2d of Volume 2, Appendix 15-2 contains guidance for converting vehicles per day into other units of measures. This can be used for screening proposals to identify whether an ITA is required or not.

Existing Vehicle Access Triggers

b) For existing vehicle accesses to a strategic network or major arterial transport corridor, or where it takes access across an existing railway level crossing:

i. A Broad ITA shall be prepared for any restricted discretionary activity in the relevant zone (including subdivision), or

ii. A Simple ITA shall be prepared for any permitted activity in the relevant zone,

that increases the use of the vehicle access by more than 100 vehicles per day.

This standard shall not apply if the relevant road controlling authority or Kiwirail (in the case of railway level crossings) provides written confirmation that an ITA is unnecessary.

Specific Activity Triggers

c) A Broad ITA shall be prepared for new:

i. Schools.

ii. Hospitals.

iii. Transport depots (goods).

iv. Drive-through services.

v. Emergency service facilities (with traffic control signals controlling access).

vi. Transport corridor.

d) A Simple ITA shall be prepared for new:

i. Emergency service facilities (without traffic control signals controlling access).

Area Specific Triggers

e) i) A Broad ITA shall be prepared for any new activity within the 'Area A' identified in Volume 2, Appendix 15-7, Figure 15-7a, which exceeds the following traffic generation rate based on gross site area.

i. 14.1 trips/hectare/morning peak hour, or

ii. 15 trips/hectare/afternoon peak hour

Note

1. Every inward or outward movement from the site shall be counted as an individual trip.
2. The trip rates specified are those as they related to the peak hour of the road network, between the hours of 0700-0900 and 1600-1800 Monday to Friday and 1100-1300 on Saturday.
3. Gross site area includes any land to be vested as public road, open space, or other public purpose; any entrance strip with a width of 6m or less, any right of way, any private way or access lot; or any other land that is unable to be developed as part of an industrial site on a permanent basis.

e) ii) A Broad ITA shall be prepared for subdivision creating any additional lots, and/or any new development which generates greater than 100vpd, within 'Area B' identified in Volume 2, Appendix 15-7, Figure 15-7a.

In addition to the Broad ITA content specified in 25.14.4.3m) the assessment shall include but not be limited to, specific consideration of demand, levels of service, and options for mitigation at the following intersections as identified on Figure 15-7b in Volume 2, Appendix 15-7:

1. Te Kowhai Road/Te Rapa Road

2. Base Parade/Te Rapa Road
3. Wairere Drive/Te Rapa Road
4. Te Wetini Drive/Arthur Porter Drive/Wairere Drive/ramps to and from Mangaharakeke Drive
5. Foreman Road/Mangaharakeke Drive
6. Crawford Street/Mangaharakeke Drive/Avalon Drive roundabout
7. Avalon Drive (through road)/Avalon Drive (Connection to Rotokauri Road)

The purpose of mitigation is to ensure the safe and efficient operation of the transport network, and to maintain the desirable levels of service as follows:

i) An average delay per vehicle during peak hours on the approaches to intersections of no greater than:
   a. 55 seconds for the strategic network, major and minor arterial transport corridors;
   b. 80 seconds for all other transport corridors.

ii) On the strategic network, major and minor arterial transport corridors during peak hours:
   a. Average vehicle speeds between intersections restricted to no less than 90 percent of the posted speed limit;
   b. Average vehicle speeds, including intersections, constrained to no less than 18km/h;

iii) Unless demonstrated otherwise with site specific data, peak periods are taken to be 7am to 9am and 4pm to 6pm Monday to Friday.

f) A Broad ITA shall be prepared for any new managed care facilities; retirement villages; rest homes; and visitor accommodation activity on the defined site shown on Figure 15-7c in Volume 2, Appendix 15-7, where the traffic generation from all activities on the defined site exceed:

i. 989 trips in the morning peak hour, or

ii. 1,386 trips in the afternoon peak hour.

Note

1. Every inward or outward movement from the site shall be counted as an individual trip.
2. The trip rates specified are those as they related to the peak hour of the road network, between the hours of 1600-1800 Monday to Friday.

New Vehicle Access Triggers

g) A Broad ITA shall be prepared for any activities requiring a new vehicle access to a transport corridor.

i. That is part of the strategic network,

ii. That is identified as a major arterial transport corridor,

iii. From any site within the Major Facilities Zone (excluding the Thoroughbred Business Park),

iv. From the University of Waikato (Knowledge Zone),

v. That is identified as an active frontage in the Central City Zone (refer to Volume 2, Appendix 5, Figure 5-7 Active Frontages Overlay Plan), or

vi. From any site within the Central City Zone, other than from dedicated service lanes or public parking buildings or lots.

The assessment required by this rule may be reduced to a Simple ITA or removed if there is no internal connection possible to other entrances and the relevant Road Controlling Authority provides written confirmation that a Broad ITA is not appropriate. The trigger thresholds in Rule 25.14.4.3a) can provide guidance on the level of assessment necessary based on location and intensity of use.

h) A Broad ITA shall be prepared for any subdivision, use or development requiring a new railway level crossing access.

Peacocke Structure Plan Triggers

i) A Simple ITA shall be prepared for fee simple subdivisions in the Peacocke Character Zone in the following circumstances.

i. For creation of lots between 2ha and 10ha in the Terrace Area; or

ii. For creation of lots between 5000m2 and 10ha in the Gully and Hill Areas.

j) A Broad ITA shall be prepared for:

i. The subdivision of the 500 lots within Stage 1 of the Peacocke Structure Plan area; or

ii. Any Master Plan required for subdivision within the Peacocke Character Zone.

Exceptions

k) Rules 25.14.4.3 a) to e) do not apply to:

i. Events and Temporary Activities (see Chapter 25.3: City-wide – Events and Temporary Activities) where a Transport Management Plan is required.

ii. New activities in a Major Facilities Zone or the University of Waikato (Knowledge Zone) when in accordance with an approved Concept Development Consent (Volume 2, Appendix 1.2.2.14).

iii. New activities in accordance with an approved Comprehensive Development Plan (Volume 2, Appendix 1.2.2.8).

iv. New activities in the Te Rapa North Industrial Zone when in accordance with an approved Concept Development Consent (Volume 2, Appendix 1.3.2D).

v. New activities at the Ruakura Research Centre (Knowledge Zone) and Waikato Innovation Park (Knowledge Zone) when in accordance with an approved Concept Plan.

l) Rule 25.14.4.3 a) does not apply to activities within an approved Structure Plan Area (Refer Chapter 3 and Appendix 2), except that a Broad ITA shall be prepared for significant (>1,500vpd) traffic generating activities. This exception does not apply to those activities covered by Rule 25.14.4.3h) or Rule 25.14.4.3e) ii) above.

Content

m) All ITAs shall be completed by suitably qualified professionals and should generally follow the approach and guidelines of New Zealand Transport Agency's "Research Report 422: Integrated Transport Assessment Guidelines, November 2010". Requirements and report format for ITAs are included in Tables 15-2a Simple ITA and 15-2b Broad ITA of Volume 2, Appendix 15-2.

Proposed Plan Change XX- Rotokauri North Private Plan Change

Rotokauri North Triggers

n) In addition to any other requirement for an ITA any subdivision (other than subdivision of a duplex) must include an assessment from a suitably qualified transportation engineer to indicate whether the anticipated trip generation/vehicle movement and/or new roading connections require new intersections or upgrades to existing intersections identified on the Rotokauri North Structure Plan.

25.14.4.4 Minimum Sight Distances at Railway Level Crossings

a) New buildings, structures and activities that would obstruct drivers seeing approaching trains shall not be located within the Approach Sight Triangles and Restart Sight Triangles of any Railway Level Crossing.

b) Approach Sight Triangles shall be measured using the vehicle approach speeds and distances identified in Table 15-3a measured in accordance with Figure 15-3b of Volume 2, Appendix 15-3.

c) Restart Sight Triangles shall be measured using the distances identified in Table 15-3c measured in accordance with Figure 15-3d of Volume 2, Appendix 15-3.

d) Rule 25.14.4.4 does not apply to transport infrastructure or signage required to manage traffic at the Railway Level Crossing.

Note

1. Approach Sight Triangle controls ensure sight distances are maintained to ensure transport corridor users are able to see a train and stop before the crossing or to continue at the approach speed and cross the level crossing safely.
2. Restart Sight Triangle controls ensure transport corridor users stopped at level crossing are able to see far enough along the railway line to be able to start off, cross and clear the level crossing safely before the arrival of any previously unseen train.

25.14.4.5 Height of Structures – Horizontal and Conical Obstacle Limitation Surfaces

a) No building, mast, tree or other object shall penetrate any of the horizontal and conical obstacle limitation surfaces surrounding Hamilton Airport as shown in Volume 2, Appendix 15-9.

Note

1. The Horizontal Obstacle Limitation Surface is located in a horizontal plane above the main runway with an elevation of 102m Moturiki Datum having its outer limit at a locus of 4000m measured from the periphery of the main strip.
2. The Conical Obstacle Limitation Surface slopes upwards and outwards from the periphery of the Horizontal Surface at a gradient of 1 vertical to 20 horizontal to an elevation of 207m above Moturiki Datum.
3. Where any Resource Consent is required as a result of non-compliance with this rule then consultation with the operator of Hamilton Airport is advised. Evidence of any consultation with and support or comments from the operator of Hamilton Airport should be included in the resource consent application.

25.14.5 Rules – Specific Standards

25.14.5.1 New Transport Corridors

The provisions of the following chapters apply to new transport corridors where relevant.

- Chapter 2: Strategic Framework
- Chapter 3: Structure Plans
- Chapter 19: Historic Heritage
- Chapter 20: Natural Environments
- Chapter 21: Waikato River Corridor and Gully Systems
- Chapter 22: Natural Hazards
- Chapter 23: Subdivision
- Chapter 24: Financial Contributions
- Chapter 25: City-wide

25.14.6 Restricted Discretionary Activities: Matters of Discretion and Assessment Criteria

a) In determining any application for resource consent for a restricted discretionary activity, Council shall have regard to the matters referenced below, to which Council has restricted the exercise of its discretion. Assessment Criteria within Volume 2, Appendix 1.3 provide for assessment of applications as will any relevant objectives and policies. In addition, when considering any Restricted Discretionary Activity located within the Natural Open Space Zone, Waikato Riverbank and Gully Hazard Area, or Significant Natural Area, Council will also restrict its discretion to Waikato River Corridor or Gully System Matters (see the objectives and policies of Chapter 21: Waikato River Corridor and Gully Systems).

Activity Specific	Matter of Discretion and Assessment Criteria Reference Number (Refer to Volume 2, Appendix 1.3.3)
i. Any activity required to prepare a simple or broad Integrated Transport Assessment by Rule 25.14.4.3*	• G – Transportation
ii. New transport corridors	• G – Transportation

Note

1. Refer to Chapter 1.1.9 for activities marked with an asterisk (*)

25.14.7 Other Resource Consent Information

Refer to Chapter 1: Plan Overview for guidance on the following.

- How to Use this District Plan
- Explanation of Activity Status
- Activity Status Defaults
- Notification / Non-notification Rules
- Rules Having Early or Delayed Effect

Refer to Volume 2, Appendix 1: District Plan Administration for the following.

- Definitions and Terms Used in the District Plan
- Information Requirements
- Controlled Activities – Matters of Control
- Restricted Discretionary, Discretionary and Non-Complying Activities Assessment Criteria
- Design Guides
- Other Methods of Implementation

25.15 Urban Design

25.15.1 Purpose

a) Good quality urban design is fundamental in delivering the Council's Vision for a smart, liveable city which is attractive, well-designed and compact with a strong sense of place. The District Plan is a 'design led' plan which is 'outcome' focused. The consideration of urban design throughout the Plan chapters is required to ensure that urban design principles are applied consistently throughout all zones.

b) Urban design applies not only to the appearance but also the function and feel of buildings and public spaces including streets. It focuses on public frontages and spaces and addresses elements such as streetscape, walkability, sustainable design, mixed-use development, 'active edges' of building frontages, and people's safety and accessibility.

c) Quality urban design is recognised as having economic, environmental, cultural and social dimensions (*The Value of Urban Design: The economic, environmental and social benefits of urban design, Ministry for the Environment, 2005*). Good quality design increases economic value, producing higher returns on investment. It can also reduce management and maintenance costs, lead to more productive workplaces, and enhance image and prestige.

d) Quality urban design assists to enhance environmental, social, cultural and economic wellbeing by establishing urban environments that:

   i. Are competitive, thrive economically and facilitate creativity and innovation.

   ii. Provide a choice of housing, work and lifestyle options.

   iii. Are healthy and assist to sustain people and nature.

   iv. Are inclusive and offer opportunities for all citizens.

   v. Are distinctive and have a strong identity and sense of place.

   vi. Are well-governed and have a shared vision and sense of direction.

   vii. Are well connected and accessible for a range of users.

e) Within some zoning chapters outlined in this plan new buildings are to have matters such as design quality, appearance and amenity considered as controlled or restricted discretionary activities. This is combined with design led assessment criteria which combines international best practice urban design principles with factors considered to be of special importance to the City of Hamilton and its surrounding environments. The design principles identified within the plan also reflect New Zealand's national Urban Design Protocol of which Hamilton City has been a signatory since 2006.

f) The *City Design Guide* VISTA further outlines Hamilton's expectations for better designed environments – describing how a well-designed place should look, feel and function. The non-regulatory guide highlights key urban design principles considered fundamental to Hamilton's development as a prosperous, memorable and sustainable city.

g) Objectives, policies, rules and assessment matters within this District Plan, along with other methods adopted by Council, seek to facilitate and encourage

subdivision and development design in a manner that will continually enhance the quality of the City's urban environments. While many urban design matters are responded to directly within the chapters of this District Plan, including specific topic and area based design guidance, this section provides the objectives and policies for those urban design matters that need to be considered throughout Hamilton regardless of the zoning that may apply.

25.15.2 Objectives and Policies: Urban Design

Objective	Policies
25.15.2.1 Urban environments that promote the retention and enhancement of urban amenity values, i.e. pleasantness, aesthetics, coherence, cultural and recreational values.	**25.15.2.1a** Streetscape quality, public open spaces and pedestrian amenity are improved through appropriate streetscape and built-form which enhances the appearance, functionality, comfort and safety of the pedestrian environment.
	25.15.2.1b Built form and public amenity features, including public art, are encouraged to enhance public awareness of historic and contemporary heritage and culture.
	25.15.2.1c A high standard of internal and external amenity for commercial and community buildings and a high standard of external amenity for residential buildings are provided, including provision of natural ventilation, recreation space, daylight and sunlight access, and adequate living space for residential units.
Explanation	
The pleasantness, aesthetics, coherence, cultural and recreational values of an urban environment can assist to enhance the environmental, social, cultural and economic wellbeing of the community. *Through the District Plan, for both controlled and restricted discretionary activities, matters such as design quality, scale, appropriate streetscape, provision of active frontages, articulated facades and safe, legible pedestrian connections will be considered as part of the assessment criteria. Other methods such as area specific design guides, will also be used. Council can facilitate discussion, encourage and provide for design responses that will continually increase these values and the wellbeing of the Hamilton community.*	

Objective	Policies
25.15.2.2 Urban environments that promote a positive sense of place and are reflective of the characteristics of the surrounding local environment.	**25.15.2.2a** Development within residential, business and City living areas is encouraged to promote a sense of human scale.
	25.15.2.2b Development will be expected to respond positively to the character of the area, the scale and proportion of buildings and spaces in which it is situated.
	25.15.2.2c Public and private development is encouraged to provide for attractions or focal points (including 'gateways') that assist in enhancing community identity.
	25.15.2.2d Sympathetic, contemporary design responses to cultural and heritage character within the surrounding local environment is encouraged.
	25.15.2.2e Distinctive architectural styles within identified character areas are retained.
Explanation	
It is important that the positive characteristics of the local urban environment are embraced in future subdivision and development so that the local environment retains its distinctiveness, and from this, its unique sense of place. *Through the District Plan and other methods such as the Urban Design Panel, Council can facilitate and encourage design which reflects those positive attributes to enhance the sense of place and local identity.*	
Objective	**Policies**
25.15.2.3 Continued enhancement of public and personal safety throughout the City, by reducing opportunities for crime to occur.	**25.15.2.3a** The assessment of and appropriate responses to Crime Prevention Through Environmental Design (CPTED) principles is required within subdivision and development proposals, to reduce threats to personal safety and security and to promote the delivery or development of environments where people feel safe.
	25.15.2.3b The concepts and philosophy of CPTED are included in the Council's design, planning, management and use of public space and community facilities.

Explanation
Public and personal safety is essential to develop and sustain an inclusive City in which all ages and genders can feel comfortable. The use of CPTED principles in subdivision and development proposals such as the provision of linkages, accessibility in subdivision design and active surveillance, will assist in creating and maintaining such a city.

Objective	Policies
25.15.2.4 Subdivision and development which is well connected, legible and promotes sustainable energy use.	**25.15.2.4a** Subdivision and development design responds positively to local amenity and character values and promote use of renewable energy sources.
	25.15.2.4b Subdivision and development patterns through good through site linkages and consideration of site context promote walking, cycling and other active modes of transport.

Explanation
Sustainable energy use in subdivision and development has positive impacts on people economically, socially and culturally, as well as benefitting the natural environment. Through the District Plan and other methods Council can encourage subdivision and development which promotes sustainable energy use, either through the design and orientation of buildings, windows and open space, provision of through-site links for pedestrians and cyclists, or on-site water conservation measures.

Objective	Policies
25.15.2.5 Urban environments that integrate land use with transport planning to provide permeable, highly connected and sustainable transport networks.	**25.15.2.5a** Activities that are well located in respect of travel demand promote an efficient transport hierarchy and compact City around key nodes and circulation networks.
	25.15.2.5b Development promotes connectivity and accessibility with pedestrian routes, cycleways, public reserves and green corridors.

Explanation
Integrating land use in subdivision and development design has positive impacts on people economically, socially and culturally, as well as benefitting the natural environment. Through the District Plan and other methods Council can encourage an integrated approach to land use and transport planning which promotes sustainable travel patterns and energy use, either through integration of existing circulation networks including transport corridors, cycleways, public reserves and green corridors or a highly connected and permeable road hierarchy.

25.15.3 Other Resource Consent Information

Refer to Volume 2, Appendix 1: District Plan Administration for the following urban design criteria and guidance.

- Controlled Activities – Matters of Control
- Restricted Discretionary, Discretionary and Non-Complying Activities Assessment Criteria
- Design Guides

Appendix 1: District Plan Administration

Purpose

This chapter contains matters necessary for administering and implementing the District Plan and Council's assessment and determination of resource consent applications. These matters are:

- 1.1 Definitions and Terms
    - 1.1.1 Acronyms Used in the District Plan
    - 1.1.2 Definitions Used in the District Plan
- 1.2 Information Requirements
- 1.3 Assessment Criteria
    - 1.3.1 Guide to Using the Criteria
    - 1.3.2 Controlled Activities – Matters of Control
    - 1.3.3 Restricted Discretionary, Discretionary and Non-Complying Assessment Criteria
- 1.4 Design Guides

This chapter also identifies other methods of implementation (1.5) relevant to the issues raised in the District Plan.

1.1 Definitions and Terms

1.1.1 Acronyms Used in the District Plan

AEE	Assessment of Environmental Effects
CDP	Comprehensive Development Plan
cds/m^2	Candelas per square metre
CPTED	Crime Prevention through Environmental Design
FTE	Full-Time Equivalent
GFA	Gross Floor Area
GLFA	Gross Leasable Floor Area
ICMP	Integrated Catchment Management Plan
ITA	Integrated Transport Assessment
LIUDD	Low-Impact Urban Design and Development
LAP	Local Area Plan
LTP	Long-Term Plan
m^2	Square metres
m^3	Cubic metres
NIMTR	North Island Main Trunk Railway
NMP	Noise Management Plan
PFA	Public Floor Area
RPS	Regional Policy Statement
VPD	Vehicles Per Day

1.1.2 Definitions Used in the District Plan

Unless specified otherwise the definitions below apply in this District Plan. Where any term used in the District Plan is not defined below or elsewhere in the District Plan (including by reference) then the following hierarchy of definition sources applies as appropriate and relevant to the context:

a) The Resource Management Act 1991 and its regulations.

b) Any relevant National Policy Statement or National Environmental Standard.

c) Any other relevant New Zealand legislation and their regulations.

d) The Oxford Concise English Dictionary.

Accessible: Means able to be accessed by all users including those with sight and mobility impairment.

Accessibility: Means the ease with which activities, either economic or social, can be reached or accessed by people.

Accessibility modelling: Means the measurement of how easy it is for an individual to participate in desired activities, based on a set of factors, including mode and destination choice.

Accessible parking spaces: Means parking spaces designed specifically for vehicle users with mobility impairments.

Accessory building: Means a building, which is clearly incidental to the principal building or primary land use on a site. Accessory buildings include garages, carports, sleep-outs, rumpus rooms, garden sheds, and storage sheds. Such a building will not meet all of the primary living requirements of the occupants, and the occupants remain members of the principal household. An accessory building used as a sleep-out must contain no more than two bedrooms and must not contain any kitchen facilities or laundry facilities. Solar panels and solar water-heating devices not attached to a building are included in the definition of an accessory building. Accessory buildings can be either attached to or detached from another building on the site.

Access strip: Means a strip of land created by the registration of an easement in accordance with Section 237B of the Resource Management Act for the purpose of allowing public access to or along any river, or lake, or the coast, or to any esplanade reserve, esplanade strip, other reserve, or land owned by the local authority or by the Crown (but excluding all land held for a public work except that held, administered, or managed under the Conservation Act 1987 and the Acts named in the First Schedule to that Act).

Access way: As defined in s315(1) of the Local Government Act 1974.

Acoustic Design Certificate: Means a certificate provided by an acoustic engineer, architect or other person(s) experienced in the field of acoustic design.

Act: Means the Resource Management Act 1991 and any amendments.

Active frontage: Means a façade of a building that includes windows and preferably an entrance to encourage activity and allow passive surveillance of the street, carpark or area of public space.

Active modes of transport: Means those methods of transportation that involve physical effort such as walking and cycling.

Adjacent: Means lying near to, but not necessarily contiguous to.

Adjoining: Means next to and joined with or is contiguous to.

Allotment: Means:

a) Any parcel of land under the Land Transfer Act 1952 that is a continuous area and whose boundaries are shown separately on a survey plan, whether or not:

   i. The subdivision shown on the survey plan has been allowed, or subdivision approval has been granted by Council.

   ii. A subdivision consent for the subdivision shown on the survey plan has been granted under the Act.

b) Any parcel of land or building or part of a building that is shown or identified separately:

   i. On a survey plan.

   ii. On a licence within the meaning of Part 7A of the Land Transfer Act 1952.

c) Any unit on a unit plan.

d) Any parcel of land not subject to the Land Transfer Act 1952.

Alterations and additions: Means any work to existing buildings or structures which involves the addition, change, removal or replacement of walls, windows or features which results in an external appearance different to its existing appearance, but excludes activities identified in the definition for 'Minor Works (in Business 1-7, Central City, Industrial, Ruakura Logistics and Ruakura Industrial Park Zones)'. It may result in increasing or decreasing floor space through change of the external walls.

Amateur radio: Means a radio-communication service for the purpose of self-training, intercommunication and technical investigations carried out by amateurs, that is, by duly authorised persons interested in radio technique solely with a personal aim and without pecuniary interest.

Amateur radio configuration: Means the antennas, aerials (including rods, wires and tubes) and associated supporting structures which are owned and used by licensed amateur radio operators.

Amenity Protection Area: Means an area within an Industrial Zone adjacent to the boundary with residential sites or other sensitive areas. The extent of Amenity Protection Areas is indicated on the Planning Maps. Amenity Protection Areas provide greater control with respect to building height, site coverage, hazardous facilities, landscaping and screening within the Industrial area in order to minimise adverse effects on the amenity of residential sites, or other sensitive areas, adjacent to land zoned Industrial.

Amenity values: means those natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes.

Ancillary: Means an activity or structure which is subordinate or subsidiary to the principal activity on the site.

Ancillary residential structure: Means a structure associated with the day-to-day running of a household that does not meet the definition of a 'building'. This includes letterboxes, clothes lines, swimming pools and accessories, ornamental pools, fences and walls not exceeding 2.5m in height, steps, terraces and patios (not roofed or enclosed, and not exceeding 1m in height).

Ancillary residential unit: Means a self-contained residential unit held in common ownership with the primary activity on the site. To be self-contained the ancillary residential unit must have a kitchen, bathroom, bedroom(s), living room and laundry facilities. The ancillary residential unit can be attached to the principal building, or be a detached stand-alone structure. In the Industrial and Ruakura Logistics Zone it means any residential unit ancillary to any activity undertaken on site, e.g. a caretaker's residence, live-in employees or security staff accommodation.

Ancillary retailing and offices: Means any retail or office activity on the same site as the principal activity, and whose use is ancillary to that principal activity (e.g. a retail showroom attached to a manufacturing premises) and forms an integral part of the business occupying the site.

Annual Average Daily Traffic (AADT): Refer to NZS6806: 2010 Acoustics – Road traffic noise – New and altered roads.

Annual Exceedance Probability (AEP): Means the probability, expressed as a percentage, that a flood of a given magnitude will be equalled or exceeded in any one year. For example, a 1% AEP means an event that has a 1% probability of occurring or being exceeded in any one year.

Antenna (defined in the National Environmental Standard for Telecommunications Facilities 2008): Means a device that:

a) Receives or transmits radio-communication or telecommunication signals.

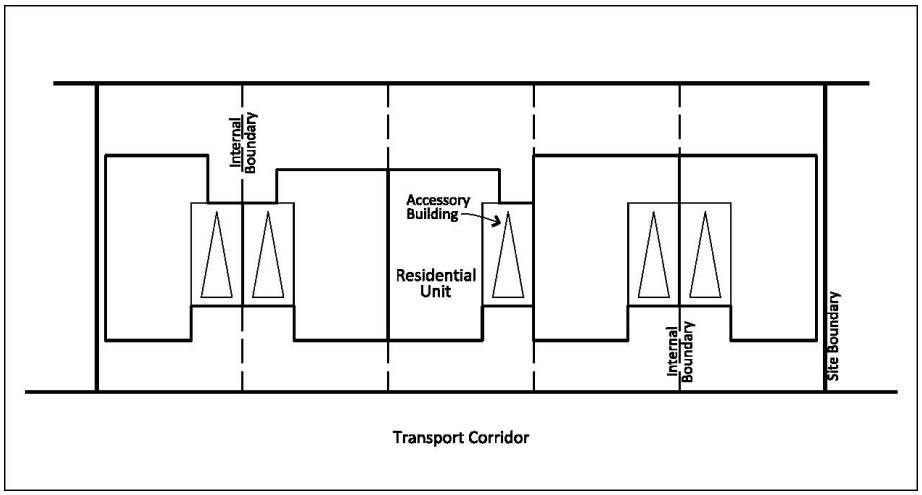
b) Is operated by a network operator.

c) Includes the mount, if there is one, for the device.

d) Includes the shroud, if there is one, for the device.

Any activity specified in the Hamilton City Public Places Bylaw 2009 or Public Places Policy 2009: Means outdoor dining, signs in public places, markets, stalls, merchandise displays and mobile shops, busking, hawking and charitable collection.

Apartment building: Means a residential building comprising three or more attached residential units. For the avoidance of doubt, residential units physically connected by one or more accessory buildings, such as garages, will also be deemed to be attached.



Archaeological Site (as stated in the Heritage New Zealand Pouhere Taonga Act 2014): Means any place in New Zealand that:

a) Either —

   i. Was associated with human activity that occurred before 1900 or,

   ii. Is the site of the wreck of any vessel where that wreck occurred before 1900.

b) Is or may be able, through investigation by archaeological methods, to provide evidence relating to the history of New Zealand.

Arterial transport corridor: Means any major or minor arterial transport corridor.

Artificial watercourse: A watercourse that contains no natural portions from its confluence with a river or stream to its headwaters and includes irrigation canals, water supply races, canals for the supply of water for electricity power generation and farm drainage canals.

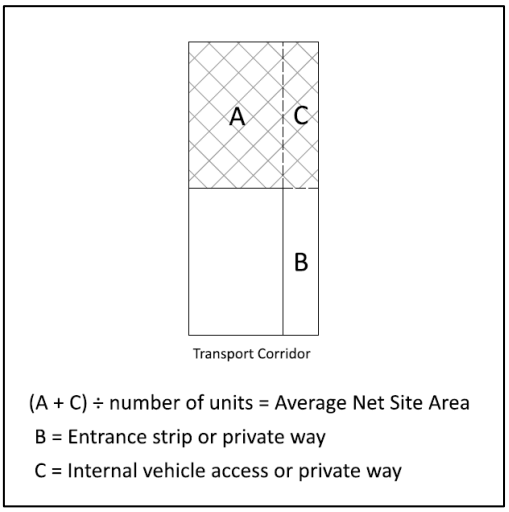
Assessment Period: Means the time over which traffic conditions for the expected environment should be considered as part of a simple or broad Integrated Transport Assessment as described in Appendix 15-2. This should include traffic growth, planned infrastructure and changes in nearby land use and access characteristics.

Automotive and/or marine suppliers: Means a business primarily engaged in selling automotive vehicles and/or marine craft, accessories to and parts for such vehicles and craft.

Includes:

- boats and boating accessories
- trucks, cars and motorcycles
- auto parts and accessories
- trailers and caravans
- tyres and batteries
- mobility scooters.

Average Net Site Area: means the area of the site, including any internal vehicle access or private way, but excluding any entrance strip or private way to a rear site from any transport corridor, divided by the number of residential units.



Bank: Means a financial establishment that receives money on current or deposit account, provides a transactional deposit and withdrawal service, provides credit/makes loans at interest and exchanges currency. This excludes offices of banks without a transactional service element or where such transactions are limited to electronic funds transfer at point of sale (EFTPOS machines).

Bed: Means:

a) In relation to any river:

   i. For the purposes of esplanade reserves, esplanade strips, and subdivision, the space of land which the waters of the river cover at its annual fullest flow without overtopping its banks.

   ii. In all other cases, the space of land which the waters of the river cover at its fullest flow without overtopping its banks.

b) In relation to any lake, except a lake controlled by artificial means:

   i. For the purposes of esplanade reserves, esplanade strips, and subdivision, the space of land which the waters of the lake cover at its annual highest level without exceeding its margin.

   ii. In all other cases, the space of land which the waters of the lake cover at its highest level without exceeding its margin.

c) In relation to any lake controlled by artificial means, the space of land which the waters of the lake cover at its maximum permitted operating level.

Bioaccumulation: Means accumulation of a substance within the tissues of living organisms.

Block: Means accumulation of allotments bounded on all sides by public roads.

Boarding kennels and catteries: means any land, structures or buildings used for the purpose of accommodating dogs or cats on a commercial basis, but does not include the keeping of dogs or cats as an ancillary activity for domestic purposes, or the keeping of dogs to assist in the management of a farm or other rural activity.

BOD_5: Means the biochemical oxygen demand (measured at 20°C over a 5-day period), which is the amount of dissolved oxygen in a body of water required for the breakdown of organic matter in the water. When discharged to surface water or groundwater, these substances have the potential to deplete oxygen as a result of microbial decomposition of organic material (e.g. milk or other foodstuffs). In the context of a hazardous substance a high BOD_5 is >10,000 mg/l.

Boundary Adjustment: Means an alteration of boundaries between two or more allotments (whether or not the allotments are held within the same Computer Freehold Registers) which will result in each of the allotments having substantially the same boundaries, area, shape and access as before.

Buffer Strip: Means a planting strip of a permeable nature with planting consisting of shrubs which can grow to a mature growth height of at least 2 metres, planted at a maximum of 1.5 metres apart, and including at least 1 tree for every 10m of boundary length.

Building: Means any structure of any kind, whether temporary or permanent, moveable or immoveable, and includes:

a) Any fence or wall over 2.5m in height.

b) Any retaining wall over 1.5m in height and load bearing.

c) Any scaffolding or falsework erected temporarily for maintenance or construction purposes.

d) Any vehicle, trailer, tent, caravan or boat, whether fixed or moveable, used as a place of accommodation, business or storage.

e) Any swimming pool with walls more than 1.2m above the ground level at any point.

f) Any deck more than 1m above the ground level at any point.

g) A mast pole or a telecommunication aerial that is on, or forms part of, a building and that is more than 7m in height above the point of its attachment or base support (except a dish aerial that is less than 2m wide).

A building does not include:

h) Except for the purposes of the Electricity Transmission Corridor Rules in Table 25.7.4:

   (i) Pergolas, not roofed or enclosed, and not exceeding 3m in height; and

   (ii) Lych-gates not exceeding 3m in height.

i) Steps, terraces and patios, not roofed or enclosed, and not exceeding 1m in height.

j) Public art, floodlights, goal posts, park furniture.

Buildings housing network utility equipment: Means structures needed for housing pumps, weather stations, recording stations, etc, containing network utility structures.

Building improvement centre: Means premises used for the storage, display and sale of goods and materials used in the construction, repair, alteration and renovation of buildings and includes nurseries and garden centres.

Building line: Refer to **building line restriction**, **front building line** or **rear building line** as relevant.

Building line restriction: Means a restriction imposed on a site to ensure that when new buildings are erected, or existing buildings re-erected, altered or substantially rebuilt, no part of any such building shall stand within the area between the building line and the adjacent site boundary.

Bulk and location provisions: Means density, site coverage, permeable surfacing, height in relation to boundary, building setback, separation, outdoor living area and service area related provisions.

Bulk power supply: Means greater than 20kW generation.

Business activities: Means activities carried out on a site principally for commercial gain.

Business activities associated with the racing industry: Means businesses which are associated with horse-racing activities, such as those undertaken at Te Rapa Racecourse. This includes administration services for the racing industry, authorised betting agencies, offices for businesses involved in bloodstock and/or breeding and/or training and/or racing of horses, businesses providing veterinary and/or research services, and retail and/or manufacturing activities which predominantly handle equine-related products.

Cabinet (defined in the National Environmental Standard for Telecommunication Facilities, 2008): Means a casing around equipment that is necessary to operate a telecommunication network.

Central City transport corridor: Means any transport corridor identified as a Central City transport corridor in Appendix 15, Figure 15-4e, the function and form of which is defined in Volume 2, Appendix 15-4.

Centre Viability Assessment Report: Means an analysis to determine whether the scale and trading format of the activity is appropriate for the location, having regard to the hierarchy of business centres, maintaining the primacy of the Central City and the opportunity for development within higher order centres.

Childcare facilities: Means premises where children are cared for or given basic tuition and includes a crèche, day or after-school care, pre-school, kindergarten, kohanga reo or play centre. This term excludes a school.

Clean fill: Includes soil, clay, sand, gravel, silt, rock and other inert materials such as broken concrete and brick, or mixtures of any of the above, but excludes materials:

a) Containing hazardous substances.

b) Contaminated with hazardous substances or pathogens.

c) Derived from hazardous waste treatment, hazardous waste stabilisation or hazardous waste disposal practices.

d) Medical and veterinary waste, asbestos, or radioactive substances that may present a risk to human health.

e) Likely to create leachate by biological or chemical breakdown.

f) Containing organic content of 5% or more of the total volume.

g) Having a particle size of 200mm or more.

Clubrooms: Means premises which are set aside for the use, convenience and enjoyment of a recreational or community organisation which may be licensed under the Sale and Supply of Alcohol Act.

Collector transport corridor: Means any transport corridor identified in Appendix 15, Figure 15-4b to 15-4f as Collector or Proposed Collector, the function and form of which is defined in Appendix 15-4.

Commercial activities on the surface of water: Means any activity undertaken on the surface of water for commercial gain. This includes motorised and non-motorised commercial activities such as jet-boats, cruise boats and kayak tours.

Commercialisation of research and innovation activities (Precincts A and B – Knowledge Zone): Means activities directly related to permitted research and innovation activity including prototype development and maintenance, initial run product development, manufacturing method development and logistics method development.

Communal open space: Means a quantity of landscaped land freely available to all residents on the site, exclusive of driveways, buildings, and private outdoor space of individual residential units.

Community garden: Means a garden operated by a group or collective on public land for the purpose of growing plants, vegetables or fruit. Not for commercial gain.

Community Centre: Means premises designed to act as a meeting place for people of all ages in the local community. It provides for a range of functions such as playgroups for children, before- and after-school care, crafts, education courses/seminars, spiritual, cultural, recreational, health and wellbeing purposes. It also acts as a base for social support and possibly delivers some social services. They can also include ancillary offices, temporary fundraising activities and one small retail activity for the purpose of providing fundraising or a social service (such as an opportunity shop). Such centres are owned/administered by local or central government authorities, and voluntary /charitable organisations providing voluntary/not-for-profit services.

Community scale energy generation (produces less than 20kW): Means renewable energy generation for the purpose of using electricity on a particular site, supplying an immediate community, or connecting into the distribution network (but excludes solar panels supplying electricity for the site on which they are located).

Company lease: Has the same meaning as the Act.

Conference facilities: Includes seminar rooms.

Construction work: Means any work in connection with the construction, erection, installation, carrying out, repair, maintenance, cleaning, painting, renewal, removal, alteration, dismantling, or demolition of:

a) Any building, erection, edifice, structure, wall, fence or chimney, whether constructed wholly or partly above or below ground level.

b) Any road, motorway, harbour or foreshore works, railway, cableway, tramway, canal, or aerodrome.

c) Any drainage, irrigation, or river control work.

d) Any electricity, water, wastewater, stormwater, gas, or telecommunications reticulation.

e) Any bridge, viaduct, dam, reservoir, earthworks, pipeline, aqueduct, culvert, drive, shaft, tunnel, or reclamation.

f) Any scaffolding.

Construction work includes:

a) Any work in connection with any excavation, site preparation, or preparatory work, carried out for the purpose of any construction work.

b) The use of any plant, tools, gear or materials for the purpose of any construction work.

c) Any construction work carried out underwater, including work on ships, wrecks, buoys, rafts, and obstructions to navigation.

d) Any inspection or other work carried out for the purpose of ascertaining whether construction work should be carried out.

Construction noise: Means noise arising from any construction work, as defined above.

Contaminated land: Has the same meaning as the Act.

Council: Means the Hamilton City Council and includes any committee, subcommittee or person acting under delegated authority.

CPTED: Means Crime Prevention Through Environmental Design, a crime-prevention philosophy based on the premise that

"proper design and effective use of the physical environment can produce behavioural effects that will reduce the incidence and fear of crime, thereby improving the quality of life. These behavioural effects can be accomplished by reducing the propensity of the physical environment to support criminal behaviour"
(Crowe, 1991, *Crime Prevention Through Environmental Design: Applications of Architectural Design and Space Management Concepts*.)

Note

Further guidance in relation to CPTED principles can be obtained within the Ministry for Environment's CPTED guidelines.

Cross lease: Has the same meaning as the Act.

Culvert Block Flood Hazard Area: Means that part of any land affected by flooding as a consequence of a blocked culvert downstream. This is the maximum extent of flooding before water overtops the accessway or transport corridor above the culvert (refer to the Planning Maps).

Cumulative risk: Means the risk posed by a Hazardous Facility added to or multiplied, or otherwise cumulated by risks from other facilities.

Customary activities: As described in Schedule 3 of Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010 and includes cultural harvest as defined in Section 63(9) of the Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010.

Dairy: Means the use of a building in a residential area for the sale of day-to-day food and associated household items. The majority of its trade must be derived from the sale of milk, bread, non-alcoholic beverages and other day-to-day convenience merchandise. Retail activity involving food cooked on the premises and the sale of alcohol are excluded.

Demolition or removal of buildings: Means dismantling, destruction and/or removal of part or all of any building.

Design Speed Environment: Means the maximum speed of vehicles created by traffic management and the design of transport corridors. These speeds reflect the desirable maximum speeds given the land use environment and transport corridor hierarchy. Refer to Appendix 15-6 for further detail.

Design year (Chapter 25.8: City-wide – Noise and Vibration): Refer to NZS6806: 2010 Acoustics – Road traffic noise – New and altered roads.

Development: Means any activity undertaken to change the scale, character or intensity of any use of land, and includes any building activity.

Development Agreement: Means a binding contract between Council, other infrastructure providers and developers for the funding of additional infrastructure and the use and upgrading of existing infrastructure.

Dish: Means an antenna with which signals are transmitted to, or received from, a communications satellite. This applies to dishes attached to a building, as well as those mounted on their own support structure.

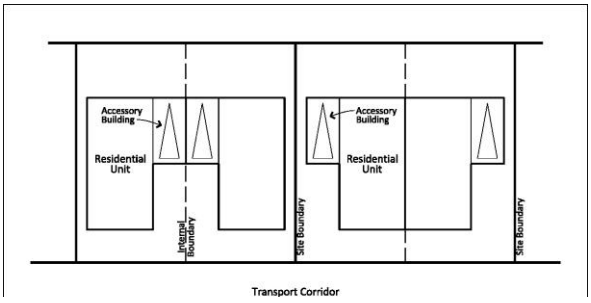
Dispensing facility: Means for drive-through fast food or service outlets each single combination of an order point, a payment point, and a collection point and for service stations a single petrol pump or a group of petrol pumps that are grouped on a single 'island'.

Disposal: Means discharge of a hazardous substance into the environment, with or without biological or chemical treatment that may change composition and characteristics of the substance.

Drive-through services (excluding service stations within the Rototuna Town Centre Zone): Means any premises where goods and services are offered for sale to the motoring public, primarily in a manner where the customer can remain in their vehicle. Drive-through services can include dispensing and associated storage of motor fuels (as the primary activity) and the sale of associated goods, services, food and beverages, fast-food outlets providing on-demand meals prepared on the premises for consumption therein or take away, the provision of servicing and running repairs for light motor vehicles and any other activity of a drive-through nature, including those ancillary to the above.

Duplex dwelling: Means a residential building comprising two attached residential units on one allotment, or two Computer Freehold Registers where subsequently subdivided in reliance on rule 23.7b)ii). For the avoidance of doubt, residential units physically connected by one or more accessory buildings, such as garages, will also be deemed to be attached.

For the purpose of this definition 'allotment' shall have the same meaning as 'Computer Freehold Register' as such term is defined in the Land Transfer Act 2017, and may comprise more than one freehold register where held together by a registered legal instrument.



Earthquake strengthening: Means specific seismic structural works undertaken to strengthen buildings or structures.

Earthworks: Means the disturbance of the land surface by moving, removing, placing or replacing soil or earth, by excavation, cutting or filling, but excludes cultivation of land and foundation piling.

Eave: Means that portion of the roof extending beyond the exterior wall of a building, having a maximum overhang of 500mm.

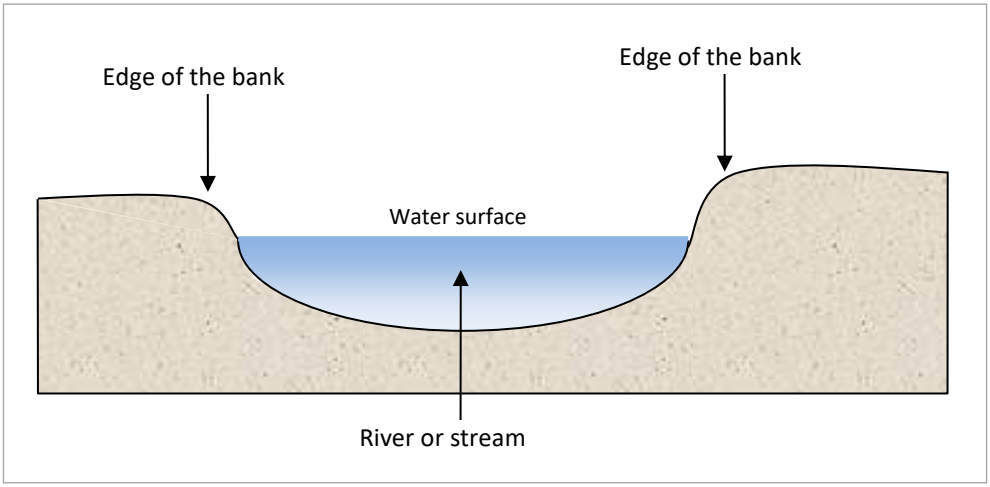
Ecological corridors: Means natural corridors that provide for the movement of flora and fauna for a variety of purposes, including feeding and breeding.

Eco-sourced: Means plants which are grown from seeds or propagules collected from naturally occurring vegetation in a locality close to where they are replanted as part of a restoration or re-vegetation project.

Ecosystem: Means any system of interacting terrestrial or aquatic organisms within their natural and physical environment.

Ecosystem services: Means the benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services such as nutrient cycling that maintain the conditions for life on Earth.

Edge of the bank: Means the topographical feature defined in the diagram below:



Effect: Means:

a) Any positive or adverse effect.

b) Any temporary or permanent effect.

c) Any past, present or future effect.

d) Any cumulative effect which arises over time or in combination with other effects regardless of the scale, intensity, duration, or frequency of the effect, and also includes:

   i. Any potential effect of high probability.

   ii. Any potential effect of low probability which has a high potential impact.

Electricity distribution: Means the lines (above and below ground) and structures involved in the final stage of delivery of electricity to end users. A distribution system's network conveys electricity from the transmission network and delivers it to consumers. Typically, the network would include low, medium and high-voltage (less than 110 kV) electric lines, substations, switching stations and road side transformers, ring main units and pillar boxes.

Electricity transmission network, electricity transmission and transmission activities/assets/infrastructure/resources/system: All mean part of the national grid of transmission lines and cables (aerial, underground and undersea, including the high-voltage direct current link), stations and sub-stations and other works used to connect grid injection points and grid exit points to convey electricity throughout the North and South Islands of New Zealand. This is owned and operated by Transpower NZ Limited.

Electronic Sign: Means a form of illuminant advertising media that are created solely from a light source and include digital screens, cinema projections, LED signs and the like.

Emergency housing: Means any Managed Care Facility in which temporary residential accommodation, care and/or support are provided by another person or agency for five or more residents (including children) on an emergency basis or for their personal protection. For the purpose of calculating the number of residents, account shall be taken of owners and/or staff and any of their children aged 16 years or older who live on the premises. Including, but not limited to night shelters and women's refuges.

Emergency service facilities: Means those facilities of organisations which are responsible for the safety and physical welfare of people or property in the community, and includes fire, ambulance and police stations.

Entertainment and recreation facility: Means land or buildings which are used principally for the public or private assembly of persons for cultural, entertainment, recreation, leisure, education or similar purposes. They include gymnasiums, public halls, theatres and cinemas, display galleries and museums, bowling alleys.

Entrance strip: Means that part of a rear site extending from the street frontage, which has a width less than or equal to the minimum subdivision frontage standard required for a rear lot in the zone, and accommodates the driveway for that site.

Environment: Means:

a) Ecosystems and their constituent parts, including people and communities.

b) All natural and physical resources.

c) Amenity values.

d) The social, economic, aesthetic and cultural conditions which affect the matters stated in a) to c) of this definition or which are affected by those matters.

Environmental maintenance: Means the routine care and attention of the transport corridor to maintain safety, aesthetic and environmental standards, including:

a) Clearing the carriageway of damaged vehicles, crash debris and spills.

b) Maintenance of planting, including pruning.

c) Control of weeds and pest plants.

d) Mowing of the grass berm.

e) Removal of litter.

f) Removal of rocks and slip material from the transport corridor or catch fences.

g) Removal of, and protection against, graffiti.

h) Snow clearing and ice control.

i) Sweeping loose chip and detritus.

Equestrian supply retail: Means a business selling equipment including horse floats, feed, supplements, clothing and accessories related to the equine industry.

Event: Means an activity that is irregular or infrequent and does not require the construction of a permanent building, the installation of permanent infrastructure or services, or works such as vegetation clearing or other operational work. Events involve large groups of people either as participants or spectators and include carnivals, parades, concerts, markets, craft or trade fairs, field days, open days, displays and the like. This definition applies only where the activity is **not** covered by another definition/activity in the District Plan.

Excavation, modification and disturbance: Means to dig into the soil, or the removal of soil or other material from the ground; or the movement of soil or other material on to or within the site which changes the existing profile of the landform; with the exception of those matters defined as minor work.

Exotic vegetation or trees: Means vegetation or trees which do not occur naturally in New Zealand (refer also to the definition of **indigenous vegetation**).

Expected outcome: Means in relation to any rule the environmental outcome expected from compliance with that rule.

Expressway: Means a road mainly for through traffic, usually a dual carriageway with full or partial control of access. Intersections are generally grade separated.

Fabric: Means all the physical material of a building, object, site, place or area that contributes to its character.

Farming: Means a land-based activity having as its primary purpose the commercial production of any livestock or vegetative matter, and includes bee-keeping, horse training agistment, but excludes forestry and intensive farming.

Fence: Means any structure, intended to be a permanent division, screen or barrier, but shall not include a post-wire fence or temporary fence.

Flammable: Means having the capability to be ignited in the presence of oxygen and to sustain combustion. Refer Hazardous Substances and New Organisms Act 1996 Regulations.

Flood Hazard Area: Means the land shown on the Planning Maps as:

a) High Flood Hazard Area.

b) Medium Flood Hazard Area.

c) Low Flood Hazard Area.

d) Temple View Flood Hazard Area.

e) Culvert Block Flood Hazard Area.

Flood protection structure: Means physical structures for the purpose of flood protection, such as dams, stop-banks and flood gates.

Floor Area (for residential units in the Residential Intensification zone, Medium Density Residential zone, Central City zone and Business zones): Means that total square metres (m^2) of the floor space of each residential unit when measured from the outer edge of the unit's exterior walls, including from the mid-point of the inter-tenancy walls shared with adjoining units. But excludes garages, carports and other accessory buildings associated with the residential unit; and communal spaces such as pedestrian access, stairwells or service areas within the building.

Floor area ratio: Means the ratio between the gross floor area of a building and the net area of the site which for the purposes of this definition comprises one or more lots in permanent contiguous ownership and occupied exclusively by the development to which the requirement applies.

Food and beverage outlets: Means premises serving food and/or beverages prepared for immediate consumption on or off the premises to the general public. It includes bakeries, lunch bars and cafes operating during normal working hours, but excludes restaurants, licensed premises, and supermarkets.

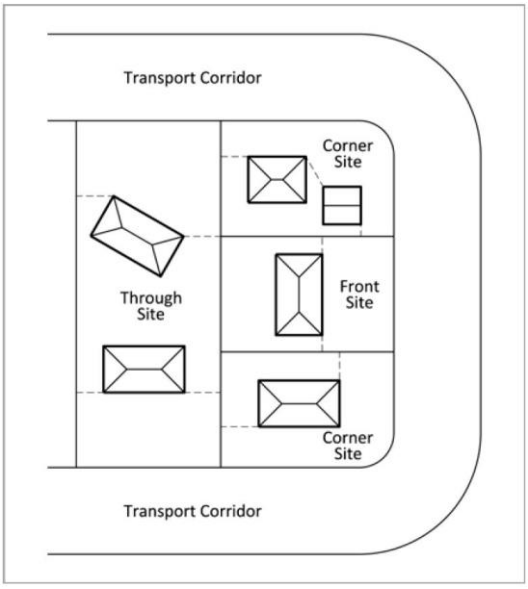
Forestry: Means the establishment (including replanting) and management of forest or tree plantations for commercial gain but does not include saw-milling or other timber processing. Includes pruning and thinning (manual operations done from the ground). Does not include Christmas tree farms.

Formal recreation: Means sports fields, greens, courts.

Frangible: Means able to be broken and absorb enough impact energy to reduce the severity of a vehicle collision. Non-hardwood species of trees with a diameter of less than 100mm when measured 400mm above the ground are considered to be frangible.

Note
Guidance for frangible species can be found in Appendix 1 of 'Guidelines for Highway Landscaping' December 2006, Transit New Zealand.

Front building line: Means a line or lines drawn across the site creating a space forward of the façade of any buildings facing an adjoining transport corridor.



Frontage: Means that portion of the boundary of any lot which is also the boundary of an existing road, or road to be vested or otherwise legalised as a condition of subdivision consent. For the purpose of this definition, 'road' does not include any service lane or accessway.

Fronting: Means a site having legal and or physical frontage or access to a road.

Full Integrated Catchment Management Plan: Means an Integrated Catchment Management Plan for a full hydrological catchment that has been technically certified by the Waikato Regional Council (with regard to compliance with Council's Comprehensive Sortmwater Discharge Consent) and Council.

General recreation: Means any active sports or games or recreational pursuits for participants and/or spectators and the fields necessary to accommodate them but excludes motorised vehicle sports.

Greenfield development: means subdivision and/or urban development of previously undeveloped rural land.

Green corridors: Means a strip of land, the majority of which is vegetated and which may include surface water, and its associated airspace, which afford access and connectivity for pedestrians, cyclists or wildlife. Green corridors are often, but not necessarily, along the route of a transport corridor, a natural or artificial waterway or a network utility and may include an underpass or an overpass. These corridors may serve several functions simultaneously, including amenity, recreation, transportation, drainage, ecological, biodiversity and network utility functions. Green corridors could comprise privately or publicly owned land.

Greenwood/Kahikatea Corridor: Means those lots shown in Volume 2, Appendix 6, Figure 6-5.

Gross Floor Area (GFA): Means the sum of the gross floor area of all floors of all buildings on a site measured from the exterior faces of the exterior walls or from the centrelines of walls separating two buildings. Gross floor area shall:

a) Include elevator shafts, stairwells and lobbies at each floor and mezzanine floors and balconies.

b) Exclude any provided car-parking, loading and servicing areas and access thereto and building service rooms containing equipment such as lift machinery, tanks, air conditioning and heating plants.

Gross Leasable Floor Area (GLFA): Means the sum of any floor areas (within the external walls of buildings) designed for tenant occupancy and exclusive use including both freehold and leased areas. It includes any stock storage or preparation areas whether exclusive or not, but excludes the following areas where these are common and not designed for rental: liftwells and stair wells including landing areas; corridors and malls; building service rooms; required parking areas.

Ground level: See **natural ground level**.

Gymnasium: Means a facility that provides for physical exercise or activity and includes, but is not limited to, weight lifting studios, group exercise spaces, indoor sport facilities, yoga, pilates and dance studios and indoor physical recreational activities such as trampoline parks and climbing facilities.

Habitable floor area (natural hazards): Means that part of any building used for residential activities but excludes floorspace used solely for the purposes of an entrance, passageway, toilet, bathroom, laundry, garage or storeroom.

Habitable room: Means any room that is part of a building used for any noise sensitive activity, apart from those rooms used solely for the purposes of an entrance, passageway, toilet, bathroom, laundry, garage or storeroom.

Harvesting forestry: Means the felling and extracting of trees, processing them into logs and then loading on to trucks. Does not include Christmas tree farms.

Hazard: Means physical situations, processes and actions that have the potential for adverse effects on people, property or the natural environment.

Hazard Area: Means the land shown on the Planning Maps as:

a) High Flood Hazard Area.

b) Medium Flood Hazard Area.

c) Low Flood Hazard Area.

d) Temple View Flood Hazard Area.

e) Culvert Block Flood Hazard Area.

f) Waikato Riverbank and Gully Hazard Area.

Hazardous facility: Means any activity involving hazardous substances and sites at which these substances are stored, used, transported or disposed of, and any installations or vehicles parked on site that contain hazardous substances. A Hazardous Facility does not include:

a) Wastewater networks, or waste treatment and disposal facilities (this exception does not apply to the storage of hazardous substances or waste associated with these facilities).

b) The incidental use and storage of hazardous substances in minimal domestic quantities.

c) LPG installations using one or more cylinders as part of a piped system for domestic heating and cooking purposes that:

   i. Have a maximum capacity of 100kg, and

   ii Are limited to one per household

d) Retail outlets for the sale of hazardous substances for domestic use (e.g. supermarkets, hardware shops, pharmacies, home garden centres) .

e) Facilities using genetically modified or new organisms.

f) Facilities presenting a dust explosion risk of non-hazardous substances.

g) Gas or oil pipelines, including all incidental equipment.

h) Fuel contained in tanks of motor vehicles, agricultural and forestry equipment, boats, aircraft and small engines.

i) Developments that are or may be hazardous but do not involve hazardous substances (e.g. radio masts, electrical substations).

j) The occasional loading and unloading of hazardous substances on a site where this forms only a minor part of site operations.

k) Routine, renewal and new works to a transport corridor and transport infrastructure including related storage, all within road reserves.

Note
The above activities must comply with any relevant Hazardous Substances and New Organisms Act 1996 or regulation requirements to be excluded from the definition of a Hazardous Facility.

Hazardous substance: Means any substance:

a) With one or more of the following intrinsic properties:

i. Explosiveness.

ii. Flammability.

iii. A capacity to oxidise.

iv. Corrosiveness.

v. Toxicity (including chronic toxicity).

vi. Ecotoxicity, with or without bioaccumulation.

Or

b) Which on contact with air or water (other than air or water where the temperature or pressure has been artificially increased or decreased) generates a substance with any one or more of the properties specified in paragraph (a).

Or

c) Containing radioactive material.

Or

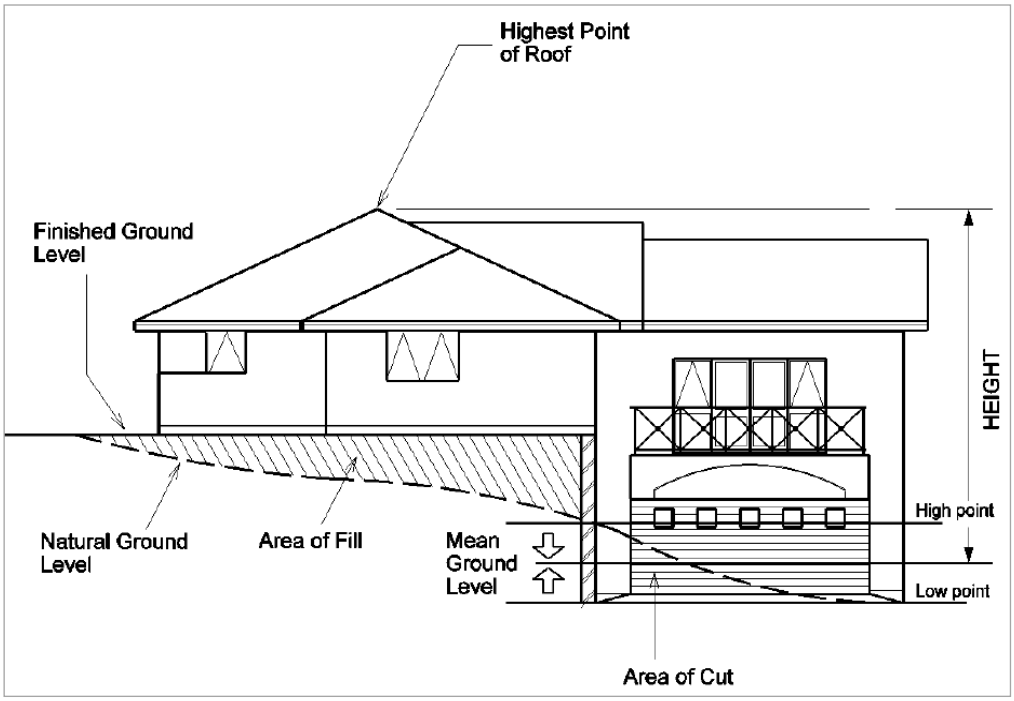
d) That in water has a high BOD_5 (>10,000 mg/l)

Health care services: Means services relating to physical and mental health and welfare, performed by duly qualified practitioners or by persons in their employ and includes services provided by medical practitioners or by persons in their employ including surgical procedures and day-patient care, dentists and veterinary surgeons but excludes a **hospital**.

Height (in relation to maximum height of a building): Means the vertical distance between:

a) A horizontal plane through the highest point of the roof, excluding service rooms containing equipment such as lift machinery, tanks, air-conditioning and heating plants, aerials and dishes as permitted in Volume 1, Chapter 25.7 City-wide – Network Utilities and the Electricity National Grid Corridor; and chimneys, flues and similar projections of less than $1m^2$ in area and projecting not more than 2m above maximum permitted height.

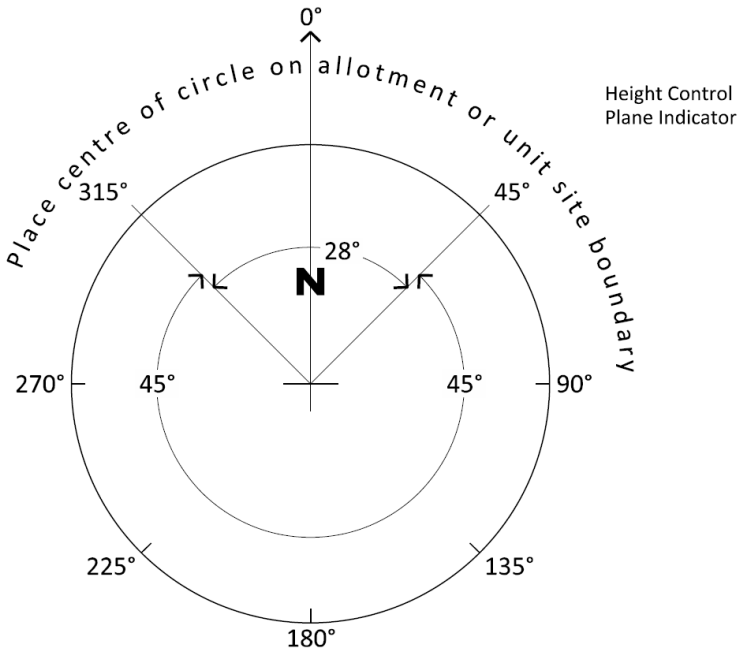
b) A horizontal plane through the mean of the highest and lowest point of the natural ground level along the relevant external wall of the building provided that any calculated mean height shall not exceed the maximum permitted height.



Height control plane: Means a surface through which no part of a building other than chimneys, flues and similar projections not exceeding 2m in height and 1m^2 in area or an aerial as permitted in Volume 1, Chapter 25.7 City-wide – Network Utilities and the Electricity National Grid Corridor may protrude. It is defined by drawing height control lines from all points on the boundaries of an allotment or unit site area. Such lines are to start at a specified vertical distance above the natural ground level at the boundary, point into the site at right angles to the boundary and rise at a specified angle.

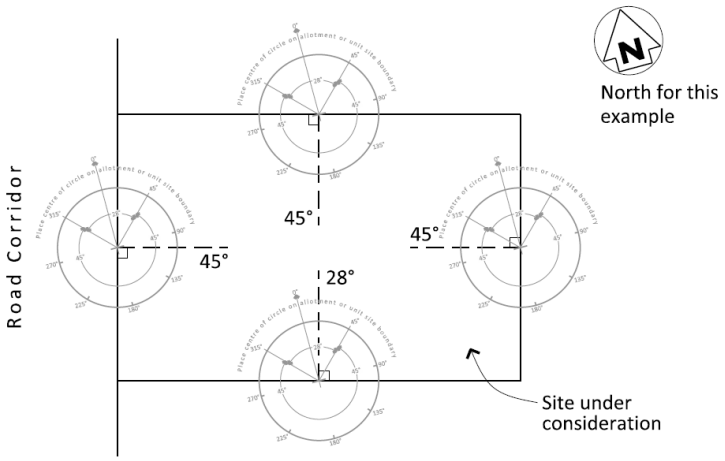
HEIGHT CONTROL PLANE

The height in relation to boundaries of the allotment or unit site area shall vary with the direction or bearing of each allotment or unit boundary according to the diagrams below.



NOTE: North is True North

The height control plane shall be calculated by orientating both the site plan and height control plane indicator to true north, and placing the height control plane indicator over the site plan with the centre of the circle touching the allotment or unit site boundary under consideration. The height control plane angle shall be that indicated by that sector of the diagram within which a line drawn at right angles to the allotment or unit site boundary from the centre of the circle lies.



Heliport: Means a facility for the landing, take-off, parking, storage, refuelling and routine maintenance of helicopters including associated buildings, but does not include facilities for overhaul or long-term engine testing.

Heritage item: Means a building, structure, object, site or place and all elements of that item, which have been identified as having heritage value.

High BOD_5: See **BOD_5**.

High Flood Hazard Area: Means that part of any land predicted to be affected by river or surface flooding during a 1% annual exceedance probability event. Further detail for how this Flood Hazard Area category has been derived is contained in Appendix 11. High Flood Hazard Areas are identified on the Planning Maps.

High-intensity sign: Means any flashing, moving or animated sign, or any other active sign including electronic signs.

High-use allocation: Means industrial activities requiring more than 15m^3 of water per day excluding:

a) Water used for human drinking and sanitation.

b) The volume of water discharged into the municipal wastewater system.

Hire centre: Means premises that hire tools and equipment, including machinery and equipment for event purposes such as utensils, marquees and safety equipment. It does not include the hiring of personal electronic equipment such as video games, computer consoles, video library premises, or the hire of indoor or outdoor recreational equipment.

Home-based business: Means an occupation, craft or profession which is incidental to the residential use of the site, where the principal operator of the home business is a permanent resident on the site. A home-based business excludes: activities involving heavy vehicles, panel beating, spray painting, motor vehicle repairs, motor vehicle dismantling, motor body building, servicing of internal combustion engines, fibreglassing, sheet metal work, wrought iron work or manufacture, bottle or scrap metal storage, rubbish collection, establishments for boarding domestic pets, funeral parlours, and the sale/trading of motor vehicles. The owner or occupier of a household unit is not precluded from carrying out normal maintenance and repair of domestic equipment including vehicles owned by the household owner/occupier.

Homestay accommodation: Means a portion of a dwelling occupied on a temporary (periods of up to 3 months continuous occupation during any 12-month period) basis and includes bed and breakfast establishments. The maximum occupancy is six guests at any one time.

Household: means a person or a group of people related or unrelated who reside together and interact on a daily basis to maintain a self-contained housekeeping unit. This definition excludes people living in residential centres or managed care facilities.

Hospital: Means an institution providing primarily in-patient care for the sick or injured, including medical, surgical, maternity, mental health, convalescent or hospice care, and includes all hospital clinics, dispensaries, out-patient departments, operations and maintenance support services (such as laundries, kitchens, cafeterias, refreshment facilities, residential centres, generators, substation, storage facilities and workshops), hospital administration offices, ancillary retail facilities and undertakings maintained in connection with, or incidental to, the hospital activity.

Impermeable surfaces: Means surfaces such as roads, roof tops, footpaths, paving, decking, swimming pools, patios or highly compacted soil that are not vegetated and do not infiltrate run-off.

Incidental: Means accompanying as a minor part to something else.

Indigenous vegetation or trees: Means vegetation or trees that occur naturally in New Zealand or arrived in New Zealand without human assistance.

Indoor recreation: Means recreational activities within a building. Includes courts, swimming pools and gyms, with ancillary facilities such as changing rooms.

Industrial activity: includes:

a) All types of processing, manufacturing, service and repair activities
b) Laboratories and research facilities
c) Transport depots.

Informal recreation: Means an activity whose aim is the enjoyment of leisure of a primarily non-competitive casual nature and includes resting, sitting, walking, cycling, jogging, enjoying nature, picnicking, barbecuing, spontaneous informal games and kite flying.

Infrastructure: Means:

a) pipelines that distribute or transmit natural or manufactured gas, petroleum, biofuel, or geothermal energy;
b) a network for the purpose of telecommunication as defined in section 5 of the Telecommunications Act 2001;
c) a network for the purpose of radiocommunication as defined in section 2(1) of the Radiocommunications Act 1989;
d) facilities for the generation of electricity, lines used or intended to be used to convey electricity, and support structures for lines used or intended to be used to convey electricity, excluding facilities, lines, and support structures if a person -
    i. uses them in connection with the generation of electricity for the person's use; and
    ii. does not use them to generate any electricity for supply to any other person;
e) a water supply distribution system, including a system for irrigation;
f) a drainage or sewerage system;
g) structures for transport on land by cycleways, rail, roads, walkways, or any other means;
h) facilities for the loading or unloading of cargo or passengers transported on land by any means;
i) an airport as defined in section 2 of the Airport Authorities Act 1966;
j) a navigation installation as defined in section 2 of the Civil Aviation Act 1990;
k) facilities for the loading or unloading of cargo or passengers carried by sea, including a port related commercial undertaking as defined in section 2(1) of the Port Companies Act 1988;
l) anything described as a network utility operation in regulations made for the purposes of the definition of network utility operator in section 166.

Integrated Catchment Management Plans: Means a full Integrated Catchment Management Plan (ICMP) or sub-catchment ICMP being an analysis of the effects of development on all three waters infrastructure capacity and the appropriateness and integrity of proposed treatments and reticulation systems as described in Appendix 1.2.2.6.

Integrated Residential Development: Means a development containing a mixture of residential units, and specifically more than one of the following types: single dwellings, duplex dwellings and/or apartment buildings on a site which is designed in a comprehensive way to function as an integrated development. The development shall include shared facilities such as open space, access, parking and manoeuvring, and may have other communal activities (e.g. recreational facilities, office administration) for the exclusive use of the residents of the development and their visitors.

The development may include where relevant management structures which govern its day to day operation (such as for retirement villages or rest homes).

An integrated residential development does not include a development that consists solely of one of the following activities:

- One type of residential unit
- Hospitals
- Managed Care Facilities
- Residential Centres.

Integrated retail development: Means a development of retail activities on a site which are managed as a comprehensive entity, and which has combined facilities (i.e. service areas, loading spaces and parking) which are accessible from, and can be used by, all the individual tenancies of the development.

Integrated Transport Assessment: Means an analysis to determine impacts of a development on the transport network for all modes of travel and effects on safety, parking, efficiency, access and the capacity of the transport network. This District Plan identifies two levels of assessment, simple and broad; the content of these is detailed in Appendix 15-2.

Intensive farming: Means the commercial raising and keeping of plants or animals, which is dependent on a high input of food or fertiliser, is not dependent on the soil characteristics of the site, and is contained in buildings or outdoor enclosures. This includes, but is not limited to, poultry farms, piggeries and mushroom farms.

Interface area: Means land within the Major Facility Zone or Knowledge Zone that is within 30m of any public space external to the zone. This excludes any land within the Major Facilities Zone or Knowledge Zone that is positioned behind an existing building or landscaping so as to be screened from the adjoining public space.

Interface area within Stage 1A or 1B or the Te Rapa North Industrial Zone: Means the area within the defined building setback of the zone for the Waikato Expressway and Te Rapa Road.

Interface Design Control Area (Ruakura Logistics Zone and Ruakura Industrial Park Zone): Means the area within 50m of a transport corridor including the Waikato Expressway but excludes any private road within the area to be used as an Inland Port.

Interfacing with a public place: Means the area within the Community Facilities Zone that is within 30m of any boundary with the Community Facilities Zone, any Open Space Zone or the Transport Corridor Zone.

Internal alteration of buildings: Means changes to the interior of a building that do not result in any external visible change.

Internal vehicle access: Means a combined access arrangement (e.g. accessway, right-of-way, shared driveway) serving two or more dwellings or business occupancies on the same site or serving two or more allotments.

Jetty: Means a landing pier attached to the bed of a lake or river and includes boat ramps.

L_{dn}: Means the day-night noise level which is calculated from the 24-hour L_{eq} with a 10 dBA penalty applied to the night time L_{eq} (2200-0700 hours).

L_{eq}: Means the time-averaged noise level (i.e. the constant noise level which would contain an equal amount of sound energy to the actual fluctuating noise level).

L_{max}: Means the maximum noise level recorded during the particular measurement period. L_{max} is generally used to assess the potential sleep disturbance of individual noise events.

Lake: Means a body of fresh water that is entirely or nearly surrounded by land.

Landscape design: Means the functional layout and design of a site involving the planned use of open space, landform, plant-form, water and artificial features for the purpose of beautifying or enhancing a site for human use and enjoyment.

Land use environment: Means groupings of land-use zones that provide for activities that share similar sensitivities to, or demands of, the transport network. These groups are defined in Table 15-4a of Appendix 15-4.

Less mobile users: Means those vehicle users who are less mobile but are not eligible to use accessible spaces allocated to disabled users. These include the elderly, parents with infants, people with temporary mobility disabilities.

Licensed premises: Means land, buildings or part of a building used principally for the serving of liquor, for consumption on the premises. Licensed premises include (but are not limited to) hotels, taverns, wine bars and clubs (both chartered and night).

Lifeline utilities: Means the same as in the Civil Defence and Emergency Management Act 2002.

Light industry: Means manufacturing, warehouse, bulk storage, service and repair activities which do not involve the use of heavy machinery, are carried out indoors and are unlikely to give rise to significant adverse effects beyond the site and are generally of a small scale. They include printing works, furniture manufacture, car repairs, light engineering, tradesmen's depots and the like.

Lightning rod: A grounded metal rod placed high on a building or structure to prevent damage by conducting lightning to the ground.

Line: Means the conductors (cables) of any above ground network utility infrastructure.

Loading space: Means a space on a site suitable and available for the temporary station of a vehicle which is primarily on the site to load/unload goods that are required for the nature of that particular business on that site.

Local Transport Corridor: Means any transport corridor identified as local or any other formed road not otherwise identified in Appendix 15, Figures 15-4b to 15-4f, the function and form of which is defined in Appendix 15-4.

Logistics and freight-handling activities: Includes:

a) All aspects of freight handling such as loading and unloading of goods from and to road or rail, container storage, container devanning and MAF/customs procedures, warehousing and distribution/consignment activities.

b) All ancillary activities including container, equipment and fleet maintenance and administration activities.

c) All offices and facilities associated with inland port management or customs excise functions.

d) All offices and specialised training facilities directly related to a logistics or freight-handling activity on site, having a maximum gross floor area of 10% of the total gross floor area of a site or area of a leased site.

Logistics and freight-handling infrastructure: Includes rail siding, platforms, hardstand storage areas, private roads, lighting towers, fences, car parking, CCTV, security infrastructure, fire and hazard substance management facilities, and communications and data management infrastructure.

Lot: See **Allotment**.

Low flow (for the purposes of events for motorised water activities on the Waikato River): Means a river level of less than 11.80m above mean sea level (Moturiki Datum) measured at the Waikato Regional Council Victoria Bridge Recorder Station.

Low flow fixtures: Means the following.

a) Showers using not more than nine litres of water per minute. Being the nominal flow rate measured in accordance with AS/NZS 3662: 2005 Performance of showers for bathing.

b) Tap equipment using not more than nine litres of water per minute. Being the nominal flow rate measured in accordance with AS/NZS 3718: 2005 Water supply – Tap ware (excludes outdoor tap equipment).

c) Toilets using not more than four litres on average per flush:

   i. For single-flush cisterns – the discharge flush volume, determined in accordance with AS 1172.2 Water closet (WC) pans of 6/3 L capacity or proven equivalent – Cisterns.

   ii. For dual-flush cisterns – the average flush of one full-flush discharge and four reduced-flush discharge volumes, with the full-flush discharge flush volume and reduced-flush discharge volumes determined in accordance with AS 1172.2 Water closet (WC) pans of 6/3 L capacity or proven equivalent – Cisterns.

Note

1. Toilets, showers, and taps with at least a 3 star rating in accordance with the New Zealand Water Efficiency Labelling Scheme meet this definition.

Low Flood Hazard Area: Means that part of any land affected by river or surface flooding during a 1% annual exceedance probability event. Further detail for how this Flood Hazard Area category has been derived is contained in Appendix 11. Low Flood Hazard Areas are identified on the Planning Maps.

Low Impact Urban Design and Development (LIUDD): Means design and development techniques that aim to protect aquatic and terrestrial ecological integrity while allowing urbanisation based on the following principles.

a) Work with nature's cycles on a catchment basis to maintain the integrity and mauri of ecosystems and minimise ecological footprints.

b) Adverse effect and impact minimisation through site selection.

c) Use ecosystem services and infrastructure efficiently.

d) Promote and support alternative development forms that maintain, enhance or create natural spaces and increase infrastructure efficiency.

Note
Refer to the source document for further guidance on LIUDD principles and their application. Source: M van Roon and H van Roon "Low Impact Urban Design and Development: the big picture", The University of Auckland, Manaaki Whenua Press, Landcare Research Science Series No.37, 2009.

Low-intensity sign: Means any painted or similar sign, device or symbol and includes statically illuminated signs.

Maintenance and repair of buildings and structures: Means activities required to restore to a good or sound condition after decay or damage, including strengthening and repair with similar materials. In terms of buildings, this involves no visible structural change to the external façade.

Maintenance and repair of buildings and structures (in relation to Chapter 19: Historic Heritage): Means work for the purpose of weatherproofing, plumbing and electrical work restoration and for the purpose of repair which includes patching, piecing in, splicing or consolidating of any original structure including the repair of materials and replacement of minor components where these are beyond repair or are missing. The replacement should be of original or similar material, and maintain a consistency in colour, texture, form and design as the original it replaces.

Major arterial transport corridor: Means any transport corridor identified in Appendix 15, Figures 15-4b to 15-4f as major arterial or proposed major arterial, the function and form of which is defined in Volume 2, Appendix 15-4.

Managed care facilities: Means land or buildings, in which residential accommodation, supervision, assistance, care and/or support are provided by another person or agency for residents. For the purpose of calculating the number of residents, account shall be taken of owners and/or staff and any of their children aged 16 years or older who reside on the premises. All other staff are excluded from that calculation. They include but are not limited to, emergency housing and rehabilitation centres. They exclude:

a) A residence established in accordance with section 364(2)(d) of the Children, Young Persons and Their Families Act 1989, or replacement thereof.
b) Apartment buildings.
c) Hospitals.
d) Retirement villages.
e) Rest homes.
f) Residential centres.
g) Secure units.

Manouevring area: Means that part of the site used by vehicles to move about to gain access to and from parking spaces. Parking spaces and loading spaces may be served in whole or part by a common manoeuvring area. The manoeuvring area excludes any required queuing length.

Marae: Means land and buildings generally associated with hapu or iwi, which are used for whanau, community, cultural, social and educational gatherings (including tangi hanga), and includes whare-nui (meeting house), whare-kai (kitchen/dining hall) and ablution facilities.

Margins: Means the land/water boundary of any permanent, natural watercourse, lake or wetland.

Market days: Means an event with temporary stalls for the display and sale of food, plants and flowers to the public. Market days may be regular or irregular occurrences and are principally for marketing and selling goods produced within the Waikato Region by vendors directly involved in the growing or production process.

Mast: Means any mast, pole, tower or similar structure designed to carry antennas to facilitate telecommunications, radio-communications and broadcasting and which is fixed to the ground.

Means of compliance: Means those standards, terms, restrictions, prohibitions, classifications and other provisions forming a rule.

Medium Flood Hazard Area: Means that part of any land predicted to be affected by river or surface flooding during a 1% annual exceedance probability event. Further detail for how this Flood Hazard Area category has been derived is contained in Appendix 11. Medium Flood Hazard Areas are identified on the Planning Maps.

Meteorological instrument: Means masts and supporting sensors established for the purposes of recording and transmitting meteorological data, including anemometers and wind vanes.

Minor arterial transport corridor: Means any transport corridor identified in Appendix 15, Figures 15-4b to 15-4f as minor arterial or proposed minor arterial, the function and form of which is defined in Appendix 15-4.

Minor upgrading (in Volume 1, Chapter 25.7: City-wide – Network Utilities and the Electricity National Grid Corridor): In terms of electricity line means an increase in carrying capacity, efficiency or security of electricity and telecommunication lines and equipment where this uses the existing support structures or structures of a similar scale and character and includes:

a) The addition of conductors to form a twinned or duplex-pairing.
b) The reconductoring of the line with higher capacity conductors.
c) The resagging of conductors.
d) The addition of longer, more efficient insulators.
e) The addition of earthwires (which may contain telecommunication lines), earthpeaks and lightning rods.
f) The replacement of an existing overhead wire with another one or more of similar character and scale.
g) The addition or replacement of antennas.
h) The addition of circuits and conductors.
i) The addition of telecommunication fittings.
j) The replacement of existing cross-arms with cross-arms of an alternative design.
k) The increase in voltage of electric lines from 11kV to 33kV.

l) An increase in support structure height by not more than 15% of the base height of the support structure, and where the base height is defined as the height of the structure at date of public notification of the Plan.

m) Support structure replacement within a similar location as the support structure that is to be replaced.

Note
It does not include an increase in the voltage of the line up to or above 110kV unless the line was originally constructed to operate at the higher voltage but has been operating at a reduced voltage, or the addition of extra lines.

In terms of telecommunications facilities means the maintenance, replacement or increase in the carrying capacity utilising the same or similar structure(s), provided that the effects of the upgrade is of the same or similar character, intensity and scale to the telecommunications facility which is being upgraded.

Minor works (in the Business 1-7, Central City, Industrial, Ruakura Logistics and Ruakura Industrial Park Zones): Means all works to an existing building for the purpose of:

a) Maintenance activities.

b) Repair works.

c) Re-cladding.

d) Internal refurbishment works.

e) Internal alterations.

f) Painting and signage

And other alterations and additions (except in the Business 1 – 7 Zones) that are either:

g) Not visible from a public space, or

h) That result in additional gross floor area of no more than 25m².

Minor work (in relation to Volume 1, Chapter 19: Historic Heritage): Means the maintenance of existing site landscape features such as gardens, lawns, and planting beds; but excludes the development or re-development of the site which involves excavation, modification or disturbance of the ground.

Motorised commercial activities on land: Means Segway tours, trains, and tram rides and tours. Does not include motorsport.

Motorised recreation activity: Means indoor or outdoor recreation activity where the operation of vehicles by members of the public is the primary form of entertainment and/or recreation.

Motorised vehicle activity: Means any activity involving a motor-driven vehicle and can include cars, motorbikes and karts; but does not include modelled or scaled-down versions of vehicles operated through remote control.

Motorised water activity: Means any activity involving a motor-driven vessel and can include jetboats, water skiing, jet skis, hovercraft and the use of inboard and outboard motors, but does not include modelled or scaled-down versions of boats operated through remote control.

Motorway: Means a road declared as a motorway by the Governor-General in Council under section 138 of the Public Works Act 1981 or under section 71 of the Government Roading Powers Act 1989 and includes all bridges, drains, culverts, or other structures or works that form a part of any motorway so declared but does not include any other road, accessway or service land (or the supports) that crosses over or under a motorway at a different level.

Mowers and outdoor maintenance equipment retail: Means a business engaged in selling outdoor maintenance equipment such as, but not limited to, chainsaws and lawnmowers and any related safety equipment.

Multi-purpose facilities for international sports, events and functions: Means land and buildings that provide for:

a) International standard playing surfaces.

b) International standard facilities for use by professional sports codes.

c) International standard facilities for televised sports and events broadcasting.

d) Spectator facilities including but not limited to stands, seating, corporate and entertainment boxes, audio-visual screens.

e) Places of assembly including function rooms and facilities for concessions to serve food and refreshments including liquor; restaurants, licensed premises and catering services, entertainment, exhibitions and conferences.

and may include:

f) Retail and offices.

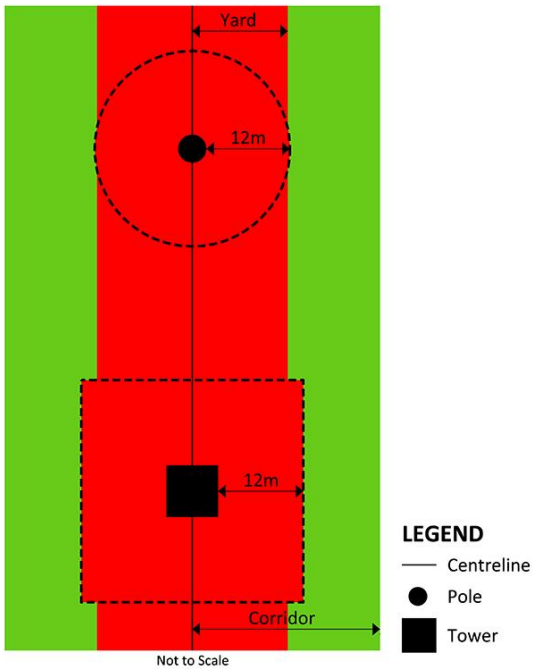
g) Visitor accommodation.

h) Out-catering services to serve venues, facilities and functions beyond the major facility.

Note
"Event" excludes the use of the playing areas for training, practice and rehearsals at night time, notwithstanding that lights and floodlights may be used.

National Grid Corridor and National Grid Yard: Means a buffer area around the national grid high voltage electricity transmission lines identified on the Planning Maps. The purpose of this yard and corridor is to manage activities and structures in close proximity to the National Grid transmission lines and is required by the National Policy Statement for Electricity Transmission. The corridor seeks to ensure that subdivision is designed so that future buildings will avoid the yard. The Corridors within Urban Areas and Greenfield Areas are differentiated on the Planning Maps.

Diagrammatically, the Yard and Corridor are as follows.



National Grid Yard (shown in red)

- the area located 12 metres in any direction from the outer edge of a National Grid support structure; and
- the area located 10 metres either side of the centreline of any above ground 110kV National Grid line on single poles (HAM-MER A, ARI-HAM A); or
- the area located 12 metres either side of the centreline of any above ground National Grid line on towers (HAM-MER B, HAM-WHU A, ARI-HAM B, HAM-KPO A, HAM DEV A).

National Grid Corridor

means the area measured either side of the centreline of any above ground electricity transmission line as follows:

- 14m for the 110kV National Grid lines on single poles (HAM-MER A, ARI-HAM A)
- 16m for the 110kV National Grid lines on pi poles
- 32m for 110kV National Grid lines on towers (HAM-MER B, HAM-WHU A, ARI-HAM B, HAM-KPO A)
- 37m for the 220kV transmission lines (HAM DEV A)

For the avoidance of doubt the National Grid Corridor and National Grid Yard do not apply to underground cables or any transmission lines (or sections of line) that are designated.

Natural and physical resources: Includes land, water, air, soil, minerals, and energy, all forms of plants and animals (whether native to New Zealand or introduced), and all structures.

Natural Ground Level: Means the lowest of:

a) The level of the ground at the time the Section 224 certificate is issued.

b) The finished level of the ground as the result of building construction work.

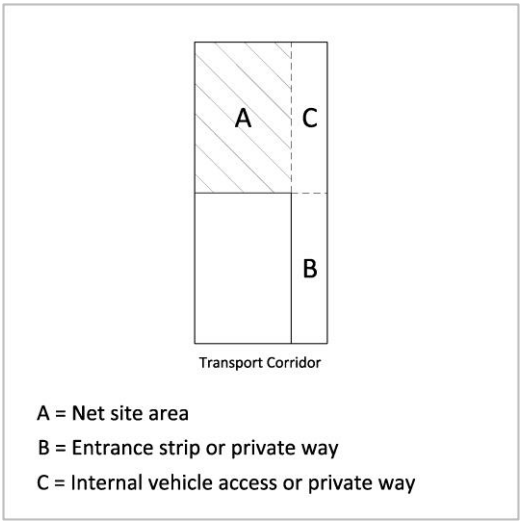
c) The finished level of the ground as the result of any subsequent works.

Natural hazard: Means any atmospheric or earth- or water-related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment.

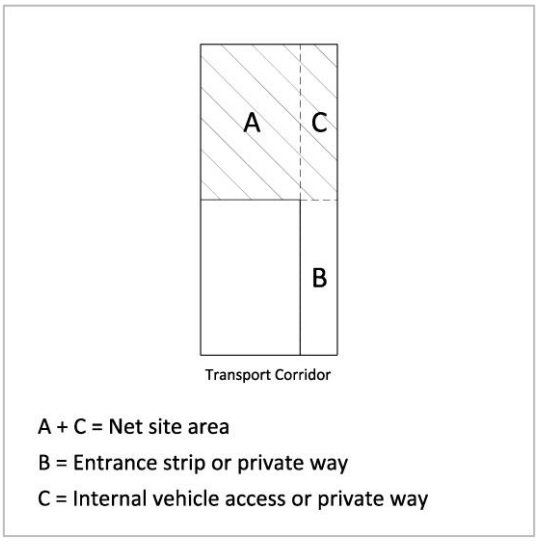
Natural values (in terms of this District Plan): Means the City's key natural features – the Waikato River corridor and gully systems, peat lakes, wetlands and associated peat land, remnant and regenerated indigenous vegetation, surface and groundwater resources and the ecosystems and habitats that depend on these natural features. It also includes the landscape and visual qualities associated with these features.

Natural watercourse: Means a continually or intermittently flowing body of fresh water including streams but not including any artificial watercourse.

Net site area: Means the area of the site, excluding any entrance strip, internal vehicle access or private way, except for apartment buildings and duplex dwellings in the Residential Intensification Zone.



Net site area for duplex dwellings in the Residential Intensification Zone: means the area of the site, including any internal vehicle access or private way, but excluding any entrance strip or private way to a rear site from any transport corridor.



New and altered roads: Refer to NZS6806: 2010 Acoustics – Road traffic noise – New and altered roads.

Network utility: Means any activity or structure relating to:

a) Distribution or transmission by pipeline of natural or manufactured gas petroleum or geothermal energy.

b) Telecommunication or radiocommunication.

c) Transformation, transmission, or distribution of electricity.

d) The holding, transmission and distribution of water for supply.

e) Stormwater drainage or sewerage reticulation systems.

f) Beacons and natural hazard emergency warning devices.

g) Meteorological services.

h) Construction, operation and maintenance of power-generation schemes.

i) A project or work described as a "network utility operation" by regulations made under the Resource Management Act 1991.

And includes the operation and maintenance of the network utility service. The definition of network utilities does not include roads or structures associated with the operation of roads such as signs, traffic signals or street lights. Amateur Radio is excluded from this definition; see **Amateur Radio Configuration**.

New works: Means work that adds to or otherwise physically alters the existing transport infrastructure. This includes, but is not limited to, new or altered:

a) Paved surfaces (e.g., carriageways, pedestrian paths, cycle ways, access ways).

b) Lanes and other changes that alter the flow of traffic, including clearways and bus lanes.

c) Access controls or restrictions.

d) Stormwater assets.

e) Intersection controls such as traffic signals or roundabouts.

f) Structures including bridges, retaining walls, underpasses and overpasses.

g) Median barriers and segregation strips.

h) On-road parking controls or restrictions.

i) Street furniture such as a bus shelter, rubbish bin, seat.

j) Landscaping, including planted areas and street trees.

k) Traffic services.

l) Traffic islands and pedestrian refuge islands.

m) Vehicle crossings.

n) Closing or stopping of roads that does not affect the function of connected transport corridors as described in the transport corridor hierarchy plan.

Noise-sensitive activities: Means residential activities (including residential accommodation in buildings which predominantly have other uses such as commercial

or industrial premises), marae, spaces within buildings used for overnight patient medical care, and teaching areas and sleeping rooms in buildings used as educational facilities. For the purpose of this definition educational facilities includes tertiary institutions and schools, and premises licensed under the Education (Early Childhood Services) Regulations, and playgrounds which are part of such facilities and located within 20m of buildings used for teaching purposes.

Non-industrial activity: Means all activities other than industrial activities.

Non-residential activities: Means all activities other than residential activities.

Notional boundary: A line 20m from any side of any dwelling or the legal boundary where this is closer than 20m.

In relation to existing residential units within the Ruakura Logistics Zone means a line measured 20m from the external wall of any habitable room or the boundary of the site, whichever is the lesser.

In relation to residential unit in the Future Urban Zone means a line measured 20m from the external wall of any habitable room or the boundary of the site, whichever is the lesser.

Noxious or offensive activities: Means those activities that emit or have the potential to emit odours, gases or other substances to air which would be so offensive as to impact on the amenity values of neighbouring sites or which could constitute a health risk for people in the vicinity. They include:

a) Blood or offal treating, bone boiling or crushing, dag crushing, fellmongering, fish cleaning or curing, gut scraping and treating, tallow melting.

b) Flax pulping, flock manufacture or teasing of textile materials for any purpose, wood pulping.

c) Storage and disposal of night-soil, septic tank sludge or refuse.

d) Slaughtering of animals for any purpose other than human consumption, storage, drying or preserving of bones, hides, hoofs or skins, tanning, wool scouring.

e) The burning of waste oil in the open air, or in any combustion processes involving fuel-burning equipment, or other than any combustion processes involving fuel-burning equipment, if carried out primarily for the purposes of producing energy, which singly or together have a maximum fuel-burning rate of 1000kg/hr or more carbonaceous fuels or those containing hydrocarbons or sulphur.

f) The open burning of coated or covered metal cable or wire including metal coated with varnish or lacquers or covered with plastic or rubber.

g) Any activity with the potential to discharge asbestos to air including the removal or disposal of friable asbestos, except where it complies with the Health, Safety, and Employment Regulations for Asbestos and is supervised and monitored by Occupational Safety and Health.

h) Burning out of the residual content of metal containers used for the transport or storage of chemicals.

i) The open burning of municipal, commercial or industrial wastes or the use of single-chamber incinerators for disposal of waste.

j) Any industrial wood pulp process in which wood or other cellulose material is cooked with chemical solutions to dissolve lining and the associated processes of bleaching and chemical and by-product recovery.

Offices: Means premises used for administration, consultation, or management of and shall include:

a) Administrative offices for the purposes of managing the affairs of an organisation, whether or not trading is conducted.

b) Commercial offices such as banks, insurance agents, or real estate agents where trade (other than for the immediate exchange of money for goods) is transacted.

c) Professional offices such as the offices of accountants, solicitors, architects, engineers, surveyors, stockbrokers, and consultants where a professional service is available and carried out.

d) Non-custodial premises used by Corrections staff for administration and delivery of community-based activities, including, inter alia, Probation Centres and bases for Community Work activities.

e) Within Chapter 8 Knowledge Zone 'office' shall include space used for desk-based research and innovation, associated meeting and administration, conferencing and similar activities and excludes commercial offices and professional offices not associated with research and innovation activities.

In this context "**office**" shall exclude activities meeting the definition and performance standards for a "**home-based business**".

Open space network: Means a network of open space corridors throughout the City, consisting of both public and private land, that supports the natural environment and ecological processes. The Waikato River and associated gully system form the backbone of the open space network.

Organised recreation: Means any active sports or games or recreational pursuits for participants and spectators, the fields and structures (such as goal posts, nets, and courts) necessary to accommodate them but excludes motorised vehicle sports. It does, however, include mountain bike tracks and BMX.

Outdoor living area: Means an on-site, outdoor area for the exclusive use of each residential unit, (unless otherwise stated, e.g., communal outdoor living areas for residential centres), free of any building or carparking, but which may include the area beneath eaves, and uncovered decks and terraces regardless of height. In the case of multi-storey apartments covered decks and balconies are included.

Overland flow path: Means the route along which stormwater flows. A subset of overland flow paths is called "secondary flow path". These routes carry water which cannot flow through the primary storm water system (usually piped) because the water flow has exceeded the capacity of that network.

Papakainga: Means a community where tangata whenua live, primarily clustered around marae and other places of significance. Also means contemporary or ancient marae sites with or without accompanying residences or buildings. The extent of individual papakainga should be determined in consultation with tangata whenua and is not necessarily confined to multiple-owned Māori land. The definition may also extend to include 'taura here' communities who establish modern/urban papakainga.

Park: Means a defined and named area of recreation land administered or owned by Hamilton City Council.

Parking lots and parking buildings: Means land or buildings used specifically for the lease or hire of car parking as the primary activity on the site, and which are not provided to fulfil the parking requirements of the Plan for any other on-site activity. Parking lots are single level parking facilities at ground level. Parking buildings are facilities that have multiple storeys.

Parking space: Means a space on a site suitable and available for the parking of a vehicle which complies with standards referred to in Volume 1, Chapter 25.14: City-wide – Transportation.

Park furniture: Means structures designed to facilitate the use and enjoyment of a public open space and include park benches, bicycle racks, band rotunda, shelters under $20m^2$, rubbish bins, playgrounds, adult recreation equipment, fountains, skate bowls, confidence courses and drinking fountains.

Park maintenance building: Means buildings associated with the maintenance of the park or for storage, e.g. equipment or tractor shed.

Passenger transport facility: Means land and buildings, used for scheduled passenger transport services. This may include bus bays, taxi ranks, drop-off and pick-up points, cycle parking, shelters, waiting rooms, ticket office, information centre, luggage lockers, public toilets, showers, changing rooms and ancillary activities.

Peat lakes: Means lakes which are influenced by the presence of extensive areas of peat within their catchments and dystrophic characteristics being relatively low in nutrients, low in pH and their waters stained by dissolved humic compounds.

Peat Lakes, Wetlands and Peat Lake Catchments (Chapter 20: Natural Environments): Means those areas identified on the Planning Maps as Peat Lakes and wetlands or peat lake catchment.

Pedestrian focus area: Means any transport corridor identified as being part of a pedestrian focus area in Appendix 15, Figure 15-4e, the function and form of which is defined in Appendix 15-4.

Performance assessment: Means, in relation to any rule, those provisions intended to guide Council in determination of resource consents.

Pergola: With a roof it becomes an accessory building, a pergola attached to dwelling becomes an attached accessory building.

Permeable surface: Means any part of a site which is grassed or planted in trees or shrubs and is capable of absorbing water. It does not include impermeable surfaces or any area which:

a) Falls within the definition of building coverage.

b) Is covered by decks which do not allow water to drain through to a permeable surface.

c) Is occupied by swimming pools.

d) Is paved, sealed or formed to create a solid surface.

e) Is used for vehicle parking, manoeuvring or access.

Note
A green or living roof may provide a suitable alternative to permeable surfaces requirements but will be assessed on a case by case basis.

Personal risk: Means a measure of the danger to an individual using the transport network as part of a simple or broad Integrated Transport Assessment, as described in Appendix 15-2. Personal risk is calculated as:

$$\frac{\left(\frac{\text{Number of Fatal Crashes + Number of Serious Injury Crashes}}{\text{Number of years of data}}\right)}{\left(\frac{\text{Number of Vehicles}}{\text{Number of years of data}}\right)}$$

Pest control: Means any activity undertaken by, or at the direction of a local authority for the control, management or eradication of species identified in a Pest Management Plan prepared under the Biosecurity Act 1993.

Places of assembly: Means land or buildings which are used principally for the public or private assembly of persons for cultural, entertainment, recreation, leisure, education or similar purposes. They include conference centres, seminar rooms, gymnasiums, public halls, theatres and cinemas, display galleries and museums.

Places of worship: Means premises used for public or private religious worship, religious ceremonies, religious meetings or instruction and social gatherings directly related to the work of the religious organisation. They include temporary fundraising activities.

Planned infrastructure: Means, in the case of a specific subdivision, use or development proposal, consented or designated infrastructure. However, where district plan changes or structure plans are being considered a broader application of the term 'planned' covers infrastructure for which feasibility studies have been completed, where funding has been allocated to advance consenting or designation processes or where such infrastructure is included in strategic documents such as the Regional Land Transport Strategy.

Planting: Means the provision of trees, shrubs, and/or groundcover plantings, and may include any other vegetative forms so arranged as to improve visual amenity.

Planting Strip: Means an area of planting of a permeable nature consisting of a combination of groundcovers, shrubs and trees, which is designed in such a manner so as not to obscure visibility for road users.

Pontoon: Means a landing pier that floats on the surface of a water body and is attached to the bank of the water body.

Pool and spa retail: Means a business selling pools and/or spa-pools and any related chemicals and equipment.

Pre-development: Means pre-development characteristics and refers to the physical characteristics of the site at the point of lodgement (with Council) of a new resource consent application. Any unimplemented resource or building consents are excluded from the definition of pre-development characteristics.

Private way: As defined by Section 315 of the Local Government Act 1974. A private way is designed to provide vehicular and/or pedestrian access to a public street, and may comprise separately owned entrance strips subject to rights-of-way or a separate lot (access lot) which is jointly owned and used by adjacent lots. It includes any common area defined for the purposes of providing the vehicular access for cross-lease or unit title subdivision.

Private recreation on the surface of water: Includes canoeing, rafting, boating, kayaking, rescue and research craft of a non-commercial nature.

Produce stalls: Means any land, building or part of any building that is used for the sale, to the public only, of goods grown or produced on the property on which the produce stall is sited.

Products Transported in Bulk: includes cement, clinker, coal, cotton seed meal, palm kernel, fertilizers, sand, gravel, scoria, loose logs, wood chips, salt, soy flour, and goods of a like nature. For clarity, this definition excludes any product stored or moved in a unitised or packaged form including in a container and storage associated with the unloading or loading of containers.

Proper speed: Means speed of a watercraft discounting the contribution of any current to that speed.

Protected premises and facilities: Refer to NZS6806: 2010 Acoustics – Road traffic noise – New and altered roads.

Protected tree: Means any tree/shrub or group of trees or shrubs listed in the Significant Tree Register of this District Plan (refer Appendix 9, Schedule 9D).

Pruning, trimming and maintenance (of a significant tree or indigenous vegetation in a Significant Natural Area): Means detaching foliage, branches, and roots from a significant tree or indigenous vegetation in a Significant Natural Area.

Public art: Means artistic works created for, or located in, part of a public space or facility and accessible to members of the public. Public art includes works of a permanent or temporary nature located in the public domain. A public space means all those spaces which the public has access to or can view. This includes, but is not limited to, parks, streets, squares, gardens walkways, public plazas and building foyers.

Public floor area: Means the sum of all floor areas contained within the external walls of any building or within the boundaries of any outdoor area available for the use of the general public in association with the activity, excluding any areas used for:

a) Lift wells, including the assembly area outside the lift doors for a maximum depth of 2m.

b) Stairwells, including landing areas.

c) Toilets and bathrooms.

d) Parking areas required by the District Plan.

Public space: Means any space (whether in public or private ownership) that can be accessed without charge by everyone to use or see. This can include roads, squares, public place, parks and reserves.

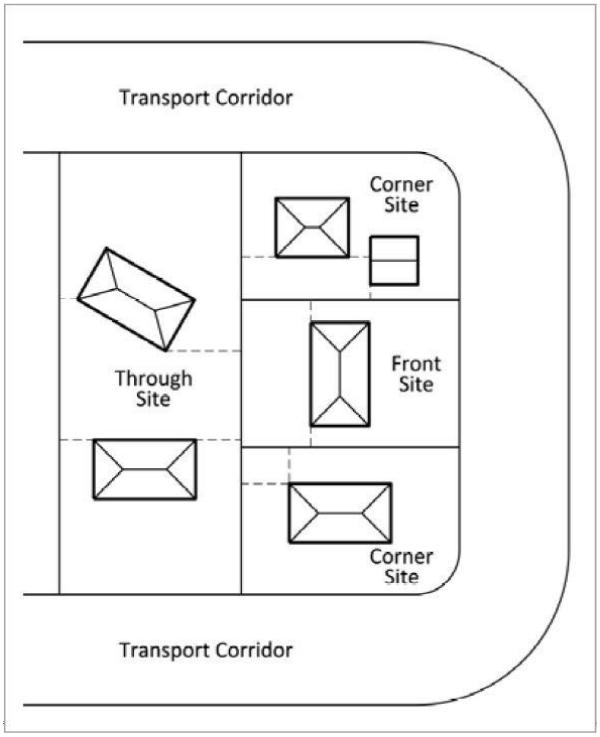
Pyrotechnic displays: Means a professional fireworks display undertaken by an approved handler.

Queuing length/space: Means the area between the kerb and the on-site manoeuvring area which is used solely for queuing and/or to gain access to the manoeuvring area and on which there is no parking.

Radioactive material: Means any article containing a radioactive substance giving it a specific radioactivity exceeding 100 kilobecquerels per kilogram and a total radioactivity exceeding three kilobecquerels (radioactive substance means a radionuclide or mixture of radionuclides, either alone or in chemical combination with other elements) but excluding smoke detectors.

Railway houses: Means pre-cut timber single dwellings constructed in the 1920s by the NZ Railways for employees and their families and located in the Frankton Railway Village.

Rear building line: Means a line or lines drawn across the site creating a space behind the rear façade of any buildings.



Recreational activities: Means the passive or active recreational use of any land. Does not involve buildings but may include gardens, playing fields, courts, park furniture and playgrounds.

Regionally significant infrastructure: Includes:

a) Pipelines for the distribution or transmission of natural or manufactured gas or petroleum.

b) Infrastructure required to permit telecommunication as defined in the Telecommunications Act 2001.

c) Ratio apparatus, as defined in section 2(1) of the Radio Communications Act 1989.

d) The national electricity grid, as defined by the Electricity Industry Act 2010.

e) Facilities for the generation of electricity that is fed into the national grid or a network (as defined by the Electricity Industry Act 2010).

f) Lifeline utilities as defined in the Civil Defence and Emergency Management Act 2002, and their associated essential infrastructure and services.

g) Flood and drainage infrastructure managed by Waikato Regional Council.

h) Transport corridors identified in Appendix 15, Figures 15-4b to 15-4f as 'Major Arterial Transport Corridor', 'Proposed Major Arterial Transport Corridor', 'Strategic Network', or 'Strategic Network and Pedestrian Focus Area'.

i) Hamilton City bus terminal and Hamilton Railway Station terminus.

j) Hamilton International Airport.

k) All KiwiRail managed railway lines that extend through the City.

l) The electricity distribution network (as defined by the Electricity Industry Act 2010).

Reinstatement: Means work carried out to restore the exterior of a building to a completed and integrated standard and appearance. This includes the reassembling of the building as a unified whole, the replacement of defective exterior materials with materials in keeping with the character of the building, and exterior repainting.

Relocated building: Means a building originally built off site which is repositioned on to a new site, or relocated within the original site, or the removal from the original site unless a building within a Special Character Zone or identified in Schedule 8A Heritage, but does not include new buildings or accessory buildings.

Remnant or regenerated indigenous vegetation: Means vegetation dominated by indigenous species or with a substantial component of indigenous species, i.e. species native to the Hamilton Ecological District (McEwen, M.C, 1987: *Ecological Regions & Districts of New Zealand*, Department of Conservation, Wellington). This may be indigenous vegetation that remains after a larger area has been incompletely cleared, e.g. Claudelands Bush which still contains some original or old growth trees. It also includes vegetation dominated by indigenous species that has developed following major disturbance or destruction of the original vegetation, e.g. second or third-growth vegetation which has regenerated naturally but which may be essentially different to the original vegetation, e.g. the induced kanuka forest of some Hamilton river scarps and terraces. It does not include plantations of indigenous species.

Renewal works: Means work required to repair or otherwise return existing transport infrastructure assets to their intended level of service, where for reasons of economies of scale or practicality the works have been extended to include more than that part of the asset that requires immediate attention. This includes but is not limited to:

a) Resurfacing of part or all of a transport corridor.

b) Replacement of stormwater assets including catchpits, culverts and kerb and channel.

c) Pavement and footpath rehabilitation.

d) Pavement and footpath reconstruction.

e) Replacement of traffic services.

f) Replacement of street furniture and lighting.

g) Replanting of street trees and landscaping.

Research and innovation activities: Includes all activities involved in the research, development, manufacture and commercial application of advanced technology including, but not limited to, agritechnology, biotechnology, chemical processes, food technology, laser physics, information technology, energy technology, transportation technology, manufacturing technology, medical technology, materials technology, telecommunications and data management and processing, soil, air and water research, infrastructure systems and management, and activities required to serve the aforementioned activities.

Residential activities: Means the use of land and buildings by people for living accommodation (whether or not any person is subject to care or supervision).

Residential building: Means any building or part thereof used, or intended to be used for human habitation.

Residential centre: Means land or buildings used for long-term shared residential accommodation occupied by five or more persons in addition to staff and not constituting a household. They include boarding houses, hostels, and other long-stay accommodation. They exclude:

a) Visitor accommodation.

b) Hospitals.

c) Rest homes.

d) Retirement villages.

e) Managed care facilities.

f) Secure units.

g) Apartment buildings.

h) A residence established in accordance with section 364(2)(d) of the Children, Young Persons and Their Families Act 1989, or replacement thereof.

Residential unit: Means a building or group of buildings, or part of a building or group of buildings that is:

a) Used, or intended to be used, only or mainly for residential activities.

b) Occupied, or intended to be occupied, exclusively as the home or residence of not more than one household.

Residual risk: Means the remaining level of risk control after risk control measures have been taken

Rest Home: Means land or buildings for the accommodation of the elderly and/or infirm where nursing/medical care is provided. They exclude hospitals, managed care facilities and residential centres.

Restaurant: Means premises where food is sold principally for consumption on the premises, whether or not the premises are licensed under the Sale and Supply of Alcohol Act.

Restoration: Means returning the existing physical material of heritage resources to a known earlier state.

Retail: Means the use of land or buildings where goods and services are offered or exposed to the general public for sale, hire or use, and includes premises serving food such as bakeries and cafes and ancillary storage and warehousing of goods to be sold through that retail activity, but excludes restaurants, licensed premises, offices or drive-through services.

Retail – bulky goods: Means buildings and activities involving the sale to the public of large bulky goods, such as furniture and whiteware appliances, where the gross floor area of the outlet exceeds 500m^2.

Retail – nurseries and garden centres: Means the use of land or buildings involving the sale of plants and associated merchandise (excluding power-driven equipment) for the home gardener, and includes premises for the propagation, display or storage of plants for sale to the public.

Retail – food and beverage: Means buildings and activities associated with preparation and sale of food which is processed or cooked and ready to eat immediately. This includes cafes, lunch bars, restaurants, takeaways, bakeries.

Retail – specialised food: Means buildings and activities associated with the display and sale of food that requires processing or cooking first. This includes butchers, fishmongers, fruit and vegetable shops.

Retirement Village: Means part of any property, building, or other premises that contains two or more independent dwelling units or their dwelling unit equivalents that provide residential accommodation in the form of independent and/or supported living provided on a bed and/or room basis (for avoidance of doubt this includes rest home), predominantly for persons in their retirement (including their spouses or partners), together with associated services and facilities. Associated services and facilities may include, but are not limited to, the following:

a) Healthcare facilities providing medical support exclusively to village residents;
b) Recreational service facilities for the exclusive use of village residents;
c) Administrative offices for the day to day operation of the village.

The following are not retirement villages for the purposes of this definition:

d) Owner-occupied residential units registered under the Unit Titles Act 2010 or owner-occupied cross lease residential units that in either case do not provide services or facilities to their occupants beyond those commonly provided by:
    i) similar residential units that are not intended to provide accommodation predominantly for retired people and their spouses or partners; or
    ii) residential units occupied under tenancies to which the Residential Tenancies Act 1986 applies;
e) Boarding houses, guest houses, or hostels;
f) Halls of residence associated with educational institutions;
g) Residential centres or Managed care facilities; or
h) Hospitals.

Risk: Means the likelihood of specified consequences of a specific event (e.g. an explosion, a fire or a toxic release) on people, property or the natural environment.

Risk assessment: Means the overall process of risk identification, risk analysis and risk evaluation.

Riverfront overlay: Means that area shown in Appendix 5: Central City Zone, Appendix 5-1.

Road: Means all land comprising formed and unformed roads as defined in section 315(1) of the Local Government Act 1974.

Road Controlling Authority: Means the territorial local authority, agency or approved organisation in control of roads in accordance with section 317 Control of Roads of the Local Government Act 1974. Approved organisation is defined in the Land Transport Management Act 2003.

Root protection zone: Means the minimum area required to ensure a tree's health and stability is safeguarded, as calculated using the following table.

Tree age	Vigour	Metres
Young trees (where the age of the tree is less than 20% of life expectancy)	Good vigour	6 x DBH*
	Poor vigour	9 x DBH
Mature trees (where the age of the tree is between 20% and 80% of life expectancy)	Good vigour	9 x DBH
	Poor vigour	12 x DBH
Over mature trees (where the age of tree is greater than 80% of life expectancy)	Good vigour	12 x DBH
	Poor vigour	15 x DBH

*DBH means Diameter at Breast Height which in NZ is diameter at 1.4m high (the diameter of the stem 1.4m above ground level).

Routine work: Means the operational and maintenance work required to repair or otherwise return existing transport infrastructure assets to their intended level of service. This includes but is not limited to:

a) General and environmental maintenance.

b) Cleaning and maintenance of stormwater assets including street sweeping.

c) Localised carriageway, footpath and cycle path repair, for example pavement digouts, patching and pothole repairs.

d) Maintenance of street trees and landscape planting.

e) Repair of traffic services.

f) Repair of street furniture.

g) Transport network inspections including structural inspections, and roughness and condition rating surveys.

h) Structures maintenance, including repairs to guardrails and handrails associated with the structure, cleaning and painting, and stream clearing and debris removal to maintain water course under bridges.

i) Traffic count surveys including pedestrian and cycle counts.

Ruakura Structure Plan Area: Means all of the area contained in the Ruakura Structure Plan boundary as shown in Figures 2-14 to 2-18 (Appendix 2).

Rural industry: Means any industry ancillary to rural activities which is dependent primarily on the direct handling of raw produce of, or supply of services to, farming, horticulture, intensive farming or forestry and includes; packing and storage of produce, engineering workshops for the repair and servicing of farm equipment, depots for rural transporters and farming contractors, depots for the receipt of produce for preparation for market, agricultural, horticultural, or silvicultural research, horticultural services and primary processing of horticultural produce. It excludes saw mills, abattoirs, wool scouring and the like.

Rural production: Means an agricultural activity or combination of activities for commercial gain or exchange and can include:

a) The cultivation of land.

b) The keeping, maintenance and farming of animals and birds (including poultry) for the production of meat, fibre, or other animal-derived produce (including offspring).

c) Horticulture (including all forms of fruit, vegetable, flower, seed, or grain crop farming).

But excludes forestry and intensive farming.

Satellite dishes: Refer to **Dish**.

School: Means land and/or buildings used to provide regular instruction or training of children including, primary, intermediate and secondary schools, and their ancillary administrative, cultural, recreational or communal facilities. This term excludes tertiary education and specialised training facilities and childcare facilities.

Secondary containment system: Means a system in which pooling substances held in a place will be contained if they escape from their original package or container from which they can, subject to unavoidable wastage, be recovered.

Secure unit: Means land or buildings using physical barriers and/or guards for the purpose of preventing departure from the facility for the primary purpose of the protection of property and/or the security or safety of any person other than staff, visitors and residents at the facility. For the purpose of this definition 'Managed Care Facilities' that require detaining or confining a resident for their own protection or for the protection of other people in the facility are excluded.

Sensitive Transport Network: Means transport corridors indentified as Sensitive Transport Network in Appendix 15, Figure 15-8.

Note

1. The Sensitive Transport Network is derived from the following factors:
   a) The Strategic Network.
   b) Cycle lanes – Transport Corridors with cycle lanes marked in accordance with the Traffic Control Devices (Rule) 2004.
   c) Bus route – Transport Corridors with a key bus route operated by a local authority or an agent of a local authority.
   d) Central City Zone – All Transport Corridors within or adjoining the Central City Zone, excluding to the east of the Waikato River (refer Planning Maps).
2. As some of these factors alter over time administrative changes to the District Plan will be required from time to time to keep the Sensitive Transport Network planning map up to date.

Bus route information can be sourced from the Waikato Regional Council website or www.busit.co.nz/hamilton-routes/

Sensitive land use: As defined in the National Environmental Standard for Electricity Transmission Activities (2009), this includes the use of land for a childcare facility, school, residential building, or hospital.

Service areas: Means an area provided for the service needs of the occupants of a residential unit; commercial; industrial; community or recreational activity, and may include associated access and loading areas.

Service industry: Means premises occupied by activities involving light manufacturing or the repair or servicing of goods of a light nature and includes repair of household appliances, electronic equipment assembly and servicing, craft manufacture and clothes manufacture. It does not include car repairs, furniture making and the like.

Service lane: Means land dedicated as service lane which is used from time to time for the vehicular servicing of adjacent properties.

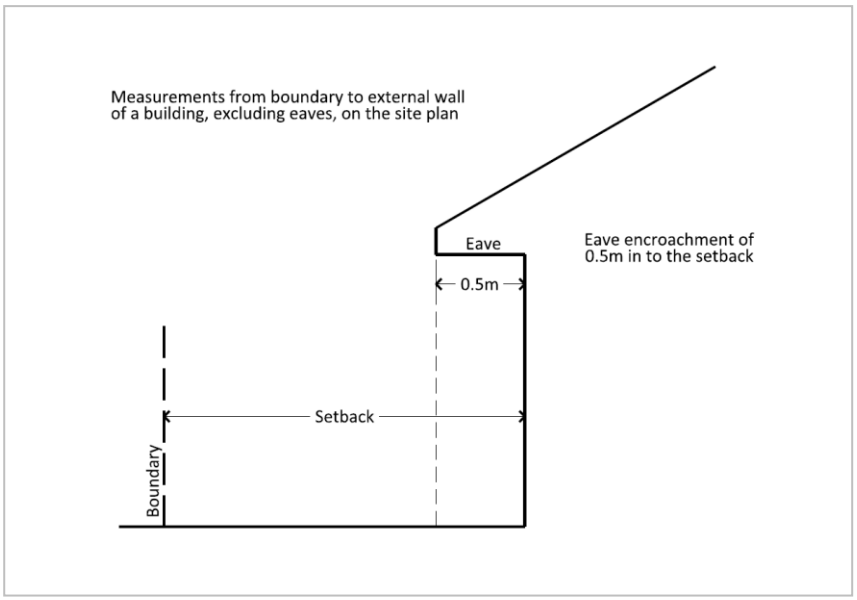
Service Station (within the Rototuna Town Centre Zone): Means any premise primarily used for the sale of motor fuels and lubricants by retail and includes:

a) Mechanical repair and servicing.
b) Ancillary retail of goods and food provided that the trading space provided within the building devoted to their display, sale or hire does not exceed 50m^2 GFA.
c) Vehicle washers.
d) The hire of trailers.
e) The storage and retailing of LPG and CNG.

But excludes:

f) Panel beating and spray painting.
g) Heavy engineering such as engine reboring and crankshaft grinding.

Setback: Means the distance from the boundary, specified object, or building line restriction in respect of a road widening, which is required to be free, unoccupied or unobstructed by buildings from the ground upwards, with the exception of eaves and, except as otherwise provided for in this District Plan. Front and rear setbacks extend across the full width of the site and side setbacks lie along the length of a side boundary between the front and rear setbacks.



Shared-use access way: Means, for the purpose of this District Plan, an access way to provide for the movement needs of pedestrians, including the use of motorised disability equipment (e.g. mobility scooters), and cyclists.

Shopping frontage: Means the principal face of a commercial building which is intended to be occupied by retail activities or which adjoins other such buildings and which is on or adjacent to the street frontage or which faces a customer parking area with 15 or more car spaces.

Short-stay worker accommodation: Means the same as visitor accommodation but for the exclusive use of employees or contractors.

Show home: Means a residential building and land which displays the design, construction materials, and building techniques available to potential house buyers including outside living areas and gardens. The show home is likely to include an office and is available for inspection by the public.

Sign: Means any advertising, informational or directional device or advertising matter, whether consisting of a specially constructed device, structure, erection or apparatus, or painted, printed, written, carved, inscribed, endorsed, projected on to, placed or otherwise affixed to or displayed upon anything.

Single dwelling: Means a residential building designed for, and occupied exclusively by, one household.

Site: Means an area of land which is:

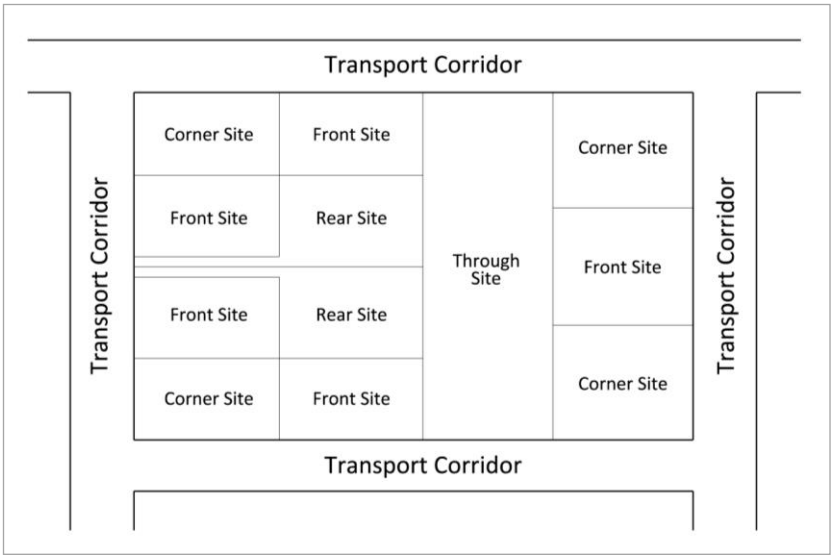
a) Comprised in a single certificate of title or in respect of which a single certificate of title could be issued without further consent from the Council.

b) Composed of two or more lots held together in one (or more) certificate(s) of title and where no single lot can be dealt with separately without the prior consent of the Council.

c) An area of land which has been defined for the purpose of transferring it from one certificate of title to another.

d) An area of land which is, or is to be, used or developed as one property whether or not that use or development covers the whole or a part(s) of one or more lots.

Allotments shown on a subdivision or survey plan for the purposes of effecting cross leases or company leases or issuing separate unit titles under the Unit Titles Act 2010, shall be deemed to comprise one site.



Front site: Means an allotment:

a) Which complies with the relevant frontage requirements for the zone.

b) Whose frontage is not less than two-thirds the maximum width of the allotment, measured parallel to its street frontage.

c) Is not a corner site as defined below.

Corner site: Means an allotment which lies within a general change of direction (being a change of 45° or more) of the abutting street or streets.

Through site: Means any allotment having two or more street frontages that are not contiguous.

Rear site: Means any allotment other than a front, corner or through allotment as defined above.

Site coverage: Means that portion of a site which is covered by buildings, whether principal or accessory, excluding eaves and uncovered decks and terraces. The net site area shall be used for the purpose of calculating coverage.

Small-scale energy generation (produces less than 20kW): Means renewable energy generation for the purpose of using electricity on a particular site or connecting into the distribution network (but excludes solar panels supplying electricity for the site on which they are located).

Soil conservation and river control works: Means any activity undertaken by or at the direction of a local authority for the express purpose of soil conservation, river and erosion control.

Spectator facility: Means an activity within a structure or building which supplies seating or standing accommodation at any racecourse, sports ground, recreation ground or similar place, whether or not such construction is enclosed or covered.

Spill containment system: Means a structure which will contain liquid or solid hazardous substances in the event of a spill, and prevent them from entering the stormwater system or a natural water body.

State highway: Means a road whether or not constructed or vested in the Crown that is declared to be a state highway under Section 11 of the National Roads Act 1953, or Section 60 of the Government Roading Powers Act 1989, and includes:

a) All land along or contiguous with its route that is the road.

b) Any part of an intersection that is within the route of the state highway.

Storage (in relation to hazardous substance facilities): Means the containment of a substance, either above ground or underground, in enclosed packages, containers or tanks.

Strategic network: Means any transport corridor identified as being part of the strategic network in Appendix 15, Figures 15-4b to 15-4f, the function and form of which is defined in Appendix 15.5.

Streetscape: Means the physical features such as buildings, landscaping, street furniture and other elements that contribute to the appearance or view of a road.

Structure Plan: Means a plan that sets out the development concept for longer-term growth and the likely extent of future infrastructure provision within a locality. It may set out a logical sequence and timing for provision of infrastructure and establish the principles on which development levies are to be paid as part of a subdivision and/or development.

Structures associated with the generation, storage, transmission or distribution of any network utility: Means any pole, mast, aerial, dish, or equipment shelter used for the transmission, switching, measurement, or regulation of any approved network utility.

Studio unit: Means a residential unit with living areas combined into one main room (e.g. kitchen, lounge, and bedroom may be open plan with bathroom and toilet facilities in a separate room).

Subdivision: Has the same meaning as contained within section 218 of the Resource Management Act 1991 which means:

a) The division of an allotment:

   i. By an application to a District Land Registrar for the issue of a separate certificate of title for any part of the allotment.

   ii. By the disposition by way of sale or offer for sale of the fee simple to part of the allotment.

   iii. By a lease of part of the allotment which, including renewals, is or could be for a term of more than 35 years.

   iv. By the grant of a company lease or cross-lease in respect of any part of the allotment.

   v. By the deposit of a unit plan, or an application to a District Land Registrar for the issue of a separate certificate of title for any part of a unit on a unit plan.

b) An application to a District Land Registrar for the issue of a separate certificate of title in circumstances where the issue of that certificate of title is prohibited by section 226.

The term subdivide land has a corresponding meaning.

Supermarket: This includes:

An individual retail outlet having a store footprint over 1,000m^2 GFA that sells, primarily by way of self service, a comprehensive range of:

a) domestic supplies, fresh food, groceries, such as fresh meat and produce; chilled, frozen, packaged, canned and bottled foodstuffs and beverages; and general housekeeping and personal goods, including (but not limited to) cooking, cleaning and washing products; kitchenwares; toilet paper, diapers and other paper tissue products; pharmaceutical, health and personal hygiene products and other toiletries; cigarettes, magazines and newspapers, greeting cards and stationery, batteries, flashlights, light bulbs and related products; and

b) non-domestic supplies and comparison goods comprising not more than 20 per cent of all products offered for sale as measured by retail floor space, including (but not limited to) clothing and footwear; furniture; electrical appliances; office supplies; barbecue and heating fuels; audio visual products.

Note

Retail floor space means that area of the premises to which the public has access for the purpose of shopping, together with any area:

a) taken up for the purpose of display of goods; and
b) any counter areas used by or occupied exclusively by staff members whilst actively engaged in serving the public.

This area does not include floor space used for:

- storerooms
- back of house including delivery areas
- trolley storage areas
- entrance lobbies
- behind counter areas, and
- checkouts.

Te Rapa Corridor: Means those lots shown in Volume 2, Appendix 6, Figure 6-4.

Te Rapa Dairy Manufacturing Site: Means the land identified on Figure 6-4 and the Planning Maps as Te Rapa Dairy Manufacturing Site.

Temple View Flood Hazard Area: Means that part of any land within the vicinity of Temple View affected by flooding during a 1% annual exceedance probability event. This is identified as Temple View Flood Hazard Area within the Planning Maps.

Temporary activities in a public place: This includes:

a) Outdoor dining areas.

b) Markets, stalls, merchandise displays and mobile shops.

c) Busking, hawking and charitable collections.

A public place is:

d) Under the control of Council.

e) Open to, or being used by, the public, whether or not there is a charge for admission.

and includes:

f) A road, whether or not the road is under the control of Council.

g) Any part of a public place; but excludes reserves which are regulated by the Parks, Domains and Reserves Bylaw 2007.

Note
Refer to the Hamilton City Public Places Bylaw 2009 and Hamilton City Public Places Policy 2009 for restrictions to activities in a public place.

Temporary buildings and structures ancillary to an event: These include marquees and spectator stands.

Temporary logistics activities: Logistics activities provided for in the Logistics Zone (Sub Area A) as a controlled activity in Rule 10.3c and excluding freight handling activities.

Temporary sign: Means a sign that is not reflectorised, illuminated, flashing or moving and the sign is used to:

a) Advertise that the property is for sale, and is displayed only while the property is on the market.

b) Advise of any temporary construction project being undertaken on the site.

c) Inform of a public election.

d) Inform for the purpose of public notification.

e) Advertise an event associated with any temporary recreational or community activity.

Tenancy: Tenancy is defined as the gross floor area occupied by way of exclusive use by a tenant and includes both freehold and leasehold area.

Tertiary education and specialised training facility: Means land and/or buildings used to provide regular instruction, training and/or related research not meeting the definition of school and includes tertiary education institutions, work skills training centres, and their ancillary administrative, cultural, recreational, accommodation, retailing, research or communal facilities.

TEU: Means 20-foot equivalent unit and is a measure of container throughput in the freight industry.

Three Waters: Means the three key areas of strategic water management (including associated infrastructure) within the City. Three Waters comprises:

a) Water supply – including drinking water and other water abstracted from the Waikato River, treated and used within the City, and water for fire fighting purposes.

b) Wastewater – liquid waste (including liquids containing waste solids) from domestic, industrial and commercial premises including toilet wastes, grey water and tradewastes.

c) Stormwater – rainwater that runs off a surface into streams, waterways, underground aquifers, rivers and eventually, far beyond Hamilton's boundaries, ends up in the sea.

Trade and industry training facilities: Means premises accommodating specialised education and training facilities where groups of people are given trade or industry tuition and training on a formal basis.

Traffic services: Means the transport corridor furniture, pavement markings and lighting assets that make up part of the transport infrastructure, and includes:

a) Belisha beacons and lighting at pedestrian crossings.

b) Carriageway and footpath lighting.

c) Guard rails, pedestrian railings and fences.

d) Pavement markings, including cycleway markings.

e) Transport corridor delineation, including edge marker posts and raised and reflective pavement markers.

f) Sight rails.

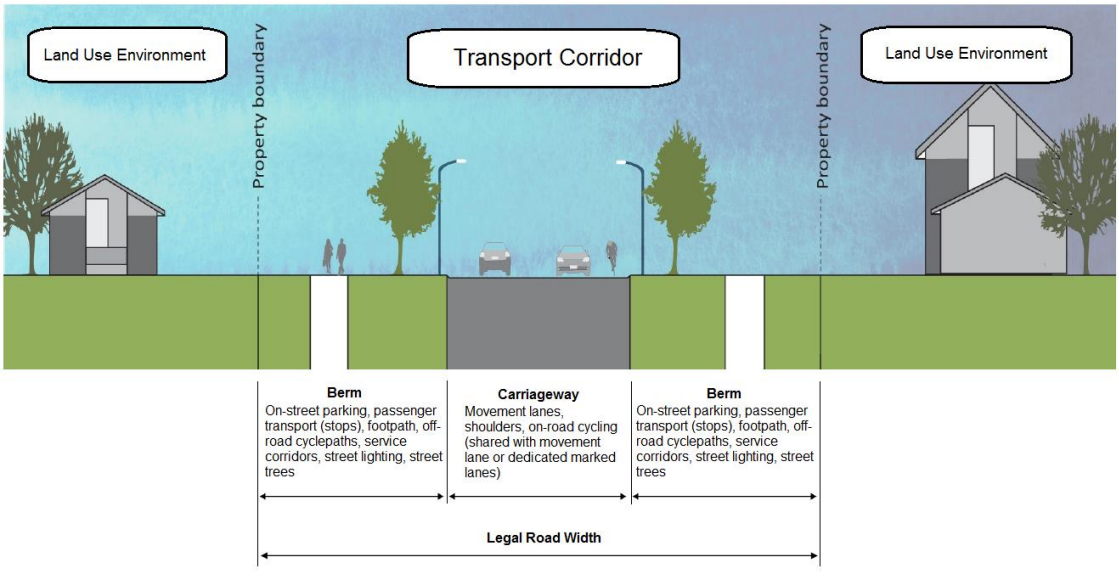
g) Signs, including the posts.

h) Traffic signals.

i) Variable message signs (VMS).

Transplanting (of a significant tree or indigenous vegetation in a Significant Natural Area): Means the relocation of a significant tree or indigenous vegetation to a new site in accordance with standard arboricultural practice.

Transport corridor: Means the whole corridor that provides for carriageway, berms and any adjoining pedestrian or cycle paths, landscaping and lighting, and includes roads, but excludes private roads in the Ruakura Logistics Zone and the Knowledge Zone.



Transport depot: Means land, buildings and infrastructure used principally for the receiving, dispatching or holding of goods or passengers in transit by road or rail and any associated provision for vehicles.

Transport infrastructure: Means any structure that is necessary for the functioning of the transport network and that caters for the needs of transport users. This includes but is not limited to surfacing and pavement, traffic services and structures such as

transport lighting, bridges, retaining walls, bus shelters, taxi shelters, information fixtures for bus passengers, parking and loading spaces and facilities, litter bins, drinking fountains, mobility scooter charging points, and public seating.

Transport network: Means the combined network of:

a) Existing and future transport corridors (as shown on any Structure Plan, Figures 15-4b to 15-4f or Designation).

b) Private roads and ways, access ways, service lanes pedestrian, cycle and passenger transport lanes or routes (both within and outside the transport corridor).

c) Rail, river ferry and air travel routes

that provides for the movement of people and goods to, from and through the City. It includes all of the ancillary support transport infrastructure and activities, and vehicle entrances. It also includes those facilities in addition to transport infrastructure that support the use of the transport network, as well as (but not limited to) end-of-journey facilities and Travel Management Plans.

Transportation service centre: Means a development with the primary purpose of providing an accessible range of services to the motoring public using the State Highway network including commercial freight vehicles. A Transportation Service Centre may include the following uses.

a) Service Stations and car wash facilities.

b) Truck stops, truckers' lounges and associated accommodation.

c) Food and refreshment facilities (including drive through services).

d) Rest, picnic and sealed vehicle parking areas.

e) Public toilets and showers.

f) Lotto facilities.

g) Playgrounds.

h) Information centre for the provision of information for travellers and tourists.

i) Storage area for tow trucks.

j) Telephones, mail box, coin laundry, automatic teller machine banking faculties (ATMs) and fax/communication facilities.

k) Premises for emergency and transport related regulatory services.

l) Accessory buildings for the foregoing uses.

Travel plan: Means a set of measures to encourage people (e.g. employees, visitors and students) to travel to and from the site (e.g. workplace or school) by walking, cycling, passenger transport and car sharing or car pooling.

Tree (in relation to landscaping and screening): Means a large perennial plant with a woody trunk that has a mature growth height of greater than 3m or with a trunk diameter at its base of greater than 100mm.

Unit site area: Means either:

a) A delineated area for exclusive use on a proposed plan of cross lease, company lease subdivision.

b) A principal unit and its accessory unit entitlements on a proposed unit title subdivision.

Upper floor levels: Means those floors at a level higher than 2.5m above ground level at any corner of external foundations of the building.

Use (in relation to the hazardous facilities screening procedure contained in Appendix 12): Means the manufacturing, processing or handling of a substance for a particular activity without necessarily changing the physical state or chemical structure of the substance involved. This includes mixing, blending and packaging operations, or the use of a substance as a cooling or heating medium. It does not include:

loading out and dispensing of petroleum products; or

the filling or drawing of substances from bulk storage tanks where the connection to the bulk storage tank is not permanent.

Vegetation removal: Means removing any vegetation or trees of any height including the root structure of such vegetation, provided that this shall not include emergency removal of protected trees and/or removal or alteration of vegetation necessary to avoid injury to persons or imminent danger to property or works undertaken by regional or territorial authorities for erosion control, flood management, or plant pest management purposes.

Vegetation trimming and maintenance: Means for the purpose of maintaining existing fence lines, vehicle tracks, walkways, cycleways, drains, ponds, utilities or other structures. It includes clearance required for the management of exotic plant species or compliance with a Pest Management Plan under the Biosecurity Act 1993 and must be in accordance with currently accepted arboricultural practice.

Vehicle crossing: Means the formed and properly constructed vehicle entry/exit point from the carriageway of any road up to and including that portion of the road boundary of the site across which a vehicle entry or exit point is permitted by this District Plan. It includes any culvert, bridge or kerbing.

Vehicle control point: Means a point on an internal vehicle access route controlled by a barrier, or similar means, at which a vehicle is required to stop.

Vibration sensitive activities: Means residential activities, marae, hospitals, facilities for the elderly, hotels, accommodation and educational establishments.

Visitor accommodation: Means any land or buildings used for day-to-day accommodation of visitors on a temporary basis (up to three months' continuous occupation during any 12-month period). It includes motels, hotels, holiday or tourist flats, backpacker accommodation, motor or tourist lodges. It excludes camping grounds and motor camps.

Waahi tapu: Means a place sacred to Māori in the traditional, spiritual, religious, ritual, or mythological sense.

Waikato Hydro System Operating Range: Means

Waikato Hydro System Operating Range		
Location	**Lower Level (m)**	**Upper Level (m)**
Cobham Bridge	11.60	15.80
Victoria Bridge	11.40	15.44
Claudelands Bridge	11.20	15.29
Whitiora Bridge	10.99	15.18
Fairfield Bridge	10.83	15.06
Ann Street	10.70	14.92
Wairere Drive	10.40	14.38

Waikato River: Means the 'Waikato River' as defined by section 6 of the Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010.

Waikato Riverbank and Gully Hazard Area: Means the area identified on the Planning Maps as Waikato Riverbank and Gully Hazard Area and is susceptible to land instability because of its slope and/or soil types.

Note

Council holds mapping information that separates the gully network and Waikato Riverbank components of this Hazard Area.

Walkways and cycleways: Means publicly accessible formed pathways and includes mountain bike/BMX tracks, boardwalks, shared paths, footpaths and cycle paths.

Warehouse: Means premises used for the receipt, storage and disposal of materials, articles or goods destined for a retail outlet, trader or manufacturer.

Water-sensitive techniques: These include a variety of methods designed for water conservation. They include many techniques referred to under other names, e.g. low-impact design (LID), water-sensitive urban design (WSUD), low-impact urban design and development (LIUDD), sustainable urban drainage systems (SUDS), "natural", "green" and "sustainable". A primary aim of water-sensitive techniques is to maximise the achievement of multiple benefits rather than a single engineering technical efficiency measure. Recognised water-sensitive techniques include:

a) For water supply:
   i. Rainwater reuse systems comprising rainwater tanks and appropriate connections that use rainwater instead of potable water for toilet flushing and landscape irrigation.
   ii. Low-flow fixtures.
   iii. Leak resistant fixtures and fittings.
   iv. Automated greywater reuse systems that use greywater instead of potable water for toilet flushing and landscape irrigation.
   v. Drought-resistant landscaping (e.g. xeriscape) with low water requirements.
   vi. Conservation education.

b) For stormwater:

i. Rainwater tanks/chambers/ponds for reuse or detention.
ii. On-site soakage.
iii. Green roofs.
iv. Reed beds/wetlands.
v. Rain gardens.
vi. Vegetative filter strips.
vii. Swales and depression landscaping.
viii. Gross pollutant traps.
ix. Permeable paving.
x. Requiring buildings to be built above the freeboard of a 1% annual exceedance probability event.

c) For wastewater:
i. Low-flow and leak resistant fittings and fixtures on a water supply.
ii. Automated greywater reuse systems as in a) above.
iii. Best practice inflow and infiltration reduction methods.

d) Biodiversity:
i. Reed beds.
ii. Wetlands.
iii. Ponds.
iv. Rain gardens.
v. Green or living roofs.
vi. Water-quality protection and improvement devices.
vii. Maintenance or restoration of natural flow regimens.

e) Cultural:
i. Traditional food and fibre plants within riparian areas.
ii. Water-quality protection and improvement devices.
iii. Facilitation of appropriate water body access.
iv. Maintenance or restoration of natural flow regimens.

Wetland: Means permanently or intermittently wet areas, shallow water, and land-water margins that support a natural ecosystem of plants and animals adapted to wet conditions.

Wholesale retail and trade supplier: Means premises that engage primarily in the storage, distribution and sale of goods to other businesses (rather than the general public, although it may include a minor proportion of its sales to the general public), including premises engaged in supplying the construction and building industries, such as plumbing and building materials, farming and primary production supplies (including seed and grain merchants, farming and horticultural equipment suppliers, and equestrian and veterinary suppliers).

Yard: Has the same meaning as setback.

Yard area (relating to ancillary office activity): Means that area of a site used for outdoor storage or outdoor activity related to the principal activity on the site, or which is the principal activity on the site. It excludes any provided staff or customer car-parking, landscaping areas and manoeuvring and loading areas.

Yard-based retailing: Means a retail activity selling or hiring products where more than half of the display area (not including any parking, servicing, landscaping or manoeuvring areas) is located outside of an enclosed building. Such activities include, but are not limited to car, boat and heavy machinery sales yards; garden centres and landscaping supplies; automotive and boating accessories; trailer and caravan sales yards, building and farm supply outlets, and hire pools.

1.2 Information Requirements

Where noted and relevant the following information is to be supplied with applications for resource consents and certificates of compliance.

Any information and plans provided must be in writing and in sufficient detail and accuracy to enable a full assessment of compliance with the District Plan and to evaluate any environmental effects of the proposal.

Note

1. Wherever possible application material should also be provided in an electronic format. Checklists, forms, templates and guides are available from Council. Further general guidance on the Act and its processes is available from the Ministry for the Environment website: www.mfe.govt.nz/rma/index.html

1.2.1 All Applications

a) **Description of the proposal**

An introductory background providing a clear description of:

i. The proposed activity and how it is intended to operate (including information such as hours of use, numbers of users, etc).

ii. The proposed use of all existing and proposed buildings on the site.

iii. The current use of the site.

iv. Resource consents applied for, identifying what aspects of the proposal do not comply with relevant standards and assessment criteria within the District Plan (including any plan changes or variations).

b) **Legal description of the subject site**

i. Street address, legal description and allotment area(s) of the subject site.

ii. A copy of the current Certificate of Title(s) for the subject site and documents detailing any associated:

- Consent notices
- Easement documents
- Hamilton City Council covenants
- Building line restrictions

Note

1. Certificates of Title may be obtained from Land Information New Zealand. Please ensure that the Certificate of Title consists of both the cover page and attached pages showing the survey plan.

c) **Locality plan**

A locality plan or aerial photograph showing the physical location of the subject site in relation to adjoining roads and sites.

Note

1. One copy at a scale of 1:500 is required with all applications.

d) **Site plan/s**

Showing the following.

i. North point.

ii. Allotment boundaries and dimensions.

iii. Date the plans were drawn.

iv. Any historic or natural feature identified in Appendix 8 or Appendix 9 as follows:

- Schedule 8A: Built Heritage (structures, buildings and associated sites)
- Schedule 8B: Group 1 Archaeological and Cultural Sites
- Schedule 8C: Group 2 Archaeological and Cultural Sites
- Schedule 9C: Significant Natural Areas
- Schedule 9D: Significant Trees

v. Other natural features (e.g. wetlands, springs, streams, location of banks).

vi. Frontages to public road (noting the road's hierarchy in the Transport Corridor Hierarchy Plans in Appendix 15, Figures 15-4b to 15-4f).

vii. Locations and layout of existing and proposed buildings (including key dimensions from buildings to boundaries).

viii. Floor plans showing the internal room layout and identifying the floor area and any habitable rooms (the outline of any upper storey should be indicated on the site plan).

ix. Access and vehicle crossings from road boundaries to parking, loading and manoeuvring areas.

x. Location of buildings on adjoining sites.

xi. Location, layout and dimensions of existing and proposed:

- Parking spaces (cars, motorbikes, bicycle, accessible)
- Loading spaces
- Service areas
- Living court areas
- Storage areas

xii. Location, layout, dimensions and description of existing (noting any that are to be retained or removed) and any proposed:

- Landscaping and vegetation
- Walls or fences
- Signs (including sign design)
- Utility services (e.g. water lines, street lights), which may also require details about connections to Three Waters infrastructure (including size, depth at boundary, grade and distance to boundary pegs)

Note

1. This may need to include features beyond the property boundary (e.g. utility services along the road frontage which may affect the desirable location of proposed vehicle accesses).

xiii. Original and proposed future contours of the site with contours marked at 0.5m intervals.

xiv. Nature and extent of any:

- Proposed earthworks (e.g. cut or fill, quantities)
- Designations affecting the site (refer Volume 1, Chapter 26: Designations)
- Natural hazards (including hazard layers identified by the District Plan – refer Volume 1, Chapter 22: Natural Hazards and the Planning Maps)

Note

1. Two copies at a scale of 1:100, and one reduced A4 copy is required with any application.

e) **Elevation drawings**

Elevation drawings of all buildings to be constructed or altered, showing the relationship, design and appearance of proposed buildings, including:

i. The natural ground level, and the nature and extent of any proposed earthworks (e.g. cut or fill, quantities).

ii. Existing and finished ground levels.

iii. Maximum building height and relevant height control plane angles.

iv. Ground floor levels in relation to the top of the kerb at entry locations from any adjoining transport corridor.

iv. Height above floor level of any upper-storey windows.

v. Floor levels in relation to the depth of a 1% annual exceedance probability flood event.

Note

1. Two copies at a scale of 1:50, 1:100 or 1:200, and one reduced A4 copy is required with any application.

f) **Engineering design plans for any proposed infrastructure**

Engineering design plans should be included for any proposed infrastructure.

Note

1. Guidance on engineering plan information requirements is contained within the Hamilton City Infrastructure Technical Specifications.

g) **Other specialist information specifically required by the District Plan**

This may include Integrated Transport Assessments, Acoustic Design Certificates, and Landscape and Planting Plans. Specific information required is referred to in the following Sections 1.2.2.

h) **Other resource consents/permits**

A description of whether any additional resource consents are required for the proposal and whether these have been applied for (e.g. Regional Council Discharge Permits, Regional Council Water Take Permit if the proposal is likely to involve a commercial or industrial-type activity that is likely to consume more than $15m^3$ of water per day).

i) **Assessment of environmental effects**

i. An assessment of the environmental effects (AEE) of a proposal shall be provided with applications for resource consents. Any AEE shall be prepared in accordance with the Fourth Schedule of the Act and shall discuss all the actual and potential effects of the proposal on the environment.

ii. The amount of detail provided must reflect the scale and nature of the effects. For example, if there are major effects arising from the proposal, a detailed analysis and discussion of these effects should be included. It may require the provision of information from a suitably qualified and experienced practitioner (e.g. a traffic engineer, planner, geotech engineer or acoustic consultant). If the effects of the proposal are small, then a less detailed AEE may be appropriate.

iii. The AEE should identify how any adverse environmental effects are to be avoided, remedied, or mitigated, and shall also ensure that the following matters are addressed.

- Consultation undertaken with affected parties
- Effects of the proposal on the natural environment (including existing vegetation and natural land form), neighbourhood amenity, and infrastructure
- Heritage issues (such as waahi tapu)
- Site constraints (such as flooding)
- External impacts (such as discharges)
- Construction impacts (such as noise)
- Other matters associated with the proposal

iv. In the case of controlled and restricted discretionary activities the AEE need address only those matters which Council has retained control over or restricted its discretion to in the District Plan.

1.2.2 Additional Information Requirements

1.2.2.1 General

a) In addition to the information specified in 1.2.1 above, any other relevant plans, reports or information are to be provided with any application for a resource consent, to enable the full assessment and determination of the proposal, including:

i. Details and outcomes of any consultation undertaken (e.g. Waikato iwi and local hapu, Kiwi Rail, Transpower, New Zealand Transport Agency, Heritage New Zealand Pouhere Taonga, Waikato Regional Council).

ii. Potential future subdivision of site.

iii. How the proposal will promote any design guidance referenced in the District Plan.

iv. Details about previous uses of the site and an assessment on whether the National Environmental Standard on Assessing and Managing Contaminants in Soil to Protect Human Health applies.

v. Any other relevant rules or provisions in the District Plan, such as any overlay provisions and bonus provisions.

b) Reports and management plans demonstrating how adverse environmental effects associated with the proposed activity are to be avoided, remedied or mitigated with respect to:

i. Nuisances such as noise, dust, odour, glare, and vibration.

ii. Stormwater disposal and sediment control measures.

iii. Hazardous facilities and substances.

iv. Discharges of contaminants.

Note

1. Historical and cultural sites and natural features are of significance to iwi and local hapu. In respect of any developments or activities requiring a resource consent, or for plan changes it is advisable that iwi representatives are notified at the earliest stages of planning. This will assist with the identification and mitigation of any potential adverse effects that may impact on cultural values. It is also advisable that before any archaeological surveys or investigations are undertaken iwi representatives are consulted.
2. It is recognised that traditional iwi/hapu customary processes are a complementary method of control outside the District Plan for activities that can adversely affect cultural values associated with natural features (such as the pollution of waterways that are used as important food-gathering sites). Customary processes may vary in different situations and could include:
   - *Mauri* – the notion of respect towards the health and wellbeing of significant sites
   - *Rahui* – an embargo or restriction on access to a site until it is lifted (usually in relation to a polluted or hazardous site)
3. Consultation with iwi can assist in identifying any appropriate customary processes to be followed where special tangata whenua values are identified.

1.2.2.2 Subdivision

a) **General**

Any subdivision application shall include plans, reports, and other information to show how the proposed allotments and access can adequately accommodate the development potential of the site.

b) **Scheme Plan**

A Scheme Plan covering the following matters should be provided.

i. Unit site area of each proposed allotment.

ii. Net site area of each proposed allotment.

iii. Dimensions of all:

- Existing boundaries
- Proposed boundaries

iv. Shape factor shown on all proposed allotments, including those with existing buildings.

v. Schedule of existing easements.

vi. Memorandum and dimensions of proposed easements.

vii. Existing and proposed land contours at 0.5m intervals and/or sufficient spot heights to allow accurate representation of the land surface.

viii. Existing trees and other vegetation proposed for retention or removal.

ix. All existing buildings (plan views of roof and wall outlines).

Note

1. Documents should also be provided to show that existing buildings have been legally established.

x. All proposed buildings and building platforms (including buildings being re-positioned on site).

xi. Service areas, living areas, storage areas, vehicle parking areas and loading areas for all existing buildings.

xii. Parking spaces (cars, motorbikes, bicycle, accessible) and loading spaces.

xiii. Vehicle manoeuvring tracking curves.

xiv. Vehicle queuing areas.

xv. Distance of building eaves from abutting accessway or right-of-way boundaries.

xvi. Vertical cross-section of building eaves/stairs/doors and windows that encroach accessway/right of way boundaries/unit title common areas.

xvii. Existing and proposed Three Waters reticulation.

xviii. All existing and proposed vehicle crossings.

xix. Sight distances of all existing and proposed vehicle crossings.

xx. Distance of all existing and proposed vehicle crossings from intersections or railway crossings.

xxi. Distance between all existing and proposed vehicle crossings (including adjoining sites.

xxii. Location of proposed roads, reserves, easements, and essential services.

xxiii. Land to be vested in the Crown, Council, or network utility operator.

xxiv. Nature and standard of existing and proposed roads and network utility services such as sewage disposal, stormwater management, water supply, telecommunications and electricity supply.

xxv. Proposed final legal status (e.g. freehold, cross-lease, unit title).

Note

1. A checklist is provided by Council outlining all the information required with a subdivision application. Staged subdivisions should have each stage shown on a separate scheme plan, as well as a scheme plan showing the complete subdivision.

c) **Site Analysis**

A site analysis shall be provided in such detail as corresponds with the scale and significance of the potential effects that the subdivision and any associated or subsequent development may have on the environment.

The site analysis shall identify, and where relevant provide detail of, how the proposed subdivision addresses (avoids, remedies or mitigates) adverse effects (on and or from), or where possible enhances (the values of):

i. Topography and landforms, natural features, wetlands, springs and streams.

ii. Existing native vegetation and significant trees.

iii. Soils and groundwater.

iv. Any significant viewshafts.

v. Existing buildings and structures.

vi. Heritage and cultural elements.

vii. The road to be accessed and the surrounding transport networks.

viii. Reserves, parks and open space.

ix. Stormwater and wastewater systems, stormwater paths and any downstream capacity issues.

x. Infrastructural capacity, performance and/or availability.

xi. Any contamination issues.

xii. Natural hazards.

xiii. Impacts on community facilities.

xiv. Surrounding character.

Note

1. All applications for subdivision are also required to provide a Water Impact Assessment as set out in 1.2.2.5 below or an Integrated Catchment Management Plan in accordance with, and where required by, Rule 25.13.4.1 in Volume 1.

d) **Subdivision Concept Plan**

A Subdivision Concept Plan shall accompany subdivision applications for the following.

- Any single or staged subdivision creating more than 10 additional lots
- Any subdivision creating additional lots within Stage 1 of the Peacocke Structure Plan

The information provided as part of a Subdivision Concept Plan must demonstrate how the proposal meets, is consistent with, or otherwise satisfies:

a) Objectives and Policies of:

i. The relevant zone.

ii. Chapter 3: Structure Plans (as relevant to specific Structure Plan Areas).

iii. Chapter 23: Subdivision.

b) Relevant standards

c) Relevant design guides in Appendix 1.4

A Subdivision Concept Plan is made up of the following components, which are described further below.

- Context Analysis Plan
- Site Analysis Plan
- Concept Plan

i) Context Analysis Plan

A context analysis plan identifies the constraints and opportunities within the wider site context (minimum 800m radius from the site); and helps to establish how development of the site either mitigates (constraints) or maximises (opportunities) these elements. The elements to be considered include but are not limited to:

a) The wider transport network both existing and proposed, identified within the Structure Plan and Transport Corridor Hierarchy Plan (transport corridors, cycle and pedestrian routes).

b) Opportunities to connect and integrate with adjacent transport networks.

c) Existing and planned:

   i. Open spaces, parks, and green linkages.

   ii. Local centres, community facilities (e.g. schools, parks), passenger transport and direct routes to these.

   iii. Residential areas, surrounding subdivision lot density, housing typologies or styles, parks and networks.

d) Existing infrastructure and reticulated services (including overhead transmission lines), available connections and capacity.

e) The form and scale of the built and natural environment.

f) The amenity and character of the wider area.

g) Notable natural (e.g. significant trees), heritage and cultural features.

h) Landscape or landform features such as wetlands, streams, rivers, vegetation.

i) Significant views and aspects.

ii) Site Analysis Plan

A detailed site analysis should be undertaken once the context analysis has been completed. The detailed analysis of the specific site and its close surroundings facilitates the design of appropriate subdivision responses.

A site analysis should be provided in such detail as corresponds with the scale and significance of the potential effects that the subdivision and any associated or subsequent development may have on the environment.

The site analysis should identify and, where relevant, provide detail of how the proposed subdivision addresses (avoids, remedies or mitigates) adverse effects (on and/or from), or where possible enhances (the values of) the following.

a) Topography and landforms, natural features, wetlands, springs and streams.

b) Existing native vegetation and significant trees.

c) Soils and groundwater.

d) Any existing and significant viewshafts.

e) Existing buildings and structures.

f) Heritage and cultural elements.

g) The road to be accessed and the surrounding transport network.

h) Reserves, parks and open space.

i) Stormwater and wastewater systems, stormwater paths and any downstream capacity issues.

j) Infrastructural capacity, performance and/or availability.

k) Any contamination issues.

l) Natural hazards.

m) Impacts on community facilities.

n) Surrounding character.

Note

1. All applications for subdivision are also required to provide a Water Impact Assessment as set out in 1.2.2.4 below or an Integrated Catchment Management Plan in accordance with, and where required by, Rule 25.13.4.1 in Volume 1.

iii) Concept Plan

The concept plan shall be prepared once the context and site analysis plans have been completed and there is a good understanding of the opportunities and constraints within the site and the wider neighbourhood.

a) A subdivision concept plan shall specifically include the following information.

   i. The location and width of proposed roads and carriageways and the integration of the roads with the existing transport network.

   ii. The location and dimension of public reserves.

   iii. The location and dimension of shared-use pedestrian/cycle accessways.

   iv. The intended use of each lot in the subdivision and the ways in which the subdivision will integrate with all neighbouring sites either as already developed or as proposed in accordance with existing resource consents.

b) In preparing the concept plan the assessment criteria in Appendix 1.4.1.3 shall also be considered.

c) Concept plans within the Peacocke Structure Plan Area shall be prepared in accordance with the neighbourhoods identified in Appendix 2.3.

d) All concept plans shall be prepared by the applicant in consultation with Council officers as necessary and other stake holders prior to completing detailed subdivision proposals for the resource consent. Council officers shall use the concept plan to assess the subdivision application and will as necessary require compliance with concept plan for subdivision through conditions of consent and consent notices.

1.2.2.3 Master Plan for Peacocke Character Zone Neighbourhoods

A Master Plan shall accompany subdivision applications for in the Peacocke Character Zone for Fee Simple Subdivision where lots created are less than 2ha in the Terrace Area and less than 5000m² in the Gully and Hill Areas.

Master Plans shall be prepared in accordance with the neighbourhoods identified in Appendix 2-3 and the Peacocke Structure Plan (refer to Volume 1, Chapter 3: Structure Plans).

A Master Plan will also be required to include a Subdivision Concept Plan (refer to Appendix 1.2.2.2d)), an analysis over all adjoining neighbourhoods to the subject site to ensure issues impacting on the development are understood and address the following matters.

a) **Transport Network**

The Master Plan will need to outline the street pattern as well as set out the street typologies that will be used in the development, the pedestrian and cycle network and how this links with the City's/area's transport network and open space network. As part of the Master Plan a broad Integrated Transport Assessment will be required (refer to Rule 25.14.4.3).

b) **Infrastructure and Servicing**

The Master Plan will need to identify the approach to the provision of infrastructure and services which is aligned with the structure plan and the wider city infrastructure development program. Incorporate a low impact urban design and development approach in association with the development of an Integrated Catchment Management Plan, as set out in Appendix1.2.2.6, for the stormwater catchment area in which the Master Plan neighbourhood or neighbourhoods are located. Demonstrate the integration of any short term infrastructure solutions created under Rule 23.6.10(f) into the overall infrastructure solution for the Peacocke Structure Plan area as indentified by the Master Plan.

c) **Natural Environment Network**

The Master Plan will need to identify the natural and ecological systems within the area and demonstrate how these areas have been either integrated into the urban design or how they are to be protected. The integration of the natural environment into the urban form has strong links to how the open space system is developed and the establishment of the land use patterns.

d) **Open Space Network**

The Master Plan will need to demonstrate how the open space links with the natural environment, the Waikato River esplanade, the transport network, and land uses; how the pedestrian and cycle networks have been integrated into the open space network and river esplanade.

e) **Land Use**

The Master Plan will need to identify the location of commercial and community facilities as well as residential densities. It will need to also develop the street pattern taking into account the open space, natural environment and transport network. The street pattern will also need to take into consideration the

development principles set out in the structure plan and the transport corridor hierarchies.

f) **Detailed Development Response**

The approach proposed for the urban form of the neighbourhood will need to be developed. This will demonstrate the urban design and architectural responses to the opportunities and constraints within the neighbourhood and will need to consider the design guides set out in Appendices 1.4.1, 1.4.2 and 1.4.3.

g) **Staging**

The plan will need to identify the staging of development to demonstrate how any urban development created under Rule 23.6.10(f) is integrated into the overall master plan for the neighbourhood.

1.2.2.4 Landscaping Plan

All subdivision applications and any resource consent for development that has not complied with any landscaping and screening standards shall include, as part of the resource consent application, a Landscaping Plan in such detail as appropriate to the scale and significance of the potential effects that the activity may have on the environment. The Landscaping Plan shall contain as relevant:

a) Site and property boundaries.

b) Transport corridors and public spaces such as parks and walkways adjacent to the site.

c) The location of existing and proposed site features including buildings and structures, hard surfaces, retaining walls and fences, landforms, grassed areas and any other relevant features.

d) Description of the location, size and species of existing and proposed vegetation.

1.2.2.5 Water Impact Assessments

a) As part of an assessment of environmental effects a Water Impact Assessment will be required in accordance with Table 1.2.2.5a below:

Table 1.2.2.5a: Water Impact Assessments – Where required and what type

Where required	Type of Water Impact Assessment required
Except as provided for by Rule 25.13.4.6(b) in Volume 1: Any development or subdivision: i. Failing to comply with relevant standards in Volume 1, Rule 25.13.4.5 Water efficiency measures. ii. Failing to comply with any relevant permeable surface standards for the zone.	Type 1 (Residential activities) Type 2 (Other activities)

iii. Creating four or more residential units on any site (excluding lots for the purpose of reserves, network utilities or transport corridors). iv. Creating four or more additional allotments (excluding lots for the purpose of reserves, network utilities or transport corridors). v. Involving more than 1ha of land. vi. Creating a new building for industrial activities with a gross floor area greater than 1000m^2. vii. Involving any new activity which will have a water requirement greater than 15m^3 per day. viii. Creating a new building for non-residential activities (other than industrial activities or as provided for in ix. below) with a gross floor area greater than 300m^2. ix. Within the Major Facilities Zone: 1. Creating a new building for non-residential activities (other than industrial activities) with a gross floor area greater than 3,000 m^2; or 2. Providing residential accommodation for more than 13 additional people, not being accommodation for hospital patients.	

b) The information required in a Water Impact Assessment shall be in such detail as appropriate to the scale and significance of the potential effects that the activity may have on the environment, and only if relevant to the proposal. Table 1.2.2.5b outlines the information requirements for the different types of Water Impact Assessments referenced in Table 1.2.2.5a above.

Note

1. The extent and degree of assessment needed for a Water Impact Assessment may be greater when without an existing Integrated Catchment Management Plan.
2. As an outcome of the Water Impact Assessment, conditions may be applied to the development. These may include financial contributions, monitoring and the requirement for the installation of specific water sensitive techniques.

Table 1.2.2.5b: Information required for each type of Water Impact Assessment

	Type of Water Impact Assessment and what information is to be provided (✓ = required)	
Information to be provided	**Type 1**	**Type 2**
i. How the proposal is consistent with, or otherwise complies with, the recommendations, measures and targets of any relevant Integrated Catchment Management Plan.	✓	✓

	Type of Water Impact Assessment and what information is to be provided (✓ = required)	
Information to be provided	**Type 1**	**Type 2**
ii. An assessment of any potential effects (including cumulative effects) of the development in relation to its catchment.	✓	✓
iii. Details of what water-sensitive techniques are proposed. iv. Details of the expected water efficiency benefits arising from the proposed water-sensitive techniques compared to the same development without using those water-sensitive techniques. v. Details of how the water-sensitive techniques will be operated and maintained to ensure ongoing water efficiency benefits. vi. Where no water-sensitive techniques are proposed, an assessment containing reasons and justification for not incorporating water-sensitive techniques, having particular regard to the objectives and policies of the Volume 1, Chapter 25.13: City-wide – Three Waters.	✓	✓
vii. Confirmation of available Three Waters infrastructure and capacity to appropriately service the proposal.	✓	✓
viii. Details of the water demand (flow and pressure) and water sources.	✓	✓
ix. Where the water demand of the proposal is greater than $15m^3$ of water per day, details of a programme explaining how the proposal intends to reduce its water consumption to achieve that level. ***Note*** Consent from the Regional Council for an increased water take may be required where a proposal is to take in excess of $15m^3$ of water per day.		✓
x. Information on how wastewater (including trade waste) will be managed to minimise any impacts on the reticulated network.		✓
xi. A list of measureable targets and performance indicators to allow the efficient and effective monitoring of the proposal's compliance with any conditions arising from the Water Impact Assessment.		✓

1.2.2.6 Integrated Catchment Management Plans (ICMP)

All ICMPs shall be developed in consultation with Council and Waikato Regional Council and completed in accordance with the requirements set out below. Each ICMP shall be lodged with Council, and Council shall review the content of the ICMP and certify whether it complies with the requirements of this Rule set out below.

There are three different types of ICMPs, which each have different information requirements – see Table 1.2.2.6a.

Table 1.2.2.6a: Types of ICMPs and where to find their Information requirements

Type of ICMP	Where to find the information requirements
Full ICMP	Table 1.2.2.6b
Sub-catchment ICMP for Greenfield Areas [See Note 1]	Table 1.2.2.6b
Sub-catchment ICMP for areas other than Greenfield Areas	Table 1.2.2.6c

Note

1. Greenfield Areas include the Future Urban Zone, Temple View Zone, Te Rapa North Industrial Zone, Large Lot Residential Zone and all Structure Plan Areas identified in Appendix 2.

Table 1.2.2.6b: Information requirements for Full ICMPs and Sub-catchment ICMPs for Greenfield Areas

a)	Maps/drawings identifying for the relevant hydrological catchment (or sub-catchment): i. the catchment boundary; (***Note***: In the case of a full ICMP, this will be used in relation to determining future compliance with Rule 25.13.4.1(b)); ii. Natural features, surface water bodies, existing drainage systems and infrastructure; iii. Existing development and land uses (see f) vi below); iv. Proposed future development and land uses (see d) below); and v. The extent of the infrastructure networks that have been assessed and the location of any network constraints (see f) vii below).
b)	Classification of the surface water bodies within the catchment (or sub-catchment) as detailed in the Waikato Regional Plan.
c)	The social, economic, ecological, amenity and cultural objectives being sought for the catchment (likely to stem from a structure planning process).
d)	A description of proposed urban growth, development and land use intensification within the catchment (or sub-catchment).
e)	A list of the key stakeholders associated with the catchment (or sub-catchment), details of the consultation undertaken, and details of their respective views on providing for new stormwater diversion and discharge activities with the catchment (or sub-catchment).
f)	An assessment of the current state of the catchment (or sub-catchment) and stormwater receiving environment/s, and the provision of catchment baseline information (including maps/drawings) on: i. Topography; ii. Soils and geology;

iii. Receiving environment –
   a. Erosion;
   b. Ecology, including ecological sensitivity;
   c. Water quality (including contaminant load);
   d. Sediment quality; and
   e. Hydrology;
iv. Hydrogeology;
v. Flooding (including overland flow paths);
vi. Existing development and land uses;
vii. Existing three waters infrastructure and water source(s), including their capacity to appropriately service the proposed urban growth, development and landuse intensification within the catchment (or sub-catchment); and
viii. All relevant existing resource use authorisations (including, for example, consents issued by the Waikato Regional Council for water take, wastewater and stormwater diversion and discharge activities).

g) The effects of climate change.

h) An assessment of the environmental effects, including cumulative effects over time, of all proposed water take, wastewater management and stormwater diversion and discharge activities on the catchment (or sub-catchment) and stormwater receiving environment/s. The assessment shall include maps/drawings and be in such detail as corresponds with the scale and significance of the effects on the catchment (or sub-catchment) including, but not limited to, effects on the following, taking into account the effects of climate change:
   i. Natural features, surface water bodies and aquifers, including water sources;
   ii. Sites of cultural and/or historical significance;
   iii. Public health;
   iv. Flooding hazards, including overland flow;
   v. Receiving water hydrology, including base flows and peak flows in rivers and streams and long-term aquifer levels;
   vi. Receiving water sediment and water quality;
   vii. Receiving water habitat, ecology and ecosystem health, including an explanation of how they will be maintained and enhanced;
   viii. Receiving water riparian vegetation;
   ix. The extent and quality of open stream channels, including erosion and sedimentation;
   x. Fish passage for indigenous and trout fisheries (refer to the Waikato Regional Plan Water Management Classes for applicability);
   xi. The natural and amenity values of stormwater receiving waters, including the management of litter than becomes entrained in stormwater;
   xii. Existing infrastructure; and
   xiii. Existing authorised resource use activities.

i)	In response to the environmental effects assessment, a description and assessment of the available options for managing the effects of all proposed water take, wastewater management and stormwater diversion and discharge activities within the catchment (or subcatchment).
j)	Identification of a recommended integrated catchment management approach that is based on the Best Practicable Option to avoid as far as practicable and otherwise minimise or offset actual and potential adverse effects of all proposed water take, wastewater management and stormwater diversion and discharge activities on the catchment (or sub-catchment) and its infrastructure, while ensuring the proposed urban growth, development and landuse intensification has an appropriate and sustainable water source and receives appropriate three-water services.
k)	Education initiatives to support the integrated catchment management approach recommended in the ICMP.
l)	Maps/drawings, a description, and a prioritised schedule of the infrastructure works to be carried out to implement the integrated catchment management approach recommended in the ICMP.
m)	A list of performance measures by which the implementation of the integrated catchment management approach recommended in the ICMP will be gauged.
n)	The need for any changes (including designations) or variations to the relevant District Plan, as a result of the findings and approach of the ICMP.
o)	Identification of the water sensitive techniques that are appropriate, and those that are unsuitable, within the catchment or any sub-catchment.
p)	All ICMPs shall be of sufficient scope and detail to inform development of Water Impact Assessments.

Note

1. Information requirements shaded in the table above do not apply to sub-catchment ICMPs for greenfield areas, but do apply to full ICMPs.
2. Council will hold some information and modelling data that may assist in preparing any type of ICMP.
3. Anyone preparing an ICMP will need to collaborate closely with Council. Council's guidance should be sought prior to commissioning any ICMP work. Council will define appropriate methodologies and deliverables for the technical components of an ICMP and how the information and assessments are to be presented. See also the Three Waters Management Practice Notes on Council's website.
4. Catchment boundaries will not always follow the boundary of a site. Some sites may fall within more than one hydrological catchment. Water supply, wastewater and stormwater networks often cross hydrological catchment boundaries.

Table 1.2.2.6c: Information requirements for Sub-catchment ICMPs for areas other than Greenfield Areas

A Water Impact Assessment in accordance with Appendix 1.2.2.5 that also includes details of how adverse effects arising from the following will be avoided, remedied or mitigated:	
a)	Flood hazards;

b) Stormwater disposal; c) Discharges of contaminants; and d) Identified network constraints.

Table 1.2.2.6d: Completion of Full ICMP Preparation

Preparation of a full ICMP shall be considered complete when the ICMP has received technical certification by: a) Council that the ICMP complies with the relevant information requirements; and b) Waikato Regional Council that the guidance within the ICMP for stormwater diversion and discharge activities is to an acceptable standard.

1.2.2.7 Historic Heritage – Schedule 8A and 8B Sites (Historic Heritage)

Any activity requiring a resource consent relating to Schedule 8A or 8B sites (refer Volume 2, Appendix 8) shall include as part of the resource consent application:

a) Written advice from an appropriately qualified person or body concerning the effects of the proposed activity on the cultural and heritage values identified for the site and outlining possible mitigation measures.

b) In the case of the site having identified tangata whenua values, advice from relevant iwi.

c) Where the site history indicates that there may be historical artefacts or other physical remains, advice from a suitably qualified and experienced archaeologist.

d) Advice that the necessary authority to modify or damage an archaeological site has been obtained from Heritage New Zealand Pouhere Taonga under the Heritage New Zealand Pouhere Taonga Act 2014.

Note

1. An archaeological assessment, advice from Heritage New Zealand Pouhere Taonga, or consultation with iwi will not be required where there is documentary evidence held by Council that this has previously been carried out for the site, and that the proposed new work is covered by that documentary evidence.

1.2.2.8 Comprehensive Development Plan

a) All CDP applications shall show the total expected development for the identified Comprehensive Development Plan area (even if the development is to proceed in stages) through plans and explanatory text.

b) Where a CDP area is to be developed in stages, the information required for each stage of the CDP process must be sufficient to enable assessment of the application in terms of the Concept Plan (Rototuna), Development Plan Area (Temple View), Structure Plan and the Urban Design Guide.

c) Any staged application for the development of a CDP area shall include an overall development framework setting out the following for the entire CDP area:

i. Staging,

ii. Main block pattern,

iii. Roads and access ways,

iv. Stormwater solutions,

v. Reserves, and

vi. Bulk and scale of the buildings.

The application for the development of a specific stage within a CDP area shall provide detailed information, including the design of urban spaces, buildings and their service infrastructure as set out in the table below.

d) For CDP applications in the Industrial Zone refer to Rule 9.3.3 and 9.3.4.

e) CDP applications (except those in the industrial zone) shall include where relevant, but not be limited to the following:

Note

1. Depending on the nature of the development and the stage it is at, not all information maybe required as part of the CDP.

Information Requirements	Rototuna Town Centre Zone	Lake Waiwhakareke Natural Character Zone	Temple View Zone	All other CDPs (excluding Industrial Zone)
a) Demonstrating how the land-use pattern and features proposed in the relevant Structure Plan will be achieved.	✓	✓	✓	✓
b) Demonstrating via an urban design assessment how the proposed development is in general accordance with the relevant assessment criteria and design guide.	✓	✓	✓	✓
c) Demonstrating how the standards of the zone will be met and the extent to which the relevant assessment criteria is achieved.	✓	✓	✓	✓
d) Defining the exact boundaries between the precinct and adjoining precincts.	✓			
e) The method by which the development of each Comprehensive Development Plan Area is to be managed, and how it		✓	✓	✓

Information Requirements	Rototuna Town Centre Zone	Lake Waiwhakareke Natural Character Zone	Temple View Zone	All other CDPs (excluding Industrial Zone)
will relate to surrounding land, and the wider Structure Plan area.				
f) The method by which the development of each precinct is to be managed, and how precincts will relate to each other, surrounding land and the wider Rototuna Town Centre area.	✓			
g) How transportation and other infrastructure is to be provided to enable the efficient, safe, effective, functional and sustainable delivery of infrastructure. This must take into account the subject Comprehensive Development Plan Area, integration with the surrounding CDP areas and the wider Structure Plan area.		✓	✓	✓
h) How transportation and other infrastructure is to be provided to enable the efficient, safe, effective, functional and sustainable delivery of infrastructure. This must take into account the subject Comprehensive Development Plan Area, integration with the surrounding CDP areas, the wider Rototuna Town Centre and the wider Structure Plan area.	✓			
i) Showing the exact location and design of proposed areas of open space, ecological links and natural features which are to be retained or enhanced, and the areas to be developed for stormwater purposes.	✓	✓	✓	✓
j) Site development. Illustrate:			✓	
i. Activity types	✓	✓	✓	✓
ii. Building footprints	✓	✓	✓	✓

Information Requirements	Rototuna Town Centre Zone	Lake Waiwhakareke Natural Character Zone	Temple View Zone	All other CDPs (excluding Industrial Zone)
iii. Individual shop and business tenancy sizes	✓			
iv. The number of residential units proposed	✓	✓	✓	✓
v. External layout and floor areas of residential units	✓	✓	✓	✓
vi. How the identified yield is to be met	✓	✓		✓
vii. Pedestrian walkways and cycleways	✓	✓	✓	✓
viii. Carparking areas and vehicular circulation	✓	✓	✓	✓
ix. Vehicular access points between the site and public roads	✓	✓	✓	✓
x. Landscaping areas	✓	✓	✓	✓
xi. Service areas with appropriate screening	✓	✓	✓	✓
xii. Outdoor living courts		✓	✓	✓
xiii. Position of any existing buildings on adjacent land	✓	✓	✓	✓
xiv. How the proposal integrates with adjacent properties in terms of contributing to an overall urban design and streetscape character including treatment of building frontages, and relationship between internal boundaries of Comprehensive Development Areas (e.g. glazing and orientation)		✓	✓	✓
xv. How the proposal integrates with adjacent properties in terms of contributing to an overall urban design and streetscape character including	✓	✓		

Information Requirements	Rototuna Town Centre Zone	Lake Waiwhakareke Natural Character Zone	Temple View Zone	All other CDPs (excluding Industrial Zone)
treatment of building frontages (e.g. glazing and orientation)				
k) Development staging: Explain if the development of the Comprehensive Development Area is to be staged, the manner and proposed timeframes for the staging and the means of managing any vacant land during the staging process.	✓	✓	✓	✓
l) Elevations. Illustrate: i. Building height and orientation, building exterior design features, any balconies, any artificial lighting to exterior walls and features, and how the proposed development will integrate with adjacent properties in terms of overall urban design, streetscape character and amenity.	✓	✓	✓	✓
ii. Verandas	✓			
m) Signs. Give details on number, dimensions, location, content, means of support and attachment. This includes signs of the names of the residential development if applicable.	✓	✓	✓	✓
n) Transportation. Carry out an Integrated Transport Assessment (ITA) which addresses: i. Provision for pedestrians, cyclists and passenger transport ii. Consistency with Access Hamilton and associated action plans iii. On-site provision of car parking, servicing and manoeuvring space	✓	✓	✓	✓

Information Requirements	Rototuna Town Centre Zone	Lake Waiwhakareke Natural Character Zone	Temple View Zone	All other CDPs (excluding Industrial Zone)
iv. How car parking is to be provided, taking into account surrounding land uses and the opportunities for shared car parking v. Safe and efficient provision of entry and exit, including safety for all road users vi. Safe sight visibility distance for access points vii. Safe separation of access points from intersections and other access points viii. Impact of access on safe and efficient traffic flow on the transport network ix. Impact on the capacity and performance of the transport network.				
o) Possible transport and accessibility modelling to assist in the preparation of the ITA. Applicants must also demonstrate whether a Travel Plan is required to mitigate any transport impacts from the development.	✓	✓	✓	✓
p) Servicing. Explain the provision, staging, location and capacity of network utilities and integration with existing and planned network utilities, quantity and quality of stormwater and proposed stormwater treatment, management and disposal facilities. Prepare an assessment of the impact on the infrastructure including network capacity and tolerance to support the development including future maintenance requirements.	✓	✓	✓	✓
q) Road Design. Provide details of:		✓	✓	✓

Information Requirements	Rototuna Town Centre Zone	Lake Waiwhakareke Natural Character Zone	Temple View Zone	All other CDPs (excluding Industrial Zone)
i. Form, function and design of internal roads including the integration with the existing transport network ii. Pavement and surfacing materials iii. Location of parking areas iv. Planting and street furniture v. Provision for pedestrians and cyclists vi. Location of passenger transport facilities, including corridors or priority treatments vii. Provision for road lighting viii. Proposed speed limit and design speed ix. The location and concept design of the roads (including typologies).				
r) Pedestrian and Cycle Links. Provide details of the position of walkways and cycle ways, links to adjacent sites, consideration of passive surveillance and other CPTED principles, and any artificial lighting to be used within these areas.	✓	✓	✓	✓

Information Requirements	Rototuna Town Centre Zone	Lake Waiwhakareke Natural Character Zone	Temple View Zone	All other CDPs (excluding Industrial Zone)
s) Planting and Screening. Provide details of: i. The type of landscaping to be established in yards, carparking areas, and other landscape areas ii. Identification of the plant and tree species to be used iii. Size of the vegetation iv. Number of plants to be used v. Artificial lighting or screening to be used vi. Consideration of passive surveillance and other CPTED principles vii. Maintenance provisions.	✓	✓	✓	✓
t) Public Square: Show the type of landscaping and materials to be used, taking into consideration CPTED and lighting for safety, amenity and ambience. Consideration must be given to the multifunctional use of the square and its relationship with surrounding buildings and features.	✓			
u) Gateways: Show how the areas defined as gateways in the Rototuna Town Centre Design Guide will be treated in terms of opportunities for landmark buildings, structures, and public art to announce the sense of arrival and departure.	✓			
v) ICMP: Show how the development takes into account and addresses a completed and approved ICMP.		✓		
w) Demonstrate how the development of the CDP will integrate the identified heritage			✓	

Information Requirements	Rototuna Town Centre Zone	Lake Waiwhakareke Natural Character Zone	Temple View Zone	All other CDPs (excluding Industrial Zone)
items found within the Temple View Zone ensuring the retention of the heritage values associated with these items.				
x) Define the final location of CDP boundary between CDP Area 1 and CDP Area 2 taking the following into account: • Impact on the heritage items located within the two CDP areas. • The ability to retain the identified character of the Temple View Zone. • Influences of topography and built form.			✓	

1.2.2.9 Flood Risk Assessment Report

Any application for subdivision consent creating additional lots within a Flood Hazard Area is to undertake a flood risk assessment report as outlined below.

This report is a site specific flood assessment supporting proposed subdivision, use or development of land which may be affected by flooding. Its purpose is to provide information about the subject site, the proposed activity, the likelihood, nature and extent of the relevant flood hazard and an explanation as to whether the resulting level of flood risk is acceptable. It can be used to provide a more site specific assessment of flood hazards than the broad flood hazard categorisation identified on the Planning Maps and implemented by rules in Volume 1, Chapter 22: Natural Hazards.

The flood hazard modelling information used by Council to identify Flood Hazard Areas should be used to inform this report.

a) The report must be prepared by an appropriately experienced and qualified practitioner and consider up to at least a 1% annual exceedance probability event.

b) The report must include, but may not be limited to, the following matters, where applicable.

   i. The existing use and development of the site.

   ii. An outline of the likelihood and effects of flooding on the site.

   iii. A site layout plan showing:

      • Land potentially affected by flooding in a flood event, including areas of overland flow paths on the subject site and all adjoining sites.

- The location of the proposed activity, including any proposed building platforms, in relation to the land potentially affected by flooding.

iv. Whether there is a reasonable or practicable alternative to locating the proposed use or development on land within a Flood Hazard Area.

v. The sensitivity of the proposed activity to the adverse effects of flooding.

vi. The potential risk to life, health and safety, and property during a flood event including consideration of:

- Frequency, duration, extent, depth and velocity of flooding on the site and any access to the proposed activity,
- Cumulative risks from interactions with any other natural hazard affecting that site (e.g. geotechnical conditions),
- Any available flood warning time, and
- The ability to access or evacuate the site and the danger to residents and emergency service personnel if the site or access to the proposed activity is affected by flooding.

vii. The positive or adverse effect of the proposed activity on:

- Overland flow paths (e.g. obstructing or diverting),
- Hydrological capacity (e.g. reduced flood water storage capacity),
- Flood water depths, and
- Flood water velocities.

viii. Whether the proposed activity creates a new or exacerbates an existing natural hazard both on or off site.

ix. Options to avoid or mitigate the adverse effects of flood hazards and reduce risk to the proposed activity to an acceptable level, including consideration of the appropriateness of any mitigation measures proposed. This may require:

- An elevation plan showing freeboard heights in relation to the top water flood level of a 1% annual exceedance probability event.
- Information confirming that the proposed design of sub-floor structures, walls or fences allows for the free passage of flood waters.
- Information confirming that the design of proposed structures or buildings is sufficient to withstand inundation by flood waters.

c) If the report relies on flood hazard modelling information other than that used by Council to identify the Flood Hazard Areas in the Planning Maps then the report must include detail about the model methodology, assumptions and limitations, validation and any peer review.

d) The report may recommend the refinement of the extent of the Flood Hazard Areas depicted in the Planning Maps to reflect a greater level of topographical detail than that used in Council's flood hazard modelling. An explanation of the methodology used and the nature, extent and effect of the refinement is required.

Note

1. Recommended refinements cannot alter the activity status of the proposal.

1.2.2.10 Site Management Plan (Waikato Riverbank and Gully Hazard Area)

Any application for resource consent for subdivision, use or development within the Waikato Riverbank and Gully Hazard Area or any activity not complying with standards in Rule 20.4.1, must be accompanied by a Site Management Plan prepared by an appropriately experienced and qualified practitioner. This will include, but may not be limited to:

a) Location, extent and form of all existing and proposed:

   i. Buildings and structures.

   ii. Landscaping (including retaining walls and fences).

   iii. Sealed and impermeable ground surfaces.

b) Existing and proposed site contours at 0.5m intervals.

c) Location, extent and species of:

   i. Existing vegetation being removed.

   ii. Existing vegetation being retained.

   iii. Any proposed new vegetation.

d) The location of vehicle access, manoeuvring and parking areas.

e) The nature of the ground conditions and the suitability of the proposal having regard to these ground conditions.

f) Any risk mitigation measures proposed.

g) Land stability, erosion, earthquake (amplification and liquefaction) or any other natural hazard, including any modification to landforms and removal of vegetation.

h) Methods proposed for site management of earthworks and stormwater.

In relation to Peat Lakes, Wetlands and Peat Lake Catchments:

A description of the measures to be undertaken to help prevent or reduce effects on:

- Ecosystems, plants and animals any any disturbance of habitats
- Any natural watercourse including any discharge of sediment to the waterway and any effect on water quality, water clarity and in-stream habitats.

1.2.2.11 Stormwater Disposal Report

Any application for resource consent for subdivision, use or development within the Waikato Riverbank and Gully Hazard Area or any activity not complying with standards in Rule 20.4.1, must be accompanied by a Stormwater Disposal Report prepared by an appropriately experienced and qualified practitioner. This will include, but may not be limited to:

a) A description of the site, including:

   i. Natural drainage patterns and any other drainage features (including any spring or groundwater seepage).

   ii. Its relationship to broader stormwater catchments.

iii. Ground conditions and any particular geotechnical vulnerabilities.

b) Existing stormwater consent constraints (if any) and whether these impact on the proposal.

c) An assessment of the wet season (winter) water table that establishes the minimum capacity of the ground to absorb water.

d) An assessment of post-development stormwater flows and the means to be employed to match these to predevelopment flows.

1.2.2.12 Hazardous Facilities

Any application for resource consent for Hazardous Facilities shall include as part of the resource consent application the following information.

a) The proposed site and layout, with a description of the nature and scale of the proposed hazardous facility and associated operations.

b) Quantities of hazardous substances proposed to be used, stored, transported or disposed of on the site.

c) Site drainage and off-site infrastructure, including the biophysical characteristics of the site and surrounding areas (e.g. stormwater systems, transport corridors).

d) Design and location of site access to provide safe access to and from the transport network.

e) The sensitivity of the surrounding human, natural and physical environment and proposed measures to protect them.

f) Separation distances from neighbouring activities and people potentially at risk from the hazardous substance facility, including consideration of the proximity to people oriented activities (e.g. childcare facilities, hospitals, schools, rest homes).

g) Identification of on-site hazards and exposure pathways from the proposed facility, including a description of the environment actually or potentially affected by the proposal.

h) Potential cumulative effects with neighbouring facilities.

i) Preliminary hazard and risk assessment that systematically addresses the site hazards, likely accident scenarios, exposure pathways, receiving environments and potential environmental effects.

j) Management of wastes containing hazardous substances, including a waste management plan.

k) Fire safety and fire water management.

l) Proposed contingency measures and emergency plans.

m) Proposed monitoring and maintenance schedules.

n) **Risk assessment.** For any activity that requires discretionary activity consent under Chapter 25.4 City-wide – Hazardous Facilities, the Assessment of Environmental Effects must contain a risk assessment that systematically addresses site hazards, likely accident scenarios, exposure pathways, receiving environments and potential environmental effects. The detailed hazard analysis and risk assessment of installations, operations and processes involving hazardous

substances is to be appropriate to the type and scale of the proposed facility. For significant facilities a quantitative risk assessment may be required. This assessment should place emphasis on:

i. Identification of potential hazards, failure modes and exposure pathways; assessment of the probability and potential consequences of an accident leading to a release of a hazardous substance or loss of control, including, as applicable, cumulative or synergistic effects.

ii. Acceptability of the assessed risks, including cumulative risks.

iii. Residual risks after applying proposed risk control and mitigation measures.

o) **Alternatives.** For any activity that requires discretionary activity consent under Chapter 25.4 City-wide – Hazardous Facilities, the Assessment of Environmental Effects must also contain an evaluation of alternatives (sites or locations, substances, quantities, processes or equipment, site management, etc) to determine whether there are any alternatives to the proposal, particularly where it is possible that the activity is likely to result in significant environmental effects.

p) **Risk mitigation and control.** For any activity that requires discretionary activity consent under Chapter 25.4 City-wide – Hazardous Facilities, the Assessment of Environmental Effects must clearly identify proposed risk control and mitigation measures, with emphasis on sensitive land-use activities and environments, including, as applicable:

i. Equipment, systems and engineered safety measures such as containment devices, fire safety apparatus and spill contingency or clean-up equipment.

ii. Emergency management plans, monitoring and maintenance schedules, and training programmes.

1.2.2.13 Events

Any event requiring resource consent shall, as part of the resource consent application, provide a waste management plan, transport management plan and noise management plan prepared by suitably experienced and qualified practitioners, as outlined below:

a) Waste Management Plan

The Waste Management Plan shall outline:

i) An estimate of the types and volumes of waste to be generated by the event.

ii) Any opportunities for waste minimisation.

iii) Steps to be taken to maximise the use and collection of recyclables or re-usable materials.

iv) Waste and recyclables collection, storage and transportation equipment to be provided.

v) The method of and person responsible for the collection and disposal of waste generated by the event.

vi) The arrangements made for the provision of post-event waste analysis and reporting of that information to the Council.

vii) The arrangements made for the provision of litter minimisation, collection, and removal from within the event site and its immediate surrounds.

b) Transport Management Plan

The Transport Management Plan shall outline:

i) On and off street parking provisions.

ii) Travel plan including (but is not limited to):

i. Provision for access on and off the site for walking, cycling, passenger transport and the mobility impaired.

ii. Promotion of options for travel.

iii. Incentives for using passenger transport, walking or cycling.

iv. Cycle-parking facilities.

v. Map for ease of route planning.

iii) A Temporary Traffic Management Plan prepared in accordance with the NZTA Code of Practice for Temporary Traffic Management.

iv) The outcome of consultation with NZTA, NZ Police, emergency services, directly affected residents/businesses and Waikato Regional Council (passenger transport), wherever relevant.

v) A contingency plan which specifies a clear set of roles and procedures in the case of a traffic accident or emergency.

c) Noise Management Plan

The Noise Management Plan shall outline:

i) Days and times of pre-event sound testing and practice, and of the main event.

ii) Identification of likely noise sources and the nature of noise emissions (including frequency of occurrence and duration and any special audible characteristics).

iii) The applicable noise performance standards.

iv) Identification of likely affected persons and any special needs of those persons.

v) Community consultation and notification of affected persons.

vi) Mitigation measures, including for any pre-event sound testing and practice.

vii) Monitoring of sound levels during the event to ensure compliance with the noise performance standards.

viii) Complaints management procedure.

ix) Contact details of key personnel.

x) Reporting of monitoring results to Council.

1.2.2.14 Concept Development Consents for Major Facilities and Provision of Concept Plans

Any application for a Concept Development Consent for major facilities shall show the total expected development of the facility (even if the development in that area is to

proceed in stages) through plans and explanatory text which may include the following information (as relevant).

a) How the proposal is in general accordance with the urban design approach objectives and policies in Volume 1, Chapter 25.15: City-wide – Urban Design.

b) Demonstrate how the objectives, policies and rules in Volume 1, Chapter 17: Major Facilities Zone have been met.

c) Demonstrate how the relevant assessment criteria have been met.

d) Details of any consultation undertaken.

e) A Concept Development Consent application shall include a concept plan which shows diagrammatically, in the form of precincts:

   i. The general distribution of activities, buildings, open space and parking facilities.

   ii. Provision for access to and movement within the site for vehicles.

   iii. Pedestrian and cycle links. Show the position of existing and proposed walkway and cycleway links within the site and to adjacent sites.

   iv. The interrelationships with the surrounding locality, including buffer areas, links to local centres and access to passenger transport.

   v. Future development areas, major landscaping areas and protected natural heritage and cultural features.

   vi. The parameters to which development in different areas will be subject, in terms of the general configuration and bulk of existing and proposed buildings.

   vii. Development Staging. Explain if development of the major facility is to be staged, the manner and proposed timeframes for the staging (if known) and the means of managing any vacant land during the staging process.

   viii. How Interface Areas on site are being appropriately planned for in the development of Concept Development Consents.

   ix. In the case of Waikato Stadium a shading diagram showing the extent and duration of shading resulting from new development proposals over any neighbouring properties.

f) Any other information that may be needed to assess the application.

g) New Concept Development Consents shall include a Broad ITA in accordance with Rule 25.14.4.3.

1.2.2.15 Waste Minimisation Plan

Any resource consent for any activity that fails the solid waste standard 25.12.3.1, or a service area or outdoor storage standard of the relevant zone, shall provide a Waste Minimisation Plan as part of the application. The waste minimisation plan shall identify:

a) An estimate of the type and volume of waste to be generated.

b) Any opportunities for waste minimisation.

c) The steps to be taken to maximise the use and collection of recyclables or re-usable materials.

d) The waste and recyclables collection, storage and transportation equipment to be provided.

1.2.2.16 Managed Care Facilities Information Pack

a) A written information pack shall be provided. The information pack shall be prepared by the Agency/person(s) responsible for the managed care facility and include an overview of the Agency and the range of services provided (if relevant), and the type of care and programs to be provided within the managed care facility. The information pack shall include:

i. Proposed number of residents.

ii. The anticipated number of visitors to the site per week and daily visiting hours.

iii. Anticipated full time equivalent staff at the facility.

iv. Regular and emergency contact details to enable prompt and effective contact if necessary.

v. The policies for the management of possible emergency situations including the management of neighbour relations in an emergency situation.

Upon obtaining consent to establish the managed care facility, the Agency/person(s) responsible for the facility shall, within one calendar month of its occupancy, provide the written information pack to residents of the properties adjoining the site.

1.2.2.17 Centre Assessment Report

a) Any applicant for a resource consent for office or retail activities shall provide a Centre Assessment Report as part of the application, excluding:

i. Ancillary retail and offices in all Business zones

ii. Any retail activity in the Central City Zone

iii. Any office activity in the Central City Zone (Downtown Precinct)

iv. Yard based retail

v. Building Improvement Centres

vi. Wholesale and trade retail supplies

vii. Any office or retail activity that is provided for in the Zone Activity Status Table as Permitted but requires resource consent due to failure to comply with one or more General Standard(s).

b) **Purpose**

To address the potential effects associated with a proposal for retail or office activity in terms of the specified restricted discretionary activity criteria set out in Appendix 1 – clause 1.3.3H.

The content and detail of the Centre Assessment Report shall correspond with the scale, nature and potential adverse effects of the proposal. A detailed assessment may not be required if the applicant can clearly demonstrate that the proposed development is unlikely to have any significant effects in relation to the matters referred to above.

c) **Information requirements**

The information shall include:

i. A summary of the methodology and data sources used to prepare the assessment.

ii. The following comparative indicators on the current vitality, functions and amenity of the Central City and sub-regional centres for the activity and a summary analysis of discernible trends:

- Retail expenditure patterns
- Floorspace and activity mix
- Employment by type
- Pedestrian environment and flows
- Parking and public transport services and connections
- Retail and office demand and supply, including vacancy levels.

iii. The existing and consented development located outside of the Central City and/or sub-regional centres, which has been taken into account when assessing the potential adverse effects of the development.

iv. Any external non-development factors such as macroeconomic trends or site specific factors that could influence the above indicators

v. Information should be included to demonstrate the appropriateness of the timeframes used to demonstrate trends and future predictions.

1.2.2.18 Ruakura Logistics Zone

a) Applications for Freight-handling activities and Logistics and Freight-handling infrastructure within the Inland Port (Sub Area A (Inland Port)), see Figure 2-14, shall be accompanied by a Noise and Vibration Management Plan for the relevant stage of the Inland Port which shall include the following:

i. The result of any noise monitoring undertaken to demonstrate that earlier stages of Inland Port development and logistics activities, if any, meet noise performance standards, with an analysis of compliance as necessary.

ii. A recalibrated model based on the results of the above monitoring.

iii. The identification of construction and operational noise and vibration sources and the noise emissions associated with each stage of the development of the Inland Port (Sub Area A (Inland Port)), including refrigerated containers.

iv. The applicable noise performance standards to be achieved at different times of the day.

v. The applicable vibration performance standards.

vi. Operational strategies and configurations adopted for each stage based on modelling which achieve compliance with the noise and vibration performance standards set out in Chapter 25.8.

vii. Plans and diagrams sufficient to illustrate the location, scale and dimensions of the noise barrier designed to achieve compliance with the noise performance standards set out in Chapter 25.8.

viii. Strategies and configurations to be adopted during construction which achieve compliance with the noise and vibration performance standards set out in Chapter 25.8.

ix. A signed statement by its author stating that the measures identified will enable the activity to comply with the noise and vibration performance standards set out in Chapter 25.8.

x. A subsequent signed statement by the designer of the noise barrier that it has been constructed in a way that makes it fit for purpose.

xi. Identification of persons potentially affected by noise and vibration from the operation and construction of the Inland Port (Sub Area A (Inland Port)) (including but not limited to members of the Inland Port Community Liaison Committee required under Rule 10.5.1), a record of meetings held and consultation undertaken with such potentially affected persons, and responses to matters raised in consultation.

xii. Procedures for monitoring noise levels to ensure compliance with the noise performance standards in Chapter 25.8.

xiii. Management of noise emissions at night, with particular emphasis on the methods to effectively manage the noise effects on noise sensitive activities and which avoid or minimise sudden and/or loud noises at night.

xiv. Procedures for receiving and addressing noise complaints.

xv. Methods for updating the Noise and Vibration Management Plan as appropriate to respond to changing requirements.

xvi. Contact details of key personnel, including the name of the person with overall responsibility for ensuring noise limits are met.

xvii. An independent peer review report prepared by a suitably qualified and experienced expert acceptable to the Council that considers all aspects of the Noise and Vibration Management Plan, in particular the accuracy of modelling, the matters of discretion listed in Appendix 1.3.3 N2 Ruakura and compliance with noise and vibration performance standards.

1.2.2.19 Knowledge Zone Precinct C

1.2.2.19.1 Centre Assessment Report

a) Purpose

To address the potential effects associated with a proposal for retail, office and other activities in terms of the specified restricted discretionary activity criteria set out in Appendix 1.3.3 N Ruakura.

The content and detail of the Centre Assessment Report shall correspond with the scale, nature and potential adverse effects of the proposal. A detailed assessment may not be required if the applicant can clearly demonstrate that the proposed

development is unlikely to have any significant effects in relation to the matters referred to above.

b) Information requirements

The assessment shall include the following information:

i. A summary of the methodology and data sources used to prepare the assessment.

ii. The following comparative indicators on the current vitality, functions and amenity of the Central City and sub-regional centres for the activity and a summary analysis of discernible trends:

- Retail expenditure patterns
- Floorspace and activity mix
- Employment by type
- Pedestrian environment and flows
- Parking and public transport services and connections
- Retail and office demand and supply, including vacancy levels.

iii. The existing and consented development located outside of the Central City and/or subregional centres, which has been taken into account when assessing the potential adverse effects of the development.

iv. Any external non-development factors such as macroeconomic trends or site specific factors that could influence the above indicators.

v. Information should be included to demonstrate the appropriateness of the timeframes used to demonstrate trends and future predictions.

1.2.2.20 Land Development Plans

Land Development Consent

An application under Rule 3.7.4.2 shall be accompanied by a Land Development Plan including the following information:

General

a) The exact boundaries between the Land Development Plan and adjoining Land Development Plan Areas.

b) The exact boundaries of any Open Space Zone included in the Land Development Plan.

c) Where an application for Land Development Consent is made for part of a Land Development Plan Area (as shown on Figure 2-16), pursuant to rule 3.7.4.2b) the following indicative information for the balance area of each Land Development Plan Areas shall be provided as part of that application:

i. The location and width of proposed roads and carriageways and their integration with the existing and future transport networks;

ii. The location of proposed Ruakura Strategic Infrastructure to ensure connectivity across the entire structure plan and adjacent Land Development Plan areas;

iii. The National Grid electricity transmission network;

iv. Where the Land Development Plan contains any part of the Inland Port (Sub Area A (Inland Port)) an indicative layout plan showing internal roads, hardstand and impermeable areas, crossing points under transmission lines, indicative building locations, future rail sidings and connections to the East Coast Main Trunk railway and clearances between finished surface levels of the Inland Port and the National Grid electricity transmission network;

v. The location and size of storm water treatment and control measures; and

vi. The location, size and purpose of open spaces.

Concept Layout Plan

d) The location, width and design of proposed roads and carriageways (including lighting, street furniture and signs) and the integration of roads with the existing and future transport network and the National Grid electricity transmission network.

e) The location of proposed Ruakura Strategic Infrastructure to ensure connectivity across the entire structure plan and adjacent land development plan areas.

f) Within the Inland Port (Sub Area A (Inland Port)) – an indicative layout plan showing internal roads, hardstand and impermeable areas, crossing points under transmission lines, indicative building locations, future rail sidings and connections to the East Coast Main Trunk Railway and clearances between finished surface levels of the Inland Port and the National Grid electricity transmission network.

g) The location and design of storm water treatment and control measures.

h) The location and dimension of open spaces, and the total area provided for each open space purpose consistent with the purpose of the Ruakura Open Space Zone and Ruakura Structure Plan area.

i) The location and dimension of pedestrian and cycle ways.

j) Existing and proposed Three Waters infrastructure necessary to service the Land Development Area.

k) Existing and proposed ground levels and associated earthworks (Note: consent for earthworks within a National Grid Yard may also be required under Rule 25.2.3 or 25.7.4).

l) Methods to provide public access to and use of the Open Space, except as may need to be limited for safety reasons.

m) Consistency with the overall strategic infrastructure network for the structure plan as shown on Figures 2-15A and B Ruakura Strategic Infrastruture (Appendix 2).

Landscape Concept and Ecological Enhancement Plan

n) A Landscape Concept and Ecological Enhancement Plan that includes the following:

i. A landscape concept for the area of open space included in the Land Development Plan, consistent with the purpose of the Ruakura Open Space Zone and Ruakura Structure Plan area.

ii. Details of landscape treatment of streets, footpaths and cycleways.

iii. Details of landscape treatment of storage basins, swales and linear wetlands, which show at a minimum the following:

a. 100% cover of indigenous wetland vegetation in linear wetlands associated with arterial, collector roads and local roads in Industrial Park Zone; and

b. 80% cover of indigenous wetland vegetation in linear wetlands associated with the main greenway corridor, including the Silverdale Road to Mangaonua greenway and the corridor adjoining the expressway in the Logistics and Industrial Park Zones.

iv. Details of the Landscape Buffer Areas in the Inland Port (Sub Area A (Inland Port)) required in Rule 10.5 and as shown on Figure 2-17 Inland Port Building Setbacks and Landscape Controls (Appendix 2). These details shall include:

a. Measures to ensure that filled ground provides optimum growing conditions such as avoiding the placement of compacted fill and installing topsoil that has been stripped and stockpiled according to sound practice.

b. Plant types and species, sizes at time of planting and spacing sufficient to achieve the screening purpose of the buffer areas.

c. The selection of quick growing trees that are capable of achieving the planting heights (other than understorey and edge planting) specified on Figure 2-17 Inland Port Building Setbacks and Landscape Controls (Appendix 2) according to the following growth rates:

- Year 1 = 2m
- Year 5 = 6m-8m
- Year 8 = 8m-10m
- Year 10 = 10m-12m

d. Details of ongoing maintenance to ensure the planting achieves the best possible growth rates.

v. Details of the Landscape Buffer Areas for Percival Road required under Rules 10.5.4.3 and 11.5.3 and as shown on Figures 10.5.4.3a and 11.5.3a. These details shall include those as outlined in iv a), b) and d) above.

vi. Measures to ensure the implementation and ongoing maintenance of the Landscape and Ecological Concept Plan. In particular, the Landscape and Ecological Concept Plan shall detail the proposed timeframes for the implementation of the planting in the Landscape Buffer Areas in the Inland Port (Sub Area A (Inland Port)) relative to the proposed development and operation of logistics and freight-handling activities and infrastructure.

vii. A design statement, and details of plant species[1] and materials including indigenous trees and shrubs bordering the linear wetland to improve the ecological function without hindering their treatment functions.

[1] ***Note***:
On the basis of the soil type within the storage basin to be planted, shrubland and forest species shall be selected from Clarkson B D, Clarkson B R and Downs T M, 2005: Indigenous Vegetation Types of Hamilton Ecological District, CBER Contract Report 58. The percentage vegetation cover of the storage basins shall be consistent with Hamilton City Council Infrastructure Technical Specifications October 2013 or its replacement.

viii. Methods in the design and layout of Open Space to provide for the amenity of adjoining and adjacent activities.

ix. The design of the linear wetlands to support black mudfish, shortfin eels and longfin eels, including a range of vegetation suitable to support these fish species without hindering the treatment functions of the linear wetland. The design shall take account of risk factors for black mudfish including competition from pest fish, lack of suitable peat soils, drying out, lack of cavities for mudfish to aestivate (sleep over summer) and inappropriate pH of water due to lack of peat. This may necessitate retention or incorporation of peat soils in the construction of the linear wetlands.

x. Methods to ensure implementation of a Native Fish Management Plan for the Land Development Plan Area consistent with the requirements of the Structure Plan Area-wide Native Fish Management Plan.

xi. Methods to ensure implementation of a Native Lizard Management Plan for the Land Development Plan Area consistent with the requirements of the Structure Plan Area-wide Native Lizard Management Plan.

xii. The Native Fish Management Plan and Native Lizard Management Plan prepared by suitably qualified and experienced ecologist and shall include:

a. containment and translocation methods for at risk species;

b. methods to ensure adequate separation between black mudfish and longfin eels;

c. adaptive management, monitoring and response process to determine the success or otherwise and to implement a contingency plan if necessary; and

d. an analysis of risk relating to timing of collection, containment and translocation.

Water Impact Assessment

o) A Water Impact Assessment based on anticipated development in the Land Development Plan that includes the following:

i. How the proposal is consistent with, or otherwise complies with, the recommendations, measures and targets of any relevant Integrated Catchment Management Plan.

ii. Where there is no relevant Integrated Catchment Management Plan, how the proposal is consistent with the development of and gives effect to Ruakura Strategic Infrastructure including as shown on Figures 2-15A and B in Appendix 2 for the entire structure plan area.

iii. How the Land Development Plan provides for the eventual diversion of any temporary connections to strategic infrastructure, including timing or triggers for such diversions.

iv. An assessment of any potential effects (including cumulative effects) of the development in relation to its catchment. In particular, the assessment should include consideration of potential construction effects and the potential effects of new stormwater devices on adjacent private property.

v. Details of what water-sensitive techniques are proposed and methods of implementation.

vi. Details of the expected water efficiency benefits arising from the proposed water-sensitive techniques compared to the same development without using those water-sensitive techniques.

vii. Details of how the water-sensitive techniques will be operated and maintained to ensure ongoing water efficiency benefits.

viii. Confirmation of available Three Waters infrastructure and capacity, existing and proposed, to appropriately service anticipated development in the Land Development Plan area and the wider structure plan area.

ix. Details of the water demand (flow and pressure) and water sources.

x. An assessment of the effect that any staged or interim development and infrastructure has on the strategic network described in Figures 2-15A and B Ruakura Strategic Infrastructure (Appendix 2) including an assessment of when any diversion to that strategic network is required to restore the city wide network capacity that was being used on an interim basis.

***Note**:*
Consent from the Regional Council for an increased water take may be required where a development proposal is to take in excess of 15m^3 of water per day.

Integrated Transport Assessment

p) An Integrated Transport Assessment (ITA) for anticipated development within the Land Development Plan area, prepared in accordance with the requirements of Rule 25.14.4.3 and confirming that the anticipated levels of development will comply with Rule 3.7.4.3 Staging and Traffic Requirements. Prior to approving an ITA or Land Development Plan for the first stage of the Inland Port (Sub Area A (Inland Port)), the upgrading requirements of Ruakura Road from, and including, the Silverdale Road intersection to Wairere Drive shall be reviewed. Any upgrading required shall be agreed with the Hamilton City Council, and be completed in accordance with the

agreement before operation of the Inland Port (Sub Area A (Inland Port)) or other development commences.

q) Details of how the Land Development Plan has been designed to align with the Cyclist and Pedestrian Network Plan in Figure 2-18 Ruakura Cyclist and Pedestrian Network Plan in (Appendix 2), including the grade separation of facilities on arterial routes.

r) Details of any proposed crossing of the East Coast Main Trunk Railway by the Spine Road, which show how it will be grade-separated.

Mitigation of Adverse Land Development Effects on Habitats

s) Details of how land development avoids, remedies or mitigates adverse effects on, or where possible enhances, any significant habitats of indigenous fauna.

Medium Density Residential Zone

t) The layout of roads, public spaces and lots, showing how compliance with a minimum net density of 16 dwellings per hectare will be achieved.

u) The specific location and extent of the Integrated Retail Development consistent with that shown on Figure 2-14 Ruakura Structure Plan – Land use (Appendix 2).

Open Space Provisions

The following components of the open space network are to be considered when developing a Land Development Plan to ensure the various functions are not compromised. The Land Development Plan shall demonstrate the maintenance and development of:

v) Greenway - In addition to the stormwater management function, the greenway shall create opportunities for improved habitat and ecological benefits in the Ruakura Structure Plan area and in downstream receiving environments.

w) Gullies - Layout of the residential area is to been designed to provide opportunities for the restoration and enhancement of the Kirikiriroa Stream headwaters.

x) Visual amenity and buffer between incompatible activities – in particular the following open space areas identified on the Ruakura Structure Plan are intended to provide a buffer function: (See Figure 2.14 Ruakura Structure Plan – Land use (Appendix 2))

- The greenway;
- The area to the north of the proposed Ruakura Industrial Park Zone that adjoins the General Residential Zone;
- The transmission corridor between Ruakura Road and the Knowledge Zone
- The area between the realigned Ruakura Road and Silverdale Road, and between the Ruakura Industrial Park Zone and the existing General Residential Zone to the south;
- The area between the logistics and industrial activities, and the residential neighbourhoods in Silverdale and the University of Waikato.

- The area between Fairview Downs residential area and the Spine Road.

y) Neighbourhood reserves – these will be required as part of the subdivision process and the establishment of residential neighbourhoods. As such the location of the neighbourhood reserves on Figure 2-14 Ruakura Structure Plan – Land use (Appendix 2) is indicative only. Each neighbourhood reserve shall be an area of approximately 0.5ha and serve a catchment area of approximately 500m radius. Neighbourhood reserves complement the range of facilities provided by the Ruakura Open Space Zone and provide a focal point for, and contribute to the visual amenity of the local community.

z) Connectivity – a concept layout plan at Land Development Plan stage will show the location and dimension of pedestrian and cycle ways in accordance with Figure 2-18 Cyclist and Pedestrian Network Plan (Appendix 2) as well as the landscape treatment of streets, footpaths and cycleways.

Ruakura Strategic Infrastructure (as shown on Figures 2-15A and B)

aa) Consistency with Figures 2-15A and B Ruakura Strategic Infrastructure (Appendix 2) 3.7.2.6 Connections to Ruakura Strategic Infrastructure and 3.7.4.4 Ruakura Strategic Infrastructure Rules, where relevant.

1.2.2.21 Staging and Traffic Requirements

a) The application shall be accompanied by an Integrated Transport Assessment (ITA) prepared in accordance with Rule 25.14.4.3.

b) All ITAs required shall be prepared by suitably qualified professionals and should generally follow the approach and guidelines of New Zealand Transport Agency's "Research Report 422: Integrated Transport Assessment Guidelines, November 2010", or its replacement.

1.2.2.22 Concept Plan Consent for Knowledge Zone (excluding Precinct C)

Any application for a Concept Plan Consent for Precinct A, B or D in the Knowledge Zone shall show the total expected development of the facility (even if the development in that area is to proceed in stages) through plans and explanatory text which may include the following information (as relevant).

a) How the proposal is in general accordance with the urban design approach objectives and policies in Volume 1, Chapter 25.15: City-wide – Urban Design.

b) Demonstrate how the objectives, policies and rules in Volume 1, Chapter 8: Knowledge Zone have been met.

c) Demonstrate how the relevant assessment criteria have been met.

d) Details of any consultation undertaken.

e) A Concept Plan shall be provided as part of a Concept Plan Consent that shows diagrammatically, in the form of sub areas:

   i. The general distribution of activities, buildings, open space and parking facilities.

   ii. Provision for access to and movement within the site for vehicles.

iii. Pedestrian and cycle links. Show the position of existing and proposed walkway and cycleway links within the site and to adjacent sites.

iv. The interrelationships with the surrounding locality, including buffer areas, links to local centres and access to passenger transport.

v. Future development areas, major landscaping areas and protected natural heritage and cultural features.

vi. The parameters to which development in different areas will be subject, in terms of the general configuration and bulk of existing and proposed buildings.

vii. Development Staging. Explain if development of the precinct is to be staged, the manner and proposed timeframes for the staging (if known) and the means of managing any vacant land during the staging process.

viii. How Interface Areas on site are being appropriately planned for in the development of Concept Plans as part of a Concept Plan Consent.

f) Any other information that may be needed to assess the application.

g) New Concept Plan Consents shall include a Broad ITA in accordance with Rule 25.14.4.3.

Note

A Concept Plan Consent may include a condition which requires the consent holder to submit a detailed building design, prior to construction commencing. This is to ensure quality outcomes for the Knowledge Zone in circumstances where a CPC identifies building envelopes. The matters which may be required to be addressed will be based on Assessment Criteria B – Design and Layout in Appendix 1.3.3.

1.2.2.23 Land Development Consent - Te Awa Lakes Medium Density Residential Zone

An application under Rule 4.5.6 c) shall be accompanied by a Land Development Plan including the following information. All information shall demonstrate consistency with the Te Awa Lakes Structure Plan.

a) The boundaries between the Land Development Plan and adjoining Land Development Plan Areas.

b) The boundaries of any Open Space Zone included in the Land Development Plan.

c) Where an application for Land Development Consent is made for part of a Land Development Plan Area (as shown on Figure 2-20) pursuant to Rule 4.5.6 b), the following indicative information for the balance area of each Land Development Plan Areas shall be provided as part of that application:

i. The location of proposed roads and their integration with the existing and future transport networks

ii. The location and size of stormwater treatment and control measures

iii. The location, size and purpose of open spaces

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d) The location, width and design of proposed roads and carriageways (including lighting, street furniture and signs) and the integration of roads with the existing and future transport network.

e) The location and design of stormwater treatment and control measures.

f) The location and dimension of open spaces, including any neighbourhood reserves, and including esplanade reserves, consistent with the purposes of the Natural Open Space Zone and the Te Awa Lakes Structure Plan.

g) The location and dimensions of pedestrian and cycleways.

h) Existing and proposed Three Waters infrastructure necessary to service the Land Development Plan Area and in accordance with any approved Integrated Catchment Management Plan or Subcatchment Integrated Catchment Management Plan.

i) Existing and proposed ground levels and associated earthworks.

j) A landscape concept plan incorporating an indigenous landscape plan that includes:

   i. A landscape concept for any areas of open space, including neighbourhood reserves and esplanade reserves.

   ii. Details of landscape treatment of streets, footpaths and cycleways.

   iii. Details of landscape treatment of stormwater swales, wetlands, detention basins and lake edges.

   iv. Details of landscape treatment to provide a buffer adjacent to the Waikato Expressway.

   v. Details of plant types and species and sizes at time of planting, including ecosourcing of plants from within the Waikato Basin and choice of species that reflect the history of the area.

   vi. Details of ongoing maintenance to ensure the planting achieves the best possible growth rates.

   vii. Use of indigenous plant species and landscape design that reflect cultural perspectives.

k) An Ecological Rehabilitation Management Plan (ERMP) that includes the following, and the methods to implement them:

   i. An indigenous fish management plan, including a summary of fish habitat and species present, a summary of planned works, permitting requirements, procedures for dealing with pest fish, biosecurity protocols, timing of works, procedures for recovering indigenous fish prior to and during works, roles and responsibilities of parties, reporting requirements and any specific mitigation measures.

   ii. Planting of trees for bat habitat, including tall tree species such as Kahikatea and Totara, in areas where bat habitat utilisation is likely to be high.

   iii. Lighting design that is sensitive to bat habitat including minimal lighting in areas close to the Waikato River, avoidance of upward facing lighting and UV lighting, and avoidance of lighting in wetland and riparian margin areas.

   iv. Restoration planting to include wetland restoration, habitat enhancement and riparian buffer zones.

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v. Provision of passage into the recreational lake for indigenous fish if practicable, while excluding exotic pest fish species.

vi. Recreational lake bathymetry that is sufficient to help reduce wind-driven sediment resuspension and excessive growth of nuisance weeds.

vii. Incorporating diversity into recreational lake shore habitat including built areas, wetland plants and beach areas.

viii. Ensuring sufficient water flow through the lake or other methods to maintain high water quality having particular regard to avoidance of nuisance phytoplankton blooms.

ix. Ensuring new stream habitat mimics natural systems.

x. A specific ecological rehabilitation plan to restore and enhance the unnamed tributary to the Waikato River that is the southern stormwater outlet of the site. The stream runs through the adjacent Lot 1 DPS 57602 and Part Lot 1 DPS 11080, and the plan is to apply to its full length and incorporate as a minimum:

- Creation of a diverse and variable habitat and channel complexity over time to allow for differences in flow velocities.
- Provision of vegetative cover, woody debris or other in-stream structures.
- Fish passage by way of lined ramp or similar to enable native climbing species.
- A meandering channel.
- Creation of pool-riffle-run sequences.
- Proposals for ongoing maintenance and management.
- Avoidance of instream works during peak fish migration periods (August-December)

l) Within 200m of the Waikato Expressway carriageway, the layout of roads and lots to generally achieve orientation of noise sensitive spaces in buildings away from the Expressway.

m) A Water Impact Assessment that demonstrates how the proposal is consistent with the recommendations, measures and targets of the relevant Integrated Catchment Management Plan or Subcatchment Integrated Catchment Management Plan.

n) A management plan for the main linear lake that includes:

- a monitoring plan of stormwater inflows to provide sufficient data to adaptively manage the lake to meet a swimmable standard and trophic state
- a series of triggers and actions to maintain the lake to a swimmable standard and trophic state

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o) The layout of roads, public spaces and lots, showing how the dwelling unit yields in Rule 4.6.2 b) will be achieved.

p) Building envelopes to demonstrate the suitability of any lots intended for duplex or apartment development.

q) An Integrated Transport Assessment for anticipated development within the LDP area, prepared in accordance with the requirements of Rule 25.14.4.3 and assessing the levels of traffic generation against the traffic generation threshold and

associated mitigation measures described in clause 3.8.3 in section 3.8, Te Awa Lakes Structure Plan.

Proposed Plan Change XX-Rotokauri North Private Plan Change

1.2.2.24 Rotokauri North

a) Subdivision of a Duplex

i) For any restricted discretionary activity subdivision of a permitted activity duplex (which meets Rule 4.7.12(a)), applicants need not provide a site analysis (otherwise provided for in 1.2.2.2 c) above).

b) ICMP

i) As per Rule 25.13.4.7 an approved sub-catchment ICMP for the Rotokauri North Structure Plan area, will hold the same status as an "approved ICMP" or "full ICMP" with respect to the Three Waters provisions of this Chapter 25.

ii) Applications for development in Rotokauri North needs not resubmit an ICMP or sub-catchment ICMP, instead applicants shall submit sufficient detail to demonstrate that the recommendations of the approved ICMP (including an approved sub-catchment ICMP) can be implemented for the proposed development area.

1.3 Assessment Criteria

1.3.1 Guide to Using the Criteria

This chapter provides a range of Assessment Criteria that are to be used, where relevant, in the assessment of activities that require resource consent.

Specifically:

1. Controlled Activities will be assessed against the matters over which Council has reserved control. The assessment criteria are provided within section 1.3.2 with the section headings being the Matters of Control.

2. Restricted Discretionary Activities that are restricted solely due to failed standards will be assessed against the effects resulting from an activity not complying with any relevant standard(s) in this District Plan (refer section 1.3.3. A1 of this appendix).

   To assist with assessing the effects of the non-compliance, there may be specific criteria within section 1.3.3 of this appendix that could be of use in assessing the application.

3. Restricted Discretionary Activities that are restricted solely due to being listed in the chapters as a Restricted Discretionary Activity will be assessed against the specific matters of discretion which are identified against each activity in the chapter.

   The headings within section 1.3.3 relate to the Matters of Discretion. The criteria listed under each heading are to be used where relevant. Subheadings are provided under each subject matter to define zone or activity specific criteria for that subject matter, thereby enabling them to be considered or discarded depending on relevance.

4. Restricted Discretionary Activities that are restricted by virtue of being listed in the chapter as a Controlled Activity and also fail standards will be assessed against the relevant criteria as outlined in points 1 & 2 above.

5. Restricted Discretionary Activities that are restricted by virtue of being listed in the chapter as a Restricted Discretionary Activity and also fail standards will be assessed against the relevant criteria as outlined in points 2 and 3 above.

6. Discretionary and Non-Complying Activities may use the criteria in section 1.3.3 as a guide with specific reference to the general criteria in A2.

1.3.2 Controlled Activities – Matters of Control

The following section contains matters over which Council has reserved control for Controlled activities. These are referenced in other parts of the District Plan.

Note

1. Example: chapters in this District Plan may include a section titled "Controlled Activities – Matters of Control" and a table like the example below.

Activity	Matter of Control Reference Number (Refer to Volume 2, Appendix 1.1)
i. Teaching and research laboratories	A. Hazardous Facilities

In this example the controlled activity is "i. Teaching and research laboratories". The matters of control are identified by the reference "A". These references align with the lists below. In this example "A" is associated with Hazardous Facilities with the relevant matters of control listed beneath.

A.	**Hazardous Facilities**	
	The extent to which the effects on, and risks to, the health and safety of people, property and the environment are appropriately managed, including:	
	i.	Matters referred to in the relevant standards in Rule 25.4.4 of Chapter 25.4 City-wide – Hazardous Facilities.
	ii.	Safe access to and from the transport network.
	iii.	Effects due to the sensitivity of the surrounding natural, human and physical environment.
	iv.	Separation distances and the type of environment/number of people potentially at risk from the proposed facility.
	v.	Potential hazards and exposure pathways arising from the proposed facility.
	vi.	Potential cumulative hazards presented in conjunction with neighbouring facilities.
	vii.	Proposed:
		• Fire safety and fire water management
		• Spill contingency and emergency planning
		• Monitoring and maintenance schedules
		• Waste disposal management
		• Hazardous substance transport arrangements
	viii.	Compliance with relevant Standards and Codes of Practice.
	ix.	Any other measures to avoid or mitigate risks posed by the activity.
	Note Relevant Standards and Codes of practice referred to above may include: • Below Ground Stationary Container Systems for Petroleum – Design and Installation HSNOCOP 44, Environmental Protection Agency, May 2012 • Below Ground Stationary Container Systems for Petroleum – Operation HSNOCOP 45, Environmental Protection Agency, May 2012 • Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in	

		New Zealand, Ministry for the Environment, 1999 • Environmental Guidelines for Water Discharges from Petroleum Industry Sites in New Zealand, Ministry for the Environment, 1998 • NZS8409: 2004 Management of Agrichemicals • AS/NZS 1596: 2008 – Storage and Handling of Liquid Petroleum Gas • AS/NZS 2982: 2010 – Laboratory Design and Construction • AS/NZS 2243.1: 2005 – Safety in Laboratories – Planning and Operational Aspects • AS/NZS 2243.2: 2006 – Safety in Laboratories – Chemical Aspects • AS/NZS 2243.3: 2010 – Safety in Laboratories – Microbiology • AS/NZS 2243.5: 2004 – Safety in Laboratories – Non-ionising Radiation • AS/NZS 2243.6: 2010 – Safety in Laboratories – Plant and Equipment Aspects • AS/NZS 2243.8: 2006 – Safety in Laboratories – Fume Cupboards • AS/NZS 2243.9: 2009 – Safety in Laboratories – Recirculating Fume Cabinets • AS/NZS 2243.10: 2004 – Safety in Laboratories – Storage of Chemicals
B.	**Industrial Zone**	
a)	**Building Design, External Appearance and Site Layout**	
	i.	The extent to which any activity involving buildings adjoining an identified transport corridor and buildings within the Rotokauri Employment Area presents an attractive visual appearance, including minimising:
		• Large featureless building façades facing the transport corridor.
		• The placement of any plant or machinery on the front of the building or within the front yard setback (with the exception of machinery displayed for sale, hire, or plant associated with on-site security).
		• Over-dominant illuminated signage within the site.
		• Front fences, walls and signs that detract from an active visual relationship between the site and street/primary transport corridor.
		• The location of the service and outdoor storage areas within the front setback.
	ii.	For ancillary residential activities, the extent to which:
		• Outdoor living areas or balconies are contiguous with the internal living areas.
		• The design, size and location of the private and/or communal open space, parking, loading spaces and driveways on the site achieves a high standard of amenity, noise and visual privacy for residents, whilst effect from dust, fumes and light glare are minimised.
b)	**Site Layout**	
	iii.	Within the Rotokauri Employment Area, the extent to which the adverse effects of the location of buildings, parking areas and outside storage areas minimise their potential impact on the amenity of any adjoining Residential, Special Character or Open Space Zones.
	iv.	For ancillary residential activities and within the Rotokauri Employment Area, the extent to which the development has been designed and located so that the potential for reverse sensitivity effects (including noise) is avoided, remedied or mitigated.

	v.			The extent to which the site layout incorporates Crime Prevention Through Environmental Design, to develop a positive relationship with the street and improve passive surveillance.
	vi.			The extent to which landscaping is incorporated within the site layout, to visually reduce the bulk of new development and mitigate adverse visual effects, particularly from the front boundary and those parts of the site visible from public spaces. ***Note*** This is particularly important in relation to the setback from the front boundary and those parts of the site visible from public spaces and interfaces along state highways and arterial transport corridors.
	vii.			Within the Rotokauri Employment Area, the extent to which landscaping enhances amenity at key interfaces such as State Highway 1, green corridors, arterial transport corridors, Wintec Rotokauri Campus and the Rotokauri Suburban Centre.
C.	**Knowledge Zone and Major Facilities Zone**			
a)	**Building Design, External Appearance and Configuration**			
	i.			The extent to which the external appearance, scale and design of buildings:
		1.		Contributes to compatibility between buildings and their integration with other development on the site, adjacent sites and surrounding public spaces.
		2.		Contributes to the active frontage along public streets and open space, particularly at corner sites.
		3.		Minimises, as practicable, effects on adjacent public spaces (including footpaths) in terms of shading and daylight.
	ii.			The cumulative effect of buildings and the extent to which opportunities have been taken to cluster buildings and/or ensure that areas are left free from buildings.
	iii.			The extent to which parking, manoeuvring areas, driveways and outdoor service areas are designed and located to be safe and efficient, and to protect amenity values of the streetscape and adjoining sites.
	iv.			The extent to which the building design and development:
		1.		Makes a positive contribution to the local character of the site and surrounding area.
		2.		Improves large façades (including side walls) that are visible from public places by ensuring they are treated in a way that provides visual interest and reduces the apparent bulk of the building.
	v.			The extent to which Crime Prevention Through Environmental Design principles have been incorporated.
	vi.			Encourage easy and safe pedestrian access and circulation for those not arriving by vehicle.
b)	**Landscaping**			

	vii.	The extent to which landscaping is incorporated within the site layout to reduce the bulk of new development and mitigates adverse visual effects. ***Note*** This is particularly important in relation to setback from the front boundary and those parts of the site visible from public spaces and interfaces along state highways, arterial transport corridors and City gateways.
In addition to the above general matters, the following relate to site specific matters of control.		
	University of Waikato	
	viii.	The extent to which existing linkages between land uses are reinforced by the layout of buildings and transport corridors. New connections created should seek to enhance accessibility through the zone and have regard to connectivity to the adjoining University of Waikato campus.
	ix.	The extent to which high rise buildings are concentrated on the Hillcrest Road ridge.
	x.	The extent to which the location of buildings maintains the safe and efficient operation of network utilities, including high voltage transmission lines.
	Knowledge Zone	
	xi.	The extent to which the open space character of the northwest sector of the site is maintained.
	Claudelands Event Centre	
	xii.	The extent to which the open space character of the eastern part of the site is maintained including the maintenance of a suitable buffer adjoining Jubilee Park.
	Te Rapa Racecourse/Thoroughbred Business Park	
	xiii.	The extent to which development of the site retains views between the racecourse and Minogue Park.
	Waikato Hospital	
	xiv.	The extent to which activities of an industrial nature and the heliport are grouped in the south-western sector of the site.
	xv.	The extent to which high rise buildings are concentrated towards the centre of the hospital complex.
	Waikato Stadium and Seddon Park	
	xvi.	The extent to which future buildings and the enhancement of facilities including any provision for office, retail and visitor accommodation provides for functional integration with the site.
	Wintec Rotokauri	
	xvii.	The extent to which development of the site has regard to the future development of the Rotokauri Area and the relationship of the site with Lake Waiwhakareke.
D.	**Te Rapa North Industrial Zone**	

a)	**Concept Development Consent for Stage 1A**	
	i.	The extent to which it identifies the total area not exceeding 30ha available for industrial development within Stage 1A.
	ii.	The extent to which it defines the location and extent of the development area not exceeding 7ha pursuant to Rule 12.6.1.
	iii.	The extent to which it defines the general location and extent of the development area not exceeding 23ha pursuant to Rule 12.6.1.
	iv.	The extent to which it demonstrates connectivity and sequential development between the 7ha and 23ha land release areas and adjacent sites.
	v.	The extent to which it provides an indicative internal road layout and it provides for alternative modes of transport including public transport, pedestrian and cycle linkages within and between the 30ha and adjacent land.
	vi.	The extent to which it considers and responds to the recommendations and proposed conditions of an Integrated Transport Assessment prepared in accordance with Rule 25.14.4.3.
	vii.	The extent to which it specifies methods by which vehicle movements will be managed to achieve compliance with Rule 12.4.7b).
	viii.	The extent to which it identifies any existing indigenous vegetation and areas of ecological value including recognition of existing gully systems and proposals for their management.
	ix.	The extent to which it provides for any landscaping and screen planting including landscaping buffers where land adjoins the Waikato Expressway designation boundary.
	x.	The extent to which it provides a report which demonstrates the extent to which the provision of reticulated infrastructure for the entire 30ha within the Stage 1A development area will occur; provided that existing infrastructure available from the Te Rapa Dairy Factory and/or Council infrastructure and headworks (water and wastewater only) may be relied on for the 7ha development under Rule 12.3.3f).
		Note The above does not involve: • Activities requiring an air discharge consent under the Regional Plan (except on land situated to the north of Hutchinson Road, east of Te Rapa Road) • Hazardous waste reprocessing, disposal or storage, except for temporary storage of waste from commercial activities awaiting collection • An extractive industry • Offices, except those that are ancillary to industrial uses • Hospitals, day care facilities, and educational institutions • Retail activities, except for food outlets less than 200m^2 • Residential activities unless associated with a lawfully established activity.

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~~b)~~	~~Concept Development Consent for Stage 1B~~	
	~~i.~~	~~The extent to which it identifies the total area not exceeding 30ha available for industrial development within Stage 1B.~~
	~~ii.~~	~~The extent to which it defines the location and extent of the development area not exceeding 7ha pursuant to Rule 12.6.1.~~
	~~iii.~~	~~The extent to which it defines the general location and extent of the development area not exceeding 23ha pursuant to Rule 12.6.1.~~
	~~iv.~~	~~The extent to which it demonstrates connectivity and sequential development between the 7ha and 23ha land release areas and adjacent sites.~~
	~~v.~~	~~The extent to which it provides an indicative internal road layout and it provides for alternative modes of transport including public transport, pedestrian and cycle linkages within and between the 30ha and adjacent land.~~
	~~vi.~~	~~The extent to which it demonstrates how the provision of infrastructure will occur for the area not exceeding 7ha under Rule 12.3.3h) (how wastewater will be managed prior to disposal at the Hamilton Waste Treatment Plant; and how water supply will not adversely affect Hamilton City's water quality rating); or how wastewater and water supply will be managed using Council's reticulated infrastructure.~~
	~~vii.~~	~~The extent to which it demonstrates how the provision of reticulated infrastructure for the entire 30ha within the Stage 1B development area will occur using council infrastructure and headworks (water and wastewater only) when development occurs beyond the 7ha service centre.~~
	~~viii.~~	~~The extent to which it identifies any existing indigenous vegetation and areas of ecological value including recognition of existing gully systems and proposals for their management.~~
	~~ix.~~	~~The extent to which it considers and responds to the recommendations and proposed conditions of an Integrated Transport Assessment prepared in accordance with Rule 25.14.4.3.~~
	~~x.~~	~~The extent to which it identifies methods by which vehicle movements will be managed to achieve compliance with Rule 12.4.7c).~~
	~~xi.~~	~~The extent to which it provides for landscaping and screen planting including landscaping buffers where land adjoins the Waikato Expressway designation boundary.~~
		~~***Note***~~ ~~The above does not involve:~~ ~~• Hazardous waste reprocessing, disposal or storage, except for temporary storage of waste from commercial activities awaiting collection~~ ~~• Any extractive industry~~ ~~• Offices, except those that are ancillary to industrial uses~~ ~~• Hospitals, day care facilities, and educational institutions~~ ~~• Retail activities, except for food outlets established in association with the service centre~~ ~~• Residential activities unless associated with a lawfully established activity.~~

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E.	**Historic Heritage**	
a)	**Management of effects on, and risks to the heritage value of the historic heritage building or structure, including:**	
	i.	Effects to the exterior of the historic heritage building or structure.
	ii.	Potential loss of the heritage values of the building or structure.
	iii.	Any other measures to avoid or mitigate risks proposed by the activity.
	iv.	Works compatible with and reflect the original fabric of the historic heritage building or structure.
	v.	Earthquake strengthening not detracting from the appearance and integrity of the historic heritage building or structure.
	vi.	Demonstration of the conservation principles of the International Council on Monuments and Sites (ICOMOS) New Zealand.
F.	**Ruakura**	
a)	**Interface Design Control Area**	
		Landscaping
	i.	Ruakura Logistics Zone - Subject to biosecurity requirements, landscaping should be incorporated within the site layout to reduce the bulk of new development and mitigate adverse visual effects. This is particularly important in relation to setbacks from the front boundary and those parts of the site visible from public spaces and interfaces along state highways, arterial transport corridors, and the Ruakura Open Space Zone and City gateways.
	ii.	In relation to the Waikato Expressway, whether landscaping along the boundary with the Expressway Designation is of appropriate scale and density so as to soften views from the Expressway of industrial development.
	iii.	Ruakura Industrial Park Zone – Landscaping and screening should be incorporated within the site layout to reduce the bulk of new buildings and associated development, and to mitigate adverse visual effects - particularly from storage, loading and operational areas likely to be visible from residential areas. This is also important in relation to setbacks from the front boundary and those parts of the site visible from public spaces and interfaces along state highways, arterial transport corridors, and the Ruakura Open Space Zone and city gateways.
	iv.	Ruakura Industrial Park Zone – In relation to buildings and associated development on sites that adjoin the Ruakura Open Space Zone and abutting the northern boundary of properties on Sheridan Street and Nevada Road or are adjacent to Silverdale Road, proposed landscaping and screening is subject to specific assessment and the standards in Rule 25.5.3.1 are to be used as a guide only.
b)	**Crime Prevention Through Environmental Design**	
	i.	Buildings and the site layout shall be designed to:

		a) Provide surveillance from offices over main access, car parks and the adjacent street. b) Ensure a clear distinction between visitor areas and operational areas. c) Provide direct, legible and well lit visitor routes. d) Avoid opportunities for concealment.
c)	**Temporary Logistics Activities in Sub Area A**	
	i.	Conditions shall be imposed to ensure that the location of buildings associated with logistics is temporary, the future rail spur corridor is not compromised and that buildings and activities do not preclude the future full development of the Inland Port.
d)	**Medium Density Residential Zone**	
	i.	Impact of building design, external appearance and configuration on the public realm particularly when viewed from the Ruakura Open Space Zone and arterial corridor.
	ii.	Site layout.
	iii.	Landscaping.
	iv.	The extent to which the amenity and safety of future occupiers will be protected.

1.3.3 Restricted Discretionary, Discretionary and Non-Complying Assessment Criteria

The following section contains assessment criteria under subject headings that relate to the 'Matters of Discretion' for Restricted Discretionary activities. These are referenced in other parts of the District Plan.

Note
Example: Chapters in this District Plan may include a section titled "Restricted Discretionary Activity – Matters for Discretion, Assessment Criteria and Non-Notification Rule" and a table like the example below.

Activity Specific	Matter of Discretion and Assessment Criteria Reference Number (Refer to Volume 2, Appendix 1.2)
i. Vegetation clearance	D - Natural character and open space

In this example the restricted discretionary activity is "i. Vegetation clearance". The matters to which discretion has been restricted to are identified by the subject heading of "D - Natural character and open space".

A range of criteria are provided under that heading in this section and where these criteria are relevant they can be used to assess the application. All criteria under the identified subject heading do not need to be assessed, only those relevant to the application.

Discretionary and Non-Complying Activities may use the criteria in this section as a guide, with specific reference to the general criteria in A3.

A	**General Criteria** **Restricted Discretionary Activities due to Performance Standard Non-Compliance**		
A1	The effects resulting from an activity not complying with any relevant standard(s) in this District Plan. Guidance on the assessment of effects may be derived from: a) Any relevant criteria within section 1.3.3 of this appendix; and b) Any relevant design guidelines contained within this Plan.		
A2	The extent to which any adverse effects would be offset by benefits to the community or the natural environment.		
	Discretionary & Non-Complying Activities - General Criteria		
A3	Without restricting the exercise of its discretion to grant or refuse consent or impose conditions, the Council shall have regard to the assessment criteria set out below when considering any application under sections 104 and 104B of the Act. Discretionary activities and Non-Complying activities shall be assessed against, but not limited to the following assessment criteria:		
	a)	Assessment against relevant objectives and policies including Chapter 2 Strategic Framework	
	b)	The extent to which the proposal is consistent with relevant:	
		i.	Standards in this Plan.
		ii.	Assessment Criteria, listed in this plan.

		iii.	Design Guides.
		iv.	Structure Plans.
		v.	Comprehensive Development Consents.
		vi.	Concept Plans or Concept Development Consents.
		vii.	Reserve Management Plans.
		viii.	Iwi or Hapu Management Plans.
		ix.	Waikato River Vision and Strategy.
		x.	Master Plans.
B	**Design and Layout**		
	General		
B1	Whether the proposed building design and / or site layout is consistent with the intent of any relevant design guide in Appendix 1 Section 1.4. ***Note*** If an activity is a Restricted Discretionary Activity in relation to Design and Layout matters and there is a relevant design guide, then the activity should seek to address the outcomes sought in the design guide as a priority over relevant criteria in this section. Where an application is for a Concept Plan Consent in the Knowledge Zone, the Design and Layout assessment criteria will focus on building precincts / sub-areas, development and infrastructure layout rather than individual buildings.		
B2	Whether the external appearance, scale and design of buildings and structures:		
	a)	Are consistent with the purpose of the zone, and enhance the character and amenity of the surrounding area, streetscape qualities and adjoining land uses.	
	b)	For corner sites, where appropriate, provide active frontages along both elevations.	
	c)	Incorporate Crime Prevention Through Environmental Design principles.	
B3	The extent to which the proposed design provides or continues to provide for informal surveillance of public spaces within and adjacent to the development by:		
	a)	Locating doors, windows and other openings associated with living and working areas, so that they overlook and interact with public spaces.	
	b)	Locating primary entrances to buildings to face the transport corridor frontage, with the main entrance located adjacent to the frontage with the most pedestrian traffic.	
B4	The extent to which building design will add visual interest and vitality to the streetscape and avoids large, featureless façades. For example, through articulation of a façade, attention to fenestration and rooflines, the design of verandas and balconies and the careful choice of materials and colour.		
B5	The extent to which parking, manoeuvring areas, driveways and outdoor service areas have been designed and located:		
	a)	To protect amenity values of the streetscape and adjoining sites, including through the use of appropriate screening and landscaping.	
	b)	To not be visually dominant.	
	c)	To be away from the front of the site and buildings.	

	d)	To integrate with adjacent activities and development in terms of the provision of entrances, publicly accessible spaces, verandas, parking, loading areas, access to public transport and pedestrian linkages.
B6	The extent to which the activity, including landscaping, has been designed in a manner that supports and enhances pedestrian and cyclists movements, including access to the transport network and along frontages considered important for shopping or entertainment activities.	
	Landscaping and Screening	
B7	The extent to which planting and landscaping is used to:	
	a)	Establish and maintain a well vegetated environment that is compatible with the zone and existing character.
	b)	Visually reduce the bulk of new development and mitigate adverse visual effects particularly from the front boundary and those parts of the site visible from public spaces.
	c)	Create an attractive environment that maintains safety and amenity for pedestrians.
	Waste Management	
B8	The extent to which developments provide for goods handling, storage, waste and recycling areas that are:	
	a)	Easily accessible for collection agencies and avoid adverse visual, noise or odour effects.
	b)	Consistent with the amenity values of the site and avoid causing nuisance for neighbouring residential activities.
	c)	Suitable for the demand expected by the activity.
	Business Zones	
B9	Whether the proposed building setback adversely affects the use and safety of public spaces, or the continuity of shopping frontages.	
B10	Whether development of a site adjoining the riverbank encourages pedestrian access to and facilitates public use and enjoyment of, the promenade and environs of the Waikato River.	
B11	In relation to the setbacks from internal boundaries at upper levels (i.e. fourth level and above), the extent to which the proposal minimises shadowing and loss of natural light on existing adjacent buildings by providing adequate separation between the proposed development and any existing residential development.	
	Knowledge Zone	
B12	The extent to which public spaces and streets have been designed to be accessible and open to the public at all times (except where closed for operational safety or security reasons).	
	University of Waikato	
B13	The extent to which existing linkages between land uses are reinforced by the layout of buildings and transport corridors. New connections created should enhance accessibility through the zone and have regard to connectivity to the adjoining University of Waikato campus.	
B14	The extent to which high rise buildings are concentrated on the Hillcrest Road ridge.	

B15	The extent to which the open space character of the northwest sector of the site is maintained.	
	Sites Adjoining the Waikato Riverbank	
B16	The extent to which development of a site adjoining the riverbank:	
	a)	Provides a scale and design of any building or structure that maintains or enhances street and reserve areas, the character and amenity, and the heritage or open space values of the adjoining riverbank area.
	b)	Makes provision for building design and configuration, site layout and/or landscaping which enhances the visual and physical relationship with the Waikato River.
	c)	Mitigates the impact of large developments and vehicular oriented activities on the amenity values of the riverbank environment.
	Development within a Structure Plan Area	
B17	The extent to which the proposal is consistent with any relevant objectives of any structure plan or could prejudice or foreclose options for future urban development and in particular with the proposals shown on the relevant Structure Plan for the area.	
B18	The extent to which the proposed transport network promotes opportunities to achieve:	
	a)	A legible and logical pattern of development in accordance with the planned transport network identified within the relevant structure plan or the ability to extend existing transport networks, and
	b)	The future transport network within the relevant structure plan area for which more precise design, location and layout has been approved.
B19	The extent to which the proposal takes into account new information or policies (including but not limited to ICMPs) that will result in outcomes that are more beneficial than those shown on the Structure Plan.	
	Dairies in General Residential and Special Character Zones	
B20	The extent to which the site can adequately accommodate the dairy, any associated residential activity, parking, planting, service areas and signage, whilst ensuring that the building would not dominate the streetscape.	
C	**Character and Amenity**	
	General	
C1	The extent to which the activity:	
	a)	Makes adequate provision to protect the visual and acoustic privacy of abutting residential and community uses, including through building and site design and hours of operation.
	b)	Is compatible with the location in terms of maintaining and enhancing the character and amenity of the surrounding streetscape and urban form.
	c)	Is able to avoid, remedy or mitigate adverse effects on the existing and foreseeable future amenity of the area, particularly in relation to noise, traffic generation, material deposited on roads, dust, odour and lighting.
	Reverse Sensitivity	

C2	The extent to which the development (including residential development) has been designed and located so that the potential for reverse sensitivity effects (including noise) are avoided, remedied or mitigated.	
	Residential Zone	
C3	The extent to which the cumulative effects of a non-residential activity together with other non-residential activities will result in an adverse effect to the residential character of the neighbourhood.	
	Central City & Business Zones	
C4	The extent to which the level of non-retail activity within a shopping frontage would adversely affect the attraction of shoppers and visitors.	
	Future Urban Zone	
C5	The extent to which the location and siting of effluent storage and disposal can avoid effects to dwellings or adjoining sites.	
C6	The extent to which the rural activity remains the predominant activity on the site.	
C7	The extent to which any intensive farming activity avoids adverse effects of noise, odour, vermin and other potential health hazards or mitigates these through management practices, site layout (placement and orientation), design of buildings, screening and landscaping.	
C8	The measures to be adopted to avoid, remedy or mitigate potential effects on residential activities on the site and adjoining properties.	
	Non-Industrial Activities in the Industrial Zone	
C9	The extent to which the non-industrial activity, within an Industrial Zone, serves the needs of an industrial area and adjoining areas, or is more appropriate to an industrial location than in other areas having regard to the nature of the activity, travel demand characteristics and amenity expectations.	
	Residential activities in Figure 9.3a	
C10	For managed care facilities, retirement villages, and rest homes, the extent to which:	
	a)	The siting, scale, design and layout of buildings ensures compatibility between buildings and their integration with other sensitive development on the site, adjacent sites and surrounding public spaces such as Ashurst Park.
	b)	The design, size and location of the private and/or communal open space, parking, loading spaces and driveways on the site achieves a high standard of on-site amenity, noise and visual privacy for residents, and ensures that effects from dust, fumes and light glare are minimised.
	c)	Outdoor living areas or balconies are contiguous with the internal living areas.
	d)	The location of buildings, window and door placement, parking areas and outside amenity areas avoid reverse sensitivity effects on any adjoining industrial activities.
	e)	Existing linkages between land uses are reinforced by the layout of buildings and their positive interface with the proposed linkage road between Maui Street and Karewa Place.
	Subdivision	

C11	The extent to which the proposal is consistent with any relevant design guidance in Appendix 1 Section 1.4.	
C12	The extent to which any boundary adjustment would have potential adverse effects on the site or the surrounding area.	
C13	Whether the subdivision creates lots that are appropriate for their intended use.	
C14	The extent to which subdivision or subsequent building design, including the location of transport corridors and reserves, provides for existing electricity lines and their corridors.	
C15	The extent to which the proposal is consistent with objectives of any relevant structure plan or could prejudice or foreclose options for future urban development and in particular with the proposals shown on the relevant Structure Plan for the area.	
C16	The extent to which the proposal (including the proposed transport network) promotes opportunities to achieve:	
	a)	A legible and logical pattern of development in accordance with the planned transport network identified within the relevant structure plan or the ability to extend existing transport networks, and
	b)	The future transport network within the relevant structure plan area for which more precise design, location and layout has been approved.
	Ancillary retailing and offices in the Industrial Zone	
C17	In assessing the suitability for ancillary retail or office activity to expand over the thresholds denoted in the Plan, regard shall be given to the following:	
	a)	Whether the ancillary use is integral to the continuing operation of the principal activity on the site.
	b)	Whether the ancillary use remains incidental and subordinate to the principal activity on the site.
	c)	Whether the principal activity continues to be of an industrial character and nature.
D	**Natural Character and Open Space**	
	General	
D1	The extent to which buildings, earthworks, developments and site layout and clustering:	
	a)	Complements and retains the underlying landform and the legibility of the ridgeline features including views to and from ridgelines, having regard to both immediate and cumulative effects.
	b)	Provides a sufficient area of open space to enable a sense of the underlying landform to be retained.
	c)	Retains and incorporates natural features and established mature and indigenous vegetation into the design.
D2	The extent to which the site for a proposed building or structure integrates with the site features of the open space.	

	Activities Affecting Scheduled Trees or a Significant Natural Area	
D3	The extent to which activities associated with the proposal will:	
	a)	Adversely affect any identified value of the tree.
	b)	Adversely affect the health of the tree.
	c)	Adversely affect any identified value of the Significant Natural Area.
	d)	Adversely affect the health of the Significant Natural Area.
	e)	Cause the loss of habitat that provides a key life-cycle function or the physical disturbance of indigenous species listed as 'threatened' or 'at risk' in the New Zealand Threat Classification Systems Lists.
D4	The extent to which impermeable surfaces adversely affect water quality, and the surrounding watertable.	
D5	The extent to which vegetation removal adversely affects the natural character or landscape value of any lake or wetland and the ability to offset such effects through restoration or enhancement.	
D6	The extent to which any earthworks will adversely affect the surrounding water table and water quality and the opportunity to mitigate the loss of water from the site.	
D7	The extent to which earthworks exacerbate or contribute to flooding, both on-site and off-site.	
D8	Whether the removal of peat soils can be mitigated to protect the surrounding water table.	
D9	Where it is clearly impractical to dispose of stormwater to ground the provision of other mitigation measures to maintain the water table and protect water quality.	
D10	The extent to which undertaking the activity will enable replacement or enhancement of existing vegetation, natural values, or the improvement of riparian margins.	
	Non-emergency Works to, Removal or Transplanting of, a Scheduled Tree	
D11	The extent to which the tree is causing serious damage to structures or the tree constitutes a hazard to human health, property and infrastructure.	
D12	Whether the tree's chance of survival, in the case of transplanting, is better than in its existing location.	
D13	Whether alternative developments avoiding the need to remove the tree(s) have been adequately considered.	
	Surface of Water	
D14	The extent to which water flows are impeded and the potential for debris to be snagged.	
D15	The extent of the effect of the proposal on:	
	a)	Natural character, ecological values, riparian habitat, recreational values, landscape quality and amenity values of the waterway.
	b)	Public access to the waterway and on the surface of water.
	c)	Adjacent scheduled historic buildings, structures and sites, significant natural areas and significant trees.

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	d)	Land-based activities.
	e)	Other users of the water body including recreational and other commercial activities.
	f)	Health and safety and effects on navigation.
	g)	Stirring sediment, transporting weeds and aquatic pests.
	h)	Bank erosion.
D16	The extent to which the effects of flow levels of the river have been taken into account. (Events should not take place when the Waikato River is in flood, or in low-flow condition.)	
D17	The extent to which the design of a pontoon, jetty or boat ramp allows for the operation of the Waikato Hydro System between the lower and upper operating levels for the System.	
	Esplanade Reserves and Strips	
D18	Any reduction in the required width of esplanade reserve or strip may be considered where:	
	a)	Topography or the location of an existing building dictates a practical boundary less than 20m.
	b)	Reduction of part is offset with a compensatory increased width elsewhere.
		Note For any stream, the purpose of the reserve can be met by a lesser width but should not be considered less than 4m.
	And, whether the varied width of the esplanade reserve or strip is such that:	
	c)	There is adequate public access to any river, lake or stream and their margins to enable the public to meet any social, recreational or cultural needs.
	d)	The natural habitats of flora and fauna in, on or surrounding the river, lake or stream are not adversely affected.
	e)	Any Significant Historic Heritage sites identified in Schedule 8A or 8B of Appendix 8 are protected from encroaching development.
	f)	Any adverse impacts on water quality are adequately and efficiently mitigated.
D19	In assessing whether an esplanade strip should be set aside, the Council will consider:	
	a)	Whether there is a need to retain public access because the opportunity to acquire an esplanade reserve is unlikely to arise.
	b)	Whether public benefits can be achieved.
D20	The banks of any river, lake or stream can be adequately and efficiently maintained.	
E	**Heritage Values and Special Character**	
	General	
E1	The extent to which the proposal, development, excavation or subdivision of a historic heritage site or place:	
	a)	Is consistent with the identified heritage values, including scale, design, form, style, bulk, height, materials and colour, and retains, protects or enhances the historic context.

	b)	Provides for design, layout or location of the activity, including associated building platforms, vehicle access and services on site in a manner that will minimise the disturbance of the site.
	c)	Provides for the on-going maintenance of the site to ensure that the site is preserved and that damage does not occur.
	d)	In Schedule 8A of Appendix 8 maintains visual linkages between the building or structure and the street.
	e)	Is compatible with the reasons for inclusion of the building, structure or site and its significance in Schedules 8A or 8B, of Appendix 8.
	f)	Addresses cumulative effects on heritage values.
	g)	Considers the irreversibility of an effect (e.g. the loss of unique features)
	h)	Considers the opportunities for remediation and the costs and technical feasibility of remediation.
	i)	Considers the resilience of the heritage feature to change (e.g. the ability of the feature to assimilate change, or the vulnerability of the feature to change).
	j)	Adheres to the conservation principles of International Council on Monuments and Sites (ICOMOS) New Zealand Charter (2010) for the Conservation of Places of Cultural Heritage Value, where applicable.
	k)	Includes consultation with Heritage New Zealand Pouhere Taonga.
	l)	In the event of relocation, has adequately considered whether the relocation is necessary and whether appropriate measures are proposed to ensure any potential adverse effects on heritage values are avoided, remedied or mitigated.
	m)	Incorporates proposed planting, fencing and identification (e.g. signage) sufficient to ensure site recognition.
E2	The extent to which the heritage values of any buildings or places identified in Schedules 8A or 8B of Appendix 8 would be adversely affected by the proposal.	
E3	The extent to which the proposal including modification, re-use, renovation or restoration to the building or structure:	
	a)	Contributes positively to the character of the surrounding area and maintains the relationship of the building or structure with its setting.
	b)	Will maintain and enhance environmental, social, or cultural effects for the wider community.
	c)	Considers the extent to which the primary façade of a scheduled building is proposed to be altered, and whether the main determinants of the style and character, and the heritage significance, of the building are maintained or restored.
	d)	Ensures new buildings respect the design, scale and materials of any original façade.
E4	The extent to which it is practicable to provide noise insulation to the required standard without compromising the heritage significance and fabric of the building.	
E5	The extent to which the addition of an awning would likely detract from the original character of an identified heritage building in Schedule 8A and 8B of Appendix 8.	
	Temple View Heritage Area	

E6	The extent to which new development or earthworks (including the planting or removal of vegetation and trees) would adversely affect the landscape setting and views of the Temple from Tuhikaramea Road.
E7	The extent to which works to a transport corridor or parking area continue the consistent use of materials and kerb edging used throughout the Heritage Area.
E8	The extent to which provision has been made for the investigation, recording or preservation of any archaeological deposits or features.
	Temple View Character Area
E9	The extent to which development maintains the characteristic setback of buildings from the transport corridor, visibility between the dwelling and the transport corridor and high levels of landscaping and permeable surfaces within the front building setback.
E10	The extent to which the proposed development, building, structure, alteration or addition is compatible with the scale, form, style, bulk, height, colour or materials of surrounding buildings or structures within the Temple View Character Area.
E11	Whether removal of any building or structure within the Character Area will affect the gateway appearance of the Character Area.
E12	The extent to which the generous spacing between single dwellings is maintained.
E13	Whether it has been clearly demonstrated that demolition of any heritage building in Schedule 8A of Appendix 8 is necessary, considering alternatives for the refurbishment or re-use of the building, financial cost and technical feasibility.
E14	Any immediate or cumulative effects of the loss, alteration or removal of any buildings on the overall coherence of the Character Area.
E15	The extent to which new development or earthworks would adversely affect the landscape setting and views of the Character Area.
E16	The extent to which the development would adversely affect the spatial relationship between the curtilage wall and Tuhikaramea Road, and the consistency of design of the privacy walling separating the covered walkways from Tuhikaramea Road.
E17	The extent to which new development maintains a coherent character within the Temple View Character Area and, where relevant, integrates with any Comprehensive Development Consent.
	Peacocke Special Character Zone
E18	The extent to which provision for effluent and stormwater disposal mitigates any risk of landslip or erosion and avoids adverse effects on water quality as it relates to ground water, the Waikato River, and the Mangakotukutuku gully ecosystem.
E19	The extent to which the proposed development takes into account existing rural activities, the location of existing use building platforms and the proposed arterial transport corridors as shown on the Peacocke structure Plan.
E20	Whether the placement of buildings would facilitate future urban re-subdivision particularly with regards to achieving a cohesive urban layout anticipated by the Peacocke Structure Plan and does not compromise the economic provision of future infrastructure.
E21	The extent to which the development provides for the avoidance of natural hazards.

E22	The extent to which a development could have an adverse effect on the consistency and amenity of the area or the presence of mature vegetation.	
E23	Any positive impacts to the neighbourhood or the wider community, including the extent to which the activity might enhance the amenity of the area.	
E24	Any cumulative effects from the activity, whether on its own or in combination with other activities in the area.	
E25	The extent to which the proposed development is compatible with the intent of the consented Master Plan.	
	Rototuna North East Character Zone	
E26	The extent to which any proposed development or building is consistent with the development controls for the Rototuna North East Character Zone and responds to the existing landform, including the extent to which it avoids excessive earthworks including significant cutting and filling, and does not adversely affect the natural topography, the construction or operation of the Waikato Expressway (Designation E90) or Council infrastructure.	
E27	The extent to which the development is compatible with the landform and size of the site, having regard to the intended open space and character of the area.	
E28	The relationship between the scale of any buildings on the site and existing residential development, having regard to the intended character of the area.	
E29	The extent to which the subdivision creates a block pattern with lots fronting streets and backing onto the rear of other lots, addressing the natural landform of the area and on the steeper land, the shape factor circle is located to the front of the sites with low gradients to facilitate building development and access, transitioning the slope to the steeper areas to the rear of the site.	
E30	The extent of any positive impacts to the neighbourhood or the wider community, including the extent to which the activity might enhance the amenity of the area.	
E31	The extent to which the design of the dwelling or building within the 65m setback from the Waikato Expressway (Designation 90) considers effects from the Waikato Expressway, particularly:	
	i.	The extent of a reasonable internal noise environment
	ii.	The siting of any principal outdoor living area to mitigate future traffic noise
	iii.	The extent of any acoustic mitigation to new buildings or additions for habitable uses to mitigate noise.
E32	The extent to which any principal outdoor living area within the 65m setback from the Waikato Expressway (Designation 90) is sited to mitigate the traffic noise of the future Waikato Expressway, including whether it is located to the north of the dwelling to utilise noise attenuation provided by the building form.	
E33	The extent to which the acoustic mitigation of new residential buildings or additions to existing residential buildings for habitable uses will result in mitigating any noise issues generated from the operation of the Waikato Expressway (Designation 90).	
	Railway Park	
E34	The extent to which any new building or additions or alterations to an existing building in Railway Park (Lot 1 DP S37471) is compatible with the material, form and design of the surrounding residential development and existing buildings within	

	Railway Park, in particular the Frankton Junction NZ Railways Institute Hall (Refer to Appendix 8, Schedule 8A, H44).			
F	**Hazards and Safety**			
	General			
F1	The extent to which the size, location and design of the proposed building, infrastructure, structures, stored goods and materials, fences or walls:			
	a)	Affects the scale, location and orientation of any overland flow path.		
	b)	Provides for sufficient permeability:		
		i.	So as not to obstruct any overland flow, and	
		ii.	To mitigate the likelihood of debris becoming trapped.	
	c)	Has sufficient height clearance to mitigate the risk of being affected by inundation.		
	d)	Has the structural integrity to withstand inundation.		
F2	The extent to which an appropriate building platform can be provided free from any identified hazard area.			
F3	The extent to which the applicant has demonstrated, through the use of an engineering design report:			
	a)	That the risk of ground failure can be reduced to avoid the effects on the safety of occupiers and neighbours.		
	b)	That any structure will perform safely under hazard conditions for the life of the structure.		
	c)	That any work to be carried out maintains the stability of the river bank or gully and does not increase the risk of ground instability on the subject site or adjacent sites.		
F4	The extent to which a flood risk assessment report submitted, with the proposal, contains recommended refinements to the extent of any Flood Hazard Area as a result of additional flood hazard modelling or site specific topographical analysis.			
	Earthworks			
F5	The extent to which the earthworks:			
	a)	Will obstruct or provide overland flow paths or natural surface ponding areas.		
	b)	Are managed, designed and constructed to:		
		i.	Provide any sediment control measures necessary to control the discharge of sediments.	
		ii.	Remain safe and stable for the duration of the intended land use.	
		iii.	Provide safe and accessible building sites and infrastructure.	
		iv.	Provide for the adequate control of stormwater, cater for natural groundwater flows, and avoid adverse effects from changes to natural water flows and established drainage paths.	

		v.	Avoid exacerbating the effects of natural hazards and ecological effects arising from additional sediment release.
	Hazardous Facilities		
F6	The extent to which the proposed site design, construction and operation of a hazardous facility are appropriate to:		
	a)		Avoid the accidental release, or loss of control, of hazardous substances, and whether adequate emergency and spill contingency plans are provided; and
	b)		Avoid and mitigate any adverse effects resulting from activities on the site involving hazardous substances on people, property and environmentally sensitive areas.
F7	The extent to which off-site transport of hazardous substances has been adequately addressed, and the extent to which vehicles transporting hazardous substances use appropriate routes and do not use local transport corridors in residential areas.		
F8	The extent to which the waste management plan adequately addresses the management of significant quantities of wastes containing hazardous substances, including procedures for disposal practices and use of waste contractors.		
F9	Where appropriate, the extent to which alternative locations have been considered adequately.		
F10	The extent to which the risks presented by the hazardous facility to humans, the environment and property have been assessed fully and systematically, and whether they are able to be avoided or minimised satisfactorily.		
	Nuisance and Health		
F11	The extent to which industrial activities giving rise to nuisance can be adequately managed or sited so as to reduce the impact on neighbouring sites.		
F12	The extent to which noise effects have been addressed in a noise management plan, including the location of specific noise generating activities, hours of amplified sound and the potential mitigation proposed.		
F13	The extent to which the activity may have adverse effects on the environment including water discharges, air pollution, noise and other emissions.		
F14	The extent to which any habitable rooms are located, oriented or designed in such a way that would make noise insulation to the required standards unnecessary.		
G	**Transportation**		
	General		
G1	The extent to which the proposal:		
	a)		Integrates with, and minimises adverse effects on the safe and efficient functioning of the transport network and infrastructure.
	b)		Minimises conflicts between users both within the site and any adjoining transport corridor.
	c)		Encourages easy and safe access and circulation for those not arriving by vehicle.
	d)		Provides for the accessibility needs of all users of the site.

	e)		Provides convenient and safe circulation for connections and/or the provision of facilities for passenger transport modes of travel relative to the scale of the proposal.
	f)		Provides for integration with neighbouring activities to reduce the need for separate traffic movements on the transport network.
			Note Acceptable means of compliance for the provision, design and construction of infrastructure is contained within the Hamilton City Infrastructure Technical Specifications.
G2	The extent to which the proposal and the traffic (including nature and type of the traffic, volume and peak flows, travel routes) generated by the proposal:		
	a)		Requires improvements, modifications or alterations to the transport network and infrastructure to mitigate its effects.
	b)		Achieves efficient connectivity and accessibility of transport corridors, pedestrian accessways, cycleways, public reserves and green corridors.
	c)		Adverse affects the streetscape amenity, particularly in relation to sensitive land use environments (e.g. residential land use environments identified within Table 15-4a of Appendix 15).
	Integrated Transport Assessment ***Note*** In addition to the specific ITA criteria outlined in G3 to G6 below, the balance of criteria contained within Section G may be used to assess a simple or broad ITA where considered relevant.		
G3	The extent to which the proposal considers and responds to:		
	a)		The issues, opportunities and shared outcomes in the Access Hamilton Strategy and its associated Action Plans.
	b)		Relevant:
		i.	New Zealand Transport Agency guidelines
		ii.	Kiwirail guidelines
		iii.	Regional and national transport and growth strategies
	c)		The recommendations and proposed conditions of any integrated transport assessment prepared to accompany the application.
	d)		Issues and outcomes arising from consultation with the relevant road controlling authorities and/or Kiwirail.
G4	The extent to which the proposal incorporates travel demand management and is well-located to be served by passenger transport, or encourages other active modes of travel such as walking or cycling.		
G5	The extent to which an integrated transport assessment assesses how the proposal and any mitigation measures ensure that the safety and efficiency of the transport network is maintained or enhanced.		

G6	Whether access restrictions, auxiliary lanes or other measures are necessary to provide for the safe and efficient operation of key transport corridors such as:	
	a)	Major arterial transport corridors
	b)	Transport corridors that are part of the Strategic Network
	c)	Transport corridors carrying more than 20,000 vehicles per day or with four or more vehicle lanes.
	Access	
G7	The extent to which the proposal minimises the number of vehicle access points to transport corridors, taking into account:	
	a)	Opportunities that exist for shared access with adjoining sites.
	b)	The hierarchy of the fronting transport corridor and opportunities that exist for access to transport corridors of a lower status (e.g. collector or local transport corridors or service lanes).
	c)	Traffic generated by the proposal.
	d)	The siting of the access points with respect to adjacent access points, visibility and flow.
	e)	The operational requirements of the proposal.
	f)	Potential obstruction for access to network utilities.
	g)	The appropriateness of restricting types of movements (e.g. left in/out only, entry or exit only).
	h)	The impact of multiple vehicle entrances (which break up berm, landscaping, footpath and cycleway continuity) on streetscape amenity, retail frontage areas and pedestrian and cycle movements.
	i)	The cumulative effects on traffic safety and efficiency from multiple vehicular accesses on to major arterial routes and whether this can be adequately addressed.
	Parking	
G8	Except in the Central City Zone where there are no minimum parking standards, the extent to which the proposal provides for anticipated parking demand to meet current and future needs.	
G9	In assessing a lesser number of parking spaces and the adequacy of end-of-journey facilities, regard may be had for the following:	
	a)	The anticipated parking demand generated by the proposal including typical operating and peak conditions. Where it can be demonstrated that this is less than the number of spaces required by the standard a lesser number of parking spaces may be accepted.
	b)	The hours of operation relative to other activities on the site or on adjoining sites and opportunities for sharing parking spaces.
	c)	The ability and appropriateness of adjacent transport corridors being used to accommodate on-road parking, particularly in regard to the safe and efficient operation of the transport network and the protection of local character.
	d)	The availability of appropriate off-road public parking in the locality.

	e)	Options for providing additional parking if required in the future.
	f)	The extent to which the provision of end-of-journey facilities, such as bicycle parking, showers, changing rooms and lockers are provided.
	g)	The extent to which provision for active modes of transport or travel planning has been made.
	h)	The availability of passenger transport services in the locality, the proximity of the proposed activity to passenger transport stops and the extent to which those passenger transport services are suited to providing for the transport needs of the proposed activity.
G10	In assessing whether the parking demand for a particular proposal may be provided on other sites, regard shall be given to the following:	
	a)	Whether off site parking is in close proximity with clear, safe and convenient access.
	b)	Whether shared parking provision is acceptable particularly where hours of operation are different.
	c)	The desirability of avoiding vehicular access to the site because of the effects on traffic safety or pedestrian amenity.
	d)	The convenience and safety of those using the parking spaces especially the general public.
	e)	Any arrangement for alternative parking provision is adequately secured by a legally binding mechanism.
	f)	The extent to which the safe and efficient functioning of the transport corridor is affected.
	New Transport Corridor Design	
G11	The extent to which transport corridor design provides design elements identified in or otherwise contrary to any criteria contained in Table 15-6a of Appendix 15.	
G12	The extent to which the transport corridor design meets the traffic needs of the area and the wider transport network, taking into account the function of the corridor in the transport corridor hierarchy.	
G13	The extent to which the width and alignment of the transport corridor is sufficient to accommodate, in a safe and efficient manner, the volume and type of traffic likely to use it, including service and emergency vehicles and heavy vehicles.	
G14	The adequacy of provision for the movement of pedestrians, cyclists, physically impaired and transport disadvantaged and any implications for their safety.	
G15	The adequacy of provision within the transport corridor for parking spaces relative to existing and potential developments on adjoining land.	
G16	The extent to which the extension to an existing, new or an upgraded transport corridor 'matches' the rest of the existing transport network (e.g. levels, design, construction).	
G17	The extent to which the design of the road allows for easy installation and maintenance of non-transport infrastructure and amenity tree planting.	
G18	The extent to which the design of the transport corridor recognises the character and amenity values of the adjacent land use.	

	Note In considering the above matters Council may have regard to relevant parts of Austroads Design Guides and NZS 4404:2010 Land Development and Subdivision Infrastructure, and the Hamilton City Infrastructure Technical Specifications.	
H	**Functionality, Vitality and Amenity of Centres**	
H1	The extent to which the proposed retail or office activity (having regard to its size, composition and characteristics), in conjunction with other established or consented retail or office activity:	
	a)	Avoids adverse effects on the vitality, function and amenity of the Central City and sub-regional centres that go beyond those effects ordinarily associated with competition on trade competitors.
	b)	Avoids the inefficient use of existing physical resources and promotes a compact urban form.
	c)	Promotes the efficient use of existing and planned public and private investment in infrastructure.
	d)	Reinforces the primacy of the Central City and the functions of other centres in the business hierarchy.
	To demonstrate the above criteria can be satisfied an applicant must supply a Centre Assessment report. The content of the Centre Assessment report shall be prepared in accordance with clause 1.2.2.17.	
H2	Whether and to what extent the proposed Supermarket activity in the Industrial, Business 1 or 4 zones:	
	a)	Avoids adverse effects on the vitality, function and amenity of the Central City and sub-regional centres that go beyond those effects ordinarily associated with competition on trade competitors.
	b)	Avoids the inefficient use of existing physical resources and promotes a compact urban form.
	c)	Promotes the efficient use of existing and planned public and private investment in infrastructure.
	d)	Is located within a catchment where suitable land is not available within the business centres.
	e)	Reinforces the primacy of the Central City and does not undermine the role and function of other centres within the business hierarchy where they are within the same catchment as the proposed supermarket.
	To demonstrate the above criteria can be satisfied an applicant must supply a Centre Assessment report. The content of the Centre Assessment report shall be prepared in accordance with clause 1.2.2.17.	
I	**Network Utilities and Transmission**	
	Network Utilities	
I1	The extent to which alternative technologies and techniques have been considered.	
I2	The extent to which co-location of overhead electricity and telecommunication lines is technically, economically and practically reasonable.	
I3	The extent to which the proposal is in accordance with relevant industry standards and meets specified clearance requirements for operational and safety reasons.	

I4	The extent to which the proposal will adversely affect the amenity values of the site and locality.	
I5	The extent to which there are difficult ground conditions, topography or obstructions which make undergrounding impractical.	
I6	The extent to which it is necessary for the proposed site to provide and maintain essential network utility services.	
	Electricity Transmission	
I7	The extent to which the location, height, scale, orientation and use of buildings and structures is appropriate to manage the following effects.	
	a)	The risk to the structural integrity of the transmission line.
	b)	The effects on the ability of the transmission line owner to access, operate, maintain and upgrade the transmission network.
	c)	The risk of electrical hazards affecting public or individual safety, and risk of property damage.
	d)	The extent of earthworks required, and use of mobile machinery near transmission lines, which may put the line at risk.
	e)	Minimising adverse effects including reverse sensitivity, visual and nuisance effects and from transmission lines.
	Note Consultation with Transpower New Zealand Ltd (or its successor) is advised when considering construction within Transmission Corridors A or B. The New Zealand Electrical Code of Practice NZECP: 34 contain restrictions on the location of structures in relation to lines.	
I8	The extent of separation between specified building envelopes and existing lines ensures any adverse effects on and from the Electricity Transmission network and on public safety are appropriately avoided, remedied or mitigated.	
I9	The extent of separation between the location of any proposed trees and existing lines, taking into account:	
	a)	The likely mature height of the trees,
	b)	Whether they have potential to interfere with the lines, and
	c)	Whether an alternative location for the trees would be more suitable to meet the operational requirements of the lines' owner.
	Note All trees/vegetation planted in the transmission corridor must achieve compliance with the Electricity (Hazards from Trees) Regulations 2003.	
I10	The extent to which appropriate safeguards are in place to avoid contact or flashovers from lines, and effects on the stability of support structures.	
	Note All earthworks, including the use of mobile plant, must comply with the requirements of the New Zealand Electrical Code of Practice 34:2001 (NZECP34:2001).	
I11	The extent to which the design of the subdivision, any earthworks and the construction of any subsequent buildings will comply with the safe separation distance requirements in NZECP34:2001.	
J	**Three Waters Capacity and Techniques**	

J1	The extent to which the proposal:	
	a)	Can be adequately serviced by capacity within existing Three Waters infrastructure, including access to and use of an appropriate and sustainable water source.
	b)	Can dispose of stormwater and wastewater without adversely affecting the surrounding environment.
J2	Whether the servicing needs of the proposal would necessitate additional public investment in Three Waters infrastructure, services or amenities.	
	Note Information requirements relating to WIA or ICMP applications are outlined in Volume 2, Appendix 1.2.	
J3	The extent to which the proposal is consistent with the provisions of any Integrated Catchment Management Plan (ICMP) relevant to the site and a consideration of consent conditions imposed in order to achieve that consistency.	
J4	Where there is no ICMP, the extent to which the proposal incorporates sustainable management techniques and controls to:	
	a)	Protect water quality.
	b)	Protect the integrity and health of any water courses.
	c)	Maintain land stability.
	d)	Limit erosion and sedimentation.
	e)	Limit water wastage.
	f)	Limit the generation of stormwater and wastewater.
	g)	Limit water usage.
J5	Where there is no ICMP, for all new industrial and commercial users with a requirement for high volumes and pressures, the extent to which onsite water storage is provided.	
J6	Where there is no ICMP, for development that will create a trade waste discharge:	
	a)	The extent to which suitable and safe practices will be employed.
	b)	The extent to which such waste can be treated or pre-treated onsite to improve the quality of the waste or decrease the amount of the waste, prior to any discharge to the municipal wastewater treatment network.
J7	Where there is no ICMP, the extent to which any physical works associated with the proposal affects stormwater storage and retention and whether an equivalent capacity is restored at the completion of works.	
K	**Major Facility Concept Development Consent Consistency**	
	General	
K1	The extent to which the proposal is consistent with the approved Concept Development Consent for the Major Facility.	
	Concept Development Consent	

K2	The extent to which the preparation of a Concept Development Consent or an update to an existing Concept Development Consent has given regard to the following.		
	a)	The extent to which the major facility integrates with surrounding land uses and transport network.	
	b)	The extent to which the development has been designed to minimise, as far as practicable, any adverse effects on adjoining activities, particularly residential activities.	
	c)	The extent to which any large façades (including side walls) that are visible from public places have been modulated, articulated, detailed or visually treated in a way that reduces the apparent bulk of the building or provides visual interest.	
	d)	The extent to which the proximity of facilities intended to accommodate events are sited close to residential areas.	
	e)	The extent to which the provision for vehicular and pedestrian access and circulation facilitates ready dispersal of vehicles and patrons from large events.	
	f)	The extent to which provision for vehicular and pedestrian access and circulation prioritises pedestrian safety.	
	g)	The extent to which appropriate, convenient provisions enable public transport to service the site, recognising the need for such services to directly access the Central City area.	
	h)	The extent to which signage is directed primarily at the patrons attending the venues and television audiences and the extent to which visibility is limited from any public space or near-by site, with the exception of signage associated with the naming of the major facility and signs that advertise coming events.	
	i)	The extent to which the adverse effects of earthworks are managed.	
K3	The extent to which the following have been applied as part of a new Concept Development Consent, an update to an existing Concept Development Consent or in the absence of a Concept Development Consent within the Interface Areas of all Major Facility Sites.		
	a)	Built Form and Layout	
		i.	The extent to which the external appearance, scale and design of buildings • Contributes to compatibility between buildings and its integration with other development on the site, adjacent sites and surrounding public spaces • Contributes to active frontage along public streets and open space, particularly for corner sites • Minimises, as practicable, effects on adjacent public spaces (including footpaths) in terms of shading and daylight.
		ii.	The extent to which building design and development • Makes a positive contribution to the local character of the site and surrounding areas • Ensures large façades are well designed to provide visual interest and reduce the apparent bulk of buildings within the Interface Area.

		iii.	The extent to which Crime Prevention Through Environmental Design principles have been incorporated.
	b)	Landscaping	
		i.	Incorporation of landscaping within the site layout to reduce the bulk of new development and mitigate adverse visual effects of development within the Interface Area, particularly as they interact with public spaces.
		ii.	Incorporates landscaping to maintain and enhance the character and amenity of the site and surrounding areas.
	Claudelands Events Centre		
K4	The extent to which the open space character of the eastern part of the site is maintained and in particular whether a suitable buffer is provided adjoining Jubilee Park.		
	Te Rapa Racecourse		
K5	The extent to which development of the site retains views between the racecourse and Minogue Park.		
	Waikato Hospital Complex		
K6	The extent to which activities of an industrial nature and the heliport are grouped in the south-western sector of the site.		
K7	The extent to which high rise buildings are concentrated towards the centre of the hospital complex.		
	Waikato Stadium and Seddon Park		
K8	The extent to which future buildings and the enhancement of facilities, including any provision for office, retail and visitor accommodation, ensure a high degree of functional integration within the site.		
K9	The extent to which security fencing is unobtrusive and maintains views of the Stadia grounds from surrounding streets, accepting that no views will be available of the principal playing surfaces and that the Stadia need to ensure the security of the venues as 'charge grounds'.		
K10	The extent to which the bulk and location of additional buildings at Waikato Stadium and Seddon Park has been designed and constructed to minimise the extent and duration of shading cast over residential sites.		
K11	The extent to which the design and appearance of any replacement grandstand or a substantial alteration to an existing grandstand aims to create an enduring statement and identity, which reflects the pre-eminent role of these sites in hosting international events. Additionally, the extent to which recognition is provided for the cultural heritage of the Whatanoa Gateway.		
K12	The extent to which the Mill Street frontage of the Waikato Stadium, including the Mill Street Field, is maintained as open space to continue the historical association with the West Town Belt, providing an attractive vista, enhancing links with the Central City area and the Stadium building.		
K13	The extent to which development and landscaping proposals provide for the retention of the existing Kahikatea trees on the Seddon Road frontage of the Waikato stadium and the existing mature trees on the Norton Road and Tristram Street frontages of Seddon Park.		

	Wintec Rotokauri Campus		
K14	The extent to which development of the site has regard to the future development of the Rotokauri Area and the relationship of the site with Lake Waiwhakareke and the Rotokauri Suburban Centre.		
K15	The extent to which farming activities are adequately buffered from neighbouring Residential or Special Character Zones.		
L	**Central City – Design and Layout**		
L1	The extent to which the streetscape appearance, scale and design of the building (including material and colour):		
	a)	Will add visual interest and vitality to the streetscape and avoids large, featureless façades. For example, through articulation of a façade, attention to fenestration and rooflines, the design of verandas and balconies and the careful choice of materials and colour.	
	b)	Will, where practicable, enable informal surveillance of public spaces including streets, parks, plazas and through-site links.	
	c)	Are compatible with heritage or open space values of the Riverfront Overlay area and adjoining riverbank area, where sites are within those areas.	
	d)	Activates the site frontage on sites adjoining a defined Primary or Secondary Active Frontage (Volume 2, Appendix 5, Figure 5-7).	
	e)	Enhances the experience of the Waikato riverside and Garden Place, where sites are adjacent.	
	f)	Enhance those parts of a site adjoining a defined view and vista on Figure 5-6 (Volume 2, Appendix 5).	
	g)	Enhance the visual amenity of sites identified as Key Development Sites on Figure 5-7, or Pedestrian Connections and Gateway locations identified on Figure 5-4 (Volume 2, Appendix 5).	
	h)	Will, where practicable, provide for public entrances to be on frontages with the highest pedestrian traffic.	
L2	The extent to which any proposed building setback will adversely affect the definition, use or safety of public spaces, or the continuity of defined primary or secondary active frontages (Volume 2, Appendix 5, Figure 5-7).		
L3	The extent to which the addition of an awning would detract from the original character of an identified heritage building in Schedule 8A and 8B of Appendix 8.		
L4	The extent to which the proposed building design and/or site layout is consistent with the intent of any relevant design guide in Appendix 1, Section 1.4. ***Note*** If an activity is a Restricted Discretionary Activity in relation to Design and Layout matters and there is a relevant design guide, then the activity should seek to address the outcomes sought in the design guide as a priority over relevant criteria in this section.		
L5	The extent to which the external appearance, scale and design of buildings and structures:		
	a)	Enhance the character and amenity of the surrounding area and streetscape qualities.	

	b)	Incorporate Crime Prevention Through Environmental Design principles.
L6	The extent to which parking, manoeuvring areas, driveways and outdoor service areas have been designed and located:	
	a)	To protect amenity values of the streetscape and adjoining sites, including through the use of appropriate screening and landscaping.
	b)	To not be visually dominant.
	c)	Where appropriate, to integrate with adjacent activities and development in terms of the provision of entrances, publicly accessible spaces, verandas, parking, loading areas, access to public transport and pedestrian linkages.
L7	Where opportunity is available, and it is practicable, the extent to which any proposal provides or enhances pedestrian and cycle connectivity between streets and other public areas.	
L8	Where required, the extent to which planting and landscaping is used to:	
	a)	Visually reduce the bulk of new development and mitigate adverse visual effects particularly from the front boundary and those parts of the site visible from public spaces.
	b)	Create an attractive environment that maintains safety and amenity for pedestrians.
L9	The extent to which developments provide for goods handling, storage, waste and recycling areas that are located and designed to minimise adverse effects.	
L10	The extent to which development encourages pedestrian access to, and facilitates public use and enjoyment of, the promenade and environs of the Waikato River.	
L11	On those identified streets (Volume 2, Appendix 5, Figure 5-3) the extent to which a proposed street wall or alternative design elements of any proposed building frontage will:	
	a)	Provide consistency in built form and scale with adjoining built form.
	b)	Maintain a human scale when perceived from the street level.
	c)	Maintain sunlight penetration at street level, particularly footpaths.
L12	In relation to the setbacks from internal boundaries at upper levels (i.e. fourth level and above), the extent to which the proposal minimises shadowing and loss of natural light on existing adjacent residential buildings.	
L13	The extent to which development of a site adjoining the riverbank:	
	a)	Provides a scale and design of any building or structure that maintains or enhances street and reserve areas, the character and amenity, and the heritage or open space values of the adjoining riverbank area.
	b)	Makes provision for building design and configuration, site layout and/or landscaping which enhances the visual and physical relationship with the Waikato River.
	c)	Mitigates the impact of large developments and vehicular oriented activities on the amenity values of the riverbank environment.

M	**Drive-through Services (Business Zones and Central City Zone - City Living Precinct only), Building Improvement Centre (Business 3 and 5 Zones) and Supermarkets (Central City, Business and Industrial Zones)**	
	Design and Layout	
M1	The extent to which the external appearance, scale and design of buildings (including material and colour), equipment and structures:	
	a)	Provide visual interest through a variety of styles and forms in terms of footprint, design and height.
	b)	Maintain streetscape amenity and continuity of built form.
	c)	Within the Central City Zone, whether any proposed building setback will adversely affect the definition, use or safety of public spaces, or the continuity of defined primary or secondary active frontages (Volume 2, Appendix 5, Figure 5-7).
M2	The extent to which parking, manoeuvring areas, driveways and outdoor service areas have been designed and located:	
	a)	To appropriately manage any adverse effects resulting from the location and interrelationship between these areas on streetscape amenity.
	b)	To ensure traffic generation avoids, remedies or mitigates adverse effects on amenity values.
	c)	So as not to compromise the safe use of the footpath adjacent to the site.
	d)	To integrate with adjacent activities and development in terms of the provision of entrances, publicly accessible spaces, parking, loading areas, access to public transport and pedestrian linkages.
	Landscaping and Screening	
M3	The extent to which planting and landscaping is used to:	
	a)	Mitigate adverse visual effects particularly from the front boundary and those parts of the site visible from public spaces and interfaces along state highways, arterial transport corridors and City gateways.
	b)	Create an attractive environment that maintains safety and amenity for pedestrians.
	Waste Management	
M4	The extent to which developments provide for goods handling, storage, waste and recycling areas that are:	
	a)	Easily accessible for collection agencies and avoid adverse visual, noise or odour effects.
	b)	Consistent with the amenity values of the site and avoid causing nuisance for neighbouring residential activities.
	c)	Suitable for the demand expected by the activity.
	Character and Amenity	
M5	The extent to which the activity makes adequate provision to protect the visual and acoustic privacy of abutting sites including through building and site design.	

M6	Considering whether the relationship of buildings and their associated parking, storage and service areas to the street helps to maintain the amenity values of public spaces and streets.	
M7	The extent to which any parking or service area is provided, landscaped, screened and maintained in a form which mitigates any adverse effects to adjacent activities and does not detract from the streetscape.	
	Drive-through Services	
M8	For the purpose of assessing the above criteria, regard shall be had to the following operational and functional requirements:	
	a)	The drive-through lane is an integral feature of the site layout.
	b)	Customer car parking access is preferably distinct from drive-through lanes.
	c)	Adequate and accessible servicing areas that are preferably separated from customer vehicle traffic, drive-through lanes and pedestrian movements.
	Building Improvement Centres	
M9	For the purpose of assessing the above criteria, regard shall be had to the following operational and functional requirements:	
	a)	Where large-format building formats are required, there is provision for some solid façades to facilitate internal racking of bulky products.
	b)	The provision of appropriate customer car parking, which is clearly visible from the local road network.
	c)	Adequate and accessible servicing areas that are preferably separated from customer vehicle traffic, timber trade sales access and pedestrian movements.
	Supermarkets	
M10	For the purpose of assessing the above criteria, regard shall be had to the following operational and functional requirements:	
	a)	Store visibility that is easily identifiable when viewed from the street and surrounding area.
	b)	The provision of appropriate customer car parking, which is clearly visible and accessible to motorists approaching the store from the local roading network and to customers on-site.
	c)	Where large-format building formats are required, there is provision for some solid façades to facilitate internal shelving and fresh produce display.
	d)	Adequate and accessible servicing areas that are preferably separated from customer vehicle traffic and pedestrian movements.
N	**Ruakura**	
N1	**Land Development Plans**	
	In determining the application for resource consent for a restricted discretionary activity, Council shall reserve its discretion to the following matters, where relevant.	
	a)	Integration with and effects on transport and Three Waters infrastructure.
	b)	Consistency with any relevant Integrated Catchment Management Plan or regional discharge consent.

	c)	Effects on significant habitats of indigenous fauna and habitat values of natural water courses.
	d)	Open Space and road reserve design, layout and use.
	e)	Consistency with the Ruakura Strategic Infrastructures network for the structure plan as shown on Figures 2-15A and B Ruakura Strategic Infrastructure (Appendix 2).
	f)	Where staged development of any Land Development Area is sought then the following information for the balance area shall be provided: i. The indicative location and width of proposed roads and carriageways and their integration with the existing and future transport network; ii. The indicative location of proposed Ruakura Strategic Infrastructure to ensure connectivity across the entire structure plan and adjacent Land Development Plan Areas.
	g)	Construction effects.
	h)	Effects of new stormwater ponds and wetlands (excluding swales) on private property.
	In determining the application, the Council shall consider the following assessment criteria:	
	i)	Whether there is appropriate Three Waters infrastructure and capacity, existing and proposed, to appropriately service anticipated development in the Land Development Plan area. For new stormwater ponds and wetlands, the extent to which the following adverse effects of the works on adjacent private property are avoided: i. Flooding and adverse effects on ground water levels; and ii. Creating habitat for mosquitoes and other undesirable insects.
	j)	Whether the proposal is consistent with, or otherwise complies with, the recommendations, measures and targets of any relevant Integrated Catchment Management Plan.
	k)	Whether anticipated development in the Land Development Plan area integrates with, and minimises adverse effects on the safe and efficient functioning of the transport network and transport infrastructure, having regard to the cumulative traffic effects of other approved Land Development Plans. The extent to which the Land Development Plan provides for the sequential extension of the Spine Road.
	l)	Whether the Land Development Plan is consistent with ~~the~~ Figure 2-18 Cyclist and Pedestrian Network Plan (Appendix 2).
	m)	The ITA matters for assessment set out in Appendix 1.3.3 G.
	n)	Whether the Land Development Plan considers and responds to the recommendations and proposed conditions of the Integrated Transport Assessment and Water Impact Assessment prepared to accompany the application.
	o)	The potential for cumulative construction noise effects to adversely affect individual residential properties, and the mitigation methods proposed to minimise such effects.

	p)	Whether the Land Development Plan considers and responds to issues and outcomes arising from consultation with relevant road controlling agencies, the New Zealand Transport Agency and, where relevant, KiwiRail.
	q)	Whether appropriate consideration has been given to electrical hazards and earthworks and ground level changes associated with the installation of underground Infrastructure within 12 metres of a National Grid support structure.
	r)	Where land development will cause loss of significant habitats of indigenous fauna (including but not limited to, black mudfish, shortfin eels and longfin eels), require that unavoidable adverse effects on such habitat are remedied or mitigated through: i. Replacing significant habitat; or ii. Creating new habitat; or iii. Enhancing areas of alternative habitat supporting similar ecological values and/or significance; and iv. Legal and physical protection.
	s)	Whether land development will adversely affect the flooding, water quality and habitat values of adjoining natural water courses.
	t)	Whether the Landscape Concept and Ecological Enhancement Plan provides for a comprehensive and connected section of Open Space and road reserves, which incorporates, as necessary: i. connectivity of open space and streets; ii. passive and active recreation opportunities; iii. Crime Prevention Through Environmental Design principles; iv. pedestrian and cycle paths forming a network with adjacent parts of the Open Space network; v. general amenity planting and amenity for adjoining properties, including use of specimen trees in roads; vi. street furniture; vii. provision for habitats; viii. lighting design that does not deter bat movement; and ix. stormwater management.
	u)	Whether the Land Development Plan will appropriately provide for indigenous fish and lizards.
	v)	Whether the Land Development Plan includes a greenway that provides for improved habitat and ecological benefits.
	w)	Whether the Landscape Concept and Ecological Enhancement Plan provides for a greenway to enhance long term ecological function.
	x)	Where the boundaries of a Land Development Plan Area in application for Land Development Consent differ from those shown on Figure 2-16, the extent of the Land Development Plan Area shall be developed in an integrated manner. This shall include the provision for and connectivity to infrastructure, and ensure that key infrastructure such as the Spine Road is developed in a manner that provides at least the same levels of efficiency, effectiveness and safety anticipated through a land development consent in accordance with Figure 2-

		16. Where an application includes part of a Land Development Plan Area in Figure 2-16 it shall be demonstrated that granting consent to that part will not prevent the integrated development of the balance of that Area.
	Additional Matters for Open Space	
	y)	Whether the layout and design of Open Space: i. Creates an informal parkland character; ii. Integrates with the landscape design of roads within the Land Development Plan area; iii. Applies Crime Prevention Through Environmental Design principles; iv. Utilises planting to soften the views of industrial development; v. Contains pedestrian and cycle paths forming a network with adjacent parts of the Open Space Network; vi. Provides for the amenity of adjoining and adjacent activities; vii. Integrates linear wetlands and stormwater treatment devices.
	z)	Whether provision has been made to ensure public access to and use of the Open Space, except as may need to be limited for safety reasons.
	aa)	The extent to which the different functions of Open Space are clearly identified and provided for in the Land Development Plan application.
	Additional Matters for the Medium Density Residential Zone	
	bb)	The extent to which the street network promotes a high degree of connectivity and permeability through the following: i. A grid-like street layout. ii. Block sizes that promote permeability for pedestrians/cyclists as well as for vehicles. iii. Connections to the City-wide arterial networks. iv. Paths to the Open Space Network.
	cc)	Street amenity shall be provided by the location of specimen trees and landscaped areas interspersed by kerb-side parking.
	dd)	When assessing the suitability for residential buildings to be within the side yards, regard shall be given to the following: i. The extent to which reasonable sunlight and daylight access to adjacent dwellings and outdoor living areas will be affected. ii. The extent to which pedestrian access to the rear of the site will be hindered. iii. The extent to which on-site amenity is maintained.
	Additional Matters for Precinct C within the Knowledge Zone	
	ee)	The extent to which the street network is: i. Orientated toward the Ruakura Retail Centre. ii. Permeable for pedestrians/cyclists as well as for vehicles. iii. Legible with a simple and readily understood street pattern. iv. Provides a connected path network to the Ruakura Open Space Zone.
	ff)	The extent to which blocks and lots are configured to facilitate walking and accommodate operational areas in rear yards.

	Additional Matters for the Logistics Zone (Inland Port)	
	gg)	Whether the planting of the Landscape Buffer Areas will achieve the purpose of screening the Inland Port (Sub Area A (Inland Port)) from Ryburn and Percival Roads.
	hh)	The effects of the planting of the Landscape Buffer Areas on the operation, maintenance, upgrading and development of the National Grid transmission network and the requirements of the Growth Limit Zones Schedule of the Electricity (Hazards from Trees) Regulations 2003.
	ii)	Whether Level of Service D will be achieved at the intersections of Silverdale Road and Knighton Road with Ruakura Road when Stage 1 of the Inland Port (Sub Area A (Inland Port)) is operational.
	Construction	
	jj)	Whether appropriate conditions can be placed on the resource consent to manage adverse effects associated with construction of the activities proposed in the Land Development Plan. This will be satisfied by a condition requiring the lodgement of a Construction Management Plan for Council approval, prior to the commencement of the works. The Construction Management Plan shall include at a minimum: i. Details of the works, their timing and duration. ii. Methods to control dust, debris on roads and silt laden runoff during construction. iii. Anticipated truck movements and routes to and from the site during construction. iv. Means to ensure compliance with the Construction Noise Standards in Rule 25.8.3.2 and Construction Vibration Standard in Rule 25.8.3.3. v. Contact details for the contractor, including a process for complaints and remedying concerns. The Construction Management Plan shall also ensure that: vi. Prior to the opening of the Waikato Expressway (Hamilton Section) and the realignment of Ruakura Road to traffic, construction traffic arising from the Land Development Plan area shall be managed to ensure that the capacity of local roads, as determined by normal Hamilton City Council traffic management design criteria, is not exceeded. vii. Once the Waikato Expressway (Hamilton Section) and realigned Ruakura Road are open for traffic, construction traffic arising from the Land Development Plan area shall, to the extent reasonable and practicable, be directed to use the Waikato Expressway (Hamilton Section) to minimise effects on local roads.
N2	**Construction Noise and Operation Noise of the Inl and Port (Sub Area A)**	
	a)	The extent to which: i. The construction and operation of the Inland Port avoids or mitigates adverse noise and vibration effects on adjoining facilities, existing residential dwellings and/or Large Lot Residential zoned areas. ii. Measures to avoid where possible, and otherwise minimise sudden and/or loud noises at night have been incorporated.

		iii. Lower noise producing equipment and methods have been investigated and incorporated. iv. The location and orientation of refrigerated containers have been selected to minimise noise effects on residential properties. v. The accuracy of the noise model used for predicting noise levels in Stages 2 and 3 of the development of the Inland Port, taking into account recalibration based on monitoring of previous stages.
	b)	The adequacy of the consideration of alternative methods that would meet the night time noise limits set out in Rule 25.8.3.13 and their costs and benefits.
	c)	At individual residential properties where noise levels would exceed the night-times noise limits set out in Rule 25.8.3.13, the extent to which the ambient night-time noise levels at those properties exceed 40 $dBL_{Aeq(15)}$ once the Waikato Expressway is operational.
N3	**Ruakura Retail Centre**	
	a)	Staged development should be in accordance with an overall master plan for the Ruakura Retail Centre which shall show the location of the Ruakura Retail Centre Mainstreet, building footprints, circulation network, public open space and provision for parking.
	b)	A Ruakura Retail Centre Mainstreet shall be provided and should be orientated towards and integrate with the location of the proposed transport interchange.
	c)	Buildings should directly align and address the street network and provide a constant and intact edge to streets and public places.
	d)	Buildings should be located and designed to avoid extensive or inactive edges with entrances designed to maximise pedestrian flow and to support active street frontages.
	e)	Building frontages to the Ruakura Retail Centre Mainstreet should incorporate a high proportion of glazing and provide veranda canopies over footpaths and a high level of ground floor architectural detail.
	f)	Building design should create a varied fine grained pattern of development through the modulation of height and roof form, façade depth and relief and variety in materials and colours.
	g)	Site Layout should provide options for pedestrian, cycling and vehicular circulation and permeability within and to adjoining areas.
	h)	Footpaths should be legible and be of a sufficient width with quality paving and detailing, including footpaths to and from the centre and Open Space Areas.
	i)	Where public open space is provided, it should be centrally located adjacent to main pedestrian flows and shall be highly visible.
	j)	Public outdoor spaces should be sheltered and sunny with provision for summer shade and shall be anchored by active building edges.
	k)	Carparks should be landscaped to define the street boundary and adjacent spaces.
	l)	Carparking should avoid interrupting active frontages and pedestrian circulation along the Ruakura Retail Centre Mainstreet.
	m)	Loading and service areas should not interrupt active edges and should be separated from public circulation where possible.
N4	**Concept Plan for Precincts A, B and D in the Knowledge Zone**	
	a)	**General**
		The extent to which the proposal is consistent with the approved Concept Plan for the Precinct within the Knowledge Zone.

	b)	**Concept Plan Development**	
		i.	The extent to which the preparation of a Concept Plan or an update to an existing Concept Plan has given regard to the following.
			a) The extent to which the precinct integrates with surrounding land uses and the transport network. b) Whether the development has been designed to minimise any adverse effects on adjoining activities, particularly residential activities. c) The degree to which any large façades (including side walls) that are visible from public places have been modulated, articulated, detailed or visually treated in a way that reduces the apparent bulk of the building or provides visual interest. d) The extent to which the proximity of facilities intended to accommodate events are sited close to residential areas. e) The extent to which the provision for vehicular and pedestrian access and circulation facilitates ready dispersal of vehicles and patrons from large events. f) The extent to which provision for vehicular and pedestrian access and circulation prioritises pedestrian safety. g) The extent to which appropriate, convenient provisions enable public transport to service the site, recognising the need for such services to directly access the Central City area.
		ii.	The extent to which the following have been applied as part of a new Concept Plan, an update to an existing Concept Plan or in the absence of a Concept Plan within the Interface Areas of Precincts A, B and D.
			a) Built Form and Layout i. The extent to which the external appearance, scale and design of buildings: • Contributes to compatibility between buildings and its integration with other development on the site, adjacent sites and surrounding public spaces; • Contributes to active frontage along public streets and open space, particularly for corner sites; • Minimises, as practicable, effects on adjacent public spaces (including footpaths) in terms of shading and daylight. ii. The extent to which building design and development: • Makes a positive contribution to the local character of the site and surrounding areas; • Ensure large facades are well designed to provide visual interest and reduce the apparent bulk of buildings within the Interface Area; • The extent to which crime prevention through environmental design principles have been incorporated.
			b) Landscaping i. Incorporation of landscaping within the site layout to reduce the bulk of new development and mitigate adverse visual effects of development within the Interface Area, particularly as they interact with public spaces. ii. Incorporates landscaping to maintain and enhance the character and amenity of the site and surrounding areas.

N5	**Ruakura Open Space Zone**		
	a)	For new stormwater ponds and wetlands, the extent to which adverse effects of the works on adjacent private property are avoided in relation to:	
		i.	Flooding and adverse effects on groundwater levels; and
		ii.	Creating habitat for mosquitoes and other undesirable insects
N6	**Development within a Greenfield Area**		
	a)	The extent to which the proposal is consistent with an approved Land Development Plan or could prejudice or foreclose options for future urban development and in particular with the proposals shown on Figure 2-14, Ruakura Structure Plan – Land use (Appendix 2).	
	National Grid Corridors		
N7	For crossing points for Mobile Plant that are a Restricted Discretionary Activity in Table 25.7.4, the matters to which the Council shall restrict its discretion are limited to the actual and potential effects of crossing points on the scale and efficient operation and maintenance of the National Grid.		
N8	In determining any application for resource consent for crossing points, the Council shall have regard to the following matters:		
	a)	Suitable mechanisms are in place to ensure that mobile plant and machinery moving in the National Grid Yard can not infringe safe clearance distances specified in NZECP:34. This may include physical, operational or electronic measures and will be deemed satisfied by overhead gate structures (e.g. hurdles) being erected no closer than 4.5 metres from the lowest sag of the line at maximum operating temperature.	
	b)	Crossings are approximately perpendicular to the National Grid Yard.	
	c)	Crossings and any associated traffic management structures are located no closer than 12 metres from the outer visible edge of a National Grid support structure.	
	d)	Any overhead gate structure (e.g. hurdle) is constructed to a suitable engineering standard to withstand vehicle (including mobile plant transporting containers) impact travelling at normal operating speed.	
	e)	Appropriate management and operational methods to ensure safe procedures are specified in the resource consent conditions and followed when crossing beneath the lines.	
N9	For the unloading and loading of containers, stacking containers, container stacks, operation of mobile plant associated with these activities and Light Towers, noise walls and fences greater than 2.5 metres high, the matters to which the Council shall restrict its discretion are limited to the actual and potential effects of these structures, buildings and activities on the safe and efficient operation and maintenance of the National Grid. In determining any applications for resource consent for these structures, buildings and activities, the Council shall have regard to the following matters.		
	a)	Any operational procedures and physical measures to ensure compliance with NZECP:34, including layout and allowable height limits for container stacking.	
	b)	Light towers shall ensure sufficient clearances in accordance with NZECP:34 are provided including any setback requirements for mobile plant required for maintenance and lamp replacement.	

	c)	Suitable mechanisms are in place to ensure that mobile plant and machinery moving in the National Grid Corridor can not infringe safe clearance distances specified in NZECP:34. This may include physical, operational or electronic measures.
N10	For earthworks that are a Restricted Discretionary Activity the matters to which the Council shall restrict its discretion are limited to:	
	a)	The effects of the earthworks on the operation, maintenance, upgrading, and development of the National Grid transmission network.
N11	For Subdivision that is a Restricted Discretionary Activity the matters to which the Council shall restrict its discretion are limited to:	
	a)	The extent to which the subdivision design, including the location of roads and reserves, landscaping and building platforms, allows for activities to be set back from National Grid transmission lines to ensure adverse effects on, and from, the National Grid and on public safety are appropriately avoided, remedied or mitigated.
	b)	The extent to which the subdivision design/layout and consequential development will minimise the potential reverse sensitivity on, and amenity and nuisance effects of, the National Grid.
	c)	The provision for on-going inspection, operation, maintenance and development of the National Grid, including continued reasonable access.
	d)	The extent to which the design and development will minimise the risk of injury and/or property damage from such lines.
	e)	Compliance with the New Zealand Electrical Code of Practice for Electrical Safe Distances (NZECP: 34).
	f)	Outcomes of any consultation with Transpower New Zealand Limited.
O	**Rotokauri North**	
O1		For any subdivision adjacent to the SH39 network:
	a)	Subdivison should establish a landscape buffer against SH39 (with a minimum width of 3m), and estsblish suitable legal mechanism for ongoing protection of the landscape buffer.
O2		The creation of a private rear lane:
	a)	The establishment of appropriate legal mechamisms for ownership and ongoing maintenance of the lane.
O3		All restricted discretionary, discretionary and non-compiying activites
	a)	The extent to which the proposal gives effect to the objectives and policies of the Rotokauri North Structure Plan. In the event that there is a conflict between the outcomes and objectives and policies of 3.6A and any other objective/policy in the District Plan or guidance set by the Design Guidelines in 1.4 the outcomes sought for Rotokauri North and described in section 3.6A.1 and the objectives and policies in 3.6A.2 shall be afforded a greater weighting.
	b)	The extent to which the proposal avoids, remedies or mitigates adverse effects on, or where possible enhances, any significant habitats of indigenous fauna
O4		For any subdivision of a duplex which meets Rule 4.7.12(a), the Council will restrict its discretion to the following matters:
	a)	Whether the sites can be appropriately serviced for infrastructure and access

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	b)	Administration of the consent (i.e monitoring etc)
	c)	A restriction on the commencement of the subdivision until after the pre-line inspection stage of duplex building construction under the Building Act 2004.

1.4 Design Guides

1.4.1 Subdivision Design Guide

1.4.1.1 Purpose

This section provides design guidance for any subdivision undertaken within the City. It contains general guidance for subdivision in any zone, as well as specific guidance for subdivision in the General Residential Zone.

The assessment criteria for subdivision, outlined in Section 1.3.3, require applications to be assessed against the Subdivision Design Guide. Information Requirement 1.2.2.2 - Subdivision Concept Plan - also requires consideration against the Subdivision Design Guide outlined here.

1.4.1.2 How to Use the Design Guide

Applications for subdivision shall include an assessment against the Design Guidance included in this Appendix.

Section 1.4.1.3 General Design Guidance and section 1.4.1.4 General Residential Zone apply to all subdivision, except residential subdivision creating four or less residential lots.

Where necessary, in regard to a criterion demonstrably not met, the applicant shall explain:

i. Whether site constraints inhibit the ability to address the criterion.

ii. How the intention of the criterion is met by the proposal.

iii. Whether the proposal represents a better design solution than that sought by the criterion.

Note

1. Acceptable means of compliance for the provision, design and construction of infrastructure is contained within the Hamilton City Infrastructure Technical Specifications.

1.4.1.3 General Design Guidance

Design Element 1: Public Interfaces

a) Public open spaces should be bounded by public transport corridors where possible (refer Figure 1.4.1a).

b) Where a transport corridor boundary is not practicable, private-way boundaries with public open spaces should be provided to ensure that buildings front on to public open spaces (refer Figure 1.4.1b).

c) Private ways where abutting public open spaces should ensure sightlines to the public open space via permeable fencing (see rule 15.4.6).

Figure 1.4.1a: Poorly located public open space, lacking boundaries with public transport corridors



Figure 1.4.1b: Subdivision layout



Showing:

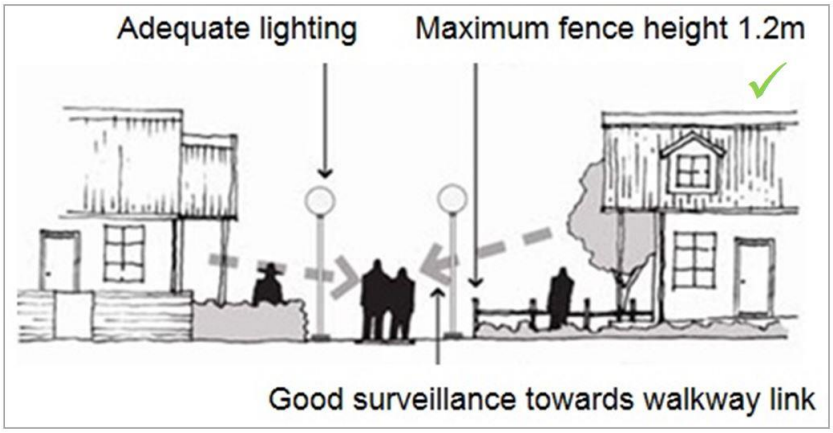
- Well located public open space (A), with boundaries to public transport corridor and private ways.
- Clear and straight pedestrian and cycle links with maximum lengths and fence height limits providing improved connectivity and following CPTED principles.

Design Element 2: Pedestrian Accessways

Pedestrian accessways should:

a) Be designed in a manner consistent with CPTED principles principles – facilitating passive surveillance and adequate lighting where appropriate (refer Figures 1.4.1e and 1.4.1f).

Figure 1.4.1e: Cross section showing a well designed interface between allotments and a pedestrian accessway. Low, visually permeable fences and walls, low cut planting and adequate lighting creates a 'safer' public space



b) Include clear and coherent direction signs.

c) Be of an easy gradient and where possible avoid the need for steps.

Figure 1.4.1f: Poorly designed interface with pedestrian accessway. High, visually impermeable fences, poor lighting and landscaping prevents passive surveillance



Design Element 3: Public Open Spaces

a) All public open spaces should be of an appropriate size and dimensions to allow for their anticipated primary function. Land to be vested as public open space will be accepted by the Council only if it is suitable for the intended functions.

b) Subdivision layout should provide, where appropriate, opportunities for connections that support the integration of pedestrian and cycling networks within and between the transport and open space networks (refer Figure 1.4.1g).

c) Public open spaces should be designed in a manner consistent with CPTED principles.

d) All public open spaces should:

i. Incorporate natural features that contribute to the functioning of ecological corridors, transport corridors and stormwater functions, where relevant.

ii. Look to incorporate existing trees and features of interest (natural and cultural).

iii. Provide recreational amenity.

iv. Contribute to the development of a coherent open space network.

v. Be easily accessible where appropriate for all aspects of the community.

vi. Be provided as identified on any relevant Structure Plan.

e) Walking and cycle paths should be provided where appropriate within the public open space network and should be well connected:

i. Through the public open space network.

ii. With adjacent streets.

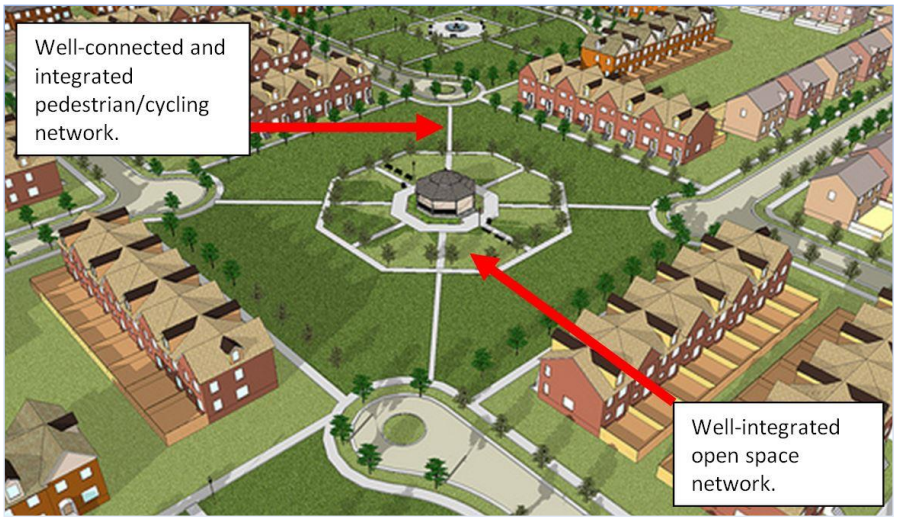
iii. With other open spaces, community facilities and any other likely destinations.

f) The provision of public open space under high-voltage transmission lines will be considered on a case-by-case basis having regard to the appropriate use of the land.

g) Neighbourhood parks should be reasonably flat and be designed and located to provide a focal point for a neighbourhood (refer Figure 1.4.1h).

h) Where required, car parking should be accessible, appropriately landscaped and designed so that traffic movement can occur in a safe and efficient manner.

Figure 1.4.1g: Public open spaces designed and located to integrate pedestrian and cycling networks with the open space network



Design Element 4: Transport Network Layout

a) The proposed transport network layout should:

i. Create sufficient separation distances and space to provide for safe vehicle access to and from the transport network.

ii. Where possible avoid the need for direct vehicle access from allotments on to the strategic or arterial transport network.

iii. Minimise local transport corridor connections to arterial or strategic transport corridors.

iv. Protect, provide for and be integrated with any planned transport corridors identified in Structure Plans or by designations.

Figure 1.4.1h: Public open spaces designed and located to be a key focal point of the neighbourhood, particularly adjoining uses



v. Create an accessible, walkable neighbourhood by:

- Providing a highly connected network of transport corridors that enables relatively direct trips in and between neighbourhoods and to local activity points (such as shops, parks, schools and passenger transport stops).
- Avoiding transport infrastructure designs that disadvantage mobility impaired, pedestrians and cyclists by hindering their ability to move safely and easily.

vi. Provide links for pedestrians and cyclists and use of passenger transport for daily activities that create an attractive, friendly, efficient, connected, safe and accessible environment.

vii. Enhance personal safety and perceptions of safety and minimise potential for crime, vandalism and fear.

viii. Avoid large blocks as these increase the trip lengths between points reducing connectivity, accessibility and the attractiveness of walking or cycling.

ix. Unless physically constrained avoid culs-de-sac and other layouts that reduce transport network connectivity.

x. Provide for strong connections to existing, committed and proposed development in adjacent areas, to help with connection and integration.

b) In accordance with the transport corridor hierarchy, the layout should provide a logical and legible network of connected transport corridors, these corridors should:

i. Contribute to a transport network that is accessible for the whole community by maximising connections and opportunities for route and mode choice.

ii. Provide local or collector transport corridors for safe property access.

c) The hierarchy of transport corridors should be reinforced by incorporating design elements appropriate to the transport function and surrounding land use (guidance is available in Appendices 15-4 and 15-6). This may include using landscaping, street materials, and space allocation (e.g. carriageway widths) to signal changes in hierarchy that directs through-traffic to and along higher-order transport corridors and encourages lower speeds in residential or pedestrian-oriented environments.

d) When considering layouts that connect to existing areas the effects of that connection, such as increased traffic volumes, should be compatible with the form and function of the existing transport network and the surrounding land use.

Design Element 5: Landscaping and Vegetation

a) Subdivision layout should seek to provide opportunities for retaining existing mature trees.

b) Streetscape should reflect the functions and characteristics of the road type in the network with larger, uniform and more formally organised trees on major transport corridors and smaller, less-regimented variation along local streets.

Note

1. Guidance on acceptable approaches to the selection and location of street tree planting is contained within the Hamilton City Infrastructure Technical Specifications.

1.4.1.4 General Residential Zone

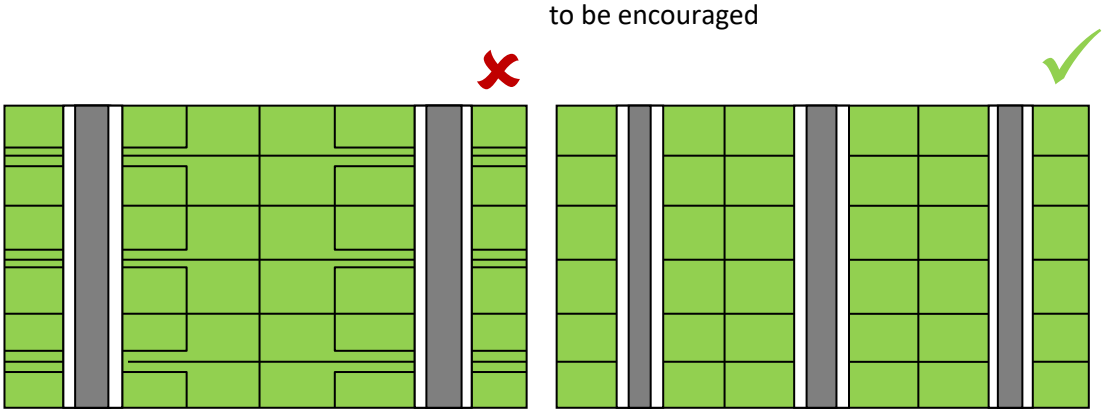
This section provides design guidance for any General Residential Zone subdivision undertaken within the City which propose to create more than four vacant fee-simple lots.

Design Element 1: Block and Allotment Layout and Orientation

a) Where possible blocks should be no more than two allotments deep (refer Figures 1.4.1i and 1.4.1j).

Figure 1.4.1i: Subdivision layouts creating deep blocks with large numbers of rear sites are to be discouraged

Figure 1.4.1j: Subdivision layout creating blocks no more than two allotments deep and maximising the creation of front sites is to be encouraged



b) Allotments should be orientated so that dwellings can be located in a manner where their front door and main living area face the adjacent transport corridor – rear sites should generally be avoided (refer Figure 1.4.1k).

Figure 1.4.1k: Allotments oriented to enable dwelling designs that can front the transport corridor



c) Block length should be limited to ensure high levels of accessibility and connectivity.

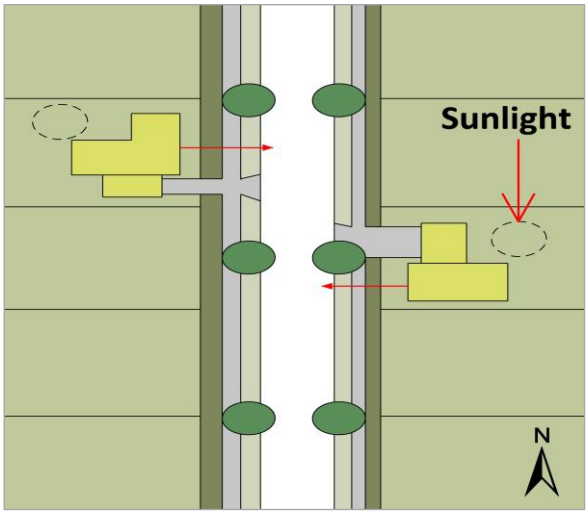
d) Blocks and allotments should be designed to enable good sunlight and daylight into future dwellings. This can be achieved by:

i. Aligning roads north/south and allotments east/west where possible.

ii. Providing south-facing allotments with north-facing backyards for outdoor living.

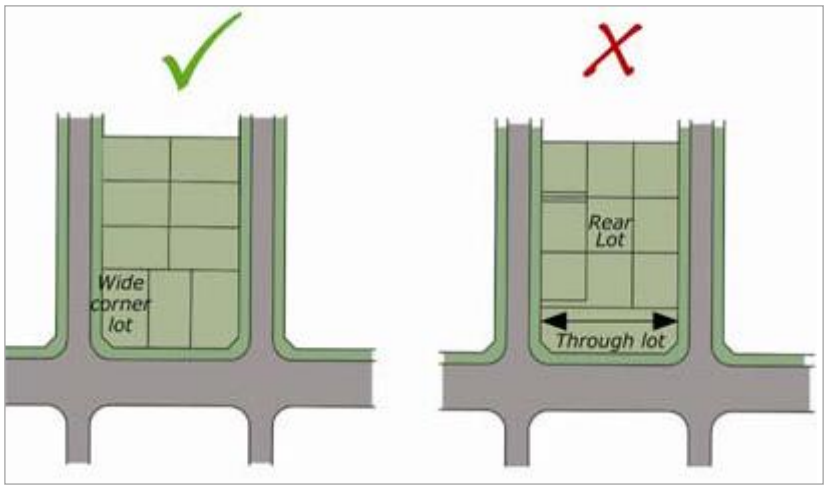
iii. Ensuring sunlight access to transport corridors, including the selection of trees to allow sunlight to penetrate through winter.

Figure 1.4.1l: Blocks and allotments have been located and designed to ensure dwellings and allotments receive a good level of sunlight



e) Through allotments should be avoided (refer Figure 1.4.1m).

Figure 1.4.1m: Blocks and allotments should be located and designed to avoid the creation of rear and through allotments



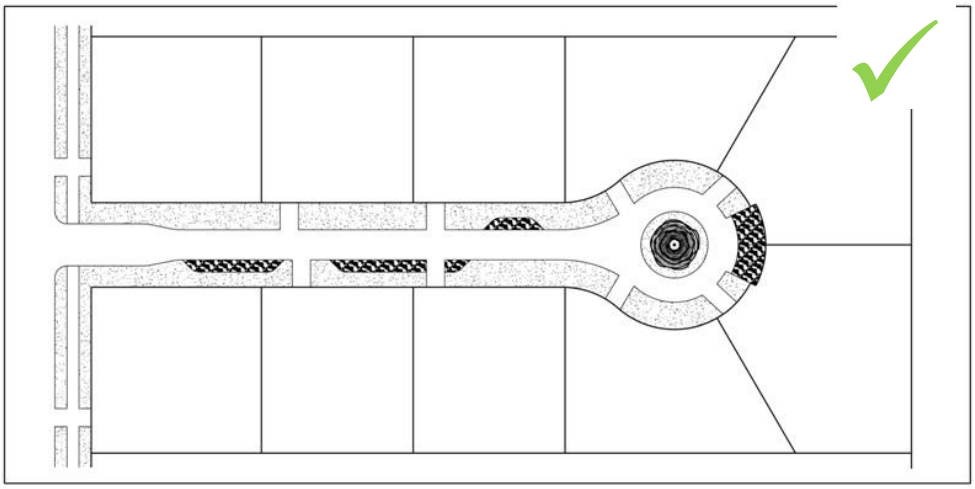
f) Culs-de-sac should be avoided where possible. Where they are proposed as part of a subdivision, the applicant shall provide:

i. Justification and reasons why a more integrated movement network cannot be provided.

ii. How the proposal manages to achieve appropriate connectivity and accessibility.

g) Where they cannot be avoided, culs-de-sac should be straight and short (unless physically constrained for example by topography, infrastructure or geotechnical factors) (refer Figure 1.4.1n).

Figure 1.4.1n: Where provided, culs-de-sac should be straight and short



h) Where culs-de-sac cannot be avoided, they should provide, where appropriate, pedestrian and cycle links to other streets and/or open spaces at their heads to create connectivity and accessibility (refer Figure 1.4.1o)

Figure 1.4.1o: Where vehicle connections cannot be made culs-de-sac should include, where appropriate, pedestrian and cycle links



i) More than one private-way accessing on to a cul-de-sac should be discouraged where possible.

Where this is proposed, the applicant shall provide provide justification and reasons showing how the proposal will achieve appropriate connectivity (including safe pedestrian access), how CPTED principles, visitor parking, emergency access and refuse collection are addressed.

1.4.2 Residential Design Guide (Residential and Special Character Zones)

1.4.2.1 Purpose

This section provides design guidance for developments undertaken within the General Residential Zone, Residential Intensification Zone, Large Lot Residential Zone and Special Character Zone. The guidelines apply to:

a) Apartment buildings

b) Papakaianga

c) Third and subsequent single dwellings per site

d) Duplexes

e) Integrated Residential Developments.

As noted within the section 1.3.3 B Design and Layout, if an activity is a Restricted Discretionary Activity solely to Design and Layout matters and there is a relevant design guide; then the activity should seek to address the outcomes sought in the design guide as a priority over any other criteria in section 1.3.3 B.

1.4.2.2 How to use the Design Guidelines

Applications for development within the Zones as described in 1.4.2.1 should provide an assessment against the guidelines outlined within this Appendix.

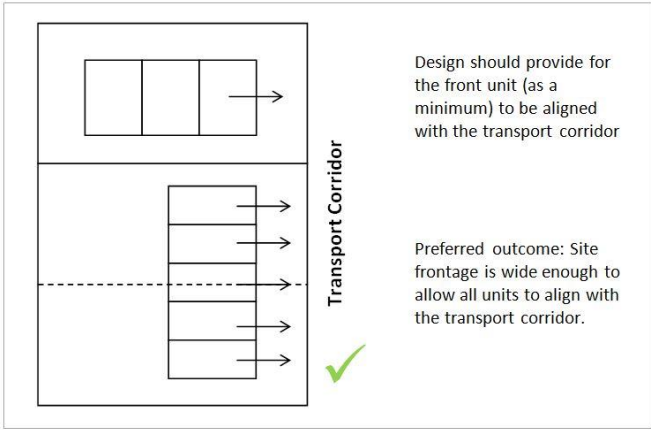
As the guidelines are generic, they may not be appropriate in every instance and a degree of flexibility is reasonable and to be expected. In such cases, the creation of an equivalent or better outcome should be demonstrated.

1.4.2.3 Site Size and Dimensions

a) To ensure good overall design outcomes, the site should be of an appropriate size to accommodate the proposed number of residential units and ancillary spaces, such as car parks and outdoor living areas.

b) Where possible, the site should have an adequate length of transport corridor frontage to allow residential units to be oriented parallel to the transport corridor (refer Figure 1.4.2a).

Figure 1.4.2a: Preferred unit orientation



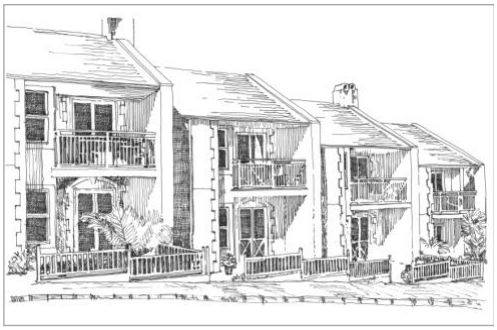
1.4.2.4 Interface between Public and Private Land

a) Where appropriate, the site layout and building design should promote passive surveillance of adjoining or adjacent public spaces (including transport corridors).

b) To achieve this, the following aspects need to be considered:

- Where possible, ensure units have a public front and a more private side or rear.
- Promote a clear definition between public, semi-private and private spaces through the use of design features which may include low boundary walls and landscaping as appropriate.
- Avoid bland, featureless elevations, high blank walls and non-permeable fencing.
- Where possible, orientate habitable rooms, balconies and entrances towards the public space (including transport corridors - refer Figure 1.4.2b, c and d).

Figures 1.4.2b, c and d: Examples showing public/private interfaces that have been well-designed



Apartment



Detached dwelling



Duplex

1.4.2.5 Building Orientation and Siting

a) Buildings should be oriented and located to allow adequate daylight and sunlight to reach principal living rooms and outdoor spaces.

b) Buildings should be positioned to minimise overshadowing of adjoining buildings or private outdoor spaces.

c) Buildings should be oriented, sited and designed to accommodate outdoor living areas, service areas and storage areas as well as permeable surfaces.

1.4.2.6 Access, Garages and Parking

a) Where possible, garages and car parking should not dominate the frontage and should be located to the side or rear of the building to reduce visual impact (refer Figure 1.4.2e).

b) When locating garages and outdoor parking spaces, consideration should be given to safety for users.

c) Where possible, driveways should not be located side by side. Preferably use shared driveways to serve more than one residential unit.

d) The design of the vehicle entry and exit to the site should ensure safety for the residents and pedestrians and the safe and efficient operation of the transport network.

e) The design and landscaping of car parks should contribute to the amenity of the development and the safety of users.

Figure 1.4.2e: Garage doors forward of the front face of buildings should be discouraged



1.4.2.7 External Appearance

a) When viewed from any transport corridor or public open space, buildings should be designed to create visual interest through appropriate modulation, articulation, and architectural expression (refer Figure 1.4.2f).

Figure 1.4.2f: Building design that creates visual interest by incorporating a range of features



b) Features such as balconies, canopies, porches, bay windows, dormers and pediments can also be used to break up continuous building mass and large roof forms.

c) Height should not exceed the relevant District Plan standard unless the particular design will:

i. Contribute to identity and local character.

ii. Add interest.

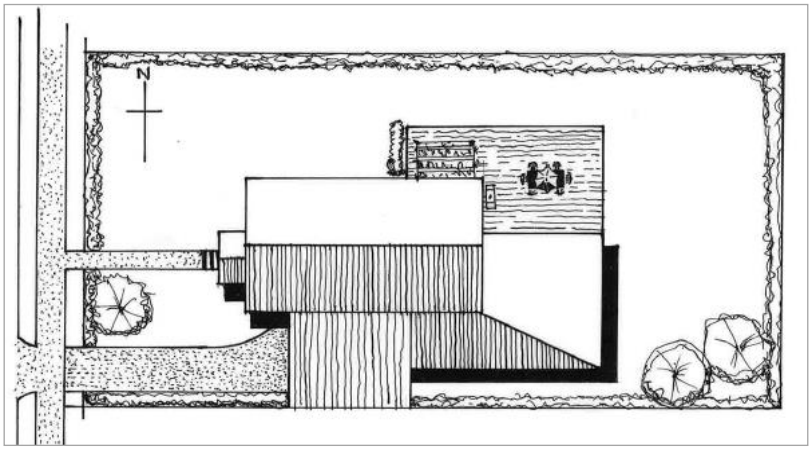
iii. Where appropriate, create local landmarks.

d) Where similar buildings are grouped or joined together, visual interest should be promoted through high quality architectural design, including the use of varying design features, e.g. roof form, canopies, porches, balconies, windows, colour and materials.

1.4.2.8 Private Outdoor Living Areas

a) Private or communal outdoor living areas should be located either to the north, east or west of the residential unit, readily accessible from a living area within the residential unit (refer Figure 1.4.2g). The private outdoor living area may be at ground level or an upper-storey balcony.

Figure 1.4.2g: Example of a functional, usable and private outdoor living area



b) Outdoor living areas should be sited and designed to ensure safe use.

c) Outdoor living areas should be of appropriate size and dimensions to suit both occupancy and residential unit type. Regard should be given to available shared outdoor space (for multi-unit development) and the proximity of the site to a public open space.

d) Outdoor living areas should be located and designed to achieve an adequate level of visual privacy, protected from being overlooked from windows and private outdoor living areas of adjacent residential units. Responses could include:

i. The shape and position of buildings, spaces and windows.
ii. Varying levels.
iii. Separation distance.
iv. Screening such as hedges.
v. Offset and high sill windows.
vi. Opaque glass.

1.4.2.9 Landscaping and Vegetation

a) Where possible, existing mature trees should be retained where they contribute to site amenity.

b) Landscaping and vegetation should complement the layout of the site and the buildings.

1.4.2.10 Acoustic Amenity

a) Attached dwellings should be designed to minimise sound transmission between residential units.

b) Noise-producing activities such as driveways and/or car parks should be separated from bedroom windows of adjacent residential units.

c) Residential units should be designed with appropriate acoustic treatment to maintain residential amenity.

1.4.2.11 Service Areas

a) Outdoor service areas should be provided for solid waste and recycling storage without creating adverse visual, noise or odour effects for residents or neighbours.

b) The waste and recycling storage in outdoor service areas should be easily accessible for residents and collection agencies.

1.4.2.12 Water Efficiency

a) Water-sensitive techniques should be used where possible.

b) Sites should ensure a sufficient area of permeable surface to manage the volume of stormwater entering the reticulated system (e.g. through stormwater collection and detention); or be able to provide alternative stormwater solutions.

c) Landscaping should be used to minimise and control the impacts of stormwater run-off. This could be through use of vegetation filtration techniques (e.g. swales

and rain gardens, refer Figures 1.4.2h and 1.4.2i) and choosing appropriate plant species.

d) The reuse of water including grey water should be considered and adopted where appropriate. (Also see Waikato Regional Council requirements.)

Figures 1.4.2h and i: Examples of swales to manage stormwater (from Hobsonville and Long Bay, Auckland)





1.4.2.13 Integrated Residential Developments

In addition to the above design guidelines, the following should be considered when preparing and assessing a resource consent application for an integrated residential development:

a) Developments should be designed to minimise adverse impacts on neighbouring sites, the streetscape and the character of the area.

b) This includes, where applicable, consideration of building height and the impact on views and vistas to and from the site and the natural landform.

c) The built form should be residential in nature and scale and where possible avoid excessive repetition of architectural styles.

d) As much as possible, developments should have a unique identity and sense of place whilst respecting the character of the surrounding context.

e) Developments should be designed in a way that provides an appropriate level of on-site amenity through the use of landscaping and communal open space, building placement and maintaninance of privacy.

f) Access arrangements should be carefully considered, including the provision of rear access lanes and ensuring garages do not visually dominate.

g) Developments should ensure an integrated service space is provided and that it is easily accessible.

1.4.3 Medium-Density Residential Design Guidelines

1.4.3.1 Purpose

These design guidelines are developed to assist groups, professionals, and Council to prepare and assess resource consent applications for medium-density residential.

1.4.3.2 How to Use the Design Guidelines

These guidelines form part of the assessment criteria for Comprehensive Development Plans along with applications for development occurring after the implementation of the Comprehensive Development Plan (CDP). A resource consent application is required for each area.

The guidelines have been incorporated as assessment criteria rather than performance standards as they are more of a guide than an absolute standard that must be adhered to. Refer to Chapter 1 – Plan Overview, Section 1.1.4f iii Design Guides.

There are two steps to consider when preparing a CDP. Firstly, there are a number of specific design guidelines which outline basic bulk and location requirements. Secondly, the application should be assessed against the urban design principles outlined in the Design Guide.

1.4.3.3 Site Coverage

a) Site coverage	Up to 50%

1.4.3.4 Permeable Surfaces

a) Net site permeability	At least 20% of the net site area. The front yard requirements are to be included in this percentage.
b) Front sites only: Permeability forward of the building line of the dwelling planted in grass, shrubs and trees	At least 50%

1.4.3.5 Building Height

a) Height of buildings	Up to 12.5m

1.4.3.6 Building Setbacks

Building setback from	Minimum distance
a) Transport corridor boundary – local and collector transport corridors	3m
b) Transport corridor boundary – arterial transport corridors Except that any garage or carport facing the transport corridor should be set back a minimum of 8m	5m
c) Waikato Expressway (Designation E90 and E90a)	i. 35m from the designation boundary, or ii. 40m from the actual carriageway edge of the Waikato Expressway if: 1. The location of the carriageway within the designation corridor of the Waikato Expressway has been confirmed in writing by the Requiring Authority, or 2. Construction is underway or completed.
d) Boundary of a Comprehensive Development Area or zone boundary	1.5m

1.4.3.7 Water Management

a) Rainwater storage devices for the supply of non-potable water for outdoor use and indoor toilets, and for the purpose of stormwater soakage or detention, should be provided.

1.4.3.8 Interface Between Public and Private

a) The front wall of all accessory buildings that are detached (including carports and garages) and an integral part of the design and construction of the dwelling, should be:

   i. Located no further forward of the front building line of the dwelling than 0.5m if the garage door is to face the street;

   ii. Located forward of the front line of the dwelling (but not encroaching into the front setback) by no more than 8m if the garage door is 90 degrees to the street;

b) At least one principal room should have a clear-glazed window facing the street. For corner sites and sites with two transport corridor frontages, this is required only on the transport corridor frontage from which vehicular access is provided.

1.4.3.9 Fences

a) All fences should have a maximum height of 1.8m except for those adjoining an open space zone (refer to 15.4.6).

1.4.3.10 Residential Buildings – Separation and Privacy

a) Residential buildings should maintain an appropriate set back from the nearest part of any other residential building, except:

i. No separation is required between buildings that are attached.

ii. Where windows are located and designed (including by glazing) to avoid views between rooms in different buildings, the separation distance could be reduced.

b) To ensure privacy, any balcony at upper-floor level should be appropriately set back from adjacent residential buildings. This does not apply along a transport corridor, access way, right-of-way, private way, access lot, or entrance strip less than 6m wide.

1.4.3.11 Outdoor Living Area

a) Each residential unit, except for when a communal area is provided, should be provided with an outdoor living area that is:

i. For the exclusive use of each residential unit.

ii. Readily accessible from a living area inside the residential unit.

iii. Free of driveways, manoeuvring areas, parking spaces, accessory buildings and service areas.

iv. Located on a side of the residential unit which faces north, east or west.

b) Outdoor living areas for residential units to have areas and dimensions as follows.

Residential units	Outdoor living area per residential unit	Shape
i. Single dwellings, duplex dwellings and dwellings in comprehensive residential developments	40m²	Capable of containing a 6m-diameter circle
ii. Ancillary residential units	12m²	No dimension less than 2.5m
iii. Apartments	12m²	No dimension less than 2.5m

c) The outdoor living area for an ancillary residential unit should be separate from the outdoor living area provided for the principal residential unit.

Note

1. Any communal open space is optional and is additional to the above provisions.

1.4.3.12 Service Areas

Description	Minimum requirements
a) Single dwellings, duplex dwellings and dwellings in comprehensive residential developments	$20m^2$ Minimum dimension 3m
b) Service area per ancillary residential unit	Additional $10m^2$ Minimum dimension 2.5m
c) Apartments	$10m^2$ Minimum dimension 2.5m
d) All service areas	Readily accessible from each residential unit Not visible from a public place

1.4.4 Rototuna Town Centre Design Guide

1.4.4.1 Purpose

This design guide was developed to assist groups, professionals and Council to prepare and assess resource consent applications for Comprehensive Development Plans (CDPs) and resource consent applications for development occurring after the implementation of the CDP (refer to Volume 1, Rule 13.5c).

A Concept Plan (Appendix 7, Figure 7-1) has been prepared for the Rototuna Town Centre. The Rototuna Town Centre Concept Plan provides a design-led framework for the development of the Centre. The Rototuna Town Centre Concept Plan comprises several activity precincts. The Concept Plan identifies the location and extent of land use types and other essential features including:

i. The main street and other streets,

ii. The public square, and

iii. Community and open space elements.

All development in the Rototuna Town Centre Zone:

i. Will have a strong emphasis on urban design considerations.

ii. Must demonstrate that urban design principles have been applied.

iii. Must be in general accordance with the Rototuna Town Centre Concept Plan.

iv. Must be designed in accordance with this Guide. To achieve this, before commencing development within the Rototuna Town Centre Zone, a Comprehensive Development Plan (land use consent) must be prepared and approved for each of the Comprehensive Development Areas identified in Appendix 7, Figure 7-2.

1.4.4.2 How to Use the Design Guide

The Design Guide contains four parts.

i. Part 1: The Overall Concept (refer to 1.4.4.3).

ii. Part 2: Guidelines relating to the Rototuna Town Centre (refer to 1.4.4.4).

iii. Part 3: General Principles for Comprehensive Development Plans (refer to 1.4.4.5).

iv. Part 4: Principles and Assessment Criteria for Precincts (refer to 1.4.4.6).

There are three steps to using this Guide when preparing a Comprehensive Development Plan. Firstly, there are a number of guidelines which clearly outline Council's expectations for achieving high quality design, set out in Sections 1.4.4.4. Secondly, the application should be assessed against the general principles which are outlined in Section 1.4.4.5, and thirdly, the application should be considered in terms of the relevant assessment criteria for the precinct/area in Section 1.4.4.6.

There is a degree of flexibility, and the standards may not be appropriate in every instance. In such cases it must be demonstrated that design flexibility is warranted through the creation of an equivalent or better outcome.

1.4.4.3 Part 1: The Overall Concept

Vision

A Town Centre for Rototuna that functions as a focal point for the wider Rototuna community by enabling a diverse range of activities that operate within a pedestrian-focused, street-based layout, and incorporate principles of good urban design.

Key Features

The key features of the Rototuna Town Centre are:

a) The Main Street

The Main Street provides the central core of the retail area with a traditional street-based layout which is intended to be a pedestrian focused, vibrant shopping destination for the local community. Primary and secondary frontage areas are identified in Appendix 7, Figure 7-3, to facilitate active frontages with buildings closely relating to the street. Pedestrian orientated activities will be encouraged along these frontages, particularly along the Main Street and Public Square which are to be the principal shopping areas.

The carriageway should accommodate cyclists, buses and motor vehicles. There should be wide pedestrian walkways on either side of the carriageway to provide space for street-side dining, parking bays and large specimen trees. The street will be a slow speed environment. The street should have a clear and distinguishing landscaping treatment (streetscape design) applied, to highlight its importance and add to its character, identity and legibility.

The CDP for the Comprehensive Development Plan Areas will include an Integrated Transport Assessment to determine the nature of the intersections at (as relevant):

i. Borman Road/North City Road.

ii. North City Road/Park Lane/Suburban Collector Roads.

iii. Suburban Collector Roads/Local Streets.

iv. Suburban Collector Roads/Residential Collector Roads.

v. Midblock access for Public Square, Pool & Library.

The intersection treatments should also consider the pedestrian and cyclist provision to ensure a safe environment and high level of connectivity occurs.

b) The Public Square

The Public Square is designed to be an important public space where markets, fairs and special events can be held. The library and retail areas will open onto the Square. It can be accessed from the Main Street and from walkways and cycleways through the adjoining watercourse and drainage reserve.

The Square should contain key amenity features such as lighting, seating, trees, landscape features and public art. The design should incorporate on the eastern edge the entrance space for the library and other small businesses such as cafés – including space for outdoor dining. A consistent design theme and materials should be used throughout the Square.

c) The Gateways

Key gateway features such as public art at the entrances to the Town Centre from the arterial roads would identify the Centre and contribute to its sense of place. A gateway feature could take a variety of forms or elements (e.g. public art, gantry, landscaping). The carriageway/building design at these key entrance points should be flexible enough to allow a gateway feature to be incorporated into the design.

d) The Watercourse

A central unifying feature of the Town Centre is the drainage reserve/central watercourse which has a principal stormwater function but also provides a key green corridor and walkway/cycleway link. It is important that the waterway and associated corridor is designed as a high amenity, multifunctional feature. To the north, the watercourse will connect with the Active Recreation Reserve and provide a green edge to the playing fields and the secondary school. This green edge will also accommodate shared pedestrian and cycle routes that will connect with parks and footpaths in nearby neighbourhoods.

The precise form and function of the watercourse and corridor will be determined by hydrological requirements and controls. This watercourse will be the principal secondary flow path for the concept plan area, and be sized to accommodate 1% annual exceedance probability storm flood conditions.

e) Park Lane

Park Lane runs along the eastern edge of the Active Recreation Reserve and will provide access to the Reserve and adjacent Residential High Density Precinct. The combination of the housing and lane will provide increased surveillance over the Reserve.

Park Lane should be designed as a slow moving lane, with a number of traffic calming measures incorporated into the design. Provision should be made for angled parking adjacent to the park, and berms for landscaping. Its character should be that of a tree-lined lane within a residential environment.

f) Passenger Transport

Passenger transport within the Town Centre should be catered for via integrated bus stops within the transport corridor carriageway.

A transport interchange opposite the Public Square on the Main Street should be provided. The interchange is central to the Concept Plan. It will bring people directly to the heart of the Town Centre and will improve the general surveillance and safety around the Public Square.

g) Connectivity

In order to achieve a legible and efficient transport network it is essential that all nodes are well connected both internally and to other nodes. The local nodes and Town Centre in particular shall be well connected to the surrounding residential neighbourhood they serve.

h) Walkways/Cycleways

The emphasis in and around the Town Centre is on achieving good walking and cycling connectivity. Effective connections to the Centre must be provided from the adjoining residential areas. The central drainage reserve/water course must

incorporate walking and cycling paths, offering good connectivity with the Active Recreation Reserve, community facilities and schools, and to the southwest along existing walkways/cycleways.

i) Primary/Secondary Frontages

Primary and secondary frontages have been identified where the interface between buildings and the street or public space is considered particularly important. Along these edges at ground floor level, retail activity should predominate and buildings must relate closely to the street – providing activity, interest and vitality.

Precincts

As shown on the Concept Plan, the Rototuna Town Centre is made up of several activity precincts that contribute to the overall function of the Centre. These include:

a) Retail Precinct

The Concept Plan provides for two distinct retail areas – Retail Precincts 1 and 2.

The Retail 1 Precinct has frontage to the Main Street and Public Square and adjoins the proposed library and aquatic centre. Within this Precinct, the scale and form of the buildings and shopfronts should respond to and reflect the pedestrian nature of the streetscape. Retail should be of a fine grain and typically include small shops of a maximum floor area of 400m^2, restaurants and cafés. Offices and apartments should be located above ground floor level. Activities provided for in this precinct include entertainment, restaurants, cafes, takeaways and small store retailing.

In the Retail 2 Precinct, which is located immediately to the west of the Main Street, the Concept Plan provides for larger scale retail activities to serve the local community. Development should, however, still provide an active frontage to the street – either through a main entrance or by sleeving the development with smaller retail outlets.

b) Employment Precinct

It is intended that this centre have a strong employment base, and areas for business and light industry are identified on the Concept Plan. Employment based activities should not interrupt or conflict with shopping activities or more sensitive uses in adjacent precincts. Appropriate locations are therefore shown to the north of the Retail 2 Precinct and close to the major arterial road.

The Employment Precinct will provide for light industry and service type activities to predominantly meet the needs of local residents. Light industry activities include vehicle servicing and repair activities, small scale home improvement activities, electronic and computer repairs and service, small scale manufacturing, cleaning services, food preparation, catering, printing and storage.

c) Residential Mixed Use Precinct

The Residential Mixed Use Precinct will act as a transition area between retail and residential development. The Precinct predominantly provides for residential activities, however a limited amount of office development, service industry, small retailing and activities that will not compromise residential living amenity levels are also provided for.

d) Residential High/Medium Density Precinct

Residential High Density and Residential Medium Density Precincts form part of the Town Centre. These precincts are intended to provide a population base to support the Centre's retail, employment, entertainment, community and recreational activities and enhance its vitality and vibrancy. Conversely, the Centre will provide goods and services for the local residential catchment. It is therefore important that residential land is developed to a sufficient density to enable these mutual benefits, and to ensure efficient use of the land resource.

e) Community Precinct

In addition to the planned community facilities described below, land has been set aside for other community facilities such as community centres, education and training facilities and health care services.

Library – The proposed new library will occupy a key central site within the Town Centre having frontages onto both the Public Square and the watercourse. Ideally this will be designed as a high quality, innovative building.

Aquatic Centre – The aquatic centre is strategically located between the Retail 1 Precinct and Active Recreation Reserve. This will enable shared use of facilities such as changing rooms and carparking space. As with the library, this building should be of high quality and innovative design.

Schools – A new primary school and a new secondary school will contribute to the overall Town Centre 'node'. Both schools are within a 10 minute walk of the heart of the Centre. The schools are to be zoned Community Facilities and do not form part of the Concept Plan.

Apostolic Church – There is an existing church on North City Road. This existing use will be acknowledged by identifying the land as a Community Facilities Precinct.

Parks and Green Space

A large recreation reserve is centrally located in the Town Centre and in close proximity to the aquatic centre and schools. The reserve will provide for playing fields, one of which may be served by a stand, together with other facilities such as courts, cricket ovals and potentially floodlighting. Transport corridors and high density residential developments are planned around the perimeter, offering good views into the reserve. In turn this will increase passive surveillance and overall safety, and provide open space and amenity for residents.

1.4.4.4 Part 2: Guidelines for the Rototuna Town Centre

a) Building Height

Building height standards for each Precinct are as follows.

Precinct	Maximum Building Height	Minimum Building Height	Minimum Storeys
Retail 1 and Retail 2	15m	8m Primary frontage	2 in Primary Frontage

Precinct	Maximum Building Height	Minimum Building Height	Minimum Storeys
Community	15m	8m Primary frontage	2 in Primary Frontage
Employment	6m	-	-
Active Recreation	i. 8m, except public toilets adjoining a transport corridor boundary where the maximum height shall be 3m ii. Maximum height of any floodlighting shall be 15m	-	-
Public Square	-	-	-
Residential Mixed Use	12.5m	-	-
Residential High Density	12.5m	-	-
Residential Medium Density	12.5m	-	-

b) Separation Distances and Privacy

i. Where two or more buildings, excluding accessory buildings, are located on the one site, no eaves of a building shall be located closer than 3m from the eaves of another building.

ii. A balcony or window of a habitable room at upper-floor level shall be set back 5m from any boundary of a Comprehensive Development Area, zone boundary, precinct boundary, or public open space, excluding the road boundary or adjoining an accessway, any entrance strip with a width of 6m or less, or any right of way, private way or access lot.

iii. Where buildings are attached, no setback is required between those buildings.

iv. Separation distances may be reduced where:

- Windows are at an angle of 60° or greater to the boundary, or
- Window sill height from the finished upper-floor level is 1.7m, or
- Opaque or obscure glazing is provided.

c) Building Setbacks

Building setback standards for each Precinct are as follows:

Precinct	Maximum Building Setback from Transport Corridor	Minimum Building Setback from Transport Corridor	Minimum Building Setback from side, and rear boundary
Retail 1 and Retail 2	• 0m Primary frontage	0m	

Precinct	Maximum Building Setback from Transport Corridor	Minimum Building Setback from Transport Corridor	Minimum Building Setback from side, and rear boundary
	• 0m Secondary frontage • No maximum elsewhere		
Community	• 0m Primary frontage • 0m Secondary frontage • No maximum elsewhere	0m Primary frontage 5m front	Refer Volume 1, Rule 16.4.4 Where site adjoins the Residential or Special Character Zone or a Residential Precinct – 3m
Employment	10m	5m	5m
Active Recreation	-	5m except public toilets which may be sited up to the transport corridor boundary	5m from the boundary of any Residential Precinct
Public Square	-	-	-
Residential Mixed Use	• 0m Primary frontage • 0m Secondary frontage • No maximum elsewhere	0m	
Residential High Density	5m	1m	1.5m where adjoining another precinct, CDP Area or zone boundary
Residential Medium Density	No maximum	i. 3m from the boundary of a local/collector transport corridor ii. 5m from the boundary of an arterial transport corridor	1.5m where adjoining another precinct, CDP Area or zone boundary

d) Development Intensity

Development Intensity for each precinct shall be as follows.

Precinct	Maximum Floor Area Ratio	Maximum Site Coverage
Retail 1	3:1	100%

Retail 2	3:1	100%
Community	2:1	100%
Employment	1:1	75%
Public Square	NA	NA
Residential Mixed Use	2:1	100%
Residential High Density	NA	50%
Residential Medium Density	NA	50%

e) Primary Frontages

For buildings within the Primary Frontages as defined in Appendix 7, Figure 7-3:

i. Buildings shall include a minimum of 2 stories of useable floor space.

ii. A minimum of 75% of ground floor wall facing the street or public space, for the length of the ground floor wall, shall be of clear glass and capable of being used for displaying goods and services to passing pedestrians.

iii. Ground floor tenancies shall have the main customer entrance facing the street.

iv. A continuous veranda not less than 2.5m deep shall be provided which extends along the full street frontage except that no veranda over a footpath may encroach to within 600mm from the kerb. Verandas should be designed to provide continuous pedestrian cover so they abut one another.

v. There shall be no vehicle access, parking or service areas within the Primary Frontage Area.

f) Secondary Frontages

For buildings within the Secondary Frontages as defined in Appendix 7, Figure 7-3:

i. A minimum of 50% of the ground floor wall facing the street or public space, for the length of the ground floor wall, shall be of clear glass and capable of being used for displaying goods and services to passing pedestrians.

ii. Ground floor tenancies shall have the main customer entrance facing the street.

iii. There shall be no parking or service areas within the Secondary Frontage Area.

g) Outdoor Living Area

Each Residential Unit or any residential accommodation associated with non-residential activities shall be provided with an outdoor living area which:

i. Shall be for the exclusive use of the Residential Unit.

ii. Shall be readily accessible from a living area of a Residential Unit.

iii. Shall be free of driveways, manoeuvring area, parking spaces, accessory buildings, and service areas.

iv. Shall have a minimum area per Residential Unit of $12m^2$, and a minimum dimension of 2.5m width.

Note

1. Any communal outdoor living is optional, and shall be provided in addition to the above provisions.

h) Service Area

Each Residential Unit or any residential accommodation associated with non-residential activities shall be provided with service areas as follows.

i. A minimum service area of $10m^2$ with a minimum dimension of 2.5m located at ground floor level, and readily accessible to that residential accommodation.

ii. The service area shall be maintained with an all-weather, dust free surface.

iii. The vehicular access associated with a service area may not be located within a primary or secondary frontage.

iv. A service area shall not be able to be viewed from a public space.

v. The service area required under this rule shall be additional to the service area required under Volume 1, Chapter 13: Rototuna Town Centre, Rule 13.8.5.

i) Communal Outdoor Space

Any Residential Accommodation that does not constitute a Residential Unit (e.g. hostels, and motels), and all Visitor Accommodation shall provide a Communal Outdoor Living Area for each building which:

i. Has a minimum area which shall be equal to $12m^2$ multiplied by the number of Residential Units or 12% of the gross leasable area of that part of any building occupied by residential accommodation, whichever is the greater.

ii. Has a minimum dimension of not less than 4m.

iii. Is capable of containing a circle not less than 8m in diameter.

iv. Is readily accessible to those parts of any buildings occupied by Residential Activities.

1.4.4.5 Part 3: General Principles for Comprehensive Development Plans

Principle

Development of the Rototuna Town Centre shall be undertaken in accordance with a CDP to be approved by Council for the individual Areas shown in Appendix 7, Figure 7-2.

Explanation

An application for a CDP needs to address the following.

a) The overall design of the Rototuna Town Centre achieves aesthetic and architectural coherence, and is of a design, scale, form and character appropriate to its unique location.

b) The arrangement of buildings, car parking, service areas, and open spaces including provision for vehicular, cycle and pedestrian circulation will:

i. Enable the establishment of activities that are appropriate for the comfort, and convenience of visitors to the Rototuna Suburban Centre, and the local community.

ii. Be safe, and convenient, and achieve high standards of amenity.

iii. Be functionally linked with, and physically connected by, walkways/cycleways to the suburban centre.

iv. Reinforce high quality urban design, particularly the orientation of buildings to outdoor public spaces, transport corridors, and utilising a variety of architectural elements.

v. Provide for appropriate public access (pedestrian and cyclists) to, and around the area.

vi. Provide direct access paths on the most well-used routes with appropriate lighting, landscaping, and seating.

vii. Buildings shall be constructed from solid and durable materials to ensure a high standard of aesthetic coherence, and amenity consistent with the aim of providing an attractive suburban centre.

c) Design and layout of transport corridors

i. To ensure appropriate connections to existing, and future transport corridors.

ii. Respond to the site's existing landform, vegetation, views, water courses (for the purposes of stormwater runoff), and areas of public open space.

iii. Accommodate safe traffic speeds, and sightlines for all transport corridors users (pedestrians, cyclists, and motorists).

iv. Provide sufficient width to safely accommodate all transport corridor users, parking, footpaths, cycle ways and amenity landscaping.

v. Promote a consistent design theme to achieve high amenity values.

vi. Have regard to the future design relationship between the transport corridors, adjoining land and adjacent precincts.

vii. Design guidance for transport corridors can be found in Appendix 15-6: Criteria for the Form of Transport Corridors, and the Hamilton City Infrastructure Technical Specifications.

d) Type, form, and density of housing

Whether future development sites have been identified in a manner that:

i. Responds to the context within which the development site is to be located, including roads, open space, pedestrian linkages, views and natural features.

ii. Is appropriate to the type, and form of housing (medium density or high density).

iii. Is in accordance with policies and rules in Volume 1, Chapter 13: Rototuna Town Centre Zone, setting out the required yield for the various precincts.

iv. Has regard to the relationship with existing developed areas.

v. Gives consideration to the size, shape and aspect of the land, and its suitability for future development, with particular regard to the relationship of the site to the transport corridor, and adjoining sites.

vi. Integrates the development of sites with the relevant precinct as a whole.

1.4.4.6 Part 4: Principles and Assessment Criteria for Precincts

a) Retail Precinct 1

Principle

The Retail 1 precinct faces onto the Main Street and Public Square, and adjoins the proposed library and aquatic centre. This is the main shopping area within the centre and activities have been specifically selected to create a vibrant and vital centre. It is therefore important that there is a continuity of buildings facing onto the street and that they have 'active' frontages. This coupled with the range of activities and public realm elements (footpaths, lighting, landscaping, street furniture, open space, etc) play an important role in creating an attractive and thriving Town Centre.

Figure 1.4.4a: Main shopping street



Explanation

The intent is to create a community focal point providing employment, shopping, recreation and passenger transport opportunities for a locally-based population. A key consideration is the creation of a local identity for Rototuna's main retail area. The centre's design needs to be of a high quality so that people want to shop, linger, live, work and play within its environs. Therefore the setting needs to be safe, attractive, comfortable, accessible and durable. This is achieved by ensuring that buildings have 'active' street frontages. The scale and form of buildings should be of a fine grain and designed to reflect the street's pedestrian focus.

It is envisaged that buildings within this part of Rototuna will be a minimum of two levels. Residential activities must be able to protect themselves from adjacent activities namely restaurants, bars (licensed premises) and bakeries, as these activities operate at a time when they may disturb residents. One key consideration is the protection of business land in, and around, this centre. Locations that work for businesses are fewer than for residential.

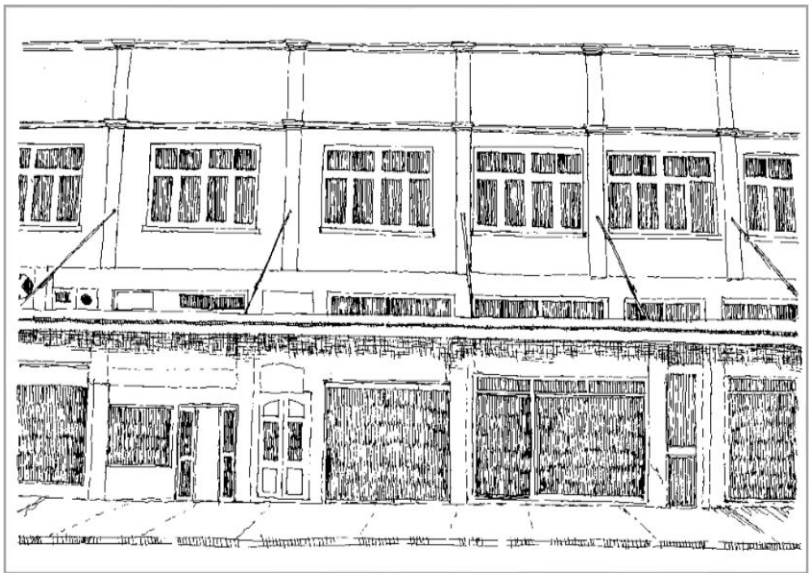
Assessment Criteria

1. Active Street Frontages

Active street frontages add interest, life and vitality to the public realm. This means:

i. Buildings must contain street level activity, along with frequent doors, windows and few blank walls, which allows a visual connection between people within the building, and those on the street.
ii. Shop frontages should be narrow to provide frequent changes in use and add visual interest.
iii. Building entries need to be clearly identifiable, face onto the street and be at the same level as the street.

Figure 1.4.4b: Active street frontages



2. Building Design – Form and Appearance

Building design defines the public realm while setting the scene for character and form including window, door proportion and placement. This means:

High quality design

i. Buildings should be designed to be of a high quality and help create a unique identity and character.
ii. Durable materials should be used.

Building continuity

iii. Buildings need to be designed so that they line both sides of the street. Minor modulation to the building's frontage is acceptable (including pedestrian entrances, windows, bay windows, etc) provided street front continuity is not compromised.

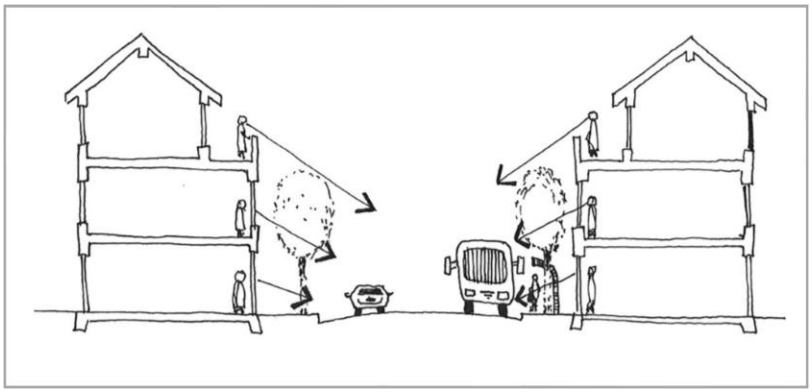
Corner buildings

iv. Where buildings are located on street corners (intersection of two streets) architectural details should be used to emphasise and address the street corner.

Passive surveillance

v. Buildings should be designed so that their occupants can overlook the street and public open space.

Figure 1.4.4c: Passive surveillance



Public access

vi. Buildings facing onto open space are required to create openings so people can access such buildings from open space areas.

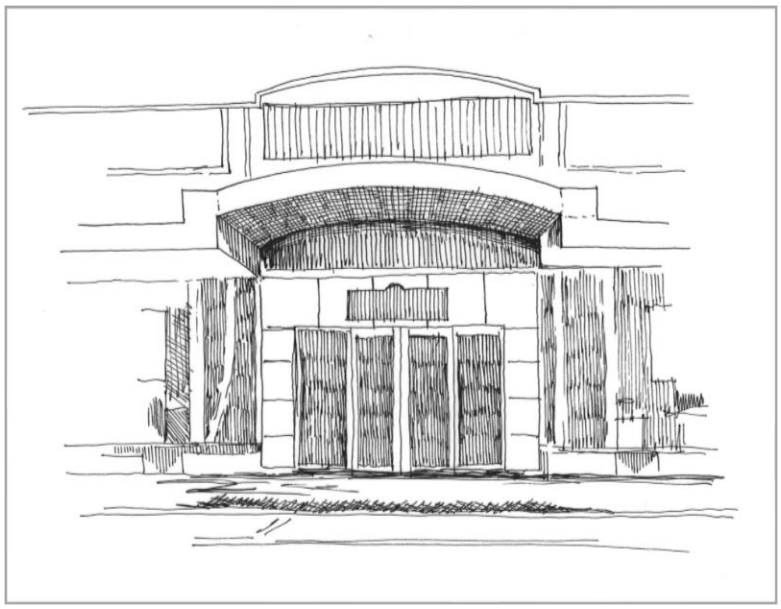
vii. Access into buildings should be at grade for both pedestrians and vehicles, to reduce the need for pedestrians to negotiate changes in footpath grade.

Building façades

viii. Building façades should incorporate the following features.

- Articulation, celebration of main building entrances, use of projections such as bays and balconies.

Figure 1.4.4d: Building façades



- Narrow building frontages – this gives the street scene a vertical as opposed to a horizontal emphasis.
- Variation in materials, colour, window shape and size to accentuate and highlight features.
- Use eaves, and window sills to create interest for street users.
- Car parking and service entries need to be designed so they have a minimal effect on building continuity, where possible using rear lanes and access ways.
- Use architectural details to differentiate building levels, e.g. the building's ground, middle and upper levels.
- Blank façades which are visible from public spaces are inappropriate.

Rooftops

ix. Integrate lift plant, and mechanical services into the building's roof so they are not visible from public spaces.
x. Orientate satellite dishes, telecommunication antennae, and air conditioning units so they are not visible from public spaces.
xi. Use a variety of roof forms to provide visual interest. Sections of long horizontal 'flat' roofs are inappropriate.

Acoustic amenity

xii. Apartment buildings need to be designed so that residents are not disturbed by street noise or from neighbouring residents.

b) Retail Precinct 2:

Principle

This Precinct is separated from the Retail 1 Precinct by a proposed drainage reserve containing a watercourse. The Retail 1 Precinct contains similar land uses to the Retail 1 Precinct. The main difference is that provision is made for larger format retailing in Retail 2.

Explanation

It is still preferable that buildings provide an active frontage to the street, either through a main entrance or by sleeving the development with smaller retail outlets.

Assessment Criteria

The same assessment criteria for Retail 1 also applies to the Retail 2 area. For larger scale buildings, use should be made of the Employment Precinct assessment criteria outlined below.

c) Employment Precinct:

Principle

The Employment Precinct provides opportunity for business, and light industry. In certain instances it may be necessary to buffer this precinct from adjacent residential areas.

Explanation

Employment Precinct land will not provide the level of amenity found within the Retail 1, and 2 zones. However these zones will be used by Town Centre workers, and visitors, and pedestrians walking from areas beyond it.

Front Façades, and Entrances

Business buildings are often of a larger scale, and can therefore potentially create adverse effects due to the traffic they attract, e.g. conflicts between visitors, staff, and service based vehicles. Due to their size these buildings can often have large blank façades making it difficult to create an attractive street scene.

Assessment Criteria

i. Site entrances need to be obvious, and located next to vehicular and pedestrian entrances from the street.

ii. Pedestrian walkways should be provided directly from the public footpath to the building's front door.

iii. Buildings should make a positive connection with the street. This can be achieved by designing buildings so they present a narrow face to the street and locating building mass away from the frontage.

Figure 1.4.4e: Example light industry



iv. Signage should be minimal, and clear – the focus should be on business identification rather than promotion of goods and services.
v. Office components should be located towards the building's front, since this minimises vehicle/pedestrian conflicts.
vi. Corner buildings – refer Retail Area 1 buildings.

Loading and servicing

vii. Storage areas should be located at the rear or side of buildings, and ensure that they are screened from the street, so that the collection of rubbish, waste products, and goods cannot be viewed from the street.

viii. Car parking should be located at the side or near the front of buildings, as these areas need to be visible from the street so that visitors do not enter unsafe or hazardous areas.

Landscaping

ix. Use landscaping to help soften the appearance of large buildings, provide amenity, and screen loading, and service areas.

x. Where possible use landscaping to mitigate stormwater run-off as this helps to reduce the need for piped infrastructure.

xi. Use landscaping to provide visual relief to areas of car parking.

Buffers

In certain circumstances, it may be necessary to buffer employment activity to protect the adjacent residential areas. Buffers generally consist of a physical element that acts as a barrier, screening device or shield between quiet areas, and noise producing areas of a single development. Buffers are essential in that they help maintain good levels of noise and visual privacy, thereby providing an acceptable degree of amenity for all occupants.

Examples of buffers include:

- Physical distance – a space or courtyard separating employment and residential uses to sufficiently protect residents from the noise source.
- Structural element – a well insulated exterior wall may minimise noise transmission between buildings. Similarly horizontal separation between activities such as commercial, offices, and upper residential floors.

Landscape feature

Trees/vegetation can be used as a buffer. Other landscape buffers include: ground level changes along with planting to create 'screens' or 'shields'.

d) Residential Mixed-use Precinct

Principle

An area of residential mixed-use has been incorporated into the concept plan to further encourage choice and diversity. When designing mixed-use development it is important to ensure that buildings can accommodate a range of different uses, as these can change over time.

Explanation

Mixed-use development needs to provide a degree of flexibility so that the buildings can respond to changes in demand whether this is office, residential or retail. Such development can encourage people to use the centre outside the working day. Business activity helps to create vibrancy and life including 24- hour occupancy of buildings.

Assessment Criteria

i. Residential entries need to be clearly demarcated and separated from business entries.

ii. Separate business loading docks and waste storage areas from residential access.

iii. Ensure that the design of residential units recognises the needs for servicing, privacy and outlook, and that this is not compromised by business activities.

iv. Consider acoustic privacy. The design needs to specifically address this issue demonstrating that an acceptable residential living environment can be created and maintained.

Figure 1.4.4f: Example mixed-use development



e) Residential Medium Density – in the Rototuna Town Centre Medium Density Precinct

Principle

Medium density housing typically consists of a mix of detached and terraced type housing.

Explanation

Housing lots at medium densities typically deliver around 25 units per hectare, and typically comprise a mix of single dwellings located on single sites and terraced dwellings. There are important amenity considerations associated with this development form. For example how buildings address the street and how they create visual interest.

Figure 1.4.4g: Example medium density housing



Assessment Criteria

i. Buildings need to be designed to form a positive relationship with the street so that:

- They provide for streetscape amenity, through the careful placement of entry doors, windows, porches, balconies, entry courtyards as these attributes help to create an active frontage to the street.
- They demonstrate the transition between the street (public realm), the building's front yard (semi-public realm) and the building's private rear yard.
- Visitors know how to access the building.

ii. Design balconies so that they face onto public space/roads, including a clear outlook of at least 6m which is not of adjacent properties. It is preferable that balconies which face roads be designed as recessed elements so they do not protrude from the face of buildings.

iii. Site buildings to maximise sunlight into indoor and outdoor areas:

- Maximise north facing windows.
- Maximise exposure to private open space e.g. rear yards facing north.

iv. Make provision within each residential unit for:

- Collection of recyclable materials and an area for rubbish bins, ensuring they are located and designed not to be visible from the street or other public places.
- Storage area for outdoor equipment e.g. bicycles, prams, sports equipment etc.

v. Use landscaping to provide visual interest, create privacy and shelter people from prevailing winds.

vi. Maximise privacy between dwellings by taking extra care over the interface at the sides of adjacent buildings. This is dependent on each development and local circumstances.

vii. Design buildings so they provide visual interest, diversity and variation. This helps to avoid monotonous repetition of building form including: roof pitches, materials, decks, courtyards, balconies and other detailing.

viii. Design buildings to address local conditions including topography, views and climate. Use eaves to control summer sun, provide shelter from rain and shelter courtyards from wind.

ix. Avoid locating satellite dishes and clothes lines at the front of buildings. Locate these items so they are not clearly visible from the street.

x. Garages and car ports need to be designed and located so that:

- There is sufficient space to park a car between the site's front boundary and the front of the garage/carport.
- Garages and carports are set back from the dwelling's main façade.
- They relate to the building's design in terms of height, roof form, materials, detailing and colours.

f) Residential High Density Precinct

Principle

Within this precinct, the form of development is likely to be comprised of two level apartments or terraced housing. It is preferable that such development faces onto, and overlooks the active recreation reserve.

Explanation

Locating higher density housing within a five minute walk of the Rototuna Town Centre helps increase the probability of people using passenger transport. It also increases the likelihood of people walking to the main street as opposed to taking the car.

Higher density residential housing requires a higher design standard including improved pedestrian and cycle connections to the Town Centre. In Rototuna's case the high density area is located on either side of the Active Recreation Reserve.

With this housing it is important that appropriate scale is maintained to avoid the creation of large monolithic structures similar in appearance to commercial and industrial buildings.

Height needs to be sensitively managed, pitched roofs can assist in this regard. Flat roofs are discouraged as these often give the development a strong horizontal feel and can be monotonous.

The key is to create a degree of variety, and this means using balconies, recesses, and voids, along with careful roof design.

Figure 1.4.4h: Example of high density housing

Assessment Criteria



i. The above criteria for Residential Medium Density housing, namely i, ii, iii, iv, v, vi, viii, and ix.

ii. For iv above consideration needs to be given to the provision of these items either within an individual building or within an apartment complex.

iii. Where possible, residential development should front onto and overlook the Active Recreation Reserve.

iv. Where vehicular access is from the street (at the front of the development) parking bays and garages should be set to the side/rear of buildings.

v. Rear lane access may also be appropriate to reduce the need for garages located at the development's street front.

vi. Consider locating car parking areas half a level below ground and placing buildings half a level above. This helps reduce the amount of space taken up by garaging and parking on a given site.

vii. Use elements such as balconies, recesses, voids, materials, colours and roof design to create variety, such features should be used to reduce building mass.

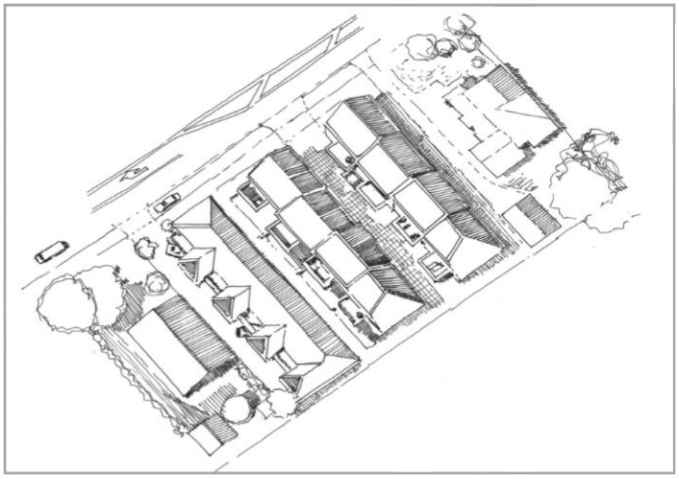
viii. Design buildings so they provide a range of accommodation choice in terms of type, style, and size.

ix. Consider acoustic privacy. The design needs to specifically address this key consideration and demonstrate that an acceptable residential living environment can be created and maintained. This can be achieved by:

- Placing living rooms of one apartment adjacent to the living rooms of adjacent apartments along with bedrooms next to bedrooms.
- Locate noise sources such as kitchens, bathrooms and laundries next to noise sources in adjacent apartments.
- Locate vehicle, pedestrian entranceways away from bedroom areas.

xiii. Avoid locating buildings so that they are perpendicular to the street as this presents an extremely poor street interface and adversely affects the privacy of neighbouring units.

Figure 1.4.4i: Example of high density housing



g) Community Facilities

Principle

A feature of the concept plan is the provision of new community facilities, namely a library, aquatic centre and the secondary school (outside the concept plan boundary). This also includes some land which will be privately developed, along with an existing church.

Explanation

The proper integration of these facilities with the movement and activity network is key to ensuring the success of the Rototuna Town Centre. It is envisaged that other community facilities will locate within the centre. Where this occurs it is important that these activities face onto transport corridors, for example Borman Road.

Although these features have not been designed in detail the following general guidelines apply.

Assessment Criteria

i. Library

The library needs to be designed and located so that people will choose to visit because it is easy to use, exciting, modern and comfortable. The following therefore applies.

- The library is envisaged as a landmark building that will occupy a key central site within the centre, adjoining and defining one edge of the public square.
- The library should have active edges towards the public square, the main street to the northeast and the drainage reserve to the northwest. Avoid presenting blank façades to public areas.
- The library's main entrance shall be directly off the public square and the building shall be located to help define the square's southwestern edge.

- The design of the building should focus on facilitating pedestrian movement in, and around, the site.

ii. Aquatic Centre

The aquatic centre calls for the design of the facility to reflect its setting within the Rototuna Town Centre.

Currently, the scope of this project includes the design, construction and commissioning of a new aquatic centre facility, landscape works and parking facilities. A concept design is to be developed for a Community Centre/Recreation facility in conjunction with the concept design for the aquatic centre.

The aquatic centre will be located on North City Road, directly opposite the public square. The following therefore applies.

- The building is envisaged to be a landmark building and will be a significant feature for the centre.
- The building's main entrance shall be located so people can gain direct access from the main street.
- The building's northern and western façades including the changing facility for the active reserve, should be carefully designed to actively engage with the adjacent open spaces.

h) Active Recreation

Principle

Central to the Town Centre is a large active recreation reserve which is intended to be a focal point for the local community. The development of this area is critical to the functioning of the wider area. The detailed design and operation of the reserve will be subject to a Reserve Management Plan, which has yet to be finalised.

Explanation

Good visual and physical connectivity between the reserve and adjoining uses is important. The drainage reserve/watercourse corridor provides a key linking element of this connectivity within the area.

The following therefore applies.

i. The reserve will be primarily used as an active sports area containing fields and court areas.

ii. The reserve should be bounded by roads or lanes to ensure effective connectivity and integration.

iii. The western edge of the park needs to be activated with a shared pedestrian/cycle route.

iv. The reserve should be designed to be accessible from surrounding dwellings.

v. The design of the park should enable effective access for pedestrians, cyclists and the disabled.

i) Public Square

Principle

A key feature of the concept is the provision of a key piece of public open space – a public square. Conceptually, this space marks the intersection of the main street and the drainage reserve/watercourse, and links the public library to the aquatic centre (refer concept plan). The square is located north-east of the library, opening out onto the main street.

Explanation

It is envisaged that the square will be a primary gathering and social space for the wider area. The creation of a high quality, functional public space is essential to the vitality of the Town Centre.

Assessment Criteria

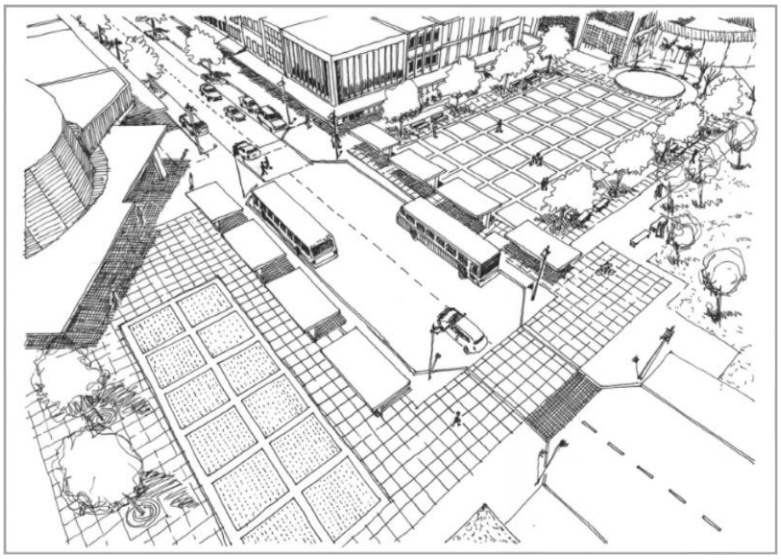
i. The Public Square needs to be designed to accommodate a range of uses and activities, including outdoor dining.

ii. The Public Square is to be flanked by retail development, the library, drainage reserve and main street. It is important that active edges are provided around the perimeter of this space. A key component is entrances to these activities opening out onto this square.

iii. The space should contain key amenity features including, lighting, seating, trees/landscaping, public art.

iv. CPTED principles should be incorporated into the Public Square's design.

Figure 1.4.4j: Example of a public square



j) Drainage Reserve/Watercourse

Principle

Another unifying feature of the concept plan is the central drainage reserve/watercourse corridor. Its principal function is stormwater management however it also forms part of the open space network catering for pedestrians, and cyclists.

Explanation

It is important that this corridor is designed as a movement corridor, providing a link from the Te Awa O Katapaki esplanade in the southwest to the northern areas of Rototuna. This link will help provide strong connections with the surrounding residential areas for both pedestrians and cyclists.

Furthermore, the concept plan includes a larger green space at its southwestern corner. This space will be particularly visible from the Town Centre and it is therefore important that this vista is maintained and reinforced. From the north the watercourse will link with the active recreation reserve creating a green edge to the playing fields and secondary school.

The precise form and function of this corridor will be determined by hydrological requirements and controls but is likely to become more urban in character as it gets closer to the main street. The following therefore applies.

i. All buildings that face onto the drainage reserve/watercourse corridor need to be designed so that the ground floor faces onto the drainage reserve/watercourse corridor.

ii. Fences that line the drainage reserve/watercourse corridor need to be no higher than 1.4m if of a solid construction; if permeable (pool fence or similar) they should be up to but no greater than 1.8m in height.

iii. The drainage reserve/watercourse corridor needs to be designed and developed to be an attractive landscaped space.

iv. Entrance and exit points onto the corridor should be aligned to enable connections to be made with the wider pedestrian and cycleway network, and may require bridging of the watercourse.

k) Transport Network

1. Street Design

Principle

The creation of attractive, safe streets which encourage walking/cycling is an important goal. The transport network is required to provide effective movement for all transport modes.

Explanation

A key consideration is the provision for pedestrian and cycle paths. The Town Centre will be promoted as a walkable node to cater for the large number of people anticipated to be living within a 10 minute walk (800m) of its centre.

The concept plan indicates a pedestrian/cycle path along the active reserve's western edge. The link could be reinforced with appropriate landscaping and lighting. This link will provide good connectivity to the north side of the site whilst providing an effective linkage to schools and the bus interchange.

The Rototuna Town Centre comprises minor collector and major arterial transport corridors which will be designed in accordance with the guidance in Appendix 15-6, and the Hamilton City Infrastructure Technical Specifications. This concept contains three main types of street; these are the Main Street,

Park Lane and local streets. The following guidelines apply to the three street typologies.

Main Street

i. North City Road is to be designed to function as the Town Centre's main street.

ii. The carriageway needs to accommodate buses, cars and cyclists, and be designed so these uses can safely co-exist with one another. Footpaths need to be sufficiently wide to provide for pedestrians along with opportunities for street-side dining.

iii. Parking should be accommodated along with large structure trees within the parking area.

iv. The street should be designed to create a low speed environment.

v. All crossing points should be at grade.

vi. Develop a 'shared street' concept (where pedestrians have priority) in conjunction with the passenger transport interchange.

Park Lane

vii. The Lane's primary function is to provide access to the active recreation reserve and adjacent residential development.

viii. Park Lane must provide a strong interface with the edge of the recreation reserve.

ix. The street must be designed to have a low speed environment.

x. A shared pedestrian/cycle path needs to be provided along the edge of the recreation reserve.

xi. Angled parking should be provided along the edge of the recreation reserve, along with planted berms (containing large specimen trees).

xii. Design safe pedestrian/cycle access ways to the schools.

Local Streets

xiii. These streets are intended to provide connections to other areas of the Town Centre.

xiv. The carriageway needs to be designed to accommodate vehicles, cyclists and pedestrians, and to include parking (angle and parallel) along with provision for service vehicles. Paved pavement areas need to be provided on both sides of the street.

xv. Landscaping is to include large specimen trees on either side of these streets.

2. Car Parking

Principle

An adequate number of parking spaces needs to be provided to enable the Town Centre to function effectively.

Explanation

Parking provision that is not carefully integrated with the surrounding buildings has the potential to disrupt the centre's pedestrian-friendly nature and compact urban form.

The following therefore applies.

i. Large open parking areas should be avoided, especially along primary and secondary street frontages as this can disrupt building continuity.

ii. Parking areas should be located at the rear or side of development or towards the centre's perimeter.

iii. Shared parking should be promoted so it can be used by a multitude of users rather than those visiting a single building.

iv. Multi-level parking buildings should be located away from the main street unless they can be designed to accommodate 'active' ground floor uses. Consideration needs to be given to the design of the building's façade so this has a minimal effect on the centre's streetscape.

v. Parking and circulation areas adjacent to the open space network need to be carefully designed and landscaped to integrate with the streetscape, landscape and buildings.

3. Passenger Transport

Within the Town Centre, it is intended that bus stops will be integrated into the carriageway of the transport corridors. A transport interchange will be provided and located opposite the public square on either side of the Main Street. A number of routes will converge on the centre at this point enabling people to transfer from one route to another.

The interchange (including shelters, bins and other streetscape elements) needs to be carefully designed to reflect and compliment street character, the public square, and surrounding buildings. The street at this location needs to be designed as a 'shared space' (where no single mode has priority) to facilitate the large number of pedestrians anticipated to be crossing the transport corridor at this point.

4. Gateway design principles

Two gateways have been identified on the concept plan, to define the start and end of the heart of the Rototuna centre. Main road intersections provide opportunities for landmark buildings/structures which are often used to announce the sense of arrival and departure.

It is therefore important that the gateway features be carefully designed so that views can terminate upon them. The exact form of the Gateway features has yet to be determined and will be developed as part of the CDP for the area. Council's Public Art Plan will be a key reference point.

1.4.5 Key Development Site Design Guidance

1.4.5.1 Purpose

These design guidelines apply to new buildings, including, where appropriate, alterations and additions to existing buildings on Key Development Sites identified in Volume 2, Appendix 5, Figure 5-9.

The intention of the guidelines is to provide landowners, applicants, Council regulatory staff and decision makers with an indication of desired outcomes for the sites based on the objectives and policies of the Central City area. Key design principles have been provided for each site to promote and encourage good urban design outcomes. The priority outcomes, concept plans, sections and precedent images are indicative only, and represent one way in which the key design principles for development may be applied.

1.4.5.2 How to use the Design Guide

Applications for new buildings, including, where appropriate, alterations and additions to existing buildings on Key Development Sites identified in Volume 2, Appendix 5, Figure 5-9 shall provide an assessment of how the proposed design will promote the key design principles and, in doing so, achieve the objectives and policies of the Central City area.

1.4.5.3 Key Development Site 1 – Cobham Drive

Located in the City Living Precinct, bounded by Clarence and Anglesea Streets and Cobham Drive (refer to Figure 1.4.5a).

a) **Site Characteristics**

i. Flat, Central City-edge fringe, 2991m^2.

ii. The site occupies a prominent corner location at the southern entry to the Central City with potential to create a memorable corner reinforced by the design of the building.

iii. The site is currently under-utilised accommodating a 730m^2 building with the remaining site occupied by grade car parking (refer to Figure 1.4.5b).

iv. The site has a north-facing frontage, which faces onto a no-exit street (which has potential to be upgraded to enhance local amenity.

v. The potential for the site to be a pedestrian destination from the Central City is limited, however, there is potential for the site to be an anchor to activities in the existing blocks to the north.

vi. There is the potential to improve site accessfrom Clarence Street, improving access to the arterial transport network.

b) **Key Design Principles**

i. Maximise the development potential of the site.

ii. Provide for a diverse range of activities, including appropriate ground floor activities that address Clarence Street (e.g. small format retail, dining).

iii. High-quality living environment shall be encouraged through appropriately sized and located internal living spaces with adequate external outlook space, orientated to maximise solar gain.

iv. Locate internal shared open space adjacent to Clarence Street and design this as a destination.Council has the potential to provide for 90 degree parking along Clarence Street, adjacent to street facing and courtyard dining.

v. Provide for retail, commercial office and other uses that add to the vitality of the City Centre.

vi. Provide for car parking away from the street (e.g. internal, above ground or below ground).

c) **Short term priority outcomes**

i. Landowners / applicants to develop a site masterplan to review the bulk and location options, and assess the usability of landscape strips currently edging arterial transport corridors.

ii. Develop the site to establish an attractive built form entry to Hamilton's Central City.

iii. Subject to funding, Council to upgrade the street amenity (paving, trees, carparking) at the same time as building development occurs.

Note
Landowners/applicants of the key development site and Council are encouraged to liaise together, to work towards a common vision for the key development site (led by the landowner/applicants) and the adjoining public realm (along Clarence Street, led by Council), to achieve the Key Design Principles outlined above.

d) **Medium to long term priority outcomes**

i. Build on the precedent set by the primary redevelopment and encourage the revitalisation of Clarence Street.

e) **Proposed mix of uses on site**

i. Net retail and commercial approximately 5,600m^2 (approximately 225 employees/235 employees per hectare).

ii. Net residential: approx. 36 1-3 bedroom residential units; approx. 90-100 residents (approximately 100 dwellings per hectare).

f) Figures 1.4.5c to 1.4.5i show indicative concepts and future development preferences that are consistent with the design principles for this site.

Figure 1.4.5a: Location map of Key Development Site 1


ANGLESEA STREET
CLARENCE STREET
COBHAM DRIVE

Figure 1.4.5b: Existing situation on Key Development Site 1 (2014)



Figure 1.4.5c Indicative concept plan for Key Development Site 1 – long term vision

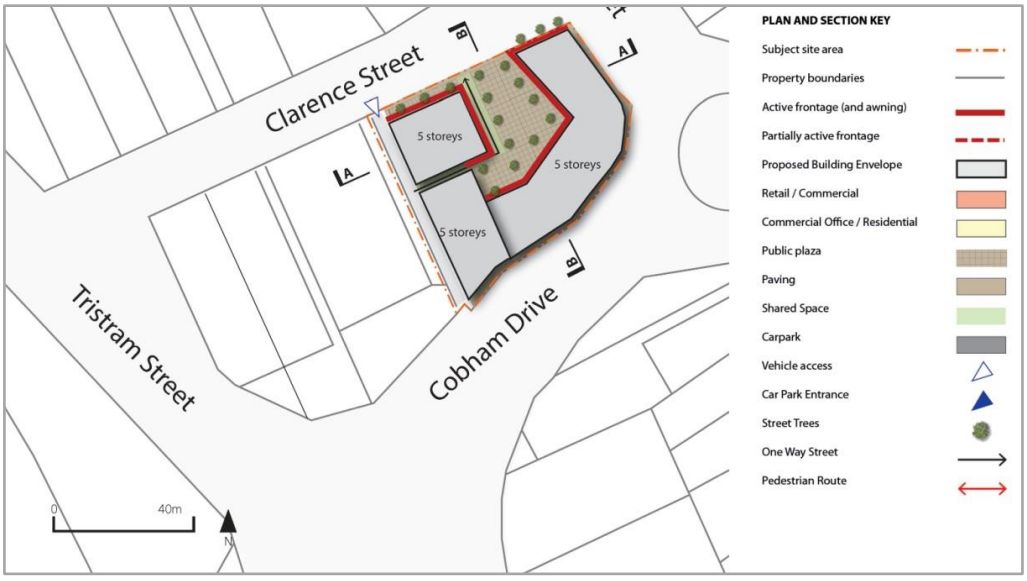


Figure 1.4.5d: Indicative concept cross section A-A for Key Development Site 1

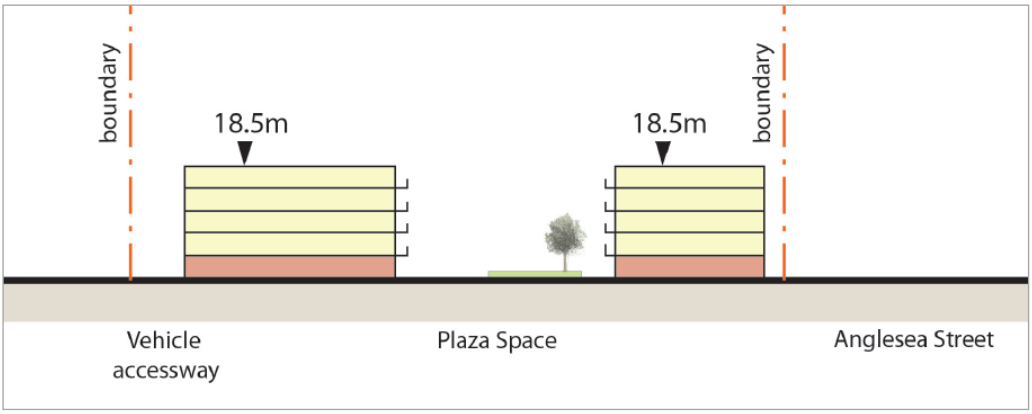


Figure 1.4.5e: Indicative concept cross section B-B for Key Development Site 1

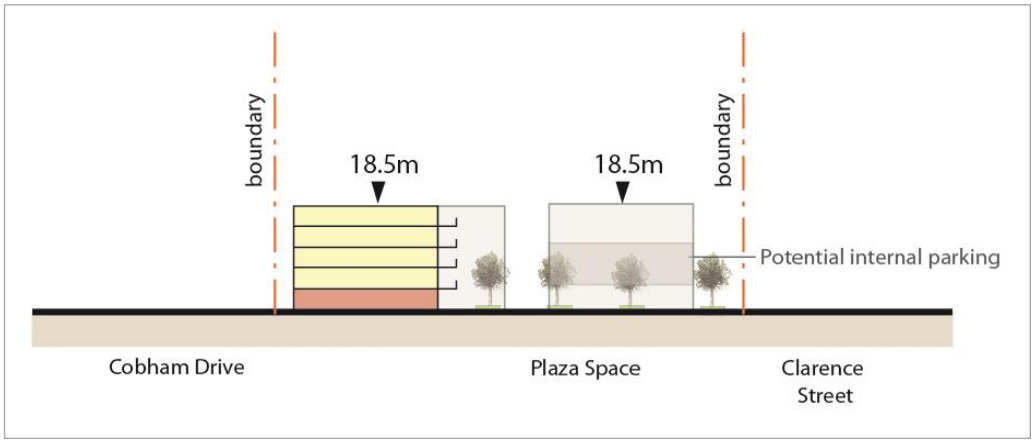


Figure 1.4.5f: Future development preference – indicative visualisation of potential future development showing active ground level, courtyards, streetscape improvements and five to six storey development emphasizing the gateway location



Figure 1.4.5g: Future development preference – architecture that responds to the site and its gateway location

Figure 1.4.5h: Future development preference – five storey commercial/mixed use with activate frontages along Clarence Street





Figure 1.4.5i: Future development preference – plaza space within the site



1.4.5.4 Key Development Site 2 – Corner of Alexandra and Hood Streets

Located in the Downtown Precinct, bounded by Alexandra, Hood and Anglesea Streets (refer to Figure 1.4.5j).

a) Site Characteristics

i. Flat, Central City site, 10,300m^2.

ii. Large block pattern.

iii. Currently dominated by car and service yards, and low density commercial uses (refer to Figure 1.4.5k).

iv. Located adjacent to an existing car parking building in close vicinity to Garden place and Victoria Street.

b) Key Design Principles

i. Maximise commercial development potential of the site, providing high quality offices with shared open space.

ii. Provide active frontages at ground level through appropriate commercial retail activities; increase public realm by requiring a 2m setback on Anglesea Street.

iii. Provide ongoing opportunity for existing uses including car sales, albeit in a higher amenity environment.

iv. Provide for through site links to assist in breaking up blocks, building upon wider proposals for future pedestrian connections.

v. Provide for underground parking where required.

c) Short term priority outcomes

i. Upgrade of Alexandra and western Hood Streets.

d) Medium to long term priority outcomes

i. Comprehensive development of sites, including provision of shared private public space and a pedestrian through link at mid block, between Anglesea and Alexandra Streets.

e) Proposed mix of uses on site

i. Net retail and commercial approx. 21,800m^2 (approximately 870 employees).

ii. No residential component is envisaged.

Figures 1.4.5l to 1.4.5r show indicative concepts and future development preferences that are consistent with the design principles for this site.

Figure 1.4.5j: Location map of Key Development Site 2



Figure 1.4.5k: Existing situation on Key Development Site 2 (2011)



Figure 1.4.5l: Indicative concept plan for Key Development Site 2 – long term vision

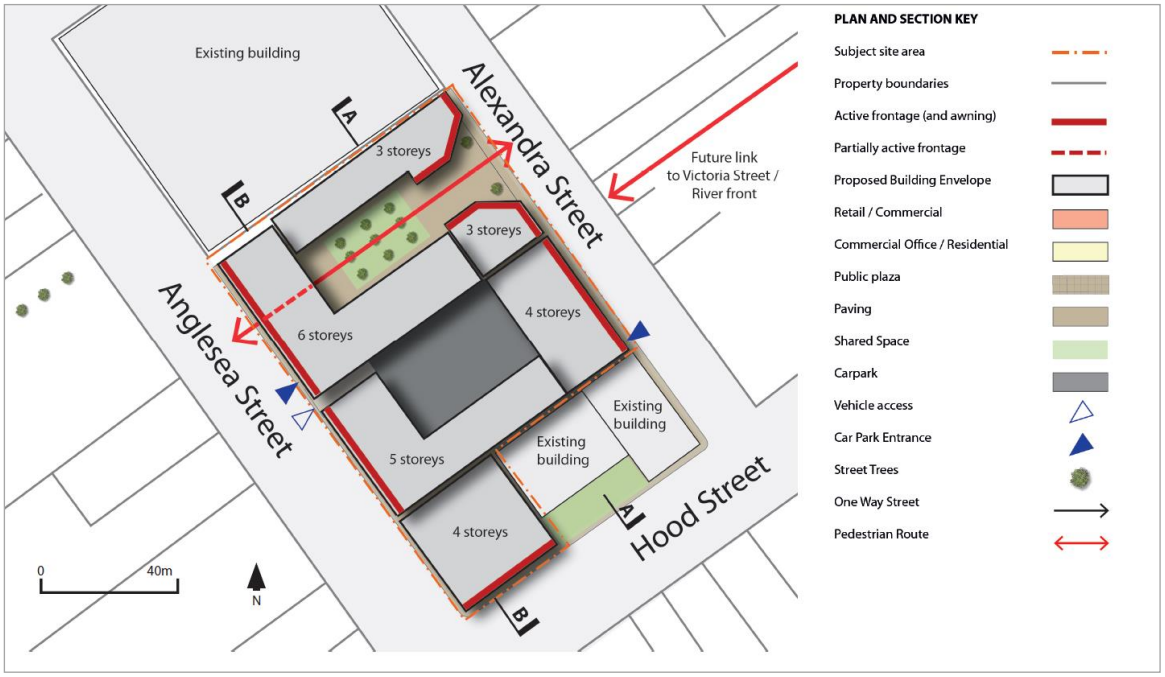


Figure 1.4.5m: Indicative concept cross section A-A for Key Development Site 1

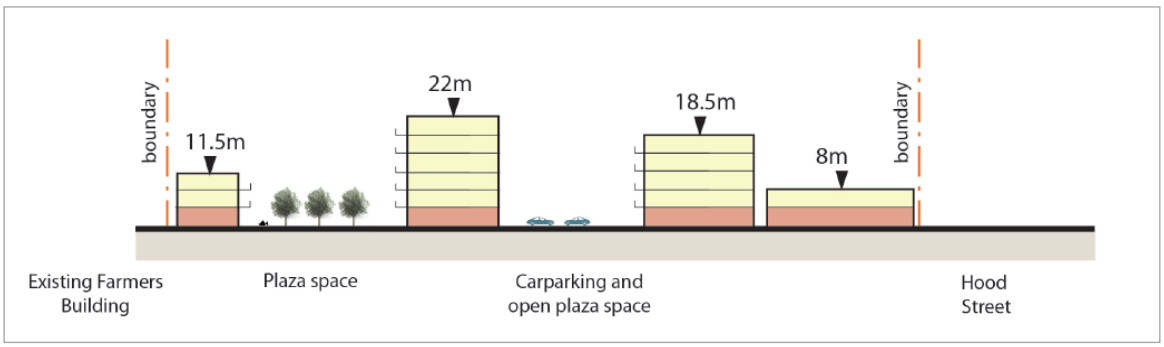


Figure 1.4.5n: Indicative concept cross section B-B for Key Development Site 1

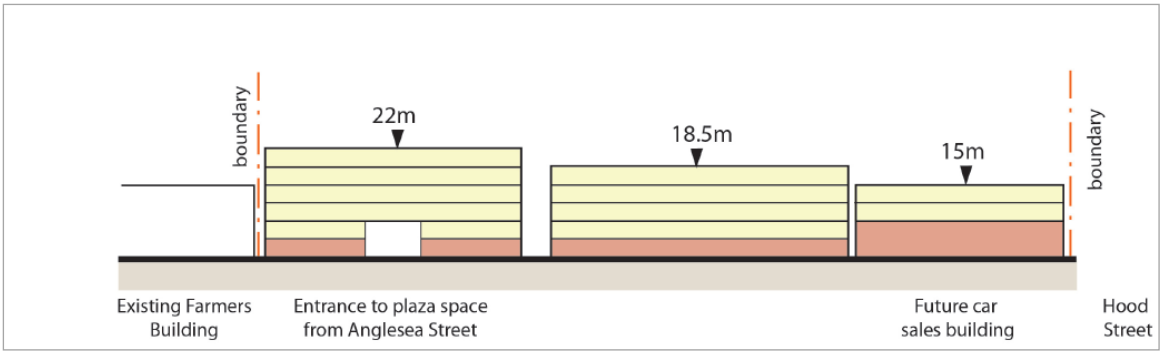


Figure 1.4.5o: Future development preference – Indicative visualisation of potential future development showing through-site links, active ground floor uses, improved streetscape, increased landscape amenity and high quality built form



Figure 1.4.5p: Future development preference – high quality, car showroom with offices above



Figure 1.4.5q: Future development preference – 3D model showing potential built form, with through-site links, internal courtyards and veranda cover



Figure 1.4.5r: Future development preference – internal public courtyard



1.4.5.5 Key Development Site 3 – Victoria on the River

Located in the Downtown Precinct, on Victoria Street (refer to Figure 1.4.5s).

a) Site Characteristics

i. Flat, riverside site, approximately 3,800 m^2.

ii. Located on Victoria Street, within the restaurant and cafe hub of the city

iii. Located adjacent to and with good views over the river; currently underutilised (predominantly parking) in relation to its strategic position within the city (refer to Figures 1.4.5t and 1.4.5u).

iv Potential to contribute to the revitalisation of the city centre and, in particular, enhance the relationship with the Waikato River.

b) Key Design Principles and Priority Outcomes

i. Maximise development potential of the site: provide for restaurant, cafe, small scale offices and similar uses at ground level, and for commercial and residential living at upper levels.

ii. Provide for a Riverfront promenade as outlined below in the indicative concept plan Figure 1.4.5v and in Figure 1.4.6b: Future Vision (2021).

iii. Provide north-south pedestrian access along the river's edge (through building setbacks), implemented over time with adjoining sites.

iv. Respect the existing built form pattern along Victoria Street through appropriate scale.

v. Residential and commercial units to have access to high amenity outdoor space.

vi. Provide access from Victoria Street through to public open space, adjacent to the river's edge.

vii. Provide for vehicle parking away from Victoria Street preferably underground, undercroft (sleeved) or at upper levels (subject to viability).

c) Short term priority outcomes

i. Masterplanning and redevelopment of site as a comprehensive development; access to public open space adjacent to rivers edge.

d) Medium to long term priority outcomes

i. Provision of access to lower river walkway, continued access along adjacent sites.

ii. Access to construction of, a pedestrian bridge across the river.

e) Proposed mix of uses on site

i. The site has the possibility to provide for up to approximately 10,000m2 of gross floor space.

ii. Land use at ground level should be limited to retail and small scale office activities.

iii. Land use at upper levels may be commercial and/or residential.

Figures 1.4.5v to 1.4.5cc show indicative concepts and future development preferences that are consistent with the design principles for this site.

Figure 1.4.5s: Location map of Key Development Site 3



Figure 1.4.5t: Existing situation on Key Development Site 3 (2011)



Figure 1.4.5u: Existing situation on Key Development Site 3 (2011)



Figure 1.4.5v: Indicative concept plan for Key Development Site 3 – long term vision

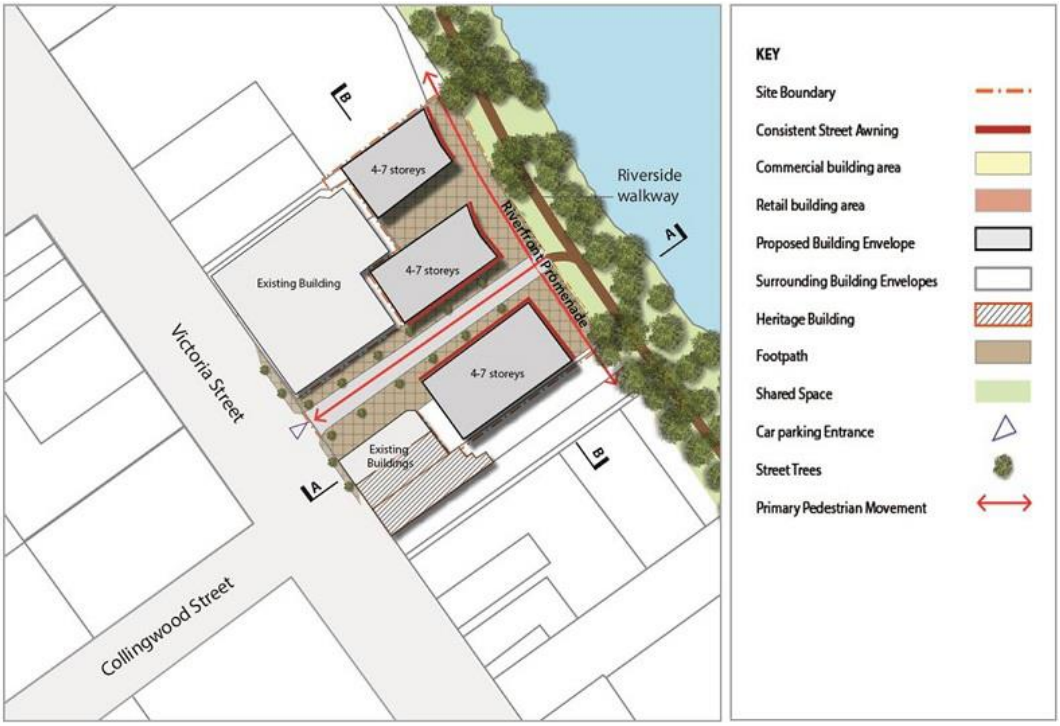


Figure 1.4.5w: Indicative concept cross section A-A for Key Development Site 3

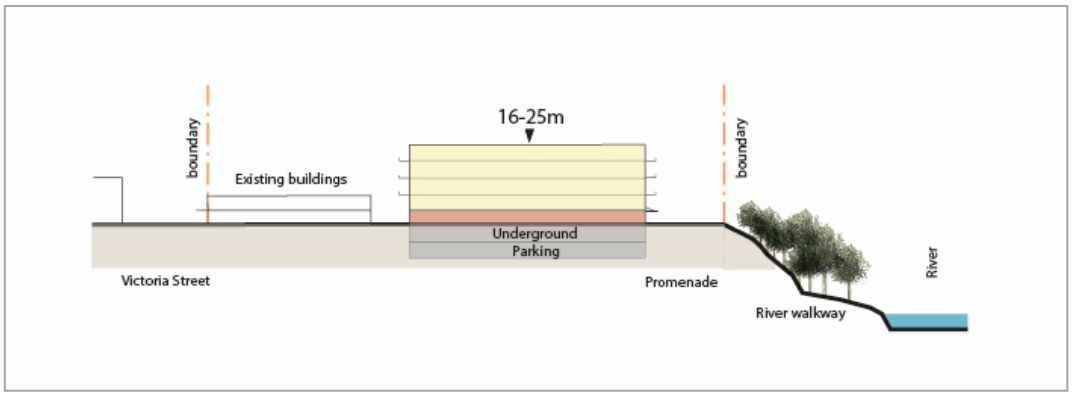


Figure 1.4.5x: Indicative concept cross section B-B for Key Development Site 3

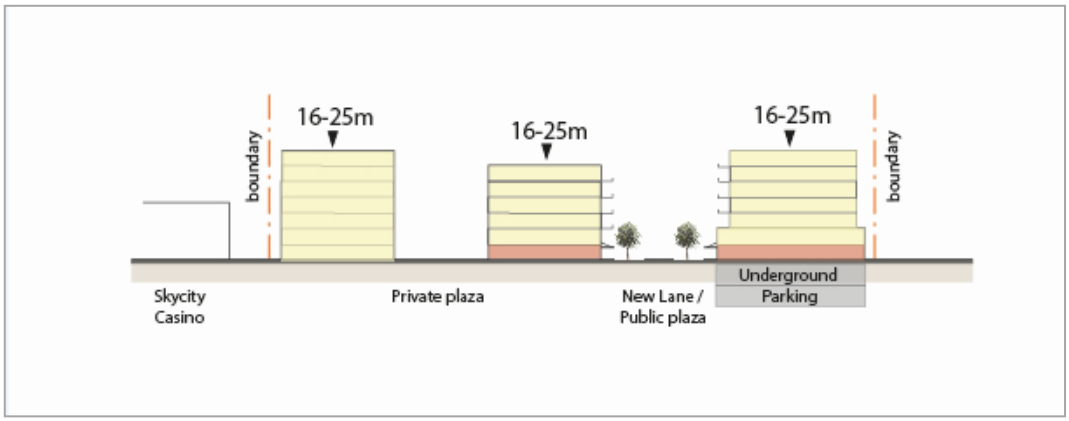


Figure 1.4.5y: Future development preference – upper level riverfront promenade and recreation space



Figure 1.4.5z: Future development preference – internal laneway/shared lane with active frontages



Figure 1.4.5aa: Future development preference – courtyard dining along an internal laneway with active frontages



Figure 1.4.5bb: Future development preference – Indicative visualisation of potential development showing a high quality through-site link connecting Victoria Street with the riverfront, active ground floor frontages, veranda cover and landscaping



Figure 1.4.5cc: Future development preference – indicative visualisation of future promenade along Victoria on the River, with access down to the river walkway and to a future river crossing



1.4.5.6 Key Development Site 4 – Warehouse/Kmart/Transport Centre Site

Located in the Downtown Precinct, bounded by Anglesea, Ward and Tristram Streets (refer to Figure 1.4.5dd).

a) Site Characteristics

i. Flat Central City site, 46,160m^2.

ii. Currently dominated by low density, large format, commercial use with little or no relationship to the surrounding public realm (refer to Figures 1.4.5ee and 1.4.5ff).

b) Key Design Principles

i. Maximise development potential of the site, providing flexibility and ensuring a high quality public realm is delivered, particularly along Ward and Bryce Streets.

Practice Note: Make full use of development potential, include a mix of uses and focus on the contribution of the building to the public realm.

ii. Provide frontages which promote activity and passive surveillance to provide for good pedestrian amenity on high pedestrian routes.

Practice Note: Provide active frontages to Key Development Site 4 where:

1. The buildings with public road frontage and frontage onto a through site link shall:

- *Provide at least 75% of the primary active frontage, and at least 50% of the secondary active frontage or through site link, as clear glazing (or equivalent) at ground floor level.*
- *Be capable of use for displaying goods and services to passing pedestrians.*
- *Not have painted, covered or otherwise altered glazed areas so as to render them ineffective in achieving the purpose of this rule.*

2. *Vehicular access across active frontages shall not use any more than 10% of the defined frontage.*
3. *The principle public entrance to a building shall be provided from the active frontage.*
4. *All storage areas should be situated within or to the rear of the buildings.*

iii. Provide for a north-south pedestrian through site link between Bryce Street and Ward Street through Key Development Site 4.

Practice Note: Enable a legible pedestrian connection and through site link that responds to or enhances pedestrian permeability, between street Ward Street and Bryce Street, taking into consideration the Transport Centre, traffic movements and potential pedestrian crossing points along those streets.

iv. Enhance crossing points between north and south blocks over Bryce Street while enabling traffic flows and access to parking along Bryce Street.

v. Provide appropriate built form to create a gateway to the Downtown Precinct.

Practice Note: The built form on the corner of Tristram and Ward Streets should reinforce the gateway function through appropriate height, architectural form and detailing.

vi. Protect the public transport function of the Transport Centre.

Practice Note: Maintain vehicle access points for the safe and efficient movement of the public transport vehicles to and from the transport centre.

c) Short term priority outcomes

i. Upgrade of Anglesea and Ward Streets.

d) Medium to long term priority outcomes

i. Comprehensive development of sites, to deliver a gateway building and attractive, safe streets and pedestrian spaces (including through site connectivity) which connect to the wider movement network.

e) Proposed mix of uses on site

i. A wide range of activities are appropriate for the site including retail, commercial office, cafes and restaurants, education, car parking buildings, residential apartments and other uses that add to the vitality of the city centre.

Figure 1.4.5dd: Location map of Key Development Site 4



Figure 1.4.5ee: Existing situation on Key Development Site 4 (2011)



Figure 1.4.5ff: Existing situation on Key Development Site 4 (2011)



Figures 1.4.5gg to 1.4.5kk show indicative concepts and future development preferences that are consistent with the design principles for this site.

Figure 1.4.5gg: Indicative concept plan for Key Development Site 4 – long term vision

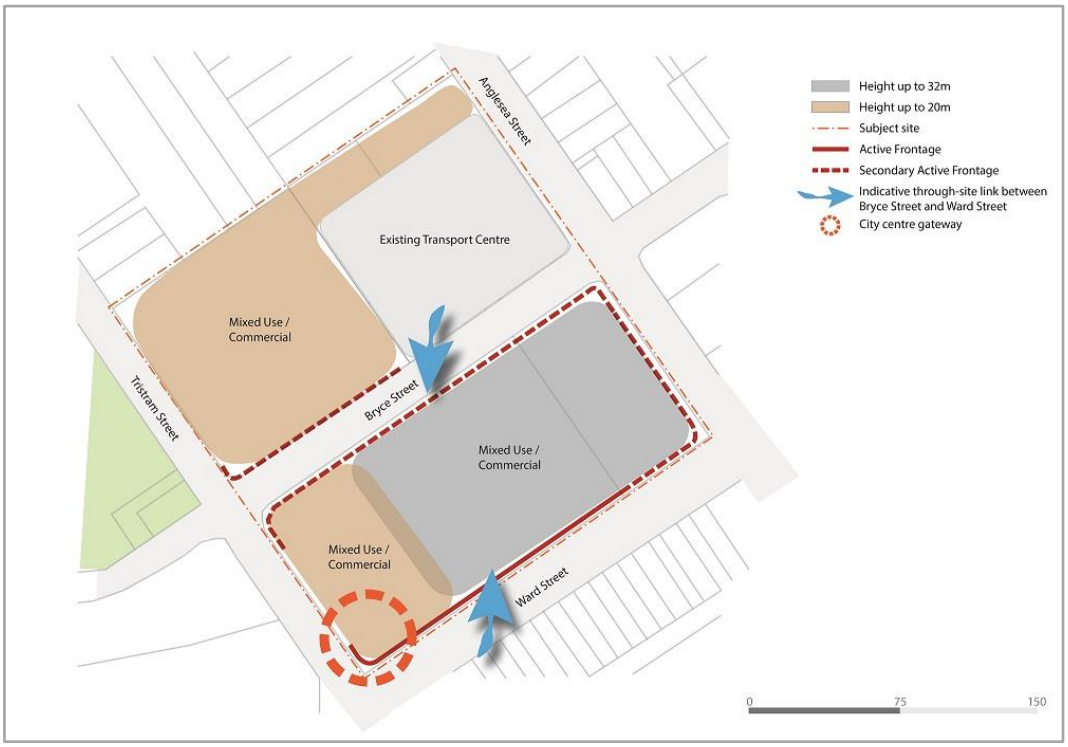


Figure 1.4.5hh : Future development preference – indicative visualisation of potential development showing an improved streetscape with increased pedestrian priority, active ground floor uses, enhanced landscaping and high quality built form contributing to a 'human scale' along the street.



Figure 1.4.5ii : Future development preference – activated through site link, human scale development



Figure 1.4.5jj : Future development preference – high quality built form, improved streetscape and landscaping



Figure 1.4.5kk : Future development preference – local dining along street edge/laneway



1.4.5.7 Key Development Site 5 – Countdown Site, Anglesea North

Located in City Living Precinct, bounded by Anglesea, Vialou and Liverpool Streets (refer to Figure 1.4.5ll).

a) Site Characteristics

i. Flat Central City fringe site, 15,600m^2.

ii. Site is occupied by large format food retail with a service station on the corner (refer to Figure 1.4.5mm)

iii. Located on a prominent entry corner and potential future gateway to Hamilton's Central City.

iv. Site design and surrounding street radii based on vehicle access.

v. One block away from significant open space (west of Tristram Street).

vi. Building is set back from the street with carparking in front.

b) Key Design Principles

i. Continue to support the existing supermarket activities on site, as a building block for future high density residential living within the northern city area.

Practice Note: Supermarket activities have the potential to support future residential development on and around the subject site and are therefore encouraged (although not essential), either in their current form, or within an alternative more compact form in the future.

ii. Provide for high amenity pedestrian routes around and through the site.

Practice Note: Where practicable, pedestrian routes through the site be provided to increase permeability. These routes should be free of conflict with vehicles, have good CPTED qualities, high landscape amenity, visual interest and be well connected to a wider pedestrian network of desire lines.

iii. Comprehensive redevelopment of the site should support the gateway function of the site.

Practice Note: The built form of the corner of Anglesea and Liverpool Streets should reinforce the gateway function through appropriate height, architectural form and detailing.

iv. Provide building frontages which promote activity and passive surveillance to provide for good pedestrian amenity and support the shift to a mixed use area.

Practice Note: Building frontages, particularly at ground level, should provide for interest through the use of architectural features and textures. Passive surveillance of the street should be provided by active uses and glazing at ground level, pedestrian entry and exit points. Storage and services areas which detract from good building frontage should be placed internal to the site and away from the public street frontage.

c) Short term priority outcomes

i. Develop a public realm masterplan to establish Council led projects that will reinforce the change in land use and encourage different modes of travel – walking and cycling (refer to Figure 1.4.5nn).

d) Medium to long term priority outcomes

i. Continue to implement the public realm masterplan that has been developed, including the creation of a northern entry boulevard along Anglesea Street with pedestrian and cycling provision.

ii. Celebrate and mark the city entrance through development of an appropriate marker building at the corner of Anglesea and Liverpool Streets.

e) Proposed mix of uses on site

i. Retail, commercial office, education, and other uses that add vitality to the city centre.

Figure 1.4.5ll: Location map of Key Development Site 5



Figure 1.4.5mm: Existing situation on Key Development Site 5 (2014)



Figures 1.4.5nn to 1.4.5uu show indicative concepts and future development preferences that are consistent with the design principles for this site.

Figure 1.4.5nn: Indicative concept plan for Key Development Site 5 – long term vision

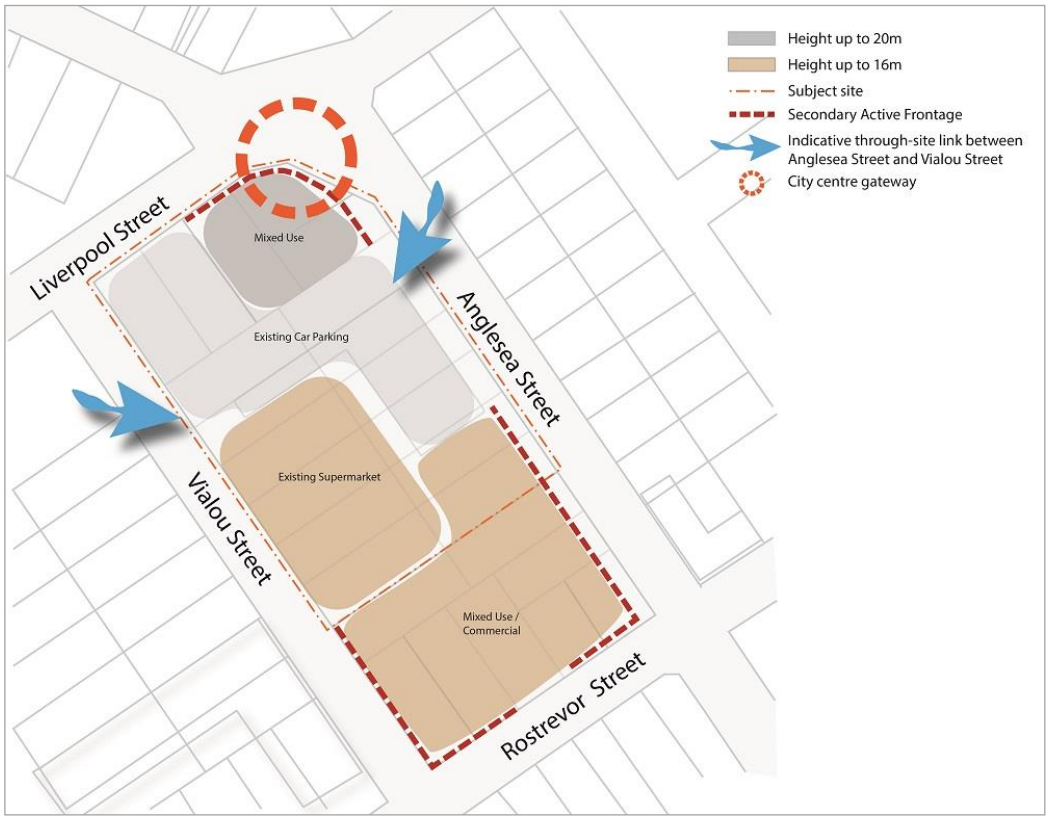


Figure 1.4.5oo: Future development preference – integrated pedestrian and vehicle spaces



Figure 1.4.5pp: Future development preference – integrated pedestrian and vehicle spaces



Figure 1.4.5qq : Future development preference – high quality landscaping within carparks



Figure 1.4.5rr : Future development preference – improved pedestrian space/public realm providing opportunities for passive recreation



Figure 1.4.5ss: Future development preference – Indicative visualisation of potential development showing high quality built form, active frontages and sleeved carparking.



Figure 1.4.5tt: Future development preference – Indicative visualisation of potential development showing a gateway entrance to the Central City from the North, looking down Anglesea Street. High quality built form, improved streetscape and landscaping is promoted at gateway locations



Figure 1.4.5uu: Future development preference – indicative visualisation of potential development including possibility for enhancing connections with surrounding pedestrian and cycle linkage



1.4.5.8 Key Development Site 6 – Sonning

Located in the Downtown Precinct on the eastern side of the Waikato River (refer to Figure 1.4.5ww)

a) Site Characteristics

i. Flat, Central City fringe site, 9,700m^2.

ii. Site is used for car parking and Sunday Farmers' Market.

iii. Located on a prominent entry point to Hamilton's Central City.

iv. Used as a pedestrian route between the Central City and Claudelands Event Centre.

v. Western boundary adjoins the Waikato River margins and bank.

vi. Northern boundary adjoins existing residential development.

vii. Access off River Road on northern part of the Eastern Boundary. Significant portion of the eastern boundary adjoins the bridge buttressing for River Road crossing the railway line and Claudelands Road.

viii. Southern boundary adjoins the railway line. A pedestrian footbridge connects Sonning to Claudelands Bridge.

b) Key Design Principles

i. Development must maintain the amenity of the adjoining residential area to the north.

ii. Active ground floor use to attract people to visit the site and enhance the viability of development.

iii. Provide for safe and more clearly defined pedestrian and cycle paths through the site, along desire lines.

iv. Potential for a sleeved parking building serving the site and providing parking for Central City visitors.

c) Proposed mix of uses on site

i. Promote a mix of uses such as retail, offices, apartments and/or visitor accommodation.

Figures 1.4.5xx and 1.4.5yy show indicative concepts and future development preferences that are consistent with the design principles for this site.

Figure 1.4.5ww: Location map of Key Development Site 6



Figure 1.4.5xx: Indicative concept plan for Key Development Site 6

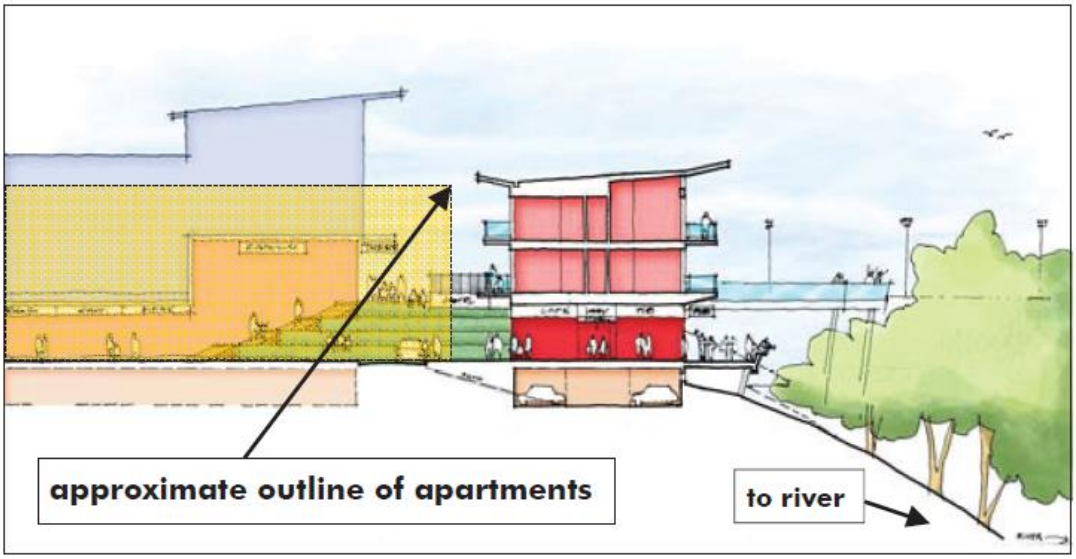
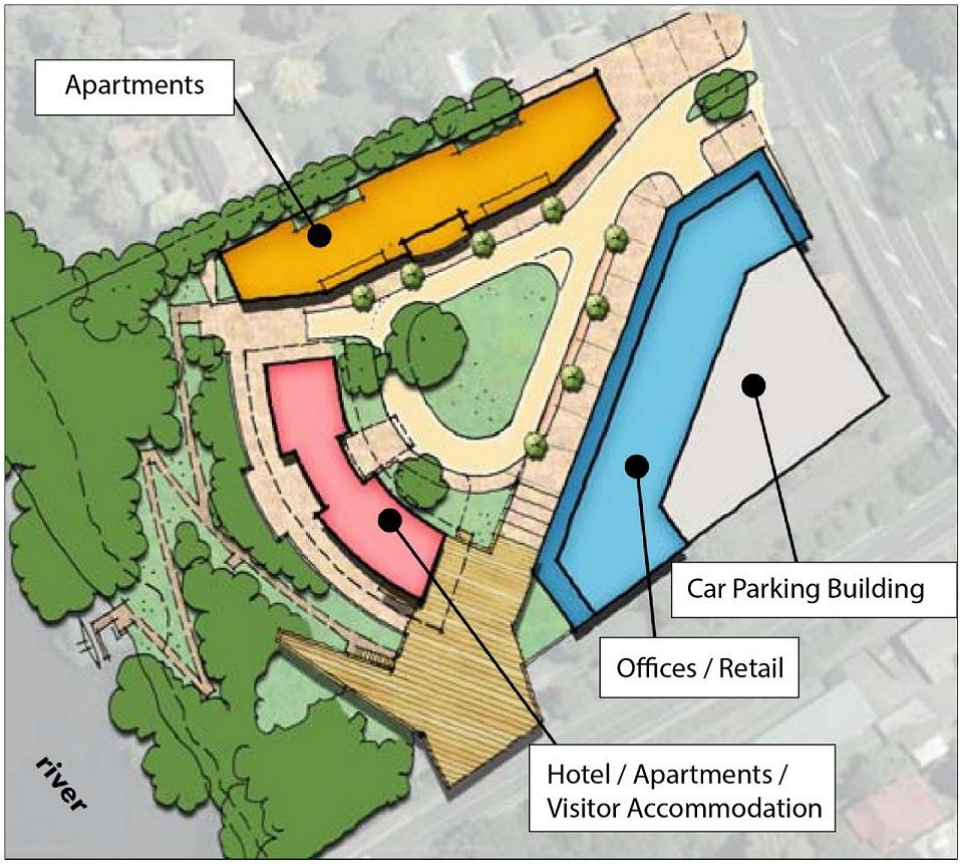


Figure 1.4.5yy: Indicative concept plan for Key Development Site 6



1.4.6 Riverfront Development Design Guide

1.4.6.1 Purpose

These design guidelines are developed to assist groups, landowners, developers, professionals and Council to prepare and assess applications for development within the Riverfront Overlay area as shown in Appendix 5 Figure 5-1.

This design guide applies to development within the Riverfront Overlay area, as shown in Appendix 5 Figure 5-1, and demonstrates how the area can evolve in a way which embraces the Waikato River as part of the Central City.

The existing river frontage in Hamilton is hidden from the Central City. There are a number of obvious connections between Victoria Street and the river's edge and existing built form turns its back on the river. To encourage the establishment of such connections in the public's favour, Council will, in line with the provisions for the Central City, provide incentives through additional height.

This area presents a major opportunity for Hamilton to create a premier public open space along the river's edge, supported by safe and legible connections and attractive and sustainable built form.

1.4.6.2 How to use the Design Guide

Applications for new buildings, including alterations and additions to existing buildings, within the Riverfront Overlay area as shown in Appendix 5 Figure 5-1 should provide an

assessment against the guidance outlined within this Appendix. In particular, it is expected that the proposed design will promote the key design principles, either as shown within the indicative development concepts, or in another manner that achieves a comparable outcome.

1.4.6.3 Background

a) Figure 1.4.6a illustrates the existing situation along the riverfront in Hamilton's Central City. This shows sparse built form and an abundance of 'dead space' along the river's edge, currently utilised for parking or 'back of house' services.

b) The existing open space along the river's edge, (Soldiers Memorial Park and Jesmond Park to the East and Grantham Reserve and the area surrounding the Rowing Club to the west) provide green 'book ends' framing the river and providing strong potential for improved connections along the river front itself and across the river from west to east.

c) There are several 'character' and heritage buildings located along Victoria Street, and these have been highlighted in the plan. It is recommended that heritage buildings be preserved and enhanced with adjacent buildings sympathetic in scale, form and colour.

d) Building height ranges from 3-4m to 30m along the river's edge, with higher buildings generally used as hotel and accommodation facilities. The form of the buildings ranges from small, narrow shop frontages to large format buildings such as the Casino.

e) There are several spaces between buildings (refer to Figure 1.4.6a) that could provide successful linkages from Victoria Street to the river's edge.

f) Activation of these spaces is fundamental to ensuring use and safety. Existing connections to the river are provided down Sapper Moore-Jones Place, the Riff Raff reserve connection and Alma Street.

1.4.6.4 Design Objectives

The following design objectives identify a future vision for Hamilton's Riverfront (refer to Appendix 5 Central City Zone, Figure 5-1 Central City Zone Precinct Plan).

A riverfront promenade will develop over time, with initial public space along the river's edge taking the form of 'pocket parks', as illustrated in Figure 1.4.6b.

Over time, new buildings will set back from the river's edge, and some areas will be built out in front of existing buildings to create a continuous riverside promenade, refer Figure 1.4.6c.

Design Objective	
A Public Riverfront	a) The riverfront will be developed as Hamilton's premiere public space, providing opportunities for people to access and appreciate the Waikato River.
A Connected Riverfront	b) The riverfront will be safely and easily accessible from Victoria Street via streets and laneways. Additional pedestrian connections from the east side of the river will

Design Objective	
	improve pedestrian connectivity not only to the river front, but also to the Central City.
An Active Riverfront	c) The riverfront will be an active public space, with buildings fronting on and opening out on to a riverside promenade. d) This area will be prime real estate, with high quality new development creating complete street blocks between the river and Victoria Street.
A Sustainable Riverfront	e) The riverfront will be sustainable. Built form will carefully consider daylighting principles to ensure that the buildings provide a pleasant environment both within the buildings themselves and also the public spaces which surround them and open out on to the river.
An Iconic Riverfront	f) The riverfront will be iconic – a destination within Hamilton, Waikato and New Zealand. A pedestrian bridge connecting west to east will be a feature, attracting people to the river's edge. The materials, lighting and landscaping along the promenade will be of a high quality, reflecting the significance and beauty of the Waikato River.

1.4.6.5 Design Principles

The following design principles provide guidance as to how the riverfront area should be developed over time to achieve the objectives listed above and the 2021 and 2041 vision (refer to 1.4.6b and 1.4.6c).

These design principles have informed District Plan rules and ensure riverfront development is appropriate and will not degrade or detract from this area of natural amenity.

Design Principles	
Promenade and open space	a) As part of the development or redevelopment of any site adjoining the Waikato Riverbank area between London Street and Sapper Moore-Jones Place, provision shall be made for a continuous pedestrian promenade. b) The minimum width of the promenade is 5m, providing adequate space for pedestrian and cycle access. c) Open space in key locations (i.e. those identified within the medium and long term visions for the Riverfront) shall be provided with minimum dimensions of 15m in width alongside the promenade, to provide room for outdoor dining and other activities. Such space shall be accessible and appropriately designed and landscaped to achieve safe, attractive, comfortable space for use by patrons of restaurants, cafes and the general public. d) All public space, including the promenade, shall be designed in accordance with best practice CPTED principles.

Design Principles	
Height	e) Height allowance will be in relation to provision of public space. Where significant public space is provided (in the form of promenade, public open space or similar, either connecting between Victoria Street and the Riverfront, or along the Riverfront) and gateway locations, additional height shall be provided for. Importantly, height will assist and enable the reading of the cityscape such that taller buildings will be associated with greater public accessibility to the Riverfront.
Built form	f) Building setbacks, in addition to preserving general amenity values, will assist to preserve daylighting, human scale and openness of the proposed promenade (and reduce wind tunnelling effects). Buildings with boundaries adjoining the Riverbank will be required to have a minimum setback of 5m. g) In relation to the setbacks from internal boundaries at upper levels (i.e. fourth level and above), assessment criteria will facilitate a more enabling approach to guide whether the proposal minimises shadowing and loss of natural light on existing adjacent buildings by providing adequate separation between the proposed and existing development. h) Importantly, additional height allowance will be provided for where setbacks from boundaries provide for through-site links and public open space along the riverfront (refer to Figure 1.4.6d). i) Based on the height and built form principles, the preferred built form will be one of narrow buildings running perpendicular to the riverfront, providing for through-site links to the riverfront.

1.4.6.6 Design Interventions

Figures 1.4.6b and 1.4.6c identify six medium-term interventions for key areas or catalyst sites key to realising the design objectives for the Riverfront Area.

Area/Site Reference Refer to Figures 1.4.6b and 1.4.6c	Design Interventions
1	Promote events and temporary activities within this space, drawing people to the river's edge and keeping people engaged through its evolving and temporary nature.
2	Encourage the formalisation of laneways and through-site links into public spaces. Activate laneways through ground-floor activities, such as 'hole-in-the-wall' cafes and encourage upper levels to overlook these spaces to promote safety and CPTED principles.
3	Key Development Site 3 – Victoria on the River (refer to 1.4.5.5).
4	Use streets connecting Victoria Street to the river's edge as key pedestrian links and areas of public space. Open out views to the river at the end of these streets, where possible, and connect the end of the street with the upper-level promenade. Encourage active, ground-floor uses with buildings fronting on to these streets.

Area/Site Reference Refer to Figures 1.4.6b and 1.4.6c	Design Interventions
5	Encourage the development of the 'Art Post' site in line with some of the initiatives outlined as part of the City Heart project, with additional built form complementing the Waikato Museum and better embracing its riverfront location.
6	Encourage the continuation of an upper-level riverside promenade along the western river bank through walkways, built out from the river bank where necessary to connect 'pocket parks' or areas of public space along the riverfront.
7	Provide at least eight pocket parks at regular intervals along the upper level promenade, terminating at major through-links, to act as activity nodes along the promenade that will support and encourage walking and enjoyment of the river environment.

Figure 1.4.6a: Existing Situation (2011) – An analysis of the existing riverfront, illustrating areas of vacant or underutilised space, age of buildings and potential connections

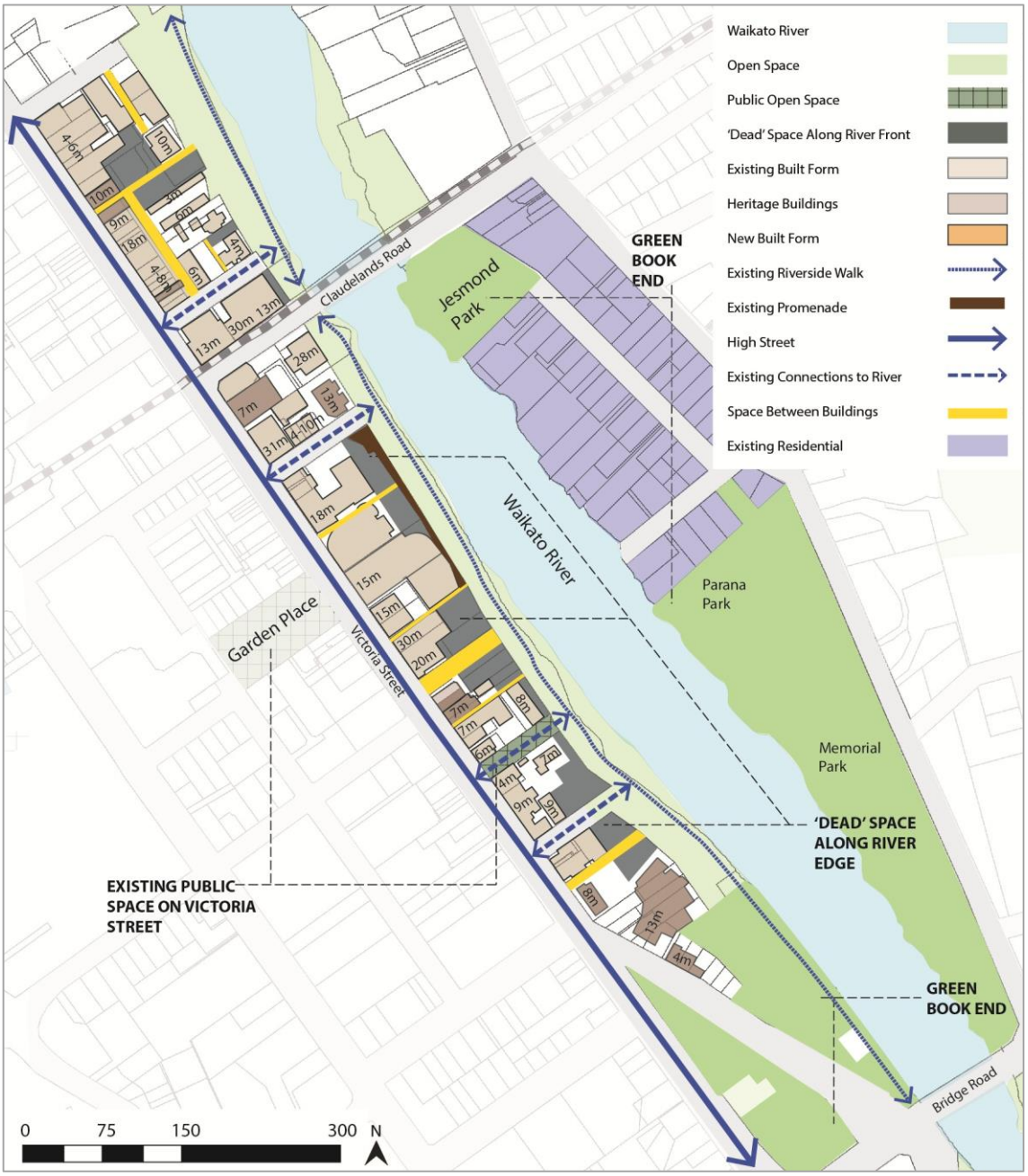


Figure 1.4.6b: Future Vision (2021) – Visual representation showing potential development along the riverfront at 2021, beginning with pockets of public spaces

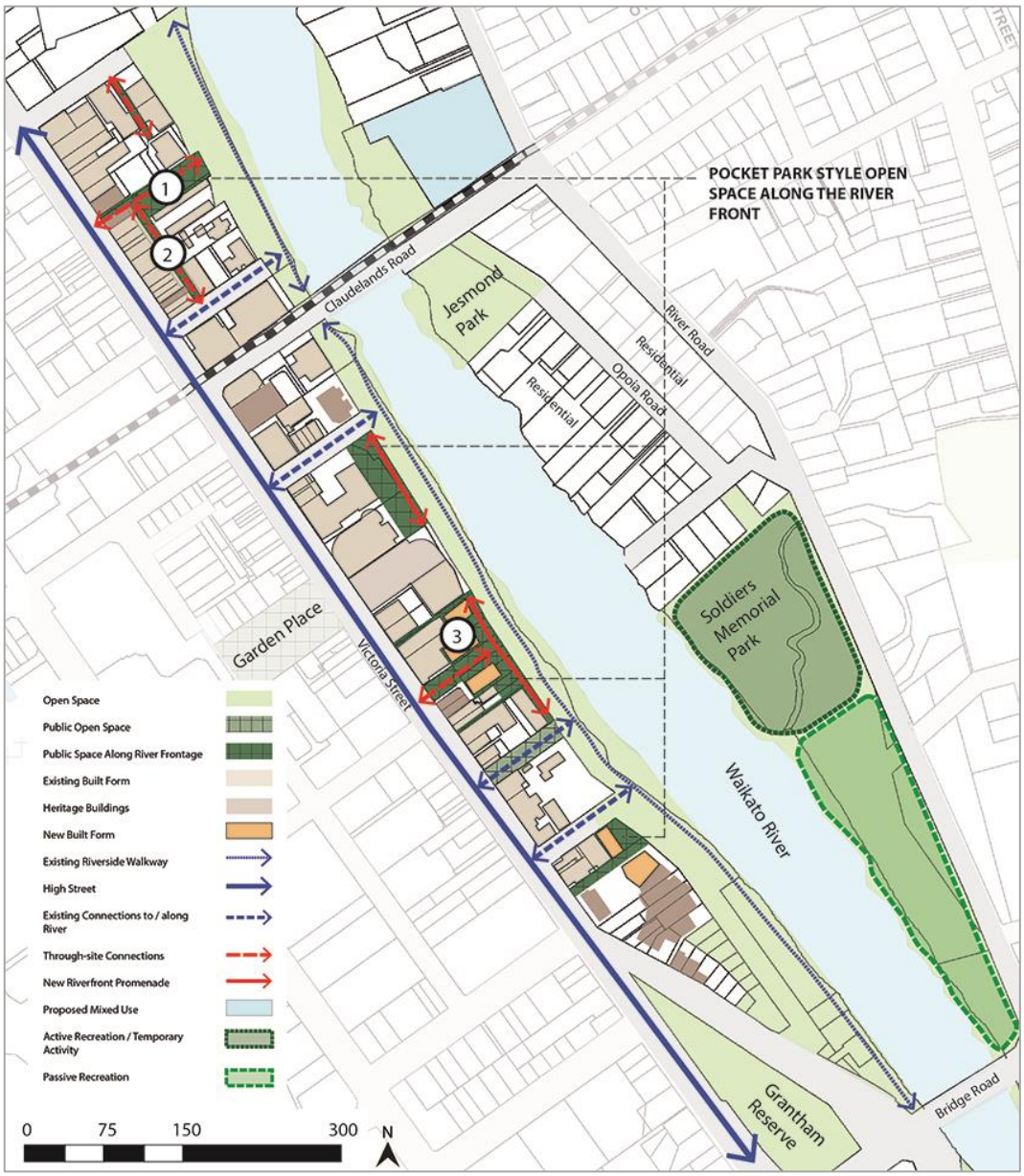


Figure 1.4.6c: Future Vision (2041) – Visual representation showing potential development along the riverfront (including indicative development within Opoia) and a continuous pedestrian promenade

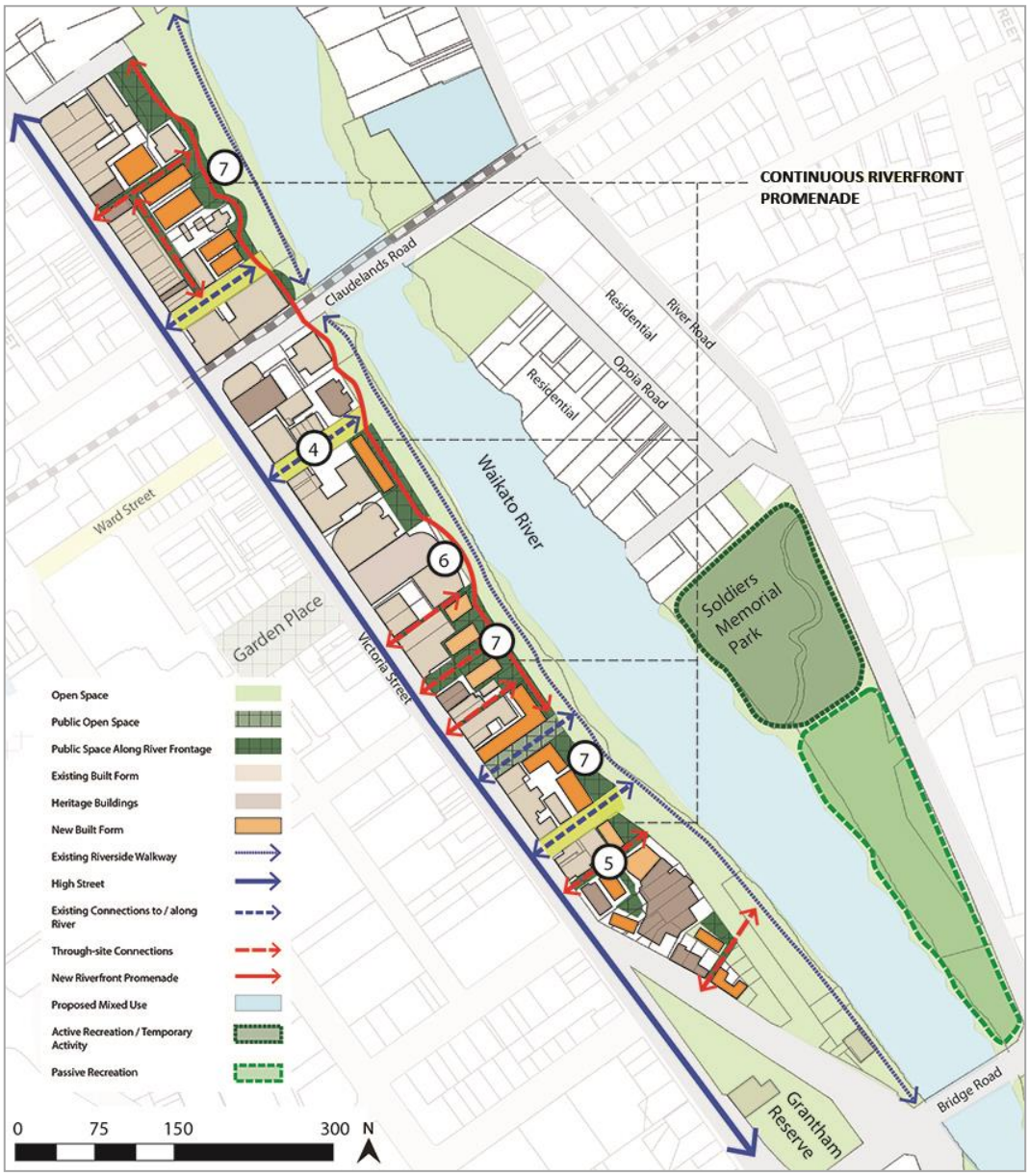
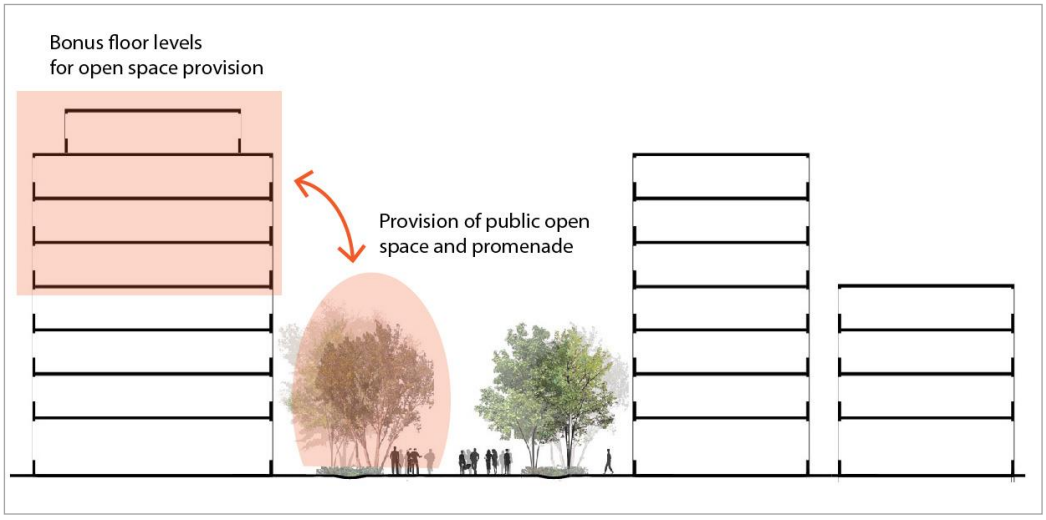


Figure 1.4.6d: Illustrating potential bonus height allowances when through-site linkages and public spaces are provided by development proposals along the riverfront



1.4.7 Lake Waiwhakareke Landscape Character Area Design Guide

1.4.7.1 Purpose

The Rotokauri Structure Plan, the Special Natural Zone and the Rotokauri – Lake Waiwhakareke Landscape Character Area identify the need to protect and enhance the special character of the Lake Waiwhakareke area. The District Plan's rules regarding development and subdivision provide controls that will enable a sensitive response to this character.

Where these rules provide for an element of discretion through the ability of Council to impose conditions on, this guide provides further description and amplification of the area's particular character. This will assist with consistent interpretation and provide more certainty to the development industry.

The Guide recognises Council's commitment to the adaption of best practice urban design techniques as expressed in its urban design guide, *Vista*.

1.4.7.2 How to Use This Guide

Applications for development within the Rotokauri - Lake Waiwhakareke Landscape Character Area as shown on the planning maps provide for an assessment against the guidance outlined within this Appendix.

Within each element, the design guidelines are organised as follows.

Explanation

Rationale for that particular design element and how it contributes to the development of a sustainable neighbourhood.

Design consideration

Consideration to guide development outlining how a proposal should respond to particular elements of character.

Design guideline

Representative of good design solutions which help achieve the design consideration. They do not however preclude other ways of achieving good design.

1.4.7.3 Background

The Lake Waiwhakareke Landscape Character Area represents a distinctive landscape unit which is defined by Rotokauri Road to the east and north, Brymer Road to the west and Baverstock Road to the south. The characteristics of the Lake Waiwhakareke Landscape Character Area are described in the operative Waiwhakareke Natural Heritage Park Management Plan 2011 and summarised in this guide. This character is derived from the unique combination of natural, cultural and recreational values present in and around the lake and the Natural Heritage Park. Together the lake and Natural Heritage Park create a focal point for adjoining development and provide very significant and cultural opportunities that need to be recognised and reflected through future development.

The lake and the extensive natural areas provided within the Natural Heritage Park, combined with the sharply undulating topography that frame them, clearly sets this part of the Rotokauri Structure Plan area apart from the area to the north of Rotokauri Road.

The following character elements have influenced how the Rotokauri Structure Plan and Special Natural Zone seeks to manage development in this area.

- The sharply undulating topography of the area and the way in which it provides a point of difference in the landscape
- The native ecology of and the recreational resource presented by the Natural Heritage Park (including its value as an educational resource)
- The lake itself and its role in providing a strong focal point for the area
- The natural drainage pattern of the area
- The historic and cultural values associated with the area.

1.4.7.4 Understanding the Context

a) Explanation

The Lake Waiwhakareke Landscape Character Area is located at the southern end of the Rotokauri Structure Plan, in close proximity to existing urban development along Baverstock Road and to a lesser extent along Rotokauri Road. It will be dominated by the 50ha Natural Heritage Park that is ultimately intended to become a self-sustaining habitat sanctuary surrounding Lake Waiwhakareke and representative of the original ecosystem diversity of the Hamilton Basin.

The Natural Heritage Park will be managed by the operative Waiwhakareke Natural Heritage Park Management Plan 2011. This provides a framework for the future management of the Park and identifies some key concepts to consider during development of the Lake Waiwhakareke Landscape Character Area. The importance of the location of the entrances to the Park, treatment of the park edges, the planting scheme, the community parks and proposed street furniture design for the residential area are explained within this guide.

The context for development in the surrounding area is established by the Rotokauri Structure Plan. The key locational relationships to note are the presence of Hamilton Zoo adjacent to the southwestern corner of the Heritage Park, the neighbourhood centre proposed to the northeast, the proximity of the Wintec Rotokauri Campus and Nga Taiatea Wharekura School, the green corridor running from Lake Waiwhakareke and the importance of Rotokauri Road as a public transport corridor.

In order to design a development that respects the unique characteristics of a particular location, it is necessary to conduct the following:

- Context analysis
- Site analysis

b) Context analysis – Design consideration

Proposals should demonstrate an understanding of the context of the site, its relationship to the natural and surrounding built environment and the impact that has on the design of the site.

Design guideline

Prepare plans, diagrams and maps that illustrate the location of the site and its characteristics in relation to:

- Proximity to nearby services – shops, transport, schools, other services or recreation facilities
- Immediate surrounds – natural landscape, significant vegetation or waterways, buildings and land uses
- Adjoining infrastructure – roads, open spaces, public transport services

c) Site analysis – Design consideration

Proposals should demonstrate an understanding of the particular features of the site itself, both its natural features and character of the adjacent built up area.

Design guideline

Prepare plans, diagrams and maps that illustrate the characteristics of the site particularly in relation to:

- Natural features – slope, topography, vegetation, waterways, geotechnical considerations
- Orientation – prevailing winds, sun and shading (winter and summer), views, overlooking (to and from neighbours)
- Movement – desire lines, missing links to surrounding neighbourhoods (e.g. from Neighbourhood Centre and Wintec Rotokauri Campus through to Heritage Park and to Hamilton Zoo)
- Other features that may influence site layout – e.g. nearby open spaces, arterial roads

1.4.7.5 Designing for Topography

a) Explanation

The Lake Waiwhakareke area derives a major element of its character from topography. This is sharply undulating in its form with prominent east-west orientated ridgelines that give detail to the area, and provide a point of difference in the landscape.

The ridges and slopes act as local landmarks and enable long distance views to be gained both north to the Hakarimata Ranges and south to Lake Waiwhakareke. Utilising these opportunities will help create a sense of place and a stronger connection to the surrounding landscape.

Retaining the underlying landform is an important part of ensuring that the area's character is preserved once development occurs (refer Figure 1.4.7a). Particular consideration should therefore be given to:

- Designing for slope
- Alternating slope and landform
- Orientation and outlook

b) Designing for slope – Design consideration

Proposals should avoid unnecessary loss of underlying landform, to reflect the character of the site and surroundings and retain the significant features of the site.

Design guideline

- Minimise need for major engineering intervention
- Use existing topography and land features to define the structure of the subdivision – street layouts, open space, view shafts and building platforms (Refer Figures 1.4.7a, 1.4.7b and 1.4.7c)

Figure 1.4.7a: Design with existing features – landform, vegetation, waterways

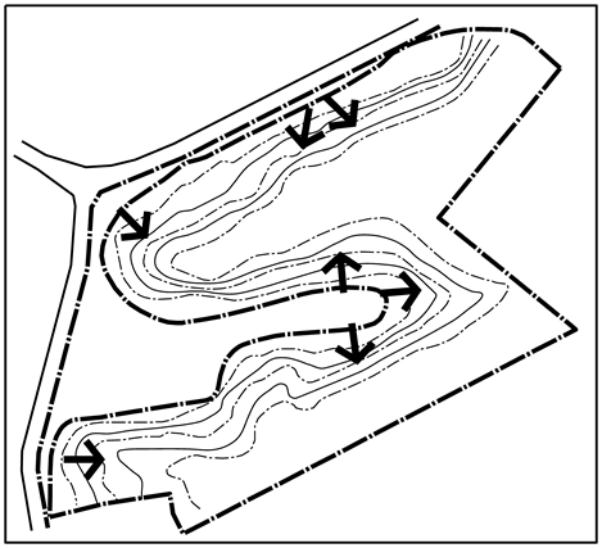
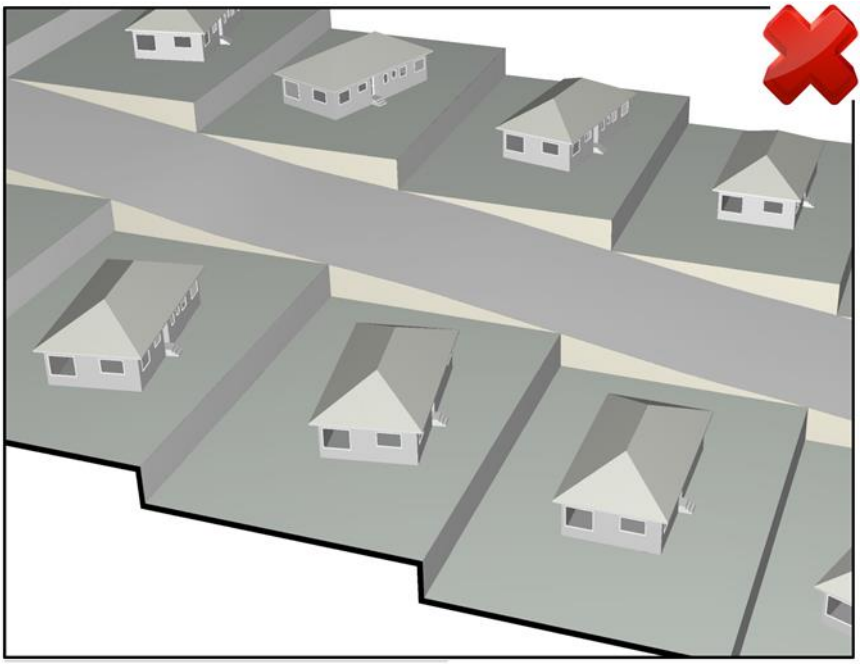


Figure 1.4.7b: Design that has worked with existing features – landform, vegetation, waterways



Figure 1.4.7c: Design that has not worked with existing features – landform, vegetation, waterways



c) Altering slope and landform – Design consideration

Where it is necessary to re-contour land to allow for access and building platforms, the intervention should not be large scale or visually obvious once planting has matured.

Design guideline

Site contouring and retention should be on a site-by-site basis to allow building platforms to be formed. House designs should be customised to reflect the slope and orientation of the site, discouraging single platform for each site on sloping terrain.

Use of retaining walls should be minimised by terracing and planting to mimic the natural features, particularly when viewed from the transport corridor.

d) Orientation and outlook – Design consideration

Proposals should take advantage of the sloping terrain to maximise the views available from both individual properties and the public realm (transport corridors and open spaces).

Design guideline

Consider long and short views when aligning transport corridors, open spaces and walkways to provide glimpses of the surrounding landscape and natural features.

1.4.7.6 Reinforcing Local Character

g) Explanation

The Natural Heritage Park will be a defining element of this area's character and surrounding development will establish both a physical and a natural relationship with it.

Residents will have the advantage of a large public space on their doorstep, notwithstanding that access to the Park will be limited and controlled. The Natural Heritage Park will incorporate small community parks at its entrances and these will serve as local purpose reserves.

The way in which landscaping treatments are handled within the developed areas can reinforce the natural settings of the Natural Heritage Park and provide a stronger sense of place and character for the neighbourhoods created around it.

The overall goal for the Natural Heritage Park is to create a self sustaining habitat sanctuary that represents the original ecosystem for this part of Hamilton. The Heritage Park Management Plan identifies the vegetative species appropriate for the differing terrain encountered within the area, such as ridge tops and hill slopes.

Important considerations are therefore:

- Physical and visual relationship to the Natural Heritage Park
- Links to and between existing habitats and features
- Species and planting combinations

b) Physical and visual relationship to Heritage Park – Design consideration

Surrounding development should provide an edge to the Natural Heritage Park, both to increase public surveillance and to offer an opportunity for people to circumnavigate the park and enjoy views into and beyond it.

Design guideline

Buildings along the northern boundary of the Natural Heritage Park should be of sufficient height and orientated towards the park in order to provide surveillance of the road, park or walkway.

Public access should preferably be along a perimeter street, open to cars as well as pedestrians, to provide surveillance from passing traffic and greater safety after dark.

If the site is only appropriate for a pedestrian walkway at the perimeter of the Natural Heritage Park, such as the fence of the hill slope, it should be connected to the street system and of sufficient width to provide long views allowing for curves and changes in topography. This will ensure some surveillance of pedestrians using the walkway.

Fencing adjacent to the walkway should be transparent enough to allow observation from neighbouring houses.

If the topography demands that some lots are side or rear-facing, fencing should be low and transparent and at least one main room should overlook the park edge (refer Figure 1.4.7d).

c) Link to existing habitats – Design consideration

Public and private spaces within the Lake Waiwhakareke Landscape Character Area should reflect ecosystems within the Natural Heritage Park and provide an extension of the parks habitat. This will create a network of indigenous flora and fauna, and reduce the risk of pest plant invasions of the park.

Design guideline

Identify opportunities to extend habitats which are favourable to flora and fauna beyond the extent of the Natural Heritage Park. While the network does not need to be continuous, it does need to take into account the preferred habitat and travel patterns of the particular species it is intended to encourage.

d) Species and planting combinations – Design consideration

The Natural Heritage Park Management Plan identifies a programme of weeds and predator eradication, and replanting of more appropriate species to encourage indigenous flora and fauna. Identifying and replicating those successful plant combinations both extends heritage plant character beyond its boundaries and creates a low maintenance landscape regime that adds to a sense of place in the surrounding development.

Design guideline

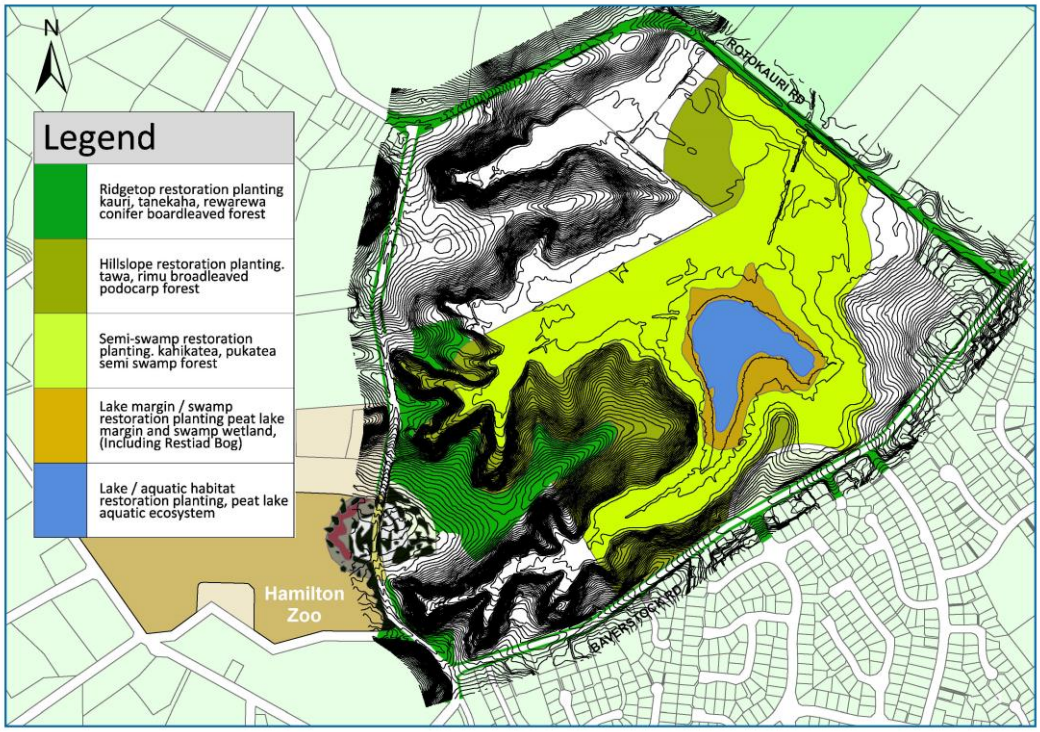
Based on the Heritage Park Management Plan, identify a plant palette and planting scheme which reflects the underlying indigenous combinations and avoids re-infestation of the Heritage Park by weeds. Refer Figure 1.4.7d.

Provide future residents with suggestions for selecting and maintaining planting schemes which extend the philosophy of the Heritage Park.

Any species planted should be eco-sourced.

Refer to *Plant Me Instead: Waikato Region* and *Gully Restoration Guide: A guide to assist in the ecological restoration of Hamilton's gully systems*.

Figure 1.4.7d: Topography and vegetation types at Waiwhakareke Natural Heritage Park



Note
Diagram shows proposed vegetation scheme inside the Natural Heritage Park. This concept should be extended into the surrounding Waiwhakareke Landscape Character Area through the introduction of a range of methods and eco-sourced plants.

1.4.7.7 Connectivity

a) Explanation

Topographical constraints present a number of challenges in terms of achieving high levels of connectivity for movements within and beyond the Lake Waiwhakareke Landscape Character Area. This is true for pedestrian and cyclists as well as motorised vehicles.

The alignment of roads in the area of land immediately north of the Natural Heritage Park is likely to be predominantly east-west in nature. However, in designing a network that encourages walking and cycling it is important to acknowledge that the elements of convenience, safety and amenity required by these users might differ from the needs of those driving cars.

With large parts of the Heritage Park likely to be enclosed by development, it is important that routes into and around the park are legible and provide a choice of routes reflecting desire lines.

Effective connectivity will therefore benefit from a consideration of the following.

- Walking
- Legibility
- Types of streets
- Additional links
- Street Furniture

b) Walking and cycling – Design consideration

Proposals should deliver a connected street network that provides a variety of direct routes for pedestrians and cyclists to nearby services such as the neighbourhood centre, Zoo and the closest entrance to the Natural Heritage Park.

Design guideline

The overall street network should be inter-connected, with block sizes that provide a choice of routes for pedestrians as directly as possible. Where possible, a street used by pedestrians and vehicles is preferable to provide the security of passing vehicles and avoid less used pedestrian-only links.

Given that vehicular traffic flows are expected to be low and slow moving, cyclists should be encouraged to use the street network. Connections to areas outside the Lake Waiwhakareke Landscape Character Area such as the neighbourhood centre may necessitate the provision of dedicated cycle lanes.

Block sizes will vary with topography and location, but ideally should not be longer than 120m between intersections.

c) Legibility – Design consideration

The street hierarchy should be legible for visitors and residents, and clearly signal the route to the park edge or entrances as distinct from more local access to residential blocks (refer Figure 1.4.7e).

Design guideline

Identify the main routes to the edges and entrances to the park by the treatment of the street – width, landscape treatment, footpath width and location.

Visual signals, which may match the branding and arts programme proposed for the Waiwhakareke Natural Heritage Park can also act as subtle markers to identify the route to the park, such as colouring of street furniture and lights or distinctive markers along the route (refer Section 1.4.8).

On all streets, cyclists should be encouraged to use the street network. As the routes link to the main external circulation, additional measures such as dedicated cycle lanes may need to be considered.

d) Types of streets – Design consideration

The treatment of each street can vary depending on its location and role. In general it is assumed there will be three main types of streets with section dimensions and treatment to suit.

Local access streets – main circulation connecting sub-neighbourhoods and linking to the Natural Heritage Park.

Green Streets – smaller-scaled street adjacent to the Natural Heritage Park or local reserve.

Local Lane – smaller scaled cross-streets to serve blocks between local access streets.

Design guideline

The Rotokauri Structure Plan provides for low speed, green streets along the northern and south-eastern edges of the Natural Heritage Park in order to provide active frontages.

Minimising curb radii creates tight corners – forcing cars to slow and making it easier for pedestrians to cross.

Avoid roundabouts – these disadvantage pedestrians and cyclists and require more space at intersections (reducing the sense of enclosure and encouraging faster vehicle movement).

e) Additional links – Design consideration

Where streets are not appropriate, allow for safe alternative routes for pedestrians, with good surveillance (refer Figure 1.4.7f).

Design guideline

Pedestrian only routes should generally be not less than 2m wide, provide clear visibility from the main street footpath and contain no hidden spaces which could conceal people or activity from view of the main street.

Pedestrian routes should be overlooked by adjacent development with low or transparent fencing and preferably overlooked by main occupied rooms of the adjacent houses.

If the pedestrian routes are connecting two different levels, attempts should be made to keep the slope at 1:12 and where steps are necessary a handrail should be provided.

The above illustrations indicate an acceptable design for a given environment but should not be regarded as being a specific requirement or the only design solution that will be adopted.

f) Street furniture – Design consideration

Street furniture should cater for the safety and comfort of pedestrians and cyclists, including lighting, street trees and other planting, and items such as seats, rubbish bins and cycle parking racks.

Design guideline

Street lighting should provide high quality, safe environments for pedestrians.

The suite of furniture, including street lights, should co-ordinate with the colours and branding adopted for the Waiwhakareke Natural Heritage Park (refer Section 1.4.8).

Street planting should take into account the need to reflect the native vegetation and planting combinations within the Natural Heritage Park.

Figure 1.4.7e: Layout provides for access to the park edge, is legible for visitors and residents whilst providing a variety of routes

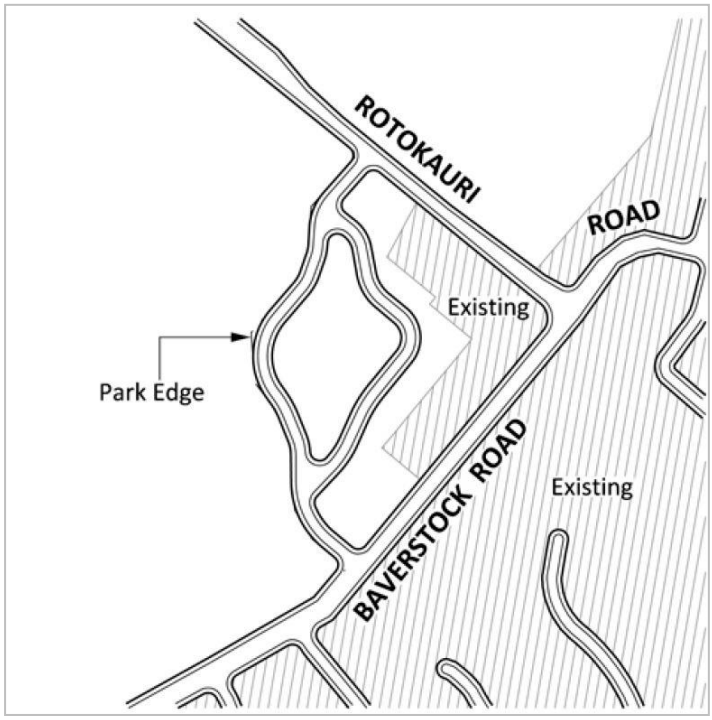
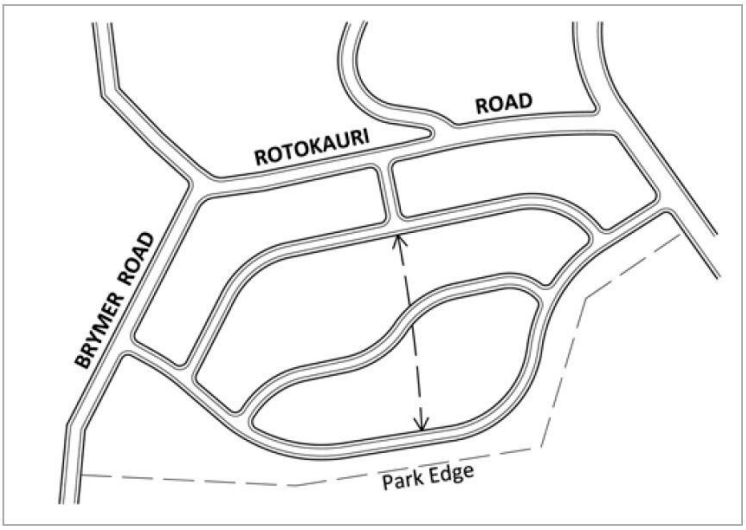


Figure 1.4.7f: Layout allows for safe alternative routes for pedestrians, with good surveillance



1.4.7.8 The Layout of Development

a) Explanation

The topography of the Lake Waiwhakareke Landscape Character Area presents significant opportunities and constraints for development. The sharply undulating terrain offers the possibility for residents to enjoy long distance views, but at the same time the orientation of the resulting street network may present challenges for maximising solar gain.

On flat land, rectangular or square locks represent the most efficient form of lot layouts. Sloping land however, requires a modified approach to be taken. It is also desirable that the size and shape of lots are configured to allow some flexibility in the types and density of housing that can be established.

The orientation of lots influences the amount of sun gained inside the house and in outdoor living areas. The layout of development should seek to maximise the proportion of dwellings receiving sun, particularly in the winter.

In planning the layout of development, the following issues need to be considered.

- Configuration of lots
- Solar orientation
- Front yard living

b) Configuration – Design consideration

Regardless of the density or housing type being built, the size and configuration of lots should allow for building platforms that provide good internal spaces and solar orientation as well as sunny and private outdoor areas (refer Figures 1.4.7g and 1.4.7h).

Design guideline

- The depth of the lots should allow for an efficient building platform and a distance of 20m back to back between buildings.

Figure 1.4.7g: Design for deeper back yards to allow sun in south-facing parts of the site, front setbacks of at least 3m allow for a front porch or deck

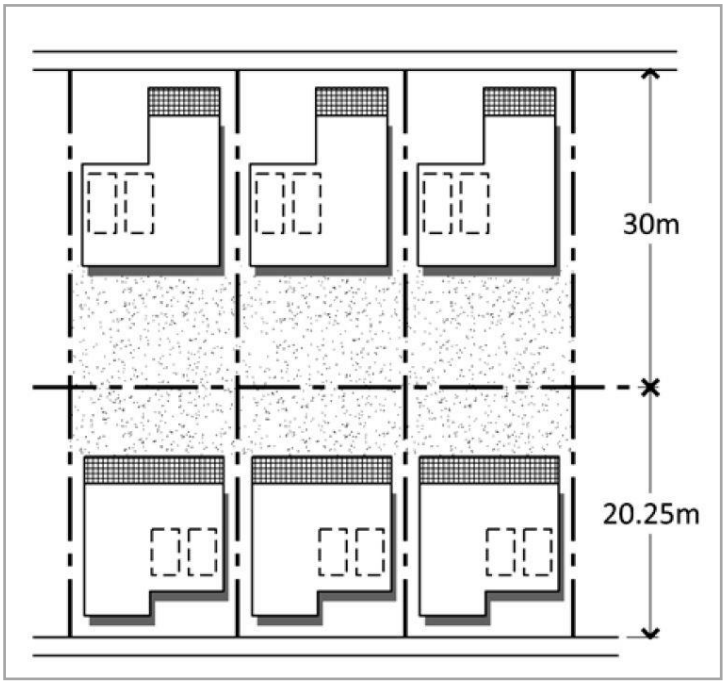
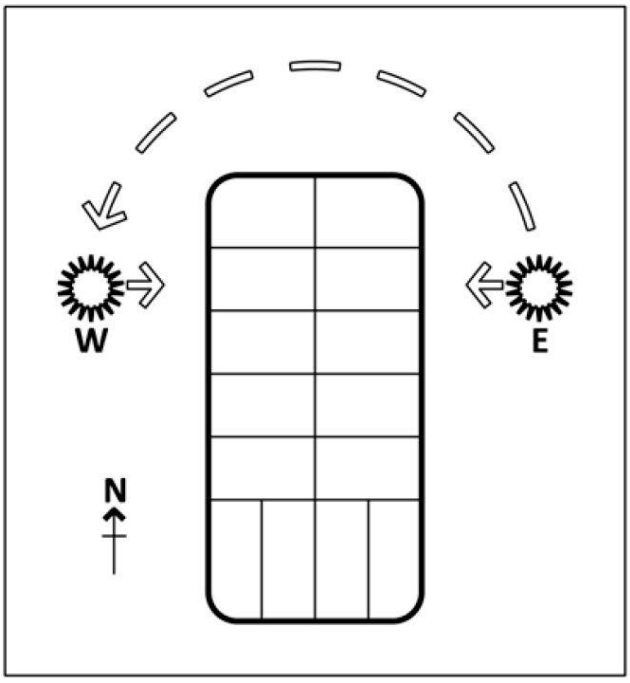


Figure 1.4.7h: Allotments oriented north-south or with north-facing back yards mean sun in front and rear setbacks most of the year



c) Solar orientation – Design consideration

Maximise opportunities for solar gain.

Design guideline

Maximise the number of lots with the long axis within range N200W to N300E or E200N to E300S.

Orientate houses to allow some living spaces setback from the northern boundary to gain northern sun in winter.

In a comprehensive development, zero lot lines can maximise useable outdoor space by setting houses to the southern boundary and locating service areas along that wall.

Vary the depth of north-south facing lots. Consider using the upper levels to create outdoor living platforms that receive some sunshine and may also pick up views over rooftops.

d) Front-yard living – Design consideration

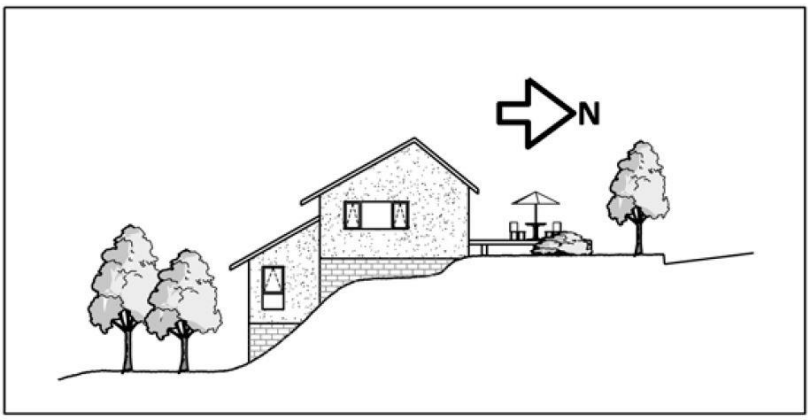
Where the rear of the house may not receive sufficient sunshine, additional outdoor living space should be provided at the front of the house.

Design guideline

Where dwellings have a south-facing back yard, include some form of semi-private outdoor living space on the northern front of the house. Traditional verandas or decks can be treated to provide privacy for those using them but also providing 'eyes on the street' and an attractive frontage for passers-by (refer Figure 1.4.7i).

Upstairs balconies or bay windows also create sunny living spaces and enliven the frontage of a house.

Figure 1.4.7i: Terraces in the front yard allows sunny outdoor living on south-facing slopes



1.4.7.9 Stormwater Management

a) Explanation

Hydrological processes account, in large measure, for many of the natural features present in the Lake area. They are also of special significance for tangata whenua.

Lake Waiwhakareke itself is a sensitive receiving environment and can be adversely affected by both the quality and quantity of stormwater arising from surrounding development. For this reason, an approved ICMP is required before any development can occur on Lot 2 DP 425316.

The management of stormwater must therefore take account of local drainage conditions, which in parts of the area will include peat soils and correspondingly high ground water levels. There are likely, however, to be significant opportunities for incorporating management measures as part of the design of public spaces.

In formulating stormwater management systems, the following matters should be taken into account.

- The potential impact of development on Lake Waiwhakareke
- Retention of natural drainage patterns
- Treatment of streets
- Integration into open space

b) The potential impact of development on Lake Waiwhakareke

Development around Lake Waiwhakareke shall manage the quality and quantity of runoff that enters the Lake in order to avoid any adverse effects on Lake Waiwhakareke.

Design guide

Development should be informed by an approved Integrated Catchment Management Plan. The ICMP should be used to identify any issues that may impact on the water quality of Lake Waiwhakareke.

c) Retention of natural drainage patterns – Design consideration

The natural drainage pattern of the area should be maintained where possible.

Design guideline

Identify natural watercourses in the early site analysis so they can help inform the subdivision layout. Where possible they should be retained and enhanced with vegetation as part of the open space network.

The use of impermeable surfaces should be minimised wherever possible.

Naturally occurring fresh springs should not be piped or diverted.

d) Location and treatment of streets – Design consideration

The street network should take into account overland flow paths and may be designed as temporary flood ways during major storm events. Treatment of berms and kerb systems can absorb some stormwater or minimise flows during extreme events.

Design guideline

Streets adjacent to public open spaces or water courses may be designed as temporary floodways during major events, provided that vehicular access can be maintained (at slow speed) and that water flows do not become a hazard for motorists or adjacent residents.

Swales and rain gardens can be considered, either in the centre of the carriageway or side berms. A 'soft' edge adjacent to a park or open space serves the dual purpose of stormwater management and extending the visual amenity of the park to the edge of the carriageway.

Consider permeable paving on low trafficked streets (such as local lanes) or parking bays which are offset from the main carriageway.

e) Integration into open space network – Design consideration

In addition to creating an open space network around existing water courses or wetlands, permanent water features can be incorporated into open spaces and circulation networks to add amenity or recreational features as well as assist with stormwater or minimise flows during extreme events (refer Figure 1.4.7j).

Design guideline

Incorporate stormwater management into hard and soft landscape design for open spaces and streetscapes. Features such as ponds, wetlands and rain gardens can be considered.

Pedestrian paths between levels can incorporate hard or soft flow paths, creating amenity and stormwater treatment. Care must be taken to ensure paths are still safe and useable during storm events.

Figure 1.4.7j: Pedestrian link on steep slopes provides opportunity for informal watercourse – width provides space for amenity planting as well as surveillance (CPTED)



1.4.8 Design Theme for Waiwhakareke Natural Heritage Park

1.4.8.1 Purpose

The Designation Open Space Zone near Lake Waiwhakareke in the Rotokauri Structure Plan is labelled the Waiwhakareke Natural Heritage Park on the planning maps. This Appendix provides guidance for development within the Park.

1.4.8.2 How to Use This Guide

Applications for development within the Rotokauri - Lake Waiwhakareke Landscape Character Area as shown on the planning maps provide for an assessment against the guidance outlined within this Appendix.

1.4.8.3 Background

Waiwhakareke Natural Heritage Park represents a rare opportunity for Hamilton City to integrate a significant ecological restoration project within its current environmental, promotional, planning and development strategies.

The design intent is to create a key ecological hub within the City. This will not only provide for the well being of the flora and fauna that will live within it, but also for the well being of the City's residents and visitors, through educational opportunities and amenity values it will provide.

Ecological viability and the need to meet the desires and aspirations of the community were key factors in the development of the overview concept for the park. This concept delivers both opportunities for recreation and community wellbeing by creating an accessible natural resource within the City. It also provides for the reintroduction of plants and animals that no longer inhabit the area.

1.4.8.4 Connections

There is an opportunity to create a significant link between the site and Hamilton Zoo. The entrances to the two facilities are located together to create a specific destination. This will allow integration between the facilities and permit efficient use of Council resources through shared use.

Specifically, the creation of a main entrance facility that would combine the entrance facilities of the park and zoo would mean that facilities such as administration, education and retail could be shared between the two amenities.

It is intended that facilities fundamental to the Heritage Park's development and operation are developed on the eastern side of Brymer Rd, and those fundamental to the Zoo's operation, or shared between the Heritage Park and Zoo, developed on the western side.

A number of important secondary nodes and potential access points have also been identified. These are located along Baverstock Road and Rotokauri Roads, indicating potential linkages for the community and Wintec. These nodes are important when considering the location requirements for community parks for Nawton and future communities that will establish as a result of the Rotokauri Structure planning process.

1.4.8.5 Design Overview

The Heritage Park concept involves the retirement and ecological restoration of approximately 50ha of farm land surrounding Waiwhakareke (Horseshoe Lake).

Key components of the concept include:

a) The creation of an eco-centre, in association with Hamilton Zoo, to act as the main entrance to the park, a tourist destination in its own right.

b) The reintroduction of indigenous flora and fauna to the site made possible by the use of predator proof fencing to enclose the site.

c) The development of a publicly accessible walkway network within the site and a cycleway around the perimeter.

d) While not part of this proposal, two parks will also be created for the local community.

1.4.8.6 Buildings

a) Buildings will be of contemporary architectural design, reflecting the purpose and function of the park and the zoo.

b) Buildings will be open to nature, providing opportunities for multi-functional use.

c) Construction techniques, cladding and roofing materials will follow sustainable design principles, for example cladding buildings in a mixture of natural timbers.

d) Building design will reflect the ecological themes of the park, yet provide for modern contemporary facilities.

e) Significant areas of canopy will be incorporated into the building design in order to provide shade and shelter.

f) A large membrane canopy, covering a paved plaza, will provide a sheltered environment for planting day demonstrations and educational opportunities.

g) At the main entrance to the park, an integrated facilities building will be constructed.

h) This will house interpretive material, indoor and outdoor demonstration areas, toilet facilities and provide secure storage for maintenance equipment.

i) Where possible, sustainable building principles will be used e.g. solar hot water heating, composting toilets.

j) Building colours should reflect nature and be chosen so that the building blends into its surroundings (e.g. brown tones).

1.4.8.7 Parking

a) The informal parkland at the main entrance between Brymer Road and the pest-proof fence can be used for overflow parking, and if required may be used for future car park extensions.

1.4.8.8 Main Entranceway

a) The Zoo and Park will be physically linked by a central pedestrian spine.

b) Entrance statements and traffic calming measures (decorative rumble strips along Brymer Road) will be used to slow traffic and create a sense of arrival.

c) Local iwi will be closely involved in the design and development so that recognition of this site and elements of pre-European Māori life are reflected in the park.

1.4.8.9 Furniture and Facilities

a) It is intended that any constructed elements within Waiwhakareke Natural Heritage Park be elegant and contemporary in nature, reflecting the processes and principles of the ecological design. All furniture should be designed specifically for the park and standard 'off the shelf' street furniture should be avoided.

b) Facilities and site furniture such as seating, rubbish bins, boardwalks and interpretation panels are to be contextually appropriate. This means that they appear linked to the overall concept of the design when seen within the context of the site. All design should be subtle and symbolic in nature. Literal interpretations should be avoided.

c) *Seats* – seats will resemble a stylised leaf shape and be constructed out of a renewable hardwood timber or recycled native timber, and a metal frame.

d) *Rubbish Bins* – rubbish bins will also resemble a stylised leaf shape, constructed out of sheet metal with profile cut and embossed patterns and textures that symbolise the indigenous flora and fauna of the Natural Heritage Park.

e) *Boardwalk* – the boardwalk network will be made of a renewable hardwood timber and detailed in areas of interpretation with the timber placed in a directional pattern (symbolising the patterns of a leaf).

f) *Interpretation panels* – the interpretation panels will be constructed of curvilinear sheet metal with profile cut and embossed images and text, and recycled native timber. The timber will incorporate Māori carvings.

g) *Balustrade (for viewing platforms)* – the balustrades will be constructed with curvilinear sheet metal uprights and steel rods in an overlapping stylised reed pattern.

1.4.9 Temple View Zone Urban Design Guide

1.4.9.1 Purpose of the Guide

The purpose of this guide is to give direction for further development in the Temple View area and assist in understanding the rationale behind the development of the Comprehensive Development Plans (CDPs) and how they relate to the valued qualities and character of the Temple View Zone. It highlights urban issues that are specific to the Temple View Zone while assuming that general best practice urban design will be applied for any development. This will assist in ensuring that any development is consistent with the Zone and enhances the wider Temple View community. The District Plan's rules regarding development and subdivision provide controls that will enable a sensitive response to this character.

Where these rules provide for an element of discretion through the ability of Council to impose conditions, this guide provides further description and amplification of the area's particular character. This will assist with consistent interpretation and provide more certainty for future development. This guide responds to the broader scale urban design components of the Temple View Zone. (It is noted that, in some instances, aspects of the existing character are contrary to current urban design best practice.

The Guide recognises Council's commitment to the adoption of best practice urban design techniques as expressed in its urban design guide, Vista.

1.4.9.2 Background

The Temple View Zone identifies an area of Temple View which, through a combination of layout, building scale and materiality, colour, landscape treatment and maintenance has a distinctive character. Much of this character is derived from the cultural influence of the Hamilton New Zealand Temple of the Church of Jesus Christ of Latter-day Saints and the Associated Church College of New Zealand (CCNZ) Campus. The present day character reflects the combination of planned and opportune incremental development that occurred over the initial construction period throughout the 1950s and 1960s, and has continued to evolve to the present day.

This process involved the construction of a range of buildings, some specifically for or in support of the former CCNZ, while others formed part of the construction industry which developed on site during this period. These often simple structures, provided both masonry product and processed timber to the former CCNZ site and wider afield to support the building of chapels in other parts of New Zealand. Over time buildings were removed, re-purposed or modified, and others added as required. This has resulted in a variety of styles and forms of building, reflecting the pragmatic and utilitarian requirements of their time. The continued management of the area by the Church has ensured the maintenance of the development. The application of a limited colour palette and tended landscape has provided a sense of consistency to what would otherwise appear markedly disparate elements.

Many of the structures, while appearing ostensibly sound, are now over 50 years old and no longer meet contemporary standards for building code compliance or structural integrity. With the closing of the CCNZ in 2009 and a gradual decline in population numbers in the wider Temple View area, it is anticipated that buildings will be removed to allow for re purposing of the site to encourage a more sustainable and vibrant community. The application of this design guide, in combination with the restricted

discretionary consent status for building demolition, will ensure that future development has reference to the existing Temple View character.

Figure 1.4.9a: Temple View Zone



Figure 1.4.9b: The former CCNZ campus and residential development that lies immediately on either side of Tuhikaramea Road



Figure 1.4.9c: The former CCNZ campus and residential development that lies immediately on either side of Tuhikaramea Road



The Temple View Zone encompasses a broad area that includes the Hamilton New Zealand Temple of the Church of Jesus Christ of Latter-day Saints and its immediate environs, the former CCNZ Campus, and the Teacher Housing that lies on either side of Tuhikaramea Road. This Zone includes 7 buildings, 3 stands of three and 1 individual specimen tree that are protected through this Plan. (See Appendix 8 and 9.)

Figure 1.4.9d: The temple, former CCNZ Campus and Teacher Housing that lies on either side of Tuhikaramea Road, and residential development to the west



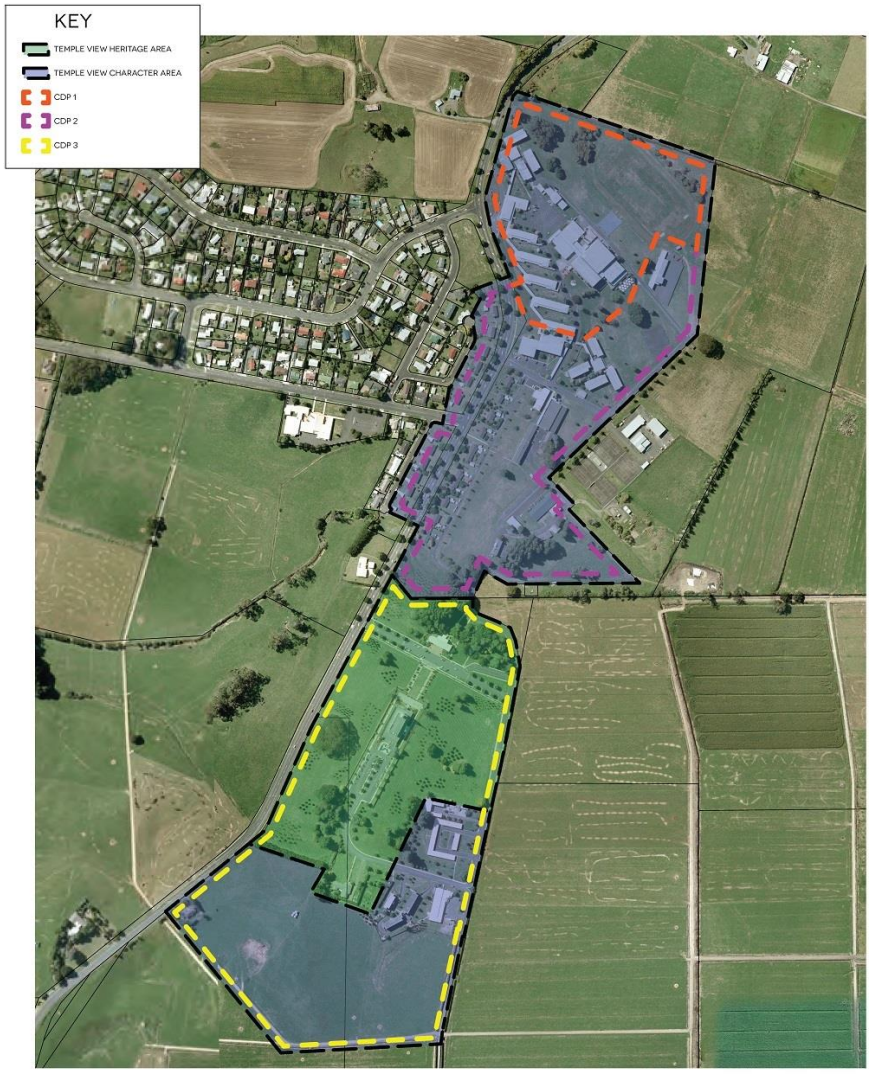
Figure 1.4.9e: The Hamilton New Zealand Temple of the Church of Jesus Christ of Latter-day Saints



The Temple View Zone has been divided into two distinct areas: the Temple View Heritage Area, including the Temple and its immediate surrounds; and the Temple View Character Area, including the former CCNZ buildings, open space areas and the residential development aligning Tuhikaramea Road.

As the Temple View Character Area is more diverse in character and has a greater scope for development opportunities, it has been divided into two areas for Comprehensive Development Plans (CDPs) indicatively based on contour; CDP 1 being the elevated land and sports field to the north, and CDP 2 being the flatter land to the south. Both CDPs will need to be prepared in accordance with the provisions of this Plan and considered for approval.

Figure 1.4.9f: Temple View CDP Areas



1.4.9.3 How to Use the Guide

Development within the Temple View Zone cannot occur until a Comprehensive Development Plan (CDP) (Land Use Consent) is approved. CDPs give form to the intended development and identity at a broad scale the nature of the intended activities, their distribution and how they relate with the surrounding existing and proposed activities. CDPs for the Temple View character area have been prepared and

need to be considered for approval by the Council as part of the process of approving specific landuse activities.

Development in the Temple View Character Area therefore must be in accordance with CDP 1 and CDP 2. Similarly development within the Temple View Heritage Area would require the development of a separate CDP 3.

The design guidance below is split between the general design guidance that applies in the development of each CDP as well as locational specific design guidance.

1.4.9.4 Design Guidance

1.4.9.4.1 General Design Guidance

An application for a Comprehensive Development Plan will need to address how the following outcomes will be achieved:

a. The overall design of the Comprehensive Development Plan achieves aesthetic and architectural coherence and is of a design, scale, form and character appropriate to its location.

b. The arrangement of buildings, car parking, service areas and open spaces including provision for vehicular, cycle and pedestrian circulation will:

   i. Be safe and convenient and achieve high standards of amenity
   ii. Be functionally linked with and physically connected by walkways/cycleways to areas of open space within the CDP
   iii. Will enable safe pedestrian and cycle linkages to be created to the existing Temple View community
   iv. Be aesthetically coherent and reinforce good urban design, particularly the orientation of buildings to outdoor public spaces, roads and utilising a variety of architectural elements consistent with the Temple View character
   v. Give consideration to the identified heritage values of items listed within the District Plan.

c. The design and layout of roads will:

   i. Ensure appropriate connections to existing and future roads
   ii. Respond to the sites existing landform, vegetation, views, water courses (for the purposes of stormwater runoff) and areas of public open space
   iii. Accommodate safe traffic speeds and sightlines for all road users (pedestrians, cyclists and motorists)
   iv. Provide sufficient width to safely accommodate all road users, parking, footpaths, cycle ways, amenity landscaping and compliance with Council's Infrastructure Technical Specifications
   v. Promote a consistent design theme to achieve high amenity values
   vi. Have regard to the future design relationship between the road, adjoining land and adjacent precincts.

d. The location and size of future development sites have been identified in a manner that:

i. Responds to the context within which the development site is to be located, including roads, open space, pedestrian linkages, views and natural features
ii. Where they are for residential housing, they are appropriate to the type and form of housing (medium density or high density) they will contain
iii. Has regard to the relationship with existing grain and scale of developed areas
iv. Gives consideration to the size, shape and aspect of the land, and its suitability for future development
v. Integrates the development of sites within the relevant Comprehensive Development Plan as a whole.

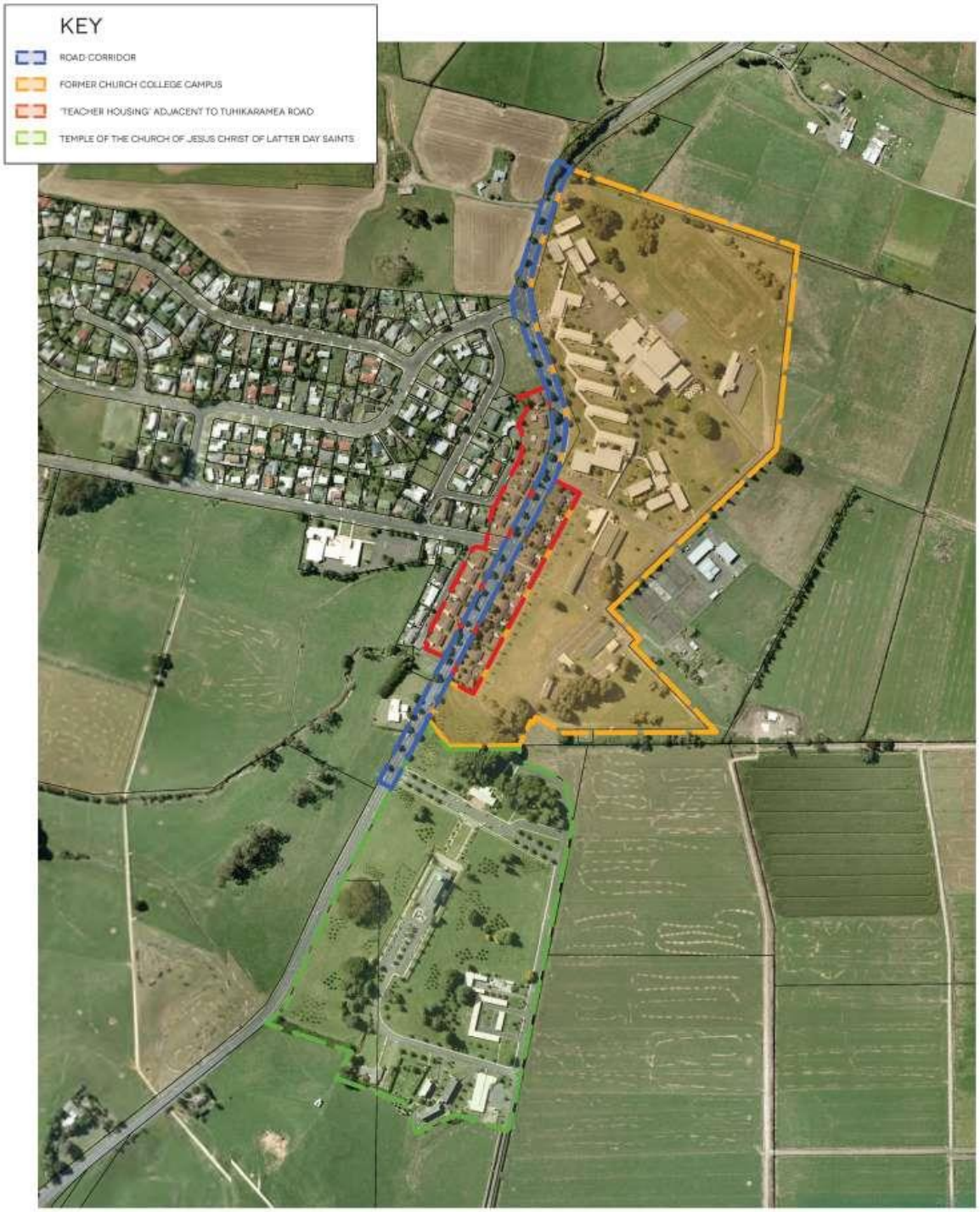
1.4.9.4.2 Local Character Specific Design Guidance

In order to evaluate the appropriateness of a Comprehensive Development Plan an understanding of the character of the area is required. Much of the character of the Temple View Zone is derived from the cultural influence of the Hamilton New Zealand Temple of the Church of Jesus Christ of Latter-day Saints and the associated former Church College of New Zealand (CCNZ) campus and its evolution over the decades since the 1950s. This approach has resulted in a variable building vernacular due to the differing development phases that have occurred. Although the present appearance of the Temple View Zone has a superficial consistency of appearance which allows the diverse components to be perceived as a whole, the area can be usefully divided into four sections which contribute significantly to the perceived character of the area (refer to Figure 1.4.9g):

1. The Road Corridor
2. 'Teacher Housing' adjacent to Tuhikaramea Road
3. The former Church College Campus
4. The Temple of The Church of Jesus Christ of Latter-day Saints.

Each of these sections contains elements which mark it as distinct from the others and warrant specific consideration. The following sections outline the specific elements or combination of elements that contribute to this character and offer suggestions as to how future development can respond and maintain that character.

Figure 1.4.9g: Temple View Local Character Areas



1. The Road Corridor

The character of the road corridor is informed by a degree of consistency and repetition of the elements within a linear corridor when compared to a typical residential street. Although the elements are somewhat variable, typically the road corridor is defined by a delineating element such as a low masonry curtilage wall of uniform cream colour, metal balustrade atop a retaining wall or round timber bollards. These delineating elements typically contain some permutation of the simple combination of footpath, lawn, street trees and the road carriage way of Tuhikaramea Road.

At the northern entrance to Temple View, the sweeping driveway into the former CCNZ creates an atypical entrance node with a broad swath of grass separating the development from the road corridor. This then returns to the more typical configuration of street trees, grass and footpath. The absence of a delineating element, combined with the curvature of the roadway, presents a less defined edge to the corridor. As a result a more expansive experience is obtained with the character being augmented by more lawn, palm trees and the stepped curtain wall which forms part of the covered walkway beyond.

Where present, the stature of the street trees and extent of their canopy is such that when viewed from along the road alignment they form an unbroken visual element, which restricts views out and reinforces the corridor experience. Elements to either side are partially visible beneath or above the canopy, but are only readily seen when viewed perpendicular to the alignment of the street trees.

Design Guidance:

- Where a low curtilage wall is proposed, it shall be similar to the existing masonry materiality of Temple View and the standard tree and pathway berm configuration should be utilised along Tuhikaramea Road, especially within the former Teacher Housing Character Area.
- Where no curtilage wall is proposed, the standard berm configuration of trees, pathway and grass berm should be maintained where practical.
- Where no curtilage walls are utilised, any delineating elements, such as courtyard and walkway walls should allow visibility into and from the street. Where the delineating element is a building that building should address the street.
- Alternate design configurations may be considered where they maintain or enhance the spatial and visual integrity of the road corridor and provide best practice urban design solutions.
- The current road alignment is to be maintained where possible so as to maintain the integrity of the visual corridor. Where, according to roading design best practice, improvements (such as roundabouts or traffic islands for traffic calming) are required, vertical deviations are preferred over horizontal deviations and any deviations should be contained as much as practicable within the existing road corridor.
- Encourage the introduction of arrival features and/or gateway markers at key locations within Tuhikaramea Road.

Figure 1.4.9h: The Road Corridor



Figure 1.4.9i: The Road Corridor



2. Teacher Housing on Tuhikaramea Road

The character of the Teacher Housing is closely associated with the road corridor and is informed by a level of spatial consistency and repetition of residential scale architecture, materiality and colour. In addition to a consistent architectural vernacular, albeit with a degree of variation in architectural form, the Teacher Housing is positioned in a regular manner relative to their setback from Tuhikaramea Road corridor and their spacing in-between.

The buildings themselves are relatively modest in size being mainly one storey, some with basements, but varying in configuration with both single dwelling and duplex configurations present. The buildings are oriented toward Tuhikaramea Road with modest gates and simple direct pathways leading from the street to the houses.

In some instances the existing grade results in awkward transitions from Tuhikaramea Road, with examples of steps up and down from the street boundary into several of the front yards.

The teacher housing character area also contains a number of features which are contrary to good urban design. On the western side of the road, toward the north, a significant difference in elevation results in houses sitting well below the road level of Tuhikaramea Road. These houses face the retaining wall which supports the road, with pedestrian access afforded by a series of steps down the face of the retaining wall.

While pedestrian access is afforded from Tuhikaramea Road, no parking is available on Tuhikaramea Road for the residents of these dwellings. Garages and vehicular access are obtained only from the 'rear' of these properties. Demarcation between individual properties is very limited and for the most part achieved through soft landscaping of a residential character.

The Teacher Housing Character Area contains one building listed as a Heritage Item under this Plan, being the First House /George Biesinger House (H133). This building has not been ranked by Heritage New Zealand Pouhere Taonga.

Design Guidance

- Development within this area should respond with appropriate scale and setback, in a similar manner to the existing residential setback alignment. The development should address Tuhikaramea Road, where practical and contiguous grades allow, and present an attractive frontage for passers-by. It should also offer an appropriate response to any adjoining open space.
- Consideration should be given to strategies to reduce or ameliorate the discontiguous grades.
- Where discontiguous grades prevent a direct visual connection with the street, alternative configurations which provide attractive street frontage treatments consistent with good urban design may be considered.
- Consideration should be given to alternative dwelling orientations which respond to the wider area and may result in a better urban design outcome for the overall development.
- Vehicle parking should be provided on Tuhikaramea Road.
- Pedestrian access should be provided from Tuhikaramea Road, with garages and vehicular access provided at the 'rear' of the development.

- In addition to the above, development along the western side of Tuhikaramea Road should respond to the residential scale and grain of development to which it is immediately adjacent.
- Materials and colour should be compatible with the Temple View Character area.
- Development should respond to existing heritage buildings and consider scale, materials and contextual cues.

Figure 1.4.9j: Teacher housing on Tuhikaramea Road



Figure 1.4.9k: Teacher Housing on Tuhikaramea Road



3. The Former Church College of New Zealand Campus

The character of the former Church College of New Zealand (CCNZ) Campus is informed by the distribution of built form over elevated topography within the wider park-like campus. The buildings are generally of similar institutional scale, one to two storey rectilinear form of a variety of construction materials. The majority reflect the combination of planned and opportune incremental development that occurred during the initial construction period (which spanned the 1950s till the late 1970s). This process involved the construction of a range of buildings, some specifically for or in support of the former CCNZ, while others formed part of a construction industry which developed on site during the initial construction period. Over time some of these buildings were removed, others re-purposed or modified, and still others added as required, with this evolution continuing to present day. The application of a limited colour palette and tended landscape, provides a sense of consistency to disparate structures which might otherwise appear markedly different.

The distribution of the buildings follows either Tuhikaramea Road or the elevated terrace overlooking the campus sport fields, with the orientation of the buildings predominately to the north. With the exception of the Matthew Cowley Administration building and the Wendell B Mendenhall Library, the campus buildings do not address Tuhikaramea Road,contrary to current urban design best practice. As a result, when viewed from Tuhikaramea Road the buildings in combination with the curtain wall covered walkway convey the character of an institutional but introverted development.

When approaching Temple View from the north, the former CCNZ campus appears as a cluster of large buildings dominating the ridgeline with groups of specimen trees in the fore ground. The largest of these (the David O McKay building) appears as a three storey complex with only limited windows and expansive blank walls. This building is flanked by an ordered array of similar coloured single and double-storyed buildings. Although the buildings address the open space, with the playing field in the foreground providing a balance to the bulk of the buildings, the elevated position, limited windows and the expanse of surrounding open space convey a sense of introversion.

The consistent quality of maintenance of the surrounding landscape, with tidy groomed planting and specimen trees and stands of trees contained within a wider matrix of manicured lawn, provide a degree of consistency to the development. In combination, the application of a limited colour palette and tended landscape, provide a sense of coherence to disparate structures which might otherwise appear markedly different. Overall the former CCNZ campus conveys a coherent albeit introverted character in spite of the differences in architectural form. On closer inspection, the condition of many of the buildings conveys their age and the construction requirements of their time.

The former CCNZ Character Area contains 5 buildings listed as a Heritage Item under this Plan being the David O McKay Building (H106), the GRB Building (H107), The Wendell B Mendenhall Library (H109), Kai Hall (H134), and the Block Plant (H135) House. These buildings have not been ranked by Heritage New Zealand Pouhere Taonga but are valued because of their association with the former CCNZ and the missionaries involved in their construction. (See Appendix 8.)

This area also contains two full stands and one part stand of significant trees, which extends into the Temple of Jesus Christ of the Latter-day Saints Character Area (being T620, T63 and part of T64). These stands are predominantly Kahikatea with some Titoki. These trees are scheduled under this Plan (see Appendix 9).

Design Guidance:

- Development within this area should contain either larger scale elements or clusters of buildings particularly along the northern ridgeline and Tuhikaramea Road frontages.
- Developments within this area should address the street by providing an active edge and “eyes on the street” with an attractive frontage for passers-by. This should be particularly emphasised for development on Tuhikaramea Road frontages.
- Garages and parking should be located such that they do not dominant the street frontage.
- Development should offer an appropriate response to any adjoining open space.
- Development should respond to existing heritage buildings and consider scale, materials and contextual cues.

Figure1.4.9l: The former Church College of New Zealand campus



Figure 1.4.9m: The former Church College of New Zealand campus



4. The Temple of the Church of Jesus Christ of Latter-day Saints

The heritage values of this area are derived from the combination of the built and landscaped environment immediately surrounding the Hamilton New Zealand Temple of the Church of Jesus Christ of Latter-day Saints, and the significant role the church has played in the physical, spiritual and social development of the local community and further afield. The Temple itself was the first in the southern hemisphere and is the focal point of the Church of Jesus Christ of Latter-day Saints in New Zealand.

The siting, design and landscape treatment of the Temple emphasise the vertical proportions of the building and create an impression of a monument. Other buildings within the area include the visitors centre, which has a strong visual relationship with the north elevation of the Temple and the central parking area, the temple presidents house which is visually connected by the walled car parking area to the south of the Temple, and the dormitory accommodation on the eastern side. Much of the character of this area is due to the relative absence of other building particularly when viewed from Tuhikaramea Road. Consequently, landscaping and the tree planting emphasise the dramatic and dominant position of the Temple in the local landscape. This tree planting includes trees that mark periods of occupation and development of the site by the Church.

The Temple of the Church of Jesus Christ of Latter-day Saints (H108) is listed as a Heritage Item under this Plan. This building has not been ranked by Heritage New Zealand Pouhere Taonga but is valued because of its historic, cultural and architectural qualities.

This area contains part of a stand of significant trees, predominantly Kahikatea with some Titoki, which extend from the former CCNZ Character Area (being part of T64). In addition it contains one Bunya-bunya tree (T65). These trees are scheduled under this Plan as significant.

Design Guidance:

- Development shall maintain the primacy of the Temple as the key focus of the area.
- Existing view shafts to the temple shall be maintained with respect to siting of buildings and landscape elements. Consideration may be given to developments and landscape elements within these view shafts which improve the overall amenity of the area with respect to the temple setting.
- Any development should consider and relate to the grain and distribution of development within the immediate area.
- Development should respond to existing heritage buildings and consider the scale, materials and contextual cues presented by these buildings.

Figure 1.4.9n: The Temple of the Church of Jesus Christ of Latter-day Saints



Proposed Plan Change XX-Rotokauri North Private Plan Change

1.4.10 Rotokauri North Acceptable Solutions Code (for duplex buildings)

1.4.10.1 Introduction

The Rotokauri North Medium Density Residential Zone enables a specific form of duplex housing so as to promote affordable housing and housing choice in the new neighbourhood. However, in order to deliver on the Zone's urban design outcomes and avoid unacceptable adverse amenity effects, duplexes must be undertaken in in a specific manner.

This Design Code sets out the conditions that must be complied with to allow duplex development within the Rotokauri North Density Residential Zone to be a Permitted activity (rules 4.5.3 and 4.7.12(a)).

Other relevant rules within the Rotokauri North Density Residential Zone must also still be complied with.

Where the conditions specified in this Code are met, the duplex can be progressed directly to a Building Consent and construction (unless it otherwise triggers the need for resource consent). Subdivision of the duplex under rule 23.3d can be obtained. To ensure that the subdivision does not occur in the absence of the duplex being constructed, a condition of consent will be imposed on all such subdivisions delaying the issue of section 224(c) until the duplex has received and passed a pre-lining inspection from the Council.

Where the conditions specified in this Code are not met, the duplex will require land use consent as a Discretionary activity under rule 4.5.3

1.4.10.2 Conditions to be complied with

All of the following must be complied with for the duplex to be a permitted activity under rules 4.5.3 and 4.7.12(a).

a) site size

i) The allotment must be at least 12.5m wide and 28m deep.
ii) The site subject to the duplex must be a front site and not be subject to a vehicle access restriction in Chapter 25.

b) car parking

i) Each unit within the duplex may only have one car parking space. It must be an unenclosed parking pad and shall not be enclosed into a carport or garage at any time. The subdivision consent shall record this as a consent notice.
ii) The car park for each unit must be at least 2.5m x 5.5m, be located next to one another and be accessed from a single double-width vehicle crossing.
iii) The vehicle crossing must be located at one side of the site and both parking spaces must be contained within 6.25m of the relevant side boundary.

c) building location and design

i) The duplex units must be off-set from one another such that one unit (the 'back' unit) shall be located no more than 8m back from front boundary (exclusive of any porch/verandah).

ii) The second unit (the 'front' unit), shall be located no more than 4m back from the front boundary (exclusive of any porch/verandah).

iii) Each duplex unit's front door must face the front boundary and be directly accessible from the public footpath. The back unit's front door may be screened for privacy from the car park of the front unit.

iv) Each duplex unit shall provide a minimum 1m side yard between the unit and the relevant side boundary.

*For interpretation of the above, refer to **Figures 1 and 2**. These illustrate acceptable solution plans for a combination of 2, 3 and 4 bedroom duplex units.*

d) Notwithstanding the above conditions that must be complied with, the following are permitted, subject to compliance with MDRZ rules:

- Internal floor plan and unit layout.
- Façade shape and window design.
- Roof profile and shape.
- Cladding materials and colours.

e) The combination of different duplex units shall also be permitted i.e. the different duplex designs illustrated in Figures 1 and 2 could be mixed and matched as desired or both duplex units could have the same design (or a different design that complied with 1.4.10.2 a)-c) could be used).

f) Examples of how different duplex unit front facades could be designed are included as Figures 3 and 4. Examples of how the duplexes could appear in three dimensions are included as Figure 5.

g) While the matters specified in 1.4.10.2 a)-c) must be complied with, the intention is that as far as possible the design of each duplex reflect the individuality of the builder and future occupants.

FIGURE 1 – EXAMPLE OF ACCEPTABLE DUPLEX LAYOUT (1-STOREY / 2-BEDROOM + 2-STOREY / 3-BEDROOM)

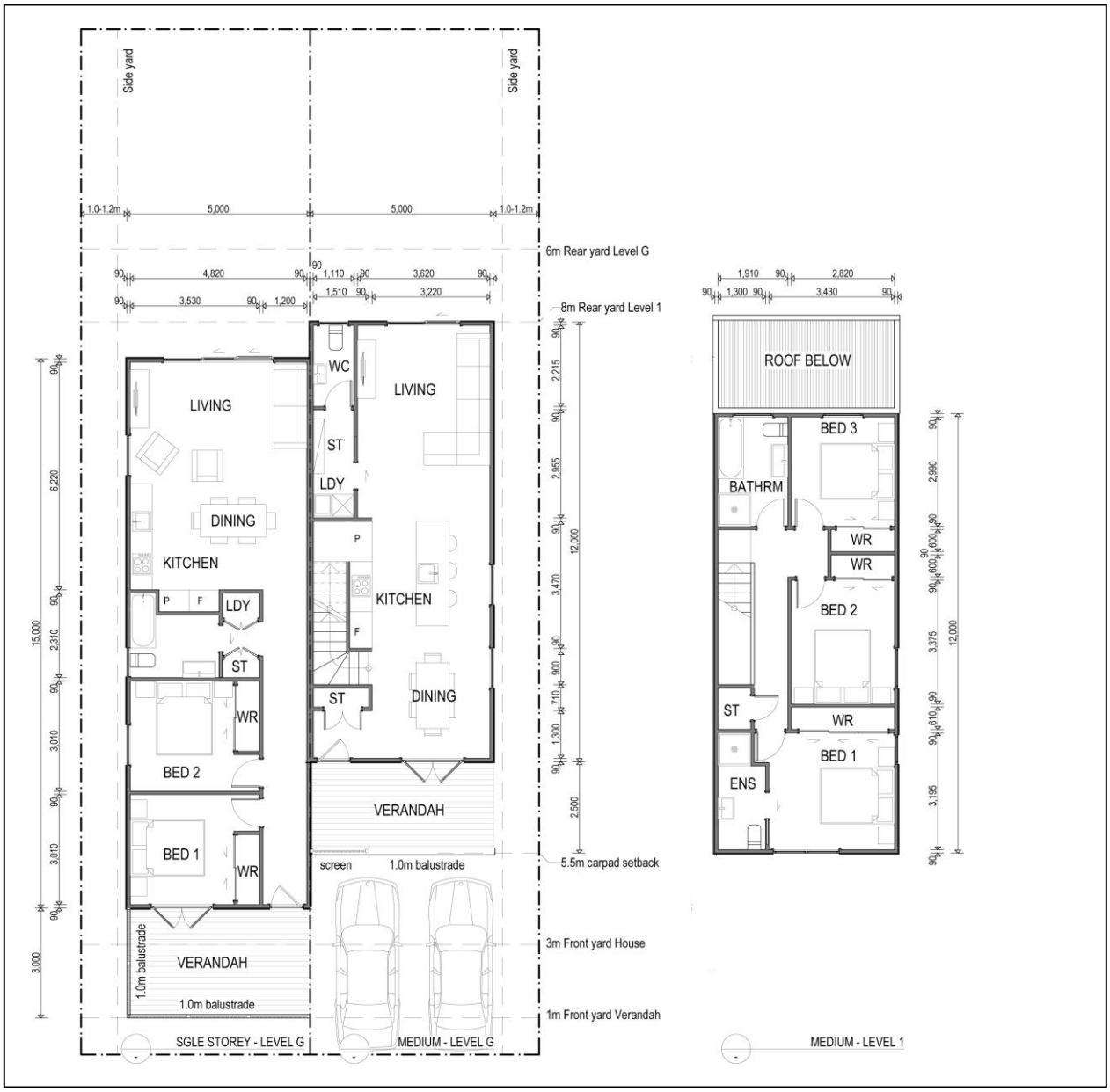


FIGURE 2 - EXAMPLE OF ACCEPTABLE DUPLEX LAYOUT (2-STOREY / 4-BEDROOM + 2-STOREY / 2-BEDROOM)

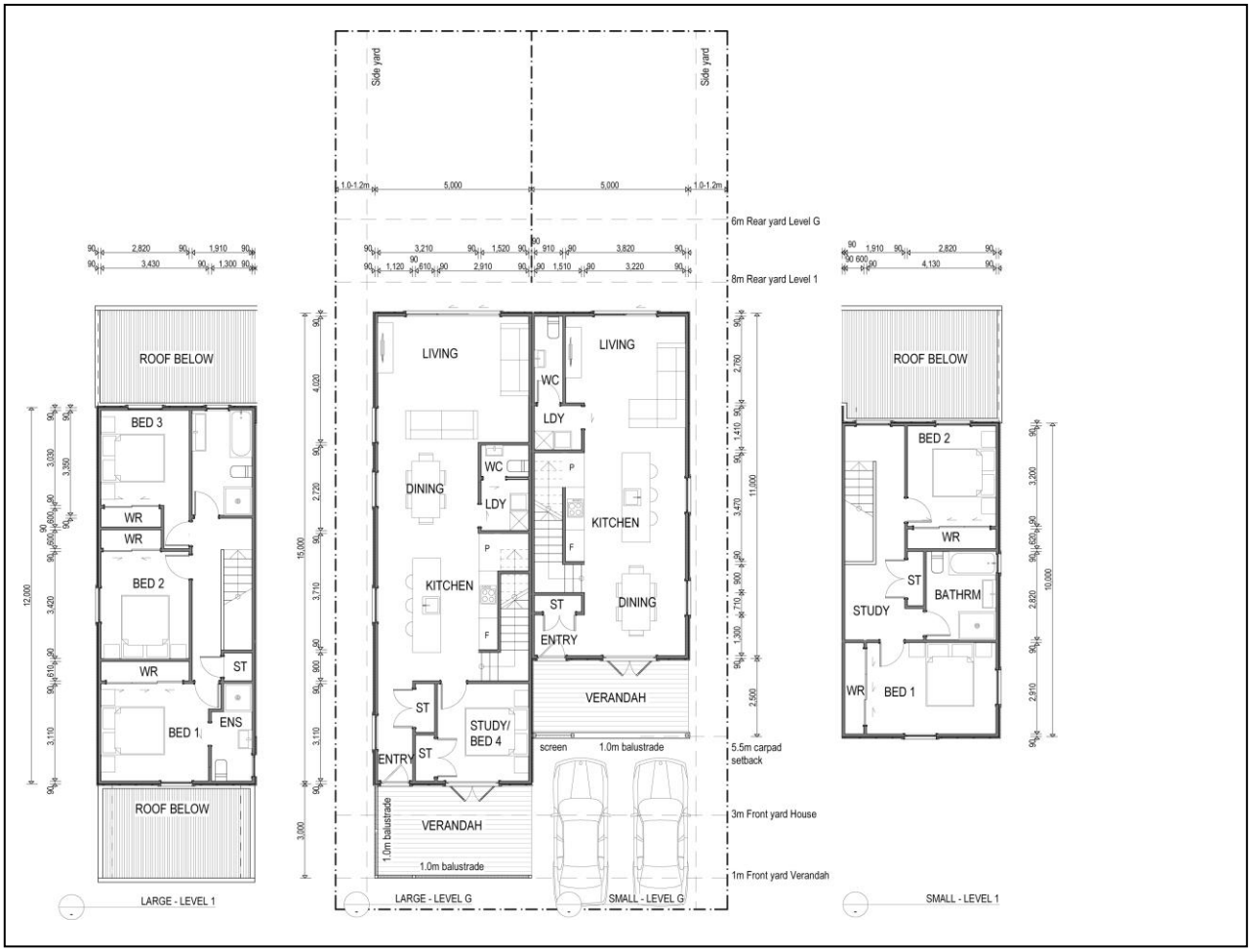


FIGURE 3 – EXAMPLE OF DUPLEXES FRONT FAÇADE DESIGN VARIANTS (PERMITTED)



FIGURE 4 – EXAMPLE OF DUPLEX FRONT FAÇADE DESIGN VARIANTS (PERMITTED)



FIGURE 5 – EXAMPLE OF DUPLEX UNITS - PHOTOSIMULATION



1.5 Other Methods of Implementation

Many issues require a regulatory response through District Plan rules. The Resource Management Act also requires that regard be paid to other methods that may provide for more effective resource management, either on their own or in combination with rules.

This section outlines some of the methods, other than District Plan regulation, that will be developed and implemented to give effect to the District Plan's objectives. These 'other methods' may change and develop over the life of the District Plan as the Council progresses its strategic and annual planning responsibilities through its 10-year Long-Term Plan.

The following list of 'other methods' is an indication of the types of methods that contribute towards achieving District Plan objectives, the list is not exhaustive.

1.5.1 Regulatory Methods Outside the District Plan

a) National Environmental Standards (air-quality standards, assessing and managing contaminants in soil, sources of human drinking water standards, telecommunication facilities, electricity transmission).

b) National Policy Statements such as Electricity Transmission and Renewable Electricity Generation.

c) Additional matters for consenting process for land affected by instability or inundation in the Resource Management Act, section 106.

d) Civil Defence Emergency Management Act 2002 and Civil Defence Emergency Management Plans.

e) Soil Conservation and Rivers Control Act 1941.

f) Hazardous Substances and New Organisms Act 1996 and regulations.

g) Reserves Act 1977 and the development, implementation and review Reserves Act 1977 Management Plans for Council reserves.

h) Historic Places Act 1993.

i) Wildlife Act 1953.

j) Local Government Act 1974 and 2002.

k) Electoral Act 1993 and regulations (e.g. election signs).

l) Speed Limit Bylaws and safer speed areas.

m) Traffic Bylaws (including restrictions on heavy vehicle transport routes).

n) Hamilton City Council Bylaws.

o) Enforcement action under the Resource Management Act.

p) Consenting process and enforcement action under the Building Act 2004 and regulations.

q) Public Works Act 1981 and designations.

r) Land Transport Act 1998 and regulations.

s) Utilities Access Act 2010.

t) Waikato Regional Policy Statement, Regional Plans and Strategies (e.g. Regional Land Transport Strategy).

u) Other Regional or Sub-Regional Strategies (e.g. Futureproof and Sub-Regional Three Waters Strategy).

v) Hamilton City Strategies (e.g. Access Hamilton and any associated action plans, Hamilton Urban Growth Strategy) and Plans.

1.5.2 Education and Advocacy

a) Information from Land Information Memorandum/Project Information Memorandum.

b) Information about contaminants in soil from:

i. Hamilton City Council's Selected Land-use Register.

ii. Waikato Regional Council's Register of Contaminated Land.

iii. Land Information Memorandum.

iv. Ministry for the Environment's Hazardous Activities and Industries List.

v. Ministry for the Environment's Contaminated Land Guidelines.

vi. Department of Labour's Health and Safety Guidelines on the Cleanup of Contaminated Sites.

vii. Industry health and environmental guidelines for assessing and managing contaminated sites.

c) Guides and technical advice include information on:

i. Planting in the City, including recommendations on native planting.

ii. Earthworks.

iii. Good-quality urban design (e.g. *Vista* – highlights key urban design principles).

iv. Low-Impact Urban Design and Development principles.

v. Efficient water use and conservation (e.g. water-sensitive techniques including technologies such as low-flow shower heads and dual-flush toilets in new developments; water-efficient appliances (e.g. washing machines).

d) Promote the Hamilton Waste Management and Minimisation Plan including:

i. Waste audits and waste reduction to be carried out by high waste-generating activities.

ii. Re-use, recycling and disposal of waste including demolition materials.

e) Advocate or promote:

i. Good-quality urban design. Specific advice is available through the Urban Design Panel.

ii. The incorporation of public art into the City.

iii. Water-sensitive approaches to water use and disposal and the benefits of energy- and water-efficiency mechanisms and changing behaviour.

iv. Conservation of landscape, ecological values and gully restoration including voluntary protection of natural environments (e.g. QEII covenants).

v. Undergrounding of network utility services where possible.

vi. Improvements to passenger transport, walkable environments and the outcomes stated in the action plans developed under Access Hamilton.

vii. Broadband across the City.

viii. The benefits of a compact city coupled with good urban design and the advantages of medium-density and mixed-use development.

f) Manage landowner expectations by clear and consistent information about:

i. The constraints and opportunities of having a scheduled building/structure/site.

ii. The timing and sequencing of development of different parts of the City, in accordance with the Hamilton Urban Growth Strategy.

iii. Location of business and industrial activities in centres.

g) Make available natural hazard information. Information about the risks of natural hazards should be provided to assist with the planning and preparation for natural hazard events.

h) Build civic consciousness and pride through public promotion of sites that are of character-defining significance or unique to Hamilton and its history.

1.5.3 Council Projects and Initiatives (Subject to Long Term Plan and Annual Plan)

a) Local Government Act 2002 policies and plans identifying community outcomes, establishing council financial policies, operational/management programmes and infrastructure plans (e.g. Long-term Plans, activity management plans, and budgets).

b) Council work shows leadership in:

i. Co-ordination with other network utility operators regarding the location of new utility services.

ii. Urban design, accessibility, innovation, sustainability and optimisation.

iii. Best practice solutions.

c) Council provides services such as:

i. Monitoring and enforcement.

ii. Transportation and Three Water infrastructure services.

iii. Inner-city free wireless internet.

d) Implement the Public Art Plan and commission public art.

e) Provide infrastructure in a manner that supports residential, business, industrial activities in preferred locations in accordance with City and Regional growth strategies.

f) Develop Integrated Catchment Management Plans and/or water impact assessments for the long-term sustainable management of water resources and align Council works with those Catchment Management Plans and river bank stability programmes.

g) Maintain Hamilton City Infrastructure Technical Specifications, as a guide for acceptable engineering practice and design solutions.

h) Develop and implement Hamilton City Council Three Waters Management Plan.

i) Activity Management Plans for development and management of infrastructure to respond to City growth, renewal and enhanced service levels (including improved service levels to meet environmental objectives).

j) Observe responsibilities under Council's resource consents for water take, wastewater and stormwater management to increase water efficiency and the resulting slowing of growth in demand.

k) Undertake appropriate site investigation, assessment and design, and ensure good management practices are followed for Council-controlled infrastructure and community facilities.

l) Undertake demonstration projects (including public-private) for:

   i. Mixed-use developments.

   ii. Medium-density residential.

   iii. Higher-density Central City living.

   iv. Use of new technology in key public sites.

m) Implement Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010, (Hamilton City Council and other parties) through an integrated River Management Plan and associated joint management agreements and documents.

n) Facilitate public access from the Central City to the riverbank.

o) Develop a Master Plan for future development of the River Corridor.

p) Adopt appropriate place and street names, commemorative signs or pou.

q) Enhance identified Hamilton character areas, precincts and built and natural character.

r) Construct gateways, under the Gateways Policy, including securing land.

s) Develop and implement an Open Space Plan that will set the direction for the future provision of open space in Hamilton, taking account of City growth, demographic change and changes in recreation patterns. As well as providing for recreation needs the plan will acknowledge the role of open space in protecting areas of natural, cultural and historic value. The plan will emphasise the benefits of providing open space that serves multiple values and is connected to provide for pedestrian/cycle paths and ecological links.

t) Develop and implement action plans as described in Access Hamilton, including for parking, safety, travel demand, active travel and passenger transport.

u) Secure necessary land, consents and designations for infrastructure (e.g. land for waste and recycling, and materials recovery activities; transport corridors; Three Waters networks).

v) Develop an Opoia Precinct Framework to guide future development, which builds upon engagement with key stakeholders and addresses key issues including access, connectivity, residential amenity and mix of use.

1.5.4 Collaboration and Partnership

a) Involve and consult with tangata whenua.

b) Work with tangata whenua to improve community understanding of tikanga and customs (e.g. meaning and significance of waahi tapu sites, sensitivities about funeral activities near to food retail activities, scattering of ashes in waterways) .

c) Work with Futureproof partnership to implement the Futureproof Strategy.

d) Collaborate with the Waikato Regional Council, landowners and occupiers in the identification and assessment of potentially contaminated land and the remediation, management or containment of contaminated land.

e) Collaborate with Waikato Regional Council, Civil Defence, and other territorial authorities, to collect and analyse natural hazard risk information.

f) Collaborate with Waikato Regional Council to develop and implement public education and awareness programmes on natural hazards and their associated risks.

g) Participate in any regional natural hazards forum to promote organisational integration and information sharing across jurisdictional and plan boundaries.

h) Co-ordinate upgrades with other network utility operators so road corridor openings are minimised.

i) Advocate for enhanced advertising standards in commercial centres and along industrial frontages.

j) Develop public-private partnerships and joint ventures with the Crown and other councils, as appropriate.

k) Work with infrastructure providers (e.g. Council, NZTA, Kiwi Rail) to develop infrastructure including roads, walkways and cycleways, passenger transport, water services, energy and telecommunications infrastructure, public space and reserves to complement land uses.

l) Maintain an ongoing partnership between Hamilton City Council and event organisers.

m) Maintain an ongoing relationship with the controlling authorities of major facilities.

n) Work with key stakeholders to manage adverse social effects created by alcohol and substance abuse (e.g. liquor ban bylaws, discouraging liquor outlets from neighbourhood centres).

o) Work with community groups in conservation and ecological restoration efforts within Hamilton City.

p) Collaborate with Mighty River Power for design of infrastructure to allow for carefull management of public walkways/cycleways within the operating range of the Waikato Hydro System.

q) Engage with stakeholders involved in the movement of goods that exceed normal maximum size of loads to ensure their operating needs are being considered as part of managing the transport network.

1.5.5 Economic Instruments

a) Develop Development Contributions and Financial Contributions policies that are consistent with the City's strategies, Hamilton City Long-term Plan, Annual Plans and Activity Management Plans.

b) Development agreements between Council and developers for the funding of additional infrastructure and the use and upgrading of existing infrastructure.

c) Cost recovery for services provided (fees and charges).

d) Incentives (e.g. development bonuses, rebates, financial contributions for reserves, discounts) for proposals to:

   i. Encourage high-level adoption of water-sensitive techniques, including financial incentives for water-efficient appliances or financial disincentives (e.g. water metering).

   ii. Retain, plant or covenant native bush areas.

Appendix 9: Natural Environments

9-1 Significant Tree Assessment Valuation Method and Criteria

9-1.1 The RNZIH Standard Method of Evaluation

A standard evaluation method has been developed by the Royal New Zealand Institute of Horticulture (RNZIH) for the assessment of all trees proposed for inclusion in district plans.

In this adapted form there are 13 categories (A-M). Each category asks specific questions of the assessor. Each category must be regarded as a specific question and answered without reference to other categories.

The categories are given ratings of 1 to 4. Each rating requires a clear decision. Any expansion of the rating values leads to subjectivity and fractional differences of opinion. The following assessment must be used in the context of the value of that tree or group of trees to the local community. The scoring is carried out using the form shown in Appendix 9-2.

9-1.2 Category A: Size of Tree

The **height** and the **width** of the tree are measured and the tree is then assessed for **size**. This is done by taking the larger dimension, i.e. height or width, and doubling. The lesser dimension is subsequently added. This figure will give the visual area of the tree.

Small	1-25	1 point
Medium	26-60	2 points
Large	61-86	3 points
Exceptional	86	4 points

The terrain may slope or be level without affecting the measurement method.

9-1.3 Category B: Importance of Position

This is used for assessing the trees' **visual importance** or **proximity to the public**. There is a need to recognise the value of trees that are adjacent to well-used footpaths or walkways in urban situations. For ease of definition the rating of this category is divided as follows (with vehicle counts for types of routes as a guide).

Minor Significance (local transport corridor or private garden), fewer than 3000 vehicles per day (vpd)	1 point
Significant (collector transport corridor) 3000–10,000 vpd	2 points
Very Significant (minor arterial transport corridor or suburban and sub-regional centres) 10,000–20,000 vpd	3 points
Major Significance (major arterial transport corridor or city centre) > 20,000 vpd	4 points

9-1.4 Category C: Presence of Other Trees

This category evaluates the **proximity** of other trees in the area. The rating is as follows.

Forest or woodland park	1 point
Group or small park (10+ trees)	2 points
Small group (2-9 trees)	3 points
Solitary specimen	4 points

9-1.5 Category D: Occurrence of the Species

Trees of importance in this category are assessed according to the **frequency of the species** in the local area. This category makes allowance for regional geographic differences such as climate.

Common	1 point
Infrequent	2 points
Rare locally	3 points
Rare regionally	4 points

9-1.6 Category E: Role in Location or Setting

This category assesses the **visual and spatial quality** surrounding the trees, i.e. the visual or spatial role of the tree in the setting. Does it contribute to the scene in a special way? Would the removal of the tree detract from the scene? Is the tree complementary to its surrounds? Is the tree an intentional part of a composition? The rating is as follows.

Minor significance	1 point
Significant	2 points
Very Significant	3 points
Major Significance	4 points

9-1.7 Category F: Useful Life Expectancy

The **health** and condition of a tree are indicators in this category. Simply put – does the tree look healthy in foliage, branch or bark? Are there any bad cuts or wounds liable to infection or rot? This category is divided into human life-span generations (in broad terms) for ease of reference. The question to be asked is whether the tree will be expected to be there for the next generation or generations to enjoy.

0 – 30 years	1 point
30 – 60 years	2 points
60 – 90 years	3 points
90 + years	4 points

9-1.8 Category G: Form

This is assessed by observing the **appearance** of the tree. Is it a well-shaped tree with a well-balanced branch system? A sturdy well-developed trunk is also visually important in the overall appearance of the tree.

Poor Form	1 point
Fair Form	2 points
Good Form	3 points
Excellent Form	4 points

9-1.9 Category H: Scientific Value

This category is for trees that have interest due to a **genetic purity** lost in the countries of origin, their value as a **source of propagation material**, or their **uniqueness** as rare cultivar or forms of a species. Trees without great stature or even a common species could be of great scientific interest. Specialist knowledge is required for the scientific evaluation and should be fully documented.

Minor Significance	1 point
Significant	2 points
Very Significant	3 points
Major Significance	4 points

9-1.10 Category I: Historic Value

This category is used for awarding trees their own particular **historic distinctions**. These include trees that have historic associations with early pioneers of historic events or places. It is important that trees in this category are given documented reasons for the evaluation.

Minor Significance	1 point
Significant (locally)	2 points
Very Significant	3 points
Major Significance	4 points

9-1.11 Category J: Cultural Value

Trees of **spiritual, tribal, or other cultural values** that are well documented or widely recognised. This category includes trees that are very large (notable) or very old for the species, but not recognised in Category A or commemorative trees without historic associations.

Minor significance	1 point
Significant (locally)	2 points
Very Significant (locally)	3 points

Major Significance (locally, nationally)	4 points

9-1.12 Category K: Functional Value(s)

This assesses the values of protection of soil by stabilisation, noise amelioration, shelter and shade, and fruit production, where these values are **primary** functions of the tree(s) in their location, i.e. the tree(s) are there for that reason.

Minor Significance	1 point
Significant	2 points
Very Significant	3 points
Major Significance	4 points

9-1.13 Category L: Ecological Value

This is assessed as distinct from scientific and botanical value. It is related to habitat values for flora and fauna (particularly native) and is assessed on a **stand basis** so that single or isolated trees would score 1 in all cases. The species diversity of a stand is also important in this respect. Stands that serve as links between natural features and other larger stands can also be assessed here.

Minor Significance	1 point
Significant	2 points
Very Significant	3 points
Major Significance	4 points

9-1.14 Category M: Stand Landscape Value

This is assessed distinct from individual trees so individual or isolated trees would score 1 in all cases. The essential aspect is the **overall significance of the stand** in its environment. Is it visually significant? Does it screen or buffer development? Does it contribute to the city-wide tree framework or green network?

Minor Significance	1 point
Significant	2 points
Very Significant	3 points
Major Significance	4 points

9-1.15 Method of Finding the Score for the Evaluation

The rating figures for each category entered on the registration form are now multiplied category by category. A x B x C x D x E x F x G x H x I x J x K x L x M = Total Points. Please note that in whatever order the individual category scores are multiplied, the final score remains the same. This represents the sum of the evaluation for amenity purposes and clarification for listing.

For individual trees or groups of up to nine trees, the qualifying score should be the average of individual scores. For groups of 10 or more trees, the qualifying score should

be the **average** score for the 10 best typical trees of the group. (If required, individual scores for other trees in the group could be assessed.)

Thus for individual trees or groups of up to nine trees, the score obtained shall achieve or exceed for:

Category 1 – 1000 points

Category 2 – 500 points

For trees protected as a condition of consent – 250 points.

9-1.16 Method of Applying a Monetary Value

A monetary value is obtained by multiplying the evaluation score by the unit value. A value of $45 per unit has been adopted, based on the 1998 cost of purchase and establishment of a tree scoring 1.

The value of an individual tree, in a group or stand of more than 10 trees, shall be the unit value multiplied by the average score for 10 typical trees as established in the registration procedure. The stand value will be the individual value multiplied by the number of trees.

Appendix 9-2: Significant Tree Assessment Form

District Plan & Tree Evaluation Form

Register No.: ..... Registration Category: .....

Site Address: ..... Map Ref: .....

Legal Description: .....

Site Owner: .....

Owner Address: .....

Site Occupier: .....

Registration Requested By:..... Date (First Registered): .....

HCC Resolution: ..... File: .....

Tree Species: ..... Tree Evaluation Score: .....

Common Name:..... Tree Monetary Value ($30/unit): .....

Location On Site: .....

Evaluating Officer: ..... Date: .....

	Rating Categories	Points	1	2	3	4	Scores
A	Size of tree 2 Height + Width (m)		Small 1-25	Medium 26-60	Large 61-85	Outstanding 86+	
		Points					
B	Importance of position		Minor Significance	Significant	Very Significant	Major Significance	
		Points					
C	Presence of other trees		Forest or woodland park (many)	Group or park 10+ trees (some)	Small group 2-9 trees (few)	Solitary	
		Points					
D	Occurrence of the species		Common	Infrequent (locally or regionally)	Rare (nationally)	Rare	
		Points					

Rating Categories		Points	1	2	3	4	Scores
E	Role in location or setting (visual spatial composition in setting)		Minor Significance	Significant	Very Significant	Major Significance	
		Points					
F	Useful life expectancy in years from now (vigour)		0-30	30-60	60-90	90+	
		Points					
G	Form or shapeliness		Poor	Fair	Good	Excellent	
		Points					
H	Scientific value		Minor Significance	Significant	Very Significant	Major Significance	
		Points					
I	Historic value		Minor Significance	Significant	Very Significant (regional)	Major Significance (national)	
		Points					
J	Cultural value		Minor Significance	Significant	Very Significant	Major Significance	
		Points					
K	Functional value		Minor Significance	Significant	Very Significant	Major Significance	
		Points					
L	Ecological value		Minor Significance	Significant	Very Significant	Major Significance	
		Points					
M	Stand landscape value		Minor Significance	Significant	Very Significant	Major Significance	
		Points					
						TREE EVALUATION TOTAL =	

Schedule 9C: Significant Natural Areas

Site Number (refer to Planning Maps)	Name	Map Number
SNA 1	Te Rapa North kahikatea I	7B
SNA 2	Te Rapa North kahikatea II	7B
SNA 3	River Road North Gully	7B, 8B
SNA 4	Riverside alder with tree ferns	7B, 8B
SNA 5	Pukete kanuka Gully I	16B, 8B
SNA 6	Riverbank mahoe scrub, Pukete	16B, 8B
SNA 7	Pukete Riverside mamaku-mahoe Forest	16B, 17B
SNA 8	Pukete kanuka Gully II	16B
SNA 9	Pukete Riverside kanuka	17B
SNA 10	Puketaha astelia Gully	19B
SNA 11	~~Burbush Road Forest/Perkins Bush~~ Te Uuhi Paa Reserve	14B
SNA 12	Horseshoe Lake (Waiwhakareke Natural Heritage Park)	33B
SNA 13	Riverbank north of Pukete Bridge	17B
SNA 14	Kirikiriroa Gully, Harrowfield	17B
SNA 15	Totara Park	17B
SNA 16	Mooney Street kahikatea	25B
SNA 17	Kirikiriroa Gully adjacent to Gordonton Road	19B
SNA 18	Kirikiriroa Gully, Chartwell	19B
SNA 19	Riverbank opposite St Andrew's Golf Course	18B, 27B
SNA 20	St Andrew's kanuka	27B
SNA 21	Donny Park raupo	27B
SNA 22	Riverbank opposite Anne Street	27B
SNA 23	Ranfurly Park, Fairfield	36B, 37B
SNA 24	Kirikiriroa Gully, Mangaiti	18B, 19B
SNA 25	Nawton Wetland	33B
SNA 26	Brymer Park	33B
SNA 27	Lake Rotokaeo (Forest Lake)	35B
SNA 28	Grove Park kahikatea	42B
SNA 29	Waitawhiriwhiri Gully, Edgecumbe Park	36B
SNA 30	Waitawhiriwhiri Gully, Whitiora	35B
SNA 31	Claudelands Bush	37B, 38B
SNA 32	Riverbank south of Miropiko	37B
SNA 33	Seeley's Gully	37B, 38B, 45B, 46B
SNA 34	Peachgrove kahikatea	46B
SNA 35	Mixed planted forest and totara forest near Golf Area Hamilton Lake Domain	44B
SNA 36	Lake Rotoroa	44B, 45B, 54B, 55B
SNA 37	Southwell Bush	38B
SNA 38	Caldwell Native Bush	38B
SNA 39	Waikato University kahikatea	47B
SNA 40	Hillcrest kahikatea	47B
SNA 41	Mangaonua Gully, Chelmsford Park	48B
SNA 42	Mangaonua Gully, Silverdale	48B

Proposed Plan Change XX- Rotokauri North Private Plan Change

Site Number (refer to Planning Maps)	Name	Map Number
SNA 43	Temple View kahikatea	60B
SNA 44	Graham Island (Te Motere o Kaipikau)	56B
SNA 45	Riverbank east of Cobham Drive	56B
SNA 46	River Island with turf vegetation	56B
SNA 47	Mamaku-mahoe forest, Hamilton Gardens Riverbank Mamaku-kamahi forest, Hamilton Gardens	57B
SNA 48	Riverbank kanuka opposite Hammond Park	57B
SNA 49	Hammond Bush	58B, 57B
SNA 50	Gully near Hammond Bush I	58B
SNA 51	Gully near Hammond Bush II	58B
SNA 52	Riverside kanuka, Hammond Park	58B
SNA 53	Mangaonua streamside, Riverlea	58B
SNA 54	Riverside kanuka, Peacocke	58B, 65B
SNA 55	Mangakotukutuku gully, Te Anau Park	63B
SNA 56	Mangakotukutuku gully, Peacocke	64B
SNA 57	Mangaonua gully, Berkley	58B
SNA 58	Mangaonua streamside, Riverlea	58B
SNA 59	Mangaonua gully arm, Riverlea	58B

Schedule 9D: Significant Trees

Note

In the table below:

1. "*" Means when assessed as part of a stand these trees reach the required threshold.
2. "x3" Means the number of trees assessed as one canopy (i.e. three trees).
3. The root protection zone of a tree may extend beyond the boundary of the listed lot and onto a neighbouring property.

ID# (as per planning maps)	Common Name	Botanical Name	Address/Legal Description	RNZIH Score	Category
T3 Map 56B	Bunya bunya	Araucaria bidwillii	Cobham Drive (Hamilton Gardens), Sec 26 Hamilton East Twn Belt	3456	1
T4 Map 57B		**Mixed Group**			
4.2	Atlantic cedar	Cedrus atlantica glauca	Cobham Drive Reserve, Lot DPS 23750	2592	1
4.3	Redwood	Sequoia sempervirens	Cobham Drive Reserve, Lot 3 DPS 23750	1152	1
4.4	Holm oak	Quercus ilex	Cobham Drive Reserve, Lot 3 DPS 23750	2592	1
4.5	Atlantic cedar	Cedrus atlantica glauca	Cobham Drive Reserve, Lot 3 DPS 23750	2592	1
4.6	Redwood	Sequoia sempervirens	334 Cobham Drive, Pt Lot 2 DPS 13020	2592	1
4.7	Atlantic cedar	Cedrus atlantica glauca	332 Cobham Drive, Lot 1 DPS 23750	1728	1
4.8	Holm oak	Quercus ilex	332 Cobham Drive, Lot 1 DPS 23750	3456	1
T5 Map 57B	English oak	Quercus robur	61 Flynn Rd, Lot 1 DPS 24621	648	2
T6 Map 37B	Tupelo	Nyssa sylvatica	12 George St, Lot 1 DPS 4394	1296	1
T7 Map 45B	**Ferrybank Plantation**	**Mixed Group**	**Grantham St - Ferrybank Reserve, Allotment 443A Town of West Hamilton, Lot 2 DPS 257.**		**1 (Stand) Av.10 best**
7.1	English oak	Quercus robur	Grantham St – Ferrybank Reserve	3456	
7.2	English oak	Quercus robur	Grantham St – Ferrybank Reserve	1152	
7.3	English oak	Quercus robur	Grantham St – Ferrybank Reserve	1296	
7.4	Japanese cedar	Cryptomeria japonica	Grantham St – Ferrybank Reserve	1728	
7.5	English beech	Fagus sylvatica	Grantham St – Ferrybank Reserve	2592	
7.6	English beech	Fagus sylvatica	Grantham St – Ferrybank Reserve	3456	
7.7	Pin oak	Quercus palustris	Grantham St – Ferrybank Reserve	1152	

ID# (as per planning maps)	Common Name	Botanical Name	Address/Legal Description	RNZIH Score	Category
7.8	London plane	Platanus acerifolia	Grantham St – Ferrybank Reserve	3456	
7.9	Japanese cedar	Cryptomeria japonica	Grantham St – Ferrybank Reserve	576	
7.10	London plane	Platanus acerifolia	Grantham St – Ferrybank Reserve	2304	
7.11	Japanese cedar	Cryptomeria japonica	Grantham St – Ferrybank Reserve	1052	
7.12	London plane	Platanus acerifolia	Grantham St – Ferrybank Reserve	3456	
7.13	London plane	Platanus acerifolia	Grantham St – Ferrybank Reserve	2304	
7.16	California big tree or Giant Sequoia	Sequoiadendron giganteum	Grantham St – Ferrybank Reserve	3888	
7.17	Japanese cedar	Cryptomeria japonica	Grantham St – Ferrybank Reserve	1152	
T8 Map 46B	**Grey St Avenue**		**Grey St, Hamilton East, Road Reserve**		**1 (stand) Av. 10 best**
8.1	London plane	Platanus acerifolia	By 142 Grey St	2916	
8.2	English elm	Ulmus procera	Opposite 293 Grey St (by Steele Park toilets)	1296	
8.5	English oak	Quercus robur	By 146 Grey St	5184	
8.6	London plane	Platanus acerifolia	By 293 Grey St	1944	
8.7	London plane	Platanus acerifolia	Cnr Cook and Grey St (by 300 Grey Street)	6912	
8.8	London plane	Platanus acerifolia	Cnr Cook and Grey St (Steel Park Corner)	5184	
8.9	Common elm	Ulmus procera	By 191 Grey St	5832	
8.10	London plane	Platanus acerifolia	By 242 Grey St	2916	
8.11	London plane	Platanus acerifolia	By 209 Grey St	2916	
8.12	London plane	Platanus acerifolia	By 208A Grey St	2916	
8.13	London plane	Platanus acerifolia	By 180 Grey St	2916	
8.14	London plane	Platanus acerifolia	Cnr of Wellington and Grey St (by 265 Grey Street)	3888	
8.15	London plane	Platanus acerifolia	By 150 Grey St	3888	
T9 Map 46B	**Steele Park Memorial Trees**		**Steele Park, Grey St, Allotment 410 Town of Hamilton East**		**1 (stand) Av. 10 best**
9.1	Silver birch	Betula pendula	Cook St (opposite 300 Grey St)	432	
9.2	Sycamore maple	Acer pseudoplatanus	Cook St	864	
9.3	London plane	Platanus acerifolia	Cook St	1728	
9.4	English oak	Quercus robur	Cook St	2592	
9.5	English oak	Quercus robur	Cook St	2592	
9.6	London plane	Platanus acerifolia	Cook St	864	
9.7	English oak	Quercus robur	Cook St	2916	
9.8	English oak	Quercus robur	Cook St	648	
9.9	English oak	Quercus robur	Cook St	1944	

ID# (as per planning maps)	Common Name	Botanical Name	Address/Legal Description	RNZIH Score	Category
9.10	English oak	Quercus robur	Cook St	1296	
9.11	English oak	Quercus robur	Cook St	648	
9.12	English oak	Quercus robur	Firth St	576	
9.13	English oak	Quercus robur	Firth St	972	
9.14	English oak	Quercus robur	Firth St	1944	
9.15	English oak	Quercus robur	Firth St	1944	
9.16	English oak	Quercus robur	Firth St	4374	
9.17	English oak	Quercus robur	Firth St	864	
9.18	English oak	Quercus robur	Firth St	1944	
9.19	English oak	Quercus robur	Firth St	972	
9.20	English oak	Quercus robur	Firth St	2592	
9.22	English oak	Quercus robur	Firth St	2592	
9.23	California big tree or Giant Sequoia	Sequoiadendron giganteum	Wellington St	1728	
9.24	English oak	Quercus robur	Wellington St	648	
9.25	English oak	Quercus robur	Wellington St	1944	
9.26	English oak	Quercus robur	Wellington St	1944	
9.27	English oak	Quercus robur	Wellington St	3888	
9.28	English oak	Quercus robur	Wellington St	3888	
9.29	English oak	Quercus robur	Wellington St	1944	
9.30	English oak	Quercus robur	Wellington St	2916	
9.31	English oak	Quercus robur	Wellington St	1944	
9.32	Sycamore maple	Acer pseudoplatanus	Wellington St	864	
9.33	English oak	Quercus robur	Wellington St	1944	
9.34	English oak	Quercus robur	Wellington St	3888	
9.36	English oak	Quercus robur	Wellington St	576	
9.37	English oak	Quercus robur	Wellington St	1944	
9.38	Douglas fir	Pseudotsuga menziesii	Wellington St	2592	
9.39	English oak	Quercus robur	Wellington St	2592	
9.40	Indian cedar	Cedrus deodora	Cnr Wellington & Grey St	1728	
9.41	English oak	Quercus robur	Grey St	1944	
9.42	Sweet chestnut	Castanea sativa	Grey St	864	
9.43	English oak	Quercus robur	Grey St	1296	
9.44	English oak	Quercus robur	Grey St	1728	
9.45	English oak	Quercus robur	Grey St	2592	
9.46	Sycamore maple	Acer pseudoplatanus	Grey St	576	
9.47	English oak	Quercus robur	Grey St	1296	
9.48	English oak	Quercus robur	Grey St	1944	
9.49	English oak	Quercus robur	Grey St	648	
9.50	English oak	Quercus robur	Grey St	1296	
9.51	English oak	Quercus robur	Grey St	1944	
T10 Map 45B		**Oak Stand**	**Hamilton Parade by Alma St, Road Reserve**		
10.1	Mossy cup oak	Quercus acutissima	Hamilton Parade	1536	1

ID# (as per planning maps)	Common Name	Botanical Name	Address/Legal Description	RNZIH Score	Category
10.2	Mossy cup oak	Quercus acutissima	Hamilton Parade	1536	1
10.3	Mossy cup oak	Quercus acutissima	Hamilton Parade	1536	1
10.4	Mossy cup oak	Quercus acutissima	Hamilton Parade	6144	1
10.5	Tulip poplar	Liriodendron tulipifera	Hamilton Parade	576	2
10.6	Pohutukawa	Metrosideros excelsa	Hamilton Parade	2592	1
T11 Map 37B			**Hamilton Parade by London St, Road Reserve**		
11.1	Swamp cypress	Taxodium distichum	Hamilton Parade by London St	1152	1
11.2	Kauri	Agathis australis	Hamilton Parade by London St	1024	1
T12 Map 28B	Blue Atlantic cedar	Cedrus atlantica glauca	1 Blue Cedar Lane Lot 1 DP 336812	1728	1
T13 Map 54B	California big tree or Giant Sequoia	Sequoiadendron gigantum	82 Lake Crescent, Lot 2 DP 34122	1944	1
T14 Map 37B			**2 London St**		
14.1	Indian cedar	Cedrus deodara	2 London St, Lot 2 DPS 83224	1296	1
14.2	English beech	Fagus sylvatica	2 London St, Lot 2 DPS 83224	3888	1
T15 Map 37B	Weeping elm	Ulmus glabra pendula	4 Little London Lane, Lot 1 DPS 75770	1152	1
T16 Map 45B	**Hamilton Hotel Riverside Planting**	**Stand**	**Marlborough Place, Lot 1 DPS 32477**		
16.1	Norfolk pine	Araucaria heterophylla	Hamilton Hotel, 170 Victoria St	1728	1
16.2	Norfolk pine	Araucaria heterophylla	Hamilton Hotel, 170 Victoria St	1728	1
16.3	Bunya bunya	Araucaria bidwillii	Hamilton Hotel, 170 Victoria St	6912	1
16.4	Southern magnolia	Magnolia grandiflora	Hamilton Hotel, 170 Victoria St	512	2
16.5	Southern magnolia	Magnolia grandiflora	Hamilton Hotel, 170 Victoria St	864	2
T17 Map 45B	**Soldiers' Memorial Trees**	**Stand**	**Memorial Park, Allotment 417 Town of Hamilton East, Sec 1-3 SO 56166, Pt Lots 2 and 7 DP 1233.**		**1 (Stand) Av. 10 best**
17.1	Kauri	Agathis australis	Memorial Park, Memorial Dr Allot 417 TN OF Hamilton East	1152	1
17.2	Kauri	Agathis australis	Memorial Park, Memorial Dr Pt Lot 7 DP 1233	1536	1

ID# (as per planning maps)	Common Name	Botanical Name	Address/Legal Description	RNZIH Score	Category
17.3	Titoki	Alectryon excelsus	Memorial Park, Memorial Dr Sec 2 SO 56166	1152	1
17.4	Caucasian fir	Abies nordmanniana	Memorial Park, Memorial Dr Allot 417 TN OF Hamilton East	1728	1
17.5	Caucasian fir	Abies nordmanniana	Memorial Park, Memorial Dr Pt Lot 7 DP 1233	3456	1
17.6	Horse chestnut	Aesculus hippocastanum	Memorial Park, Memorial Dr Sec 2 SO 56166	1728	2
17.8	Norfolk pine	Araucaria heterophylla	Memorial Park, Memorial Dr Allot 417 TN OF Hamilton East	3456	1
17.9	Norfolk pine	Araucaria heterophylla	Memorial Park, Memorial Dr Allot 417 TN OF Hamilton East	3456	1
17.10	Caucasian fir	Abies nordmanniana	Memorial Park, Memorial Dr Allot 417 TN OF Hamilton East	1728	1
17.11	Japanese cedar	Cryptomeria japonica	Memorial Park, Memorial Dr Sec 2 SO 56166	1728	1
17.12	Indian cedar	Cedrus deodara	Memorial Park, Memorial Dr Pt Lot 7 DP 1233	3456	1
17.13	Silver birch	Betula pendula	Memorial Park, Memorial Dr Allot 417 TN OF Hamilton East	768	2
17.14	Silver birch	Betula pendula	Memorial Park, Memorial Dr Allot 417 TN OF Hamilton East	768	2
17.15	Rimu	Dacrydium cupressinum	Memorial Park, Memorial Dr	1728	1
17.16	Rimu	Dacrydium cupressinum	Memorial Park, Memorial Dr Pt Lot 7 DP 1233	1728	1
17.17	Rimu	Dacrydium cupressinum	Memorial Park, Memorial Dr Pt Lot 7 DP 1233	2304	1
17.18	Rimu	Dacrydium cupressinum	Memorial Park, Memorial Dr Pt Lot 7 DP 1233	1152	1
17.19	English beech	Fagus sylvatica	Memorial Park, Memorial Dr Sec 3 SO 56166	1536	1
17.20	Common ash	Fraxinus excelsior	Memorial Park, Memorial Dr	384	*
17.21	Common ash	Fraxinus excelsior	Memorial Park, Memorial Dr	1152	1
17.22	Maidenhair tree	Ginkgo biloba	Memorial Park, Memorial Dr Pt Lot 2 DP 1233	1152	1
17.25	Southern magnolia	Magnolia grandiflora	Memorial Park, Memorial Dr Sec 2 SO 56166	576	2
17.26	Totara	Podocarpus totara	Memorial Park, Memorial Dr Pt Lot 7 DP 1233	1152	1
17.27	Cherry	Prunus serrulata cv.	Memorial Park, Memorial Dr Sec 2 SO 56166	864	2
17.28	Scarlet oak	Quercus coccinea	Memorial Park, Memorial Dr Sec 1 SO 56166	3456	1
17.29	Scarlet oak	Quercus coccinea	Memorial Park, Memorial Dr Sec 2 SO 56166	2304	1

ID# (as per planning maps)	Common Name	Botanical Name	Address/Legal Description	RNZIH Score	Category
17.30	English oak	Quercus robur	Memorial Park, Memorial Dr Sec 2 SO 56166	1152	1
17.32	English oak	Quercus robur	Memorial Park, Memorial Dr Allot 417 TN OF Hamilton East	1296	1
17.33	English oak	Quercus robur	Memorial Park, Memorial Dr Sec 2 SO 56166	1152	1
17.34	English oak	Quercus robur	Memorial Park, Memorial Dr Sec 2 SO 56166	864	2
17.35	English oak	Quercus robur	Memorial Park, Memorial Dr Sec 2 SO 56166	1296	1
17.36	English oak	Quercus robur	Memorial Park, Memorial Dr Allot 417 TN OF Hamilton East	1296	1
17.37	Japanese cedar	Cryptomeria japonica	Memorial Park, Memorial Dr Allot 417 TN OF Hamilton East	576	2
17.38	Redwood	Sequoia sempervirens	Memorial Park, Memorial Dr Sec 2 SO 56166	1728	1
T18 Map 36B			**20 Mill St (Whitiora Primary School), Allotment 197 Town of Hamilton West**		
18.1	Common ash	Fraxinus excelsior	20 Mill St Allot 197 Town of Hamilton West	1296	1
18.3	Sweet gum	Liquidamber styraciflua	45 Abbotsford St	648	2
18.4	Common elm	Ulmus procera	20 Mill St Allot 198 Town of Hamilton West	576	2
T19 Map 38B		**Mixed Group – Informal Avenue**	**86-120 Peachgrove Rd**		**2 (Stand) Av. 10 best**
19.1	Red oak	Quercus rubra	84 Peachgrove Rd, Lot 9 DPS 63009	576	2
19.2	Sweet gum	Liquidamber styraciflua	84 Peachgrove Rd, Lot 9 DPS 63009	432	*
19.3	Copper beech	Fagus sylvatica 'Purpurea'	88 Peachgrove Rd, Lot 2 DPS 77637	384	*
19.4	Tulip poplar	Liriodendron tulipifera	96 Peachgrove Rd, Lot 6 DPS 63009	1152	1
19.5	Tulip poplar	Liriodendron tulipifera	98 Peachgrove Rd, Lot 6 DPS 63009	432	*
19.6	Copper beech	Fagus sylvatica 'Purpurea'	100 Peachgrove Rd, Lot 5 DPS 63009	576	2
19.7	Scarlet oak	Quercus coccinea	104 Peachgrove Rd, Lot 4 DPS 63009	432	*
19.8	Tulip poplar	Liriodendron tulipifera	104 Peachgrove Rd, Lot 4 DPS 63009	384	*
19.9	Red oak	Quercus rubra	114 Peachgrove Rd, Lot 2 DPS 63009	864	2

ID# (as per planning maps)	Common Name	Botanical Name	Address/Legal Description	RNZIH Score	Category
19.10	Kahikatea x 2	Dacrycarpus dacrydioides	4 Ruakura Rd, Pt Lot 1 DPS 64567	648	2
T20 Map 38B	Silky oak	Grevillea robusta	200 Peachgrove Rd (Southwell School), Lot 12 DP 4213	972	2
T22 Map 36B	Red-flowering gum	Eucalyptus ficifolia	Road Reserve by 2 Princes St, Road Reserve	3888	1
T23 Map 37B	California big tree or Giant Sequoia	Sequoiadendron giganteum	Esplanade opposite 390 River Rd, Lot 76 DP 6695	1728	1
T24 Map 37B		**Mixed Stand**	**339 River Rd (Miropiko Reserve), Pt Allot 215 Kirikiriroa PSH**		
24.1	Chinese pearl-bloom tree	Poliothyrsis sinensis	339 River Rd (Miropiko Reserve)	4608	1
24.2	Copper beech	Fagus sylvatica 'Purpurea'	339 River Rd (Miropiko Reserve)	864	2
24.3	Maidenhair tree	Ginkgo biloba	339 River Rd (Miropiko Reserve)	1728	1
24.4	Trident maple	Acer buergerianum	339 River Rd (Miropiko Reserve)	576	2
24.5	Maidenhair tree	Ginkgo biloba	339 River Rd (Miropiko Reserve)	768	2
24.6	Kashmir cypress	Cupressus darjeelingensis	339 River Rd (Miropiko Reserve)	768	2
24.7	Tupelo	Nyssa sylvatica	339 River Rd (Miropiko Reserve)	576	2
24.8	Black oak	Quercus velutina	339 River Rd (Miropiko Reserve)	1296	1
T25 Map 27B	**Diocesan High School Entry**	**Mixed Group**	**660 River Rd (Diocesan School)**		**1 (Stand) Av. 10 best**
25.1	London plane	Platanus acerifolia	Road Reserve by 660 River Rd	2592	1
25.2	California big tree or Giant Sequoia	Sequoiadendron giganteum	660 River Rd, Lot 3 DPS 54638	3888	1
25.3	London plane	Platanus acerifolia	660 River Rd, bdry of road reserve & Lot 3 DPS 54638	3456	1
25.4	London plane	Platanus acerifolia	660 River Rd, bdry of road reserve & Lot 3 DPS 54638	3456	1
25.5	London plane	Platanus acerifolia	660 River Rd, Lot 3 DPS 54638	1152	1
25.6	London plane	Platanus acerifolia	660 River Rd, bdry of road reserve & Lot 3 DPS 54638	3456	1
25.7	London plane	Platanus acerifolia	660 River Rd, Lot 3 DPS 54638	864	2
25.8	California big tree or Giant Sequoia	Sequoiadendron giganteum	660 River Road Lot 2 DP 311806	10368	1
25.9	London plane	Platanus acerifolia	660 River Rd, Lot 3 DPS 54638	1152	1
25.10	Linden	Tilia europaea	660 River Rd, Lot 1 DP 4296	2592	1
25.11	Pin oak	Quercus palustris	660 River Rd, Lot 1 DP 24135	2592	1
25.12	London plane	Platanus acerifolia	660 River Rd, Lot 3 DPS 54638	768	2

ID# (as per planning maps)	Common Name	Botanical Name	Address/Legal Description	RNZIH Score	Category
25.13	Tulip poplar	Liriodendron tulipifera	660 River Rd, Lot 3 DPS 54638	1296	1
T26 Map 37B	Washingtonia palm	Washingtonia filifera robusta	3 New St, Lot 1 DP 26008	2048	1
T27 Map 45B	Camphor tree	Cinnamomum camphora	Cnr Thackeray/Pembroke St, bdry of Lot 2 SO 58630 & Road reserve	648	2
T29 Map 36B	Olive	Olea europea	1340 Victoria St (Trevellyn Home), Lot 1 DPS 26562	2592	1
T30 Map 37B	**Claudelands oaks**	**Mixed Group**	**Claudelands Rd, bdry Road Reserve & Lot 1 DPS 90651**		
30.4	English oak	Quercus robur	Claudelands Rd (opposite No 16), Road Reserve	768	2
30.6	Common oak	Quercus robur	Claudelands Road (opposite # 12) Lot 1 DP S90651	576	2
T31 Map 19B	**Hukanui oaks**	**Mixed Group**	**Hukanui Rd Amenity Reserve, Lot 57 DPS 13852 & Lot 58 DPS 13851**		**1 (Stand) Av. 10 best**
31.1	English oak	Quercus robur	Hukanui Rd Lot 57 DPS 13852	972	2
31.2	English oak	Quercus robur	Hukanui Rd Lot 57 DPS 13852	648	2
31.3	English oak	Quercus robur	Hukanui Rd Lot 57 DPS 13852	648	2
31.4	English oak	Quercus robur	Hukanui Rd Lot 57 DPS 13852	648	2
31.5	English oak	Quercus robur	Hukanui Rd Lot 57 DPS 13852	1944	1
31.6	English oak	Quercus robur	Hukanui Rd Lot 57 DPS 13852	648	2
31.7	English oak	Quercus robur	Hukanui Rd Lot 58 DPS 13851	648	2
31.8	English oak	Quercus robur	Hukanui Rd Lot 58 DPS 13851	972	2
31.9	English oak	Quercus robur	Hukanui Rd Lot 58 DPS 13851	648	2
31.10	English oak	Quercus robur	Hukanui Rd Lot 58 DPS 13851	972	2
31.11	English oak	Quercus robur	Hukanui Rd Lot 58 DPS 13851	972	2
31.12	English oak	Quercus robur	Hukanui Rd Lot 58 DPS 13851	648	2
31.13	English oak	Quercus robur	Hukanui Rd Lot 58 DPS 13851	972	2
31.14	California big tree or Giant Sequoia	Sequoiadendron giganteum	Hukanui Rd Lot 58 DPS 13851	1944	1
31.15 Map 28B	Italian cypress	Cupressus sempervirens	Hukanui Rd Lot 58 DPS 13851	432	*
31.16 Map 28B	English oak	Quercus robur	Hukanui Rd Lot 58 DPS 13851	972	2
31.17 Map 28B	English oak	Quercus robur	Hukanui Rd Lot 58 DPS 13851	648	2
T34 Map 23B		**Mixed Group**	**Lee Road,** Lot 1 DPS 90181		
34.1	Norfolk pine	Araucaria heterophylla	23 Lee Road Lot 1 DPS 90181	2592	1
34.2	English oak	Quercus robur	23 Lee Road Lot 1 DPS 90181	384	*
34.3	Holm oak	Quercus ilex	23 Lee Road Lot 1 DPS 90181	1296	1
34.4	Redwood	Sequoia sempervirens	23 Lee Road Lot 1 DPS 90181	576	2
34.5	Elm	Ulmus glabra	23 Lee Road Lot 1 DPS 90181	864	2
T35 Map 56B		**Mixed Group**	**137 Peacocke Road, Reserve behind Glenview Club, Lot 1 DP 312185**		**1 (Stand) Av. 10 best**

ID# (as per planning maps)	Common Name	Botanical Name	Address/Legal Description	RNZIH Score	Category
35.1	English oak	Quercus robur		1296	1
35.2	English oak	Quercus robur		1296	1
35.3	London plane	Platanus acerifolia		1728	1
35.4	London plane	Platanus acerifolia		1728	1
35.5	London plane	Platanus acerifolia		3456	1
35.6	English oak	Quercus robur		5184	1
35.7	English oak	Quercus robur		1296	1
35.8	London plane	Platanus acerifolia		2304	1
35.9	English oak	Quercus robur		1296	1
35.10	London plane	Platanus acerifolia		1296	1
35.11	London plane	Platanus acerifolia		2304	1
35.12	English oak	Quercus robur		1296	1
T36 Map 63B		**Stand plus two others**	**Northview Farm – Ohaupo Rd, Sec 1 SO 57582**		**1 (Stand)**
36.1	English oak	Quercus robur	Northview Farm – 3019 Ohaupo Rd	1296	1
36.2	Pin oak	Quercus palustris	Northview Farm – 3019 Ohaupo Rd	1296	1
36.3	Pin oak	Quercus palustris	Northview Farm – 3019 Ohaupo Rd	1296	1
36.4	Pine	Pinus sp.	Northview Farm – 3019 Ohaupo Rd	768	2
36.5	Pin oak	Quercus palustris	Northview Farm – 3019 Ohaupo Rd	864	2
36.6	Fir	Abies sp.	Northview Farm – 3019 Ohaupo Rd	1296	1
36.7	London plane	Platanus acerifolia	Northview Farm – 3019 Ohaupo Rd	864	2
36.8	Pin oak	Quercus palustris	Northview Farm – 3019 Ohaupo Rd	1052	1
36.9	Eucalyptus	Eucalyptus sp.	Northview Farm – 3019 Ohaupo Rd	1536	1
36.10	Elm	Ulmus	Northview Farm – 3019 Ohaupo Rd	1296	1
T37 Map 37B	Linden	Tilia x europea	1 Rostrevor St, Pt Allotment 28 Town of Hamilton West	864	2
T38 Map 38B	Tulip poplar	Liriodendron tulipifera	93 Peachgrove Rd, Lot 3 DPS 334	972	2
T39 Map 28B	Kapuka	Griselinia littoralis	Fairfield Primary School, Clarkin Rd, Lot 1 DPS 2417	648	2
T40 Map 44B	Maidenhair tree	Ginkgo biloba	104 Lake Rd, Lots 1&2 DPS 62186	1296	1
T42 Map 36B			**Hinemoa Park, Sec 1 SO 57622**		
42.1	Cook Island pine	Araucaria cookii	Hinemoa Park	2592	1
T43 Map 36B		**Stand**	**Victoria and Ulster St Road Reserve**		
43.1	Linden	Tilea europaea	Victoria and Ulster St Road Reserve	1728	1
43.2	Scarlet oak	Quercus coccinea	Victoria and Ulster St Road Reserve	1152	1

ID# (as per planning maps)	Common Name	Botanical Name	Address/Legal Description	RNZIH Score	Category
T44 Map 45B		**Stand**	**Jesmond Park, Road reserve (part of Claudelands Rd) Lot 1 DP 14636**		
44.1	Red oak	Quercus rubra	Jesmond Park	2592	1
44.2	London plane	Platanus acerifolia	Jesmond Park	768	2
44.3	London plane	Platanus acerifolia	Jesmond Park	768	2
T45 Map 37B	Sweet chestnut	Castanea sativa	659 Grey St, Lot 16 DP 13871	648	2
T46 Map 42B		**Stand**	**143 & 145 Newcastle Road, Lots 1 & 2 DPS 9015**		**2 (Stand)**
46.1	Tanekaha	Phyllocladus trichomanioides	143 Newcastle Rd	648	2
46.3	Kauri	Agathis australis	143 Newcastle Rd	1536	1
46.4	Black beech	Nothofagus solandri	143 Newcastle rd	576	2
46.5	Taraire	Beilschmiedia taraire	145 Newcastle Rd	648	2
46.6	Pohutukawa	Metrosideros excelsa	145 Newcastle Rd	648	2
46.7	Miro	Prumnopitys ferruginea	145 Newcastle Rd	648	2
T47 Map 57B			**221 Peacockes Rd, Lot 2 DPS 12490**		
47.1	English oak x 4	Quercus robur	221 Peacockes Rd	864	2
47.2	London plane x 4	Platanus acerifolia	221 Peacockes Rd	864	2
T49 Map 46B	Rewarewa	Knightia excelsa	130A Grey St, Lot 1 Allot 303 TN OF Hamilton East	864	2
T50 Map 11B		**Stand**	**Sexton Rd, Lot 1&2 DPS 13652**		**2 (Stand) Av. 10 best**
50.1	Magnolia	Magnolia delaveyi	13 Sexton Rd Lot 2 DPS 13652	1152	1
50.2	Trident maple	Acer buergerianum	13 Sexton Rd Lot 2 DPS 13652	576	2`
50.3	Black oak	Quercus velutina	13 Sexton Rd Lot 2 DPS 13652	1536	1
50.4	Japanese emperor oak	Quercus dentata	13 Sexton Rd Lot 2 DPS 13652	768	2
50.5	Pyrenean oak	Quercus pyrenaica	13 Sexton Rd Lot 2 DPS 13652	768	2
50.6	California big tree or Giant Sequoia	Sequoiadendron giganteum	13 Sexton Rd Lot 2 DPS 13652	576	2
50.7	Linden	Tilia europaea	13 Sexton Rd Lot 408 DP 314084	768	2
50.8	Sweet gum	Liquidamber styraciflua	13 Sexton Rd Lot 2 DPS 13652	576	2
50.9	English beech	Fagus sylvatica	13 Sexton Rd Lot 2 DPS 13652	864	2
50.10	Dawn redwood	Metasequoia glyptostroboides	13 Sexton Rd Lot 2 DPS 13652	576	2
T51 Map 38B	Copper beech	Fagus sylvatica 'Purpurea'	15 Brooklyn Rd, Lot 16 DP 26208	576	2
T52 Map 18B		**Stand**	**951-987 River Road**		

ID# (as per planning maps)	Common Name	Botanical Name	Address/Legal Description	RNZIH Score	Category
52.1	Pin oak	Quercus palustris	951 River Road, Lot 1 DPS 13322	1152	1
52.2	Black walnut	Juglans nigra	953 River Road, Lot 1 DPS 24147	648	2
52.3	Sweet chestnut	Castanea sativa	Road Reserve by 953 River Rd	576	2
52.4	English oak	Quercus robur	Road Reserve by 955 River Rd	648	2
52.5	English oak x 5	Quercus robur	975 River Rd, Lot 8 DPS 25186	648	2
52.6	Tulip poplar	Liriodendron tulipifera	975 River Rd, Lot 8 DPS 25186	486	2
52.7	London plane	Platanus acerifolia	Road Reserve by 983 River Rd	648	2
52.8	London plane	Platanus acerifolia	Road Reserve by 985 River Rd	648	2
52.9	London plane	Platanus acerifolia	Road Reserve by 987 River Rd	648	2
T54 Map 56B			**Hamilton Gardens, Cobham Drive (indoor bowls lawns), Pt Sec 28 Hamilton East TN BELT**		
54.1	Kauri	Agathis australis	Hamilton Gardens, Cobham Drive (indoor bowls lawns)	768	2
54.2	Rimu	Dacrydium cupressinum	Hamilton Gardens, Cobham Drive (indoor bowls lawns)	768	2
T55 Map 42B	Tasmanian blue gum	Eucalyptus globulus	Road Reserve on cnr Aberdeen/Lachlan Drive (adjacent to 2 Lachlan Dr)	648	2
T56 Map 27B	London plane	Platanus acerifolia	Road reserve by 655 River Rd	648	2
T57 Map 38B	Dawn redwood	Metasequoia glyptostroboides	Pensioner Housing Units – Sullivan Cres/Peachgrove Rd, Lot 18 DPS 4558	648	2
T60 Map 36B	Kauri	Agathis australis	19A Darley St, Lot 3 DPS 19479	768	2
T61 Map 36B	Totara	Podocarpus totara	422 Tristram St, Lot 18 DP 20707	576	2
T62 Map 60B	Kahikatea x 69 Titoki	Dacrycarpus dacrydioides Alectryon excelsus	465 Tuhikaramea Rd, Lot 1 DPS 88403	864	2
T63 Map 60B	Kahikatea x 9	Dacrycarpus dacrydioides	465 Tuhikaramea Rd, Lot 1 DPS 88403	576	2
T64 Map 60B	Kahikatea x 14 Titoki x 4	Dacrycarpus dacrydioides Alectryon excelsus	465 Tuhikaramea Rd, Lot 1 DPS 88403	1152	1
T65 Map 60B	Bunya-bunya	Araucaria bidwillii	509 Tuhikaramea Rd, Pt Allot 371, Tuhikaramea Parish	576	2
T66 Map 36B	Golden totara	Podocarpus totara 'Aurea'	9 Strowan Avenue Lot 2 DP 37451	576	2
T67 Map 36B	Frangipani - white	Plumeria obtusa	1202B Victoria St Lot 1 DP 26548	768	2
T68 Map 47B					
68.1	Rimu	Dacrydium cupressinum	16 Sutton Crescent Lot 6 DPS 4111	576	2

ID# (as per planning maps)	Common Name	Botanical Name	Address/Legal Description	RNZIH Score	Category
68.2	Kauri	Agathis australis	16 Sutton Crescent Lot 6 DPS 4111	576	2
T69 Map 47B	Wonder tree	Idesia polycarpa	Unit 1 117 Cambridge Rd Lot 1 DPS 1551	512	2
T70 Map 42B	Kauri	Agathis australis	32 Dalton Crescent Lot 34 DPS 18457	576	2
T71 Map 45B	Tulip tree	Liriodendron tulipifera	Outside 5 Fow St, Outside Lot 1 DP 390729	768	2
T72 Map 45B	**Plane tree**	**Platanus orientalis**	**Bridge St Road berm outside Lot 1 DP 4473, Lot 1 DP 13864 and Allot 69 Twn of Hamilton West**	**5184**	**1**
72.1	Plane tree	Platanus orientalis	Bridge St Road berm outside Lot 1 & 2 DP 4473		
72.2	Plane tree	Platanus orientalis	Bridge St Road berm outside Lot 1 DP 13864		
72.3	Plane tree	Platanus orientalis	Bridge St Road berm outside Allot 69 Town of Hamilton West		
T73 Map 45B		**Mixed Group**	**Victoria St South (cnr Victoria St & Bridge St road reserve)**		
73.1	Phoenix palm	Phoenix canariensis	Opposite Lot 1 DPS 12797	862	2
73.2	Phoenix palm	Phoenix canariensis	Opposite Lot 1 DPS 12797	862	2
73.3	Totara	Podcarpus totara	Opposite Lot 1 DPS 12797	1728	1
73.4	Karaka	Corynocarpus laevigatus	Opposite Lot 1 DPS 12797	3456	1
T74 Map 39B	**Ruakura Structure Plan**		**Ruakura Lane, Melody Lane, AgResearch**		
74.1	London plane	Platanus orientalis	Ruakura Lane – Lot 4 DPS 66853	20736	1
74.2	London plane	Platanus orientalis	Ruakura Lane – Lot 4 DPS 66853	20736	1
74.3	London plane	Platanus orientalis	Ruakura Lane – Lot 4 DPS 66853	20736	1
74.4	London plane	Platanus orientalis	Ruakura Lane – Lot 4 DPS 66853	20736	1
74.5	London plane	Platanus orientalis	Ruakura Lane – Lot 4 DPS 66853	20736	1
74.6	London plane	Platanus orientalis	Ruakura Lane – Lot 4 DPS 66853	20736	1
74.7	London plane	Platanus orientalis	Ruakura Lane – Lot 4 DPS 66853	20736	1
74.8	London plane	Platanus orientalis	Ruakura Lane – Lot 4 DPS 66853	20736	1
74.9	London plane	Platanus orientalis	Ruakura Lane – Lot 4 DPS 66853	20736	1
74.10	London plane	Platanus orientalis	Ruakura Lane – Lot 4 DPS 66853	20736	1

ID# (as per planning maps)	Common Name	Botanical Name	Address/Legal Description	RNZIH Score	Category
74.11	London plane	Platanus orientalis	Ruakura Lane – Lot 4 DPS 66853	20736	1
74.12	London plane	Platanus orientalis	Ruakura Lane – Lot 4 DPS 66853	20736	1
74.13	Scarlet oaks	Quercus coccinea	Ruakura Lane – Lot 3 DPS 66853	3456	1
74.14	English oak	Quercus robur	Ruakura Lane – Lot 3 DPS 66853	1728	1
74.15	Kapuka	Griselinia littoralis	Ruakura Lane – Lot 4 DPS 66853	432	2
74.16	Totara	Podocarpus totara	Lot 1 DPS 785-49	144	2
74.17	English oak	Quercus robur	Lot 1 DPS 785-49	1536	1
T75 Map 39B					
75.1	Japanese zelkova	Zelkova serrata	Melody Lane – Lot 3 DPS 66853	10368	1
75.2	Japanese zelkova	Zelkova serrata	Melody Lane – Lot 3 DPS 66853	10368	1
75.3	Japanese zelkova	Zelkova serrata	Melody Lane – Lot 3 DPS 66853	10368	1
75.4	Japanese zelkova	Zelkova serrata	Melody Lane – Lot 3 DPS 66853	10368	1
75.5	London plane	Platanus orientalis	Melody Lane – Lot 3 DPS 66853	2304	1
75.6	Lime	Tilia x europea	Melody Lane – Lot 3 DPS 66853	648	2
75.7	English oak	Quercus robur	Melody Lane Lot 3 DPS 66853	432	2
75.8	English oak	Quercus robur	Melody Lane Lot 3 DPS 66853	648	2
75.9 Map 38B	London plane	Platanus orientalis	Melody Lane Lot 3 DPS 66853	2592	1
75.10	Redwood	Sequoia sempervirens	Melody Lane Lot 3 DPS 66853	864	2
T76 Map 39B					
76.1	Carya	Carya	Ag Research – Lot 3 DPS 78549	2304	1
76.2	Hackberry	Celtis occidentalis	Ag Research – Lot 3 DPS 78549	1296	1
76.3	Horse chestnut	Aesculus hippocastanum	Ag Research – Lot 3 DPS 78549	1536	1
76.4	Himilayan cedar	Cedrus deodara	Ag Research – Lot 3 DPS 78549	432	2
76.5	Redwood	Sequoia sempervirens	Ag Research – Lot 3 DPS 78549	2592	1
T77 Map 39B					
77.1	Totara	Podocarpus totara	Homestead Driveway – Lot 2 DPS 66852	528	2
77.2	Totara	Podocarpus totara	Homestead Driveway – Lot 2 DPS 66852	528	2
77.3	Totara	Podocarpus totara	Homestead Driveway – Lot 2 DPS 66852	528	2

ID# (as per planning maps)	Common Name	Botanical Name	Address/Legal Description	RNZIH Score	Category
77.4	Totara	Podocarpus totara	Homestead Driveway – Lot 2 DPS 66852	528	2
77.5	Totara	Podocarpus totara	Homestead Driveway – Lot 2 DPS 66852	528	2
77.6	Totara	Podocarpus totara	Homestead Driveway – Lot 2 DPS 66852	528	2
77.7	Totara	Podocarpus totara	Homestead Driveway – Lot 2 DPS 66852	528	2
77.8	Totara	Podocarpus totara	Homestead Driveway – Lot 2 DPS 66852	528	2
77.9	Totara	Podocarpus totara	Homestead Driveway – Lot 2 DPS 66852	528	2
77.10	Totara	Podocarpus totara	Homestead Driveway – Lot 2 DPS 66852	528	2
77.11	Totara	Podocarpus totara	Homestead Driveway – Lot 2 DPS 66852	528	2
77.12	Totara	Podocarpus totara	Homestead Driveway – Lot 2 DPS 66852	528	2
77.13	Totara	Podocarpus totara	Homestead Driveway – Lot 2 DPS 66852	528	2
77.14	Horse chestnut	Aesculus hippocastanum	Ag Research – Lot 3 DPS 78549	526	2
77.15	Redwood	Sequoia sempervirens	Lot 3 DPS 78549	1152	1
77.16	Redwood	Sequoia sempervirens	Lot 3 DPS 78549	1152	1
77.17	Gum Tree	Eucalyptus	Lot 3 DPS 78549	1152	1
77.18	Gum Tree	Eucalyptus	Lot 3 DPS 78549	648	2
77.19	Gum Tree	Eucalyptus	Lot 3 DPS 78549	576	2
T78 Map 38B					
78.1	English oak x 9	Quercus robur	Ruakura – Lot 3 DPS 78549	6912	1
78.2	English oak	Quercus robur	Ruakura – East of Gate Lot 3 DPS 78549	2304	1
78.3	Gum	Eucalyptus rengans	Tramway Road/East Street Lot 3 – DPS 77459	1728	1
78.4	Kahikatea	Dacrycarpus dacrydioides	Ag Research Lot 3 DPS 78549	768	2
78.5	English oak	Quercus robur	Ag Research Lot 3 DPS 78549	384	2
T79 Map 39B					
79.1	English oak	Quercus robur	181 Ruakura Road Lot 1 DPS 77458	8748	1
79.2	Oriental plane	Platanus orientalis	181 & 191 Ruakura Road Lot 1 & 2 DPS 78529	11644	1
T80 Map 39B, 40B					
80.1	Horse chestnut	Aesculus indica	191 Ruakura Road Lot 2 DPS 78549	15552	1

ID# (as per planning maps)	Common Name	Botanical Name	Address/Legal Description	RNZIH Score	Category
80.2	Redwood	Sequoia gigantea	215 Ruakura Road Lot 2 DPS 78549	5184	1
80.3 Map 40B	Oriental plane	Platanus orientalis	191 Ruakura Road Lot 2 DPS 78549	972	2
80.4 Map 40B	Holly oak	Quercus ilex	Ruakura Road Lot 8 DPS 66853	864	2
T81 Map 39B	London plane x 18	Platanus orientalis	Ruakura Road Lot 1 DPS 77458	864	1
T82 Map 39B	Redwood (Group) x 12	Sequoia sempervirens	Ruakura Road Lot 1 DPS 78549	3456	1
T83 Map 46B	Bolleana poplar	Populus alba 'Pyramidalis'	Corner of Clyde Street and Galloway Street	1296	1
T84 Map 34B	Kahikatea	Dacrycarpus dacrydiodes	Lot 100 DP S36527 (Crawshaw Park)	576	2

Appendix 15: Transportation

15-1 Parking, Loading Spaces and Manoeuvring Areas – Tables and Figures

Table 15-1a: Number of parking, loading and cycle spaces **Activity**	**Car parking spaces**	**Loading spaces**	**Visitor cycle spaces**	**Staff cycle spaces**
a) Ancillary residential units and apartment buildings	1 per residential unit	-	1 per 4 units	-
b) Building improvement centre (excluding nurseries and garden centres)	1 per 50m^2 gross floor area	1 space	-	-
c) Camping grounds	1 per unit, camp site or caravan site	-	-	-
d) Childcare facilities for less than six children	2 plus 1 per FTE staff member	-	-	-
e) Childcare facilities for six or more children	1 per FTE staff member plus 1 drop-off car space per 5 children that the facility is designed to accommodate	-	-	1 per 100 students
f) Community centre	1 per 30m^2 gross floor area	1 space	1 per 50m^2 gross floor area	-
g) Single dwellings and duplex dwellings (except for duplex dwellings in Rotokauri North)	2 per household or dwelling	-	-	-
h) Drive-through services	1 per 30m^2 gross floor area (excluding canopy area over pumps) plus 5 queuing spaces per dispensing facility	1 space	1 per 100m^2 gross floor area	1 space per 10 FTE staff
i) Emergency service facilities	1 car space per on-duty staff person, plus sufficient space for all the emergency vehicles that use the site	-	-	-

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Table 15-1a: Number of parking, loading and cycle spaces **Activity**	**Car parking spaces**	**Loading spaces**	**Visitor cycle spaces**	**Staff cycle spaces**
j) Health care services	3 per consultant and 1 per FTE staff	1 space	1 per 2 consultants	1 space per 10 FTE staff
k) Home-based business	2 perhousehold plus 1 per vehicle used solely for the home-based business	-	-	-
l) Hospitals	1 per 4 FTE staff plus 1 per 4 beds	1 space per 50 beds	1 per 15 beds	1 per 30 beds
m) Industrial activities (including warehouses) (excluding trade and industry training facilities)	1 per 150m^2 gross floor area	1 space per development or per 3000m^2 gross floor area, whichever is the greater	-	1 space per 15 FTE staff
n) Industrial activities (trade and industry training facilities only)	1 per FTE staff, plus 1 per 3 students the facility is designed to accommodate	1 space	1 per 3 FTE students	1 space per 15 FTE staff
o) Managed care facilities and rest homes	1 per 3 bedrooms plus 1 per every FTE staff member	-	1 per 60 beds	1 space per 15 FTE staff
p) Marae	1 per 25m^2 gross floor area	1 space	1 per 50 m^2 gross floor area or 1 for every 5 persons the facility is designed to accommodate, whichever is the greater	-
q) Nurseries and garden centres	1 space per 200m^2 site area and a minimum of 4 spaces	-	-	1 space per 15 FTE staff
r) Offices	1 per 40m^2 gross floor area	1 space	1 per 800m^2 gross floor area	1 per 250m^2 gross floor area
s) Outdoor recreational area including playing fields, courts and tracks	1 per 3 participants based on the maximum number of participants that the area is designed to accommodate	-	1 per 20 participants based on the maximum number of participants that the area is designed to accommodate	-

Table 15-1a: Number of parking, loading and cycle spaces **Activity**	**Car parking spaces**	**Loading spaces**	**Visitor cycle spaces**	**Staff cycle spaces**
t) Places of assembly (except libraries and museums)	1 per 15 m^2 gross floor area or 1 for every 5 persons the facility is designed to accommodate, whichever is the greater	1 space	1 per 50 m^2 gross floor area or 1 for every 5 persons the facility is designed to accommodate, whichever is the greater	-
u) Places of assembly (Libraries and museums only)	1 per 30m^2 gross floor area	1 space	5 spaces plus 1 per 200m^2 gross floor area	1 space per 10 FTE staff
v) Places of worship	1 per 30m^2 gross floor area	1 space	1 per 50 m^2 gross floor area or 1 for every 5 persons the facility is designed to accommodate, whichever is the greater	-
w) Buildings serving outdoor recreational areas and indoor recreation buildings	1 per 20m^2 gross floor area	1 space	1 per 50m^2 gross floor area	-
x) Research and Innovation activities	1 per 40m^2 gross floor area	1 space	1 per 350m^2 gross floor area	1 space per 10 FTE staff
y) Residential centres	1 per FTE staff plus 1 per 3 bedrooms	-	1 per 5 beds	1 space per 15 FTE staff
z) Retail activities (gross floor area less than 5000$m^{2;}$ in individual ownership/tenancy or integrated retail development)	1 per 20m^2 gross floor area	1 space	1 per 500m^2 GLFA	1 per 250m^2 GLFA
aa) Retail activities (gross floor area greater than 5000m^2 and less than 10,000m^2 gross floor area; in individual ownership/tenancy or integrated retail development)	1 per 30m^2 gross floor area	1 space	1 per 500m^2 GLFA	1 per 250m^2 GLFA

Table 15-1a: Number of parking, loading and cycle spaces **Activity**	**Car parking spaces**	**Loading spaces**	**Visitor cycle spaces**	**Staff cycle spaces**
bb) Retail activities (gross floor area greater than 10,000m$^{2;}$ in individual ownership/tenancy or integrated retail development)	1 per 40m^2 gross floor area	1 space	1 per 500m^2 GLFA	1 per 250m^2 GLFA
cc) Retail activities – bulky goods only	1 per 50m^2 gross floor area	1 space	-	1 space per 10 FTE staff
dd) Retail activities – outdoor only	1 per 100m^2 of uncovered display area	-	-	1 space per 10 FTE staff
ee) Retail activities – indoor display areas for vehicles, boats and agricultural and industrial machinery only	1 per 150m^2 gross floor area	1 space	-	1 space per 10 FTE staff
ff) Retail activities – food and beverage, cafes, restaurants and licensed premises only	1 per 10m^2 gross floor area	1 space	1 per 125m^2 gross floor area	1 per 400m^2 gross floor area
gg) Retail activities – supermarkets only	1 per 20m^2 gross floor area devoted to retail sales activities and 1 per 40m^2 gross floor area for all other activities	1 space	1 per 500m^2 GLFA	1 space per 10 FTE staff
hh) Retirement villages	1 per unit plus 1 for every four units	-	1 per 60 beds	1 space per 15 FTE staff
ii) Schools	1 per FTE staff plus 1 drop-off space per 50 primary and intermediate students and 1 per 100 secondary students 1 bus space per 200 students where school bus services are provided. For schools not served by school bus services, no bus spaces are required	-	Primary schools 1 per 20 students Intermediate schools 1 per 5 students Secondary schools 1 per 4 students	1 per 100 students
jj) Showhome	2 per showhome	-	-	-

Table 15-1a: Number of parking, loading and cycle spaces **Activity**	**Car parking spaces**	**Loading spaces**	**Visitor cycle spaces**	**Staff cycle spaces**
kk) Tertiary education and specialised training facilities	1 per FTE staff, plus 1 per 3 students the facility is designed to accommodate	1 space	1 per 10 students the facility is designed to accommodate	1 per 10 FTE staff
ll) Transport depots	1 per 100m^2 gross floor area of building or site area used for storage, whichever is the greater	1 space	-	1 space per 20 FTE staff
mm) Visitor accommodation	1 per FTE staff member plus the greater of either 1 per 3 visitors that the facility is designed to accommodate or 1 per unit	1 space	1 per 20 beds except hotels where the rate is 1 per 30 bedrooms	1 space per 15 FTE staff
nn) Duplex dwelling in Rotokauri North	1 per unit			

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Note

1. The installation of bicycle spaces in an adjoining transport corridor is at the discretion and approval of Council as the Road Controlling Authority and may be subject to specific design requirements.
2. If fewer than four spaces and stands are required then these can be allocated to either visitor or staff parking (or both).
3. If more than four spaces are required then a minimum of 25% should be allocated to visitor use and 25% for staff use only, the remainder can be allocated to either visitor or staff parking (or both).
4. Volume 1, Rule 25.14.4.2(a)ii caps the minimum staff cycle spaces requirement at 1 per 10 FTE staff.
5. The standards in this table do not apply within the Transport Corridor Zone or Natural Open Space Zone (refer to Table 15-1c).
6. The car parking and loading space standards in this table do not apply within the Central City Zone (refer to Table 15-1b).
7. Cycle space standards in this table apply within the Central City Zone.

Table 15-1b: Number of parking and loading spaces required – Central City Zone

Activity	Car parking spaces	Loading/service spaces
a) Residential	-	-
b) All other activities	-	1 space per site This standard does not apply where the site has existing development and insufficient space to allow a compliant loading/service space

Table 15-1c: Number of parking and loading spaces in the Natural Open Space Zone and Transport Corridor Zone

Activity	Car parking spaces	Loading/service spaces
a) All activities	-	-

Table 15-1d: Number of accessible spaces required – disabled users – Non-Residential Use – All Zones

Total number of car park spaces being provided	Minimum number of accessible car park spaces for disabled users
1 – 20	1
21 – 50	2
For every additional 50 car parks above 50 car park spaces	1 additional

Table 15-1e: Number of spaces required for less mobile users – All Zones

Total number of car park spaces being provided	Minimum number of car park spaces for less mobile users
50 - 100	1
For every additional 50 car parks above 50 car park spaces	1 additional

Note

1. For the purposes of spaces required by Volume 1 Rule 25.14.4.2(c)ii and Table 15-1e, the allocation and management of use to less mobile users (e.g. elderly, parents with infants, and/or temporary disabilities) is at the discretion of the site owner or occupier.

2. The standards in this table do not apply to offices in the Central City Zone.

Table 15-1f: Number of motorcycle parking spaces required – All Zones

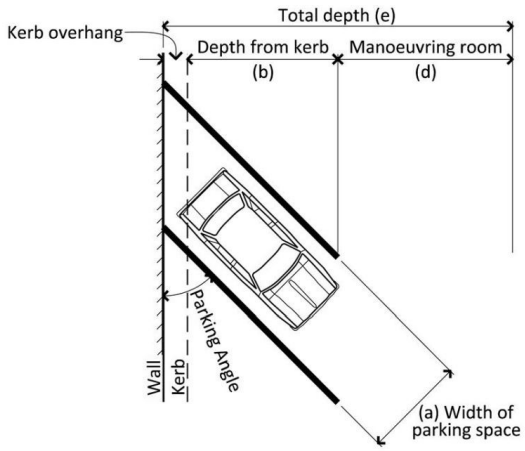
Total number of car park spaces being provided	Minimum number of motorcycle spaces
20-100 spaces	3
For every additional 40 car parks above 100 car park spaces	1 additional

Table 15-1g: Number of bicycle end-of-journey facilities required – Central City Zone and Business Zones 1 to 7

Number of staff cycle spaces	Minimum number of showers		Minimum number of changing rooms

10 – 50	2		2
51 – 150	4		
Each additional 100 cycle spaces	2 additional		

Table 15-1h: Minimum dimensions for on-site parking, loading spaces and manoeuvring areas

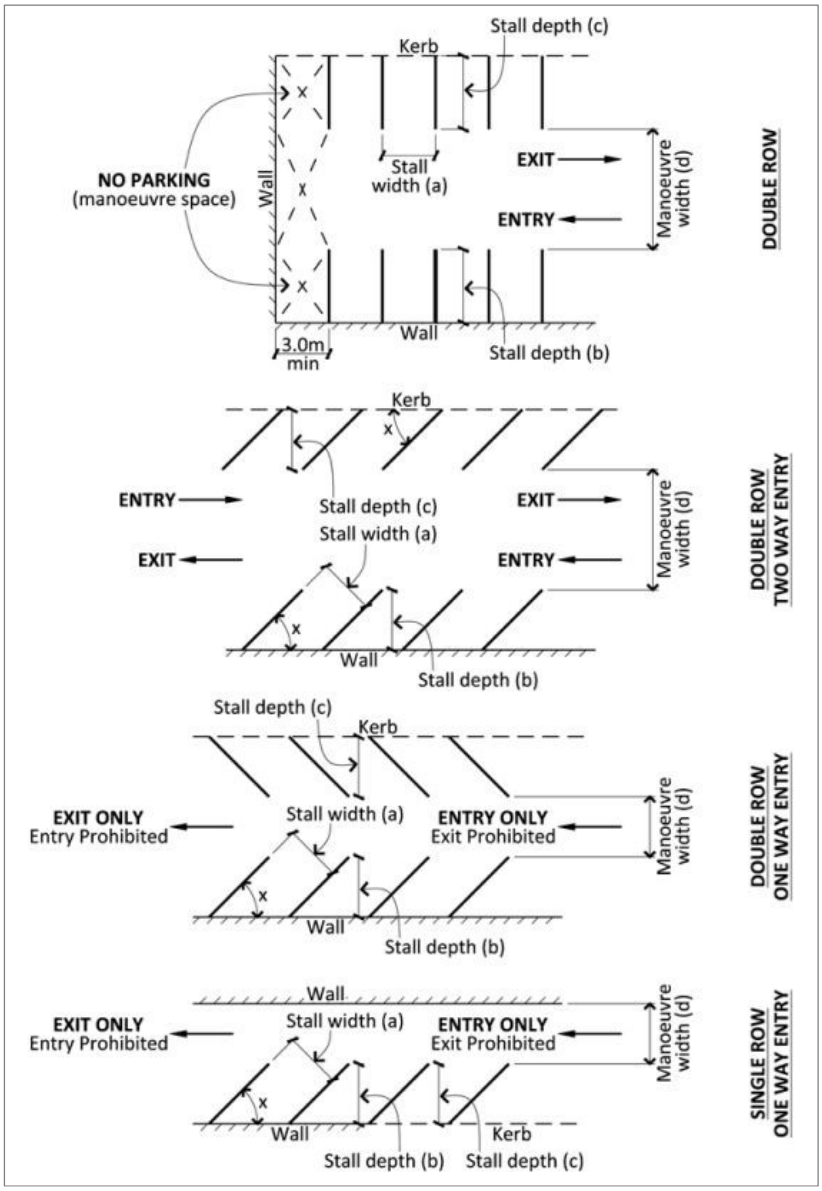


Type of parking		Stall width (a)	Stall depth		Manoeuvre width (d)	Total depth (e)	
Parking angle (x)	Type		From wall (b)	From kerb (c)		One row	Two rows
		ALL MEASUREMENTS ARE IN METRES					
90	Nose in	2.4 2.5 2.6 2.7	5.1	4.1	7.9 7.6 7.2 6.8	13.0 12.7 12.3 11.9	18.1 17.8 17.4 17.0
75	Nose in	2.4 2.5 2.6 2.7	5.4	4.4	6.4 5.8 5.2 4.6	11.3 11.2 10.6 10.0	17.2 16.6 16.0 15.4
60	Nose in	2.4 2.5 2.6 2.7	5.4	4.5	4.5 4.2 3.9 3.6	9.9 9.6 9.3 9.0	15.3 15.0 14.7 14.4
45	Nose in	2.4 2.5 2.6 2.7	5.0	4.2	3.6 3.5 3.4 3.3	8.6 8.5 8.4 8.3	13.6 13.5 13.4 13.3
30	Nose in	2.4 2.5 2.6 2.7	4.3	3.7	3.0	7.3	11.6
0	Parallel	2.5	Stall length 6.0		3.7	6.2	8.7

1. Parallel parking spaces (Parking Angle = 0) shall be 6m long, except where one end of the space is not obstructed, in which case the length of the space may be reduced to 5m.
2. Minimum aisle and accessway widths shall be 3m for one way flow, and 5.5m for two way flow. Recommended aisle and accessway widths are 3.5m for one way flow, and 6m for two way flow.
3. Maximum kerb height = 150mm.
4. Parking space dimensions will vary for accessible car park spaces.

Figure 15-1i: Examples of on-site parking configurations

Refer to Table 15-1h for relevant minimum dimensions



15-2 Integrated Transport Assessment Requirements – Tables

Table 15-2a: Simple ITA checklist

Requirements for Simple ITA[1]	
Item description	**Details to be included**
a) Background	A description of the proposed activity and the purpose and intended use of the ITA
b) Existing land data	A description of the location, site layout, existing uses, adjacent land uses and zoning
c) Existing transport data	A description of the access arrangements, on-site car parking and the surrounding transport network (including hierarchy, traffic volumes and crash analysis). Comment on passenger transport and accessibility, walking and cycling networks
d) Committed environmental changes	Consideration of other developments and land use in the immediate vicinity
e) Existing travel characteristics	The trip generation of any existing uses
f) Proposal details	A description of the proposal (including site layout, operational hours, vehicle access, on site car parking, internal vehicle and pedestrian circulation)
g) Predicted travel data	The trip generation of the proposal. Consideration of other modes of travel. A 10-year assessment period from the date of application should be used
h) Appraisal of transportation effects	An assessment of safety, efficiency and environmental effects Where the proposed activity has the potential to impact on the state highway, a summary of consultation with the New Zealand Transport Agency shall be included
i) Avoiding or mitigating actions	Details of any mitigating measures and revised effects
j) Compliance with policy and other frameworks	Consideration of compliance with District Plan standards. A simple assessment against Access Hamilton strategy and its associated action plans
k) Discussion and conclusions	Summary and conclusion assessment of effects
l) Recommendations	Proposed conditions (if any)

Note

1. For further guidance refer to Appendix A of New Zealand Transport Agency Research Report No.422, "Integrated Transport Assessment Guidelines", Abley et al, November 2010.

Table 15-2b: Broad ITA checklist

Requirements for Broad ITA[1]	
Item description	**Details to be included [2]**
a) Background	A description of the proposed activity, the purpose and intended use of the ITA, and an outline of any previous discussions with the relevant road controlling authorities
b) Existing land data	A description of location, site layout, existing use and consents (if any), adjacent and surrounding land use
c) Existing transport data	A description of the existing access and service arrangements and on-site car parking. A description of the surrounding transport network (including hierarchy, traffic volumes, crash analysis, congestion and intersections). A description of passenger transport modes and accessibility, walking and cycling networks. A 10-year assessment period for local, collector and minor arterial transport corridors should be used
d) Committed environmental changes	Consideration of other developments and land use and transport network improvements (including passenger transport, walking and cycling)
e) Existing travel characteristics	Details on the existing trip generation, modal split, and assignment of trips to the network
f) Proposal details	A description of the proposal (including site layout, operational hours, vehicle access, on site car parking and drop off, and internal vehicle and pedestrian circulation). A description of any construction management matters. A description of what end of journey facilities are proposed
g) Predicted travel data	A description of the trip generation, modal split, trip assignment to the network, trip distribution and trip type proportions of the proposal. Consideration of future traffic volumes and trip generation. A 20-year assessment period for major arterial and strategic transport corridors should be used. Assessment periods shall be from date of application
h) Appraisal of transportation effects	An assessment of safety, efficiency, environmental, accessibility, integration and economic effects (including sensitivity testing). A specific assessment of the safety and efficiency of the transport network against Assessment Criteria G3 to G6 in Appendix 1.3.3 Restricted Discretionary, Discretionary and Non-Complying Assessment Criteria – G Transportation Where the proposed activity has the potential to impact on the state highway, a summary of consultation with the New Zealand Transport Agency shall be included
i) Avoiding or mitigating actions	Details of any mitigating measures and revised effects, including measures to encourage other modes. **Travel planning and travel demand management measures and sensitivity testing mitigations**

Requirements for Broad ITA[1]	
Item description	**Details to be included [2]**
j) Compliance with policy and other frameworks	Review against District Plan objectives, policies and rules. Detailed assessment against Access Hamilton and associated action plans. Other relevant local, regional and national strategies or plans (e.g. Regional Land Transport Strategy, Regional Public Transport Plan)
k) Discussion and conclusions	An assessment of effects and conclusion of effects. **Confirmation of the suitability of the location of the proposal**
l) Recommendations	Proposed conditions (if any)

[1] For further guidance refer to Appendix A of New Zealand Transport Agency Research Report No.422 "Integrated Transport Assessment Guidelines", Abley et al, November 2010.

[2] Details listed in bold font are required for large developments with significant transport impacts and may not be applicable for smaller developments.

Note

Guidance on 'safety' and 'efficiency'

As part of assessing the effects on the transport network the ITA should consider any changes over the relevant assessment period to the:

a. Predicted level of personal risk to individuals (safety) using the network
b. Levels of service (efficiency) of the network.

This should include specific consideration of whether the desirable levels of service below can or should be maintained. This should recognise the pre-proposal levels of service and whether other benefits accrue that could have the potential to offset or otherwise support a lesser level of service. For example longer traffic delays resulting in slower speeds may support a pedestrian-friendly land use environment in the Central City.

It is not a requirement of the Plan that individual proposals mitigate the effects of other proposals in order to achieve the desirable levels of service. Where the pre-proposal desirable levels of service over the assessment period have already been exceeded, it is not expected that a proposal be required to restore the network to the desirable levels of service, rather it is expected that the proposal mitigates its effects to maintain the pre-proposal level of service for the relevant assessment period.

Desirable levels of service:

i. An average delay per vehicle during Peak Periods on the approaches to intersections of no greater than:
   - 55 seconds for the Strategic Network, Major and Minor Arterial transport corridors
   - 80 seconds for all other transport corridors
ii. On the Strategic Network, Major and Minor Arterial transport corridors during Peak Periods:
   - Average vehicle speeds between intersections restricted to no less than 90% of the posted speed limit
   - Average vehicle speeds, including intersections, constrained to no less than 18 km/h
iii. Unless demonstrated otherwise with site specific data, Peak Periods are taken to be 7am to 9am and 4pm to 6pm Monday to Friday.

Table 15-2c Downtown Precinct ITA Checklist

Requirements for ITA within Downtown Precinct [1]	
Item description	**Details to be included [2]**
a) Background	A description of the proposed activity, the purpose and intended use of the ITA, and an outline of any previous discussions with the relevant road controlling authorities
b) Existing land data	A description of location, site layout, existing use and consents (if any)
c) Existing transport data	A description of the existing access and service arrangements and on-site car parking. A description of the transport network adjacent to the pedestrian and vehicle access points (including traffic volumes and crash analysis).
d) Committed environmental changes	Consideration of other developments, land use and transport network improvements within the Downtown Precinct (including passenger transport, walking and cycling)
e) Existing travel characteristics	Details on the existing trip generation, modal split, and assignment of trips to the network
f) Proposal details	A description of the proposal (including site layout, operational hours, vehicle access, on site car parking and drop off, and internal vehicle and pedestrian circulation). A description of what end of journey facilities are proposed
g) Predicted travel data	A description of the trip generation, modal split, trip assignment to the network, trip distribution and trip type proportions of the proposal. Consideration of future traffic volumes and trip generation using a 10-year assessment period.
h) Appraisal of transportation effects	An assessment of safety, efficiency, environmental, accessibility, and integration effects in the immediate vicinity.
i) Avoiding or mitigating actions	Details of any mitigating measures and revised effects, including measures to encourage other modes. **Travel planning and travel demand management measures.**
j) Compliance with policy and other frameworks	Review against District Plan objectives, policies and rules. Simple assessment against Access Hamilton and associated action plans.
k) Discussion and conclusions	An assessment of effects and conclusion of effects. Confirmation of the suitability of the access points of the proposal
l) Recommendations	Proposed conditions (if any)

[1] For further guidance refer to Appendix A of New Zealand Transport Agency Research Report No.422 “Integrated Transport Assessment Guidelines”, Abley et al, November 2010.

[2] Details listed in bold font are required for large developments with significant transport impacts and may not be applicable for smaller developments.

Table 15-2d: Integrated Transport Assessment vehicles per day conversion table

Activity	Threshold/unit equivalent to Vehicle Trip Generation				
	<100 vpd	100 - 249 vpd	250 - 499 vpd	500 – 1499 vpd	>1500 vpd
a) Ancillary residential units and apartment buildings	Up to 20 residential units	21-50 residential units	51-100 residential units	101-300 residential units	More than 300 residential units
b) Building improvement centre (excluding nurseries and garden centres)	Up to 100m^2 GFA	101-250m^2 GFA	251-500m^2 GFA	501-1,500m^2 GFA	More than 1500m^2 GFA
c) Camping grounds	Up to 5,000m^2 site area	5,001-12,500m^2 site area	12,501-25,000m^2 site area	25,001-75,000m^2 site area	More than 75,000m^2 site area
d) Childcare facilities	Up to 30 children	31-75 children	76-150 children	151-450 children	More than 450 children
e) Community centre	Up to 1,000m^2 GFA	1,001-2,500m^2 GFA	2,501-5,000m^2 GFA	5,001-15,000m^2 GFA	More than 15,000m^2 GFA
f) Single dwellings and duplex dwellings	Up to 10 residential units	11-25 residential units	26-50 residential units	51-150 residential units	More than 150 residential units
g) Drive through services	All proposals require a Broad ITA				
h) Emergency service facilities	All proposals require an ITA				
i) Health care services	Up to 100m^2 GFA	101-250m^2 GFA	251-500m^2 GFA	501-1,500m^2 GFA	More than 1,500m^2 GFA
j) Home-based business	ITA not required				
k) Hospitals	All proposals require a Broad ITA				
l) Industrial activities (including warehouses) (excluding trade and industry facilities)	Up to 1,500m^2 GFA	1,501-3,750m^2 GFA	3751-7,500m^2 GFA	7,501-22,500m^2 GFA	More than 22,500m^2 GFA

Activity	Threshold/unit equivalent to Vehicle Trip Generation				
	<100 vpd	100 - 249 vpd	250 - 499 vpd	500 – 1499 vpd	>1500 vpd
m) Industrial activities (trade and industry facilities only)	Up to 500m^2 GFA	501-1,250m^2 GFA	1,251-2,500m^2 GFA	2,501-7,500m^2 GFA	More than 7,500m^2 GFA
n) Managed care facilities and rest homes	Up to 15 beds	16-38 beds	39-75 beds	76-240 beds	More than 240 beds
o) Marae	Up to 1,000m^2 GFA	1,001-2,500m^2 GFA	2,501-5,000m^2 GFA	5,001-15,000m^2 GFA	More than 15,000m^2 GFA
p) Nurseries and garden centres	Up to 65m^2 GFA	66-175m^2 GFA	176-400m^2 GFA	401-1,500m^2 GFA	More than 1,500m^2 GFA
q) Offices	Up to 500m^2 GFA	501-1,250m^2 GFA	1,251-2,500m^2 GFA	2,501-7,500m^2 GFA	More than 7,500m^2 GFA
r) Outdoor recreational areas including playing fields, courts and tracks	Up to 2 courts/fields	3-5 courts/fields	6-10 courts/fields	11-30 courts/fields	More than 30 courts/fields
s) Places of assembly (except Libraries and Museums)	Up to 1,000m^2 GFA	1,001-2,500m^2 GFA	2,501-5,000m^2 GFA	5,001-15,000m^2 GFA	More than 15,000m^2 GFA
t) Places of Assembly (Libraries and Museums only)	Up to 150m^2 GFA	151m^2-400m^2 GFA	401m^2-750m^2 GFA	751-2,200m^2 GFA	More than 2,200m^2 GFA
u) Places of worship	Up to 1,000m^2 GFA	1,001m^2-2,500m^2 GFA	2,501m^2-5,000m^2 GFA	5,001-15,000m^2 GFA	More than 15,000m^2 GFA
v) Building serving recreation reserves and indoor recreation buildings	Up to 100m^2 GFA	101-250m^2 GFA	251-500m^2 GFA	501-1,500m^2 GFA	More than 1,500m^2 GFA
w) Research and Innovation activities	Up to 500m^2 GFA	501-1,250m^2 GFA	1,251-2,500m^2 GFA	2,501-7,500m^2 GFA	More than 7,500m^2 GFA

Activity	Threshold/unit equivalent to Vehicle Trip Generation				
	<100 vpd	100 - 249 vpd	250 - 499 vpd	500 – 1499 vpd	>1500 vpd
x) Residential centres	Up to 10 residents	11-25 residents	26-50 residents	51-150 residents	More than 150 residents
y) Retail activities (in individual ownership / tenancy or integrated retail development)	Up to 100m^2 GFA	101-250m^2 GFA	251-500m^2 GFA	501-1,500m^2 GFA	More than 1,500m^2 GFA
z) Retail activities – Bulky goods only	Up to 100m^2 GFA	101-250m^2 GFA	251-500m^2 GFA	501-1,500m^2 GFA	More than 1,500m^2 GFA
aa) Retail activities – Outdoor only	Up to 1,000m^2 GFA	1,001-2,500m^2 GFA	2501-5,000m^2 GFA	5,001-15,000m^2 GFA	More than 15,000m^2 GFA
bb) Retail activities – Indoor display areas for vehicles, boats and agricultural and industrial machinery	Up to 1,500m^2 GFA	1,501-3,750m^2 GFA	3,751-7,500m^2 GFA	7,501-22,500m^2 GFA	More than 22,500m^2 GFA
cc) Retail activities – Food and beverage, cafes, restaurants and licensed premises only	Up to 100m^2 GFA	101-250m^2 GFA	251-500m^2 GFA	501-1,500m^2 GFA	More than 1,500m^2 GFA
dd) Retail activities – Supermarkets only	Up to 50m^2 GFA	51-125m^2 GFA	126-250m^2 GFA	251-750m^2 GFA	More than 750m^2 GFA
ee) Retirement villages	Up to 1,200m^2 GFA	1,201m^2-3,000m^2 GFA	3,001m^2-6,000m^2 GFA	6,001-18,500m^2 GFA	More than 18,500m^2 GFA
ff) Schools	All proposals require a Broad ITA				
gg) Showhome	ITA not required				
hh) Tertiary education facilities and specialised training facilities	Up to 500m^2 GFA	501-1,250m^2 GFA	1,251-500m^2 GFA	501-1,500m^2 GFA	More than 7,500m^2 GFA

Activity	Threshold/unit equivalent to Vehicle Trip Generation				
	<100 vpd	100 - 249 vpd	250 - 499 vpd	500 – 1499 vpd	>1500 vpd
ii) Transport depots	All proposals require a Broad ITA				
jj) Visitor accommodation	Up to 10 units	11-25 units	26-50 units	51-150 units	More than 150 units

15-3 Minimum Sight Distances at Railway Level Crossings – Tables and Figures

Table 15-3a: Required approach sight distances at railway level crossings[1]

Vehicle approach speed (km/h)[2, 3]	Approach distance (A)[4]	Required approach visibility along tracks (B)[4,5]		
		Signs only	Alarms only[6]	Alarms and boom gates[6]
20	31m	318m	Approach Sight Triangles not applicable in this situation	
30	50m	282m		
40	73m	274m		
50	100m	278m		
60	130m	287m		
70	164m	300m		
80	208m	314m		
90	251m	330m		
100	298m	357m		
110	350m	376m		

[1] This table is based on the sighting distance formula used in New Zealand Transport Agency Traffic Control Devices Manual 2008, Part 9 Level Crossings and in the Australian Level Crossing Assessment Model (ALCAM). Distances are conservative and are derived from:
- A train speed of 110 kph and a single set of rail tracks
- A fall of 8 % on the approach to the level crossing and a rise of 8 % at the level crossing
- 25 m design truck
- 90° angle between road and rail
- Other parameters as specified in New Zealand Transport Agency's Traffic Control Devices Manual 2008, Part 9 Level Crossings – Appendix B

[2] Speed restrictions are not used in New Zealand around level crossings

[3] The 85th percentile road vehicle speed shall be adopted. This speed is typically estimated at the point at which a driver would first see the level crossing signs/alarms and begin to look for trains. Where this is not known, the sign-posted road speed + 10% shall be used

[4] Refer to Figure 15-3b for how to define the Approach Sight Triangle using distance (A) and (B).

[5] The distances in this table apply to a single set of rail tracks only. For each additional set of tracks add 25m to the distance (B).

[6] Railway Level Crossings controlled by alarms or boom gates do not require approach sight triangles because they provide active warning signals of approaching trains.

Figure 15-3b: Measuring approach sight triangles at railway level crossings

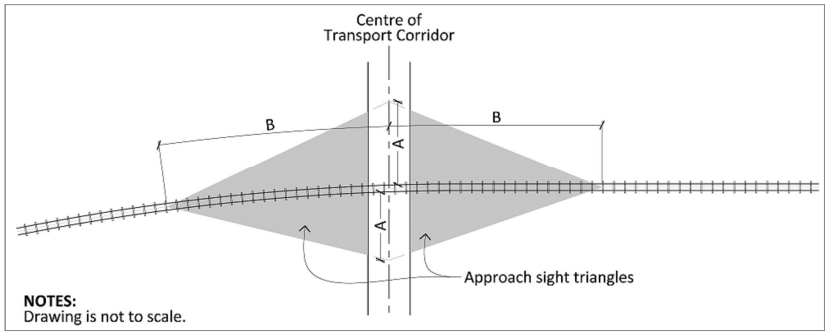


Table 15-3c: Required restart sight distances for railway level crossings[1]

Required approach visibility along tracks (C)[2,3]		
Signs only[4]	**Alarms only[4]**	**Alarms and boom gates[4]**
677m	677m	60m

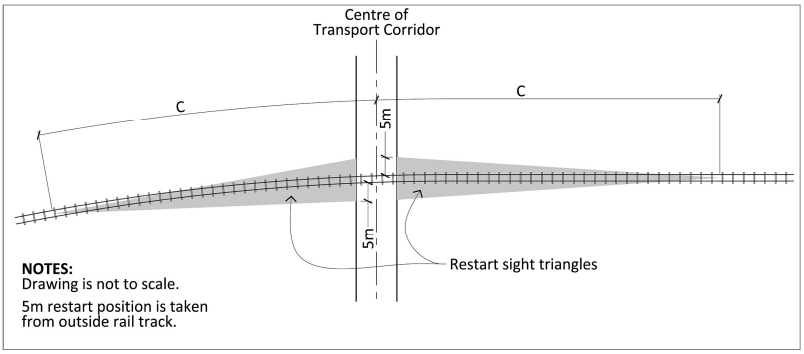
[1] This table is based on the sighting distance formula used in New Zealand Transport Agency Traffic Control Devices Manual 2008, Part 9 Level Crossings and in the Australian Level Crossing Assessment Model (ALCAM). Distances are conservative and are derived from:
- A train speed of 110 kph and a single set of rail tracks
- A fall of 8 % on the approach to the level crossing and a rise of 8 % at the level crossing
- 25 m design truck
- 90° angle between road and rail
- Other parameters as specified in New Zealand Transport Agency's Traffic Control Devices Manual 2008, Part 9 Level Crossings – Appendix B

[2] Refer to Figure 15-3d for how to define the Restart Sight Triangle using distance (C).

[3] The distances in this table apply to a single set of rail tracks only. For each additional set of tracks add 50m to distance (C).

[4] Type of Railway Level Crossing control.

Figure 15-3d: Measuring restart sight triangles at railway level crossings



15-4 Transport Corridor Hierarchy Plan and Definitions

a) The transport corridor hierarchy classifies current and planned future transport corridors within the City. The transport corridor hierarchy plan contained within Figures 15-4b to 15-4f identifies which classification applies to each transport corridor.

b) Various standards within this Plan relate to the classification of transport corridors (e.g. building setbacks from an arterial transport corridor).

Function

c) The hierarchy groups transport corridors into five main classifications based on the transportation functions they perform. These classifications are:

i. Major arterial.

ii. Minor arterial.

iii. Collector.

iv. Local.

v. Central City.

d) A 'major arterial' transport corridor's principal function is the movement of significant levels of goods and people between parts of the City and beyond. Inter- and intra-city heavy freight and through traffic should generally be directed to these corridors. This classification includes all corridors managed as Motorway or Expressway by the New Zealand Transport Agency. Property access is either non-existent or heavily controlled. Inter-city passenger transport services are expected to use these routes. Intra-city passenger transport services may traverse these routes.

e) A 'minor arterial' transport corridor's principal function is the movement of high levels of goods and people between parts of the City. Heavy freight distributing goods to parts of the City may use these corridors. Through-traffic moving between parts of the City may use these corridors. Property access is managed. Intra-city passenger transport services are likely to use these routes.

f) A 'collector' transport corridor performs both a movement and property access function. These transport corridors often move goods and people between local destinations or to higher order transport corridors for further travel. Property access is provided with few restrictions. Depending on the land use environment heavy freight and through traffic may be limited on these corridors. Intra-city passenger transport services are likely to use these routes.

g) A 'local' transport corridor's principal function is the provision of property access. The movement of goods and people is directed to higher-order transport corridors. Property access has few restrictions. The land-use environment dictates whether heavy freight movement is supported. Through-traffic is generally discouraged. Intra-city passenger transport services are unlikely to use these routes where an alternative higher-order transport corridor is available.

h) 'Central City' transport corridors provide for both property access and the distribution of goods and people throughout, into and out of, the Central City.

Passenger transport services will use some of these corridors, particularly buses which provide services to and from the Hamilton Transport Centre. These corridors are expected to be used by significant numbers of commuters (vehicle, pedestrian and cyclists) and by service vehicles accessing properties or service lanes. High levels of visitor (e.g. shoppers, students) pedestrian traffic is also expected as people access goods and services and move about the Central City. On-street parking, loading, taxi, and bus stop facilities are common features.

i) Two overlays are used to respond to factors that cross over the four classifications. These overlays are:

   i. Strategic network.

   ii. Pedestrian-focus areas.

j) A strategic network applies to most major arterial transport corridors and generally includes the significant road corridors indentified in the Regional Policy Statement and the Regional Land Transport Strategy. This overlay recognises the significant strategic role that these transport corridors perform for moving goods and people as part of the wider national and regional transport network. Protecting the efficient and effective operation of the strategic network so it can continue to provide its wider transport functions is a critical outcome.

k) A pedestrian-focus area applies to specific transport corridors within the Central City. This reflects and supports the land-use pattern identified for the Central City. It is expected that the form of these transport corridors will evolve to support a complementary integration of the transport corridor function with the adjacent land uses. The design elements of these transport corridors will be more conducive to a vibrant, pedestrian-focused environment, supporting active frontages, on-street dining or retailing activities and the creation of high-quality public spaces.

Note

1. Shared zones (Land Transport (Road User) Rule 2004) or pedestrian malls (Section 336 of Local Government Act 1974) may be used as a means of managing the use of transport corridors in a way to give greater priority to pedestrian and cyclists. These mechanisms are very case specific and not likely to be applied generally to parts of the City. They are also unlikely to be appropriate outside of local transport corridors or Central City transport corridors within pedestrian-focus areas.

Form

l) The form and design elements of transport corridors are determined through the balancing of a corridor's function within the network with the needs and sensitivities of adjacent land uses (see Land-Use Environments below).

Land-Use Environment

m) 'Land-use environments' are groupings of land-use zones that provide for activities that share similar sensitivities to, or demands of, the transport network. These groups are defined in Table 15-4a. The land-use environments tend to affect the form of transport corridors by changing the allocation of space of various design elements (e.g. number of lanes, pedestrians, landscaping and other amenity features) and whether priorities are given to the different transport users or modes (e.g. desirable speed environment, shared spaces).

n) The detail of the design elements and criteria for transport corridors is contained within Appendix 15-6. These design elements and the form created by the combination of transport corridor hierarchy classification and land-use environment, reflects a balancing process between the transport function demands and land use values (e.g. slower vehicle speeds and greater pedestrian amenity along local residential transport corridors).

Table 15-4a: Land-use environments by zone

Land-use environment	Zone[1]
a) Residential	General Residential Zone Special Residential Zone Special Heritage Zone Special Natural Zone Temple View Zone Residential Intensification Zone Peacocke Character Zone Rototuna North East Character Zone Medium Density Residential Zone Large Lot Residential Zone
b) Business	Business 1 to 7 Zones Knowledge Zone
c) Industrial	Industrial Zone Ruakura Logistics Zone Ruakura Industrial Park Zone Te Rapa North Industrial Zone
d) Future Urban	Future Urban Zone
e) Central City	Central City Zone
f) Site/Area specific[2]	Community Facilities Zone Major Facilities Zone Neighbourhood Open Space Zone Sport and Recreation Open Space Zone Destination Open Space Zone Natural Open Space Zone

[1] Refer to the "Purpose of the Zone" of the relevant zone chapters for a statement about the purpose of each zone and the land-use activities they encourage or discourage.

[2] The location and extent of zones within this land-use environment category mean that transport corridors do not generally run through them. Transport corridors adjoining these land-use environments should reflect the land-use environment directly opposite these zones or be a continuation of the corridor either side. Site access controls may still vary.

Intersections

o) The form and design elements of transport corridors may alter as they approach intersections. This is particularly the case where different classifications of transport corridors intersect and especially so where arterials meet lower-order transport corridors.

p) To reinforce and protect the function of transport corridor classifications, the respective land-use environments, and the legibility of the network, intersections and their approaches may contain transport infrastructure or be managed in a way that would not normally be expected for that classification of transport corridor. For example, where a collector meets a major arterial the collector may: Gain additional lanes; have crossing infrastructure for pedestrians and cyclists; landscaping, public art or signs may be used to reinforce a change in hierarchy; or on-street parking may be restricted.

Routes Transitioning Between Land-Use Environments

q) Some transport corridors are lengthy and pass through a range of land-use environments in the City. Along a corridor the classification or land-use environment may change. A logical evolution of the form of the transport corridor should be expected. This may be achieved by a substantial and immediate change at an appropriate intersection along the route, or possibly by gradual, progressive changes over a transitional length of the corridor.

Routes with Different Land-Use Environments on Each Side

r) Parts of some transport corridors will have different zones on either side. In this situation the form of the transport corridor will need to be flexible to provide for the needs of both land-use environments.

Note

1. The Strategic Network Overlay is derived from transport corridors identified by:
   - The Regional Policy Statement 2016 – as Significant Transport Corridors
   - The Regional Land Transport Strategy 2011-2041 – as nationally or regionally significant
   - Access Hamilton – as part of the strategic network
2. The use of specific transport corridors for passenger transport (e.g. inter or intra city bus services) is determined by the Waikato Regional Council in collaboration with Council and expressed in the Regional Land Transport Strategy and Regional Public Transport Plan.
3. Some arterial transport corridors may also be limited access roads where access restrictions have been created under s88 of the Government Roading Powers Act 1989 or s346 of the Local Government Act 1974. These restrictions apply over and above any District Plan controls.
4. Access to transport corridors may also be restricted by segregation strips. Segregation strips are essentially small strips of land along the frontage of properties (even just a few centimetres wide) created under the Public Works Act 1981 (or by councils under the Local Government Act 2002) during property negotiations and/or application negotiations. The strips are held in public ownership and are not classed as being road. Properties separated from a transport corridor by a segregation strip lose their direct vehicle access to the transport corridor adjoining the segregation strip but are generally provided with alternative vehicle access.
5. Appendix 15-5 identifies land currently set aside for road but which Council intends to 'stop'.

Figure 15-4b: Transport corridor hierarchy plan

Commented [RF1]: HCC need to update this plan for us please.

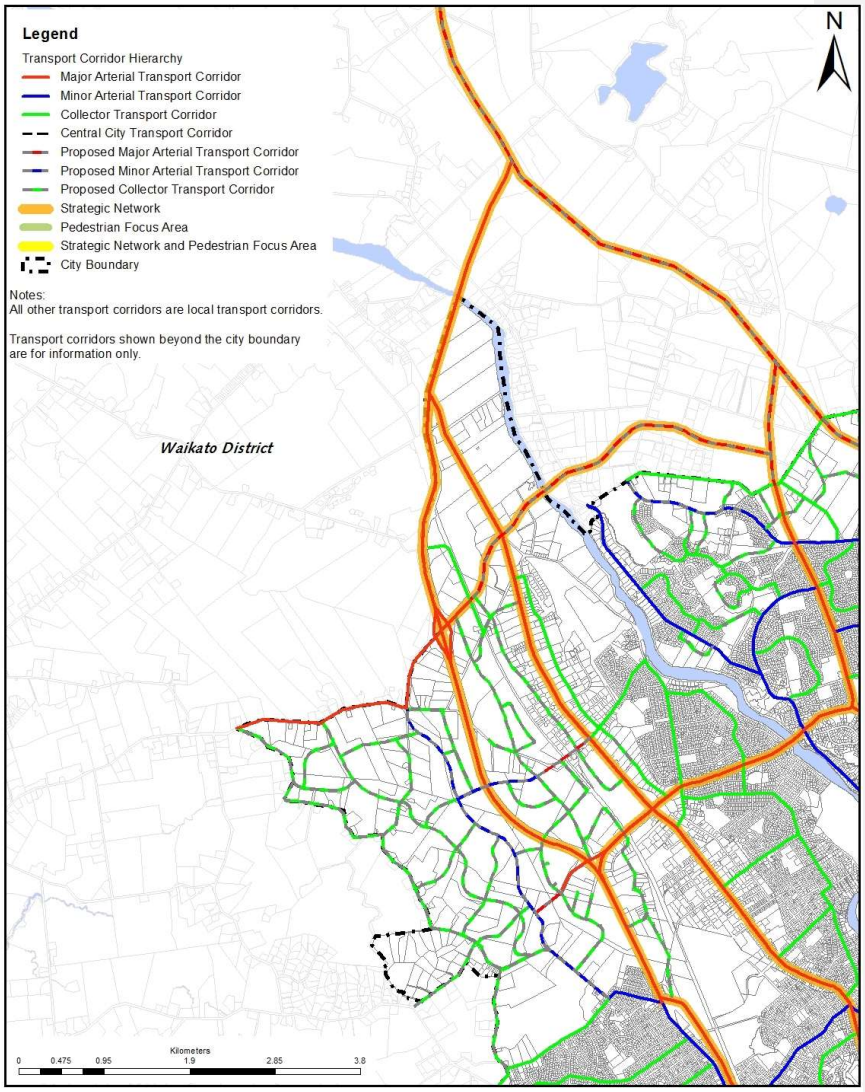


Figure 15-4c: Transport corridor hierarchy plan

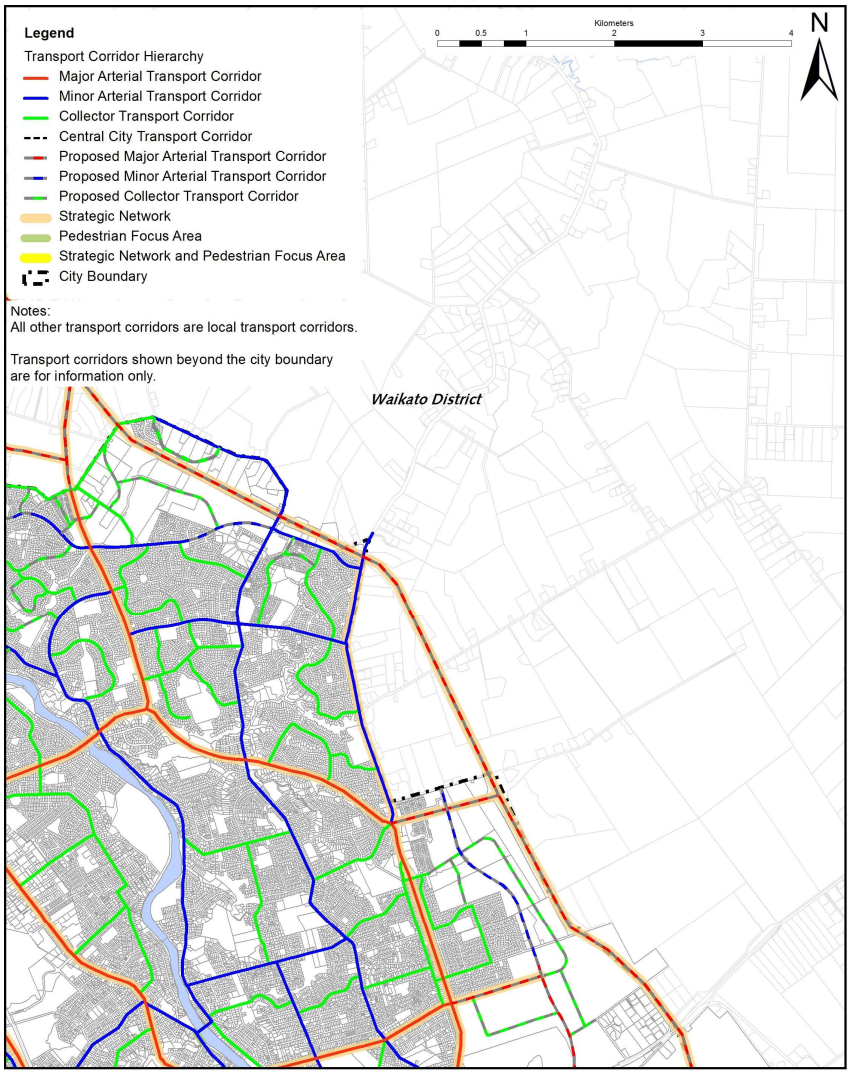


Figure 15-4d: Transport corridor hierarchy plan

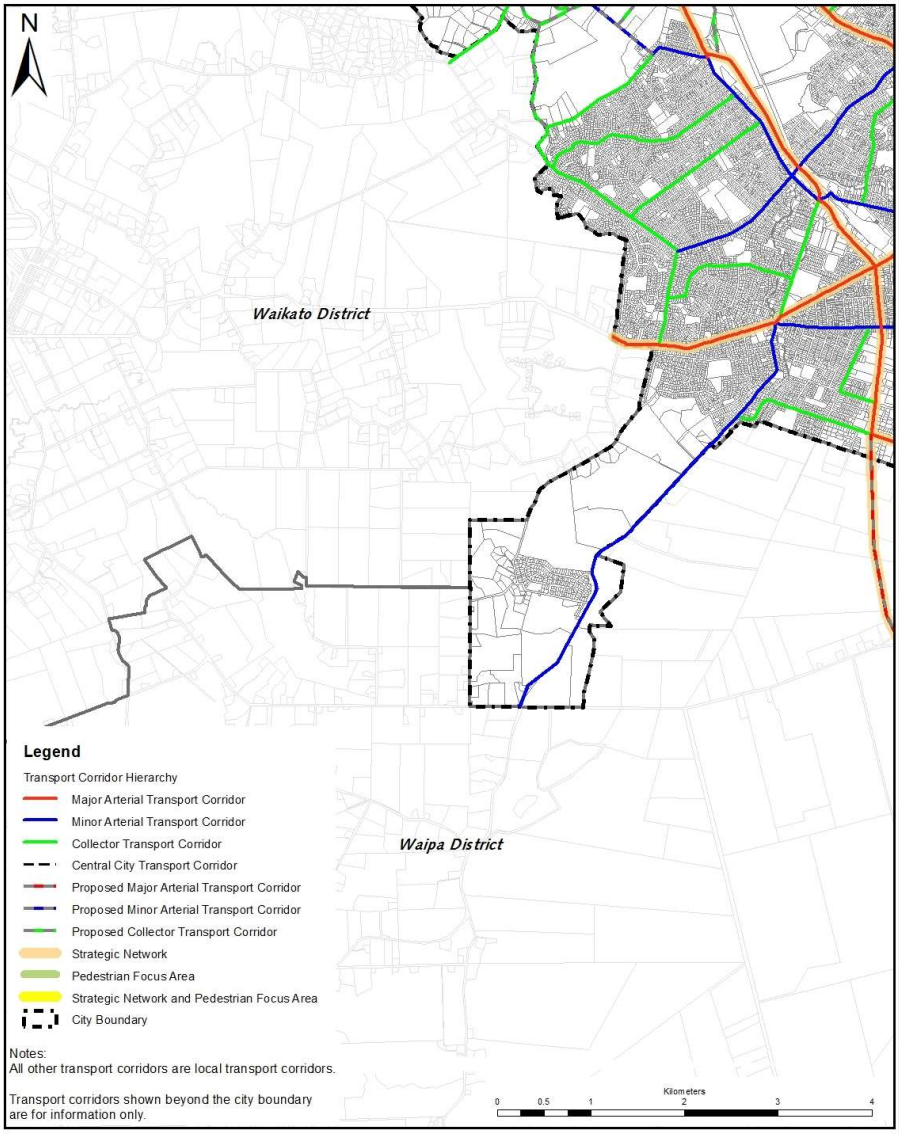


Figure 15-4e: Transport corridor hierarchy plan

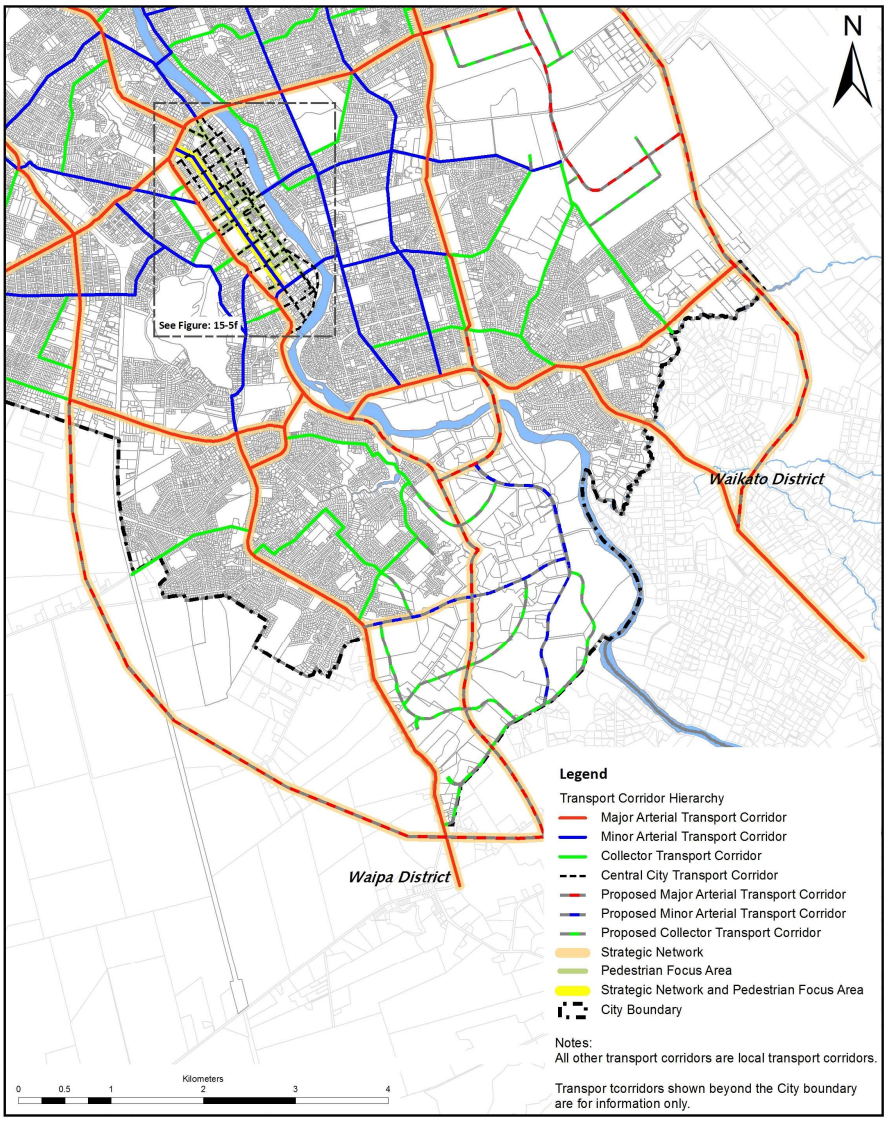
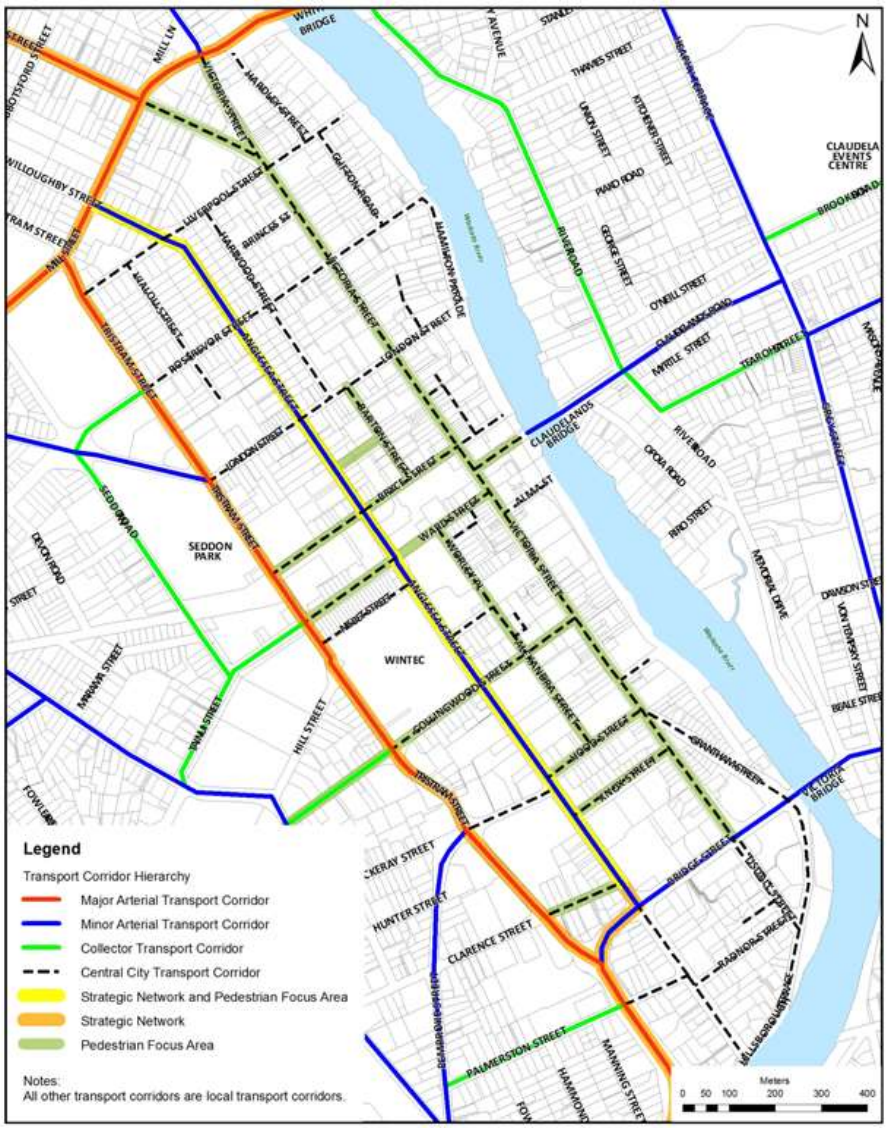


Figure 15-4f: Transport corridor hierarchy plan



15-5 Proposed Road Stopping

This appendix identifies land currently set aside for road but which Council intends to 'stop'. 'Stopping' means that it will cease to be road as defined by the Local Government Act. Road stopping is a process that can be undertaken under the Local Government Act 1974 or the Public Works Act 1981, and is separate to Resource Management Act processes, although sometimes they are run concurrently.

This appendix is for information purposes only and is not an exhaustive compilation of current or potential future road stopping. It is expected that road stopping processes, particularly the stopping of small parts of road, will arise and be processed without amendments being made to this appendix.

The areas shown are indicative and not surveyed. The final extent of any stopping will be determined as part of the formal stopping process.

Figure 15-5a

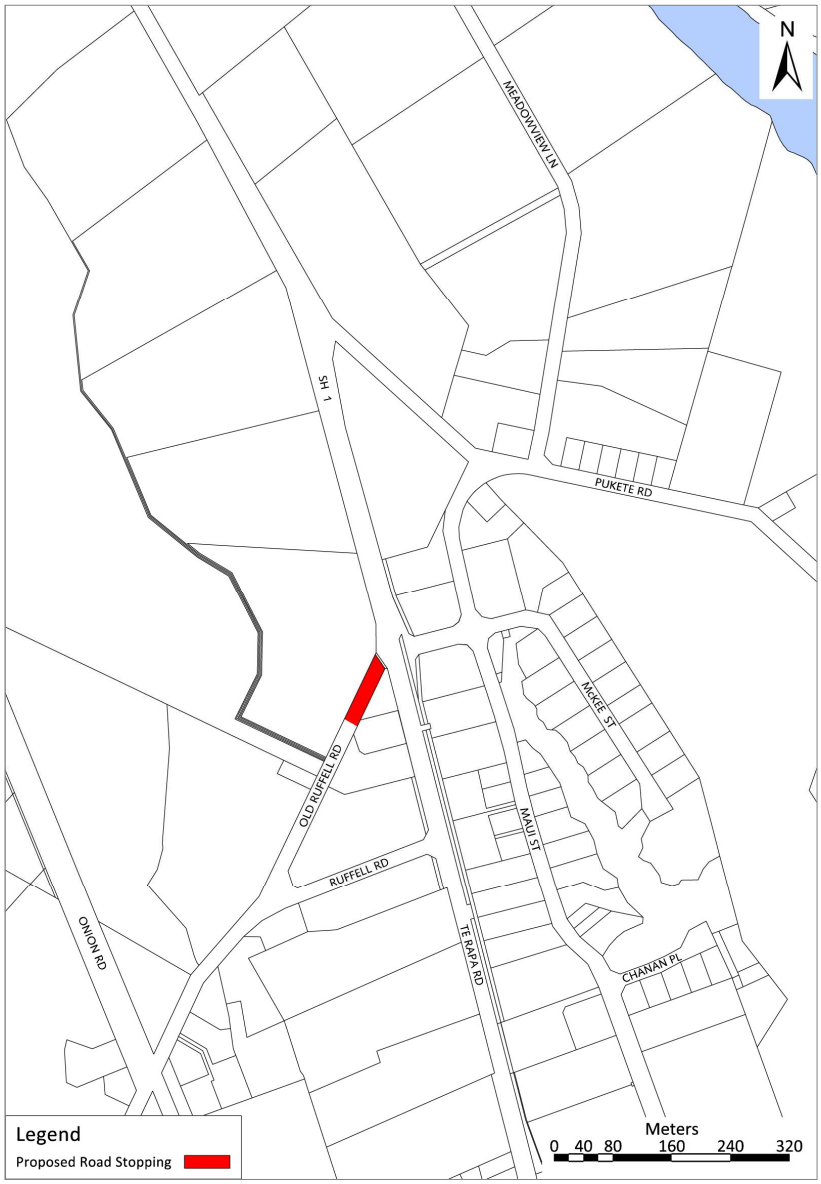

N
MEADOWVIEW LN
SH 1
PUKETE RD
MCKEE ST
OLD RUFFELL RD
MAUI ST
RUFFELL RD
ONION RD
TE RAPA RD
CHANAN PL
Legend
Proposed Road Stopping
Meters
0 40 80 160 240 320

Figure 15-5b

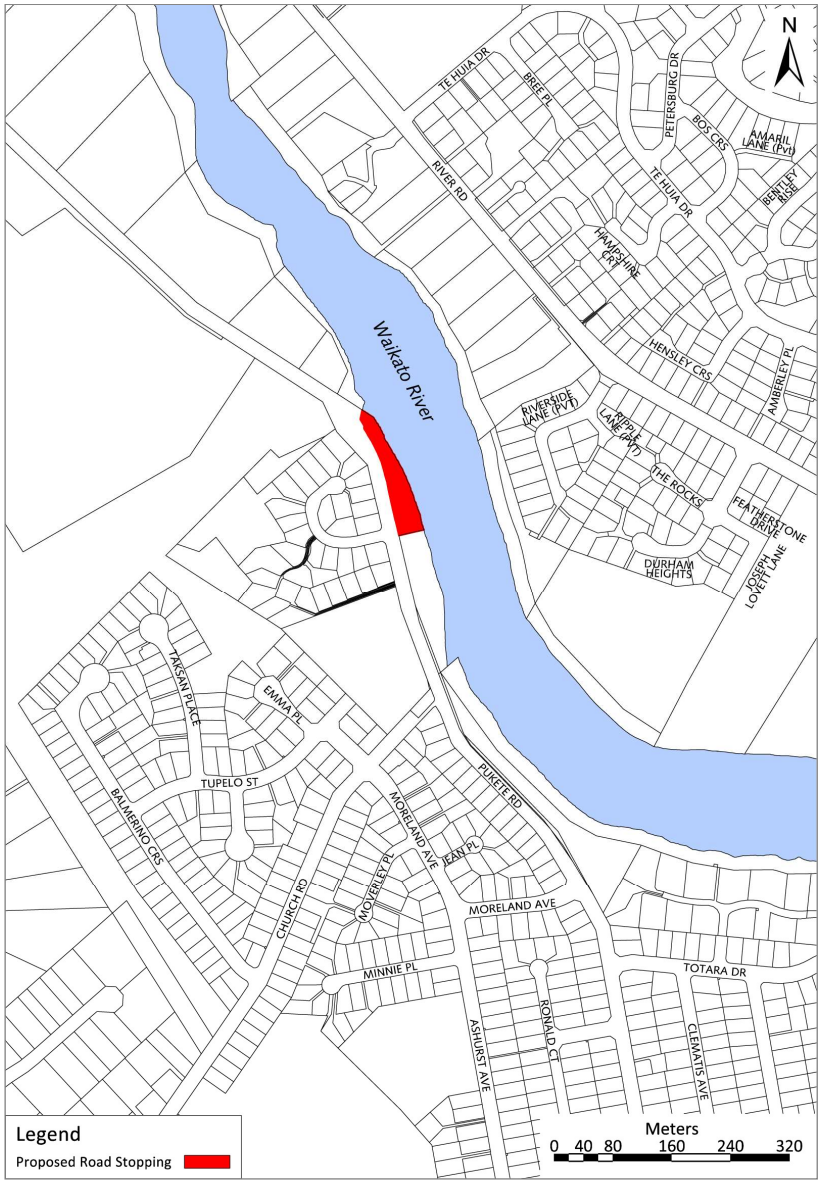

N
Waikato River
TE HUIA DR
BREE PL
PETERSBURG DR
BOS CRS
AMARIL LANE (Pvt)
RIVER RD
TE HUIA DR
BENTLEY RISE
THAMESHIRE CRS
HENSLEY CRS
AMBERLEY PL
RIVERSIDE LANE (PVT)
RIPPLE LANE (PVT)
THE ROCKS
FEATHERSTONE DRIVE
DURHAM HEIGHTS
JOSEPH LOVETT LANE
TARSAN PLACE
EMMA PL
TUPELO ST
BALMERINO CRS
PUKETE RD
MORELAND AVE
JEAN PL
CHURCH RD
MOVERLEY PL
MORELAND AVE
MINNIE PL
TOTARA DR
ASHURST AVE
RONALD CT
CLEMATIS AVE
Legend
Proposed Road Stopping
Meters
0 40 80 160 240 320

Figure 15-5c

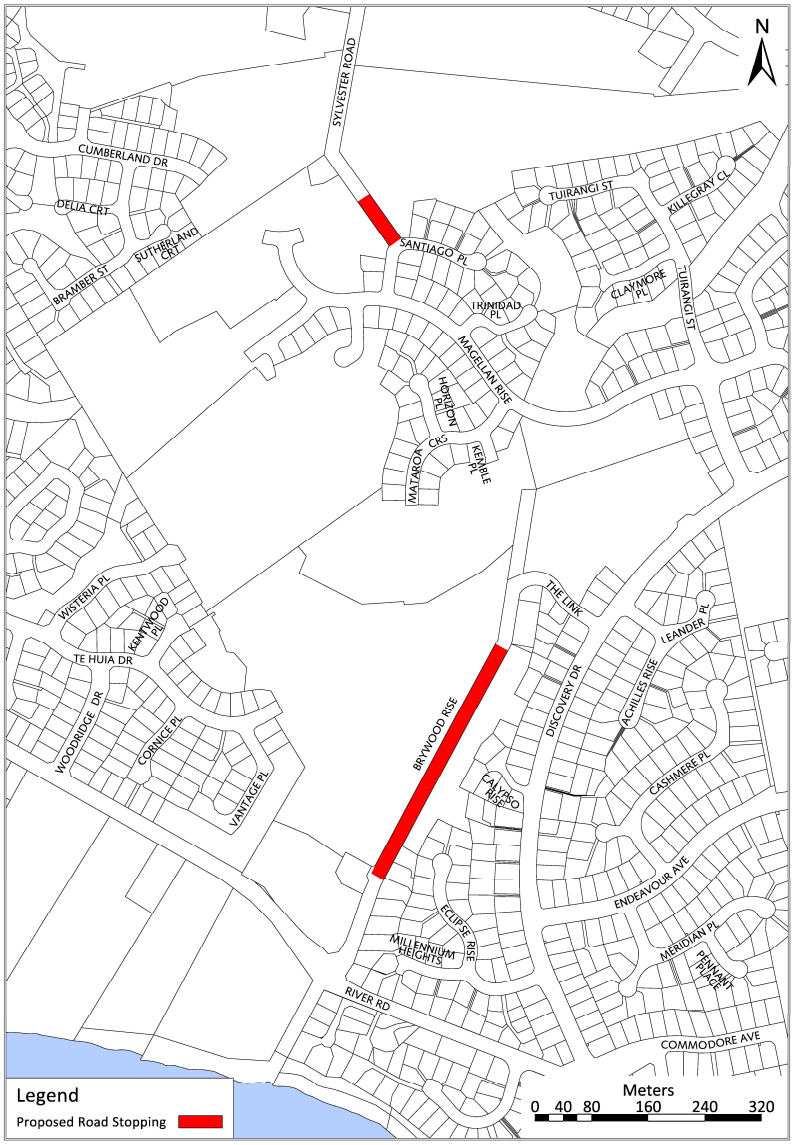

N
SYLVESTER ROAD
CUMBERLAND DR
DELIA CRT
SUTHERLAND CRT
BRAMBER ST
SANTIAGO PL
TUIRANGI ST
KILLEGRAY CL
CLAYMORE PL
TRINIDAD PL
MAGELLAN RISE
HORIZON PL
MATAROA CRES
KERMADEC PL
WISTERIA PL
ASHWOOD PL
TE HUIA DR
WOODRIDGE DR
CORNICE PL
VANTAGE PL
THE LINK
LEANDER PL
ACHILLES RISE
DISCOVERY DR
BRYWOOD RISE
CASHMERE PL
CALYPSO RISE
ENDEAVOUR AVE
ECLIPSE RISE
MILLENNIUM HEIGHTS
MERIDIAN PL
PENNANT PLACE
RIVER RD
COMMODORE AVE
Legend
Proposed Road Stopping
Meters
0 40 80 160 240 320

Figure 15-5d

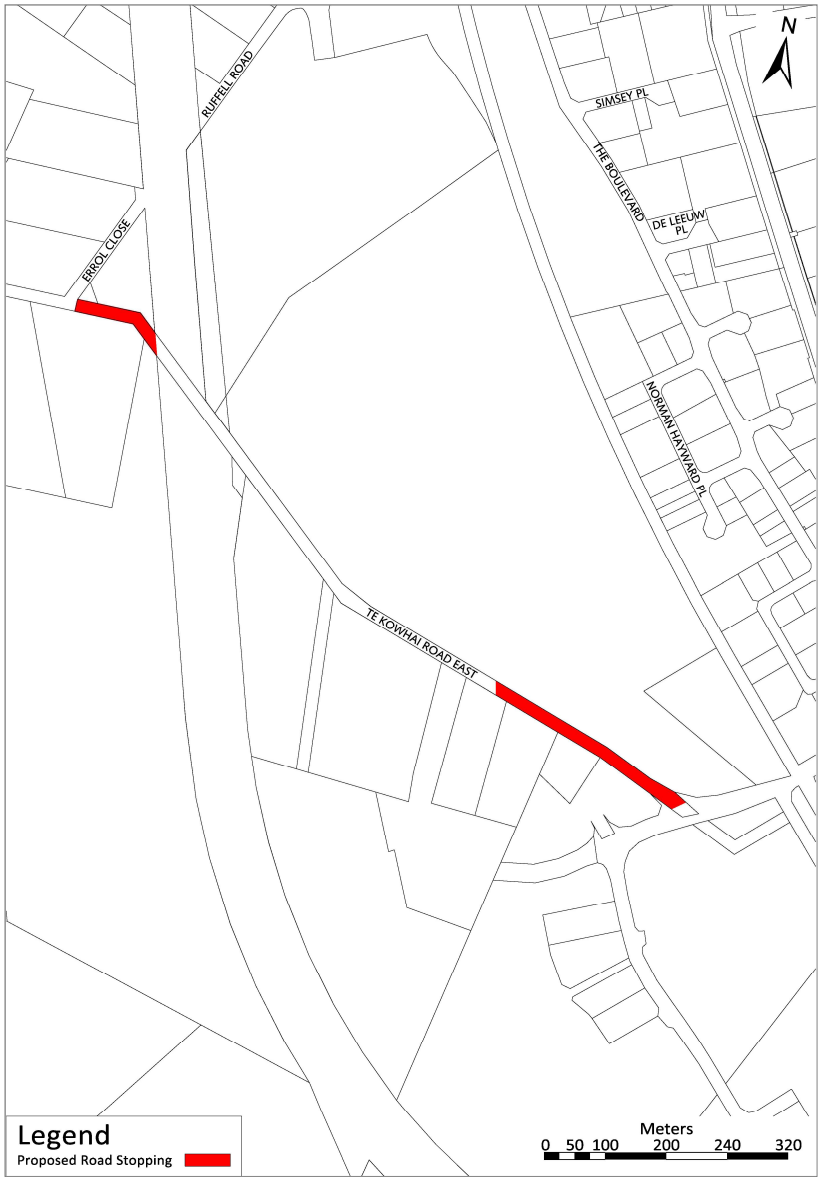

N
RUFFELL ROAD
SIMSEY PL
THE BOULEVARD
DE LEEUW PL
ERROL CLOSE
NORMAN HAYWARD PL
TE KOWHAI ROAD EAST
Legend
Proposed Road Stopping
Meters
0 50 100 200 240 320

Figure 15-5e

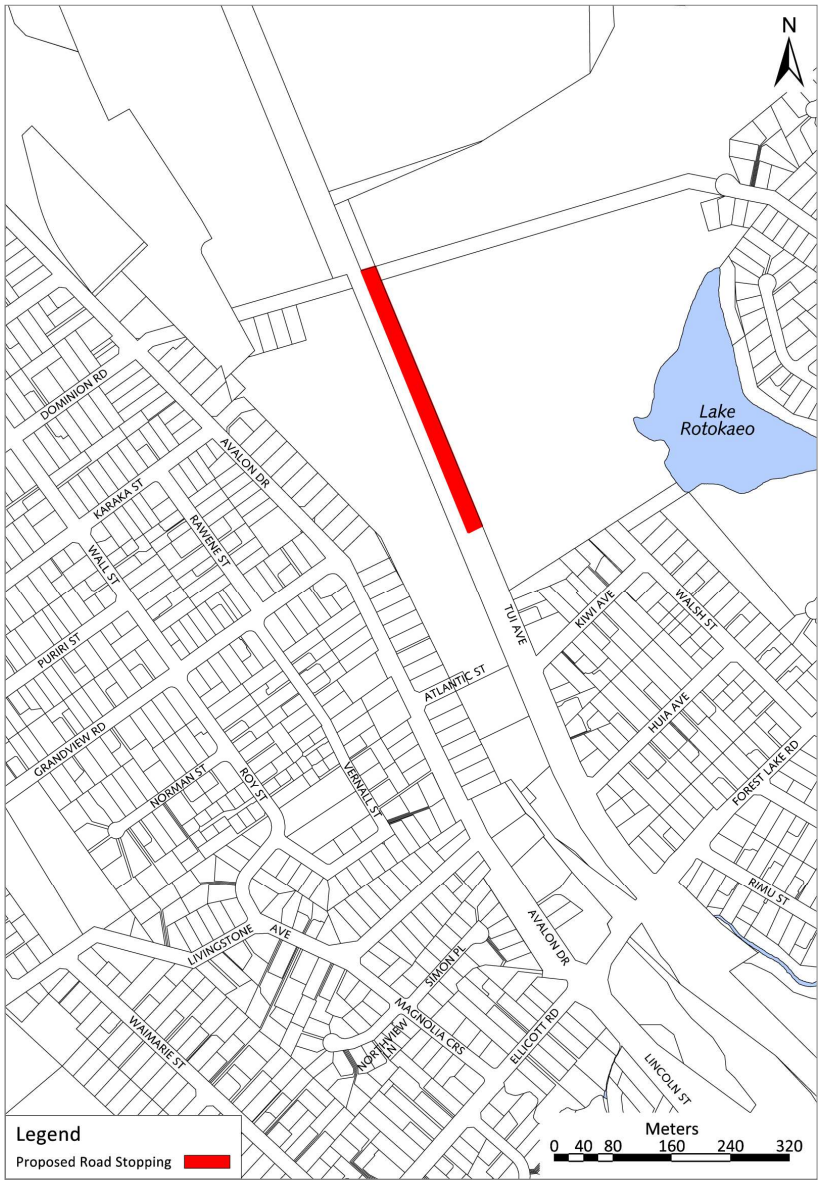

N
Lake Rotokaeo
DOMINION RD
AVALON DR
KARAKA ST
RAVENE ST
WALL ST
PURIRI ST
GRANDVIEW RD
NORMAN ST
ROY ST
VERNALL ST
ATLANTIC ST
TUI AVE
KIWI AVE
WALSH ST
HUIA AVE
FOREST LAKE RD
RIMU ST
AVALON DR
LIVINGSTONE AVE
SIMON PL
MAGNOLIA CRS
NORTHVIEW LN
WAIMARIE ST
ELLICOTT RD
LINCOLN ST
Legend
Proposed Road Stopping
Meters
0 40 80 160 240 320

Figure 15-5f

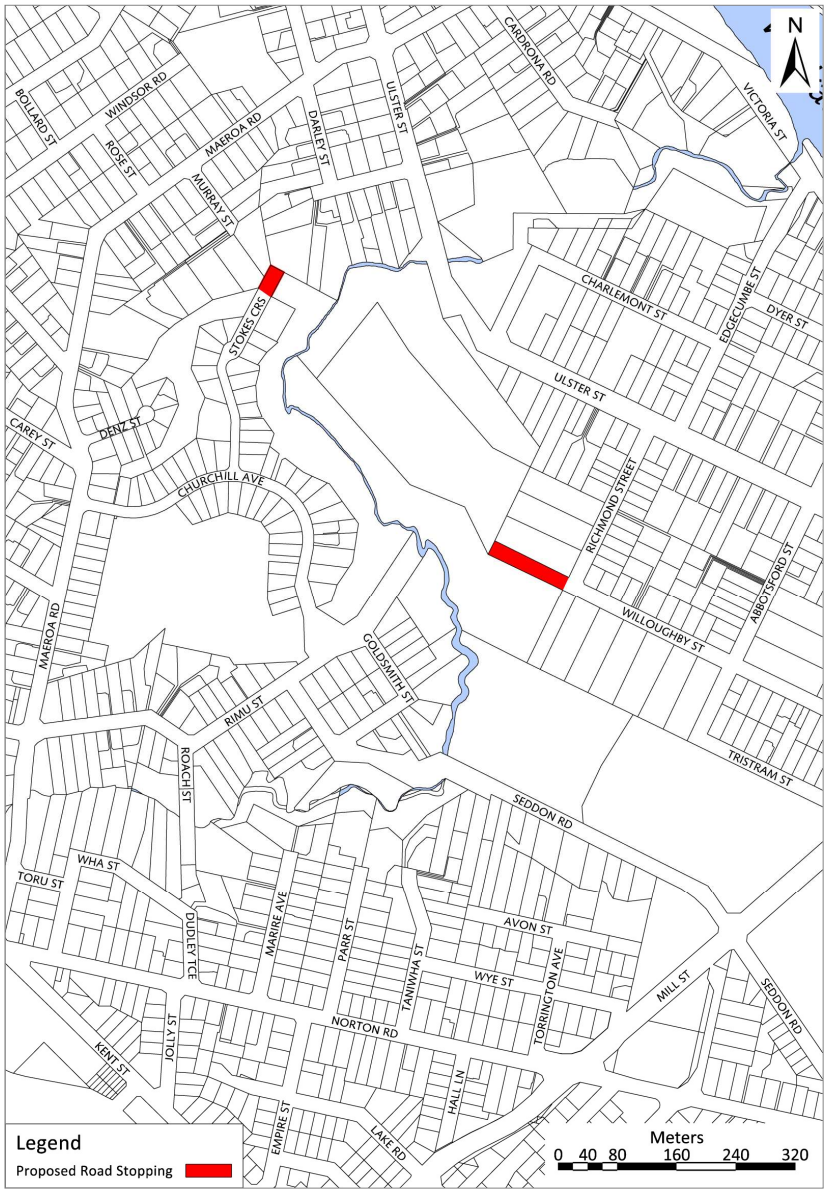

N
CARDIONA RD
VICTORIA ST
BOLLARD ST
WINDSOR RD
ROSE ST
MAEROA RD
DARLEY ST
ULSTER ST
MURRAY ST
STOKES CRS
CHARLEMONT ST
EDGECUMBE ST
DYER ST
ULSTER ST
CAREY ST
DENZ ST
CHURCHILL AVE
RICHMOND STREET
ABBOTSFORD ST
WILLOUGHBY ST
MAEROA RD
GOLDSMITH ST
RIMU ST
TRISTRAM ST
ROACH ST
SEDDON RD
WHA ST
TORU ST
DUDLEY TCE
MARINE AVE
PARR ST
TANIWHA ST
AVON ST
WYE ST
TORRINGTON AVE
MILL ST
SEDDON RD
NORTON RD
KENT ST
JOLLY ST
HALL LN
EMPIRE ST
LAKE RD
Legend
Proposed Road Stopping
Meters
0 40 80 160 240 320

Figure 15-5g

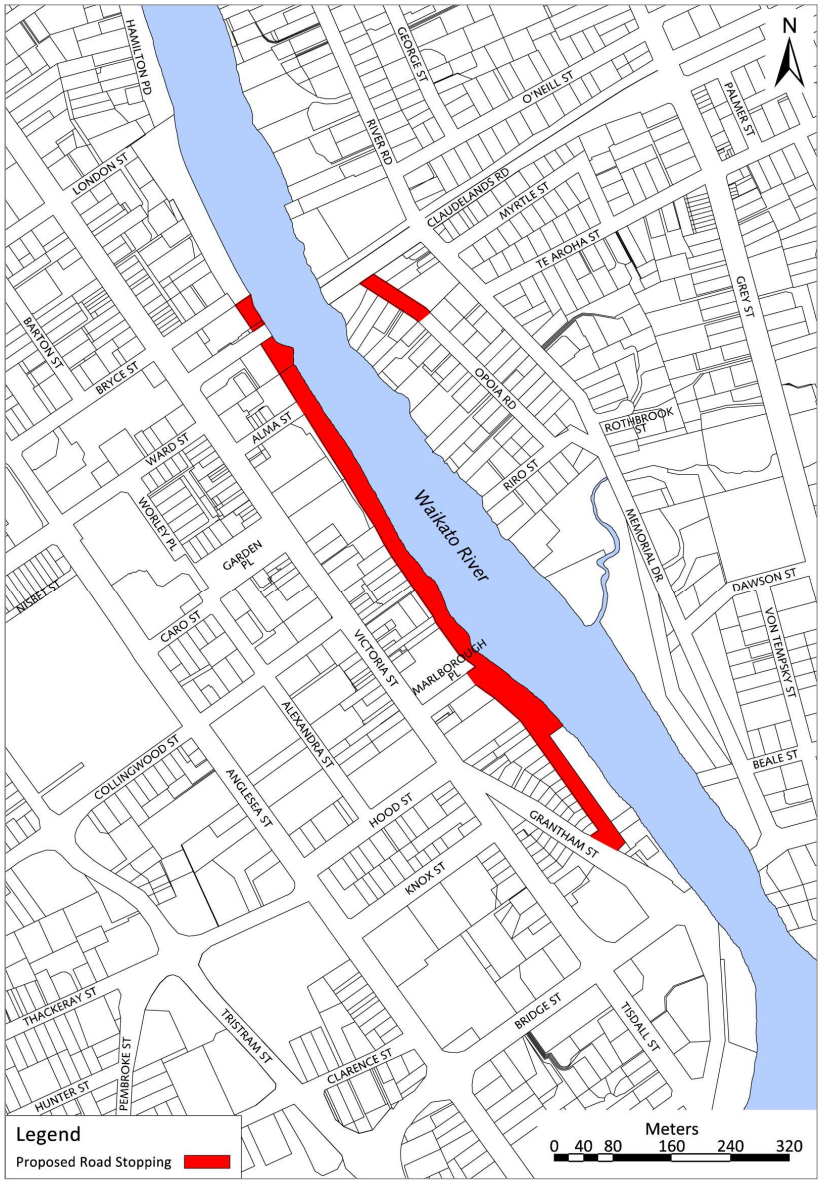

N
HAMILTON PD
LONDON ST
BARTON ST
BRYCE ST
GEORGE ST
RIVER RD
O'NEILL ST
CLAUDELANDS RD
MYRTLE ST
TE AROHA ST
PALMER ST
GREY ST
OPOJA RD
ROTHBROOK ST
RURO ST
MEMORIAL DR
DAWSON ST
VON TEMPSKY ST
BEALE ST
Waikato River
ALMA ST
WARD ST
WORLEY PL
GARDEN PL
NISBET ST
CARO ST
VICTORIA ST
MARLBOROUGH PL
ALEXANDRA ST
COLLINGWOOD ST
ANGLESEA ST
HOOD ST
GRANTHAM ST
KNOX ST
THACKERAY ST
TRISTRAM ST
CLARENCE ST
BRIDGE ST
TISDALL ST
HUNTER ST
PEMBROKE ST
Legend
Proposed Road Stopping
Meters
0 40 80 160 240 320

Figure 15-5h

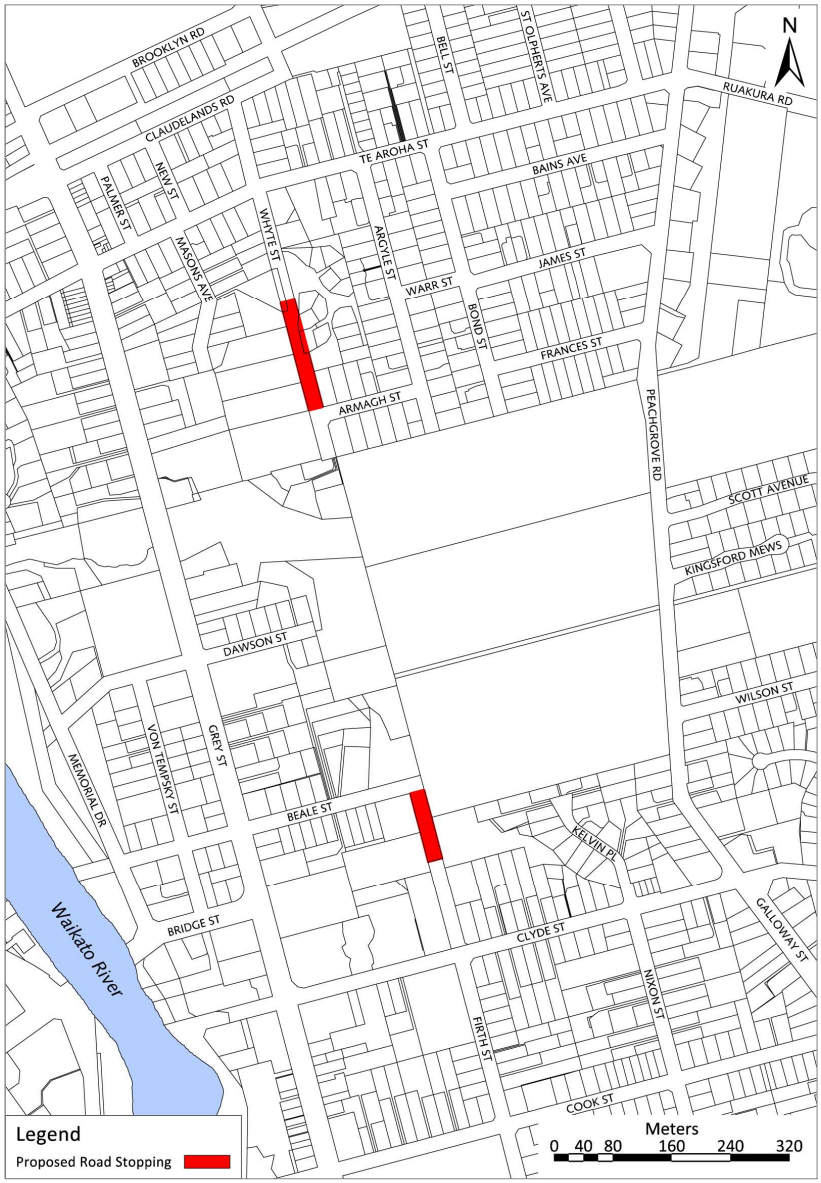

N
BROOKLYN RD
CLAUDELANDS RD
PALMER ST
NEW ST
TE AROHA ST
BELL ST
ST OLPHERTS AVE
RUAKURA RD
BAINS AVE
JAMES ST
WHYTE ST
MASONS AVE
ARGYLE ST
WARR ST
BOND ST
FRANCES ST
ARMAGH ST
PEACHGROVE RD
SCOTT AVENUE
KINGSFORD MEWS
DAWSON ST
WILSON ST
VON TEMPSKY ST
GREY ST
MEMORIAL DR
BEALE ST
KELVIN PL
Waikato River
BRIDGE ST
CLYDE ST
GALLOWAY ST
NIXON ST
FIRTH ST
COOK ST
Legend
Proposed Road Stopping
Meters
0 40 80 160 240 320

Figure 15-5i

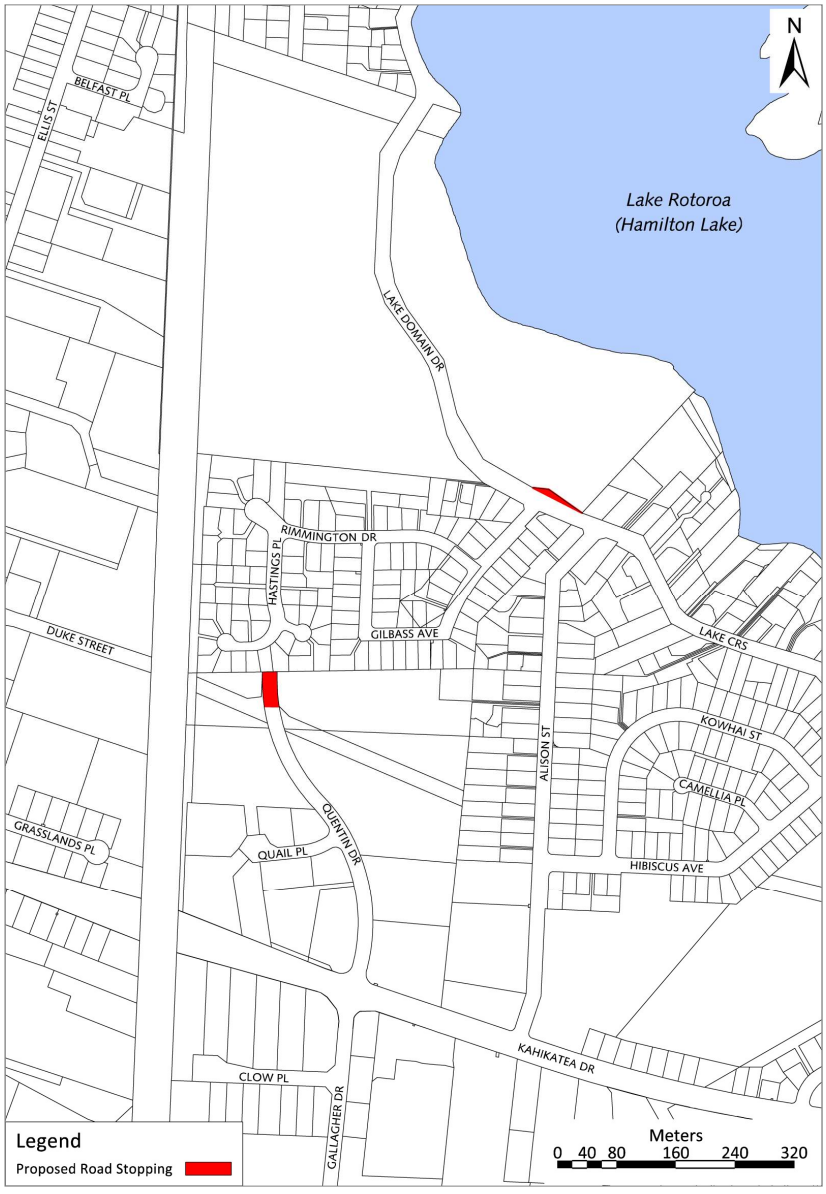

N
Lake Rotoroa
(Hamilton Lake)
BELFAST PL
ELLIS ST
LAKE DOMAIN DR
RIMMINGTON DR
HASTINGS PL
GILBASS AVE
DUKE STREET
LAKE CRS
KOWHAI ST
ALISON ST
CAMELLIA PL
HIBISCUS AVE
QUENTIN DR
QUAIL PL
GRASSLANDS PL
KAHIKATEA DR
CLOW PL
GALLAGHER DR
Legend
Proposed Road Stopping
Meters
0 40 80 160 240 320

Figure 15-5j

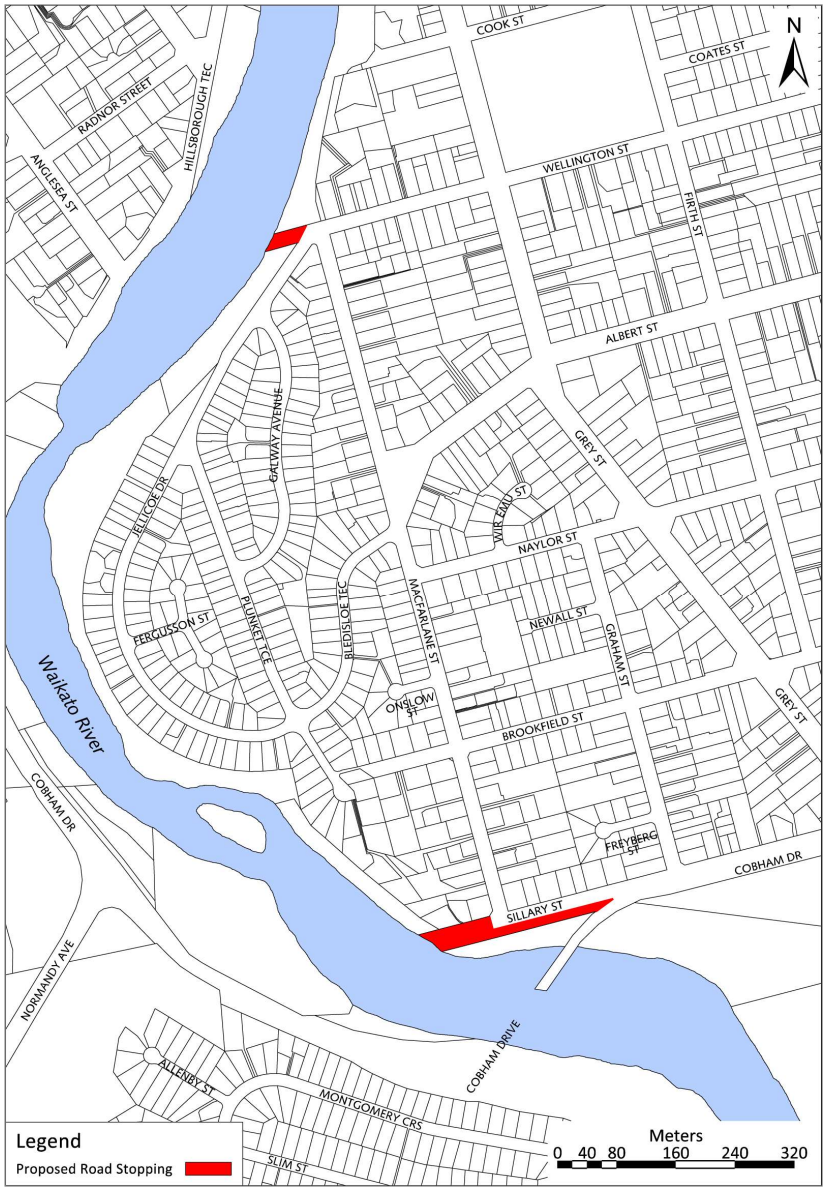

N
COOK ST
COATES ST
RADNOR STREET
HILLSBOROUGH TEC
ANGLESEA ST
WELLINGTON ST
FIRTH ST
ALBERT ST
GREY ST
GALWAY AVENUE
KIRKLAND ST
NAYLOR ST
FELLOE DR
FERGUSSON ST
PLUNKET TCE
BLEDISLOE TCE
MACFARLANE ST
NEWALL ST
GRAHAM ST
ONSLOW ST
BROOKFIELD ST
GREY ST
Waikato River
COBHAM DR
FREYBERG ST
COBHAM DR
SILLARY ST
NORMANDY AVE
COBHAM DRIVE
ALLENBY ST
MONTGOMERY CRS
SLIM ST
Legend
Proposed Road Stopping
Meters
0 40 80 160 240 320

Figure 15-5k


N
SOMMIE CRS
KAKANUI AVE
PRESCOTT PL
KNIGHTON RD
TARBETT RD
HILLCREST RD
FINDLAY ST
NAYLOR ST
CAMBRIDGE RD
GALLOWAY ST
FOX ST
DRY ST
BRETTON TCE
VECTIS RD
BROOKFIELD ST
FORSTER AVE
FLYNN RD
SUTTON CRS
GARTHWOOD RD
VISTA TCE
COBHAM DR
FLYNN RD
COBHAM DR
HUNGERFORD CRS
HOWELL AVE
Waikato River
ECHOBANK PL
WESTON LEA DR
Legend
Proposed Road Stopping
Meters
0 40 80 160 240 320

15-6 Criteria for the Form of Transport Corridors

For designations and new transport corridors the design elements in this table will be used as guidance.

For changes to existing transport corridors the design elements in this table are used to create a baseline within which new works are considered to be a permitted activity (refer to Chapter 18: Transport Corridor Zone).

The criteria on the following pages are based on the guidance contained in the Hamilton City Infrastructure Technical Specifications which can be referred to if necessary for clarification and interpretation.

Table 15-6a: Criteria for the form of Transport Corridors

							Berm requirements[5]				
Transport corridor type[1]	**Land use environment [2]**	**Design speed environment (max desirable)**	**Legal road width (min desirable)[4, 5, 14]**	**Carriageway width[3]**	**Movement lane width[15]**	**Berm requirements[5]**	**On street parking requirements (min desirable)**	**Passenger transport requirements (min desirable)[11]**	**Footpath requirements (min desirable)[12]**	**Cyclepath requirements (min desirable)**	**Service corridor (min desirable)[6]**
Residential Land Use Environment											
Private Way	Residential (serving ≤ 6 units)	10km/h	3.6m or 4.5m	3m	2 way flow, not marked	One side	None	None	Shared zone	Shared zone – no dedicated facility	One side
Private Way or Local (low volume)	Residential (serving >7 and ≤20 units)	10 to 20km/h	9m	5.5m	2 way flow, not marked	1.5m both sides	None	None	Shared zone	Shared zone – no dedicated facility	1.5m both sides
Local	Residential	40km/h	20m	6m	2 way flow, not marked	7m both sides	Recessed parallel parking bays (2m) on both sides	None	1.5m wide footpath, both sides	Cycling on road shared in movement lane	1.5m both sides
Collector	1. Residential	40 to 50km/h	23m	9m	2 @ 3m, marked	7m both sides	Recessed parallel parking bays (2m) on both sides	All bus stops to be kerbside[11]	2m wide footpath, both sides	1.5m on road marked cycle lane, both sides	2m both sides

Table 15-6a: Criteria for the form of Transport Corridors

							Berm requirements[5]				
Transport corridor type[1]	**Land use environment [2]**	**Design speed environment (max desirable)**	**Legal road width (min desirable)[4, 5, 14]**	**Carriageway width[3]**	**Movement lane width[15]**	**Berm requirements[5]**	**On street parking requirements (min desirable)**	**Passenger transport requirements (min desirable)[11]**	**Footpath requirements (min desirable)[12]**	**Cyclepath requirements (min desirable)**	**Service corridor (min desirable)[6]**
Minor Arterial	Residential (Managed or limited direct access)[10]	60km/h	Specific design[8]	Specific design[8]	2 @ 3.5m, marked, plus 3m flush median	Specific design[8]	Recessed parallel parking bays (2m) on both sides	All bus stops to be kerbside. Potential for bus priority at intersections	3m shared off road footpath and cyclepath on both sides		2.5m both sides
Major Arterial	Residential (Limited or no direct access)[10]	80km/h	Specific design[8]	Specific design[8]	4 @ 3.5m, marked, plus 3m solid median	Specific design[8]	None	All bus stops to be recessed. Potential for bus priority at intersections	3m shared off road footpath and cyclepath on one side		Specific design[8]
Industrial Land Use Environment											
Local	Industrial	40km/h	20m	9m	2 @ 4.5m, not marked	5.5m both sides	Recessed parallel parking bays (2m) on both sides	None	1.5m wide footpath, both sides	Cycling on road shared in movement lane	1.5m both sides
Collector	Industrial	40km/h	23m	11m	2 @ 4.5m, marked, plus 2m flush median	6m both sides	Recessed parallel parking bays (2m) on both sides	All bus stops to be kerbside	1.5m wide footpath, both sides	Cycling on road shared in movement lane	2m both sides

Table 15-6a: Criteria for the form of Transport Corridors

							Berm requirements[5]				
Transport corridor type[1]	**Land use environment [2]**	**Design speed environment (max desirable)**	**Legal road width (min desirable)[4, 5, 14]**	**Carriageway width[3]**	**Movement lane width[15]**	**Berm requirements[5]**	**On street parking requirements (min desirable)**	**Passenger transport requirements (min desirable)[11]**	**Footpath requirements (min desirable)[12]**	**Cyclepath requirements (min desirable)**	**Service corridor (min desirable)[6]**
Minor Arterial	Industrial	60km/h	Specific design[8]	12m Specific design[8]	2 @ 4.5m, marked, plus 3m flush median	Specific design[8]	Recessed parallel parking bays (2m) on both sides	All bus stops to be kerbside	3m shared off road footpath and cyclepath on one side and a 1.5m footpath on the other		2.5m both sides
Major Arterial	Industrial	80km/h	Specific design[8]	Specific design[8]	4 @ 3.5m, marked, plus 3m solid median	Specific design[8]	None	All bus stops to be recessed	3m shared off road footpath and cyclepath on one side		Both sides (subject to specific design[8])
Business Centres Land Use Environment											
Service Lane	Business Centres	10km/h	9m	5m	2 way flow, not marked	Specific design[8]	None	None	Shared zone	Shared zone – no dedicated facility	1.5m both sides
Local	Business Centres	40km/h[7]	Specific design[8]	12m (subject to specific design[8])	2 @ 3m	Specific design[8]	Parking one side only. May be recessed, parallel or angled	All bus stops to be kerbside	2 @ 3.5m (subject to specific design[8])	Cycling on road shared in movement lane (subject to specific design[8])	1.5m both sides (subject to specific design[8])

Table 15-6a: Criteria for the form of Transport Corridors

							Berm Requirements[5]				
Transport Corridor Type[1]	**Land Use Environment [2]**	**Design Speed Environment (max desirable)**	**Legal Road width (min desirable)[4, 5, 14]**	**Carriageway Width[3]**	**Movement Lane Width[15]**	**Berm Requirements[5]**	**On street parking requirements (min desirable)**	**Passenger Transport requirements (min desirable)[11]**	**Footpath requirements (min desirable)[12]**	**Cyclepath requirements (min desirable)**	**Service Corridor (min desirable)[6]**
Collector	Business Centres	40km/h[7]	Specific design[8]	Specific design[8]	2 @ 3.5m plus median	Specific design[8]	Specific design[8]. Parking and loading spaces recessed. Parking may be parallel or angled on both sides	All bus stops to be kerbside	2 @ 3.5m (subject to specific design[8])	Cycling on road shared in movement lane (subject to specific design[8])	2m both sides (subject to specific design[8])
Minor Arterial	Business Centres	60km/h[7]	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]. Typically recessed parallel parking bays (2m) on both sides	All bus stops to be kerbside	2 @ 3.5m (subject to specific design[8])	Cycling lanes both sides (subject to specific design[8])	2.5m both sides (subject to specific design[8])
Major Arterial	Business Centres	60km/h[7]	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]. Typically no on street parking provided	All bus stops to be kerbside. Potential for bus priority at intersections	3m, shared off road footpath and cyclepath, both sides		Both sides (subject to specific design[8])

Table 15-6a: Criteria for the form of Transport Corridors

							Berm Requirements[5]				
Transport Corridor Type[1]	**Land Use Environment [2]**	**Design Speed Environment (max desirable)**	**Legal Road width (min desirable)[4, 5, 14]**	**Carriageway Width[3]**	**Movement Lane Width[15]**	**Berm Requirements[5]**	**On street parking requirements (min desirable)**	**Passenger Transport requirements (min desirable)[11]**	**Footpath requirements (min desirable)[12]**	**Cyclepath requirements (min desirable)**	**Service Corridor (min desirable)[6]**
Future Urban Land Use Environment											
Local	Future Urban[9]	40km/h	Specific design[8] (no less than 20m)	8m	2 @ 3m plus 2 @ 1m shoulder	Specific design[8]	None	None	1.5m wide footpath, both sides	Cycling on road shared in movement lane	Both sides
Collector	Future Urban[9]	60 or 80km/h	Specific design[8] (no less than 23m)	9m	2 @ 3m plus 2 @ 1m shoulder	Specific design[8]	None	All bus stops to be recessed	2.5m, shared off road footpath and cyclepath, both sides		Both sides
Minor Arterial	Future Urban[9]	60km/h	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]
Major Arterial	Future Urban[9]	80km/h	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]
Central City Land Use Environment											
Central City	Central City	30km/h	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]	Parking and loading spaces to be separate and recessed	All bus stops to be kerbside	2 @ 4m (subject to specific design[8])	Cycling on road shared in movement lane	Both sides
Pedestrian Focus Area	Central City	30km/h	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]	Parking and loading spaces to be separate and recessed	Specific design.[8] All bus stops to be kerbside	2 @ 4m (subject to specific design[8])	Cycling on road shared in movement lane	Both sides

Table 15-6a: Criteria for the form of Transport Corridors

							Berm Requirements[5]				
Transport Corridor Type[1]	**Land Use Environment [2]**	**Design Speed Environment (max desirable)**	**Legal Road width (min desirable)[4, 5, 14]**	**Carriageway Width[3]**	**Movement Lane Width[15]**	**Berm Requirements[5]**	**On street parking requirements (min desirable)**	**Passenger Transport requirements (min desirable)[11]**	**Footpath requirements (min desirable)[12]**	**Cyclepath requirements (min desirable)**	**Service Corridor (min desirable)[6]**
Strategic Network and Pedestrian Focus Area (Anglesea St)	Central City	40km/h	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]	Parking and loading spaces to be separate and recessed	Specific design[8] Potential for bus lanes and priority at intersections	Specific design[8]	Specific design[8]	Both sides
Strategic Network (Tristram St [Mill St to Bridge St] and Mill St)	Central City	60km/h	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]	None	Potential for bus priority at intersections	Specific design[8]	Specific design[8]	Both sides
Strategic Network Overlay											
Strategic Network	All	60 or 80km/h	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8]	Specific design[8] Potential for bus priority at intersections	Specific design[8]	Specific design[8]	Specific design[8]

[1] New Major and Minor Arterial transport corridors are likely to be designated with the final design undertaken on a case by case basis. For work involving significant changes to existing transport corridors, local constraints, land use environment and network function requirements may require design compromises whereby the minimum desirable design criteria may not be able to be met. Refer to Figures 15-4b to 15-4f to identify the relevant transport corridor type.

[2] Refer to Table 15-4a for which zones form land use environments.

[3] Measured from the face of the kerb to the face of the opposite kerb (excluding any recessed parking).

[4] Full transport corridor width.

[5] Measured from the property boundary to the face of the kerb. Berm width will vary in order to accommodate features as required, including: lighting, noise attenuation, landscaping, street trees, swale drains, footpaths, cyclepaths, recessed parking. Landscaping or street trees will require a minimum width of 2m and be incorporated into the legal road width (typically replacing indented parking or medians).

[6] Location of services will be dependent upon the location of the footpath. The Hamilton City Infrastructure Technical Specifications contains relevant guidance on locating services.

[7] If high pedestrian activity is expected then a 30km/h (or lower) design speed environment will be required. An Integrated Transport Assessment and safety audits will be necessary to ensure that the safety of vulnerable transport corridor users is achieved.

[8] Specific design requires case by case consideration of the design elements in the local context. This must be undertaken with input from Council's City Infrastructure engineers.

[9] The design of transport corridors in the Future Urban land use environments should be flexible enough to enable retrofitting to a lower design speed environment should zoning of the adjacent land use change.

[10] The level of direct access (none, limited, managed) may vary along a corridor depending on network function requirements, topography and the availability of alternative access.

[11] For guidance on bus stop types refer to the Hamilton City Infrastructure Technical Specifications. The design of kerbside bus stops will result in the positioning of a stopped bus partially or fully within the cycle or movement lane. This may require kerb extensions to achieve. Bus stops are only necessary if part of a bus route.

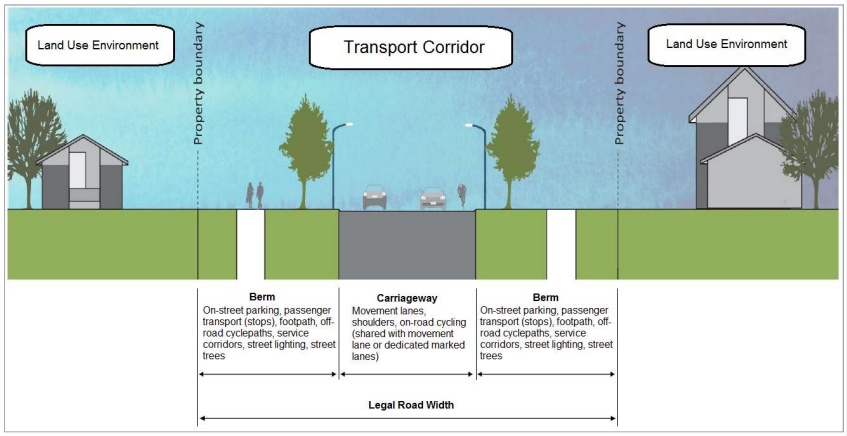
[12] For guidance on pedestrian crossing facilities refer to the Hamilton City Infrastructure Technical Specifications.

[13] Refer to 'Design Speed Environment' below for further guidance.

[14] Stormwater management solutions may require additional legal road width and alter the arrangement of elements in this table (e.g. swales or space for treatment devices).

[15] Excluding shoulders.

Figure 15-6b



Design Speed Environment

Traffic management will need to be included in transport corridor designs to ensure that the design speed environment shown in Table 15-6a is achieved.

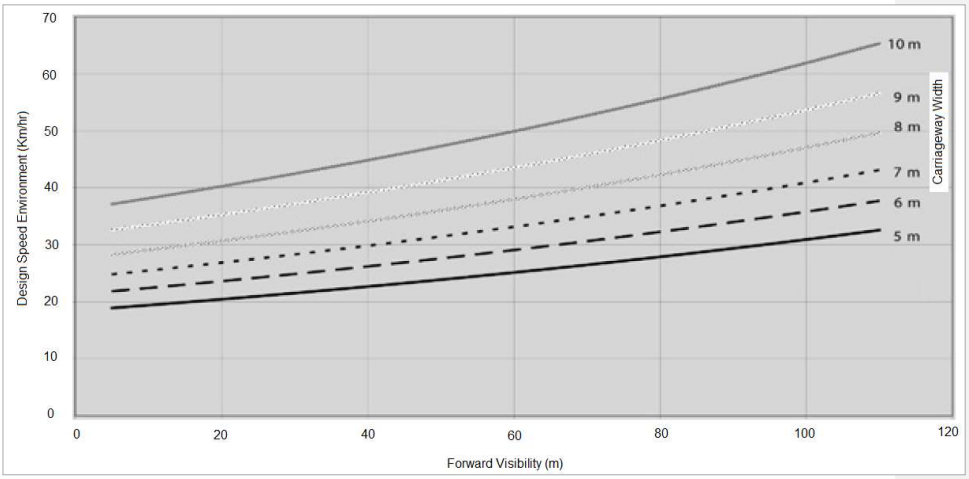
Speeds can be managed by physical and psychological devices such as narrowed movement lanes, reduced forward visibility, parking, slow points, build outs, leg lengths, chicanes, planting and landscaping, and street furniture and public art works.

Suitable guidance for designing to a design speed environment can be found in:

- The Austroads Guide to Road Design – Part 3: Geometric
- The Manual for streets (UK Department for Transport 2007)

The two key geometric factors that contribute to achieving the target operating speed are carriageway width and forward visibility. Figure 15-6c can be used to give an indication of the speed at which traffic will travel for a given carriageway width/forward visibility combination.

Figure 15-6c: Design speed environment – relationship between carriageway width and forward visibility



Source: *Adapted from figure 7.16 of UK Department for Transport 'Manual for streets' and 'TRL661 - The manual for streets: evidence and research'*

15-7 Area Specific ITA Requirement

Figure 15-7a

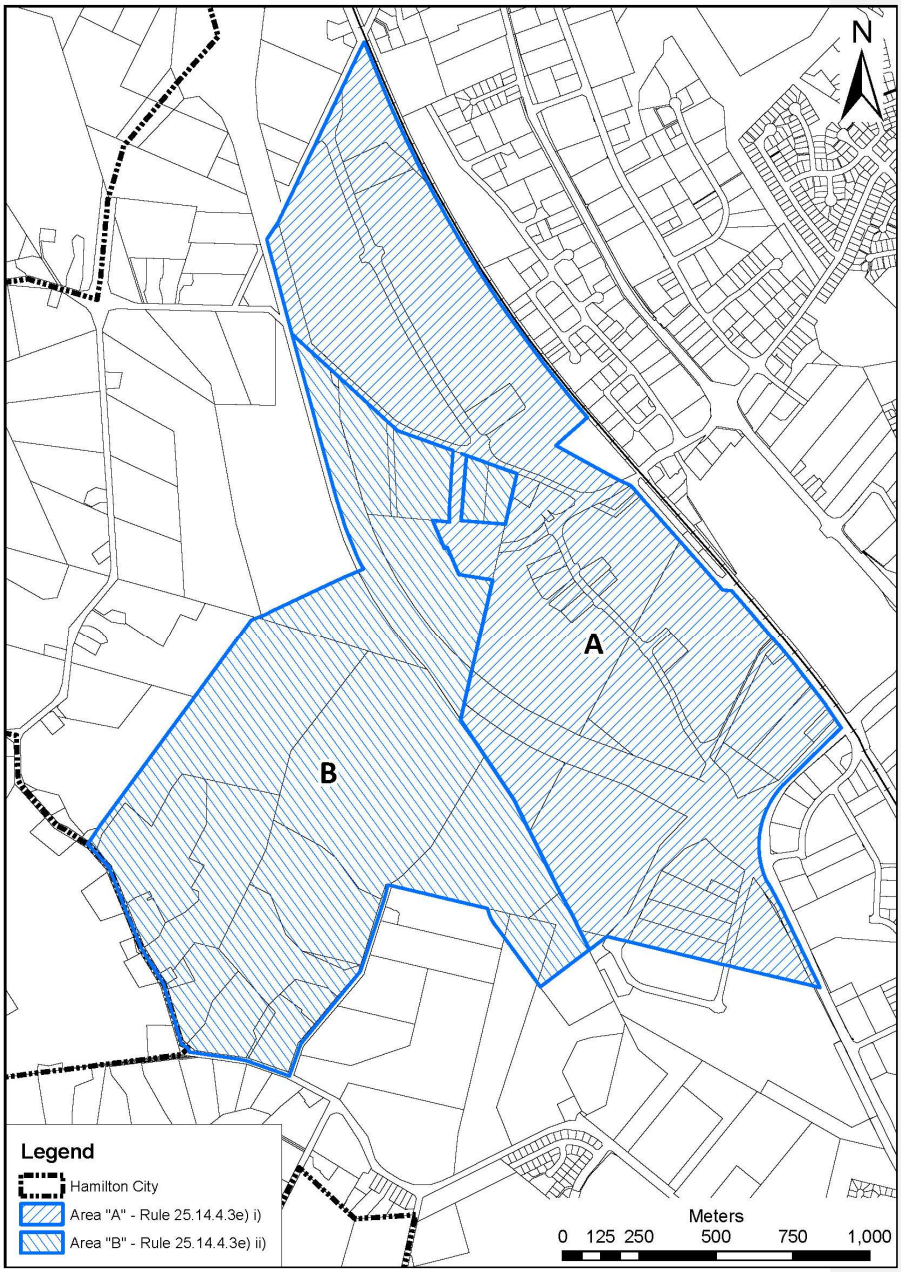


Figure 15-7b

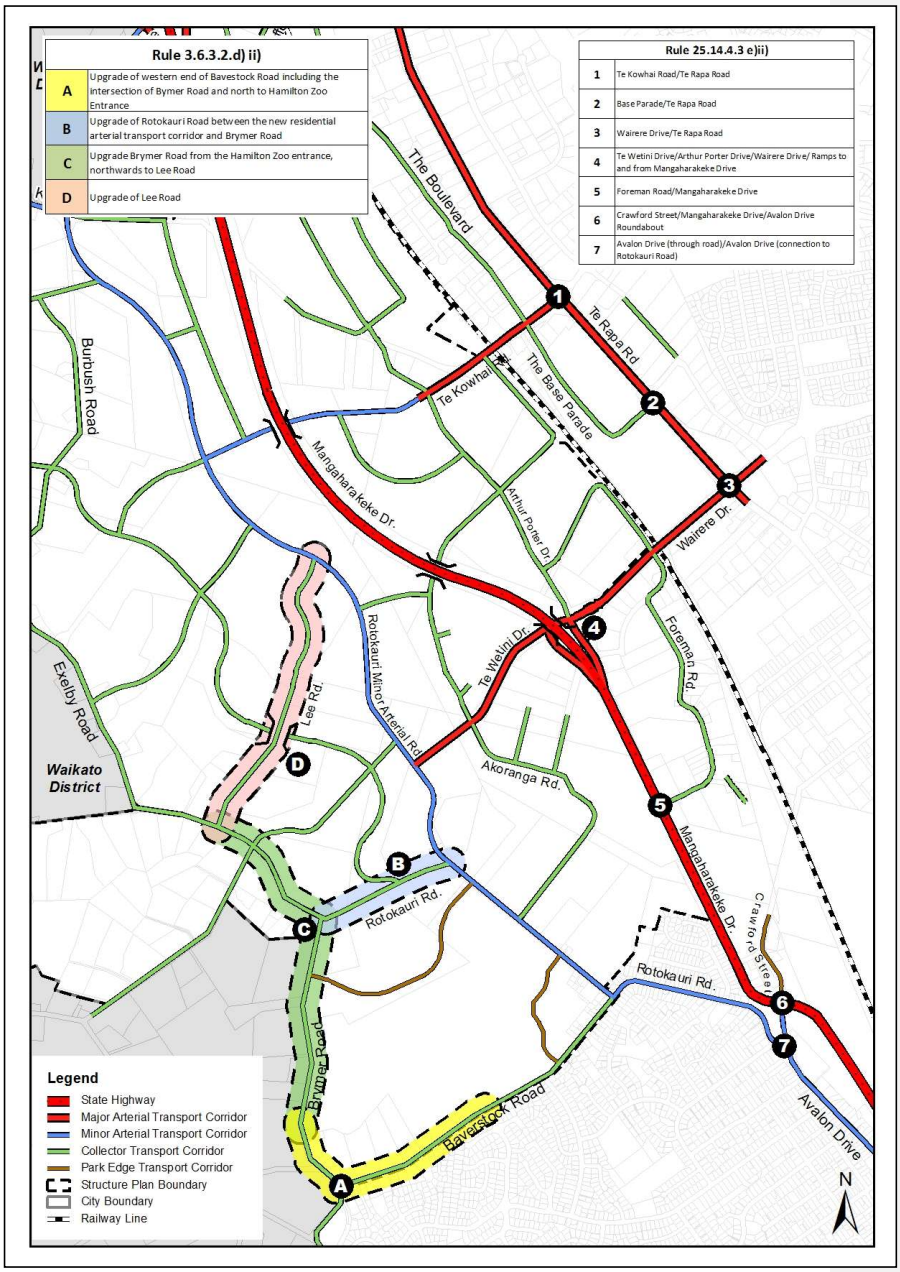

Rule 3.6.3.2.d) ii)
A Upgrade of western end of Bavestock Road including the intersection of Bymer Road and north to Hamilton Zoo Entrance
B Upgrade of Rotokauri Road between the new residential arterial transport corridor and Brymer Road
C Upgrade Brymer Road from the Hamilton Zoo entrance, northwards to Lee Road
D Upgrade of Lee Road
Rule 25.14.4.3 e)ii)
1 Te Kowhai Road/Te Rapa Road
2 Base Parade/Te Rapa Road
3 Wairere Drive/Te Rapa Road
4 Te Wetini Drive/Arthur Porter Drive/Wairere Drive/ Ramps to and from Mangaharakeke Drive
5 Foreman Road/Mangaharakeke Drive
6 Crawford Street/Mangaharakeke Drive/Avalon Drive Roundabout
7 Avalon Drive (through road)/Avalon Drive (connection to Rotokauri Road)
The Boulevard
Te Rapa Rd
Te Kowhai
The Base Parade
Burbush Road
Mangaharakeke Dr.
Arthur Porter Dr.
Wairere Dr.
Te Wetini Dr.
Foreman Rd.
Rotokauri Minor Arterial Rd.
Lee Rd.
Exelby Road
Waikato District
Akoranga Rd.
Mangaharakeke Dr.
Crawford Street
Rotokauri Rd.
Brymer Road
Bavestock Road
Avalon Drive
Legend
State Highway
Major Arterial Transport Corridor
Minor Arterial Transport Corridor
Collector Transport Corridor
Park Edge Transport Corridor
Structure Plan Boundary
City Boundary
Railway Line
N

Figure 15-7c

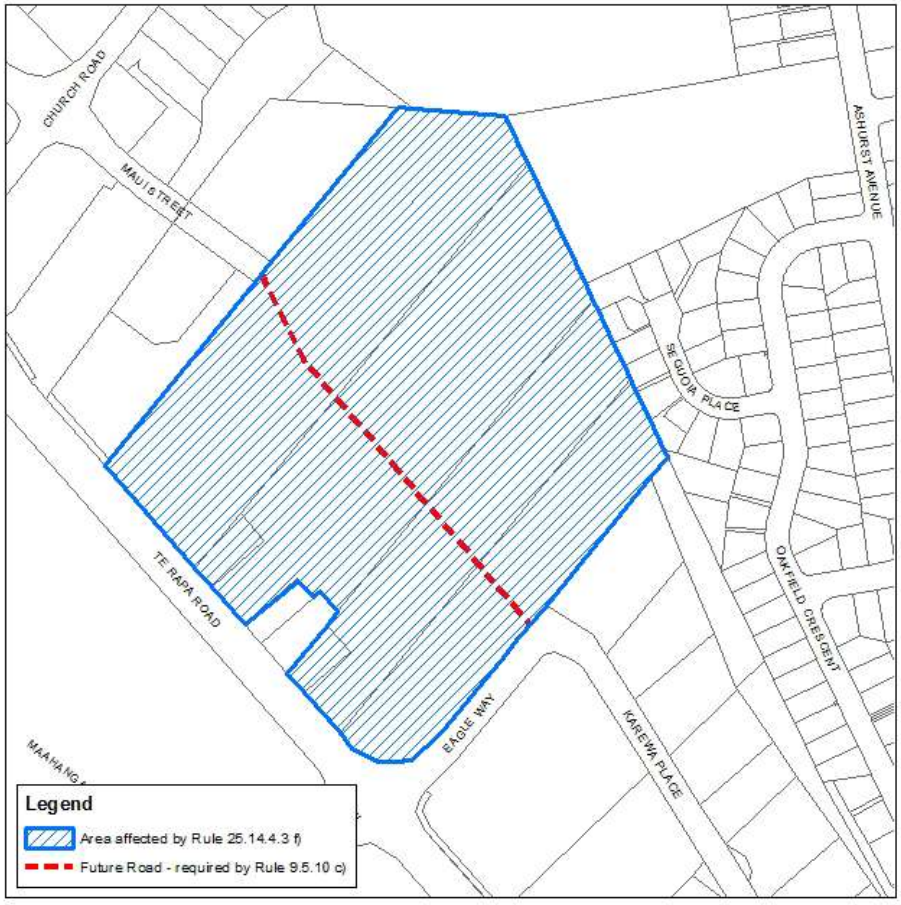

CHURCH ROAD
MAUI STREET
ASHURST AVENUE
SEQUOIA PLACE
OAKFIELD CRESCENT
TE RAPA ROAD
EAGLE WAY
KAREWA PLACE
Legend
Area affected by Rule 25.14.4.3 f)
Future Road - required by Rule 9.5.10 c)

Figure 15-8: Sensitive transport network

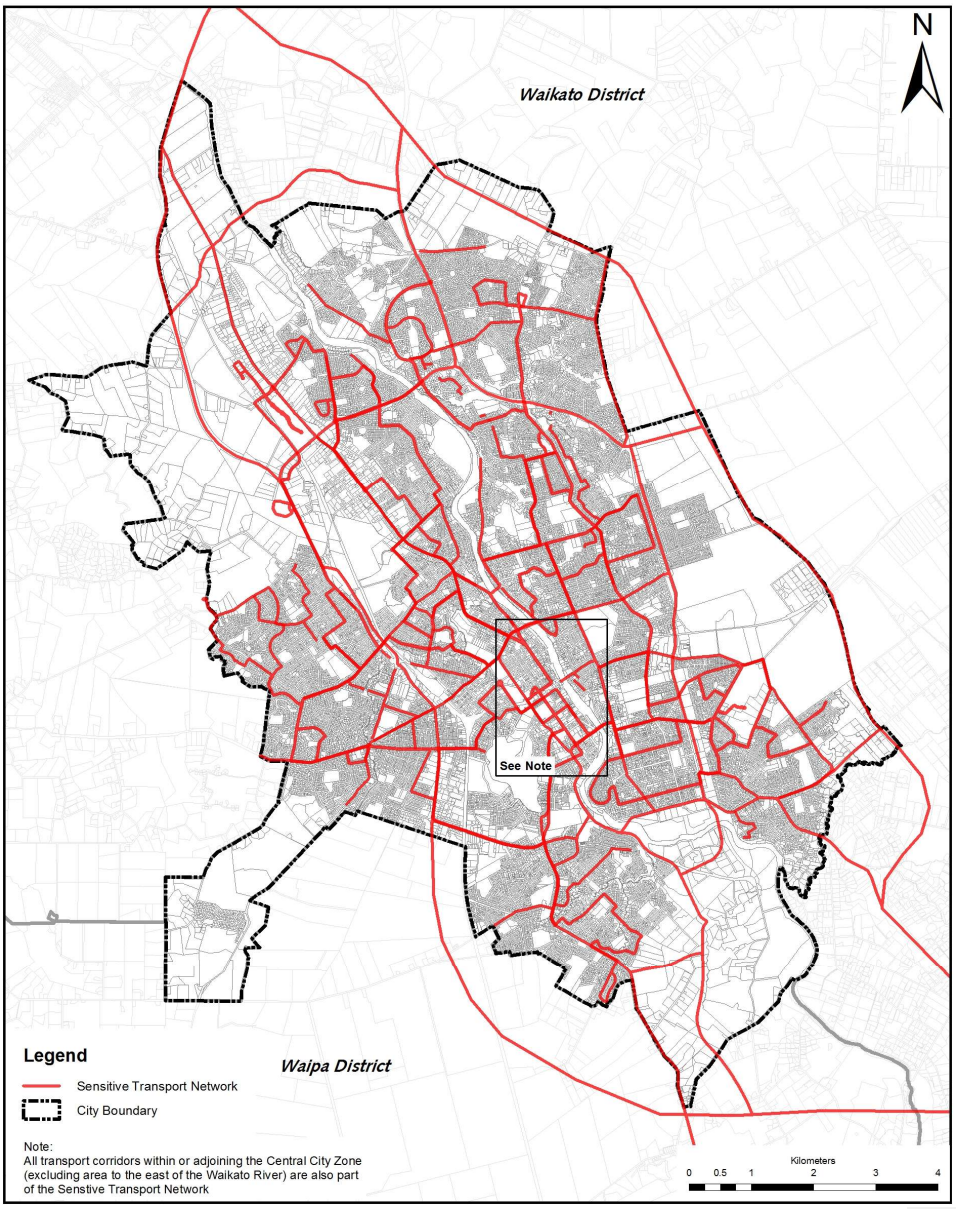
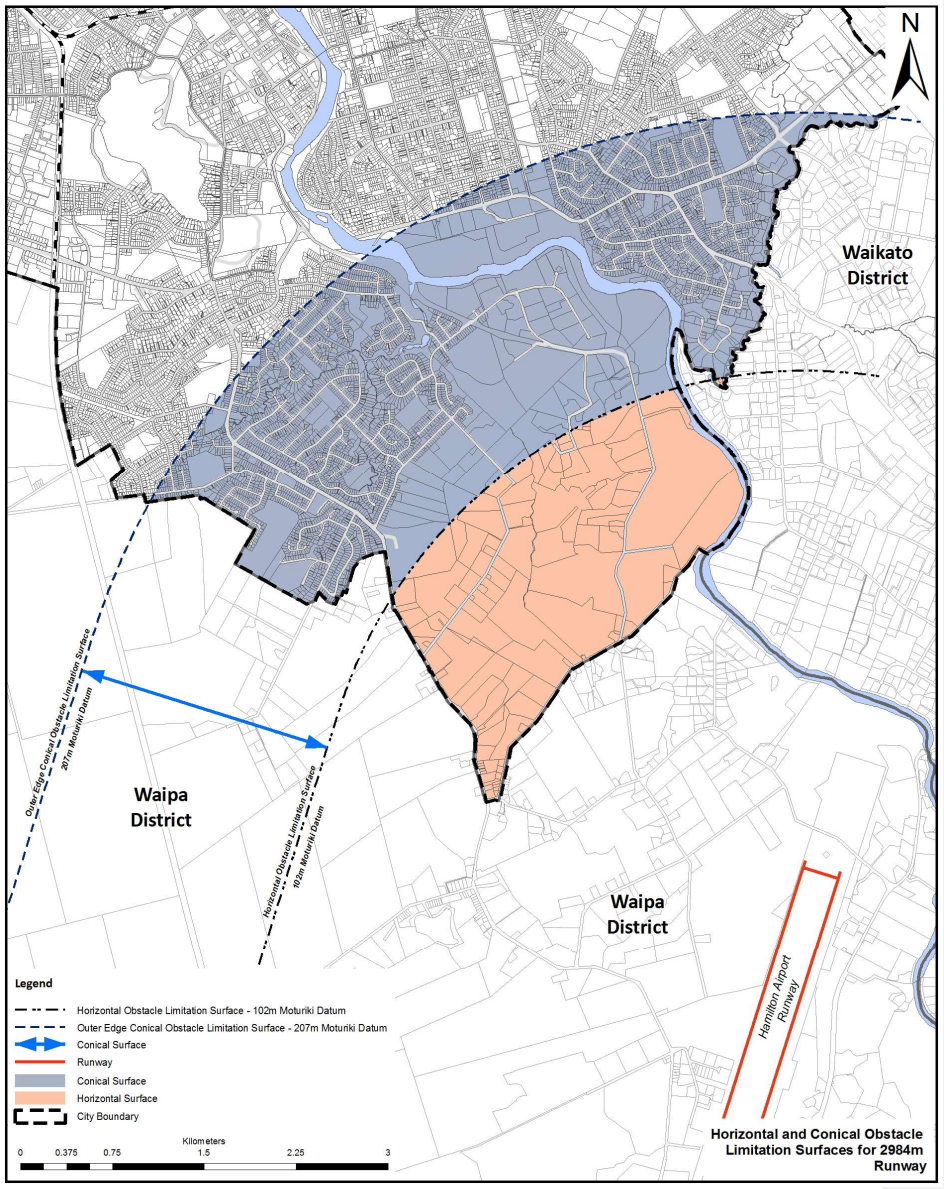
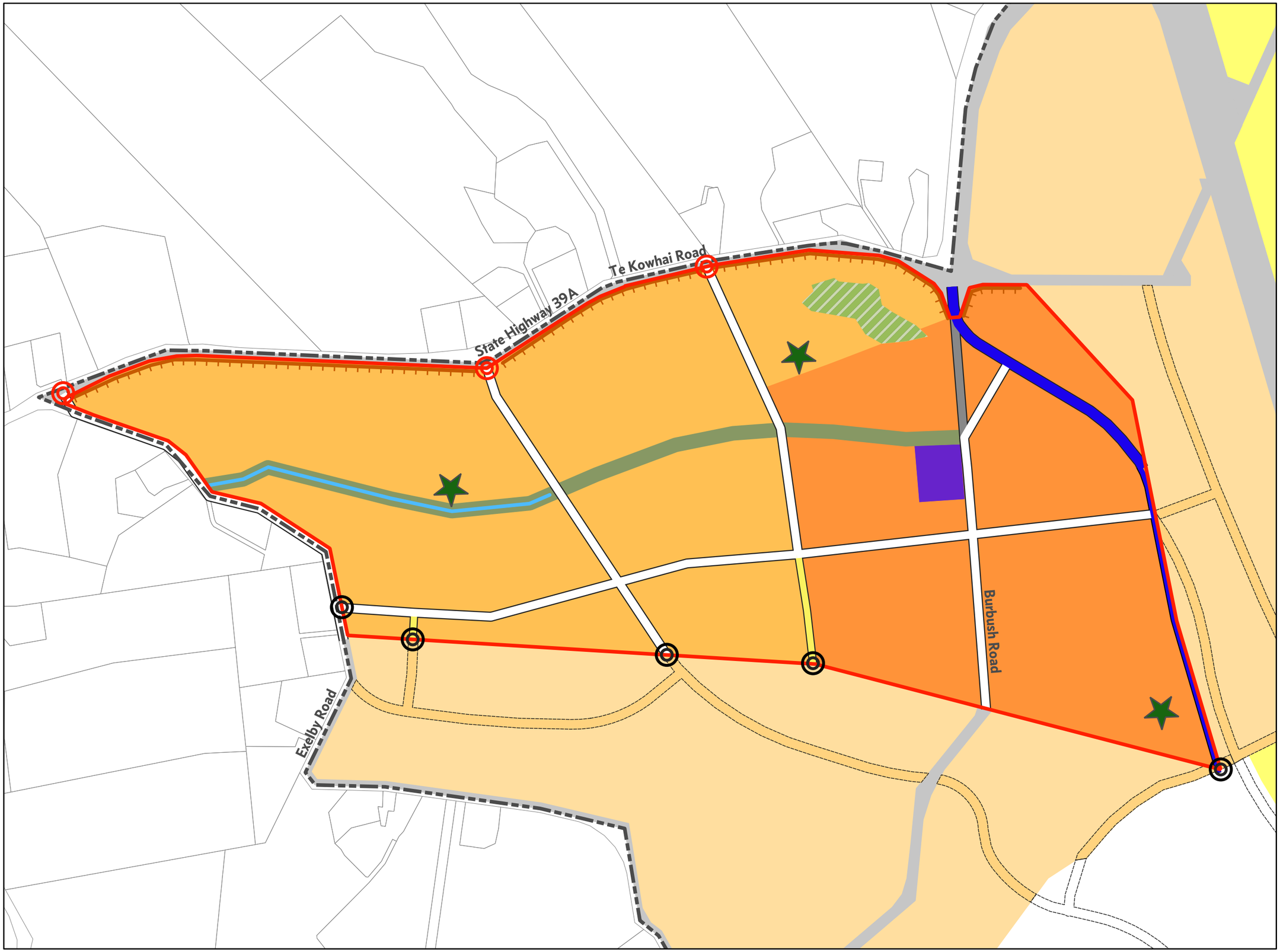


Figure 15-9: Airport protection overlay





N

Legend

- Rotokauri North PPC Area

Zone Type

- Medium Density Residential Zone
- Business 6 Zone
- Medium Density Overlay Area A

HCC Zones

- Future Urban Zone
- Industrial Zone
- Residential Zone
- Transport Corridor Zone
- Natural Open Space Zone
- Future Transportation Corridor Zone

Road Connections

- State Highway Intersection
- Road Connection

Indicative Roads

- Minor Arterial Road
- Collector Road
- Local Road
- Future Road Closing/Stopping
- No Direct Access from State Highway /Landscape Buffer
- Green Spine (could include a road)
- Ohute Stream
- Indicative Neighbourhood Reserve
- WDC/HCC TA Boundary

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Map Projection:
NZGD2000 / Mount Eden 2000 (EPSG: 2105)

Drawn By:	AJSH	Date: 15/04/2019	Signed:
Checked By:		Date:	Signed:
Approved By:		Date:	Signed:
Plot Date:	15/04/2019		

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Project:
Rotokauri North
Private Plan Change
Green Seed Consultants Ltd.

Title:
Structure Plan

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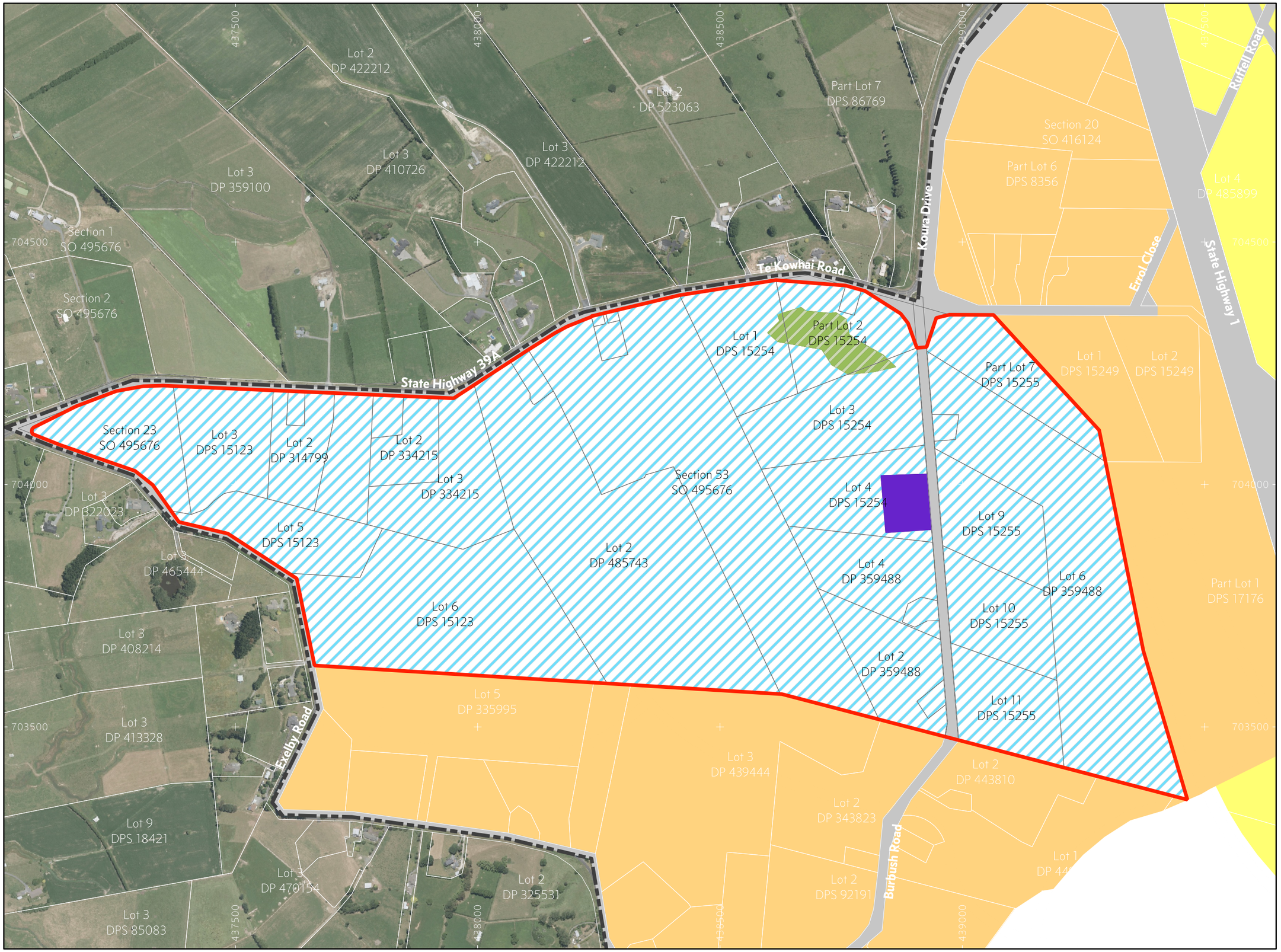
Issue Status:	For Information
Project Number:	1693
Drawing Number:	011
Revision:	I
A3 Scale:	1:7500



N

Legend

- Rotokauri North PPC Area

Proposed Land Use Zones

- Medium Density Residential Zone
- Business 6 Zone

HCC Zones

- Future Urban
- Industrial
- Residential
- Transport Corridor Zone
- Natural Open Space Zone
- WDC/HCC TA Boundary

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NZGD2000 / Mount Eden 2000 (EPSG: 2105)

Drawn By:	AJSH	Date: 04/04/2019	Signed:
Checked By:		Date:	Signed:
Approved By:		Date:	Signed:
Plot Date:	04/04/2019		

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Project:
Rotokauri North
Private Plan Change (PPC)
Green Seed Consultants Limited

Title:
Zone Map

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Issue Status:	For Information
Project Number:	1693
Drawing Number:	010
Revision:	G
A3 Scale:	1:7500

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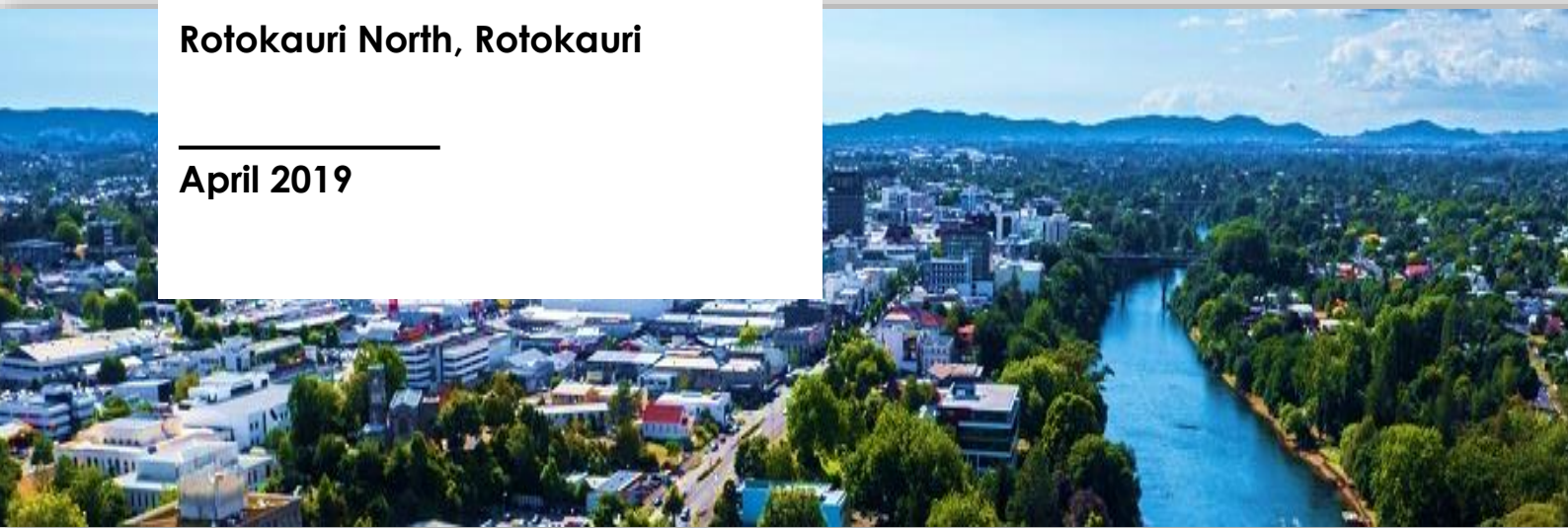
Rotokauri North Private Plan Change Request

Planning Assessment: Section 32 Assessment

Application to Hamilton City Council pursuant to Schedule 1 of the Resource Management Act 1991

Rotokauri North, Rotokauri

April 2019



DOCUMENT CONTROL RECORD

PROJECT: Rotokauri North Private Plan Change

DOCUMENT: Section 32 Assessment

CLIENT: Green Seed Consultants Limited

PROJECT LOCATION: Rotokauri North

AUTHORS: Mark Tollemache & Renee Fraser-Smith

Revision	Date	Originator	Checker	Approver	Description
DRAFT	Dec 2018	RFS	MT	MT	Draft to HCC
FINAL	April 2019	RFS	MT	MT	Final to HCC

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1. INTRODUCTION

1.0.1. This report documents the section 32 statutory analysis of an application for a Private Plan Change ("**PPC**") to rezone approximately 140ha of Future Urban ("**FUZ**") zoned land to Medium Density Residential Zone ("**MDRZ**") and Business 6 Zone ("**B6Z**") made by Green Seed Consultant Ltd ("**GSCL**") on an area of land known as Rotokauri North, within the Hamilton City Council's Rotokauri Structure Plan area ("**RSP**"). The application has been made to Hamilton City Council ("**Council**") under the Resource Management Act 1991 ("**RMA**").

2. STATUTORY REQUIREMENTS

2.1. Section 32

2.1.1. Section 32 of the RMA sets out the requirements for preparing and publishing evaluation reports for proposals for a plan change (amending proposal) to an existing plan (existing proposal). The overall purpose of section 32 in that context is to ensure that any provisions proposed through a plan change are evidence based, clear and certain, and the best means to achieve the purpose of the RMA. An evaluation of the proposed provisions is required prior to notification of the proposed plan change. The section 32 evaluation report sets out the reasoning and rationale for the proposed provisions and should be read in conjunction with those.

2.1.2. In particular, section 32(1) requires that, prior to public notification of a proposed plan change, Council must:

(a) "examine the extent to which the objectives of the proposal being evaluated are the most appropriate way to achieve the purpose of this Act; and

(b) whether the provisions in the proposal are the most appropriate way to achieve the objectives by—

(i) identifying other reasonably practicable options for achieving the objectives; and

(ii) assessing the efficiency and effectiveness of the provisions in achieving the objectives; and

(iii) summarising the reasons for deciding on the provisions;"

The evaluation report must also contain a level of detail that,

(c) corresponds to the scale and significance of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the proposal.

2.1.3. When assessing efficiency and effectiveness of the provisions in achieving the objectives of the proposed plan the report must under s32(2):

(a)" identify and assess the benefits and costs of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the provisions, including the opportunities for—

(i) economic growth that are anticipated to be provided or reduced; and

(ii) employment that are anticipated to be provided or reduced; and

(b) if practicable, quantify the benefits and costs referred to in paragraph (a); and

(c) assess the risk of acting or not acting if there is uncertain or insufficient information about the subject matter of the provisions."

2.1.4. Section 32(3) states that if the proposal is an **amending proposal**, that the examination under section 32(1)(b) must relate to:

(a) The provisions and objectives of the amending proposal; and

(b) The objectives of the existing proposal to the extent that those objectives –

i) Are relevant to the objectives of the amending proposal; and

ii) Would remain if the amending proposal were to take effect.

2.1.5. This subsection is relevant to the proposed private plan change as it will amend the existing District Plan, which by this definition is the "existing proposal".

2.1.6. Of particular relevance in the current context is that the proposed plan change provisions rely on existing objectives as well as introducing new objectives.

2.1.7. Against that background, it is necessary to consider the RMA definition of "objectives" for the purpose of evaluating the proposed plan change. The RMA defines "objectives" as follows:

Objectives means, -

(a) for a proposal that contains or states objectives, those objectives:

(b) for all other proposals, the purpose of the proposal.

2.1.8. Accordingly, following the requirement set out in section 32(3) and section 32(1)(b) (above), the relevant existing objectives in the District Plan are examined as well as any new objectives introduced by the PPC.

2.1.9. For completeness, this evaluation also includes an assessment of whether the new (proposed) provisions will help achieve the relevant existing objectives of the District Plan and will not undermine them.

2.1.10. In addition, Section (4A) also required that any proposal which utilises a Schedule 1 process must also in the evaluation report:

(a) summarise all advice concerning the proposal received from iwi authorities under the relevant provisions of Schedule 1; and

(b) summarise the response to the advice, including any provisions of the proposal that are intended to give effect to the advice.

2.2. Legal and Statutory Context

2.2.1. The purpose of the RMA is to promote the sustainable management of natural and physical resources. Sustainable management means:

"Managing the use, development and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while [emphasis added] –

(a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

(b) Safeguarding the life-supporting capacity of air, water, soil and ecosystems; and

(c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment."

2.2.2. This evaluation under section 32 must, as directed in section 32(1)(a), "*examine the extent to which the objectives of the proposal being evaluated are the most appropriate way to achieve*" the purpose of the RMA.

2.2.3. Section 31 of the RMA sets out the functions of territorial authorities for the purpose of giving effect to the RMA, which includes:

"(a) The establishment, implementation, and review of objectives, policies, and methods to achieve integrated management of the effects of the use, development, or protection of land and associated natural and physical resources of the district."

2.2.4. The purpose of a district plan is to assist territorial authorities to carry out their functions to achieve the purpose of the RMA (s72).

2.2.5. Section 74 sets out the matters to be considered by a territorial authority for the purpose of preparing or changing its district plan. This includes its obligation to prepare an evaluation report prepared in accordance with section 32. As explained above, this report sets out that evaluation.

3. PURPOSE OF THE PLAN CHANGE AND OUTLINE OF THE PROPOSAL

3.0.1. The purpose of this PPC is to enable urban residential development to be undertaken within approximately 140 hectares of land.

3.0.2 The reasons for this PPC are:

i. There is an identified housing shortfall in Hamilton City which is a significant concern, and one that is generating housing affordability issues, particularly for first home buyers. In addressing this issue, Hamilton City has a Housing Accord which has been signed with Central Government to deliver additional housing. Of the 140 hectares covered by this PPC request, 133 hectares fall within a recommended Special Housing Area ("**SHA**") targeted to release land for the development of housing supply to accommodate the rapidly expanding population of Hamilton City, therefore relieving price pressure and providing more affordable housing.

ii. The rezoning of approximately 140 hectares of land as proposed by the PPC will enable the development of new housing that will contribute towards the shortfall in the housing supply in the Hamilton City area.

iii. The land is already located within an identified growth area, and has been specifically earmarked for urban activities – notably the site has an existing FUZ (which itself signals a change in the future to "urban").

3.0.3. To address the resource management issues described above (ie the housing shortage), the proposal specifically seeks to:

i. Rezone approximately 137.6 hectares from FUZ to MDRZ to facilitate and support residential development;

ii. Rezone approximately 1.2 hectares from FUZ to B6Z (Neighbourhood Centre)

3.0.4. All full list of provisions is contained in the AEE (as well as a description of the reasons for the proposed changes).

3.0.5. Full analysis for the PPC is contained in the attached Appendices included with the PPC package as listed in the AEE.

4. SECTION 32 ASSESSMENT

4.0.1. The environmental effects of the rezoning of the Rotokauri North area to residential (with a small area of B6Z) and creation of a new Rotokauri North Structure Plan ("**RNSP**") are generally considered to be minimal as the land has been earmarked for the last decade for future urban development. This process was covered by Council's Section 32 assessment for Plan Variation 18, which included a full analysis of site constraints, geology, heritage, as well as zoning options, and staging. It is also noted that these same site characteristics for Rotokauri North are generally the same as those already assessed by Council's Section 32 for the appropriateness of the existing Rotokauri North Structure Plan and rezoning.

4.0.2. The Stage 2 Rotokauri Land was not rezoned to Future urban because it was uncertain if the land was suitable or not for urban development, and it was also uncertain when infrastructure would be available.

4.0.3 The primary matters considered in this section 32 assessment are:

(a) What is the most way forward to develop the subject land and what is the most appropriate zoning?

(b) Can the existing Hamilton City District Plan ("**HCDP**") provisions apply without modification, or are new provisions appropriate?

(c) Does the existing Rotokauri Structure Plan represent the most efficient use of land and methods for achieving the objectives?

(d) Do the methods achieve the purpose of the RMA?

(e) Are the proposed methods the most effective and efficient means of achieving the objectives?

4.0.7. The alternatives and their respective costs and benefits are discussed below.

5. ALTERNATIVES

5.1. Alternative Approaches (zoning and provisions application):

5.1.1. This section addresses the alternatives associated with the rezoning of the PPC area. The alternatives to progressing a PPC are:

(a) Retain the status quo (i.e. FUZ and wait until planned re-zoning post 2040); OR

(b) Retain the status quo (i.e. FUZ) and progress non-complying resource consent applications; OR

(c) Rezone for a Residential Zone

i) Rezone for another residential zone (i.e. lower density such as the General Residential Zone);

ii) Re-zone the land MDRZ ;

iii) Rezone to a higher density zone (e.g. Residential Intensification); OR,

(d) Rezone to another zone option

i) Rezone the entire land area for another zone (i.e. countryside living or industrial);

ii) Rezone a portion of the land for business activities (B6Z) to support a residential option]; OR,

iii) Rezone a portion of the land for business activities (Business 4 and 5 Zones) to support a residential option.

5.1.2. The alternatives then identify the preferred options for zoning and explore high for whether provisions/methods are needed. These options are:

(a) Retain existing provisions, methods etc;

(b) New suite of provisions specific only to Rotokauri North applicable zones; OR,

(c) Modify/provide bespoke provisions, methods etc and retain existing provisions where these can achieve the objectives.

5.1.3. An assessment of the options and alternatives has been undertaken, including the costs and benefits of each, in **Appendix 1**.

Analysis:

5.1.4. The status quo is the least appropriate option. It is inefficient to delay the land's zoning when there is a clear housing need and willing developer able to delivery residential lots and housing and its associated infrastructure until well ahead of the planned post 2040 timeframe.

5.1.5. Utilising the Housing Accords and Special Housing Area Act 2013 ("**HASHAA**") to progress consents creates a temporary stopgap in the housing market; however, it does not reflect long term planning outcomes for the area (and is limited to the lifetime of the HASHAA).

5.1.6. At some point, a plan change would still be needed to ensures continued delivery of housing across Rotokauri North (and/or just to tidy up the zone to match what has been delivered on the ground).

5.1.7. Therefore, these two options were rejected as being an efficient or effective means to meet housing demand, and the analysis moved into the application of an appropriate zone.

5.1.8. The lower density residential option (i.e. General Residential) option would be partially appropriate, but its major weakness would be the inefficient use of land (development density and variety of housing typologies) and development potential of the land resource. The higher density option (Residential Intensification Zone) is also partially appropriate, but its weakness would be the less effective achievement of market-supportable housing types and the Hamilton City Council ("**HCC**") zone distribution principles.

5.1.9. Other types of zoned were assessed too (such as Industrial or countryside living). However, these options do not enable sufficient housing supply to assist in meeting the recognised shortage. Furthermore, these are inconsistent with the expectations set by the existing Rotokauri Structure Plan.

5.1.10. The MDRZ option is the most appropriate option. It maximises development and land efficiency and provides the most flexibility for a variety of housing options to occur. This includes the ability to establish housing typologies that deliver on more affordable price points within the market.

5.1.11. Given the population expected, the analysis also determined an appropriate business zone to give effect to a community focal point and business hub. All large centre options were discounted due to proximity to existing and planned centres, and the B6Z (Neighbourhood Centre) is considered the most appropriate to support local convenience without detracting from the other centres.

5.1.12. Therefore, having established that a MDRZ and a small B6Z are the most appropriate, the analysis continued to determine if changes were required to the HCDP in respect of the Rotokauri North area.

5.1.13. No changes were not considered efficient as some or complete changes, as the default standards for the MDRZ rely heavily on the use of an outdated planning mechanism (Comprehensive Development Plans ("**CDPs**"). Draft Council feedback requested that a version of the masterplan be included in the PPC text, in lieu of a CDP and/or to show a CDP level of detail for guiding further development of the site. CDP's have been deemed inappropriate by the Environment Court) to deliver quality housing and design outcomes. Furthermore, many of the existing HCDP provisions are based on development of brownfields infill rather than new greenfield development.

5.1.14. A completely new set of provisions was also discounted as while it had the benefit of providing tailored provisions to secure specific outcomes; it was recreating new standards and re-litigating existing standards for no resource management reason. This type of process in itself is considered inefficient.

5.1.15. Rather than detail development in a high level subdivision concept (which is reflected in the District Plan) the preferred option is to provide some new provisions where necessary to secure high quality subdivision design outcomes and appropriate onsite amenity for residents while retaining the bulk of the HCDP standards. The new standards are targeted at achieving good outcomes for greenfield subdivision rather than relying on a concept plan to drive good outcomes. While there is some degree of uncertainty regarding how the finished product will look, this is considered appropriate for a Plan Change level of development. Key elements and features are shown on the Structure Plan, and tailored provisions produce good outcomes resource consent level.

Preferred option in detail

5.1.16. Having regard to the significant benefits over costs associated with the options assessed above, it is proposed that the majority of the PPC area (137.6 hectares of the 140) be zoned MDRZ with 1.12 hectares proposed to be zoned B6Z (and the remainder to remain as a Significant Natural Area). The PPC only seeks to rezone the FUZ and not the SNA.

5.1.17. As the subject land has been earmarked for future urban growth, it is not a matter of whether it is appropriate to rezone the land for urban development but rather a matter of timing. The applicant has undertaken comprehensive structure planning for the site. This provides the opportunity to seek the rezoning of land which is intentionally in a 'holding' zone until that structure plan process is complete and an application is made for a PPC.

5.1.18. The rezoning of this land for residential purposes, with the majority being MDRZ, will assist with providing additional housing land supply, in a location that is not constrained by infrastructure capacity and where appropriate infrastructure can be provided to remedy the housing shortage in Hamilton. The use of the MDRZ zone enables a diverse range of development options, and therefore living and lifestyle choice.

5.1.19. The proposal also takes into account the provision of a small convenience neighbourhood centre (B6Z) which will also service as the local community focal point.

5.1.20. The key component, however, is the detail of the provision to be included in the PPC to work in conjunction with the existing HCDP provisions to create a well-planned and quality medium density environment.

5.2. Structure Plan Alternatives

5.2.1. As identified previously there are also a variety of options in relation to the application of a Structure Plan. These are:

(a) Retain the existing Rotokauri Structure Plan

(b) Refresh the Rotokauri North area and the remainder of the Stage 2 area

(c) Refresh only that part applicable to Rotokauri North.

5.2.2. An assessment of the above options has been undertaken, including the costs and benefits of each, in **Appendix 1**.

5.2.3. Combined with this was the option to either include or exclude third party land to the Structure Plan and PPC area, where these would otherwise form "cut outs" in the area. An assessment of these options has also been undertaken, including the costs and benefits of each, in **Appendix 1**.

Analysis

5.2.4. The Rotokauri Structure Plan was drafted in 2005, and although went through refinement until it became operative, the base data and layout was relatively high level, and the structure plan key feature and layout was based on best practise at the time, whilst managing the needs and implementation issues associated with structure planning across many different landholdings (and owners). So while there is an underlying structure plan, the detailed costs and benefits indicate that a refresh or update is the preferred option, particularly to deliver the identified options above for MDRZ. This is also in light of the workshops undertaken by GSCL in December 2017 and August 2018 to evaluate a masterplan concept and more detailed structure plan approach.

5.2.5. The option to overhaul the entire remaining Stage 2 area of the Rotokauri North was considered. However, the costs and risk associated with making changes outside of the PPC area were considered to be too significant (particularly in terms of scope of the PPC if the changes to the Rotokauri Structure Plan went beyond the boundary of the PPC or the SHA). A review of the Rotokauri Structure Plan should be the function of HCC, should it so choose to do so.

5.2.6. This resulted in the preferred option being a refresh to the Rotokauri North area only.

5.2.7. With respect to whether or not to include third party land which would otherwise form "cut outs" to the PPC/Structure Plan are, the decision was included by logic for a PPC boundary more so than the significant costs and risks of including the third party land. This was also the preferred option of HCC.

Preferred option in detail

5.2.8. Giving effect to this option has resulted in refinements to the working masterplan and identifying planning rules that require refinement to implement the structure plan (which is based on the core elements produced by the concept masterplan). As outlined in detail in the Urban Design Report by Ian Munro prepared for the PPC, a refreshed masterplan was the outcome of a 3 day workshop with Council and technical staff and takes into account preliminary technical reporting and practical design testing of the development pattern.

5.2.9. As a result of the workshop, implementation of this option also resulted in the inclusion of third party landholdings (approx. 7 hectares) into the PPC area for those landholdings which are pepperpotted amongst the GSCL land. The inclusion makes practical sense (rather than excluding minor landholdings which otherwise fall within the PPC area), but also provides for good planning and integrated management practise.

5.2.10. The resultant Rotokauri North Structure Plan ("**RNSP**") takes into account the implementation of the preferred options has been included in the PPC text to replace the equivalent area on the Rotokauri Structure Plan.

5.2.11. Details of the RNSP have been outlined in the Urban Design Report prepared for the PPC, and where linked to a provision/method have been evaluated in section 6.0 below.

6. OBJECTIVES EVALUATION

6.1.1. Section 32(1)(a) requires that an evaluation assess the extent to which the objectives of the proposal are the most appropriate way to achieve the purpose of the RMA.

6.1.2. The RMA seeks to promote the sustainable management of natural and physical resources:

Managing the use, development and protection of natural and physical resources in a way and at a rate, which enables people and communities to provide for their social, economic and cultural wellbeing and for their health and safety while –

(a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

(b) safeguarding the life-supporting capacity of air, water, soil and ecosystems; and

(c) avoiding, remedying or mitigating any adverse effects of activities on the environment.

6.1.3. The purpose of the RMA is only achieved when the matters in (a) to (c) have been adequately provided for within a District Plan.

6.1.4. As a PPC, GSCL has a duty under Section 32 of the RMA to examine whether the objectives of the proposal and its provisions are the most appropriate way for achieving the purpose of the RMA.

6.1.5. The objectives of the PPC are listed in **Appendix 2**. They have been evaluated in terms of the extent that they are the most appropriate means to achieve the purpose of the RMA and also in relation to the objectives of the Waikato Regional Policy Statement ("**RPS**").

6.2. Evaluation of Provision/Methods

6.2.1. To ensure that the evaluation of the proposed plan change is carried out to an appropriate level of detail, the table set out in **Appendix 3** provides an assessment of the scale and significance of the environmental, economic, social and cultural effects that are anticipated from the implementation of the amending proposal (objectives, policies and rules). This assessment is required under section 32(1)(c).

6.2.2. The scale and significance of the effects anticipated by the plan change are considered to be moderate. Whilst there are numerous new objectives, policies and methods to be inserted, these are applicable only the Rotokauri North area (and are not to be applied citywide).

6.2.3. Section 32(1)(b)(ii) also requires that councils assess the efficiency and effectiveness of the policies and methods as the most appropriate way to achieve the objectives. The Ministry for the Environment's guidance explains that "efficiency" is achieved where a policy or method will achieve the objective (the benefit) at the least cost. Least cost can be difficult to quantify, especially in monetary terms, and we have not identified the costs of alternative policies and methods to indicate the least cost option for this section 32 evaluation.

6.2.4. A full assessment of provisions/methods to be inserted by this PPC and their associated costs and benefits to assess the efficiency and effectiveness of achieving the proposed objectives (and where relevant existing objectives), including identification of any alternatives, and which was been provided in a manner which corresponds to the scale and significant of the proposal (including environmental, economic, social and cultural effects) has been provided in **Appendix 3**.

6.2.5. As previously outlined (and based on the outcomes of the options assessments), development at Rotokauri North is not contained to only those objectives and methods proposed by this PPC request. It is expected that the provision work in tandem with existing HCDP provisions in other chapters, including:

- Chapter 2: Strategic Framework
- Chapter 3: Structure Plans
- Chapter 19: Historic Heritage
- Chapter 22: Natural Hazards

- Chapter 23: Subdivision
- Chapter 25: City-wide
- Volume 2, Appendix 1 District Plan Administration
- Volume 2, Appendix 9 Natural Environments
- Volume 2, Appendix 15 Transportation

6.2.6. As acknowledged in the AEE component of this PPC Request, the HCDP provision of other chapters, such as those identified above, will also ensure that any other potential effects (e.g. geotechnical issues/liquefaction mitigation, flooding, stormwater management, protection of natural features) can be adequately dealt with and responded to development and subdivision stage. It is not unusual or ineffective to rely on existing provisions in any way and does not undermine the viability of the re-zoning. This is clearly evident by the operative Rotokauri Structure Plan provisions (which were considered appropriate by Council's own section 32), which do not contain any additional objectives to mitigate effects of natural hazards or archaeology etc. Therefore, the reliance of this PPC on existing provisions is considered to be both efficient and effective.

7. CONSULTATION

7.1. Iwi Consultation

7.1.1. Cultural Values assessments and iwi engagement for this PPC are ongoing. A Rotokauri North Tangata Whenua Working Group ("**TWWG**") has been established with direction from Waikato-Tainui to include representatives from each of the Waikato-Tainui hapu within the vicinity of the project – namely Ngaati Mahanga, Ngaati Hauaa, Ngaati Tamaiunapo, Ngaati Wairere, Ngaati Reko -Waikeri Marae and Te Uri o Mahanga. Bi-monthly meetings are being held with the TWWG and Waikato-Tainui to work through cultural values (general) and any specifics that may occur for the RNDA.

7.1.2. A Cultural Impact Assessment ("**CIA**") has been prepared by the TWWG and is provided as an Attachment to the PPC documentation.

7.2. Other Consultation

7.2.1. Other Key Stakeholders for consultation have included:

- HCC
- WDC
- WRC
- MOE
- Landowners inside the PPC area

- Adjacent neighbours.

7.2.2. A summary of consultation undertaken is provided in Attachment 20 to the PPC documentation.

8. CONCLUSION

8.0.1. This Report has undertaken an analysis of the PPC request by GSCL in terms of Section 32 of the RMA. This analysis concludes that the objectives of the PPC are consistent with the purpose of the RMA as they: provide for growth in an identified growth area in Hamilton whilst maintaining and enhancing the core environmental values; propose provisions that are the most appropriate means of achieving the objectives as they provide a framework which will ensure that the development of the PPC area is comprehensive, integrated and efficient in its layout and form. Moreover, they will ensure that additional housing, and housing targeted at first home buyers, can be provided.

APPENDIX 1: SECTION 32 EVALUATION ASSESSMENT OF OPTIONS (s32(1)(b)(i))

ASSESSMENT OF OPTIONS TO ACHIEVE OBJECTIVES

Table 1: Overall Assessment of Alternatives			
Options:	**Benefits**	**Costs /Risks**	**Accept/ Reject**
Option 1: Retain the status quo (i.e. FUZ and wait until planned re-zoning post 2040)	• Consistent with the existing HCDP. • Comparatively low visual impacts as no change would be facilitated from the existing environment. • Vegetation removal would be limited to normal farming and countryside living activities. • Earthworks would be generally limited to rural activities and small scale built form developments associated with countryside living activities and rural activities. • No changes for existing landowners in the regulatory framework. • Council will have time to undertake its own structure planning prior to a plan change process. • GSCL (or other landowners) would be spared the substantial costs of a PPC as the Council would meet the costs of a future public plan change.	• Potential to undermine Council's ability to meet Hamilton Housing Accord targets and to meet land supply/new dwelling targets associated with the NPSUDC. The inability to meet land supply demand will create adverse social and economic effects as house prices increase due to high demand which cannot be met by adequate supply, particularly for first home buyers. • Although the option to retain status quo is consistent with the current provisions, these same provisions envisage that a plan change will occur to rezone in the land (alongside appropriate infrastructure provision). Therefore, doing nothing is also inconsistent with what is envisaged by the HCDP.	Reject

Table 1: Overall Assessment of Alternatives			
Options:	**Benefits**	**Costs /Risks**	**Accept/ Reject**
Option 2 Retain the status quo (i.e FUZ) and progress a non-complying resource consent application(s)	• No plan Change required.	• This option could be advanced under HASHAA (where the provision of housing has the greatest weight in respect to the statutory tests for the assessment of Qualifying Development ("**QD**") applications) – however given the lapse of the HASHAA (in September 2021) – sole reliance on the HASHAA is not considered a long term option for developing 140 hectares. At the time of lodgement of the PPC the gazette for the SHA has not been completed through the Order in Council process. In addition, HASHAA prescribes the length of resource consents as 1 year which is insufficient to design, consent and construct up to 2000 houses/lots. Further, without an urban zoning the rules for assessing the QD would default to FUZ (which would not produce an urban style neighbourhood, but rather low density rural holding zone). Otherwise all applications would need to include full building plans which significantly increases the costs of consenting to the applicant(s), but also significant input from council resource. • Unless advanced under HASHAA this option will not produce affordable homes to meet the needs of first home buyers.	Partial accept / partial reject. HASHAA path may be an option for some stages, but not for the full development.

Table 1: Overall Assessment of Alternatives			
Options:	**Benefits**	**Costs /Risks**	**Accept/ Reject**
		• Potential to undermine District Plan integrity by allowing urban activities on FUZ land without an appropriate rezoning. • Would be reliant on Council undertaking a "tidy up" plan change in the future to amend to an urban zoning.	
Residential Re-Zoning Options:			
Option 3: Re-zone the land for another residential zone (i.e. lower density such as the General Residential Zone)	• Rezoning is the most efficient way of ensuring District Plan integrity and giving the community surety over intended environmental outcomes. • Contributes some housing supply to assist with accommodating the city's growth pressures. • Does not achieve the medium density outcome sought through the proposed objectives.	• Potential to undermine Council's ability to meet Hamilton Housing Accord targets and to meet land supply/new dwelling targets associated with the NPSUDC. The inability to meet land supply demand will create adverse social and economic effects as house prices increase due to high demand which cannot be met by adequate supply, particularly for first home buyers. The lower density zone would also make it difficult to provide a variety of housing types and price points, along with affordable housing which requires smaller residential lots. • Loss of remaining semi-rural character. • Development will initially generate landscape and visual effects as the land transitions from rural to urban uses.	Reject

Table 1: Overall Assessment of Alternatives			
Options:	**Benefits**	**Costs /Risks**	**Accept/ Reject**
		• Significant infrastructure costs (lack of density may not cover costs of works required to service the development). • Loss of opportunity for higher density three storey housing, utilising land efficiently. • Loss of opportunity for the efficient use of land resources.	
Option 4: Re-zone the land for MDRZ	• Rezoning is the most efficient way of ensuring District Plan integrity and giving the community surety over intended environmental outcomes. • The MDRZ is most appropriate to reflect intended outcome to be achieved by the proposed objectives, whilst still being effective in meeting existing objectives of the HCDP. • Will accommodate a range of detached and attached units (in terms of townhouses, duplex developments, terraced houses, and low rise apartments). • Has the ability to assist the Council to meet the Hamilton Housing Accord targets and to meet land supply/new dwelling targets.	• On its own does not secure affordable housing for first home buyers. Specific rules are required to achieve this. • Out of sequence timing and staging with anticipated released of Rotokauri "Stage 2 land" – however, does not undermine a future plan change for the remainder of the area (as planned). • Loss of remaining rural character. • Development will initially generate landscape and visual effects as the land transitions from rural to urban uses.	Accept in part.

Table 1: Overall Assessment of Alternatives			
Options:	**Benefits**	**Costs /Risks**	**Accept/ Reject**
Option 5 Rezone to a higher density zone (e.g Residential Intensification)	• Rezoning is the most efficient way of ensuring District Plan integrity and giving the community securing over intended environmental outcomes. • Has the ability to assist the Council to meet the Hamilton Housing Accord targets and to meet land supply/new dwelling targets.	• On its own does not secure affordable housing for first home buyers. Specific rules are required to achieve this. • Out of sequence timing and staging with anticipated released of Rotokauri "Stage 2 land" – however, does not undermine a future plan change for the remainder of the area (as planned). • Loss of remaining rural character. • Development will initially generate landscape and visual effects as the land transitions from rural to urban uses. • Provides fewer housing typologies for the market, and could result in lower density housing types being proposed in the Zone. • Potential for effects character when view from surrounding areas. • If market demand does not support the density enabled, the land may not be used in a way that reflects the intended zone outcomes. • The zone pattern would be inconsistent with the zoning principles developed by the Council, as the intensification zone is envisaged in proximity to the	Reject

Table 1: Overall Assessment of Alternatives			
Options:	**Benefits**	**Costs /Risks**	**Accept/ Reject**
		city centre.	
Other zone options			
Option 6: Rezone the entire land area for another zone (i.e. countryside living or industrial)	• Additional business or countryside living land for release to the market	• Inconsistent with the growth planned and anticipated by Rotokauri Structure Plan, Future Proof and the RPS (and partnered by existing Stage 1 Rotokauri Industrial land could provide an oversupply of industrial land). • Loss of remaining rural character. • Development will initially generate landscape and visual effects as the land transitions from rural to urban uses. • Potential for effects character when view from surrounding areas; • Will undermine Council's ability to meet the Hamilton Housing Accord targets and to meet land supply/new dwelling targets which will continue to create adverse social and economic effects as house prices increase due to high demand which cannot be met by adequate supply, particularly for first home buyers.	Reject
Option 7: Rezone a portion of the	• Provides opportunities for local business activity to support a residential neighbourhood and provide a	• Choice of zone is important so as to not detract from existing and planned commercial centres.	Accept in part

Table 1: Overall Assessment of Alternatives			
Options:	**Benefits**	**Costs /Risks**	**Accept/ Reject**
land for business activities (B6Z) to support a residential option	local hub.	• Needs to be partnered with a residential zoning and density opportunities to be successful.	
Option 8: Rezone a portion of the land for business activities (Business 4 Zone or Business 5 Zone) to support a residential option	• Provides opportunities for local business activity and employment to support a residential neighbourhood and provide a local hub.	• Choice of zone is important so as to not detract from existing and planned commercial centres. As a larger centre is already planned for Rotokauri, an additional large centre may not be warranted and could detract from the critical mass sought in that centre to support Rotokauri as a whole. • Needs to be partnered with a residential zoning and critical mass of residents and employees within the catchment.	Reject
Preferred Options 4 and 7 combined with either:			
Option A: Retain existing provisions, methods etc	• Would provide consistency with other locations in Hamilton not subject to a structure plan or character overlay.	• Has the ability to assist the Council to meet the Hamilton Housing Accord targets and to meet land supply/new dwelling targets. • On its own does not secure affordable housing for first home buyers as there are no requirements in the HCDP to achieve this. • Risk of design outcome not meeting high quality	Reject

Table 1: Overall Assessment of Alternatives			
Options:	**Benefits**	**Costs /Risks**	**Accept/ Reject**
		proposed by the objectives as the HCDP provides for a range of scenarios, and consequently lacks the specific level of subdivision urban design control proposed through the PPC. • Default standards for residential and subdivision are targeted more an infill development than greenfield, and therefore, would be unlikely to achieve a desirable level of consistency in urban form of the PPC area or an approach which recognises greenfield subdivision. • The default subdivision controls do not provide standards for lot dimensions, urban blocks, restricted access over shared paths or dedicated cycleways, and do not direct urban design-based outcomes of avoiding cul-de-sacs and rear lots. The result would be the potential for poor urban form and amenity. • The default zone development controls of the are either reliant on the use of a Comprehensive Development Plan first to dictate building location rather than providing outcomes for greenfield development via provisions. This resource consent process in its own right places a high level of reliance on the designers for the resource consent having the skills and expertise to provide a high quality urban form, rather than this being the	

Table 1: Overall Assessment of Alternatives			
Options:	**Benefits**	**Costs /Risks**	**Accept/ Reject**
		requirement of the HCDP.	
Option B: New suite of provisions specific only to Rotokauri North applicable zones	• Tailored provisions gives the community and Council surety over intended environmental outcomes. • Has the ability to assist the Council to meet the Hamilton Housing Accord targets and to meet land supply/new dwelling targets. • Proposed objectives for affordable housing can be secured via specific provisions – which creates positive socio-economic effects. This is new to the HCDP, and relies on a specific approach. • The controls provide standards for lot dimensions, urban blocks, restricted access over shared paths or dedicated cycleways, and direct urban design-based outcomes of avoiding cul-de-sacs and rear lots. The urban form outcomes capable of being delivered by the precinct are superior to the default HCDP.	• Requires re-litigation of default standards even where these are acceptable to meet the objective outcomes. This would generate costs and time delays and is an efficient use of time and resource. However, once addressed through a PPC these would only have costs associated with resource consent processes requiring additional assessment and consideration, along with training associated with the specific Rotokauri North approach. Given the size of the RNSP area, this can be justified in the same manner as the other specific controls applied to structure plan areas elsewhere in the City.	Accept in part / reject in part
Option C: Modify/provide bespoke provisions, methods etc and retain	• Tailored provisions in combination with existing provisions gives the community and Council surety over intended environmental outcomes. Higher quality of outcome can be achieved through provisions proposed. • Has the ability to assist the Council to meet the	• Few disadvantages or costs are considered to result. However, the biggest risk is administrative - by not having all provisions in the same location (i.e. a HCDP chapter) others developers/areas in the City may not appreciate the full suite of provisions which work together in combination to produce the outcome (and may seek to utilise /	Accept

Table 1: Overall Assessment of Alternatives			
Options:	**Benefits**	**Costs /Risks**	**Accept/ Reject**
existing provisions	Hamilton Housing Accord targets and to meet land supply/new dwelling targets. • Proposed objectives for affordable housing can be secured via specific provisions – which creates positive socio-economic effects. • The controls provide standards for lot dimensions, urban blocks, restricted access over shared paths or dedicated cycleways, and direct urban design based outcomes of avoiding cul-de-sacs and rear lots. The urban form outcomes capable of being delivered by the precinct are superior to the default HCDP.	pick and choose rules that suit them as a "precedent"). This risk can be internally managed within Council, and the section 32 and AEE provides the record to capture the statutory assessment.	

Table 2: Structure Plan - Assessment of Alternatives			
Options:	**Benefits**	**Costs /Risks**	**Accept/ Reject**
Option 1: Retain the existing Rotokauri Structure Plan	• Consistent with the existing HCDP. • No changes for existing landowners within the PPC area in the regulatory framework.	• The existing Structure Plan is based on outcomes envisaged in 2005. It reflects a lower density suburban outcome that has the potential to undermine HCC's ability to meet Hamilton Housing Accord targets and to meet land supply/new dwelling targets associated with the NPSUDC. This has the potential to create adverse social and economic effects as house prices increase due to high demand, which cannot be met by adequate or appropriate form of supply, particularly for first home buyers. • The Structure Plan based on high level technical information, which has not been refined (i.e. ICMP), and therefore surety of delivery is not guaranteed. • Lost opportunity/cost to refresh the Structure Plan.	Reject
Option 2: Refresh the Rotokauri North area and the remainder of the Stage 2 area	• Wholesale update to match more current urban design practises and rethink appropriate locations for local centres and other key features based on population projections. • Ability to anticipate higher densities in different locations to meet current and future demand (and promote land efficiency).	• Structure Plan for the remainder of the Stage 2 land outside of the PPC area still based on high level technical information, which has not been refined (i.e. ICMP), and therefore surety of delivery is not guaranteed. Additional technical work would be required and this is not available to understand and respond to the opportunities and constraints of that land.	Reject

Table 2: Structure Plan - Assessment of Alternatives			
Options:	**Benefits**	**Costs /Risks**	**Accept/ Reject**
	• Assist Council's ability to meet Hamilton Housing Accord targets and to meet land supply/new dwelling targets associated with the NPSUDC. • No limitation on "boundary issues" at PPC edge • Can reflect updated technical work for the PPC area. • Opportunity to bring the stage 2 land forward as a whole.	• Significant increased costs and risk for GSCL (and its ability to deliver housing at Rotokauri North) associated with relitigating the Rotokauri Structure Plan (particularly high risks for landowners subject to any perceived negative economic or social effects resulting from any change to business/retail centre, open space location and road connections). Also significant unproportioned of costs to be borne by GSCL when comparing their land area to the whole of the Stage 2 land. • Potential to create a false expectation that the PPC has scope to (or should) include the rezoning of all the Stage 2 Rotokauri land. This is outside the land identified by the SoI, and subject to consideration in respect to developer-led infrastructure provision. • Inconsistency with HCC's recommendations to support the Rotokauri North area as an SHA.	
Option 3: Refresh only that part applicable to Rotokauri North.	• Update to match more current urban design practises for land development, along with the applicant's approach to land development and urban character and amenity outcomes. • Ability to anticipate higher densities in different locations to meet current and future demand (and promote land efficiency).	• Limited to keeping key roading connections at the interface of the Rotokauri Structure Plan. The design-led workshop process has considered that these risks do not undermine the outcomes reflected in the RNSP.	Accept

Table 2: Structure Plan - Assessment of Alternatives			
Options:	**Benefits**	**Costs /Risks**	**Accept/ Reject**
	• Assist Council's ability to meet Hamilton Housing Accord targets and to meet land supply/new dwelling targets associated with the NPSUDC. • Can reflect updated technical work for the PPC area, along with design-based multidisciplinary workshops of experts to re-examine urban form assumptions and propose recommendations in respect to future layout patterns. • As GSCL has control over a larger area of land, significantly more detailed assessments can be prepared to confirm structure plan elements and their locations (i.e. no cross boundary landowner issues regarding half road splits etc). • Keeps the scope of the PPC to the Rotokauri North area only. This supports a landowner-led request consistent with the SHA and SoI.		
Option C with either:			
Option A: Rezoning only land falling under the GSCL "umbrella" and exclude landholdings	• PPC only includes land falling under the applicant umbrella	• Reliant on HCC to undertake a tidy up plan change to rezone "cut out" land. • Uncertainty over consistent outcome (i.e. no guarantee future Council plan change will adopt the same rules, which may create a significantly different pattern of development and urban form).	Reject

Table 2: Structure Plan - Assessment of Alternatives			
Options:	**Benefits**	**Costs /Risks**	**Accept/ Reject**
which form "cut outs".		• Other landowners adjoining the boundaries of the PPC area may seek to add their landholdings too. This has the potential to cause risk and delay (and extra cost to GSCL) through the submissions and hearing process. • Based on consultation with HCC this is the least preferred option.	
Option B: Rezone GSCL land plus landholdings which form "cut outs"(and not falling under the GSCL umbrella).	• Logical PPC boundaries, utilising major roads where possible and key landholdings boundaries which from "straight" lines. • Based on consultation with HCC this is the preferred option due to logical PPC boundaries and as HCC will not have to initiate to undertake a tidy up plan change at a later date.	• Additional cost to GSCL • Additional risk to GSCL due to information requirements for specialist reporting covering third party landholdings. • Third party landowners may not wish to be part of the PPC and/ or third party landowners may not want the provisions which has been tailed and justified through this section 32 to be applicable to their land. This has the potential to cause risk and delay (and extra cost to GSCL) through the submissions and hearing process. • Other landowners adjoining the boundaries of the PPC area may utilise the inclusion of third party land as justification to increase the scope of the PPC to add their landholdings too. This has the potential to	Accept

Table 2: Structure Plan - Assessment of Alternatives			
Options:	**Benefits**	**Costs /Risks**	**Accept/ Reject**
		cause risk and delay (and extra cost to GSCL) through the submissions and hearing process.	

APPENDIX 2: SECTION 32 EVALUATION OF OBJECTIVES (s32(1)(a))

ASSESSMENT OF OBJECTIVES

Objective	Resource Management Act	Waikato Regional Policy Statement
3.6A.2.1 Development within the Rotokauri North Structure Plan area achieves a medium density residential environment which has high levels of amenity and allows for a range of housing densities and typologies.	This objective achieves the purpose of the RMA by: • Ensures that the land resource is developed in a manner that achieves and does not undermine, its potential to accommodate its share of projected growth and in particular contributes to the anticipated population growth for Hamilton City. Growth in this location relieves pressure for growth in other less appropriate parts of the Waikato Region (such as productive land) thereby safeguarding the needs of future generations. • Adverse effects of urban activities on the environment will be avoided, remedied or mitigated through the proposed provisions for land within the RNSP area and the existing HCDP rules. • The site does not contain any "outstanding landscape" or features, and the objective does not undermine the protection of the existing SNA. • The objective promotes and enables an efficient use of natural and physical resources as it will utilise land already earmarked for urban	This objective gives effect to the RPS sections, and specifically section 6 built environment (and its associated objective 3.12) as well as the Schedule 6A criteria by: • Enabling a compact urban form by releasing land already identified for urban growth (as evident by its existing zoning as FUZ) and specifically already within the RSP (and notably within the Urban Limited indicated on Map 6-2) • Promoting medium density housing, to ensure that the targets set by Policy 6.15 of 16 household units per hectare for Rotokauri can be achieved. • Releasing land for development, thereby enabling people to provide for their socio-economic wellbeing through the provision of additional housing supply • Does not undermine the protection of natural features (i.e. the existing SNA).

Objective	Resource Management Act	Waikato Regional Policy Statement
	development under the HCDP and enables a range of housing/lifestyle options and affordability to meet the shortfall in housing supply (and affordability) within Hamilton City. • While the land will no longer be retained for its rural amenity, the amenity values and quality of the area have been recognised and will be enhanced through the implementation of RNSP and proposed provisions, in conjunction with the existing provisions of the HCDP; • The relationship of Maori with their waahi tapu (and any customary activities) has been recognised (and obligations under the Treaty of Waitangi) and provided for through consultation. Implementation of this objective does not undermine this.	
3.6A.2.2 Opportunities for a neighbourhood centre are enabled	This objective achieves the purpose of the RMA by: • The objective seeks to enable a small neighbourhood centre which will provide for the day-to-day needs, and social and economic wellbeing of local residents and employment/business opportunities (which also facilitates social and economic wellbeing). • The size of the centre and activities within, via application of provisions, ensures that potential adverse effects on the environment can be avoided and/or mitigated.	This objective gives effect to Section 6 of the RRS – built environment (and its associated objective 3.12) as well as the Schedule 6A criteria by: • Enabling a neighbourhood centre to provide for commercial development to support the wellbeing of local residents without detracting from larger centres (and specifically Hamilton City Centre).

Objective	Resource Management Act	Waikato Regional Policy Statement
	• The objective promotes and enables an efficient use of natural and physical resources as it will utilise support the use of a portion of land to provide for local amenities and day-to-day convenience. • The objective supports the provision of the MDRZ and associated overlays by providing opportunities for intensification around a local neighbourhood hub. • The relationship of Maori with their waahi tapu (and any customary activities) has been recognised (and obligations under the Treaty of Waitangi) and provided for through consultation. Implementation of this objective does not undermine this.	
3.6A.2.3 Subdivision shall be designed comprehensively to deliver a well-planned medium density environment	This objective achieves the purpose of the RMA by: • the objective ensures that the land resource is developed in a manner that achieves and does not undermine, its potential to accommodate its share of projected growth and in particular contributes to the anticipated population growth for Hamilton City. Growth in this location relieves pressure for growth in other less appropriate parts of the Waikato Region (such as productive land) thereby safeguarding the needs of future generations.	This objective gives effect to Section 6 of the RRS – built environment (and its associated objective 3.12) as well as the Schedule 6A criteria by: • Enabling a compact urban form by releasing land already identified for urban growth (as evident by its existing zoning as FUZ) and specifically already within the RSP (and notably within the Urban Limited indicated on Map 6-2) • Promoting medium density housing, which will ensure that the targets set by Policy 6.15 of 16

Objective	Resource Management Act	Waikato Regional Policy Statement
	• Adverse effects of urban subdivision activities on the environment will be avoided, remedied or mitigated through the proposed provisions within the RNSP area and the existing HCDP rules. • The site does not contain any "outstanding landscape" or features, and the objective does not undermine the protection of the existing SNA. • Any protection of heritage or other features are already managed via the existing HCDP provisions. • The objective promotes and enables an efficient use of natural and physical resources as it will utilise land already earmarked for urban development under the HCDP and subdivision will enables a range of housing/lifestyle options and affordability to meet the shortfall in housing supply (and affordability) within Hamilton City. • While the land will no longer be retained for its rural amenity, the amenity values and quality of the area have been recognised and will be enhanced through the implementation of RNSP and proposed provisions, in conjunction with the existing provisions of the HCDP. • The RNSP anticipates the retention of and enhancement of the natural character of streams (and public access to them).	household units per hectare for Rotokauri can be achieved. • Existing natural features, such as the identified SNA and any biodiversity values associated with it, will continue to be protected by the PPC (no change to its protected status are proposed) and will be enhanced as it is envisaged that this area will vest with the council. • Public access will be provided along the margins of streams. • Ecosystems within steam margins can be enhanced through riparian vegetation and removal of farm culverts etc (specifically refer to the ICMP). With respect to other sections, including the Vision & Strategy for the Waikato River (Te Ture Whaimana o Te Awa o Waikato): • As already identified under Section 6 matters, Ecosystems within steam margins can be enhanced through riparian vegetation and removal of farm culverts. • Any protection of heritage or other features are already managed via the existing HCDP provisions. • There are no identified landscape features worthy of protection, and the existing SNA

Objective	Resource Management Act	Waikato Regional Policy Statement
	• The relationship of Maori with their waahi tapu (and any customary activities) has been recognised (and obligations under the Treaty of Waitangi) and provided for through consultation. Implementation of this objective does not undermine this. • Natural hazard risk at subdivision stage is already provided for in the existing HCDP provisions.	(recognised for its biodiversity values) will be retained without modification.
3.6A.2.4 Encourage a legible roading layout that supports a range of travel modes, whilst: (a) minimising effects on the State Highway; (b) providing a strong definition of public spaces; and (c) reinforcing a clear differentiation between the private and public realm. (d) managing speeds with the Rotokauri North roading network	This objective achieves the purpose of the RMA by: • The objective promotes the safety and wellbeing of people using the road network for a variety of different travel modes (motor vehicles, pedestrian and cyclists) and specific effects on safety can be managed/mitigated via provisions (which give effect to this policy). • The objective will promote high amenity for streetscape, but not does not undermine the matters in these sections relating to retention of heritage and cultural values etc.	This objective gives effect to Section 6 of the RRS – built environment (and its associated objective 3.12) as well as the Schedule 6A criteria by: • Provide for opportunities for walking and cycling through the development (which in time will be linked to other areas as the wider network and remainder of the Rotokauri area develops), and opportunities for public transport infrastructure. • Managing effects on the state highway network / regionally significant infrastructure.

Objective	Resource Management Act	Waikato Regional Policy Statement
(excluding the State Highway)		
3.6A.2.5 Subdivision and development is coordinated with the delivery of infrastructure.	This objective achieves the purpose of the RMA by: Section 5: • The objective promotes the safety and wellbeing of people by ensuring that adequate infrastructure to service development is provided. Section 6-8: • The RNSP anticipates the retention of and enhancement of the natural character of streams (and public access to them) as part of the wider stormwater management network. • Any protection of heritage or other features are already managed via the existing HCDP provisions. • Effects of hazards and climate change will be taken into account in the design of infrastructure devices. • The relationship of Maori with their waahi tapu (and any customary activities) has been recognised (and obligations under the Treaty of Waitangi) and provided for through consultation. Implementation of this objective does not undermine this.	This objective gives effect to Section 6 of the RRS – built environment (and its associated objective 3.12) as well as the Schedule 6A criteria by: • Ensuring integration of land use and water planning (as the ICMP covers three waters infrastructure). • Ensuring infrastructure to service the development for the RNSP can be provided. • Ecosystems within steam margins can be enhanced through riparian vegetation and removal of farm culverts etc (specifically refer to the ICMP). With respect to other sections, including the Vision & Strategy for the Waikato River (Te Ture Whaimana o Te Awa o Waikato): • As already identified under Section 6 matters, ecosystems within steam margins can be enhanced through riparian vegetation and removal of farm culverts. • Water quality targets for improving stream health will be implemented through the designing of the stormwater infrastructure (which will adhere to the ICMP as required by provisions which give effect to this objective).

Objective	Resource Management Act	Waikato Regional Policy Statement
		• Effects of hazards and climate change will be taken into account in the design of infrastructure devices.
3.6A.2.6 To promote availability of affordable housing to First Home Buyers.	This objective achieves the purpose of the RMA by: • The objective promotes the social and economic wellbeing of people, and specifically first home buyers, who without such provision may not otherwise be able to enter the housing market. • The objective does not undermine the matters in these sections relating to retention of amenity, heritage and cultural values etc.	This objective gives effect to Section 6 of the RRS – built environment (and it's associated objective 3.12) the Schedule 6A criteria, by: • Promoting a portion of housing for first home buyers –and relieving growth pressure.

APPENDIX 3: SECTION 32 EVALUATION OF PROPOSED RULES AND METHODS (S32(2))

PROPOSED PROVISIONS TO ACHIEVE OBJECTIVE(S):

Chapter 3: Structure Plans

Change	Objective:		Other linked Methods:	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
Chapter 3 – Rules					
New Rotokauri North Structure Plan including roading hierarchy, key road locations and connections, and indicative neighbourhood parks areas, and associated modifications to insert Rotokauri North as a specific Structure Plan area and remove Rotokauri North from the Rotokauri Structure Plan Area.	**PPC:**	3.6A.2.3 3.6A.2.4 3.6A.2.5	• Policies 3.6A.2.3a, 3.6A.2.4a, 3.6A.2.4c, 3.6A.2.4d, 3.6A.2.5b • Chapter 3.6 modifications • Insert new Chapter 3.6A for Rotokauri North • Structure plan components 3.6A2 • New Road cross section Figures (3.6A Figures) • Activity Table 23.3d • Subdivision standards (Rules 23.7.1 and 23.7.8)	**Effects** **Costs** **Benefits**	The insertion of a new Structure Plan specific to Rotokauri North is based on a refinement of the existing Rotokauri Structure Plan and has been tailored to achieved medium density living (which was not envisaged to the degree proposed by this PPC) in the original Structure Planning. This is assessed in more detail in the Urban Design report by Ian Munro. Key features shown are in greater detail and combined with the other provisions provide a greater certainty of outcome to be achieved. Provision of a Structure Plan to the level of detail as that proposed will have positive environmental, social, economic or cultural effects, as it denotes the intended outcome for the area and linked with specific provisions will enable high quality outcomes but also enables the land to be developed and released for housing (to assist in reliving demand for residential housing). Park locations are indicative as these are reliant on Council acquisition through the Local Government Act 2002 and LTP process. Although some "future reserve" features shown on the operative RSP have not been carried through onto the RNSP, this in no way impacts the ability of HCC to purchase the land for any purpose that it deems necessary to cater for parks or other reserves. Reserve features on a Structure Plan do not equate to a reserve zoning nor are they linked to any RMA expectation that the land will be "gifted" for free to the Council or any such purpose. Land for sports park facilities can be acquired by Council via the Public Works Act and designation or via a separate agreement with the relevant landowner. It is not considered necessary for any environmental, social, economic or cultural effect to denotate potential land that they Council may or may not purchase in the future for sports park facilities. Moreover, if anything, it creates a false expectation that such facilities will be [provided, when in fact they might not be the funding or desire from Council to actually acquire them.
	Existing:	3.3.1, 3.3.2 3.3.3 3.3.4	• Policies 3.3.1a-c, 3.3.2a-d, 3.3.3a, 3.3.4b-f, 3.3.5a-c, 3.3.6a-d, 3.3.7a-b	**Opportunities for economic growth and employment**	NA
				Options less or not as appropriate to	As identified above, the option to continue with the Rotokauri Structure Plan is not considered an effective means to implement a

Change	Objective:		Other linked Methods:	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
		3.3.5 3.3.6 3.3.7		**achieve the objective**	medium density outcome, or the update the structure plan to reflect more detailed consideration of the development opportunities associated with the land. Ten years has elapsed between the original structure plan and the PPC, and there is considerably greater opportunities to develop a refined structure plan layout to establish more certainty in the form of development in Rotokauri North.
Road Cross Section Figures	**PPC:**	3.6A.2.3, 3.6A.2.4	• Policies: 3.6A.2.3.a, 3.6A.2.4a, 3.6A.2.4b • Structure plan components 3.6A2	**Effects**	On their own the cross sections have very little ability to create effects on the environment, economic, social or cultural aspects. However, in tandem with other methods of implementation they have the potential to contribute to the production of a high quality outcome for the area whilst also conveying stormwater (serving both environmental and cultural effects), in addition the focus of the cross sections is to balance movement of vehicles with cyclists and pedestrians and to create allow speed environment which also influences social effects (by enabling the wellbeing of people by focusing on safety).
	Existing	25.14.2.1	• Policies 25.14.2.1a, 25.14.2.1b, 25.14.2.1c, 25.14.2.1e • Activity Table 25.14.3 • Subdivision Standards (23.7.8) • Appendix 15	**Costs**	Costs only associated with administering a structure plan specific approach to road design.
				Benefits	Consistent themes of roads across the Structure Plan area, which also tie into that anticipated for the wider Rotokauri area. However, acknowledgement that specific design will occur as part of the subdivision process (as Council already have an RDA status for new roads, with appropriate discretions). The benefit of not having specific road cross-sections is that the road design can relate to and be tailored to specific needs at subdivision stage, including, the speed environment, the relationship of dwellings to the road, the means by which swales and stormwater infrastructure are planned for and consequently the design of lots and vehicle crossings relate to these.
				Opportunities for economic growth and employment	NA
				Options less or not as appropriate to achieve the objective	The existing Appendix 15 road cross sections and Appendix 3 Rotokauri Cross Sections do not provide the same focus for shared use by multiple users as those anticipated for Rotokauri North. Therefore, sole reliance on these is considered less appropriate.
3.6A.4.1 Affordable Housing - require developments of 15 or more units/lots to provide 10% at an affordable rate to First Homebuyers.	**PPC:**	3.6A.2.1, 3.6A.2.6	• Policies, 3.6A.2.1a,3.6A.2.1c, 3.6A.2.6a	**Effects**	The provision of targeted rules for affordable housing are considered to crate directly positive environment and social effects, by increasing housing supply to first home buyers. This is also considered to enable positive economic effects and has the ability to contribute towards

Change	Objective:		Other linked Methods:	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
			• Activity Table 4.5.4 • Rule 4.7.12 PA standards for a duplex) • Bulk and location standards (4.6.2-4.6.7 & 4.8) • Activity Table 23.3d • Parking (Appendix 15)		positive cultural effects (and local hapu members meeting the affordability requirements can also be considered for the first home buyers housing).
				Costs	Financial cost to developer(s) to implement affordable/reduced cost housing. Risk that without appropriate design control affordable housing will not integrate with the rest of the development. Insertion of a rule when there is none in the HCDP.
				Benefits	Provision of 10% affordable to the market for First Home Buyers. This implements the Hamilton Housing Accord, along with commitments made by the applicant in respect to the Statement of Intent ("**SoI**"). The proposal also supports housing variety and choice, and provides for social and cultural wellbeing of residents.
				Opportunities for economic growth and employment	NA
				Options less or not as appropriate to achieve the objective	Retain existing status quo. Will not assist HCC in providing methods to achieve the Hamilton Housing Accord targets and will not assist in supply of housing the market when there is a shortage, and affordability crisis. The provision are the most efficient and effective way to ensure that affordable housing is provided within the Rotokauri North area at a rate and proportion that can be provided whist still being feasible to the developer.

Chapter 4: Residential Zones

Proposed Provisions	Objective:		Other Linked Methods	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
4.5.1, 4.5.2 & 4.5.3 – Comprehensive Development Plan Provision: Exclude Rotokauri North from this requirement.	**PPC:**	3.6A.2.3	• Policies 3.6A.2.3a	**Effects** **Costs**	The Environment Court has recently (in relation to the Auckland Unitary Plan) process made a declaration on the *ultra vires* status of comprehensive development plans ("**CDP**") as a tool to achieving resource management outcomes. The primary concern is an ambiguous nature of a land use consent for a CDP as it neither allows actual subdivision or development activities, and rather is an interim method to create a framework for other consents (subdivision and land use) to follow. In the case of the RNSP and PPC, the proposal provides a detailed structure plan maps, along with specific rules relating to the implementation of that structure plan along with the form of urban blocks and connecting roads. A detailed ICMP has been prepared to manage stormwater treatment, detention and conveyance, along with the enhancement of streams. If is considered that a rules based framework based on the RNSP is more efficient and effective at supporting the integrated development of the PPC area (being through subdivision consents to establish roads, reserves, urban blocks and lots) than a two stage process relying on a CDP. The CDP establishes a level of complexity, delay and cost which is not necessary where a more detailed RNSP and subdivision rules to support urban design outcomes can direct specific outcomes through subdivision resource consent outcomes. The same can be said for the request from Council from review of the draft provisions to insert a masterplan version of the PPC in the Structure Plan text or as an Appendix – Design Guide. Neither or these outcomes serve any purpose for managing effects over and above the detailed provisions to support the urban deign outcomes. Insertion of a high level concept has the potential to will negatively effects environmental (including any related cultural effects) as development may not as readily be able to respond to more detailed factors that arise at subdivision stage – as a masterplan outcome is instead the "locked in" outcome. The methods and provision proposed are considered more effective and efficient means of securing the same/similar outcome intended by a CDP.
	Existing:	NA	NA	**Benefits**	

Proposed Provisions	Objective:		Other Linked Methods	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
				Opportunities for economic growth and employment	NA
				Options less or not as appropriate to achieve the objective	Create a new way to require a land use type concept plan (which does not misalign with the declaration of the Environment Court). This option is not as appropriate as the methods chosen achieve a similar level of guaranteed environmental outcome, with more efficiency as it removes a doubling up or repetition in the resource consent process.
4.5.4 New activities for Rotokauri North MDRZ • Permitted Activity ("**PA**") status for a specific type of ancillary residential unit • PA status for a specific type of duplex dwelling • Restricted Discretionary Activity ("**RDA**") for any duplex not meeting the Rotokauri North Acceptable Solutions Code • **RDA** status for apartments (not being a permitted duplex) • Discretionary Activity ("**DA**") status for noncompliance with PA or RDA standards or any other residential activity not provided for • PA status for, garages and carports and garden sheds	**PPC:**	3.6A.2.1	• Policies 3.6A.2.1a, 3.6A.2.1b, 3.6A.2.1c, 3.6A.2.1e • Rule 4.7.12 PA standards for ancillary unit • Rule 4.7.12 PA standards for a duplex • Rule 4.7.12 restricted discretionary activity standards for apartments • Bulk and location standards (4.6.2-4.6.7 & 4.8) • RDA matters of discretion 4.11 and Appendix 1. • Subdivision activity table (23.3d) • Affordable Housing (3.6A.4.1) • Rotokauri North Acceptable Solutions Code 1.4.10 • Parking standards – Appendix 15	**Effects** **Costs** **Benefits**	The provisions are the most effective means to achieve a medium density housing product, and variety spread through the development, which creates positive social and economic effects. However, the provisions are reliant on others (in combination) to ensure good quality design outcomes and should not be used on their own as a precedent by other users of the HCDP to create unintended outcomes in other parts of the City.
				Opportunities for economic growth and employment	NA

Proposed Provisions	Objective:		Other Linked Methods	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
	Existing	4.2.1, 4.2.2	• Policies 4.2.1a, 4.2.2a	**Options less or not as appropriate to achieve the objective**	Retain existing HCDP provisions. These are considered to not be as efficient in enabling a diverse range of lifestyle choices to be provided for in the same community, and also providing a more enabling framework will be an effective driver for encouraging business and employment to locate in Rotokauri North.
4.5.4 Modified more stringent activity status for dairies – proposed DA (from Controlled Activity ("**CA**"))	**PPC:**	3.6A.2.2	• Policy 3.6A.2.2a and 3.6A.2.2b	**Effects**	The provision may seem to create negative economic and social effects, however, it is considered that focusing retail in the identified neighbourhood centre in the long term will be the most beneficial as this will thrive as the economic and local employment hub of the development.
				Costs	Employment opportunities and business opportunities associated with this business activity will be an economic and social cost.
				Benefits	By encouraging retail activities to locate in the Neighbourhood Centre (B6Z), the vitality of the neighbourhood centre can effectively be managed and supported.
				Opportunities for economic growth and employment	Dairies provide significant opportunities for economic growth and employment opportunities
				Options less or not as appropriate to achieve the objective	Retain existing HCDP provision. It is considered that while employment and economic growth is encouraged as CA status for dairies is too permissive and has the potential to undermine the viability and vitality of the planned neighbourhood centre.
4.5.4 Retained existing activity status for remainder of activities	**Existing:**	4.2.6	• Policy 4.2.6a-e. • Specific Standards (4.7)	**Effects**	No Change from HCDP
				Costs	
				Benefits	
				Opportunities for economic growth and employment	
				Options less or not as appropriate to achieve the objective	It is considered inefficient to change the entire activity table of provisions when it is not needed. Only those activities which need to be added to or modified to give effect to the proposed objectives (in the most efficient and effective way) have been amended.
4.6.3 – Height in relation to boundary ("**HIRB**"), insertion of new rule to manage sunlight/daylight effects on rear yards.	**PPC:**	3.6A.2.1	• Policy 3.6A.2.1a	**Effects**	The provisions are necessary to counter perceived negative amenity (social and environmental effects) of medium density living, as they seek to ensure that outdoor living areas can obtain adequate sunlight.

Proposed Provisions	Objective:		Other Linked Methods	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
			• Building Setbacks (Rule 4.8.2) • Outdoor living (Rule 4.8.5)	**Costs**	Insertion of a control where essentially there is none (as HIRB in the MDRZ only applies adjacent to the General Residential Zone or the boundary of a CDP area).
	Existing:	4.2.3	• Policy 4.2.3a,	**Benefits**	The provision is the most effective and efficient way to ensure that rear yards (which are envisaged to be for private use) can be provided with adequate daylight and sunlight. It encourages massing of building bulk towards the front yard and road whilst ensuring back yards are open for private uses and maintain solar access. The provision is an effective means to "counter balance" some of the perceived negative amenity effects of higher density living.
				Opportunities for economic growth and employment	NA
				Options less or not as appropriate to achieve the objective	Retain existing HCDP provision – which is no control unless adjacent to the General Residential Zone or a CDP area. This is not appropriate to achieve sunlight in back yards
4.6.5 – Permeable Surface, insertion of a new rule for permeability forward of the dwelling frontage (including porch) to take into account a medium density living environment	**PPC:**	3.6A.2.1	• Policy 3.6A.2.1d • Site Coverage (Rule 4.6.6) • Building Setbacks (Rule 4.8.2) • Outdoor living (Rule 4.8.5)	**Costs**	Perceived loss of amenity in front yards.
				Benefits & Effects	Adequate landscape will be achieved in the front yards to ensure positive amenity of streetscape whilst also ensuring people can provide for vehicle access and porches to sites (all of which are positive social and environmental effects).
	Existing:	4.2.4	• Policy 4.2.4a	**Opportunities for economic growth and employment**	NA
				Options less or not as appropriate to achieve the objective	Retain existing HCDP provision. This is not considered efficient as the existing rule is not workable for lot sizes/widths less than 350m2, when a site also needs to provide a vehicle crossing/driveway.
4.6.6 – Site Coverage insertion of reference to Rotokauri North for existing 50% site coverage	**PPC:**	3.6A.2.1	• Policy 3.6A.2.1a • Permeable surface (Rule 4.6.5)	**Costs**	Insertion of a control where essentially there is none.
				Benefits & Efffects	The provision is the most effective and efficient way to ensure appropriate onsite amenity and pleasant environment for detached and duplex housing (all of which are positive social and environmental effects).

Proposed Provisions	Objective:		Other Linked Methods	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
			• Building Setbacks (Rule 4.8.2) • Outdoor living (Rule 4.8.5)	**Opportunities for economic growth and employment**	NA
	Existing:	4.2.4	• Policies 4.2.4a, 4.2.4b	**Options less or not as appropriate to achieve the objective**	Retain existing HCDP provision which is no control unless the rule specifies the applicable Structure Plan area. This is not considered appropriate for achieve quality outcomes, especially when paired with the existing HCDP rule which only requires 20% permeability. Without a building converge rule as well, coverages could increase to 80%.
4.6.6 – Site Coverage insertion of a 60% site coverage for terrace housing (applicable to Rotokauri North only)	**PPC:**	3.6A.2.1	• Policies 3.6A.2.1a and 3.6A.2.1b • Permeable surface (Rule 4.6.5) • Building Setbacks (Rule 4.8.2) • Outdoor living (Rule 4.8.5)	**Costs**	Insertion of a control where essentially there is none.
				Benefits & Effects	An increased coverage control takes into account that higher densities will often be "rear loaded" i.e. accessed from a rear lane (which separates the garage from the dwelling), due to vehicle crossing separation distance constraints along frontages and/or other constraints such as cycleways etc. Separating garages and providing them at the rear of dwellings creates higher site coverages, and it is considered more efficient for social and amenity outcomes to encourage better design outcomes by allowing higher site coverages for terrace housing to recognise the overall design constraints (which will create positive social and environmental effects).
				Opportunities for economic growth and employment	NA
				Options less or not as appropriate to achieve the objective	Retain existing District Plan provision which is no control unless the rule specifies the applicable Structure Plan area. This is not considered appropriate for achieve quality outcomes, especially when paired with the existing District plan rule which only requires 20% permeability. Without a building converge rule as well, coverages could increase to 80%. Applying the 50% control is also not considered efficient, to achieving the higher density product that occurs in a medium density environment.
4.6.7 – Height, insertion of reference to Rotokauri North for 10m maximum height	**PPC:**	3.6A.2.1	• Policy 3.6A.2.1d • HIRB (Rule 4.6.3) • Building Setbacks (Rule 4.8.2)	**Costs**	Insertion of a control where essentially there is none.

Proposed Provisions	Objective:		Other Linked Methods	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
	Existing:	4.2.3	• Policy 4.2.3a,	**Benefits & Effects**	The provision is the most effective and efficient way to ensure appropriate onsite amenity and pleasant environment (which will create positive social and environmental effects). This supports three storey development, which would enable larger terrace houses.
				Opportunities for economic growth and employment	NA
				Options less or not as appropriate to achieve the objective	Retain existing HCDP provision which is no control unless the rule specifies the applicable Structure Plan area. This is not considered appropriate for achieve quality outcomes, especially when paired with the existing HCDP which doesn't not restrict HIRB.
4.6.7 – Height, insertion of reference to Rotokauri North for 14m height in a Rotokauri North Medium Density Overlay A	**PPC:**	3.6A.2.1	• Policies 3.6A.2.1b and 3.6A.2.1d • HIRB (Rule 4.6.3) • Building Setbacks (Rule 4.8.2) Other Methods: • Overlay on Structure Plan	**Costs**	Insertion of a control where essentially there is none.
				Benefits & Effects	The provision is the most effective and efficient way to create a different type of medium density housing (i.e. a higher density product) and creates and encourages a diversity of housing typologies in a location which is in proximity to the neighbourhood centre. Increased development potential height paired with other controls for appropriate amenity will create positive social, environmental and economic effects.
				Opportunities for economic growth and employment	NA
				Options less or not as appropriate to achieve the objective	Retain existing HCDP provision which has no control unless the rule specifies the applicable Structure Plan area. This is not considered appropriate for achieve quality outcomes, especially when paired with the existing HCDP which doesn't not restrict HIRB. Applying the 10m height across the Structure Plan area does not encourage a diversity of housing product, or reinforce opportunities for intensification around locations that have the most capacity to support these housing types.
4.7.1 insert specific PA parameters for ancillary units specific to Rotokauri North	**PPC:**	3.6A.2.1	• Policies 3.6A.2.1a, and 3.6A.2.1e • Rule 4.5.4 activity table	**Costs**	Potential for ancillary units needs to be taken into account in designing subdivisions and three waters capacity.
				Benefits & Effects	Enabling provision for units to front rear lanes creates social and economic opportunities (and positive effects) for both passive surveillance over the lanes as well as "home and income" options, and an effective and efficient enabling mechanism to

Proposed Provisions	Objective:		Other Linked Methods	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
			• Bulk and location standards (4..6.2-4.6.7 & 4.8)		provide a diversity of housing stock and to attract different types of people, with different income brackets, tenure types and lifestyles, to be able to live in the area (which also creates positive social, economic and environmental effects). The detailed provisions about where these types of activities can be undertaken are necessary to counter potential adverse environmental effects on the overall amenity of the rear lanes.
				Opportunities for economic growth and employment	NA
				Options less or not as appropriate to achieve the objective	Retain existing HCDP provisions (where there is no ancillary unit for the MDRZ) or no control over the location. The latter has significant risk for maintaining good urban design outcomes, while it is considered that no provision at all creates a lost opportunity for diversity of product while still being able to maintain a high standard of amenity for the overall neighbourhood through appropriate location controls
4.7.12 Insert PA parameters for a duplex design, specific to Rotokauri North and RDA parameters for apartments.	**PPC:**	3.6A.2.1, 3.6A.2.6	• Policies 3.6A.2.1a, 3.6A.2.1b, 3.6A.2.1c, 3.6A.2.6a • Rule 4.5 activity table • Bulk and location standards (4.6.2-4.6.7 & 4.8) • RDA assessment criteria 4.11 & Appendix 1. • Subdivision activity table Rule 23.3.d • Rotokauri North Acceptable Solutions Code (1.4.10)	**Effects** **Costs** **Benefits**	The provisions are the most effective means to achieve a medium density housing outcome, and variety spread through the development, which creates positive social and economic effects through the provision of a wide range of density and housing opportunities beyond just vacant fee lot subdivision. However, the provisions are reliant on others (in combination) to ensure good quality design outcomes and should not be used on their own as a precedent by other users of the HCDP to create unintended outcomes in other parts of the City.
				Opportunities for economic growth and employment	NA
				Options less or not as appropriate to achieve the objective	Retain existing District Plan provisions. These are considered ineffective, as the same/better outcomes can be achieved by the proposed combination of methods proposed.
4.8.2 Building Setbacks - insert new controls for rear yards (8m and 3m for single storey buildings) AND	**PPC:**	3.6A.2.1	• Policies 3.6A.2.1a, 3.6A.2.1d • HIRB (Rule 4.6.3)	**Costs**	Rear yards are significantly larger than the default MDRZ, on its own this may appear to be a "cost" of otherwise developable land. The provisions are reliant on others (in combination) to ensure good quality design outcomes and should not be used on their

Proposed Provisions	Objective:		Other Linked Methods	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
porch encroachment into front yard (other provisions the same generally the as existing DP)			• Permeable surface (Rule 4.6.5) • Outdoor Living (Rule 4.8.5)		own as a precedent by other users of the HCDP to create unintended outcomes in other parts of the City.
	Existing	4.2.3, 4.2.4	• Policies 4.2.3a, 4.2.4a, 4.2.4b, 4.2.4d,	**Benefits & Effects**	Specific provision for front porches encourages activation of street frontages, as traditional build styles may not otherwise incorporate this type of feature. Larger rear yards (with reduced heights in rear yards also) achieves a sense of separation between the backs of the dwelling to the adjoining property/dwelling to reinforce privacy, solar access and amenity of rear years. Specific tailored provisions are the most efficient and effective way to create a medium density living environment in Rotokauri North which has private rear yards and living courts, avoids rear lots AND enables porches for interaction at the public street level. For these reasons the provisions will enable positive social and environmental effects.
				Opportunities for economic growth and employment	NA
				Options less or not as appropriate to achieve the objective	Retain existing HCDP provisions. These are considered less effective, as the same/better outcomes can be achieved by the proposed combination of methods proposed. Rotokauri North seeks to have private rear yards, the massing of building at the front of lots, and to achieve this it is unnecessary to have wider side yards. The lot and block dimensions support narrow width lots which provide sufficient depth to support rear yards to contain private outdoor living courts. This urban form outcome is better.
4.8.3 Insert specific garage door percentages/widths for lots in Rotokauri North. • 6m for sites which have a greater width than 12.5m • 3.2m for sites with frontages less than 12.5 AND require garages or carports to be set back 1m from the front building line (or if the	**PPC:**	3.6A.2.1	• Policy 3.6A.2.1d. • Building Setbacks (Rule 4.8.2) • Subdivision standards (Rule 23.7.8)	**Costs**	Insertion of a control which is more stringent that the current rule. Additionally, lots with narrow frontages are also restricted to a single door garage only (which links to subdivision standards in 23.7.8).
	Existing:	4.2.4	• Policy 4.2.4b.	**Benefits & Effects**	The provision is the most effective and efficient way to ensure that garage doors do not dominate the street frontage

Proposed Provisions	Objective:		Other Linked Methods	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
garage door is not facing the street require minimum glazing to the street frontage).					(eliminating a potential social and environmental effect). This is a potential risk with having narrow road frontages for lots if garage door widths are not restricted.
				Opportunities for economic growth and employment	NA
				Options less or not as appropriate to achieve the objective	Retain existing HCDP provision however, this is not considered appropriate for achieve quality outcomes for the streetscape amenity of the Rotokauri North area.
4.8.4 insert outlook space/glazing for Rotokauri North – specifically require principal living rooms or dining rooms to have outlook over front yards or rear yard.	**PPC:**	3.6A.2.1	• Policy 3.6A.2.1d. • Building Setbacks (Rule 4.8.2) • Outdoor Living (Rule 4.8.5)	**Costs**	Insertion of a control which is more flexible that the current rule. However, the rule should not be read on its own as it works in combination with the other specific rules for Rotokauri North.
	Existing:	4.2.3	• Policy 4.2.3a, 4.2.3c.	**Benefits & Effects**	A control for outlook is required in a medium density living environment (to avoid adverse social and environmental effects). The proposed rules are the most efficient and effective way to ensure that outlook is provided in a manner which manage privacy effects on neighbouring properties whilst ensures onsite amenity opportunities provided by the private rear yards (enabled by the setbacks which are larger than standard rear yards in the HCDP) and opportunities for passive surveillance over the street.
				Opportunities for economic growth and employment	NA
				Options less or not as appropriate to achieve the objective	Retain existing HCDP provision, however these conflicts with the yard setback proposed for Rotokauri North. These setbacks are designed to support private rear yards and the orientation of urban blocks for solar gain, and function well because rear lots are non-complying activities.
4.8.5 insert specific Outdoor Living provisions for Rotokauri North • 36m2; OR • 30m2 plus 8m2 porch	**PPC:**	3.6A.2.1	• Policies 3.6A.2.1a, 3.6A.2.f and 3.6A.2.1g • HIRB (Rule 4.6.3)	**Costs**	The provisions enable less private outdoor space than the current HCDP rule (which could be a negative effect on onsite amenity).
				Benefits & Effects	The outdoor living provided, although 4m2 smaller than the current rule, is considered to provide appropriate amenity for medium density living (and is relevant to the lot dimensions). A relevant matter in considering effectiveness and efficiency is in the combination of this rule with the yards and HIRB, which ensure

Proposed Provisions	Objective:		Other Linked Methods	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
Insert above ground unit balcony sizes (including for ancillary units): • 5m2 (studio and one bedroom) • 8m2 (two or more bedroom)			• Building Setbacks (Rule 4.8.2) • Service Courts (Rule 4.8.6)		that outdoor living is private at the rear and has appropriate solar access. In addition, further incentive is provided in an efficient manner to utilise front porches/verandas for sites (front yard encroachment, but also being able to utilise area towards outdoor living) which encourages social interaction with the street (and protection of private space are the rear). The proposed rules efficiently provide for medium density living environments, and in particular housing choice and a variety of lot sizes, house typologies and price points and ensuring that adverse social and environment effect can be appropriately managed.
	Existing:	4.2.3	• Policy 4.2.3a	**Opportunities for economic growth and employment**	NA
				Options less or not as appropriate to achieve the objective	Retain existing District Plan provisions. In the first instance these are not appropriate as medium density living often includes units above ground level, which should be treated separately to a ground floor level unit. The current provision do not take this into account. In the second instance it is considered that the proposed provisions in combination are more effective in providing private and useable outdoor living spaces.
4.8.6 Provide exclusion for service courts to Rotokauri North	**PPC:**	3.6A.2.1	• Policies 3.6A.2.1a and 3.6A.2.1g • Outdoor Living (Rule 4.8.5) • Building Setbacks (Rule 4.8.2) • HIRB (Rule 4.6.3)	**Costs**	Perceived loss of storage space on sites for waste and other service storage/activities.
				Benefits & Effects	Use of other parts of the site which are still functional for these activities and assists in promoting an efficient use of land, along with the provision of medium density housing. Furthermore, the HCCDP already contains solid waste standard 25.12.3.1 which effectively already requires development to provide for rubbish and recycling etc. These areas can be accommodated in otherwise underutilised side yards space and/or inside garages. There is no specific reason to require additional space to be provided for storage of bins etc, and no new adverse social or environmental effects are expected to result. Other functions, such as washing lines etc are a home owners choice and do not need to be specifically legislated as separate areas to outdoor living.
	Existing:	25.12.2.2	• Policies 25.12.2.21a and 1b • Solid Waste Standard 25.12.3.1	**Opportunities for economic growth and employment**	NA

Proposed Provisions	Objective:		Other Linked Methods	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
			•	**Options less or not as appropriate to achieve the objective**	Retain existing Chapter 4 District Plan provisions.
4.6-4.8.6 Retain all other provisions (not modified above) as applicable to the MDRZ	**Existing:**	4.2.1-4.2.4	• Policies 4.2.1-4.2.4	**Costs**	No Change from HCDP
				Benefits & Effects	
				Opportunities for economic growth and employment	
				Options less or not as appropriate to achieve the objective	It is considered inefficient to change all provisions when it is not needed. Only those activities which needed to be added to or modified to give effect to the proposed objectives (in the most efficient and effective way) have been amended.
4.11 RDA Matters for Discretion • insert reference for Rotokauri North	**PPC**	3.6A.2.1, 3.6A.2.6	• Policies 3.6A.2.1a-g, 3.6A.2.6a • Activity Table 4.5.4 • Specific Standards 4.7 • Appendix 1 Assessment Matters (specific to Rotokauri)	**Costs**	No Change from HCDP plus added benefit of ensuring the RNSP outcomes can be achieved for every application.
				Benefits & Effects	
	Existing:	4.2.1-4.2.4	• Policies 4.2.1-4.2.4 • Appendix 1 Assessment Matters	**Opportunities for economic growth and employment**	NA
				Options less or not as appropriate to achieve the objective	It is considered inefficient to change, modify or add matters of discretion when it is not needed. The existing matters of discretion, combined with other provisions inserted and evaluated under the Chapter 3 rules (below), are effective to assessed applications.
Various- Other general insertions/clarifications etc to include Rotokauri North in text		NA	NA		NA – Clarity only

Chapter 23: Subdivision

Change	Objective:		Other linked Methods:	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
Amendments to Objective 23.2.3 and Policy 23.2.3.a to exclude Rotokauri North from Land Development Plans and/ or Comprehensive Development Plan		23.2.3	• Policy 23.2.3a	**All**	Although the change affects an existing policy, this is considered a "consequential change" rather than a specific change to address the objectives sought by this PPC. The change is required to give effect to the changes in Chapter 4 whereby not Land Development Plan or Comprehensive Development Plan are required for Rotokauri North. Full justification for this has been made under the Chapter 4 provision above and will not be repeated here.
23.3d New activities and associated activity status for RNSP area: • Subdivision not in accordance with the Structure Plan (RDA) • Creation of a rear lot (NC) • Not meeting minimum lot size (NC) • Not meeting lot dimensions (DA) • Not meeting block layout dimensions (DA) • Not meeting access requirements/restrictions (DA) • Road widths not meeting required minimums (DA) • Creation of a permanent cul-de-sac (DA) • Subdivision in accordance with a land use consent (RDA) • Subdivision of specific duplex house (RDA) • Subdivision of apartments to create fee simple or unit titles.	**PPC:**	3.6A.2.3 3.6A.2.4	• Policies 3.6A.2.3a, 3.6A.2.4a, 3.6A.2.4b, • Subdivision standards (Rules 23.7.1 and 23.7.8) • Activity Table 4.5.4 • Rule 4.7.12 PA standards for a duplex • Rule 4.7.12 RDA standards for apartments • Bulk and location standards (4.6.2-4.6.7 & 4.8) • Matters of Discretion 23.8 • Information Requirements and Assessment Matters Appendix 1 (specific to Rotokauri)	**Costs**	Insertion of controls where essentially there are none. The restriction on rear lots and use of cul-de-sacs also have the potential to create additional costs to development (i.e. requiring more roads) and may requiring a slightly lower yield.
				Benefits & Effects	The provisions in tandem ensure that development creates a high quality living environment (thereby creating positive social, environmental and economic effects), without reliance solely on matters of discretion for subdivision, which is considered to be the most effective way to ensure that the outcomes sought can be achieved. The individual benefits of each corresponding rule are addressed below. Furthermore, for subdivision in accordance with a land use consent or a duplex, the provisions provide for a more efficient process as it means that the land use outcomes become a priority and subdivision can occur around approved designs.
	Existing:	3.3.1 23.2.2	• Policies 3.3.1a-c, 23.2.2a	**Opportunities for economic growth and employment**	NA
				Options less or not as appropriate to achieve the objective	Retain existing DP provisions. This is not considered appropriate. The District plan provisions are better suited to infill development rather than greenfield situations.

Change	Objective:		Other linked Methods:	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
23.3d Retained existing activity status for remainder of activities (the same as applicable in column 1 of Table 23.3a), with the exception that the creation of new cross leases is not provided for.	**Existing:**	23.2.1, 23.2.2 23.2.4 23.2.5	• Policies 23.2.1a, 23.2.2a, 23.2.4a, 23.2.5a, 23.2.5b, 23.2.5c • General Standards (Rule 23.5) • Specific Standards (Rule 23.6) • Subdivision Design standards (23.7) • Information Requirements and Assessment Matters Appendix 1	**Effects** **Costs** **Benefits** **Opportunities for economic growth and employment**	No Change from HCDP (even with the exclusion of cross leases, as these are essentially "outdated" for and subdivision and are more appropriately managed via the fee simple subdivision provisions).
				Options less or not as appropriate to achieve the objective	It is considered inefficient to change the entire activity table of provisions when it is not needed. Only those activities which need to be added to or modified to give effect to the proposed objectives (in the most efficient and effective way) have been amended.
23.7.1 Insertion of 280m2 minimum lot size for Rotokauri North MDRZ	**PPC:**	3.6A.2.3	• Policy 3.6A.2.3a. • Activity Table 23.3d • Standards for subdivision (Rule 23.7.8)	**Effects**	The provision is required as a minimum to achieve the overall pattern of development anticipated for Rotokauri North, when read in tandem with other provisions regarding width and depths etc, to create a high amenity living environment (which creates positive environmental and social effects).
				Costs	NA
				Benefits	The proposed minimum lot size for vacant lots is considered to be consistent with a medium density living environment as outlined in the Urban Design Report by Ian Munro.
				Opportunities for economic growth and employment	NA
				Options less or not as appropriate to achieve the objective	The MDRZ does not provide vacant lot sizes in Chapter 23, as these are generally defined in on a CDP. As CDPs are not to be used in Rotokauri North, a provision is required to be inserted. This approach is considered to be more effective as it addresses design and form outcomes in a manner integrated with urban blocks and land use development opportunities proposed by the PPC.
23.7.8 Insert specific lot dimensions for Rotokauri North MDRZ (with corresponding garage door restrictions): • 28m depth	**PPC:**	3.6A.2.3	• Policy 3.6A.2.3a. • Activity Table 23.3d	**Effects**	The provision is required as a minimum to achieve the overall pattern of development anticipated for Rotokauri North, when read in tandem with other provisions regarding lot size and block dimensions etc, to create a high amenity living environment (which creates positive environmental and social effects).

Change	Objective:		Other linked Methods:	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
• 12.5m width ; OR • 10-12.49m width (where a requirement for a single garage door is registered as a consent notice)			• Allotment Size (Rule 23.7.1)	**Costs**	Insertion of controls where essentially there are none this specific.
				Benefits	The provisions are considered the most effective way to ensure that lots are of an appropriate shape to accommodate the planned medium density development as outlined in the Urban Design Report by Ian Munro.
				Opportunities for economic growth and employment	NA
				Options less or not as appropriate to achieve the objective	The HCDP default of a shape factor is not considered as effective as specific lot dimensions to suit the tailored outcome.
23.7.8 Insert maximum block dimensions for all subdivision in RNSP area • 250m block length • 750m block perimeter	**PPC:**	3.6A.2.3 3.6A.2.4	• Policies 3.6A.2.3a, 3.6A.2.4a, 3.6A.2.4b • Activity Table 23.3d	**Costs**	Insertion of controls/controls where there are none.
				Benefits & Effects	The provisions efficiently ensure that all subdivision layout creates legible and permeable urban blocks to support medium density development as outlined in the Urban Design Report by Ian Munro, which in turn creates positive social and environmental effects.
				Opportunities for economic growth and employment	NA
				Options less or not as appropriate to achieve the objective	The HCDP without modification on this matter is not considered as effective as specific dimensions to ensure the outcomes sought by the objectives.
23.7.8 insert Road vesting widths and accessway width standards • 7m two way rear lane • 4m one way lane with angled parking (parking angles between 0 degrees and 45 degrees) • 7m one way rear lane with angled parking (parking angles between 46 degrees and 90 degrees) • 16m Local Road • 20m Collector Road	**PPC:**	3.6A.2.3, 3.6A.2.4	• Policies: 3.6A.2.3.a, 3.6A.2.4a, 3.6A.2.4b • Chapter 3.6 • Chapter 3.6 road and lane concept illustrations • Appendix 1 Assessment Matters (specific to Rotokauri North)	**Effects**	The cross sections in both the operative Rotokauri Structure Plan and the proposed Rotokauri North Structure Plan area are indicative only, and full design to an acceptable standard is captured by existing HCCDP provisions which require a Restricted Discretionary Activity resource consent for creation of a new road. Therefore, any effects are only associated with the minimum vesting widths. These widths do not constrain or inhibit the ability of Council to require a greater width, but they do signal a shift in thinking from the Appendix 15 designs, as such no social or environmental effects are anticipated to result. Furthermore the HCDP contains no such concept of a rear lane, and insertion of this feature is considered to create significant positive environment and social effects as it enables dwellings to face and addresses street frontages whilst essentially have access from the rear (making the use along key road corridors or areas where cycle lanes are proposed ideal to avoid conflicts associated with vehicle

Change	Objective:		Other linked Methods:	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
					crossings). Initial requests from HCC officers on the draft provisions sought for proof that lanes could be accessed for emergency services and rubbish collection. The minimums provided in this rule are of a sufficient width to contain such vehicles however, specific tracking and rubbish collection detail is a matter for resource consents. It is noted that the lanes themselves will generally be "straight" as identified by the underlying subdivision standards which derive a grid pattern for development, and therefore "specific tracking" and/or manoeuvring around corners (if any) is also specifically a resource consent matter based on the specific design an layout of each lane (rather than something which can be dictated at PPC level). Issues of ownership of the lanes is also a resource consent matter which has been addressed via a specific matter for assessment in Appendix 1.
				Costs	Costs only associated with administering a structure plan specific approach to road design and access way standards.
	Existing	25.14.2.1	• Policies 25.14.2.1a, 25.14.2.1b, 25.14.2.1c, 25.14.2.1e • Activity Table 25.14.3 • Appendix 1 Matters of Assessment (including new road construction, and subdivision). • Appendix 15 Transportation	**Benefits**	Consistent themes of roads across the Structure Plan area, which also tie into that anticipated for the wider Rotokauri area. The benefit of specific road cross-sections in a MDRZ is that the urban form can be anticipated, including the speed environment, the relationship of dwellings to the road, the means by which swales and stormwater infrastructure are planned for and consequently the design of lots and vehicle crossings relate to these. The move to more specific local road standards also reflect a land efficiency for the developer(s) as these provide appropriate road cross-sections at a lesser width than standard roads, balancing the effect of the provision of a wider number of collector roads and the accommodation of swales. For the developer(s) the land efficiencies are somewhat improved to support the greater level of permeability achieved by the anticipated urban block structure. Specific accessway standards for "rear lanes" are also unique as these service lots which have legal frontage, but are served from the "rear", creating opportunities for garaging and service areas at the rear of dwellings. The rules also efficiently recognise that the angle of parking within the lane can significantly affect the required width for vehicle manoeuvring (and potentially create land efficiencies).

Change	Objective:		Other linked Methods:	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
				Opportunities for economic growth and employment	Some improvements in land efficiency.
				Options less or not as appropriate to achieve the objective	The existing Appendix 15 road cross sections and Appendix 3 Rotokauri Cross Sections and accessway standards do not provide the same focus for shared use by multiple users as those proposed for Rotokauri North nor do they anticipate "rear lanes". New cross sections are the most effective way to ensure that the objectives are efficiently met.
23.5-23.7 Retain all other provisions (not modified above) as applicable and retain all provisions relating to the B6Z zone (where it relates to the PPC B6Z zone)	**Existing:**	23.2.1, 23.2.2 23.2.4 23.2.5	• Policies 23.2.1a, 23.2.2a, 23.2.4a, 23.2.5a, 23.2.5b, 23.2.5c • General Standards (Rule 23.5) • Specific Standards (Rule 23.6) • Subdivision Design standards (23.7)	**Effects**	No Change from HCDP
				Costs	
				Benefits	
				Opportunities for economic growth and employment	
				Options less or not as appropriate to achieve the objective	It is considered inefficient to change all provisions when it is not needed. Only those activities which needed to be added to or modified to give effect to the proposed objectives (in the most efficient and effective way) have been amended.
23.8 RDA Matters for Discretion – insert reference for Rotokauri North	**PPC:**	3.6A.2.3 3.6A.2.4	• Policies 3.6A.2.3a, 3.6A.2.4a, 3.6A.2.4b • Activity Table 23.3d • Information Requirements and Assessment Matters Appendix 1 (specific to Rotokauri)	**Effects**	No Change from HCDP
				Costs	
				Benefits	
				Opportunities for economic growth and employment	
	Existing:	23.2.1, 23.2.2 23.2.4 23.2.5	• Policies 23.2.1a, 23.2.2a, 23.2.4a, 23.2.5a, 23.2.5b, 23.2.5c • General Standards (Rule 23.5) • Specific Standards (Rule 23.6)	**Options less or not as appropriate to achieve the objective**	It is considered inefficient to change, modify or add matters of discretion when it is not needed. The existing matters of discretion, combined with other provisions inserted and evaluated under Appendix 1 are effective to assess applications.

Change	Objective:		Other linked Methods:	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
			• Subdivision Design standards (23.7) • Information Requirements and Assessment Matters Appendix 1		

Chapter 25 - CityWide

Change	Objective:		Other linked Methods:	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
Chapter 25 - Citywide					
25.13.4.7 Three waters – Insert provisions for Rotokauri North ICMP to be treated with the equivalent status as a Council ICMP; AND insertion of device maintenance requirements for lot owners.	**PPC:**	3.6A.2.5	• Policy 3.6A.2.5b • Information Requirements Appendix 1	**Costs and Effects**	None - as an ICMP is still required to be undertaken and adhered to. A draft ICMP has been prepared with the PPC, and this is being evaluated to support future discharge consents. The associated policies for Rotokauri North require the implementation of the specific and tailored ICMP. This is considered to appropriately address any environmental or cultural effects.
	Existing:	3.3.3 25.13.2.1 25.13.2.2 25.13.2.3	• Policies 3.3.1, 3.3.b, 25.13.12.1a-b, 25.13.2.2a, 25.13.2.3a-d,	**Benefits**	Removal of superfluous process (for water assessments and further ICMP's with future subdivision where this has already been provided with the PPC). The provisions also effectively provide for the ongoing management of devices (which is currently not an issue addressed by the HCDP).
				Opportunities for economic growth and employment	NA
				Options less or not as appropriate to achieve the objective	As noted above, the existing process is considered to create superfluous reports at each subdivision to demonstrate the same information which is already contained in the ICMP. The proposed methods enable a more efficient use of (time and cost) resources.
Modifications to 25.14.4.1 Vehicle Crossings and Internal Vehicle Access • Minimum widths between vehicle crossings = 2m • Minimum distance for a vehicle crossing from a local road intersection = 10m	**PPC:**	3.6A.2.4	• Policy 3.6A.2.4a • New Road cross section Figures (3.6A Figures)	**Costs**	Not providing a reduced separation from intersections will result in all corner lots needing in excess of 15m plus the driveway and side yard to the transport corridor frontages (approx. 22.5m), which as the potential for significantly undermine the provision of medium density housing (a 630 m2 lot). This type of control could have the unintended consequence of reducing the fine grain urban block structure as it promotes fewer intersections and cul-de-sacs in order to limit the effect of the interception control on the achievement of density. The objectives and policies for urban form in Rotokauri North focus on the achievement of a permeable and interconnected urban block based roading network, which increases the number of intersections, corner sites and sites opposite 'T' intersections. The current vehicle crossing standards, particularly within a local roading network work to achieve an urban form outcome not consistent with these objectives and policies, or the implementation of the MDRZ.
	Existing:	25.14.2.1	• Policies 25.14.2.1b, 25.14.2.1c, 25.14.2.1e	**Benefits & Effects**	Designing roads to achieve a lower speed environment (i.e. target of 30km per hour along local roads) improves the operating characteristics of the road, which effectively creates flow on benefits for vehicle crossing distances from intersections (thereby improving

Change	Objective:		Other linked Methods:	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
			• Appendix 15 Transportation		social and environmental outcomes and minimising potential adverse effects). The Rotokauri North road cross sections are designed to provide for a low speed roading environment, which then supports the ability to achieve a permeable and interconnected urban block based roading network. The modification to widths between crossings is a clarification only as the District Plan is unclear (provides two confliction options). Vehicle crossings will also largely be determined at subdivision design stage so as to not conflict with street furniture/lighting/planting parking bays etc.
				Opportunities for economic growth and employment	The provision directly supports opportunities for increased densities.
				Options less or not as appropriate to achieve the objective	Refer to costs.
Modifications to 25.14.4.1 Vehicle Crossings and Internal Vehicle Access • provision for a combined vehicle crossing width of 6m	**PPC:**	3.6A.2.1	• Policy 3.6A.2.1c	**Costs**	Not providing the option to combine vehicle crossings is considered a lost opportunity. The current vehicle crossing widths do not take into account pairing opportunities, and these are important to supporting smaller lot sizes with narrower road frontages.
• provision for rear lane standards (equivalent to Rule 23.7.8)	**Existing:**	25.14.2.1	• Policies 25.14.2.1b, 25.14.2.1c, 25.14.2.1e • Vehicle Crossing and Internal Vehicle Access Standards (Rule 25.14.4.1) • Appendix 15	**Benefits & Effects**	Reduce the total number of vehicle crossings. The narrower the lots the more important it is to provide for paired vehicle crossings, for example associated with two 10m wide lots which must have only a single width crossing. The pairing of these along the street provides opportunities for create gaps along the frontage of the road for on-street car parking, street trees, stormwater functions and grassed berms. The quality and function of the street is improved, while higher density subdivision is enabled. Overall the change will create positive social and environmental effects. Rear lane standards are repeated so as to avoid any confusion over their intended land use or subdivision status and to avoid confusion over Appendix 15 standards.
				Opportunities for economic growth and employment	The provision directly supports opportunities for increased densities.
				Options less or not as appropriate to achieve the objective	Refer to costs.

Change	Objective:		Other linked Methods:	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
Modifications to 25.14.4.1 vehicle access restrictions insert new rule k) for: no direct access onto SH39, minor arterial road and collector road with a dedicated cycleway/3m shared path.	**PPC:**	3.6A.2.4	• Policies 3.6A.2.4c and 3.6A.2.4d • New Road cross section Figures (3.6A Figures)	**Costs**	SH39 direct vehicle access is not considered to be appropriate under any circumstances because of the traffic safety and road function implications. Because of existing HCDP provisions, along with the function of NZTA as a roading control authority and requiring authority, a developer(s) could not have held any expectation of direct vehicle access from lots to the State Highway network. In respect to the minor arterial road and collector roads, the loss of developable land due to having to provide alternative accesses (including rear lanes). This needs to be balanced by higher density housing opportunities and specific rear lane standards. On one hand, rear lanes reflect an inefficient use of the land resource as they only provide access, and on the other hand they provide alternative vehicle access opportunities to provide safety associated with dedicated pedestrian and cycle facilities, along with higher levels of amenity on these important connecting road functions.
				Benefits & Effects	Maintenance of safety on SH39 (without such a provision development has the potential to create significant negative environmental and social (safety) effects.) The provisions address potential safety and amenity conflicts between private vehicles and cyclists. This in turn supports multi-modal transport opportunities, links to the neighbourhood centre, which in turn facilitate opportunities for higher density forms of housing and housing affordability. Overall the restrictions will result in positive social and environmental effects due to minimising traffic safety conflicts and promoting multi nodal transport opportunities.
	Existing:	25.14.2.1	• Policies 25.14.2.1b, 25.14.2.1c, 25.14.2.1e • Vehicle Crossing and Internal Vehicle Access Standards (Rule 25.14.4.1) • Appendix 15	**Opportunities for economic growth and employment**	The provision directly supports opportunities for increased densities.
				Options less or not as appropriate to achieve the objective	Rely on existing HCDP provisions (which restrict access on arterial only).

Change	Objective:		Other linked Methods:	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
Clarification to 25.14.4.2(f) to ensure that permeable pavement meets the requirements for car parks to be "sealed or paved"	**PPC:**	3.6A.2.5	• Policy 3.6A.2.5b	**ALL**	The clarification for pavement use is a clarification only (but also ensures that the ICMP can be implemented efficiently').
Insert new Rule 25.14.4.3 n). Require that (in addition to any other requirement for an ITA) any subdivision in Rotokauri North (other than subdivision of a duplex) must include an assessment to indicate whether the anticipated trip generation/vehicle movement and/or new roading connections require new intersections or upgrades to existing intersections identified on the Rotokauri North Structure Plan.	**PPC:**	3.6A.2.4 3.6A.2.5	• Policies 3.6A.2.4a-e, and 3.6A.2.5a	**ALL**	Feedback from HCC officers on draft provisions was the desire to have "trigger" rules in the DP for when new intersections and/or upgrades must happen. In general, the timing of upgrades works identified the ITA is dependent on overall staging of development. For example, a first stage may locationally need one intersection with SH39 for access, however, one does not trigger the other, nor is there a total cap on dwellings prior to construction as traffic may disperse across other connections created. Hence, it is not considered appropriate to specify exact dates, timing or numbers of dwelling prior to construction of each intersection upgrade. Given the above, HCC suggested that a staging plan could and/or should be provided so that rules could align with triggers. However, as this process is developer led and the onus and obligation of infrastructure funding and extension is already on the developer these is no RMA reason to unduly restrict staging to plan. It is the choice of the developer/applicant where and what stages progress in what manner. As part of the existing HCCDP any road construction is subject to resource consent, and the effects on the wider traffic network (and any upgrades etc to accommodate development) falls within the scope of matters than can (and will be) considered. This adequately covers any potential for adverse effects on the timing of any nature of intersection upgrades associated with each stage of development. The proposed rule is somewhat superfluous (and the inefficiency of duplication rules is noted) given the broad scope Council have under the existing HCCDP provisions on this matter, however given the concerns of HCC (and the joint NZTA reviewer) the provision ensures that any requirement for upgrades and/or new intersection can be appropriately assessed with every stage of development in Rotokauri North.
	Existing:	25.14.2.1	• Policies 25.14.2.1a, 25.14.2.1b, 25.14.2.1c, 25.14.2.1e, 25.14.2.1f • Activity Table 25.14.3 • Rule 25.14.4.3 ITA Requirements • Information Requirements Appendix 1 • Appendix 15 Transportation		

Other Provisions:

Change	Objective:		Other linked Methods:	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
Appendix 1.2 Information Requirements					
Insert new Information Requirements for Rotokauri North 1.2.2.24 • Exclude Subdivision of a Duplex from concept plans • Repetition of Chapter 25 changes to ICMP requirements	**PPC:**	3.6A.2.1, 3.6A.2.5, 3.6A.2.6	• Policies, 3.6A.2.1a, 3.6A.2.1c, 3.6A.2.5b, 3.6A.2.6a • Activity Table 4.5.4 • Rule 4.7.12 PA standards for a duplex) • Activity Table 23.3d • Rotokauri North Acceptable Solutions Code Appendix 1 • Information Requirements Appendix 1	**ALL**	No new adverse effects will result from the proposed exclusions. All effects associated with ICMP's have been addressed above under Rule 25.13.4.7. Excluding subdivisions occurring around duplexes from providing a site analysis is considered a minor correction only, as there are no new effects from subdivision that require HCC discretion on a wider site analysis context.
Appendix 1.3 Assessment Criteria					
Insert new Assessment Criteria for Rotokauri North in 1.3.3 • Subdivision adjacent to SH39 • The creation of a rear lane • Any other restricted discretionary activity, discretionary activity or non-complying activities. • Specific limited criteria for subdivision of a duplex	**PPC:**	3.6A.2.1-6	• Policies 3.6A.2.1a-3.6A.2.6a • Insert new Chapter 3.6A for Rotokauri North • Structure plan components 3.6A2 • Activity Table 4.5.3 • Activity Table 23.3d	**Costs**	Inclusion of additional provisions where there may otherwise have not been any.
				Benefits & Effects	The proposed specific criteria and assessment seek to address specific items such as ownership issues, ecology and buffering effects against the SH39 network. These measures are required to avoid potential adverse environmental, social and or cultural effects. However, such matters have not been addressed through rules as outcomes and adherence to such measures could be dealt with a variety of ways at subdivision and/or land use stage. Therefore, the placement as matters of assessment is considered the most appropriate. Tailored provisions to limit discretion for duplex subdivision is considered the most efficient way to ensure that the subdivision component does not have the opportunity to re-ligate land use outcomes which have been subject to extension 32 analysis and described further above.
				Opportunities for economic growth and employment	NA

Change	Objective:		Other linked Methods:	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
				Options less or not as appropriate to achieve the objective	Refer to benefits & effects above.
Appendix 1.4 Design Guides					
Insert new 1.4.10 Design guide for duplex designs also known as the "Acceptable Solutions Code".	**PPC:**	3.6A.2.1 3.6A.2.6	• Policies 3.6A.2.1a, 3.6A.2.1b, 3.6A.2.1c, 3.6A.2.1e, 3.6A.2.6a • Rule 4.7.12 PA standards for a duplex) • Standards (4.6.2-4.6.7 & 4.8) • Subdivision (Rule 23.3.d) • Affordable Housing (3.6A.4.1) • Parking – Appendix 15	**Effects** **Costs** **Benefits**	The provisions are the most effective means to provide the opportunity of a duplex with an enabling activity status without the risk of poor-quality outcomes eventuating.
				Opportunities for economic growth and employment	NA
				Options less or not as appropriate to achieve the objective	NA
Appendix 7 – Natural Environments					
Modify name of SNA 11 to Te Uuhi Paa Reserve	**Existing**	20.2.1	• Chapter 20	**Effects** **Costs** **Benefits**	The proposed change is a recognition of outcomes sought by the CIA prepared by the TWWG. Inclusion of the change represented positive cultural effects.
				Opportunities for economic growth and employment	NA
				Options less or not as appropriate to achieve the objective	As the change has been required and supported by the CIA no alternatives have been considered.
Appendix 15 Transportation					
Amend 15-1 Parking Insert new standard for parking: 1 carpark per duplex.	**PPC:**	3.6A.2.1	3.6A.2.1a	**Costs**	Reducing car parking on sites may increase demand on street for visitor and resident car parking.
	Existing:	25.14.2.1	• Policy 25.14.2.1d	**Benefits & Effects**	Medium density housing should optimise the potential for other modes of transport, and reduce the over reliance on private transportation by simply removing the requirement for every unit to

Change	Objective:		Other linked Methods:	Effectiveness and Efficiency AND Environmental, Economic, Social and Cultural effects	
			• Parking, Loading Spaces and Manoeuvring areas (Rule 25.14.4.2) • Appendix 15		have 2 car parks. This is already recognised by the HCCDP which allows apartments to only have 1 car park per unit (rather than the standard 2). The urban design outcomes for duplex development of requiring 4 car parks per building are not appropriate. This drives a dominance of driveways and garages for this form of housing, an outcome inconsistent with the urban form objectives and policies for Rotokauri North. As part of the feedback on the draft provisions HCC have identified concerns at the flow on effect for on-street parking. It is noted that the only deviation from the existing HCDP rules is with respect to a duplex dwelling, as a terraced type product falls under the HCCDP definition of an "apartment building" and as such is already subject to only 1 car park. In general, a reduction in car parking for duplex dwellings, is likely to encourage other forms of transport (other than private car) however it is recognised that before public transport becomes wide-spread in the area this is likely to result in additional demand for on-street parking. As such in streets with a higher number of these duplex units should have additional provision for on-street parking (e.g. closer to 1 space per 3 units rather than more typical minimum rate of 1 space per 4 units). Council have the ability under the HCCDP rules to address this type of matter already (as construction of a road is a restricted discretionary activity and the design, layout and wider traffic effects all form part of the matters for discretion). Therefore, no specific new assessment criteria or rule is deemed necessary to address this matter. Further, it is noted that local roads are proposed to provide on-street parking along one or both sides of the road (not provided for in the Rotokauri Structure Plan cross-sections).
				Opportunities for economic growth and employment	NA
				Options less or not as appropriate to achieve the objective	Retaining the existing HCDC standard for 2 car parks per dwelling is not an effective way to transition from an heavy reliance on private motor vehicles to other modes of transport. They result in higher density forms of housing, particularly those necessary to achieve the affordable component, having a poor urban form and streetscape, and the consequent undermining on the urban design objectives. The proposed provisions are considered more efficient in achieving this.

ATTACHMENT 6 - Archaeological Assessment prepared by CFG Heritage dated 3 Dec 2018

Rotokauri North SHA: archaeological assessment

report to
Ma Development Enterprises Ltd

Arden Cruickshank

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Rotokauri North SHA: archaeological assessment

report to
Ma Development Enterprises Ltd

Prepared by: .....
Arden Cruickshank

Reviewed by: .....
Jacqueline Craig

Date: 3 December 2018
Reference: 18-0874

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Rotokauri North SHA:
archaeological assessment

Ma Development Enterprises Ltd propose developing a special housing area on 21 properties in Rotokauri North on Te Kowhai Road, between Exelby and Burbush Roads (Lots 2 and 3 DP 334215; Lots 2, 4, 5 and 6 DP 359488; Lots 1 and 2 DP 485743; Lots 3, 5 and 6 DPS 15123; Lots 1, 3, 4 and Pt Lot 2 DPS 15254; Lots 9, 10 , 11 and Pt Lot 7 DPS 15255; Sections 23 and 53 SO 495676). Although there are no recorded archaeological sites within the proposed development, the prevalence of modified gardening soils along the Waikato river and the presence of suitable soil for pre-European horticulture in the northern half of the property meant that there was a possibility of previously unrecorded archaeological sites being present within the area. Michael Gao from Ma Developments Ltd commissioned CFG to undertake an archaeological assessment of the proposed development to aid in their resource application.

Statutory requirements

All archaeological sites, whether recorded or not, are protected by the provisions of the Heritage New Zealand Pouhere Taonga Act 2014 and may not be destroyed, damaged or modified without an authority issued by Heritage New Zealand Pouhere Taonga (HNZPT).

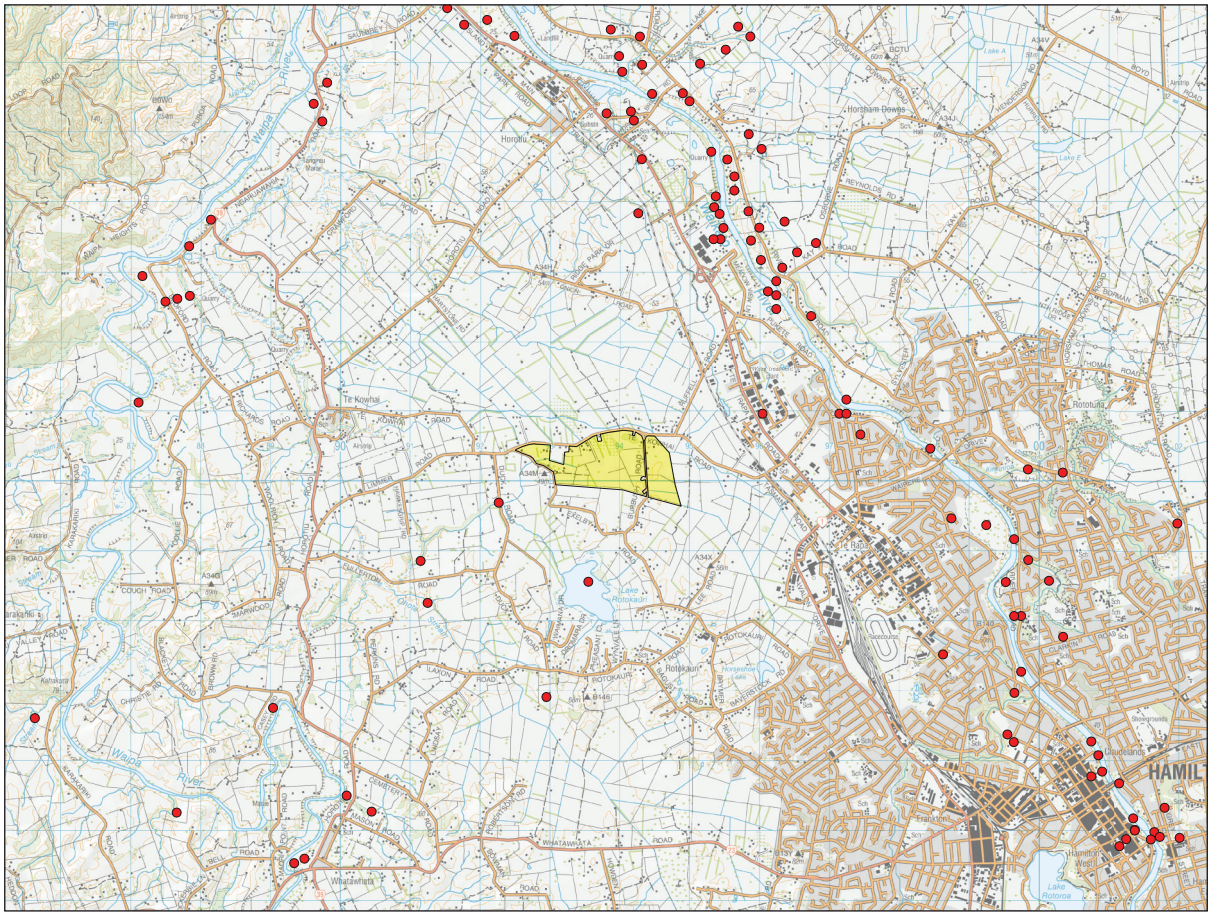

Figure 1. Map of Rotokauri North showing recorded archaeological sites in the area.

An archaeological site is defined in the Heritage New Zealand Pouhere Taonga Act as:

(a) any place in New Zealand, including any building or structure (or part of a building or structure), that—
  (i) was associated with human activity that occurred before 1900 or is the site of the wreck of any vessel where the wreck occurred before 1900; and
  (ii) provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand; and
(b) includes a site for which a declaration is made under section 43(1).

The Resource Management Act 1991 requires City, District and Regional Councils to manage the use, development, and protection of natural and physical resources in a way that provides for the wellbeing of today's communities while safeguarding the options of future generations. The protection of historic heritage from inappropriate subdivision, use, and development is identified as a matter of national importance (Section 6f).

Historic heritage is defined as those natural and physical resources that contribute to an understanding and appreciation of New Zealand's history and cultures, derived from archaeological, architectural, cultural, historic, scientific, or technological qualities.

Historic heritage includes:

- historic sites, structures, places, and areas
- archaeological sites;
- sites of significance to Maori, including wahi tapu;
- surroundings associated with the natural and physical resources (RMA Section 2).

These categories are not mutually exclusive and some archaeological sites may include above ground structures or may also be places that are of significance to Maori.

Where resource consent is required for any activity the assessment of effects is required to address cultural and historic heritage matters.

Methodology

The New Zealand Archaeological Association (NZAA) Site Recording Scheme (SRS) was searched for records of archaeological sites in the vicinity, which were incorporated into the project GIS. The Heritage New Zealand Pouhere Taonga digital library was searched for archaeological reports written about the area. Old maps and plans held by Land Information New Zealand (LINZ) and in other online archives were searched. Historic aerial photography was accessed through Retrolens (http://retrolens.nz/). Old newspaper articles were accessed through the Papers Past online database (http://paperspast.natlib.govt.nz/cgibin/paperspast). The University of Waikato Library Digital Collections and the National Library of New Zealand were searched for relevant images and maps. Geological maps of the area were accessed through GNS Science (http://data.gns.cri.nz/geology/). Soil information was obtained from the S-MAPONLINE database maintained by Landcare Research (https://smap.landcareresearch.co.nz/).

The lots were surveyed on foot. Due to the large scale of the survey area (approximately 133 hectares) and the relatively flat landscape of many of the lots, a targeted survey methodology was implemented. This methodology involved focussing on areas where drains, erosion, fence lines, animal damage and tree throw have exposed the soil in which evidence of previous modification of the landscape may be evident. No invasive methods such as test pitting were employed. Field assessment was undertaken by Arden Cruickshank of CFG Heritage Ltd on 22 June 2018.

Background

Lake Rotokauri is the largest of more than 40 lakes between Te Kauwhata and Te Awamutu. The lakes are of national importance as the largest remaining collection of such habitats within one area in New Zealand. These lakes are the remnants of once widespread wetlands, which supported productive and diverse bird and fish populations. The wetlands are recorded on early 1860s maps (Figure 2) and were drained during the early 20th century to enable roads to be established in the area. Rotokauri and the wider wetlands would have provided resources such as waterfowl, eel, and freshwater mussels, probably for the same people who were consuming the vegetable produced in the largescale gardening systems evident along the edges of the Waikato River.

On a survey map of the area from 1919 (DP 14534) the area of the proposed development is listed as 'drained swamp country' with 'undulating country in grass' to the East, in the vicinity of Burbush Road. This is confirmed by Landcare Research, who have recorded the central portion of the proposed development as containing a mellow humic organic soil of the Utuhina family. This is a poorly drained loamy peat with high water logging vulnerability which would not be suitable for pre-European horticulture. The northern portion of the proposed development however, contains well drained loams of the Otorohanga family which could have been used for pre-European horticulture. The remainder of the soil types within the property appear to be variants of poorly to moderately well drained clays.

Pre-European and 19th century Maori

Most sites in the wider area are pre-European Maori gardening sites, mostly identified from 1940s aerial photos, and many have not been field checked by an archaeologist. Maori horticultural sites (principally garden soils and borrow pits) are commonly recorded around the greater Hamilton Basin.

The first settlers in the Waikato landed at Kawhia in the *Tainui* waka, but archaeological evidence is not entirely clear on when they settled in the Area. Radiocarbon dates from archaeological sites near the Waikato River indicate large scale occupation and gardening in the area began around AD 1500. Other dates from around the Waikato Basin, such as Mangakaware, Taupiri and Horitu, suggest people began to occupy the landscape more intensively in the mid-17th (Bellwood 1978, Campbell and Harris 2011; Hoffmann 2011; Gumbley and Hoffmann 2013). Very little in-depth temporal research into land use between the Waikato and Waipa River, and the wider Waikato, means this information is tentative.

The only information that seems to be available about Maori in the area during the 19th century is mentions of kauri gum digging within the wetlands surrounding Rotokauri lake. One such mention was a result of a European settler in the 1890s who removed eel weirs from an outlet on Lake Rotokauri to lower the water level, after which local Maori searched the area and found a 'considerable quantity' of kauri gum (*Waikato Times*, 10 January 1891: 2.)

European settlers

Little information is available on Rotokauri and its surrounds. Roads are plotted in several 1880s survey maps, but there is no recorded evidence of land use or buildings until the 20th century (Figure 2). This was likely due to the area being dominated by wetland; and as the drainage and roading boards slowly lowered the water levels in the area, more land became available for settling. The Rotokauri School was opened in 1911 (Rotokauri 1986), with per-

manent road access available to the school around 1917 (*Waikato Times*, 11 January 1917: 4). There was no evidence found to indicate European people lived within the project area before the 1900s.

The property is part of Allotment 215, Parish of Pukete, which was granted to Robert Gillies and 'others' in January 1871 (Waikato Deed Index 2W 846). This Allotment was then on-sold to Orbell in 1872, who only took out one mortgage for the property at time of purchase and started splitting up the Allotment in 1899. The proposed subdivision was part of a subdivided section 'Part 215' which was sold by Orbell in 1903 (Waikato Deed Index 3W 354) and went through various hands and mortgages in the following decade. Part 215 was subdivided into smaller farms during the 20th century.

Archaeological survey and investigations

Most of the recorded archaeological sites in the Waikato basin relate to Pre-European Maori gardening. The remains of Pre-European Maori gardening sites are often in the form modified soils, which can be a mix of sand and gravel added to the parent soil (often referred to as Tamahere soils) to improve the drainage and texture of the soil for tuber growth. These sands and gravels are quarried from borrow pits, which are pits dug below the upper volcanic loams to the pumice gravels beneath. The gravels are alluvial, and hence the density of gardening soils with associated borrow pits near waterways in the Waikato basin. The middle and lower portions of the Waikato Basin are estimated to contain over 3000 ha of modified gardening soils.



Figure 2. Survey plan SO 345 drawn in 1868 showing Lot 215. The proposed development is approximately where 'Gillies and Street' is written below 'Lot 215'.



Figure 3. View southeast over Lot 6 DP 359466 showing water retention in the drained wetlands.



Figure 4. View west over central portion of the proposed development, this section has been drained, but still suffers water retention issues.

Some of these soils were mapped in 1939 by Grange et al. around Waipa and Waikato Rivers, none of which were recorded within the project area.

The closest recorded archaeological site to the proposed development is S14/11, a burial reported in 1975 approximately 700m southwest of Exelby road. It was noted as being a crouched burial, which indicates it was most likely a pre-European Maori burial. It was uncovered during sand quarrying, and appears to have been completely removed, although it is not known what happened to the remains. The site was revisited by Alexey Simmons in 2003, where it was noted



Figure 5. View south towards neighbouring properties on the prominent hills surrounding the drained wetland.

that no archaeological material was noted near where the burial was reported, but this is most likely due to the heavy modification of the area caused by the quarrying.

Field Survey

The property was surveyed on 22 June 2018 by Arden Cruickshank. the survey was conducted paddock by paddock, using the races for access. The survey was conducted from east to west.

The eastern paddocks are gently rolling hills, which extend approximately 200m west of Burbush Road. Beyond this, the paddocks are generally flat, drained wetland, which again slopes up towards Exelby Road to the west. The extent of the development is essentially a drained wetland surrounded by rolling hills.

The drained wetland still suffers from water retention, with many of the paddocks within the centre of the proposed development retaining water. This area would not have been suitable for horticultural or agricultural activities prior to the drainage being installed. No evidence of terracing or storage pits were observed on the higher portions on the peripheries of the proposed development. There are more prominent hills surrounding the drained wetland which have a higher potential for pre-European occupation, but these are outside the project area.

Summary

No evidence of pre-1900 archaeology or heritage, or significant 20th century heritage including built heritage, was found in the proposed development, either during the historic research or the field survey. The most suitable areas for pre-European Maori horticulture is in the northern portion of the proposed development but there is no evidence that this was ever undertaken here. The soils within the vicinity of the Waikato river are much more suited to it, and this is evident by the large number of borrow pits, modified gardening soils and other associated archaeological sites that have been recorded along the river. The area of the proposed develop-

ment does not appear to have been settled by Europeans until the 20th century, when drainage improvements to the soil allowed the land to be used.

Assessment

The following assessment relates only to archaeological values. Other interested parties, in particular mana whenua, may hold different values regarding the heritage values of the properties.

No evidence of pre-1900 archaeology or heritage, or significant 20th century heritage including built heritage, was found in the proposed subdivision, either during the historic research or the field survey, and no assessment of values or significance can be made.

Recommendations

These recommendations are only made based on the archaeological values that have been outlined above. Any other values associated with special interest groups, including tangata whenua, can only be determined by them. It is recommended that:

- an authority to destroy, damage or modify archaeological sites within the proposed subdivision does not need to be applied for from Heritage New Zealand Pouhere Taonga (HNZPT) under Section 44 of the Heritage New Zealand Pouhere Taonga Act 2014;
- all works should be undertaken following an accidental discovery protocol. An example of such a protocol is amended to this report.
- since archaeological research cannot always detect sites of traditional significance to Maori, or wahi tapu, the appropriate tangata whenua authorities should be consulted regarding the possible existence of such sites, and the recommendations in this report.

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Hoffmann, A. 2011. Archaeological investigation of S14/222 (modified soils), Horotiu, Waikato: final report. Unpublished report to Northgate Developments Ltd and NZHPT.

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Accidental Discovery Protocol

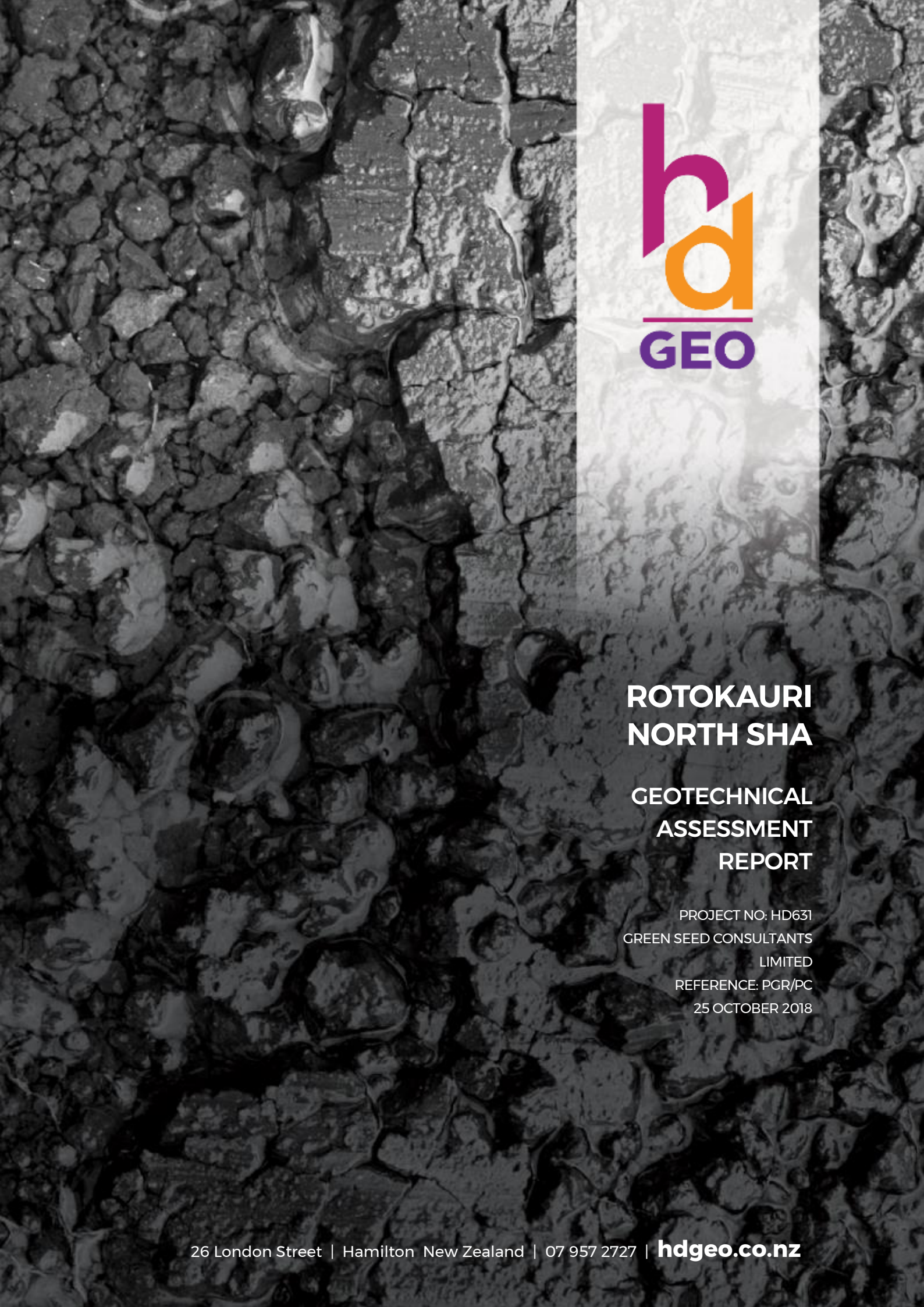
In the event of the accidental or unexpected discovery of archaeological features, including human remains:

1. All work within the vicinity of the discovery should cease immediately.
2. A buffer of at least 10 m should be set up around the discovery and this should be marked on the ground, preferably with pegs and tape, or similar.
3. All machinery and plant should be removed from the buffer zone where this is possible.
4. The site archaeologist, or other qualified archaeologist, should be informed.
   i Heritage New Zealand Pouhere Taonga (HNZPT) should be informed.
   ii If the discovery is of Maori origin, the relevant tangata whenua authorities should also be informed. Appropriate protocols (tikanga) should be observed.
   iii If the discovery is of human remains, the New Zealand Police should also be informed.
5. The archaeologist should take relevant steps to secure the area of the discovery.
6. The archaeologist will assess the discovery and advise HNZPT and the client on the relevant steps to be taken.
7. Works in the area of the discovery shall not recommence until authorised in writing by the archaeologist in consultation with any identified affected parties or HNZPT.

ATTACHMENT 7 -

Geotechnical Assessment prepared by HDGeo
dated 25 Oct 2018

Response to HCC Peer Review by HDGeo
dated 27 Feb 2019



ROTOKAURI NORTH SHA

GEOTECHNICAL ASSESSMENT REPORT

PROJECT NO: HD631
GREEN SEED CONSULTANTS LIMITED
REFERENCE: PGR/PC
25 OCTOBER 2018

26 London Street | Hamilton New Zealand | 07 957 2727 | hdgeo.co.nz

Executive Summary

Green Seed Consultants Limited have engaged HD Geo to conduct a preliminary geotechnical assessment for the Rotokauri North Special Housing Area (SHA) to accompany an application for plan change. The SHA is located at the northwest extent of Hamilton City and is comprised of approximately 133 ha. Green Seed propose to develop the site into a mixture of standard and medium density residential housing, a commercial neighbourhood centre, public parks and potentially a school.

While there are engineering considerations to be further defined by investigation, and designed for during planning of the site, we consider the site to be suitable for the proposed development subject to the considerations and recommendations in this report.

Our scope included

- a summary of testing completed to date
- an overview of the ground conditions at the site
- assessment of the geology and geo-hazards
- recommendations for further work

What we found

- there is a moderate to high risk of liquefaction at the site
- we expect that the liquefaction risk can be mitigated for residential development with strengthened foundations and/or shallow ground improvements

Further work required

- investigation and assessment to further understand the liquefaction hazard at the site and outline mitigation measures where necessary (currently being undertaken by HD Geo)
- assessment of the liquefaction induced lateral spreading risk adjacent to proposed stormwater swales
- earthworks planning
- infrastructure design (ie. stormwater swales and roading)

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Introduction

Green Seed Consultants Limited propose to develop the site known as the Rotokauri North Special Housing Area (SHA) into a mixture of standard and medium density residential housing, a commercial neighbourhood centre, public parks and potentially a school.

We have been engaged to provide a site-wide preliminary geotechnical assessment to accompany an application for plan change.

While there are engineering considerations to be further defined by investigation, and designed for during planning of the development, the site is considered to be suitable for residential development subject to the considerations and recommendations in this report.

Scope

The scope of this report includes:

- a summary of testing completed to date
- an overview of the ground conditions at the site
- assessment of the geology and geo-hazards
- recommendations for further work

Site description

The site is located at the north west extent of Hamilton City and consists of a total area of approximately 133 ha. It is bounded by the Te Kowhai Road (SH39) to the north, greenfields to the east and south and Exelby Road to the west. Burbush Road runs north to south through the eastern portion of the site. A plan showing the extent of the site is included in Appendix A.

The site lies in an area that consists of rolling hill terrain and flat-lying plains. The hill terrain (herein referred to as 'Hill Terrain') is all ground that is elevated above the flat, low-lying plains of the site (herein referred to as 'Plains').

The Hill Terrain is present at the western and eastern edges of the site, rising up to 18 m above the Plains. These hill areas merge south of the site, forming a south to north draining basin in which the majority of the site lies.

The Plains make up the majority of the west and central portions of site, while also surrounding the eastern Hill Terrain to the west, north and east. The Plains are flat with typically less than 1 m of elevation difference across much of the site. Numerous open drains dissect the Plains ranging from less than 0.5 m in depth and width up to 2 m width and depth. A Waikato River paleochannel, known as the Te Kowhai Channel lies in the northeastern corner of the site. The base of the channel lies approximately 1.5 m below the surrounding area. Parts of the low-lying areas of site are located in areas that are expected to be inundated by a 1 in 100 year flood event (Refer to Rotokauri ICMP Plan[1]).

The site is predominantly used as pasture for grazing cattle with a dairy farm and associated buildings in the northeast of site. There are eight rural residential dwellings and a number of sheds and barns across the remainder of the site.

[1] Hartland Environment Limited (June, 2017) *Rotokauri – Integrated Catchment Management Plan*.

Previous work

HD Geo undertook a preliminary geotechnical assessment of the site in July 2018 to support master planning and conceptual design for the development[2]. This assessment included an investigation which comprised of:

- 13 hand augers up to 3 m depth
- 8 cone penetrometer tests (CPTs) up to 20 m depth
- 3 dissipation tests
- 5 temporary standpipe piezometers

The key outcomes of this assessment were:

- there was a moderate to high liquefaction hazard identified across the Plains areas of the site
- there were no other significant geotechnical constraints to development at the site

In order to further understand the liquefaction hazard at the site additional testing has been undertaken including:

- installation of 5 permanent piezometers (August 2018)
- 6 shear wave velocity tests by seismic cone CPTs up to 20 m depth (October 2018)

The results of these investigations are to be incorporated into a detailed liquefaction hazard study HD Geo is currently undertaking at the site.

Geological setting

The site is located roughly centrally within the Hamilton Basin which is characterised by low rolling hills (Hamilton Hills) and plains with low terraces and gullies draining into the Waipa and Waikato Rivers (Hamilton Lowlands).

The Hamilton Hills are linear, sinuous and discontinuous hills and ridges that are remnant of an older erosion surface. They consist of alluvial material and non-welded ignimbrites (Walton Subgroup) and are typically overlain by a number of metres of airfall volcanic ash (Kauroa Ash Formation and Hamilton Ash Formation). The Hamilton Lowlands are a broad, low angle alluvial fan created by the Waikato River in the Late Quaternary. The fan materials (Piako Subgroup and Hinuera Formation) are derived from rhyolitic eruptions in the central North Island and generally consist of late Pleistocene primary and secondary volcaniclastic sediments. Deposition of the fan materials ceased when the Waikato River entrenched into its current course approximately 17 ka and thin airfall tephra layers accumulated on the fan surface (Hinuera Surface).

The New Zealand Geological map (QMap) for the Waikato Region shows that Walton Subgroup, Hinuera Formation and Piako Subgroup materials are mapped at the site. The Walton Subgroup is mapped in the Hill Terrain and is described as Early Pleistocene to Middle Pleistocene alluvium dominated by primary and re-worked non-welded ignimbrite. The Hinuera Formation and Piako Subgroup are mapped on the Plains. The Hinuera Formation is mapped in the majority of the flat-lying areas of site with small areas in the south and southeast of the site described as the Piako Subgroup. The Hinuera Formation is described as Late Pleistocene cross-bedded pumice sand, silt

[2] HD Geo Limited, 2018. *Rotokauri North SHA Preliminary Geotechnical Report*, HD631.

and gravel with interbedded peat and the Piako Subgroup is described as Late Pleistocene locally derived mud, silt, gravel and peat.

Proposed development

The development will comprise a mixture of standard and medium density residential housing, a commercial neighbourhood centre, public parks and potentially a school. The development will contain numerous new local roads and five collector roads linking internal areas with Te Kowhai Road, Exelby Road, Burbush Road and yet to be constructed roads to the south.

The proposed development consists of two stages, Stage 1 in the western portion of site covering an area of approximately 53 ha and Stage 2 in the eastern portion of site which is approximately 80 ha. The proposed development concept and staging plans are included in Appendix B.

Ground conditions

The ground conditions at the site were typically consistent with the mapped geology. The ground conditions have been grouped into areas based on their geomorphology and the conditions encountered in the investigation. All references to soil types from the CPTs are based on the soil behaviour types as interpreted by the CPT results.

Hill terrain

The Hill Terrain is all ground that is elevated above the flat, low-lying plains of the site. CPT investigations predict layered clay, silt and sand deposits to 20 m. Hand auger investigations found that the upper 3 m of the hill terrain consists of stiff to hard clay and silt consistent with the Hamilton Ash Formation.

Plains

The Plains are areas of site that are flat and low-lying. Hand auger and CPT investigations encountered layered deposits of silt, clay and sand to 20 m depth. The deposits are predominantly sand dominated in the upper 8 m to 10 m, becoming more clay dominated with depth. Sand layers reach a maximum thickness of 6.5 m and uniform clay layers reach a maximum thickness of 6 m.

Groundwater

Groundwater is currently being monitored by five piezometers across the site. Since monitoring began in August 2018, the groundwater level has been very high across the site, with a maximum recorded depth of 0.9 m and a minimum recorded depth of 0 m (ie. ground level).

Geotechnical assessment

This assessment is a collection of general information and advice for the site's suitability for the proposed development. It is intended to provide an overview of the geotechnical elements which require consideration at the site.

Liquefaction

The low-lying Plains at the site contain sand and silt soils with a high groundwater table which can be susceptible to liquefaction under earthquake-induced cyclic loading. As a result, a liquefaction

assessment of the CPT data was undertaken in accordance with NZGS guidelines[3]. The preliminary screening analysis indicated that under ULS (Ultimate limit state) conditions, liquefaction is anticipated to occur across the Plains. The layers that are predicted to liquefy vary throughout the soil profile, however liquefaction is typically predicted to occur within 1 m of the current ground surface. In accordance with NZGS guidelines, the liquefaction risk at the site ranges from L2 (moderate) to L4 (severe).

Preliminary screening of shear wave velocity data indicates that the assessed risk may be reduced in some areas of the site, while the risk in other areas remains unchanged. Further assessment and refinement of this data is currently in progress.

Predicted liquefaction of this magnitude is not uncommon in the Waikato. To allow for residential construction, mitigation in the high to severe risk areas will be achievable through strengthened foundations or shallow ground improvement.

Lateral spreading

Lateral spreading is a phenomenon were liquefied material allows the soil above to move laterally towards a free face, such as a stream bank. The site currently has an isolated lateral spreading risk adjacent to the Te Kowhai Channel in the northeastern corner of site.

Development plans show stormwater swales throughout the site which are likely to be excavated up to 2.0 m below current ground levels. Given the near surface soils have been identified as liquefiable, the formation of these swales is likely to create a lateral spreading hazard.

Specific assessment of the lateral spreading hazard will be required. Potential mitigation options of lateral spreading risks may include:

- dewatering of adjacent ground so liquefaction is unable to occur
- using a buttress of ground improvement along swale edges
- slope stabilisation methods
- specifying foundation types tolerant to lateral spreading in high risk areas

Soft soils and settlement

A screening analysis has been completed on the 13 CPTs that were located on the Plains to determine the susceptibility of the ground to static settlements when loaded. The preliminary analysis indicates that the site generally has a low risk of static settlement as most of the near surface soils are sand-dominated.

While not encountered during this investigation, our experience in the area has shown that organic and soft soils are commonly (but not exclusively) found in paleochannel features and close to the Hill Terrain in 'embayments'. As the risk of consolidation settlements is often greatest in these areas they should be a target area for future investigations.

[3] Ministry of Business, Innovation & Employment and New Zealand Geotechnical Society, 2016. *Earthquake geotechnical engineering practice – Module 3: Identification, assessment and mitigation of liquefaction hazards.*

Earthworks

Earthworks at the site are likely to consist of cut and fill operations in order to ease grades on the site, create level building platforms, fill open drains, form stormwater storage and conveyance, and to raise building platforms above flood levels.

The Hamilton Ash Formation was encountered on the Hill Terrain and is typically suitable as an earthworks material. Although not encountered in the investigations to date, our experience has shown that beneath the ash, soils of the Puketoka Formation are typically encountered. These soils are typically highly sensitive and break down on working, making them unsuitable as an earthworks material. Further investigation should define the materials to be used or exposed in earthworks.

Stability

There are no indications of any recent, large scale instability having occurred at the site, or in the immediate surrounding area. Active observed instability in the area tends to be shallow creep on steeper slopes and is often associated with springs, saturated soils or stock movement.

Earthworks on the site are likely to reduce the overall stability risk by reducing both the heights and grades of current slopes. Earthworks on the Hill Terrain may demand grades that will require retaining and specific design is likely to be required.

Pavements

A number of roads are proposed for the development, including local and collector roads. It is likely road pavement subgrades will be based on materials of the Piako Subgroup, Hinuera Formation, Hamilton Ash Formation and, depending on cut depths in the hill terrain, the sensitive materials of the Puketoka Formation.

Based on these anticipated ground conditions and the testing completed during the investigation, it is likely that natural subgrade CBR will be low. Improvement of the subgrade will likely be required by either compaction or stabilising of the insitu material or by undercutting and replacement with a hardfill subgrade improvement layer. Where organic material is encountered, removal and replacement with suitable backfill will be required. Specific investigation, testing and design will be needed for all pavements.

Recommendations

- the liquefaction hazard at the site should be refined through further investigation and assessment and outline mitigation measures where necessary (currently being undertaken by HD Geo)
- assessment of the liquefaction induced lateral spreading risk adjacent to proposed stormwater swales is completed

Future work

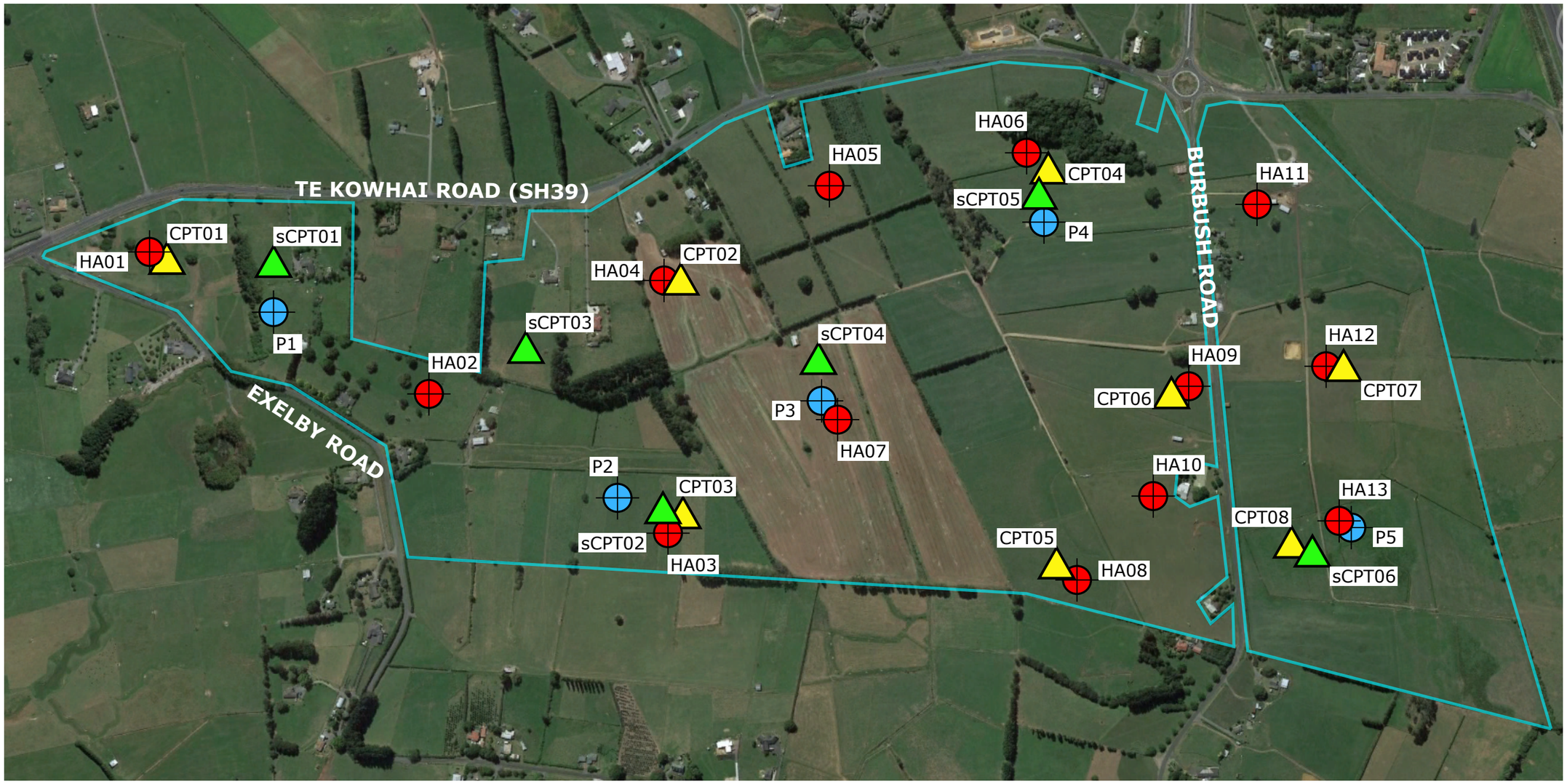
- as the risk of consolidation settlements are often greatest in paleochannels and Hill Terrain embayments, these areas should be targeted by future investigations
- further investigation of the potential cut areas of site should be completed to define the materials to be used or exposed in earthworks

Limitation

This report has been prepared for our client, Green Seed Consultants Limited, for the purpose detailed above and may not be relied on by any other party or for any other purpose. This report contains an assessment based on a site walkover and testing at discrete locations to support plan change for the proposed development.

Further testing and assessment is required prior to finalising the development proposals for the site. Inferences about the conditions at the site have been made based on the testing undertaken and our understanding of the geological environment in which the site lies. The deposits in this area are by nature highly variable both vertically and laterally. We recommend that a geotechnical engineer is engaged to provide input into the design of the development and to undertake further testing, assessment and design. For continuity and to confirm ground conditions, geotechnical observation will also be required during site construction works.

APPENDIX A – SITE PLANS



LEGEND

- Hand auger (HA)
- Cone penetrometer test (CPT)
- Seismic cone penetrometer test (sCPT)
- Piezometer (P)
- Site boundary
- WRC 5m contours

PROJECT:	Rotokauri North SHA
PROJECT NO:	HD631
CLIENT:	Green Seed Consultants Ltd
TITLE:	Geotechnical Investigation Locations
SCALE:	NTS
Drawing No:	HD631/01
Drawing by:	SA
Revision No:	

APPENDIX B – DEVELOPMENT PLANS AND STAGING

Rotokauri North Special Housing Area

February 2018
Green Seed Consultants Ltd

ROTOKAURI NORTH SHA AREA (Figure 1)

Map legend

- Site area
- 1 Stage 1 (53.39ha)
- 2 Stage 2 (79.72ha)

Stages 1 and 2 sought as an SHA.
Total of 133.1109ha.

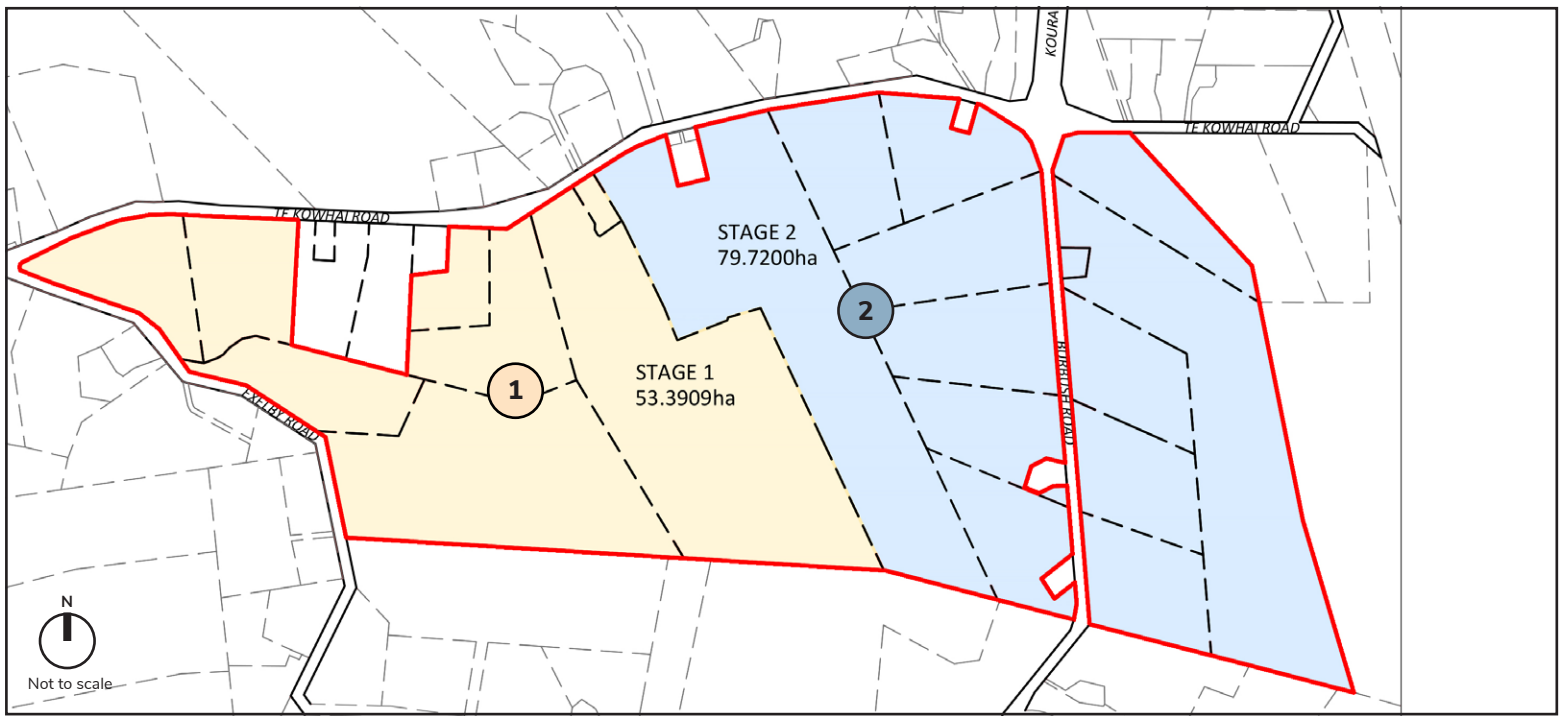


Figure 1: Rotokauri North SHA area

ROTOKAURI NORTH SHA CONCEPT (Figure 2)

Map legend

- Site area
- 1 Optimise connections to east (jobs) as well south.
- 2 Ensure each small centres is focused on its local community.
- 3 Maximise residential catchment around a small centre, and integrate movement network around the centre.
- 4 Provide for necessary stormwater conveyance and storage.
- 5 Provide district-level open space so as to maximise maximise exposure and accessibility to all. Size will be determined by Council acquisition agreement.
- 6 Ensure sensitive slopes can be appreciated as landscape features.

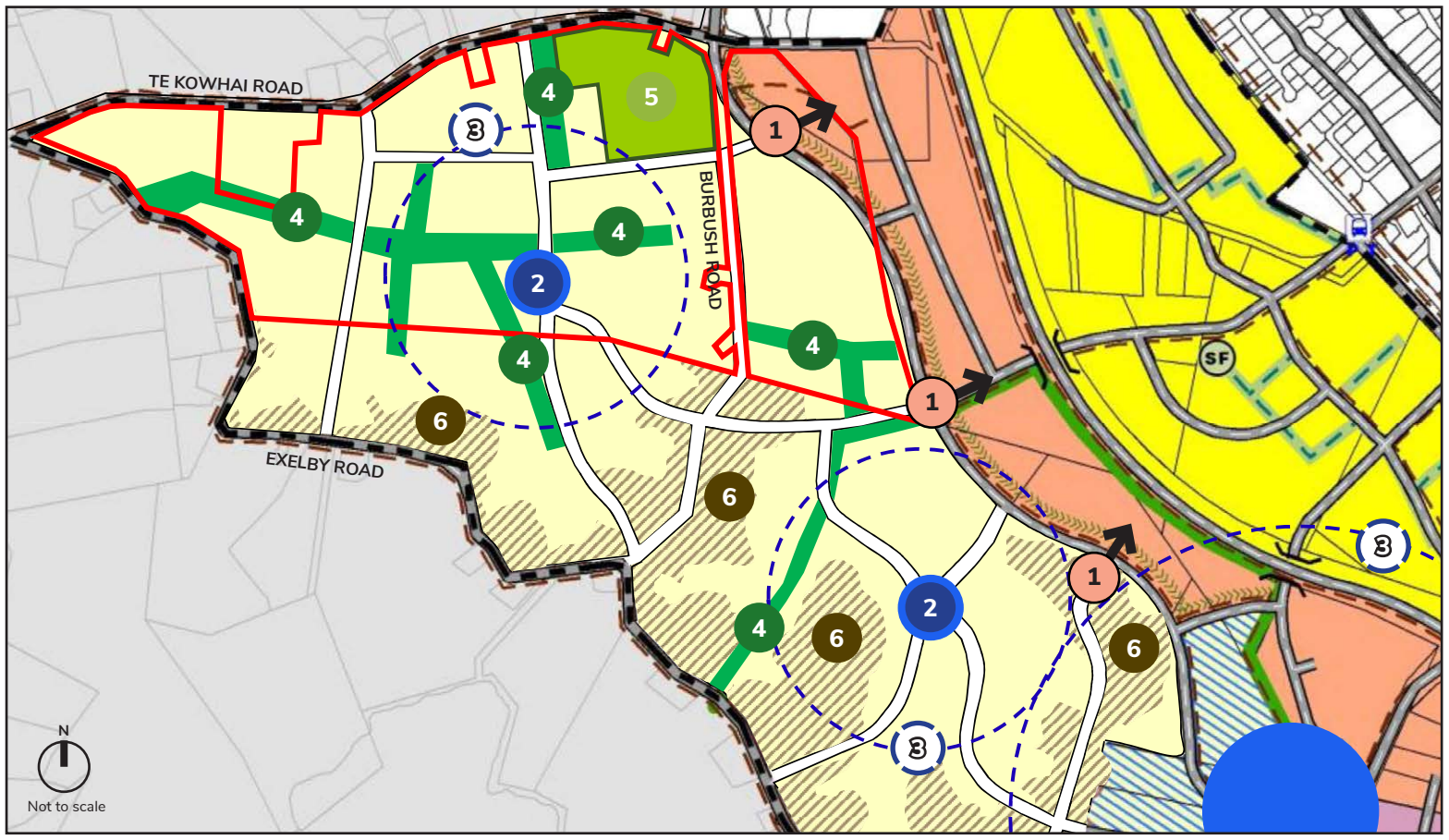


Figure 1: Key structuring elements of Rotokauri North SHA concept

ROTOKAURI NORTH SHA OPTIONS FOR STORMWATER (Figure 3)

Map legend

- Site area
- Floodway basin (conveyance and flood storage)
- Swale (conveyance only)
- Treatment wetlands
- Discharge locations

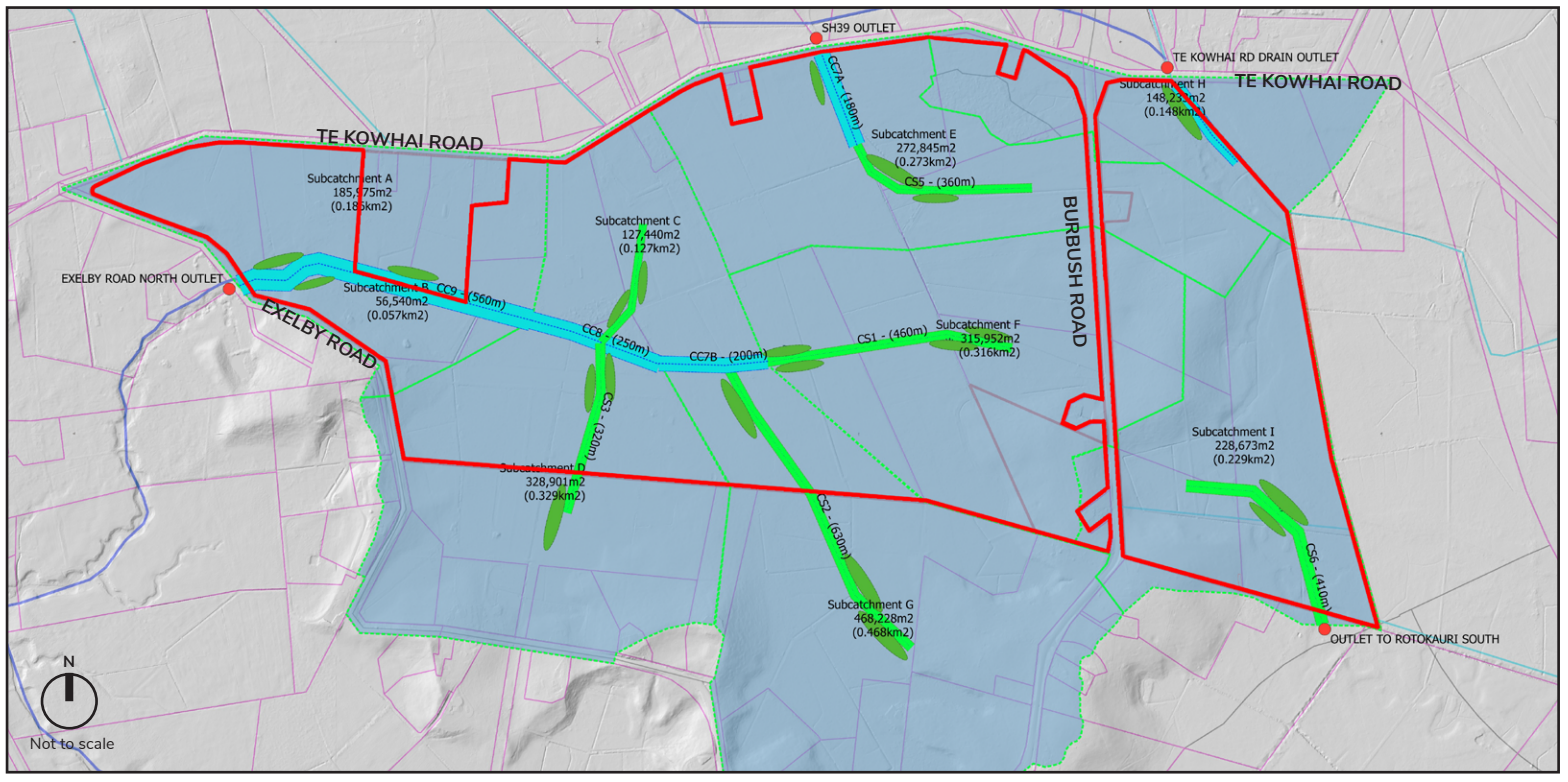


Figure 3: Rotokauri North SHA options for stormwater
Source: CKL Stormwater Solutions

Rotokauri North Special Housing Area

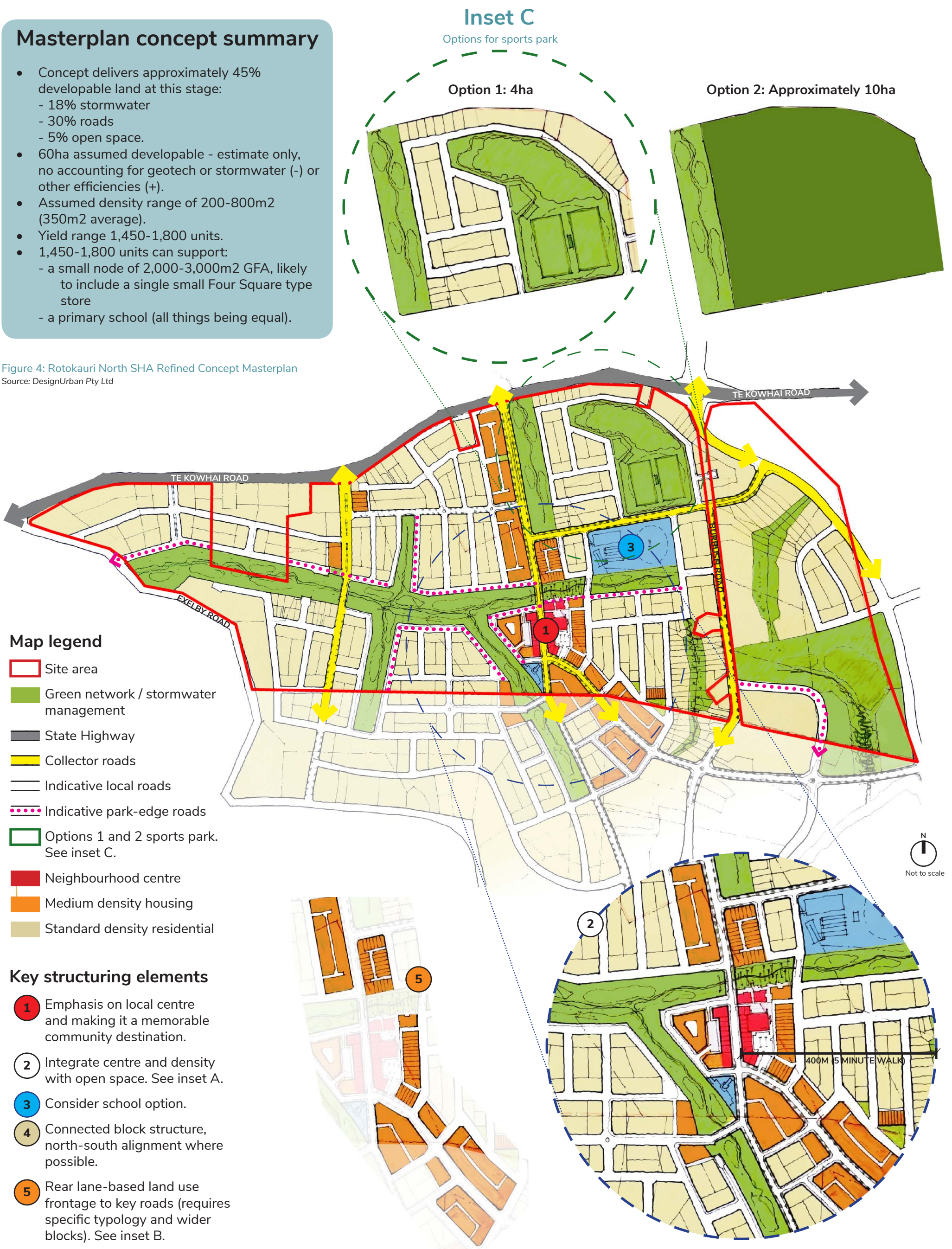
February 2018
Green Seed Consultants Ltd

ROTOKAURI NORTH SHA REFINED MASTERPLAN (Figure 4)

Masterplan concept summary

- Concept delivers approximately 45% developable land at this stage:
  - 18% stormwater
  - 30% roads
  - 5% open space.
- 60ha assumed developable - estimate only, no accounting for geotech or stormwater (-) or other efficiencies (+).
- Assumed density range of 200-800m2 (350m2 average).
- Yield range 1,450-1,800 units.
- 1,450-1,800 units can support:
  - a small node of 2,000-3,000m2 GFA, likely to include a single small Four Square type store
  - a primary school (all things being equal).

Figure 4: Rotokauri North SHA Refined Concept Masterplan
Source: DesignUrban Pty Ltd



27 February 2019

Rotokauri North SHA

c/- Renee Fraser-Smith

Email: renee@tollemache.co

26 London Street
Hamilton 3204
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Hamilton 3240
New Zealand
64 (0)7 957 2727

HD631 – Rotokauri North SHA – Response to HCC Peer Review

Dear Renee,

I understand that Council's peer reviewer has further questions regarding the liquefaction hazard at the Rotokauri North SHA. My understanding is that at plan change stage, we shouldn't need to provide detailed information on how we are to mitigate the risk (that will be done at later stages of the development design and consenting). The test is whether there is anything there that should preclude the site being zoned for development. To my mind, an appropriate test of this (in relation to liquefaction) is whether there are similar local areas that have recently been developed. There are several such examples locally that have been developed under the current guidance (noting that liquefaction assessment practice has changed significantly in the last 10 years). In our report we have highlighted that there is a liquefaction hazard that needs consideration and, at the subdivision suitability stage, we are aware that we will have to provide detailed information on our mitigation approach to meet the requirements of s106.

To answer the specific questions provided to us:

Further information is required from the applicant to substantiate the conclusion that mitigation of the moderate to severe liquefaction risk is achievable. The further information should demonstrate that the liquefaction risk can be managed at subdivision/land use stage.

The terminology 'moderate to severe' is based on the LSN categories. Based on the MBIE planning guidance, the category for the susceptible areas of the site is generally 'Medium' liquefaction vulnerability with some areas that may be categorised as 'High'.

We based our conclusion that the site is appropriate for development on:

- We have been involved in or have reviewed the assessments for several other sites in Hamilton. The assessed hazard on this site is equivalent to many of the recently developed suburbs in Hamilton including Rotokauri, Rototuna North and Ruakura.
- All of these areas have been assessed for liquefaction and various mitigation has been recommended and implemented during construction.

- The site is assessed as roughly the equivalent of TC2 land in Christchurch. Such land has been, and is, regularly developed.

We note that there is no regional or district policy that sets a framework for accepting/rejecting development based on liquefaction risk and so current practice is a good measure of suitability.

The extent of the liquefaction hazard should be discussed.

The area of the site with geology/geomorphology that indicates it may be subject to a liquefaction risk is the Plains, which covers most of the site. The site geomorphology plan in our preliminary report (attached) identified these areas. While there is variation in the assessed hazard, our study identifies that liquefaction damage is likely across the Plains area and the likely hazard ranges from **Medium** to **High** liquefaction vulnerability. Liquefaction is not a hazard in the Hills areas of the site.

Feasible measures that might be employed to mitigate the risk should be identified and discussed.

Mitigation in the recently developed parts of Hamilton that have a liquefaction hazard included measures such as

- shallow ground improvement (to separate structures from liquefiable layers)
- reinforced raft foundations (varying from simple ribraft to reinforced, resilient raft foundations
- piles to non-liquefying layers
- de-watering to reduce the hazard (usually locally to a lateral spreading hazard)
- setbacks or barrier piles in some locations where lateral spreading was considered to be a risk

The MBIE planning and engineering guidance for potentially liquefaction prone land asks for a Level B assessment at plan change – we have exceeded this with a Level C Area-wide study.

Please let me know if you have any further questions.

Kind regards,

ANDREW HOLLAND
Technical Director
Andrew@hdgeo.co.nz
022 0488 441



Plains

Hill Terrain

PROJECT: Rotokauri North SHA	
PROJECT NO: HD631	
CLIENT: Green Seed Consultants Limited	
TITLE: Site Geomorphology	
SCALE: NTS	
Drawing No: HD631/2	
Drawing by: MM	
Rev Number	
0	Initial

ATTACHMENT 8 - Site Investigation by HDGeo
dated 11 July 2018

ROTOKAURI NORTH SHA

PRELIMINARY SITE INVESTIGATION

PROJECT NO: HD637
GREEN SEED CONSULTANTS LTD
REFERENCE: PSI/1
11 JULY 2018

26 London Street | Hamilton New Zealand | 07 957 2727 | hdgeo.co.nz

Executive Summary

HD Consultants NZ Limited (HDC) has been engaged by Green Seed Consultants Limited (the Client) to conduct a Preliminary Site Investigation (PSI) for the Rotokauri North Special Housing Area (SHA). The SHA is comprised of approximately 113.11 ha and is located south of Te Kowhai Road and east of Exelby Road, north of Hamilton (the Site).

A PSI includes review of available information, including Council records and historical aerial photos, combined with a site inspection. The Site inspection was conducted by using unmanned aerial vehicle (drone) photography to identify areas of interest with regard to potential contamination. These areas were then inspected and photographed, and where possible, the property owners were interviewed.

The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) requires that Ministry for the Environment (MfE) Hazardous Activities and Industries List (HAIL) sites be identified and investigated to determine if there is potential risk to human health from subdivision, change in land use, or land disturbance. The purpose of the PSI is to identify HAIL activities and qualitatively evaluate potential risk based on the records review and site inspection. No sampling and analysis is included in the PSI.

The site is largely comprised of farms with pasture land and many have rural residences present. There is an orchard present at one parcel and dairy farms at two parcels. Many of the farms have sheds present which are used for various purposes, including storage of hazardous substances. There is a workshop/scrap yard present at one property.

While the pastures are not considered HAIL sites, there is potential for contamination if superphosphate fertilisers and/or persistent pesticides were used. Orchards, animal spray or dip stations, fuel tanks, and areas where hazardous substances are stored are considered HAIL activities. Buildings which used asbestos-containing materials or lead-based paint may also contribute to soil contamination. In addition, a workshop/scrap yard at one property is classified as a HAIL activity.

Based on the PSI findings, sampling and analysis is recommended to quantify the potential risk from activities conducted at the Site. This includes sampling and analysis of pastures to evaluate the presence of elevated cadmium (from fertiliser) or persistent pesticides. This sampling can be done in the near-term to determine whether activities within the pasture land are permitted activities or if they require consent. For example, sampling and analysis should be conducted for:

- The orchard to evaluate the presence of persistent pesticides;
- The workshop/scrap yard to evaluate the presence of heavy metals, pesticides, and hydrocarbons;
- The dairy farms to evaluate the presence of heavy metals, hydrocarbons, and pesticides; and

- Farm structures to evaluate the presence of asbestos, lead, and stored hazardous substances.

Because activities and land use can change with time, sampling and analysis is not recommended until activities cease at the properties where HAIL activities are (or were) present. Prior to sampling at these sites, a follow-up inspection is required to verify that these above recommendations are still correct (i.e., additional potentially contaminating activities have not occurred).

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Introduction

HD Consultants NZ Limited (HDC) has been engaged by Green Seed Consultants Limited (the Client) to conduct a Preliminary Site Investigation (PSI) for the Rotokauri North Special Housing Area (SHA). The SHA is comprised of approximately 113.11 ha and is located south of Te Kowhai Road and east of Exelby Road north of Hamilton. The entire SHA is hereafter referred to as "the Site", with individual parcels referred to by parcel number and street addresses. Figures showing the Site area and proposed development plan are provided in Appendix A. Parcel numbers and addresses are provided in Appendix B.

The majority of the Site has historically been used for grazing beef and sheep, with rural residential dwellings present, as well as two dairy farms. Numerous farm buildings (sheds, barns) are also present. The Site does not appear to have been used for intensive cropping, with the exception of one parcel that was used as an apple orchard.

With the proposed change in land use and planned future subdivision and earthworks, the National Environmental Standard for Assessing and Managing Contaminants in Soil (NESCS) must be considered. The NESCS applies when hazardous activities and industries list (HAIL) activities have been conducted at a site. These activities include storage and use of persistent pesticides. HAIL activities also include discharges to land which have the potential to cause contaminants to be present at concentrations above acceptable guidelines for protection of human health. In the case of pasture land and farm buildings, the "discharges" could include cadmium from superphosphate fertiliser use, lead from lead-based paint, and asbestos from building materials.

Objectives

The key objective of this PSI is to provide an assessment to evaluate whether there is potential risk to human health from contaminants in soil due to current or past activities.

Scope

To achieve the project objective, the following scope of works, outlined in Table 1 below, was undertaken.

Table 1: Scope of Works

Work Activity	Description
Site Inspection	A walk-over site inspection was undertaken to visually assess actual and potential contamination sources from a walk-over inspection of the Site. The areas inspected were identified from review of footage from aerial photography, including current images captured by a remote aerial vehicle (i.e., drone). The areas most likely to have HAIL activities present were targeted for the visual walk-over inspection.

Work Activity	Description
Site History Review	A desktop review of historical aerial photos and Regional and District Council records was undertaken to identify potentially contaminating practices which may have occurred on the Site. Searches included: review of permits and consents, reported incidents, and review of available previous environmental reports. Historic title records were not reviewed as it was considered unlikely (based on aerial photograph review) that they would reveal useful information.
Geological and hydrogeological review	A search of the Waikato Regional Council's database of bores within a 1 km radius of the site and a review of other relevant geological and hydrogeological resources to assess the general sensitivity of the environment within the vicinity of the site. In addition, this PSI was conducted concurrently with a geotechnical investigation of the Site. This investigation helped inform the geologic and hydrogeological conditions at the Site.
Reporting	Preparation of this report summarising the findings of the PSI.

Site description

The Site is located in an area south of Te Kowhai Road and east of Exelby Road to the north west of Hamilton City. The land is currently owned by numerous parties. The site location and regional setting are shown in HDC Figure 1 in Appendix A. Parcel numbers, addresses, and sizes are listed in Appendix B.

Current and proposed land use

The majority of the Site is used as pasture for grazing cattle. There was also historically some sheep grazing and two parcels are dairy farms. There are several rural residential dwellings as well as sheds and barns present. The Site is zoned Future Urban and is nearly flat with isolated high points. The site is located within the Waikato Regional Council and Hamilton City Council boundaries.

The site will be subdivided and developed for residential purposes.

Surrounding land use

Table 2: Surrounding Land Use

Direction from site	Land Uses
North	State Highway 39 – Te Kowhai Road. Pasture land and rural residential properties further to the north.
South	Pasture land and rural residential properties.
East	Pasture land and rural residential properties. State Highway 1 (Waikato Expressway – Te Rapa Section) further to the east.
West	Exelby Road with pasture land further to the west.

Regional Geology

The site is located roughly centrally within the Hamilton Basin which is characterized by low rolling hills (Hamilton Hills) and plains with low terraces and gullies draining into the Waikato and Waipa Rivers (Hamilton Lowlands).

The Hamilton Hills are linear, sinuous hills and ridges that are remnant of an older erosion surface. They consist of alluvial material and non-welded ignimbrites (Walton Subgroup) and are typically overlain by a number of metres of airfall volcanic ash (Kauroa Ash and Hamilton Ash). The Hamilton Lowlands are a broad, low angle alluvial fan created by the Waikato River in the Late Quaternary. The fan materials are derived from rhyolitic eruptions in the central North Island and generally consist of late Pleistocene primary and secondary volcaniclastic sediments with a wide variety of grain sizes (Piako Subgroup and Hinuera Formation). Deposition of the fan materials ceased when the Waikato River entrenched into its current course approximately 17 ka and thin airfall tephra layers accumulated on the fan surface (Hinuera Surface).

The New Zealand Geological map (QMap) for the Waikato Region maps Walton Subgroup, Hinuera Formation and Piako Subgroup materials at the site. The Walton Subgroup is located on the hills to the east and west of the site, and is described as alluvium dominated by primary and re-worked non-welded ignimbrite. The Hinuera Formation and Piako Subgroup are mapped in the low-lying areas of site. The Piako Subgroup is mapped in the south-eastern corner of the site and is described as locally derived lacustrine mud, silt, gravel and peat. The Hinuera Formation is mapped across the remainder of the site and is described as cross-bedded pumice sand, silt and gravel with interbedded peat.

The HDC geotechnical investigation[1] encountered Hinuera materials in all low-lying areas of the Site.

Hydrogeology

There are three surface water bodies within three km of the Site:

- Lake Rotokauri, located approximately 1.3 km to the south from the southwestern-most extent of the Site;
- Horseshoe Lake, located approximately 2.5 km to the south/southeast from the southeastern-most extent of the Site; and
- The Waikato River, located approximately 2.5 km from the eastern-most extent of the Site.

Surface water flows are expected to generally follow local topography, toward the east, north and west along drainage trenches through the site. These drains flow towards Lake Rotokauri through what appears to be a stream tributaries feeding into the Waipa River. Groundwater is likely to be largely constrained from following the same route by the hills to the east, west and south and is likely to travel north east towards the Waikato River.

A geotechnical investigation conducted at the site by HDC revealed groundwater at a depth of approximately 0.1 to 1.5 m bgs in the low-lying areas and approximately 6 m bgs in the elevated areas.

[1] HDC, 2018. Rotokauri SHA Geotechnical Suitability Report, 13 July.

Site topography and drainage

The site is relatively flat, with two hills present. Drains run broadly north and east to the low-lying area east of the site, which eventually drains to the Waipa River.

Site history

Historical Aerial Photos

Historical aerial photographs were available from Retrolens for 1952, 1963, and 1974, and are provided in Appendix C. Google Earth photos were also available from 2004, 2008, 2010, 2013, and 2016. Observations from the photos are provided in Table 3 below.

Table 3 Historical Aerial Photo Summary

Year	Description
1952	The Site appears to be predominantly grassed, with buildings present at Lot 3 DPS 15123, Lot 1 DPS 46587, Lot 1 DPS 4129, Lot 5 DP 359488, Lot 485743, and Lot 6 DP 359488*. There are sheds and barns present on several properties, with what appear to be rural residential properties on the listed lots. There is a long rectangular structure and stained area at the (present) dairy farm on Lot 6 DP 359488.
1963	There are no significant changes. Additional sheds are present at some of the parcels.
1974	There are buildings present at Section 23 SO 495676 Lot 1 DPS 4129, and Lot 1 DPS 72047. The rectangular structure at the (present) dairy farm is gone and a new structure is present just east of Burbush Road. Some of the sheds present in 1952 and 1963 have been removed and new sheds are now present.
2004	Additional rural residential properties are present along Te Kowhai and Burbush Roads. Most of the sheds are gone. There appears to be an orchard present on a portion of Section 53 SO 495676. Rows which appear to be mowed grass are also present on Section 53 SO 495676. There is a residential dwelling and two rectangular buildings east of the dwelling present on Lot 6 DPS 15123.
2008	The soil in much of Lot 2 DP 485743 has been tilled. There are some additional residential dwellings along Exelby, Burbush, and Te Kowhai Roads. There are no other significant changes from the 2004 photo.
2010	The soil in most of Lot 3 DPS 15123 has been tilled and the previously tilled areas at Lot 2 DP485743 are now grassed. There are no other significant changes from the 2008 photo.
2013	The tilled area at Lot 3 DPS 15123 is now grassed. There are no other significant changes from the 2010 photo.
2016	The soil at Part Lot 2 DPS 15254 has been tilled. There are no other significant changes from the 2013 photo. The market garden and orchard are still present on Section 53 SO 495676.

*Note that some of the lots listed are excluded from the Site. See Appendix A for Site layout.

Council Records

Records were requested from Waikato Regional Council (WRC) and Hamilton City Council (HCC).

Waikato Regional Council Records

Six parcels are on the WRC Land Use Information (LUI) Register. The information provided by WRC is shown in Table 4 below. Figure 2 in Appendix A shows the location of the Land Use Information Register areas.

Table 4. WRC Land Use Information Register Data

WRC Reference	Site Name	Classification	HAIL Activity	Comments
LUI05749	320 Te Kowhai Road	Unverified HAIL	A.10 – Persistent pesticide bulk storage or use	These sites are included on the register for land use information only; there are no reports regarding the presence or otherwise of hazardous substances in the soil.
LUI05751	NWM Trust Management Market Garden	Unverified HAIL		
LUI05752	301 Te Kowhai Road	Unverified HAIL		
LUI05753	HWM Trust Management Limited Orchard	Unverified HAIL		
LUI10871	111 Burbush Road – Soil Investigation	Review pending	Greenfields	A 2011 Soil Investigation Report* has been prepared but has not been reviewed by WRC.
LUI10880	223 Te Kowhai Road PSI	Sampled	Greenfields	A 2014 PSI Report* has been prepared. The PSI concludes that the site is highly unlikely to pose a risk to human health provided development does not occur in the vicinity of farm buildings on site that are to remain in productive use at this time. If development is to occur in these areas, a detailed site investigation may be required to the specific area of concern.

*These reports are described in the next subsection. LUI 10871 is south of the Site. LUI05751 and LUI05749 are north of the Site. However, the land use (pasture) is similar.

The information from WRC also states:

"Rural Land Considerations: Examples of sites that are "more likely than not" to have soil contamination (HAIL sites) include timber treatment activities, service stations and/or petroleum storage, panel beaters, spray painters, etc. Whilst pastoral farming is not included on this list, typical farming activities of horticulture, sheep dipping, chemical storage, petroleum storage and workshops are; but are more difficult to identify and may not be as well represented on the Land Use Information Register. Therefore, individuals interested in pastoral land may be interested in completing further investigations in accordance with Ministry for the Environment Guidelines prior to land purchase and/or development."

"Additional Information: Please note that:

- Significant use of lead-based paint on buildings can, in some cases, pose a contamination risk; the use of lead-based paint is not recorded on the Land Use Information Register.

- Buildings in deteriorated or derelict condition which contain asbestos can result in asbestos fibres in soil; the use of asbestos in building materials is not recorded on the Land Use Information Register.
- The long term, frequent use of superphosphate fertilisers can potentially result in elevated levels of cadmium in soil; the use of superphosphate fertiliser is not recorded on the Land Use Information Register."

Hamilton City Council Records

A request for relevant information was provided to Hamilton City Council. Two environmental investigation reports were received from the Council – one for 223 Te Kowhai Road (also received from Waikato Regional Council) and one for 335 Te Kowhai Road. These reports are summarised below.

Hamilton City Council does not have records for the remaining properties but does note that there may have been HAIL activities, including use of pesticides and persistent pesticides, which should be considered.

Previous Environmental Investigations

As described above, environmental investigations were conducted for the properties located at 111 Burbush Road, 223 Te Kowhai Road, and 335 Te Kowhai Road. Each is summarised below.

111 Burbush Road Soil Investigation Report Summary

A "Soil Contamination Investigation & Assessment" report was prepared for the property at 111 Burbush Road by Soil and Land Evaluation Ltd in August 2011. The report states that "the site has possibly been exposed to potentially contaminating activities such as fertilizer, herbicide and insecticide use in relation to horticulture and agricultural activities." Samples were collected from around the proposed house site and a composite sample was analysed for heavy metals and organochlorine pesticides. All results were below NESCS Soil Contaminant Standards (SCS) for residential land use. The results were also below the NESCS SCS rural residential land use; however, cadmium was detected at 0.79 mg/kg and the NESCS SCS for rural residential land use is 0.8 mg/kg. The NESCS SCS for residential land use is 3 mg/kg.

The report found that the site is suitable for rural residential land use but did state that areas not investigated could have contamination present.

223 Te Kowhai Road PSI Report Summary

A PSI report was prepared by Envirochem Evaluation Limited in 2014 for Lots 1, 3, and 4 DPS 15254 and Pt Lot 7, Lots 9, 10, and 11 DPS 15244. Seven soil samples were collected from across the site and were analysed for cadmium. The NESCS SCS was not exceeded and the report stated that "the average levels of soil contamination in the general pastoral soil are highly unlikely to be a significant risk to human health. This soil is considered suitable for the proposed subdivision and the intended rural-residential land use."

Farm buildings present at the lots investigated included sheds, a shearing barn and dairy milking shed. The report recommended that a detailed site investigation be conducted for those pieces of land where buildings were present due to possible

soil contamination. The report also recommended that any future dwellings be placed 40 to 70 metres away from existing buildings. It also noted that a new dairy effluent pond was proposed and should be taken into consideration with regard to construction of future side dwellings.

335 Te Kowhai Road Land Contamination Screening Report Summary

A *Land Contamination Screening and Heavy Metals Tests* report was prepared by Soil and Land Evaluation in 2004. The report states that there had been historical dairy farming at the site, but that it was currently being used for dry stock farming and grazing. The report also states that there is no history of horticulture or market gardening at the site.

Two samples, comprised of 18 composited single samples, were analysed for heavy metals and organochlorine pesticides. The results were reportedly below guideline values; however, the results were not included with the report provided. The organochlorine pesticide results were below laboratory reporting limits.

Owner Interview

A telephone interview was conducted with the owner of the property located at Sec 53 SO 495676. She stated that the orchard had not been operational since they had purchased the property in 2001. The orchard was previously an apple orchard, and the previous owner had told her that "mainly organic practices" were used.

Site Inspection

The site inspection was first conducted through review of photos and footage from a fly-over with an unmanned aerial vehicle (drone). Areas of interest were then inspected by a suitably qualified practitioner.

Overview

Drone flyover photos were collected in early June 2018. These photos were reviewed by Terre Nicholson, HDC Principal Environmental Consultant, and Matt Moore, HDC Field Technician.

A site inspection was undertaken by Matt Moore, HDC Field Technician, on 14th June 2018. The inspection consisted of conducting a visual inspection while driving and walking around the site, targeting areas of potential environmental concern based on a review of the drone flyover information.

There were hazardous substances (e.g., pesticides, animal drench, paints, lubricants) found in multiple buildings across a majority of the Site. There was minor hydrocarbon staining found in the sheds in Lot 5 DPS 15123 (paved), and Lot 6 DPS 15123 and Lot 2 DP 485743 (unpaved). Rubbish, including empty containers of hazardous substances, was present around and within buildings in the site; the majority of this was located at a workshop/scrap yard in Lot 3 DPS 15123, three of the sheds in the northern side of Lot 6 DPS 15123, and the two sheds and rubbish pit located at the operational dairy farm (Lot 6 DP 359488, PT Lot 7 DPS 15255). The sheds around the Site (Sec 23 SO 495676, Lots 3, 5, 6 DPS 15123, Lot 2 DP 485743, Lots 3-4 DP 15254, Pt Lot 7 DPS 15255, Lot 10 DPS 15255, Lot 6 DP 359488) are

mostly constructed of concrete and metal in varying states of disrepair. Potential asbestos-containing material was observed. There is a dairy effluent sump located next to and connecting to the milking shed, as well as an above ground diesel storage tank/pump within Pt Lot 7 DPS 15255.

Away from the buildings, the Site is predominately covered with grass and is used for grazing. The Site has an undulating terrain, with ridges located on the south, east, and west sides of the side. There are drainage ditches present across the Site running through the paddocks. There were several low-lying areas within the central and eastern sections of the site where surface water was visible. There are numerous gates and fences present which separate the paddocks.

Areas of Environmental Concern

The areas and/or activities of environmental concern and contaminants of potential concern (CoPC) are listed in Table 5.

Table 5. Areas of Environmental Concern

Parcel No.	Areas/activities of concern	CoPC
Entire Site (all parcels)	Super-phosphate fertiliser application	Cadmium
	Persistent pesticide application	Organochlorine pesticides, arsenic, lead
	Buildings with asbestos and/or lead-based paint	Asbestos, lead
	Chemical storage	Hydrocarbons, pesticides, heavy metals
Dairy Farms (Pt Lot 7 DPS 15255, Lot 2 DP 485743)	Effluent ponds	Heavy metals, nitrates
	Animal dip or spray sites	Pesticides, arsenic
	Aboveground diesel tank	Hydrocarbons
Workshop/Scrap Yard (Lot 3 DPS 15123)	Chemical storage	Hydrocarbons, heavy metals, pesticides, solvents
Orchard (Sec 53 SO 495676)	Pesticides	Pesticides, arsenic, lead, copper

Site Evaluation

Conceptual Site Model

Based on the evaluation of available data and identification of the COPCs), a Conceptual Site Model (CSM was constructed. Environmental considerations taken into account in constructing the CSM are shown in Table 6, below.

The primary COPCs for the pasture areas are heavy metals, particularly cadmium, from application of super phosphate fertiliser and organochlorine pesticides from historic use. It is likely that fertiliser was spread across the entire site in a relatively consistent manner as the grassed areas of the Site were used for pasture land rather than for specific crops. The same is true of pesticide application.

There are other COPCs associated with the sheds and buildings (such as hydrocarbons, solvents, animal drenches, lead-based paint, asbestos). In addition,

pesticides, anti-fungal treatments, herbicides, etc., may have been used in the orchard.

Table 6: Conceptual Site Model

Item	Description
Surface Water	Surface water and run off from rain and dust settlement activities may mobilise contaminants (dissolved and particulate) and therefore may contribute to migration of contamination.
Groundwater	Groundwater may contribute to migration of contamination of soluble and mobile contaminants. The depth to groundwater is estimated to be between 0.5 m and 2.1 m bgs in the low-lying areas and up to 6 m bgs in elevated areas. It is considered unlikely that groundwater would be impacted by heavy metals or pesticides; however, hydrocarbons and other organic contaminants may migrate to groundwater.
Subsurface Geology	Subsurface geology may influence migration pathways. For example, contaminants generally travel more quickly through gravel than through clay materials. The site is underlain by alluvium (sand and silt) with peat deposits.
Flora and fauna	The Site is an area which is surrounded by residential and agricultural properties. The Waikato Expressway is located next to the Site and there are no significant areas of native bush. Sensitive species may be present at the Site; however, as it has been pasture land for over 50 years, additional adverse effects are not expected from potential site contamination.
Sensitive Surface Water bodies	Lake Rotokauri is present approximately 1.3 km south of the Site. Horseshoe Lake is south of the Site and the Waikato River is approximately 2.5 km east of the Site.
Vapour Intrusion	Vapours from potential hydrocarbon contamination in soil or groundwater may travel through the gravel fill material on Site, (which will be replaced by vegetation), allowing vapours to pass freely to the atmosphere. Hydrocarbon contamination would be of particular concern, particularly if petrol or solvents have been released. Organochlorine pesticides and heavy metals do not present vapour intrusion risks.

Surface water runoff would be the most likely migration pathway for heavy metals and organochlorine pesticides. Therefore, it is assumed that concentrations in low-lying areas where there has been ponded water from storm events would be likely to have higher contaminant concentrations from the widespread application of pesticides and/or fertiliser.

Based on available information, with the exception of the orchard, the non-occupied areas of the Site have not been routinely tilled and have been used as pasture (grassland). Therefore, the contaminants would likely have the highest concentrations just below the root zone, in shallow near-surface soil.

At the orchard, ground may have been tilled and routinely sprayed with pesticides, anti-fungal treatments, etc. The contamination would likely be at the edges of the tree canopies, directly around the tree trunks, and in tilled rows between the trees.

At the farm buildings (past and present) there is potential for asbestos in building materials, lead-based paint, and hazardous substances storage. Some of the properties have other potentially contaminating activities present, such as rubbish dumps, an aboveground diesel storage tank, and offal pits.

The farm shed entrances also carry a higher risk of contamination because this is the area where fertilisers, pesticides, etc., are typically mixed and loaded into spreading equipment and there is a greater risk of spillage.

Evaluation of Potential Risk

Several potential HAIL activities were noted, which could result in the presence of contamination in soil:

- Many farm buildings historically used asbestos-containing materials and/or with lead-based paint. Farm sheds are often used for storage of pesticides, diesel fuel and petrol, fertilisers, and other hazardous substances.
- Parcel Sec 53 SO 495676 was an apple orchard. According to the site owner, it is unlikely that organochlorine pesticides were used, but it cannot be ruled out, nor can the use of other persistent pesticides, such as those containing arsenic, copper, and lead.
- The workshop/scrap yard at Lot 3 DPS 15123 is used to store hydrocarbons and other hazardous substances. Workshops and scrap yards are considered HAIL activities.
- The dairy farms located at Pt Lot 7 DPS 15255 and Lot 2 DP 485743 may have had spray races present. Past and present effluent ponds are present, along with chemical storage and older buildings. An above ground diesel storage tank is also present.
- Superphosphate fertilisers and persistent pesticides may have been used, resulting in cadmium and pesticides being present in soil.

Recommendations

Based on the review of available information and site inspection, the potential risk to human health from the greenfields (pasture) portions of the site is likely to be low. The risk from hazardous substances associated with farm structures is slightly higher.

Environmental investigations conducted at surrounding properties indicate that while cadmium concentrations are slightly above typical background concentrations, they tend to be well below residential guideline values (10% produce consumption) found in the NESCS. However, farming practices vary among owners, so without sampling and analysis, the potential risk cannot be fully quantified at this time. In the near-term, it is recommended that a strategic sampling plan be developed for the paddocks to confirm the presence or absence of contamination.

As a future activity, site inspections should be conducted as use ceases at properties where HAIL activities have occurred. A sampling and analysis plan

should be developed and implemented for each of the farm structures (current and historical) and the orchard. The sampling and analysis should be tailored to the activities conducted; for example, sampling and analysis for:

- Organochlorine pesticides in select samples from the paddocks;
- Asbestos and lead-based paint around structures;
- Heavy metals, hydrocarbons, and persistent pesticides at shed entrances;
- Heavy metals and hydrocarbons at the workshop/scrap yard;
- Heavy metals, organochlorine pesticides, and hydrocarbons at the dairy farms; and
- Lead, arsenic, copper, and organochlorine pesticides at the orchard.

Note that the activities at the HAIL sites may change over time; therefore, sampling and analysis should not be conducted until activities cease at these sites. Activities must be re-verified before sampling and analysis is conducted and the above example plan amended as appropriate. In addition, it is recommended that rubbish is removed prior to sampling and analysis.

All sample results should be compared with applicable guideline values to assess potential risk and whether remedial action will be required.

Should the samples from the paddocks indicate that there is no significant risk, they will not be classified as HAIL sites and only the areas around potentially contaminating activities (e.g., workshop/scrap yard, orchard, portions of the dairy, farm sheds) should be designated as "pieces of land" for purposes of HAIL classification

Limitations

This document does not include any assessment or consideration of potential health and safety issues under the Health and Safety in Employment Act 1992. HDC has relied upon information provided by the Client and other third parties to prepare this document, some of which has not been fully verified by HDC. This document may be transmitted, reproduced or disseminated only in its entirety. This report has been prepared for the use of the client and may not be relied upon by others without the express written permission of HDC.

From a technical perspective, the subsurface environment at any site may present substantial uncertainty. It is a heterogeneous, complex environment, in which small subsurface features or changes in geologic conditions can have substantial impacts on water, vapour and chemical movement. HDC's professional opinions are based on its professional judgement, experience, and training. It is possible that testing and analysis might produce different results and/or different opinions. Should additional information become available, this report should be updated accordingly. No sampling and analysis was undertaken for this PSI.

Certification

This report presents information from an environmental site investigation conducted by and under the oversight of a Suitably Qualified and Experienced Practitioner with contaminated land experience, as required by the National

Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health and who is a Certified Environmental Practitioner – Soil Contamination. Detailed qualifications are available upon request.



Terre Nicholson, CEnvP-SC # 0509

APPENDIX A - FIGURES

Rotokauri North Special Housing Area

February 2018
Green Seed Consultants Ltd

ROTOKAURI NORTH SHA AREA (Figure 1)

Map legend

- Site area
- 1 Stage 1 (53.39ha)
- 2 Stage 2 (79.72ha)

Stages 1 and 2 sought as an SHA.
Total of 133.1109ha.

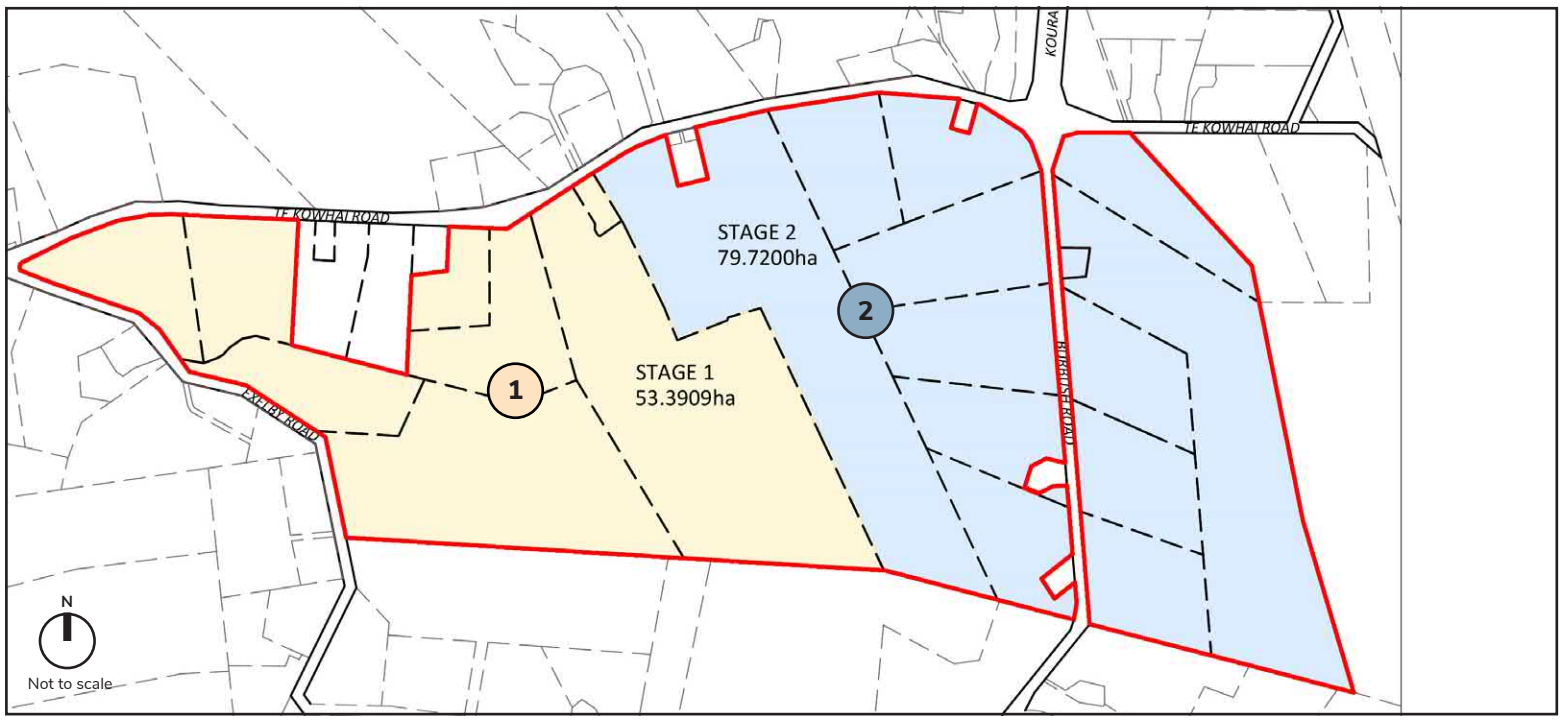


Figure 1: Rotokauri North SHA area

ROTOKAURI NORTH SHA CONCEPT (Figure 2)

Map legend

- Site area
- 1 Optimise connections to east (jobs) as well south.
- 2 Ensure each small centres is focused on its local community.
- 3 Maximise residential catchment around a small centre, and integrate movement network around the centre.
- 4 Provide for necessary stormwater conveyance and storage.
- 5 Provide district-level open space so as to maximise maximise exposure and accessibility to all. Size will be determined by Council acquisition agreement.
- 6 Ensure sensitive slopes can be appreciated as landscape features.

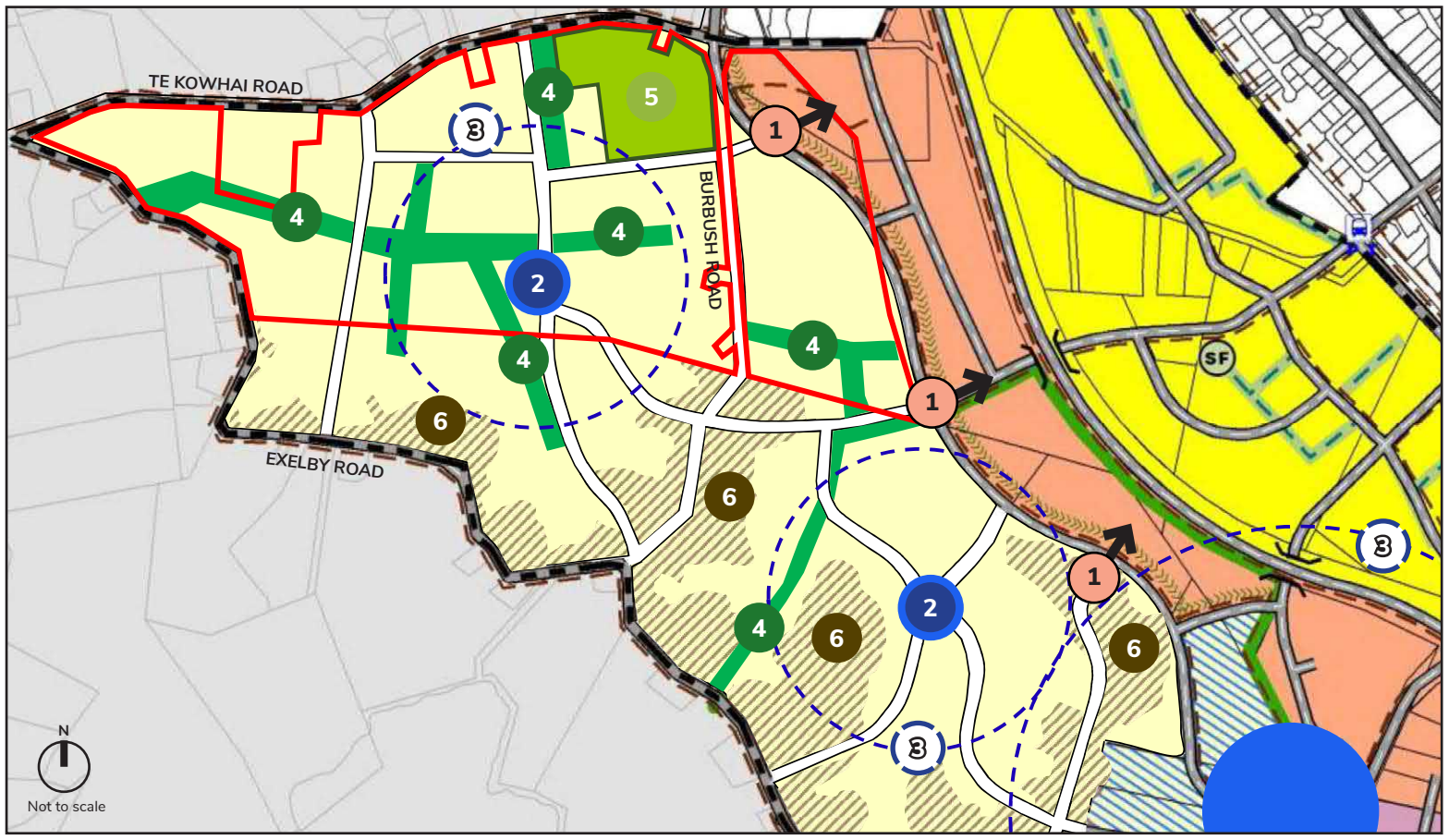


Figure 1: Key structuring elements of Rotokauri North SHA concept

ROTOKAURI NORTH SHA OPTIONS FOR STORMWATER (Figure 3)

Map legend

- Site area
- Floodway basin (conveyance and flood storage)
- Swale (conveyance only)
- Treatment wetlands
- Discharge locations

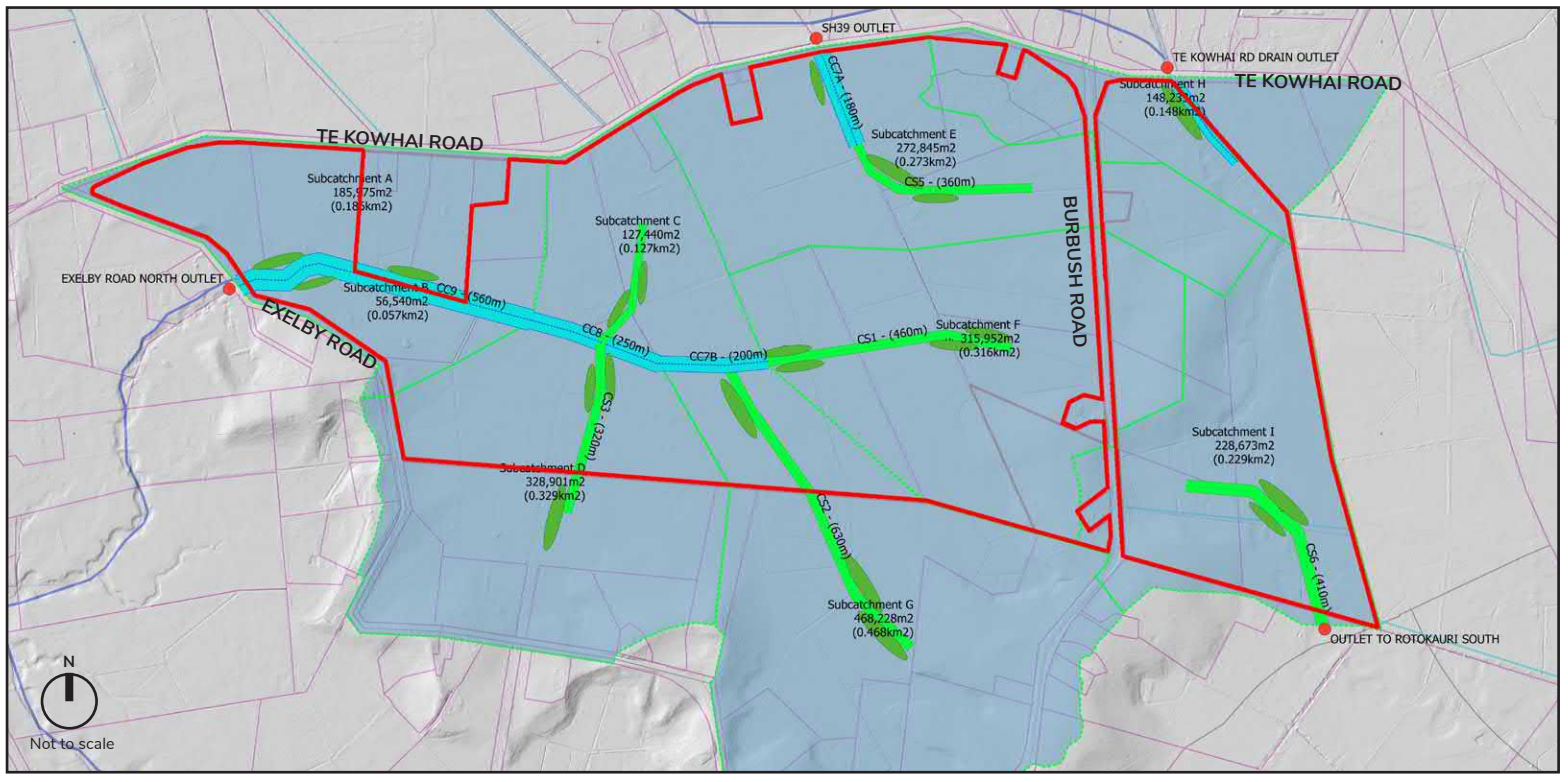


Figure 3: Rotokauri North SHA options for stormwater
Source: CKL Stormwater Solutions

Rotokauri North Special Housing Area

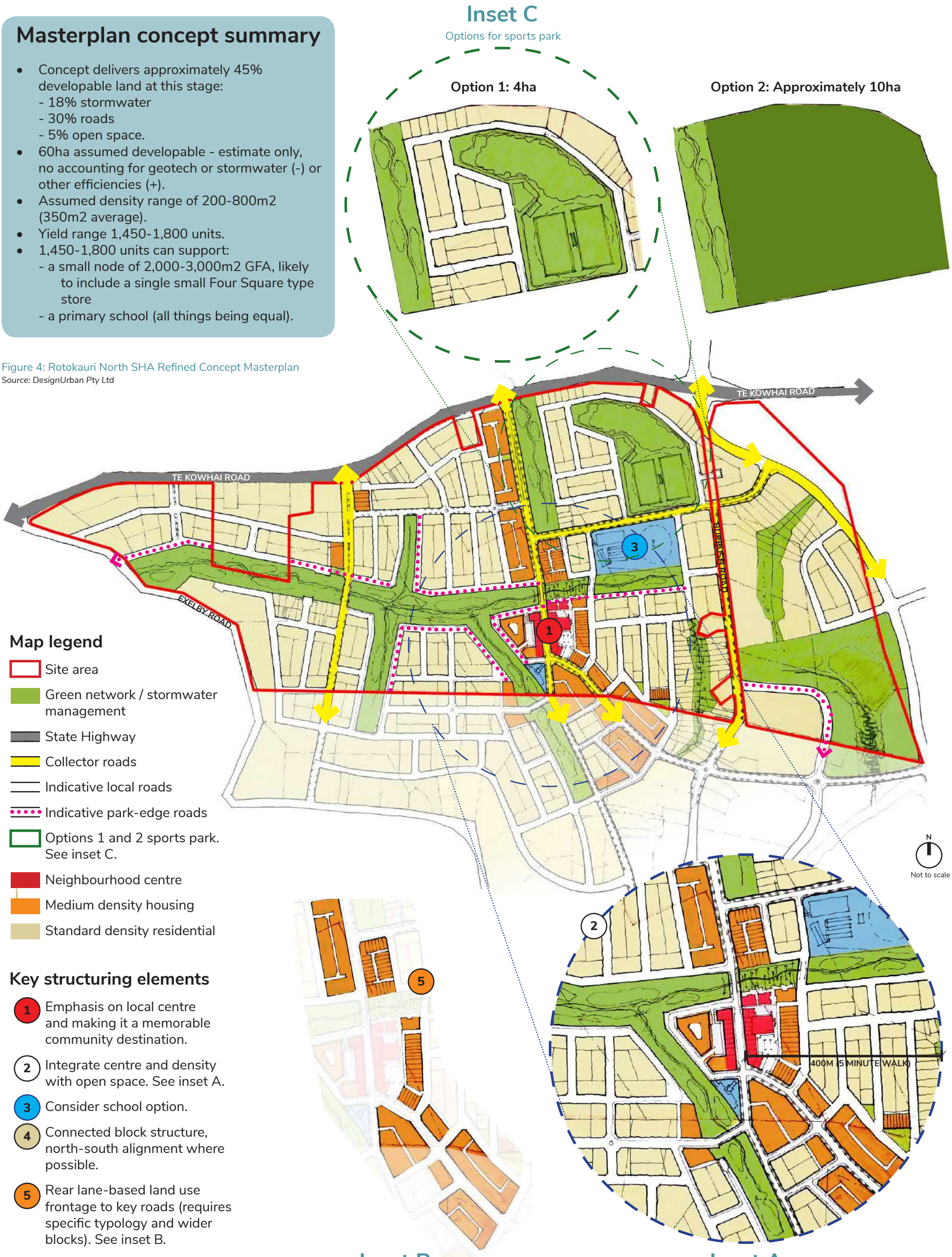
February 2018
Green Seed Consultants Ltd

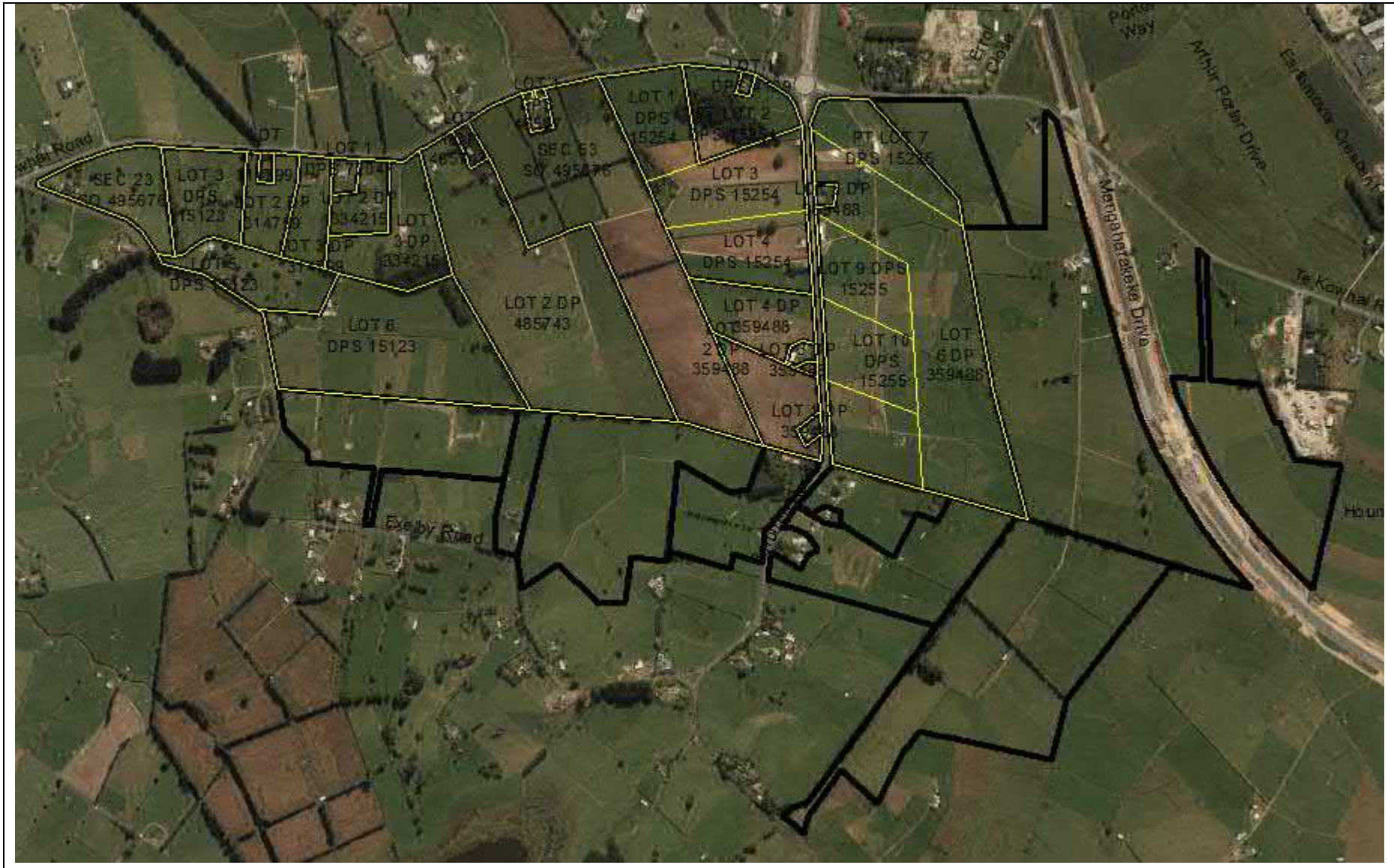
ROTOKAURI NORTH SHA REFINED MASTERPLAN (Figure 4)

Masterplan concept summary

- Concept delivers approximately 45% developable land at this stage:
  - 18% stormwater
  - 30% roads
  - 5% open space.
- 60ha assumed developable - estimate only, no accounting for geotech or stormwater (-) or other efficiencies (+).
- Assumed density range of 200-800m2 (350m2 average).
- Yield range 1,450-1,800 units.
- 1,450-1,800 units can support:
  - a small node of 2,000-3,000m2 GFA, likely to include a single small Four Square type store
  - a primary school (all things being equal).

Figure 4: Rotokauri North SHA Refined Concept Masterplan
Source: DesignUrban Pty Ltd





Approximate Site Boundary

PROJECT: Rotokauri SHA	
PROJECT NO: HD637	
CLIENT: Mark Tollemache	
TITLE: Site Location	
SCALE: NTS	
Drawing No. 1	
Drawing by: TN	
Rev Number	
0	Initial



GEO

LUIR Areas

PROJECT: Rotokauri SHA	
PROJECT NO: HD637	
CLIENT: Mark Tollemache	
TITLE: LUIR Locations	
SCALE: NTS	
Drawing No. 2	
Drawing by: TN	
Rev Number	
0	Initial

APPENDIX B – PROPERTY INFORMATION

Rotokauri Special Housing Area Property Information

Parcel Number	Address*	Area (square metres)**
Sec 23 SO 495676	415 Te Kowhai Road	42,547
Lot 3 DPS 15123	383 Te Kowhai Road	42,134
Lot 2 DP 334215	341 Te Kowhai Road	20,005
Lot 3 DP 334215	335 Te Kowhai Road	51,425
Lot 2 DP 485743	329 Te Kowhai Road	195,546
Lot 1 DP485743	321 Te Kowhai Road	4,501
Sec 53 SO 495676	Te Kowhai Road	197,859
Lot 1 DPS 15254	Te Rapa Road	42,589
Lot 2 DPS 15254	153 Te Kowhai Road	41,241
Lot 3 DPS 15254	Te Rapa Road	57,876
Lot 4 DPS 15254	38 Burbush Road	50,733
Lot 4 DP 359488	56 Burbush Road	39,486
Lot 2 DP 359488	76 Burbush Road	39,309
Pt Lot 7 DPS 15255	153 Te Kowhai Road	39.451
Lot 6 DP 359488	17 Burbush Road	164,788
Lot 5 DPS 359488	29 Burbush Road	2,626
Lot 9 DPS 15255	Burbush Road	40,475
Lot 10 DPS 15255	223 Te Kowhai Road	40,475
Lot 11 DPS 15255	223 Te Kowhai Road	40,476
Lot 5 DPS 15123	372 Exelby Road	40,643
Lot 6 DPS 15123	350 Exelby Road	137,239

*Source: http://gisviewer.hcc.govt.nz/templates/PropQuery/. Accessed 18 June 2018

** Source: https://data.linz.govt.nz/data/category/property-ownership-boundaries/global/oceania/new-zealand/waikato/hamilton-city/?s=n. Accessed 18 June 2018.

APPENDIX C – HISTORIC AERIAL PHOTOS



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1952

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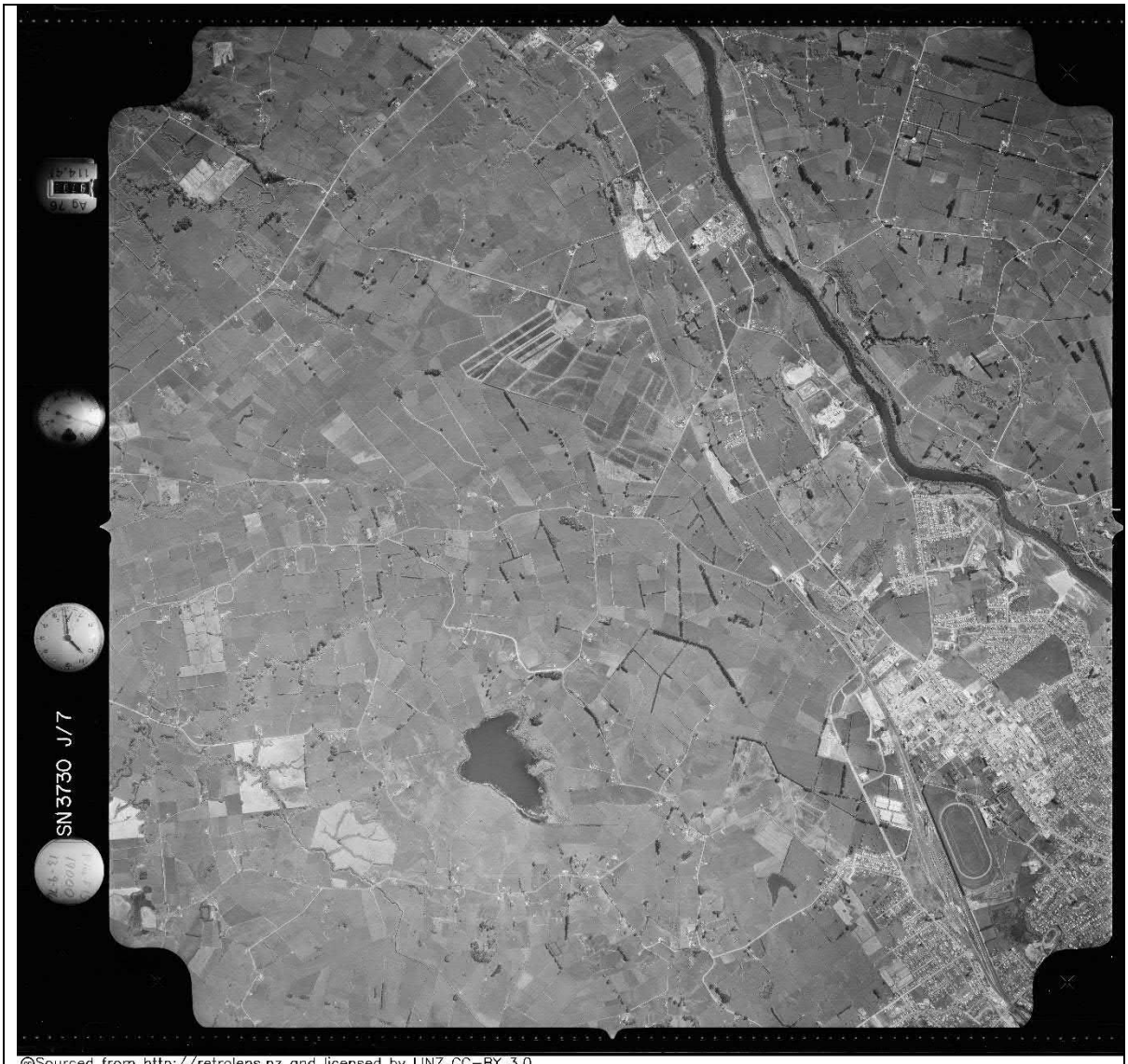
1963



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APPENDIX D – SITE PHOTOS

Site Photos – Rotokauri North SHA – 21st June, 2018



Photo 1. Hydrocarbon staining on floor of shed, facing west. Lot 5 DPS 15123.



Photo 2. Unknown storage tank, facing north. SEC 23 SO 495676.



Photo 3. Unknown metal tank (leaking) with generator & herbicide tank, facing west. SEC 23 SO 495676.



Photo 4. Fuel and oxidizing bottles, facing north. LOT 6 DPS 15123.



Photo 5. Potentially hydrocarbon stained soil, inside barn facing north-east. LOT 6 DPS 15123.



Photo 6. Glyphosate (organophosphorus) herbicides in shed. LOT 6 DPS 15123.



Photo 7. Formalin containers. LOT 3 DPS 15123.



Photo 8. Shelves of paint in storage shed. LOT 3 DPS 15123.

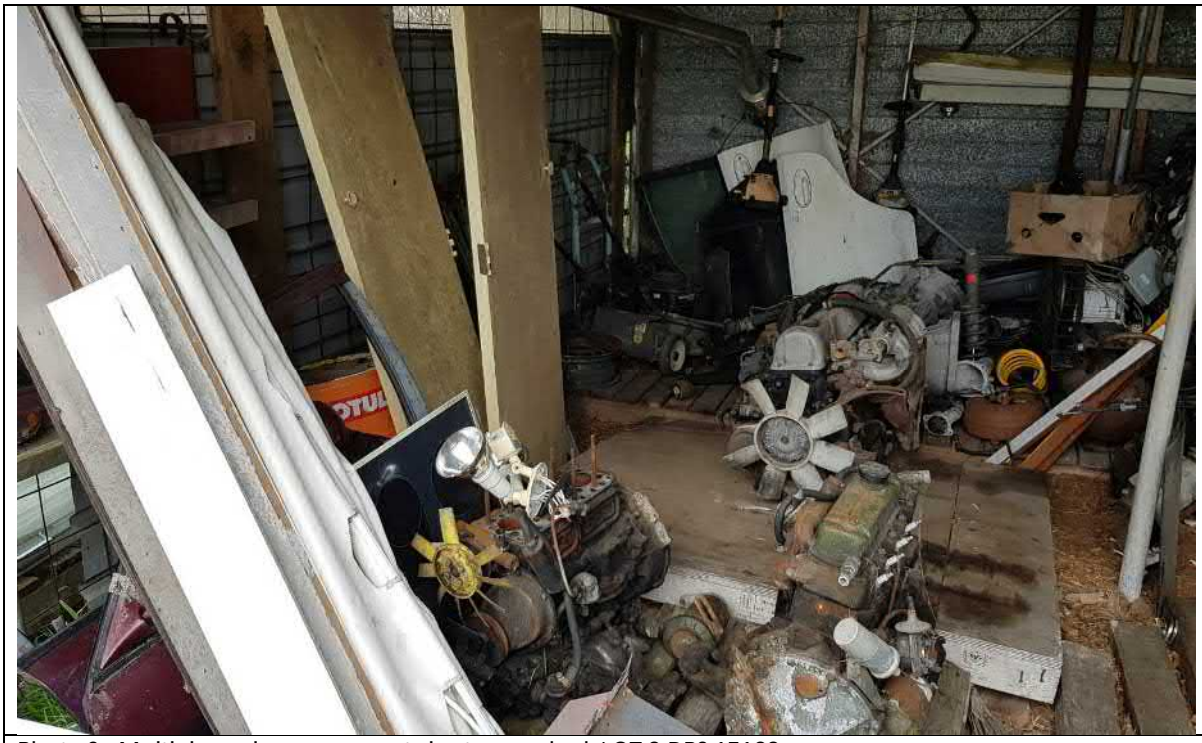

Photo 9. Multiple engine components in storage shed. LOT 3 DPS 15123.



Photo 10. Dairy cattle milking station, facing south. LOT 2 DP 485743.



Photo 11. Hydrocarbon staining under vehicles in storage shed, facing south. LOT 2 DP 485743.



Photo 12. Storage shed, facing south-east. LOT 2 DP 485743.



Photo 13. IntenSE container and pichloram+triclopyr herbicide in storage barn. LOT 6 DP 359488.

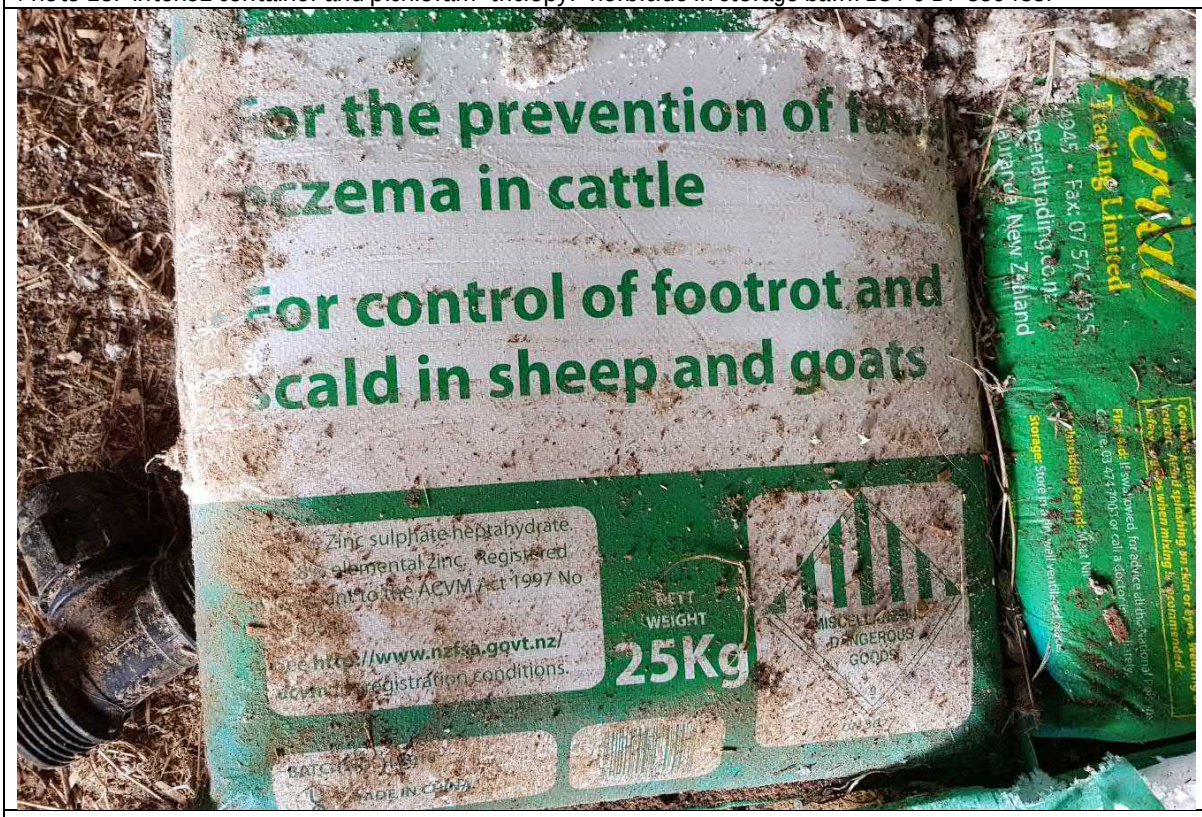

Photo 14. Zinc sulphate heptahydrate in storage barn. LOT 6 DP 359488.



Photo 15. Rubbish pit, facing south-west. PT LOT 7 DPS 15255.



Photo 16. Standing diesel tank, facing south-west. PT LOT 7 DPS 15255.

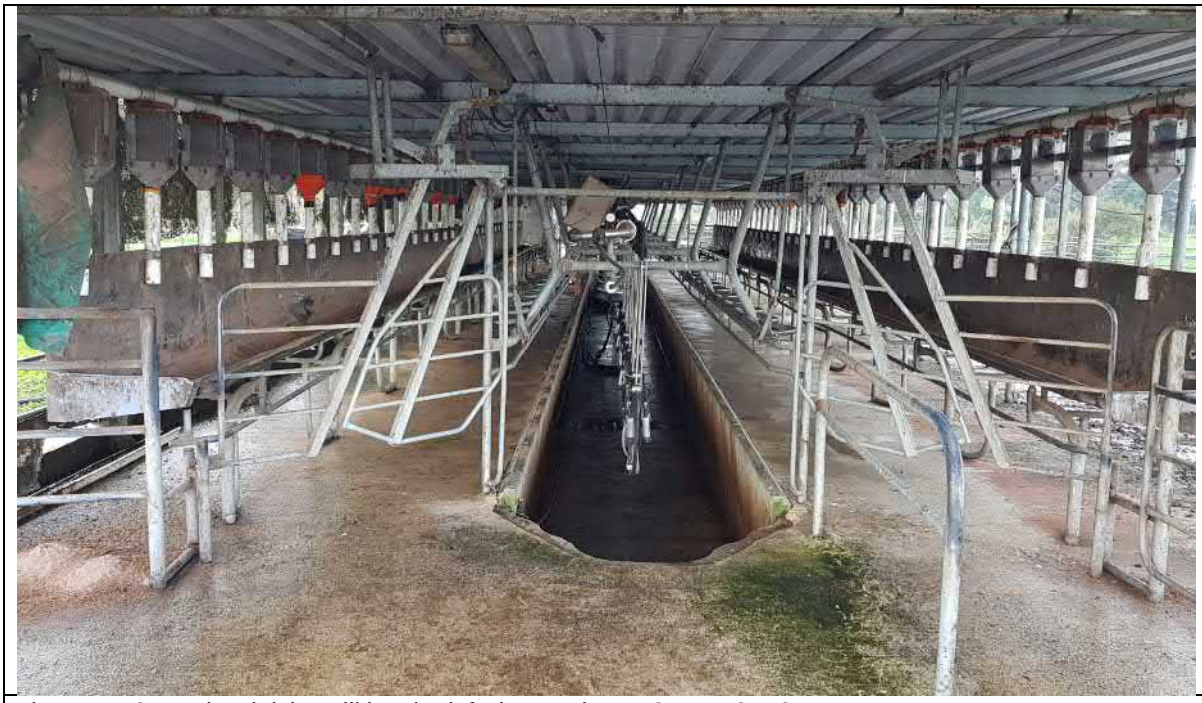

Photo 17. Operational dairy milking shed, facing south. PT LOT 7 DPS 15255.



Photo 18. Effluent sump, connected to milking shed. PT LOT 7 DPS 15255.



Photo 19. Wood storage shed with connecting pig pen, facing west south-west. LOT 3 DPS 15254.

ATTACHMENT 9 - Sub-catchment Integrated Management Plan prepared by Tollemache Consultants dated April 2019

ROTOKAURI NORTH

Green Seed Consultants Limited

Sub-Catchment Integrated Catchment Management Plan

April 2019

DOCUMENT CONTROL RECORD

PROJECT: Rotokauri North Private Plan Change – Sub-Catchment ICMP

CLIENT: Green Seed Consultants Limited

PROJECT LOCATION: Rotokauri North

AUTHOR: Tollemache Consultants Ltd

Revision	Date	Originator	Checker	Approver	Description
DRAFT	Nov	RFS	MT	MT	Internal review
DRAFT	30 Nov	RFS	AJSH	MT	Internal review
DRAFT	1 Dec	RFS	MT	MT	For Issue - HCC
FINAL	April 2019	RFS	MT	MT	For issue - HCC

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Acronym Table:

Acronym	Definition
ANZECC	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
B6Z	Business 6 Zone
BPOs	Best Practicable Options
DSI	Detailed Site Investigation
FUZ	Future Urban Zone
FWI	Far Western Interceptor
GSCL	Green Seed Consultants Ltd
HAIL	Hazardous Activities and Industries List
HCC	Hamilton City Council
HCDP	Hamilton City District Plan
ICMP	Rotokauri North Sub-Catchment Integrated Catchment Management Plan
RITS	Regional Infrastructure Technical Specifications
LASS	Waikato Local Area Shared Services
LOS	Level of Service
MDRZ	Medium Density Residential Zone
Morphum	Morphum Environmental Ltd
NPS-FM	National Policy Statement for Freshwater Management
OLFP	Overland Flowpath
PPC	Private Plan Change
PSI	Preliminary Site Investigation
RITS	Regional Infrastructure Technical Standards
RMA	Resource Management Act 1991
RNSP	Rotokauri North Structure Plan
Rotokauri ICMP	Rotokauri Integrated Catchment Management Plan
RPS	Waikato Regional Policy Statement
Settlement Act	Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010
SH39	State Highway 39
SNA	Significant Natural Area
THaWK	Te Haa o te whenua o Kirikiriroa
WDC	Waikato District Council
WRC	Waikato Regional Council
WRP	Waikato Regional Plan
WRPS	Waikato Regional Policy Statement
WWTP	Wastewater Treatment Plant

1.0 INTRODUCTION

This Sub-Catchment Integrated Catchment Management Plan ("**ICMP**") report has been prepared to support a request for a Private Plan Change ("**PPC**") to the Hamilton City District Plan ("**HCDP**"), by Green Seed Consultants Ltd ("**GSCL**") for an area of land identified as "Rotokauri North" in the north-west of Hamilton City.

Rotokauri North comprises approximately 140ha of land proposed to be zoned for urban activities, specifically;

- 137.6 hectares is proposed as a Medium Density Residential zone ("**MDRZ**");
- 1.2 Hectares is proposed as a Business 6 zone (Neighbourhood) ("**B6Z**");
- 0.5 hectares will retain its current zone as a Significant Natural Area ("**SNA**"), i.e. no change from the operative provisions.

Based on the PPC area, the development could yield approximately 2,000 houses.

The majority (approximately 133 ha) of the area, falls within land holdings falling under the GSCL umbrella.

This ICMP also includes 63.5 hectares of Rotokauri land which will retain its Future Urban zoning ("**FUZ**"), but as that land falls within the catchment subject to this application, it has been included within this ICMP.

1.1 Sub-Catchment ICMP Scope and Area

The land to which this ICMP relates is located in an area south of Te Kowhai Road (State Highway 39 "**SH39**") and east of Exelby Road to the north west of Hamilton City, as shown in Figure 2 below.

This document is a "sub-catchment" ICMP focused specifically on the Rotokauri North area. Although some of the catchments extend beyond the HCC territorial boundary, this IMCP only covers land within the HCC territorial boundary (technical assessments have covered the catchments as a whole).

As development at Rotokauri North has been anticipated and envisaged for some time, the land was included in the adopted Rotokauri Integrated Catchment Management Plan ("**Rotokauri ICMP**"), which covers all of the Rotokauri Structure Plan area identified in Chapter 3 of the HCDP.

The Rotokauri North area, therefore, constitutes a "sub-catchment" within the wider Rotokauri area, and as such, this document is prepared a "Sub-Catchment ICMP" to be read as part of the Rotokauri ICMP.

1.2 Other Supporting Documents

This ICMP is supported by the following technical reports which are provided as attachments to this report:

(a) Rotokauri North Catchment Stormwater Modelling Report prepared by Aecom [October 2018 DRAFT]

(b) Flood Impact Assessment prepared by Opus [February 2019]

(c) Rotokauri North Development Area: Technical review of stream classifications prepared by Tonkin & Taylor Ltd, dated 7 December 2018.

(d) Receiving Environment and Rapid Erosion Assessment Rotokauri North Sub-Catchment prepared by Morphum Environmental Ltd November 2018 DRAFT ("**Morphum**")

(e) Rotokauri North SHA: Archaeological Assessment prepared by CFH Heritage dated 3 December 2018

(f) Rotokauri North SHA Geotechnical Assessment Report prepared by HDGeo dated 25 October 2018

(g) Rotokauri North SHA – Response to HCC Peer Review prepared by HDGeo dated 27 February 2019

(h) Rotokauri North Preliminary Site Investigation by HDGeo dated 11 July 2018

(i) Rotokauri North ICMP: Desktop Review of Hydrogeological Conditions Influencing Stormwater Design prepared by Beca dated 17 July 2018 DRAFT

(j) Rotokauri North Stormwater and MUSIC Modelling Report prepared by McKenzie & Co Consultants Ltd dated April 2019.

(k) Rotokauri North Water and Wastewater Servicing Options by McKenzie & Co Consultants Ltd dated April 2019.

(l) Rotokauri North Catchment Modelling Report Report prepared by McKenzie & Co Consultants Ltd dated April 2019.

This ICMP is also supported by the following technical reports (which are not provided as attachments to this report but can be provided upon request).

(m) Rotokauri ICMP prepared by Hamilton City Council; and

(n) Mangaheka ICMP prepared by Beca

1.3 Purpose of the Sub-Catchment ICMP

The purpose of this sub-catchment ICMP is:

- To provide an integrated management approach based upon best practicable option(s) ("**BPOs**") to avoid as far as practicable and otherwise minimise, the cumulative adverse effects of all new stormwater activities in the sub-catchment;

- To provide guidance on how water, wastewater and stormwater within the catchment will be managed in an integrated way and in accordance with proposed land uses that occur within the site;

- To ensure the effects of stormwater discharges are mitigated in accordance with the requirements of the Rotokauri ICMP, discharge consents held/to be obtained and Waikato Regional Council ("**WRC**") guidance;

- To provide a platform for considering the implementation of water sensitive principles (including but not limited to) to reduce demand for water, minimise wastewater generation and minimise the need for three waters infrastructure where appropriate.

- Investigating how Level of Service ("**LOS**") and industry best practice can be met; and
- Investigating whether and how ICMP specific issues can be addressed.

This ICMP will be incorporated into the adopted Rotokauri ICMP document, and on-going decision making, and will be required for integrated management of the three waters infrastructure in the catchment.

It is anticipated that this ICMP will undergo periodic review (including that required by a condition of a discharge consent) by GSCL (or its successor), to maintain relevance to national, regional and local policy. It is also recognised that monitoring of possible changes within the sub-catchment will be required as the development progresses.

1.4 Key Infrastructure Projects

Roading

No new upgrades to the state highway network are required for the planned development (apart from intersections). New collector and minor arterial roads identified in the Rotokauri North Structure Plan ("**RNSP**") area will be progressively developed to support the transport network.

Wastewater

The Hamilton City Council ("**HCC**") Long-term Infrastructure Strategy 2015-2045 defines the future direction of the bulk wastewater network within the City. This document illustrates the Council's strategy to service Rotokauri through the development of a reticulated network, that will require transfer pump stations and reticulation infrastructure. It is acknowledged that the development proposed is occurring prior to the planned date for servicing the Rotokauri North area.

Water Supply

The HCC Long-term Infrastructure Strategy 2015-2045 defines the future direction of the bulk water supply network within the City. This document illustrates the Council's intention to accommodate future growth by extending the reticulated network into Rotokauri. It is acknowledged that the development proposed is occurring prior to the originally planned date for servicing the Rotokauri North area.

1.5 Outcomes

The ICMP outcomes are to:

- Set best practicable integrated three water management options for stormwater, water and wastewater within the catchment that are environmentally, culturally, socially and economically sustainable (particularly given the requirements for affordable housing in Rotokauri North).
- Identify potential constraints, demands for services and any infrastructure improvements necessary to accommodate growth, and to confirm that the available three waters infrastructure and infrastructure capacity can appropriately service the potential urban growth, development and land use intensification within the catchment;

- Provide clear direction for the adoption of appropriate water-sensitive techniques to achieve water conservation, and minimise water demand, wastewater generation and stormwater runoff.

2.0 STRATEGIC CONTEXT

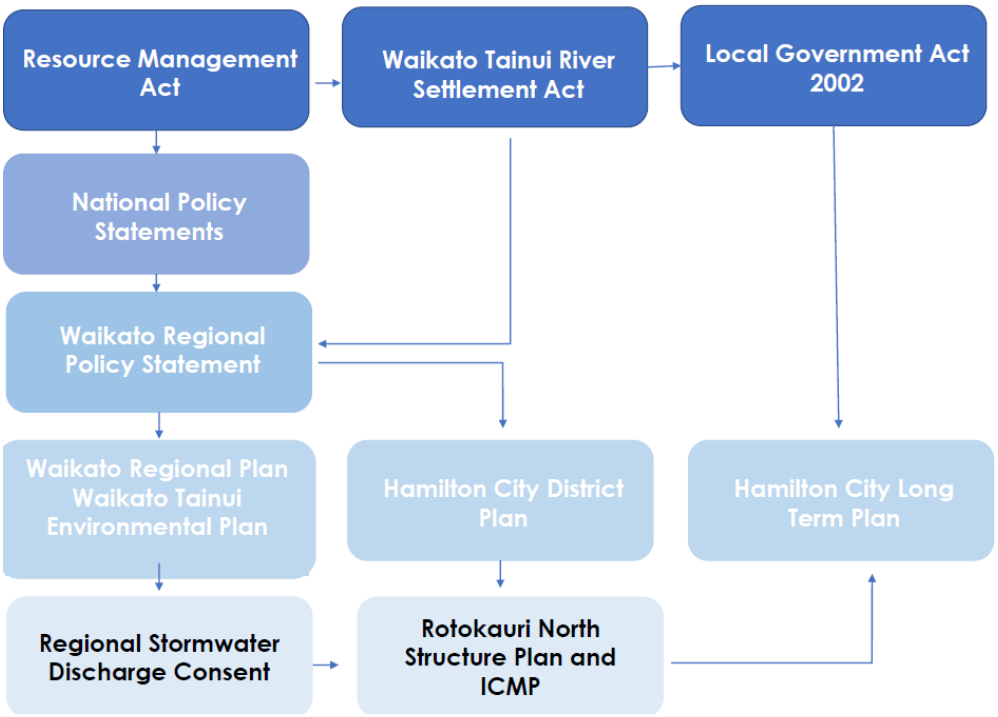
Development within the catchment is influenced by central and regional government policies, plans and resource consents, HCC policies and plans, and Waikato District Council ("**WDC**") policies and plans. Most policies and rules ultimately flow from the Waikato Regional Policy Statement ("**RPS**") which is given effect through planning documents such as District Plans and Regional Plans. The RPS also reflects iwi aspirations for the region and National Policy Statements.

The ICMP relies on current best practice stormwater management in the context of the existing strategic and legislative framework. Any changes to these external drivers must be considered during future reviews of the ICMP and HCC's Infrastructure Technical Specifications ("**ITS**") to maintain alignment of objectives.

The key planning documents relevant to catchment management planning in the Waikato Region are discussed in this section. Their hierarchy is demonstrated in Figure 1. This sub-catchment falls within an area that has been anticipated for Hamilton's future urban growth.

This ICMP and its prescribed best practicable options ("**BPOs**") predominately focuses on mitigation of the adverse effects associated with the proposed land-use changes due to urban development. It includes best practicable options for water supply, wastewater and stormwater infrastructure, and management of receiving environments across the RNSP area.

Figure 1: Relationship of documents relevant to ICMP preparation



2.1 Legislation/Key Policy Documents

Development within Rotokauri North is influenced by central and regional government policies, plans and resource consents, HCC policies and plans (and in the lower catchment WDC policies and plans). Table 1 provides a list of the key source documents that provide policy direction and guidance for the management of three waters and have been taken into account in the preparation of this ICMP.

Table 1: Key Source Documents

Document	Outline/Summary
National Legislation:	
Resource Management Act 1991 ("**RMA**")	Specifically, Section 15 of the Act includes controls on the discharge of contaminants into the environment, including from stormwater, and states that no person may discharge any water into water or onto land unless the discharge is expressly allowed for in a national environmental standard, regional plan or resource consent.
Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010 ("**Settlement Act**")	A co-management agreement was signed between Waikato Raupatu River Trust (Waikato-Tainui) and WRC. The Act sets up Te Ture Whaimana o Te Awa, a Vision and Strategy relevant to all activities within its catchment with the purpose of "*restoring and protecting the health and well-being of the Waikato River for future generations*". The agreement clarifies a range of factors and acknowledges integrated catchment management requires coordination and collaboration between each Party's respective planning documents and implementation processes.
National Policy Statements:	
National Policy Statement for Freshwater Management ("**NPS-FM**")	The NPS-FM endeavours to safeguard freshwater's ecological and human health values through the sustainable management of land and discharges of contaminants, manage freshwater quantity, manage by catchments, and provide for community and tangata whenua involvement in management. The NPS-FM also identifies tangata whenua and community values regarding freshwater and uses water quality measures to set objectives to protect these values.
Regional Policy:	
Waikato Regional Policy Statement	The RPS provides an overview of the resource management issues of the region and the ways in which integrated management of the region's natural and physical resources will be achieved. It sets an overarching direction for the management and protection of Waikato's resources as well as objectives and policies for how these issues will be addressed. The RPS

Document	Outline/Summary
	recognises the Waikato River's Te Tura Whaimana o Te Awa as the primary document for management of the Waikato River and promotes catchment-based approaches to water quality and freshwater biodiversity. In 2016 the second generation of the RPS became operative. It stipulates the importance of classifying waterways and assessing their ecological value to protect and restore the Waikato River and its tributaries. Any activities which could result in destabilisation of beds/banks of waterbodies, contaminant discharge, adverse effects on flora and fauna, loss of public access or adverse effect on any cultural association of Waikato-Tainui with the Waikato River must be controlled. The WRPS specifies the policy direction for the HCDP.
Waikato Regional Plan ("**WRP**")	The WRP contains issues, objectives, policies and rules, relating to the discharge of stormwater into water and the discharge of stormwater onto or into land. Water management is a key issue in the Waikato Region. The WRP includes requirements for efficient use of water, stormwater discharges and changes or disturbances to watercourses.
Sub Regional Three Waters Strategy	The vision of the strategy is to achieve the delivery of integrated, sustainable and well managed Three Waters services for the sub-region which ensures the cultural, social and economic needs of the community are met, and the quality of the Waikato River is improved.
Te Ture Whaimana o Te Awa o Waikato (Vision and Strategy for the Waikato River).	It is noted above that Te Ture Whaimana o Te Awa o Waikato (the Vision and Strategy for the Waikato River) has been included in full as part of the RPS. Te Ture Whaimana o Te Awa o Waikato sets out a vision whereby a healthy Waikato River sustains abundant life and prosperous communities who, in turn, are all responsible for restoring and protecting the health and wellbeing of the Waikato River, and all it embraces, for generations to come.
District Policy:	
Hamilton City District Plan	The HCDP became operative on 18 October 2017. It offers a framework for integrated resource management regarding the use, development or protection of land and associated natural and physical resources. The HCDP provisions include requirements for the preparation of integrated catchment management plans, sub-catchment integrated catchment management plans and water impact assessments. There are also provisions which set standards such as water efficiency, surface permeability, and building

Document	Outline/Summary
	coverage. Together with the ITS, the HCDP is a key tool for on-going management within the Rotokauri North sub-catchment.

In addition to the above, Table 2 provides a list of some of the key source/reference documents that have been reviewed during the development of this sub-catchment ICMP:

Table 2: Key Reference Documents

Document Title	Date/Version
Waikato River Authority Vision & Strategy	July 2011
National Policy Statement for Freshwater Management	August 2014
Sub-regional Three Waters Strategy	September 2012
Southern Growth Corridor Strategic Land-use and Infra SP	October 2015
HCC Long-term Infrastructure Strategy 2015-2045	2015
HCC Comprehensive Stormwater Discharge Consent (#105279)	June 2011
HCC Water Take Consent (#113941)	March 2009
HCC Wastewater Discharge Consent (#114674)	September 2007

2.2 Three Waters Master Planning, Integration and Hierarchy

Three waters means the three key areas of strategic water management (including associated infrastructure) within the City – comprising water supply, wastewater and stormwater.

Three waters integration recognises that there is significant interaction between the three types of waters, surrounding natural water systems and land and that it is beneficial to consider their interconnectedness. To ensure protection of the environment and the ongoing availability of services to growth areas, they need to be managed in an integrated manner.

The HCDP adopts a best-practice hierarchy for three waters management based on principles for sustainable resource management, environmental protection and efficiency. In addition, the ITS and HCDP offer detailed information on the range of water sensitive techniques which are available for greenfield developments to minimise the impact of development.

The development and implementation of BPO's should have regard to and reflect the established hierarchy for the management of the three waters (as outlined in the ITS):

Minimise Demand (Water, wastewater) -> Reuse (stormwater) -> Treat & Dispose to Ground (stormwater) -> Treatment & Detention (stormwater) -> Reticulation (stormwater, wastewater)

The ideal stormwater management system for a developed site is one that replicates the undeveloped scenario. A range of water sensitive techniques are available to minimise the impact of development and enhance the environment.

2.3 Strategic Objectives

One of the purposes of ICMPs is for HCC to define and set objectives for its catchments.

Common strategic objectives have been set across all catchments within the HCC jurisdiction

(refer to

Table 3). Strategic objectives for integrated catchment management planning have been developed by HCC to guide decision making.

Table 3: Strategic Objectives (applicable to all ICMP's)

Ref No	Strategic Objectives
SO1	***Protect freshwater systems*** Maintain, protect and enhance freshwater ecosystems and natural drainage systems by safeguarding the life-supporting capacity, improving water quality where degraded and protecting significant values of wetlands and outstanding freshwater bodies.
SO2	***Protect terrestrial systems*** Maintain, protect and enhance indigenous biodiversity values and functions for terrestrial ecosystems and protect significant habitat of indigenous fauna.
SO3	***Kaitiakitanga*** Give effect to the relationship of tangata whenua as kaitiaki of receiving water bodies and including the relationship of Waikato-Tainui with the Waikato River.
SO4	***Stormwater Management*** Stormwater management related to land use and development shall encourage and enable low impact design and incorporate best practicable mitigation measures to minimise actual and potential adverse effects on: • Receiving water bodies in terms of quantity and quality of stormwater discharges, • Locations and communities subject to flood hazards, • Natural groundwater levels, • Baseflows for freshwater systems.
SO5	***Wastewater Management*** Wastewater management shall incorporate best practicable options and be managed so that: • Conveyed network volumes are minimised, (e.g. by demand management and management of stormwater infiltration) • Dry weather overflows are prevented, and wet weather overflows are minimised.
SO6	***Potable Water Management*** Water supply is planned and provided for in a way that meets existing and future requirements to:

Ref No	Strategic Objectives
	• Provide firefighting water supply (flow and pressure) by conforming to the Code of Practice for Fire Fighting Water Supplies • Meet domestic, commercial and industrial water demand. • Ensure water consumption is managed to minimise peak and total demand.
SO7	***Three Waters Management*** Three waters networks are planned, managed and operated in an integrated manner to: • Meet existing and future development requirements whilst maintaining human and ecosystem health. • Meet design standards, consent conditions and regulatory levels of service. • Ensure assets, technology and resources have capacity, redundancy (n+1), knowledge and plans to prevent or cope with unplanned events. • Minimise the need for new infrastructure including by optimising the use of existing assets.

The following strategic objectives have been identified that are specific to this ICMP. As the area falls within both the Mangaheka and Rotokauri ICMPs the strategic objectives of both of these catchments have been considered and are incorporated below.

Table 4: Strategic Objectives applicable to this ICMP

Ref No	Strategic Objectives
Objectives across the whole ICMP area:	
CS1	**Alignment with the RNSP** Development and three waters infrastructure is designed, constructed, operated and maintained in general accordance with the overarching vision, objectives, policies and guiding principles of the RNSP. In particular to: • Manage stormwater in a manner that minimises the effects of development on downstream receiving waters • Provide a 'green corridor' for stormwater drainage which connects the wider network of open spaces and natural features • Ensure that new urban development is appropriately serviced • Ensure that the LOS required for each sub-catchment is commensurate with that catchment and can be implemented in conjunction with the urbanisation of each sub-catchment.
CS2	**Flood protection and downstream LOS** The major stormwater drainage infrastructure is designed, constructed, operated and maintained to:

Ref No	Strategic Objectives
	• Meet cross jurisdictional flood protection LOS (HCC, WDC and WRC) • Align the sizing of flood storage and conveyance infrastructure requirements to that which is reasonably needed to service the development of the RNDA (taking into account capital and ongoing operation and maintenance costs)
CS3	**Protecting water quality** Require the stormwater network to incorporate a treatment train approach which is designed, constructed, operated and maintained to improve water quality of onsite watercourses: • Minimise temperature fluctuations in receiving waterbodies • Maximise contaminant removal efficiencies at all times • Be resilient to accidental or deliberate contaminant spills and discharges • Meet or exceed the stormwater treatment requirements for the catchment, including as a minimum 75% total suspended solids removal prior to discharge to the receiving environment

2.4 Levels of Service

Levels of Service are documented in different levels of detail in various key documents. These currently include;

- Stormwater – management of 2, 10 and 100 year storm events (in accordance with land-use type);
- Wastewater - no additional overflows due to development (volume and frequency); and
- Water pressure – 10m of head at the boundary

Table 5 outlines documents to review for further levels of service and design standards information.

Table 5: LOS and Design Standards

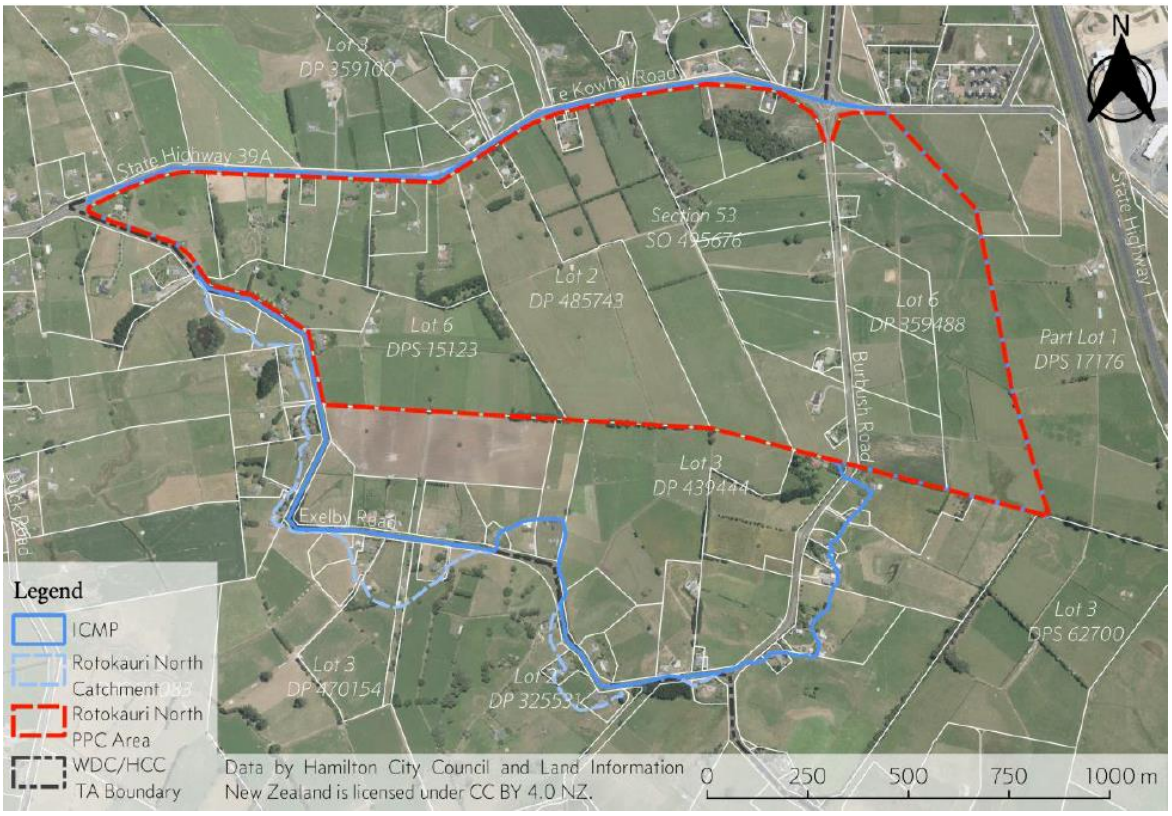
Document Title	Date/Version
HCDP	October 2017
HCC ITS	December 2016
HCC Three Water Management Practice Notes	September 2016
HCC 2015-2025 10 Year Plan	June 2015
WRC 2015-2025 Long Term Plan	June 2015
HCC Bylaws (including Water bylaw and Stormwater bylaw)	
HCC Water Master Plan	June 2015
HCC Wastewater Master Plan	June 2015

3.0 SUB CATCHMENT / SITE DESCRIPTION AND CONTEXT

3.1 The Site

The site is located at the north west extent of Hamilton City and consists of a total area of approximately 203 hectares as shown in Figure 2 below. It is bounded by the Te Kowhai Road (SH39) to the north, greenfield lands to the east and south and Exelby Road to the west and south. Burbush Road runs north to south through the eastern portion of the site.

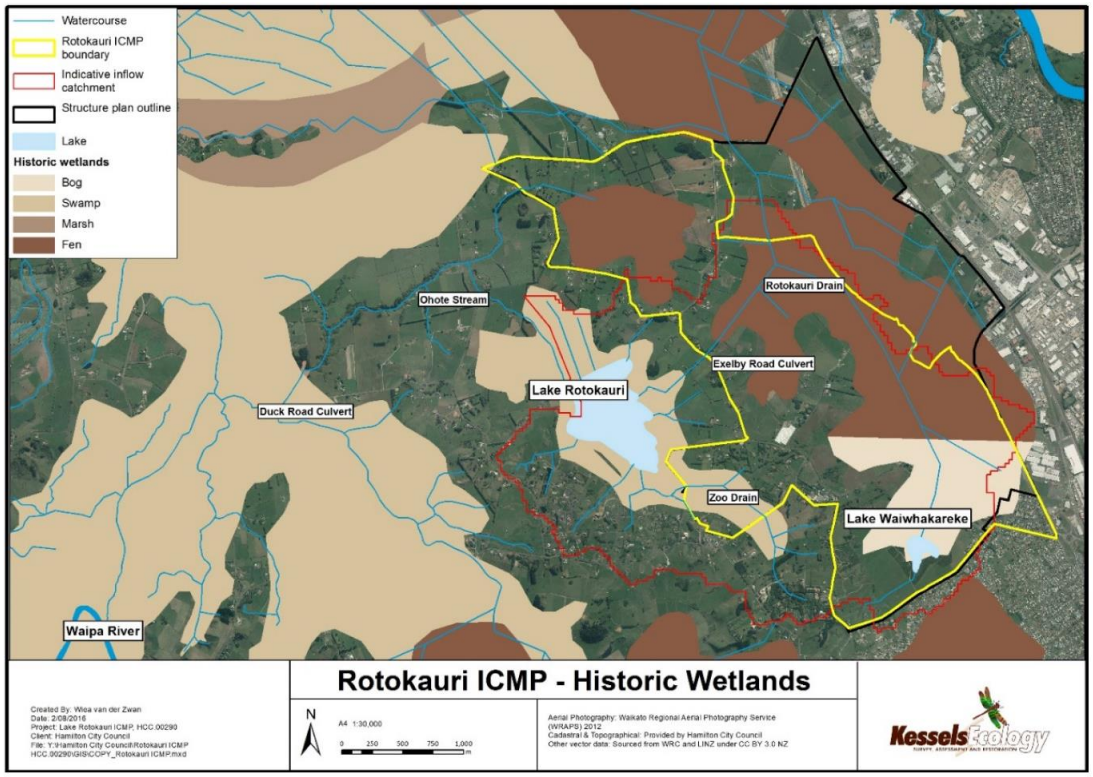
Figure 2 :ICMP area



3.2 Historic and Current Land Uses

Historically the site was partially covered by a wetland (fen) which, as identified in the archaeology section below, was drained to make way for agricultural land practises in the early 1900's. Figure 3 below is included in the Rotokauri ICMP (as Figure 2-2) and identifies the location of the fen / wetland.

Figure 3: Historical fen / wetland



The current land use is for agriculture, with some lifestyle dwellings. Historic uses of the site are associated with farming for livestock and dairying.

Vegetation on the site is mainly grazed pasture grasses and exotic tree species used for hedging and shelterbelts. Some native trees are present on the site but are generally located in amenity gardens surrounding dwellings. There is a significant existing stand of kahikatea in the northeastern corner of the site, which is identified by the HCDP as an SNA.

Proportionally across Rotokauri North, the land uses are as follows:

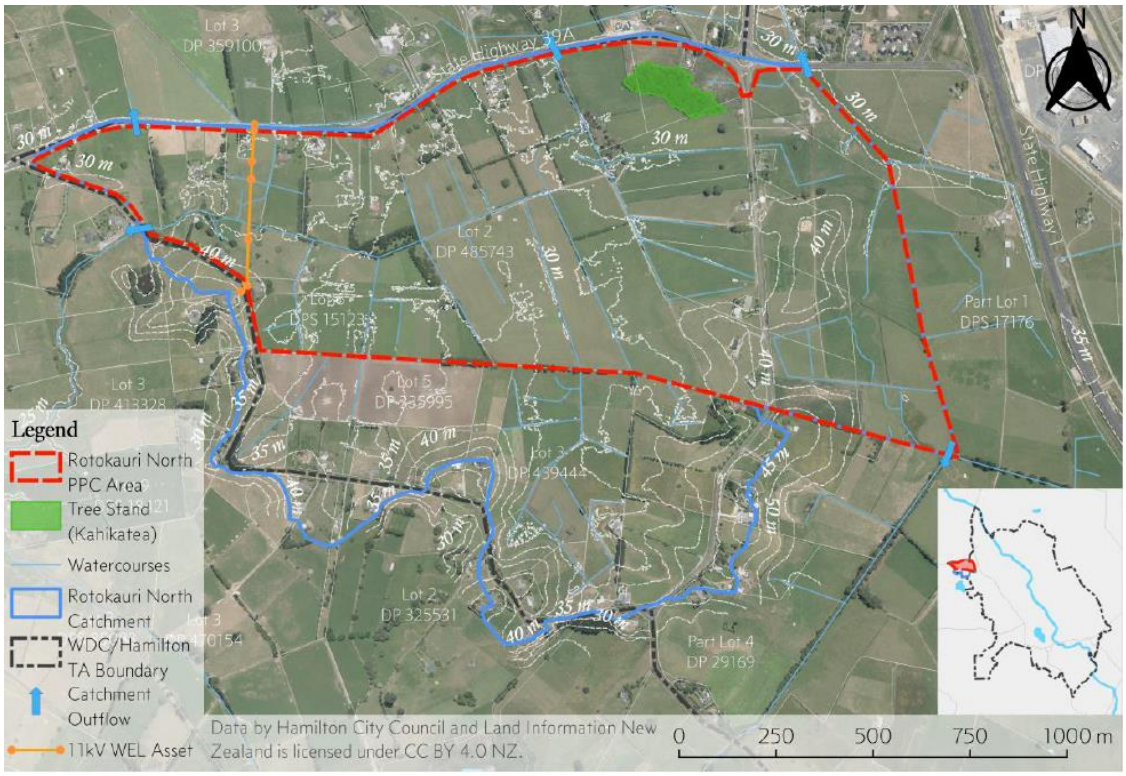
- 97.4% of land classified as exotic grassland,
- 1.6% classified as exotic forest, and
- the remaining 1.0% classified as indigenous forest as per the Land Cover Database (version 4.1).

3.3 Topography and Catchment boundaries

As identified in Figure 4 below, the majority of Rotokauri North is relatively flat, generally 28-30 RL. There are some terraces along the southern and eastern edges of the development area which are up to 40 RL.

As identified in Figure 4 below, the majority of Rotokauri North is relatively flat, generally 28-30 RL. There are some terraces along the southern and eastern edges of the development area which are up to 40 RL.

Figure 4: Topography map



The Rotokauri North area is within the catchments of the Ohote, Te Otamanui, Mangaheka and Rotokauri South stream networks.

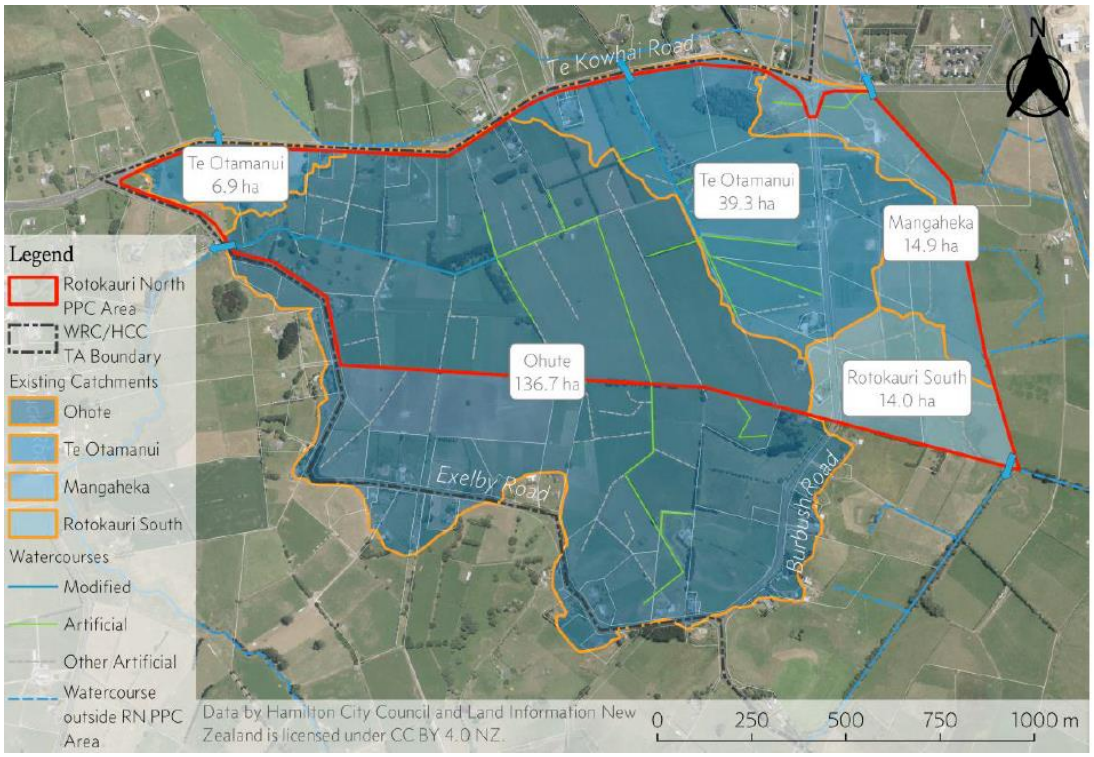
The majority of the stormwater catchment discharge is via the Ohote catchment, which runs predominantly east-west through Rotokauri North and comprises approximately 136.7 hectares of land. The Ohote catchment ultimately discharges to the Waipa River approximately 6 kilometres downstream. The catchment drains through a culvert located at Exelby Road, which is also the eastern catchment boundary.

Te Otamanui catchment falls south of Te Kowhai Road within the HCC territorial boundary, with the northern portion of the catchment (outside of Rotokarui North area) within the WDC territorial boundary. Land within this catchment comprises approximately 46.2 hectares. Two culverts under Te Kowhai Road convey flow from the south to north. One culvert services the western area (6.9 ha) and the other the eastern area (39.3 ha). Te Otamanui catchment discharges northwesterly to the Waipa River approximately 8 kilometres downstream.

The Mangaheka catchment flows from south to north, with the portion falling within Rotokauri North being 14.9 hectares and is the upper portion of the catchment. The catchment eventually discharges to the Waipa River approximately 2.5 kilometres south of Ngaruawahia. This catchment has an approved Mangaheka Integrated Catchment Management Plan.

The portion of Rotokauri North within the upper reach of the Rotokauri South catchment comprises approximately 14 hectares. The catchment flows southwesterly to Rotokauri Lake approximately 1.5 kilometres away. The Rotokauri South catchment also has an approved Rotokauri Integrated Catchment Management Plan.

Figure 5: Existing Catchments

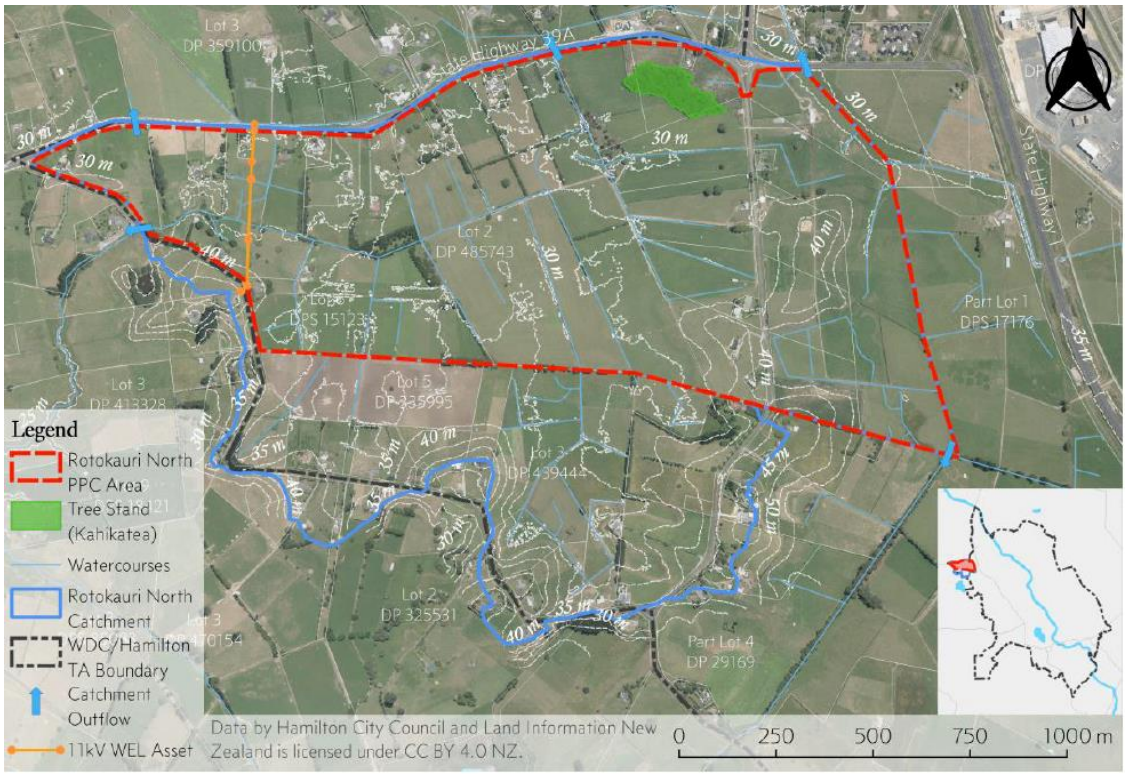


The majority of the land is currently used for farming, with minimal impervious areas.

3.4 Overland flowpaths and flooding

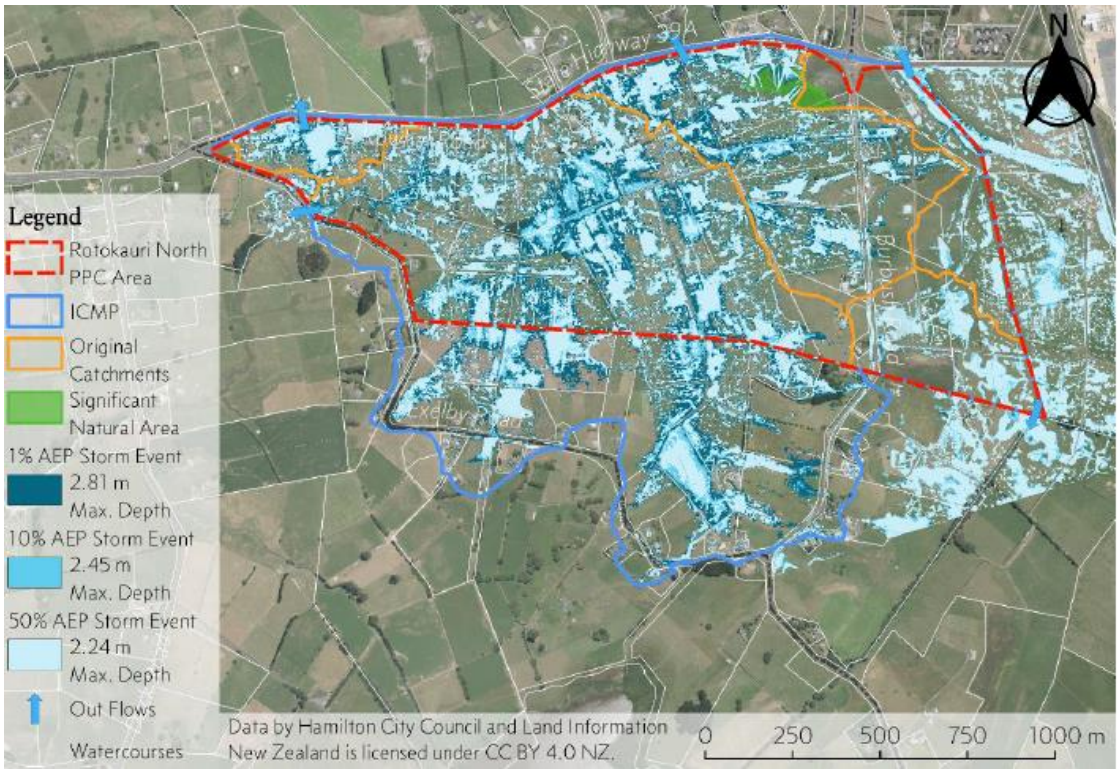
Figure 6 the main network of overland flow paths within the site. Classification of the modified and artificial watercourses is in accordance with Tonkin & Taylor stream classification report (2018). Figure 7 shows the existing flood extent and indicates that part of the site is subject to flooding.

Figure 6: Existing overland flows



The below Figure 7 shows the map of the existing flood extent:

Figure 7: Flooding



3.5 Geology

The site is located roughly central to the broader Hamilton Basin which is characterized by low rolling hills (Hamilton Hills) and plains with low terraces and gullies draining into the Waikato and Waipa Rivers (Hamilton Lowlands) as described below (HDGeo, 2018):

- The Hamilton Hills are linear, sinuous hills and ridges that are remnant of an older erosion surface. They consist of alluvial material and non-welded ignimbrites (Walton Subgroup) and are typically overlain by a number of metres of airfall volcanic ash (Kauroa Ash and Hamilton Ash).

- The Hamilton Lowlands are a broad, low angle alluvial fan created by the Waikato River in the Late Quaternary. The fan materials are derived from rhyolitic eruptions in the central North Island and generally consist of late Pleistocene primary and secondary volcaniclastic sediments with a wide variety of grain sizes (Piako Subgroup and Hinuera Formation). Deposition of the fan materials ceased when the Waikato River entrenched into its current course approximately 17 ka and thin airfall tephra layers accumulated on the fan surface (Hinuera Surface).

The New Zealand Geological map (QMap) for the Waikato Region shows that local soils within Rotokauri North consist of the Walton Subgroup, the Hinuera Formation, and Piako Subgroup materials. The Walton Subgroup falls predominantly along the ridges west, south, and east of the Rotokauri North area and are described as Early Pleistocene to Middle Pleistocene alluvium dominated by primary and re-worked non-welded ignimbrite. The main basin within the Rotokauri North area consists of the Hinuera Formation and Piako Subgroup. The Hinuera Formation makes up the majority of the low- lying areas of the site, with small areas in the south and southeast of the site described as the Piako Subgroup. The Hinuera Formation is described as Late Pleistocene cross-bedded pumice sand, silt and gravel with interbedded peat. The Piako Subgroup is described as Late Pleistocene locally derived mud, silt, gravel and peat.

Site conditions encountered by HD Geo were typically consistent with the mapped geology.

The low-lying portions of the site contain sand and silty soils with a high groundwater table, which can be susceptible to liquefaction under earthquake-induced cyclic loading. Liquefaction of this magnitude is not uncommon in the Waikato, but it does have the potential to affect options for stormwater management. Specifically, chosen options must consider the potential for "lateral spreading". Lateral spreading is a phenomenon were liquefied material allows the soil above to move horizontally towards a free face, such as a stream bank. HD Geo have indicated that the site currently has an isolated lateral spreading risk adjacent to the Mangaheka stream near Te Kowhai Road in the north-eastern corner of the site. As noted by HDGeo (2018) specific assessment of lateral spreading hazards will be required during detailed design. Potential mitigation options include:

- Dewatering of the adjacent ground so that liquefaction is unable to occur;

- Adoption of slope stabilisation methodologies;

- Buttress swale edges; and

- Adoption of foundation designs that are tolerant to lateral spreading.

In response to Council's peer review of the HD Geo work a further response dated February

2019 also identifies mitigation utilised in the recently developed parts of Hamilton that also have a liquefaction hazard, which would be suitable for Rotokauri North. These include:

- shallow ground improvement (to separate structures from liquefiable layers);
- reinforced raft foundations (varying from simple ribraft to reinforced, resilient raft foundation piles to non-liquefying layers);
- de-watering to reduce the hazard (usually locally to a lateral spreading hazard); and,
- setbacks or barrier piles in some locations where lateral spreading was considered to be a risk.

3.6 Soils

Landcare Research identifies the soils to be a mix of Land Use Capabilities (ranging from 1 in the flats adjacent to Te Kowhai Road to 4 towards the southern extent of the catchment).

Landcare Research identifies the site as having well-drained soils (along the ridges) and very poorly drained soils within the main basin (see Figure 8). The soil moisture regime ranges from moderate (along the ridges) to very high in the main basin (see Figure 9).

Figure 8: Soil Drainage

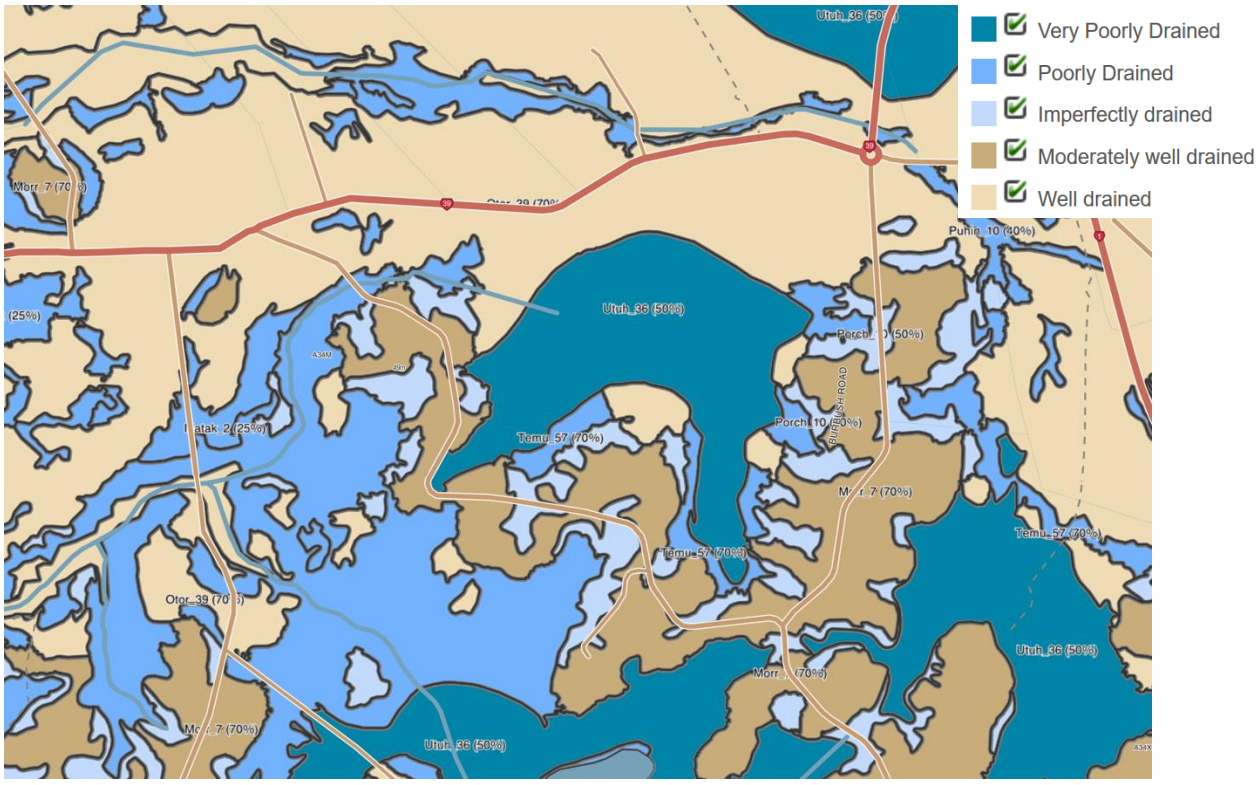
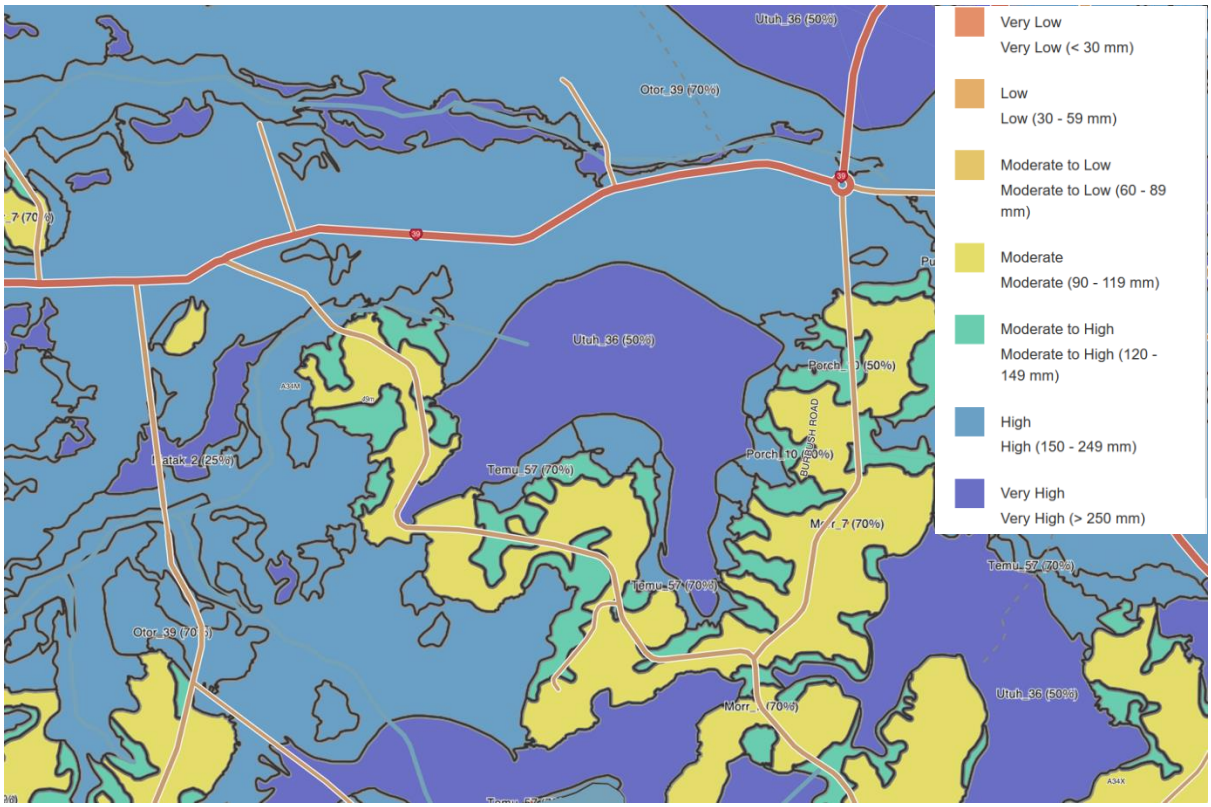


Figure 9: Soil Moisture



3.7 Hydrogeology

There are three significant surface water bodies within three kilometres of the Site:

- Lake Rotokauri, located approximately 1.3 km to the south from the southwestern-most extent of the Site;
- Horseshoe Lake, located approximately 2.5 km to the south/southeast from the south-eastern-most extent of the Site; and
- The Waikato River, located approximately 2.5 km from the eastern-most extent of the Site.

Surface water flows are expected to generally follow local topography, toward the east, north and west along drainage trenches through the site. The southeastern corner of the site drains towards Lake Rotokauri through a network of a stream tributaries feeding into Lake Rotokauri, and then into the Waipa River. The bulk of the catchment flows westwards along a network of farm drains into the Ohote stream and then into the Waipa River. The headwaters of Te Otamanui stream fall within the central northern portion of the site. And the Mangaheka stream flows along the eastern boundary of the site. Both Te Otamanui and Mangaheka catchments floe northwards out to the Rotokauri North site and then westwards to the Waipa River. However, groundwater is likely to be largely constrained from following the same routes by the hills to the east, west and south, and is likely to travel northeast towards the Waikato River Beca (2018).

A groundwater investigation conducted at the site by HD Geo (2018) revealed groundwater at a depth of approximately 0.1 to 1.5m (below ground surface) in the low-lying areas and

approximately 6m in the elevated areas.

3.8 Contaminated Land

An assessment and site inspection was undertaken to identify potentially contaminated sites by HD Geo (2018). The findings are summarised in the Preliminary Site Investigation ("**PSI**") included in the PPC supporting documentation.

Hazardous Activities and Industries List ("**HAIL**") sites are identified as sites where any potentially hazardous activities listed on the HAIL have occurred (or is currently occurring) as a result of past or current land use. The area is considered a HAIL site due to the potential sources of contamination identified in the PSI from rural activities.

The PSI recommends that prior to the development of the site (i.e. earthworks or subdivision) where potentially contaminating land uses and/or activities have taken place, a Detailed Site Investigation ("**DSI**") is recommended. The DSI would confirm if the identified land uses and/or activities have affected the site soils and will confirm the consenting requirements for those areas of the site in respect to remediation.

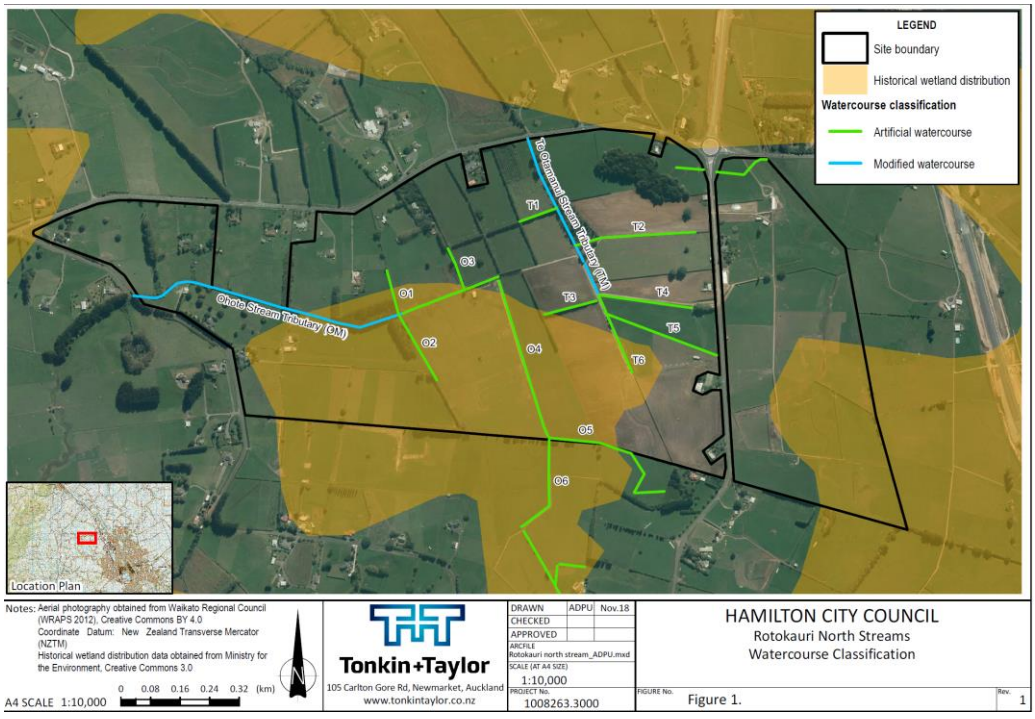
3.9 Fresh Water Environment

1.0. Stream Locations/Classifications

Tonkin & Taylor undertook an assessment to identify and classify (in accordance with WRP definitions) the watercourses located within the site.

The majority of the watercourses present within the site are consistent with the WRP definition for an "artificial watercourse", and all watercourses have been mapped as per Figure 10 below:

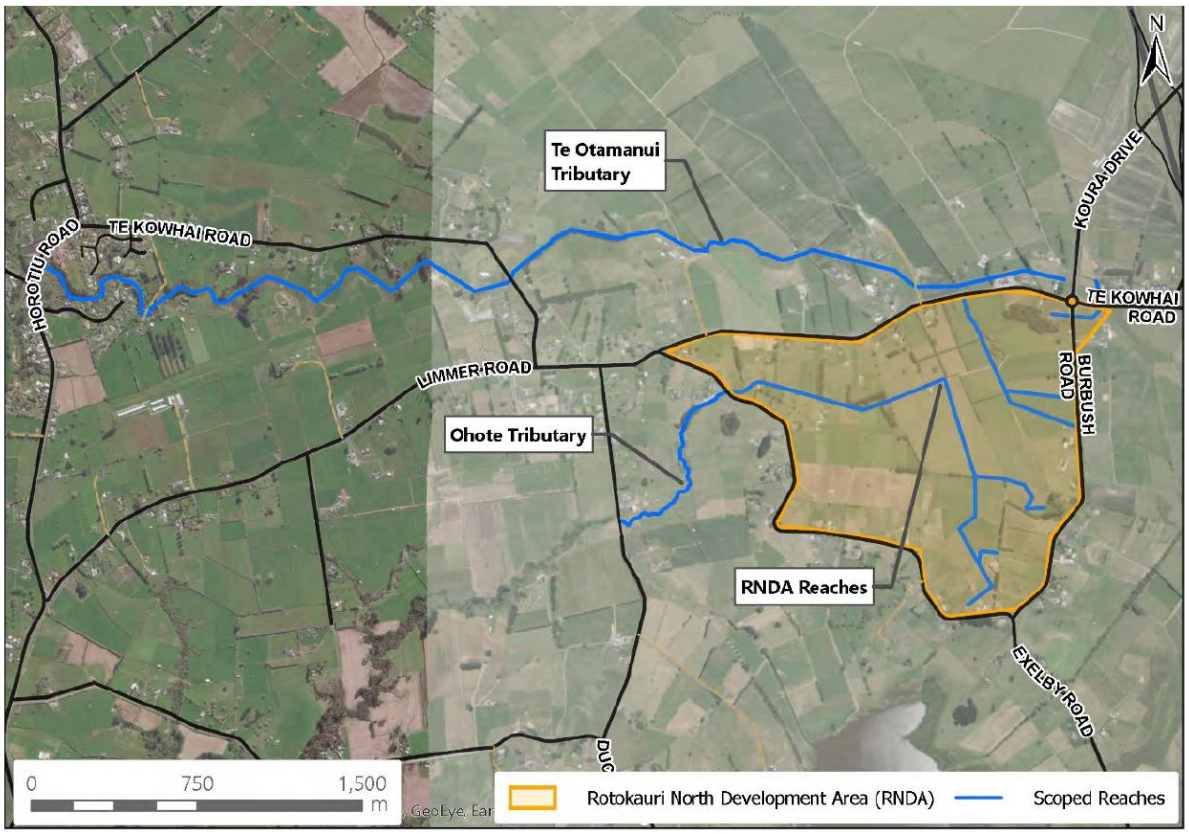
Figure 10: Watercourse Classification



2.0 Ohote and Te Otamanui Catchments

Morphum was engaged to undertake a watercourse ecology assessment of the Rotokauri North sub-catchment and its receiving environments of Te Otamanui Tributary and Ohote Stream, as shown in Figure 11.

Figure 11: Wider Tributaries



The watercourses in the sub-catchment and the receiving environments are soft-bottom streams and silt/sand are the dominate benthic substrate types. The flat topography of the area is reflected by the slow-flowing streams in the catchment.

The majority of the watercourses are located within agricultural pastoral land, with small areas of rural residential land use. These "agricultural streams" were found to have little to no native woody riparian vegetation and direct stock access to the stream channel is common with damage from stock, such as pugging of banks, evident along many reaches.

Generally, the watercourses show evidence of channel modification such as straightening, widening and deepening. Adjacent land use is dominated by agricultural, pastoral activities. Sparse vegetation consisting of gorse, barberry and poplar dominated these reaches. In the downstream reaches of Te Otamanui mixed vegetation provides moderate shading to the stream channel.

Erosion scarring of stream banks is largely attributed to anthropogenic activities such as 'drain cleaning', stock damage and a lack of riparian vegetation. Bank benching, bank instability and fine sediment deposition can be largely attributed to stock damage rather than erosion from high stormwater flows. In the downstream reaches of Te Otamanui, there is some evidence of fluvia erosion caused by larger flows through constricted channel.

No "highly unstable" banks were identified. However, nine reaches (downstream of Rotokauri North in Te Otamanui catchment) in total were found to be "unstable". Erosion hotspots were

also identified downstream of Rotokauri North.

Water Quality

Water quality results indicate poor water quality, with five measured parameters – including nitrogen and phosphorus exceeding the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (referred to hereafter by its industry reference as "**ANZECC**") trigger values. Sediment quality was indicative of agricultural land use, with high concentrations of arsenic at one site, but relatively low concentrations of heavy metals such as zinc and lead across the sampled sites. Specifically, the Morphum reporting found:

> *Five parameters exceeded the ANZECC trigger values set for lowland rivers and streams (protection of 95% of species) and the 'satisfactory' levels set by Waikato Regional Council for river water quality in the region (WRC, 2012)….*
>
> *Turbidity exceeded the guideline values at all five sites, and by a magnitude of five at TEOT2 (25 NTU). Turbidity indicates water clarity and studies have shown turbidity levels above 5 NTU have adverse effects on underwater light – and thus on plant and invertebrate production (Davies-Colley, 1991). Loss in water clarity also adversely impacts migration of common native freshwater fish species (Boubee et al., 1997). High sediment loads from the surrounding land use is contributing to high turbidity in the sub-catchment.*
>
> *Total nitrogen concentrations also exceeded the guideline values at all five sites. The highest concentrations were recorded in RNDA1 (4 g/m3) and TEOT1 (4.3 g/m3). Similarly, Total Kieldahl Nitrogen, which indicates the concentrations of biologically available nitrogen, exceeded guideline values at these two sites. The nitrogen concentrations results fall within the 'C' attribute state of the NPS-FM indicating an adverse effect on some sensitive species. These sites are downstream of cattle farms and stock access to the stream was recorded upstream of both these sites.*
>
> *Total phosphorus concentrations were also high in RNDA (0.18 g/m3), TEOT1(0.03 g/m3) and TEOT2 0.07 g/m3). Additionally, the site OHOTE, situated in the downstream reaches of the Ohote Stream (OHO_TRIB_1) also exceeded WRC guideline concentrations. Overall, the high concentrations of nutrients (N and P) are reflective of intensive agricultural land use in the sub-catchment."*

With regard to sediment quality, one site (within Te Otamanui catchment) exceeded the ANZECC Interim Sediment Quality Guidelines (ISQG) high trigger values for arsenic.

Overall, the guidelines proposed in the NPS-FM, ANZECC and supporting WRC documents suggest that the watercourses in Rotokauri North and the receiving environments are degraded.

Aquatic Ecology

Surveys for black mudfish were conducted at 4 sites, while sediment and water quality were conducted at five sites within the study area. No black mudfish were recorded at the sample sites.

No natural in-stream fish barriers such as cascades, waterfalls or dams were found in the sub-catchment, however, farm culverts within Rotokauri North were identified as currently posing a barrier to fish passage.

2.0 Mangaheka Catchment

Boffa Miskell were engaged to undertake a watercourse ecology assessment of the receiving environments of Mangaheka Stream in conjunction with the preparation of an ICMP (prepared by Beca) for the Mangaheka Catchment. Although not specifically prepared for the PPC area, the comments made in the report relating to that part of the Mangaheka catchment falling in the PPC area are relevant and have been relied on for this assessment.

> *"Downstream of the industrial area and Waikato Expressway, artificial farm drains flow north and northwest to Koura Drive, where they meet at the drain main stem. The drain then flows northwest through farmland before transitioning to a modified stream channel with perennial flow where natural topography forms a surface drainage channel. Outside the Hamilton City boundary, the catchment of the drains is almost entirely rural (dairy farming), comprising artificial farm drains, with very little riparian vegetation"*

Over the majority of the Mangaheka catchment (including that part included in Rotokauri North) the reporting identifies that vegetation has been widely modified over time with historic vegetation cover, including peat bog vegetation, replaced with exotic pasture grasses or crops and with exotic shrubs and trees established as shelterbelts. Indigenous plants are recorded as virtually non-existent throughout.

Aquatic Ecology / Water Quality

With respect to water quality the report generally identifies that in the upper catchment the watercourse type is an artificial watercourse (excavated drain) which generally provide poor habitat for fish and aquatic macroinvertebrates. Low or no flow, high temperatures, low dissolved oxygen, and very poor water clarity are likely to present fish passage barriers in this section of the catchment.

With respect to aquatic life the reporting generally finds that based on a fish survey (which was conducted in 2016) a total of four native species were identified, being: shortfin eel (Anguilla australis), longfin eel (Anguilla dieffenbachii), banded kokopu (Galaxias fasciatus), and black mudfish (Neochanna diversus); and one exotic species (mosquitofish). However, it was acknowledged that prior to development of the industrial land parcels in the upper catchment area in (in approximately 2011/12), three native species (mudfish (12 individuals), longfin eel (2 individuals) and shortfin eel (16 individuals)) were caught and translocated under permit from the upper catchment to the wetland area near Crawford Road in the lower part of the Mangaheka catchment.

4.0 Rotokauri South Catchment

There is no stream within this part of the PPC area.

5.0 Terrestrial Ecology

The site comprises mostly pasture and agricultural land. As previously outlined, there is a significant stand of kahikatea Trees adjacent to the intersection of Burbush Road and SH39 which is already protected under the HCDP provisions (and has a SNA overlay applied). All other vegetation is either associated with waterways (as accounted for in the assessment above), is of a shelterbelt/hedging variety, or associated with the garden areas of the dwellings.

As the area is already protected by the HCDP no further assessment of the values it holds have been undertaken nor are considered warranted.

Opportunities for the enhancement of terrestrial habitat are also proposed to be addressed through a specific assessment criterion for subdivision within the RNSP area.

3.10 Archaeology values

The area falls in drained swamp (fen) country. Archaeology reporting identified that in in 1919 the area was "drained swampy country" with "undulating country in grass" to the east, in the vicinity of Burbush Road. It is believed that due to the presence of the swamp and its subsequent draining there is no evidence of the land or buildings being used for European settlers until the 20th Century. No recorded European heritage features have been identified in the vicinity of the site.

The closest recorded archaeological site to the development area is S14/11, 700m southwest of Exelby Road. The site is recorded as being a pre-European Maori burial site.

Based on the archaeological survey of the site (CFH Heritage, 2018), there is no evidence of any pre-1900 archaeology or heritage, or any significant 20th century heritage.

3.11 Cultural values

The HCDP does not record any cultural or archaeological sites within Rotokauri North. The Burbush Road forest (SNA) is noted to be of high value. It has been acknowledged by the work undertaken for the Rotokauri ICMP and Structure Plan (Chapter 3 of the HCDP) that the wetland areas surrounding Lake Rotokauri may contained buried taonga.

Further background information on the cultural and archaeological significance of the catchment was provided in the cultural assessment undertaken by Nga Mana Toopu O Kirikiriroa (2001) in conjunction with the Rotokauri ICMP and Structure Plan.

Cultural Impact Assessments and iwi engagement for this ICMP are ongoing. Bi-weekly meetings are being held with THaWK hapu to work through cultural values (general) and any specifics that may occur for the RNDA. A Working Draft (suitable for lodgement) has been provided with the PPC.

3.12 Existing Three Waters infrastructure

As the site functions similar to a rural environment, there is no current wastewater infrastructure (other than specific onsite devices associated with the rural lifestyle land uses). There is an existing 100mm diameter watermain on the north side of Te Kowhai Road extending to the western extent of Rotokauri North.

Existing key culverts for stormwater conveyance were also identified in the description of the catchments in section 3.3 above.

4.0 KEY STAKEHOLDERS IN THE CATCHMENT

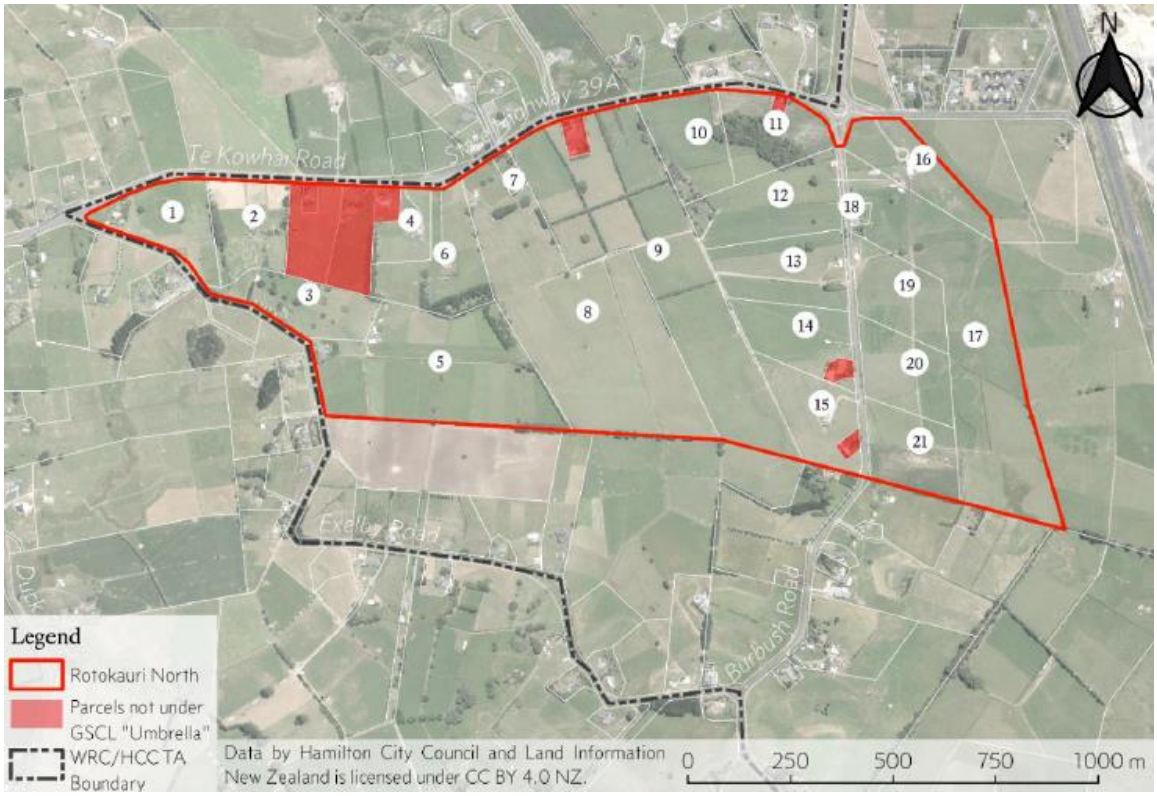
Key stakeholders for this ICMP include;

- GSCL
- HCC

- WDC
- WRC
- Waikato-Tainui
- Te Haa o te whenua o Kirikiriroa ("**THaWK**")
- Landowners

The majority of the land is under the control of GSCL through purchase by investors or is contracted to purchase. Figure 12 identifies those properties in the sub-catchment not falling under the GSCL "umbrella".

Figure 12: Properties outside GSCL control



Efforts have been made to consult all owners of land within the sub-catchment boundary as they have been identified as key stakeholders in this ICMP alongside the consultation for the PPC. A Consultation summary has been provided as an Attachment o the PPC.

5.0 DEVELOPMENT CONCEPT

5.1 Overview of Proposed Development

As outlined in detail in the PPC application, the PPC seeks to rezone 140 hectares within the identified "sub-catchment" from Future Urban Zone to:

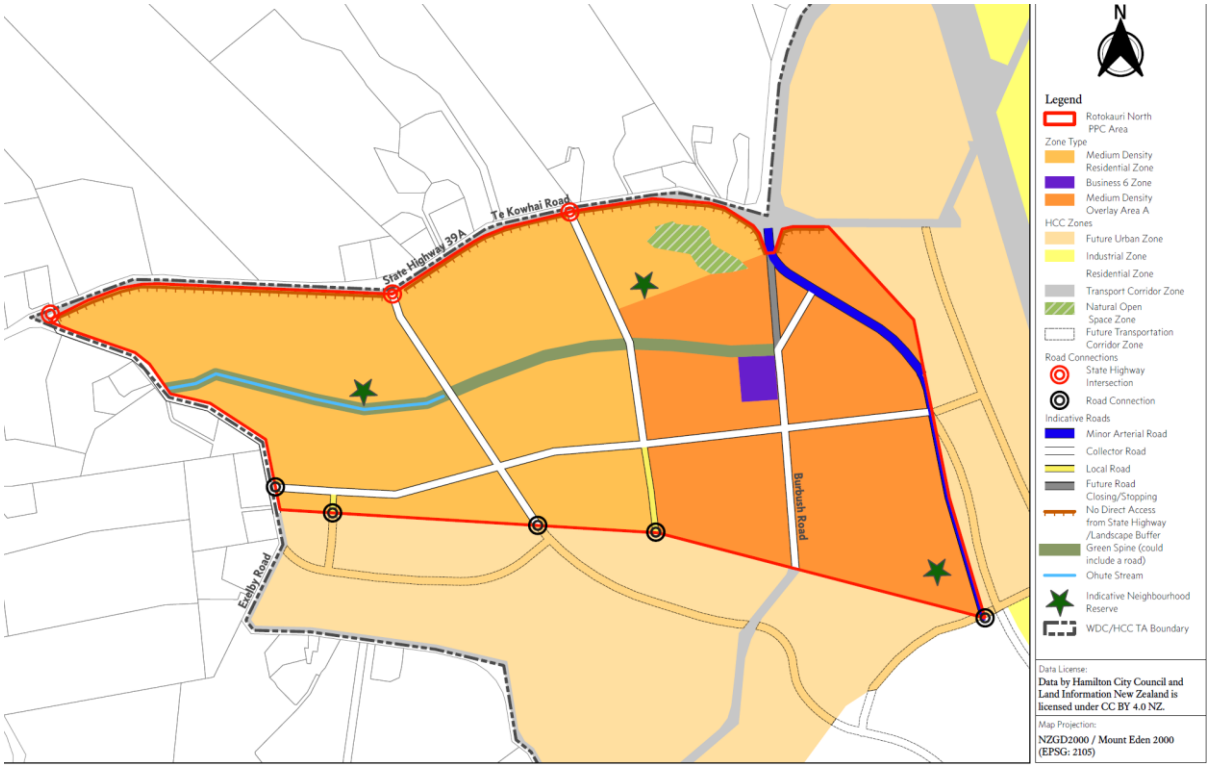
- Medium Density Residential (140 hectares); and

- Neighbourhood Centre (1.14 hectares).

The PPC and RNSP also identifies minimum vacant lot size (280m2), medium density housing opportunities, duplex housing opportunities, increased height overlays, indicative open space locations for neighbourhood reserves, an indicative sports park, and a hierarchy of key roads in indicative alignments and locations, along with key connections to the surrounding network and sites.

Approximately 2,000 dwellings are anticipated to be developed within Rotokauri North.

Figure 13: Rotokauri North Structure Plan



The remaining land within the ICMP will be retained as FUZ. However, maximum probable development scenarios have adopted an 80% impermeable rule for the development of the stormwater model and the ICMP.

5.2 Impervious Surfaces

Based on the zoning layout and the proposed PPC (and HCDP) provisions, the impervious areas expected within the development are outlined in Table 6 below:

Table 6: Impervious surfaces

Zone / Area	Percentage Impervious
Medium Density Residential	80% (per lot) – roofs, driveways, paved areas
Neighbourhood Centre	90% (across the entire B6Z)
Roads (approximate)	60% (each road) – carriageway seal, footpaths, vehicle crossings, paved areas

The 80% impervious rule for lots is based on HCDP rules and the definition for impermeable surfaces (notably for this ICMP they include pervious areas which are used for vehicle parking/manoeuvring).

5.3 Key Issues, Opportunities and Constraints

Taking into account any key site constraints identified above, the following Table 7 outlines any issues and constraints for the management of three waters and identifies any key opportunities that could be addressed (to assist in determining BPO's).

Table 7: Issues, Opportunities and Options

Broad Area / Issue	Issues/Potential Effects	Opportunities	Options for Three Waters management	
Topography	The majority of the site is flat. This creates potential issues for conveyance of three waters, specifically stormwater and wastewater. Inverts of existing streams, channels and culverts limit the vertical gradient available for stormwater conveyance. Development of a piped stormwater network would have compounding issues associated with reduced gradient, increasing diameters and required clearance between other services and carriageways. The flat topography will result in gravity wastewater network being at considerable depth (>5m). A transfer pump station will then be required to convey flows to the existing trunk wastewater (external to site).	For water: Minimal requirements for zone management across the site. For stormwater: • Potential to use of engineered wetlands for treatment (wetlands work better on flat sites). • Potential for above ground options such as swales to provide both conveyance and water quality treatment. For wastewater: • Potential suitability for low pressure system (rather than gravity serviced) to reduce depth of installation.	*Water*	As per current Technical Specifications.
			Wastewater	• Low pressure sewer network vs gravity network
			Stormwater	• Engineered wetlands for treatment and detention • Swales for conveyance

Broad Area / Issue	Issues/Potential Effects	Opportunities	Options for Three Waters management	
Soils/Permeability	Soil profile creates risk of liquefaction. Infiltration difficulties / low permeability with soils, which affects storage volumes for stormwater devices (and needs to be accounted for in design and sizing of devices, both on-lot and communal).		*Water* *Wastewater* *Stormwater*	‘Leak tight’ standard (gravity system applicable only) Stabilise areas prone to liquefaction No onsite soakage
Groundwater	High groundwater table – potential for underground tanks and structures to rise (need to be weighted) and high potential for groundwater to enter stormwater devices and gravity wastewater network. Installation of gravity piped networks would require significant dewatering operations for trench excavations, increasing complexity of installation. Designers for stormwater devices to be wary that increasing excavation depth for devices will be counterproductive as it is likely that groundwater will enter device.	Utilise new above ground and green technologies for stormwater detention, etc. Utilise open channel and swale conveyance systems for stormwater. Consider low pressure sewer system to reduce infiltration to wastewater network, including whole of life cycle analysis considering capital and operating expenses inclusive of existing downstream asset (e.g., Pukete WWTP treatment costs).	*Water* *Wastewater* *Stormwater*	Low pressure sewer system for reduced infiltration, and reduced construction difficulties. Groundwater monitoring for depth of groundwater table prior to design of wetlands/raingardens, etc. Provide impermeable lining for stormwater devices as identified by monitoring. Limit underground devices OR provide additional weighting to reduce buoyancy (additional cost.

Broad Area / Issue	Issues/Potential Effects	Opportunities	Options for Three Waters management	
	Gravity wastewater network would expose risk of infiltration occurring over asset design life, leading to reduced future capacity, increased treatment costs at Pukete Wastewater Treatment Plant.			
Significant Natural Area	Ensure all works are outside the SNA including devices and pipes for three waters.	Retain SNA (protected by a Zone in the HCDP).	*Water*	NA
			Wastewater	
			Stormwater	
Stream Network	Natural streams and farm drains (artificial watercourses) transverse the site. Stream channels are narrow with limited hydraulic capacity. Stability of existing farm drains uncertain in regards to liquefaction potential. Currently water quality is degraded. Depth of any proposed gravity wastewater networks affected by	Retain permanent natural watercourse (identified as modified watercourses by Tonkin & Taylor, 2018). Potential to utilise for conveyance of stormwater – widen stream margins, also providing benefit for reduction of liquefaction potential. Margins of stream corridors could be enhanced and works undertaken to naturalise straightened portions of streams	*Water*	
			Wastewater	Low pressure sewer system to reduce disturbance to watercourses. Removal of poorly performing septic tanks and disposal fields.
			Stormwater	Utilise natural stream network for conveyance – widen margins to accommodate additional flows. Treatment prior to entering streams.

Broad Area / Issue	Issues/Potential Effects	Opportunities	Options for Three Waters management	
	separation between watercourses and new assets. Gravity wastewater network will require emergency overflow structure(s) to manage abnormal flow conditions, specifically at pumping stations.	On lot treatment to improve water quality of the stream network and riparian planting. Low pressure sewer would follow road corridors and cross above watercourses at culvert locations. Existing performance of septic tanks and disposal fields for existing properties unknown. Removal of these has potential to improve stream water quality.		Riparian planting of stream margins (above the permanently wet flow level). Naturalise portions of stream where possible. Where possible remove farm culverts across natural watercourses. Allowance for fish passage.
Overland Flowpaths ("OLFP")	Stormwater runoff from the catchment has also been modelled. Potential risk should be accounted for in the design of flow path corridors. Gravity wastewater network manholes within road reserve that would be within overland flowpath.	Enable flows to pass through the site unimpeded by preserving OLFP routes (i.e., entry and exit points, along with capacity through the RNSP design). Consider type of wastewater manhole and chamber lids within road reserve to reduce potential for inflow from overland flowpaths. Utilise 'leak tight' wastewater networks to reduce the number of chambers within overland flow paths.	*Water*	
			Wastewater	Utilise 'leak tight' wastewater network or low-pressure sewers.
			Stormwater	Utilise road carriageway. Swales/communal corridor for flow conveyance.
Existing Culverts	• Some are undersized for flows (i.e., Exelby Road).	Remove farm culverts.	*Water*	
			Wastewater	

Broad Area / Issue	Issues/Potential Effects	Opportunities	Options for Three Waters management	
	• Some are restricting fish passage. • Onsite farm culverts.	Provide fish passage in new devices and naturalised baseflow channel. Upgrading of undersized culverts to be assessed based on capacity of downstream system (channels, streams, bridges/culverts outside the site).	*Stormwater*	Naturalise stream channels/remove farm drains/culverts, provide fish passage. Evaluate capacity of downstream networks to enable large culverts for additional flows.
Multiple Stormwater Catchments	• Multiple catchments across the site.	During development, align catchments boundaries to road network (rather than retain in current locations). Subject to further detailed assessment some catchments may have downstream capacity to take additional flows (i.e. increase some catchment areas).	Stormwater	Catchment boundaries modified at development stage to align with key roading network (utilising opportunities for conveyance associated with roads). Consider redirecting part of Te Otamanui to the Ohote to avoid the small Te Otamanui catchment/culvert under SH39.
Fragmented land ownership	• 15% of land subject to this ICMP falls in separate ownership. This creates issues for cost allocation associated with devices and conveyance networks, i.e., only one stormwater device at the bottom of the catchment creates a large land loss and cost obligation on one landowner. Coupled with	Within the stormwater network identify areas that can manage own stormwater. Site development in stages to allow for incremental construction of trunk water and wastewater networks. Mitigation measures for watermains risks developed (flushing programmes as needed).	*Water* *Wastewater* *Stormwater*	Develop stages for trunk network construction. As for Water. Sub-catchments falling outside of zoned and/or GSCL ownership be required to provide for own detention and treatment – at the time of development of those land areas.

Broad Area / Issue	Issues/Potential Effects	Opportunities	Options for Three Waters management	
	the fact that 10% of the land is not to the subject of the private plan change (and will retain its FUZ zoning) this also creates issues for HCC in having to maintain overdesigned/larger devices than what is necessary to treat the zoned land until such time that the remaining land is developed. • Similarly for the water and wastewater networks, the first landowner undertaking development will be required to install the trunk infrastructure to service the overall plan change development area. • Bulk watermains may have water age risks initially due to small stages. Performance of the water network dependent on HCC implementing upgrades as identified in the HCC Long Term Plan ("**LTP**"), with some upgrades to be constructed sooner than previously planned.	Mitigation measures developed for wastewater risks (odour, septicity, corrosion).		

Broad Area / Issue	Issues/Potential Effects	Opportunities	Options for Three Waters management	
	• Initial trunk wastewater assets likely to be oversized, thereby having odour, septicity and corrosion risks. Long Term Plan upgrades at the WWTP may need to be brought forward to deal with increased flows.			
Change in land use (from agricultural); AND Increase in impervious surfaces	• Concentration of flows and change in peak flows and volume for stormwater. • Increases in peak flow rates and volumes for all waters. • Increased temperate/heat. • Increased volume, velocity and heat of stormwater flows, can affect the physical shape and form of streams, cause scour and erosion within stream channels and at discharge points. • Increased water supply demand may require bringing forward network and treatment plant upgrades as per LTP. • Increased wastewater loading may require bringing forward network	Utilise water quality management and water sensitive design principles, including at source stormwater management, to mitigate increased flows and volumes from increased imperviousness. The range of lot sizes creates opportunities for a range of on-site retention and detention solutions for individual lots (for impervious surfaces). Sizing of wastewater networks to optimised using 'smart' sewers allowing all units to be telemetry controlled.	*Water* *Wastewater* *Stormwater*	Toolbox range of water sensitive design options, including those enabling potable water substitution. Low pressure 'smart' sewers to be provide telemetry controlled network for flow shifting and optimisation. Improve water quality through new on-lot and communal devices.

Broad Area / Issue	Issues/Potential Effects	Opportunities	Options for Three Waters management	
	and treatment plant upgrades as per LTP.			
Lot Sizes – Less than 280m2 and affordable lots	• Site area constrains above ground reuse and/or detention tanks. • Usually higher impervious surfaces/greater building coverage. • Insufficient area for soakage (and high groundwater table). • Cost of detention tanks and dual plumbing in the provision of affordable housing opportunities where fixed price points for sale of house and land packages apply.	Utilise new technology for above ground devices. Potential for communal devices to provide centralised treatment and storage location. Communal location allows for stormwater harvesting for secondary uses, e.g., reserve/garden watering.	*Water* *Wastewater* *Stormwater*	Limited potential for reuse. Limited toolbox range of devices to use.
Lot sizes greater than 280m2		Potential for a lower impervious surface threshold (i.e. 70%) due to site size and backyard size. Greater flexibility in type of retention and detention devices that can be used onsite.	*Water* *Wastewater* *Stormwater*	Some reuse potential Increased number of devices available in toolbox range. Additional planning rules for impervious surfaces.

Broad Area / Issue	Issues/Potential Effects	Opportunities	Options for Three Waters management	
Roads	Key contaminants of concern from high use roads into stream environments are heavy metals, sediment. Potential for increase in water temperature. Need quality treatment close to source. Space constraints due to access ways and services (but reduced where rear lanes access ways are used). Risk to road pavement where unable to provide subsoil drainage due to above ground stormwater conveyance and devices. Water and wastewater networks to be located within the road reserve.	Stormwater contaminants will need to be mitigated using devices compliant with TR 2013/035, Table 7 and designed according to the TP 10 water quality requirements. Pavement subsoil drainage to be integrated with stormwater conveyance system.	*Water*	Locate water supply network within berms as per current Technical Specifications.
			Wastewater	Locate wastewater networks with berms and carriageway as per current Technical Specifications.
			Stormwater	Potential for treatment train of devices (at source) to remove contaminants. Groundwater monitoring for depth prior to design of subsoil drains, etc.
Car Parking Area (Neighbourhood Centre areas).	Key contaminants of concern from high contaminant parking areas into stream environment are heavy metals (zinc/copper), sediment and increase in temperature.	Stormwater contaminants will need to be mitigated using devices compliant with TR 2013/035, Table 7 and designed according to the TP 10 water quality requirements.	*Water*	
			Wastewater	

Broad Area / Issue	Issues/Potential Effects	Opportunities	Options for Three Waters management	
	Need treatment close to source. Space constraints due to access ways and services. Risk to road pavement due to stormwater device having higher water level than adjacent subsoil drainage.	Consider treatment devices at car parking area to complement architecture and landscaping design.	*Stormwater* *Wastewater* *Stormwater*	Potential for treatment train of devices (at source) to remove contaminants. Groundwater monitoring for groundwater table depth prior to design of subsoil drains etc

5.4 Operational Objectives

Taking into account the above issues and opportunities, the following operational objectives have been derived to address the issues and to align with the strategic objectives outlined in above.

Due to the overlap with the Mangaheka catchment (and similarity in many of the issues) the objectives below have been derived generally from the Mangaheka operational objectives. However minor difference have been identified with ***bold and italics*** for clarity.

Table 8: Operational Objectives

Operational Objective	Description
OO1	**Maintain or Enhance Mangaheka, *Te Otamanui and Ohote* Streams' Water Quality *Ohote*** (a) Contaminants derived from urban or road stormwater are managed through appropriately designed treatment devices, so that any increase in mass contaminant loads and concentrations in the receiving environment following development, are minimised as much as practicable. For general guidance purposes the following guidelines (or updates thereof) are referred: i. For in-stream water quality and comparison with baseline contaminant concentrations: ANZECC, 2000 – 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality'; ii. For in-stream sediment quality and comparison with baseline contaminant concentrations: ANZECC, 2000 –'Australian and New Zealand Guidelines for Fresh and Marine Water Quality / Interim Sediment Quality Guidelines ("**ISQG**")'**;** ***and*** ii. For treatment device design and performance efficiencies: HCC ITS. (b) Primary stormwater treatment devices must achieve at least 75% sediment removal on an average long-term basis. (c) Devices servicing roading should be suitable for the removal of hydrocarbons and heavy metals. (d) To avoid increases in temperature in downstream receiving waterways, open water areas must be avoided in treatment devices and wetland vegetation cover must exceed 80% of the device surface area. (e) Where it is shown that a single device will not address receiving environment sensitivities, ~~***that***~~ ***then*** a treatment train approach should be adopted to minimise temperature effects and maximise contaminant removal.

Operational Objective	Description
	(f) Construction generated sediment shall be controlled to meet Waikato Regional Council standards and shall comply with relevant city bylaws and District Plan requirements *This objective aligns with strategic catchment objective 6.*
OO2	**Minimise Alterations to the Natural Flow Regime** (a) The erosion and scour of the bed and banks of the Mangaheka***, or Ohote or Te Otamanui*** stream**s** and other catchment waterways is not increased following proposed development within Hamilton City Council boundary. Where it is identified that stormwater discharges will have an effect on aquatic habitat and water quality values, then additional mitigation measures will be required (e.g. on-lot treatment / detention). (b) Where stormwater discharge to the Mangaheka, ***Ohote or Te Otamanui*** stream**s** needs to occur, extended detention shall be provided by the proposed stormwater management structures in accordance with ITS to control flow velocities and erosion. (c) Energy dissipation and erosion protection measures are provided at all discharge locations, and preference is given to green engineering solutions over hard engineering solutions based on rock and concrete. (d) Stream flooding in a land drainage area shall be managed to the extent that the ponding from a storm with a 10% probability of occurring in any one year (the 10% Annual Exceedance Probability (AEP) event or '10 year storm') shall be removed within three days. *This objective addresses aligns with strategic catchment objective 4.*
003	**Utilise Water Sensitive Practices** (a) Where on-lot, ***groundwater, geotechnical*** and soil conditions allow, stormwater ***can ~~shall~~*** be discharged directly to ground via soakage. This will minimise increases in discharge volume, help to recharge groundwater, maintain stream base flows, and mimic the natural water cycle. (b) The use of 'water sensitive practices' shall be incorporated into the stormwater management approach for the catchment. (c) Where it is shown that a single device will not address flood risk or receiving environment sensitivities a treatment train approach shall be adopted. *This objective addresses aligns with strategic catchment objectives 2 and 7*
004	**Promote Riparian Margin Enhancement and Re-Vegetation** (a) Riparian planting shall be undertaken ***within the RNSP area*** to mitigate effects of urbanisation in potentially affected areas. (b) Stock fencing shall be erected along stream banks to reduce bank erosion as well as help reduce suspended solids and pathogens in the water column.

Operational Objective	Description
	(c) Works using natural solutions or green engineering which will enhance habitat and maintain natural stream processes in a soft sediment environment are preferred over hard engineering solutions using rock and concrete. *This objective aligns with strategic catchment objectives 1, 2 and 5.*
005	**Have Due Regard for Economic Affordability and Safety** (a) Proposed stormwater management systems are cost-efficient during long term operation and maintenance. (b) Stormwater and wastewater management systems are designed for public safety. (c) Where it is shown that a single device will not address flood risk or receiving environment sensitivities, that a treatment train approach, incorporating an approved at source device upstream of a centralised public device, shall be adopted. (d) Limitations for onsite mitigation associated with affordable housing are acknowledged. This objective aligns with strategic objectives 1, and 4.
006	**Protect Cultural Values** (a) Riparian planting shall be encouraged by Hamilton City Council throughout the catchment in conjunction with developers, landowners, local iwi and other interested parties. Planting shall include an appropriate mix of native eco-sourced plant species. This objective aligns with strategic catchment objectives 1, 2, 3 and 5.
007	**Maintain or Improve Flood Protection Level of Service** (a) Where existing flooding is known, or potential flooding is predicted, peak flow management is generally required with reduction to 70% of predevelopment flow for the 100 year ARI storm event. (b) Overland flow paths shall be provided for all stormwater discharges in accordance with Hamilton City Council standards. Wherever possible, the use of private property for overland flow paths shall be avoided. (c) Sufficient freeboard protection, in accordance with Hamilton City Council standards, shall be provided to building floor levels. This objective aligns with strategic catchment objectives 1 and 4.
008	**Minimise water consumption and wastewater discharge** (a) That rainwater re-use tanks are installed and plumbed into non-potable water systems on-lot ***where practicable***. (b) That water efficient fittings are incorporated into ***dwellings and*** businesses and promote sustainable water use practices. (c) That the size of infrastructure is minimised by promoting sustainable water use.

Operational Objective	Description
	(d) That future infrastructure upgrades are avoided or minimised by identifying and managing inefficiencies such as leakage, inflow & infiltration and unauthorised use. *This objective aligns with strategic catchment objective 7.*
009	**Integrated water management** (a) Plan and implement three waters networks on a catchment wide basis to minimise the number of public stormwater treatment devices, wastewater pump stations and storage devices. (b) Where it is shown that a single device will not address receiving environment sensitivities, that a treatment train approach, incorporating an approved at source device upstream of a centralised public device, shall be adopted and include minimisation of temperature effects, metals, metalloids and PAHs. Construction generated sediment shall be controlled to Waikato Regional Council standards and relevant city bylaws. *This objective aligns with strategic catchment objective 7.*

6.0 THREE WATERS MANAGEMENT AND CAPACITY - WATER

6.1 Existing Network Capacity

Water supply for Rotokauri North is dependent on trunk main extensions from the eastern side of the Waikato Expressway, and extension of watermains through Rotokauri South.

Given funding availability within the LTP for the trunk main extensions, and the time to develop (and hence extension of the watermain network) land from the south, an alternative supply source will be required.

6.2 Estimated Water Demand and Modelling

Water supply for Rotokauri North will be located within the Pukete Zone, as per HCC Water Master Plan philosophy. The same Water Master Plan has identified trunk network upgrades to service both Rotokauri North and South. However, the Master Plan had not allowed for the level of development currently being considered within the PPC within Rotokauri North at this time. Detail of the demand and modelling is provided in the McKenzie & Co (2019) Water Supply & Wastewater Report.

Rotokauri North will be serviced from the existing and master planned HCC networks at Te Kowhai Road and Wetini Drive. Water supply modelling results showed that these connections had sufficient capacity to service the area, once upgrades as programmed in Master Plan for 2061 were implemented. Modelling results for the DN350 ring main network showed that it would have sufficient capacity to meet the level of service requirements, principally firefighting demand.

Rotokauri North will cover approximately 140 hectares, with an equivalent population estimated to be more than 5,900. Based on Waikato Local Area Shared Services Regional

Infrastructure Technical Standards (Section 6) the key water flow scenarios are:

- Average Day Demand = 1,537 kL/d (17.8 L/s)
- Peak Day Demand = 89 L/s
- Peak Hour Demand = 109 L/s

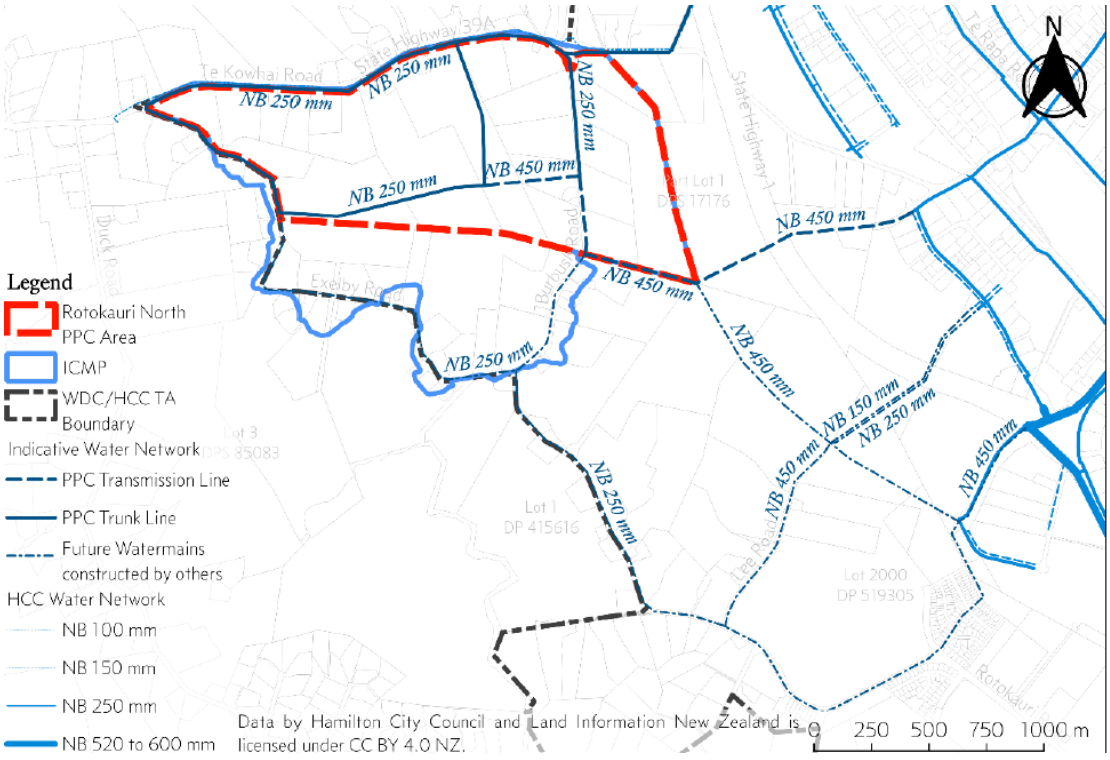
For land that will remain FUZ under this ICMP and PPC, the ultimate network for RNDA and Rotokauri South will have sufficient capacity to enable future connections at such time that land is re-zoned for future development. The HCC water supply network would have sufficient capacity to service the FUZ land after implementation of upgrades as per HCC water supply masterplan.

It is acknowledged that the site conditions could make it desirable at development stage to consider options for a low pressure system rather than a gravity fed wastewater system. This detail can be explored further in conjunction with site development.

6.3 Required Water Upgrades

In order to serve the RNSP the water supply network needs to be provided as per Figure 14 below, and as per the HCC Water Supply Masterplan. However, it is not intended that under this ICMP or development of the RNSP area that the ultimate solution be delivered.

Figure 14: Indicative Water Network



7.0 THREE WATERS MANAGEMENT AND CAPACITY - WASTEWATER

7.1 Existing Network Capacity

The existing 1050mm Far Western Interceptor ("**FWI**") is available on the western side of the Waikato expressway, some 200m south of Te Kowhai Road (SH39). The FWI is intended to service (subject to an extension to this infrastructure) Rotokauri North for wastewater. However, the proposed RNSP will impose additional demand on the Wastewater Treatment Plant ("**WWTP**") ahead of what is planned under the Rotokauri Structure Plan of the HCDP and existing Rotokauri ICMP.

7.2 Estimated Wastewater Demand and Modelling

Design Criteria

Wastewater networks have been designed with regard to the Regional Infrastructure Technical Standards ("**RITS**"), Waikato Local Area Shared Services ("**LASS**"). Detail of the demand and modelling is provided in the McKenzie & Co Consultants (2019) Water Supply & Wastewater Report.

Wastewater Flow Summary

- Rotokauri North will be serviced by an existing connection to the HCC FWI, with this connection provided as part of future proofing of the interceptor. The flow contributing to the HCC network was based on an approximate area of 140 hectares, with an equivalent population of ~5,900. Based on Waikato Local Area Shared Services Regional Infrastructure Technical Standards (Section 5) the key wastewater flow scenarios were:
    - Average daily flow = 1,481 kL/d (17.1 L/s);
    - Peak dry weather flow = 39 L/s; and
    - Peak wet weather flow = 64 L/s.

Wider wastewater infrastructure (trunk, WWTP)

A wastewater impact assessment using the HCC Wastewater Master Plan model was undertaken based on the equivalent population of approximately 5,900. The assessment considered the impact of Rotokauri North on the receiving wastewater network for the 2061 horizon. It was noted that any significant increases in density, and consequently the equivalent population, will affect modelling results. Hence, further modelling may be needed to assess the network under any new density parameters. Based on the model outputs, taking in to account the assumptions and limitations, it was concluded that:

(a) The FWI appears to have sufficient capacity to accommodate the additional RNDA development flows without worsening, or creating any existing, or new network system performance issues, respectively.

(b) System performance results for spare pipe capacity and maximum water level were over predicted due to the effects associated with point loading of the Rotokauri

North catchments. The magnitude of over prediction could not be quantified as part of the assessment. The predicted spare pipe capacity was likely to be greater than indicated by this assessment for both modelled scenarios (with and without Rotokauri North, if the discharge enters the trunk reticulation servicing the development before entering the existing network (FWI).

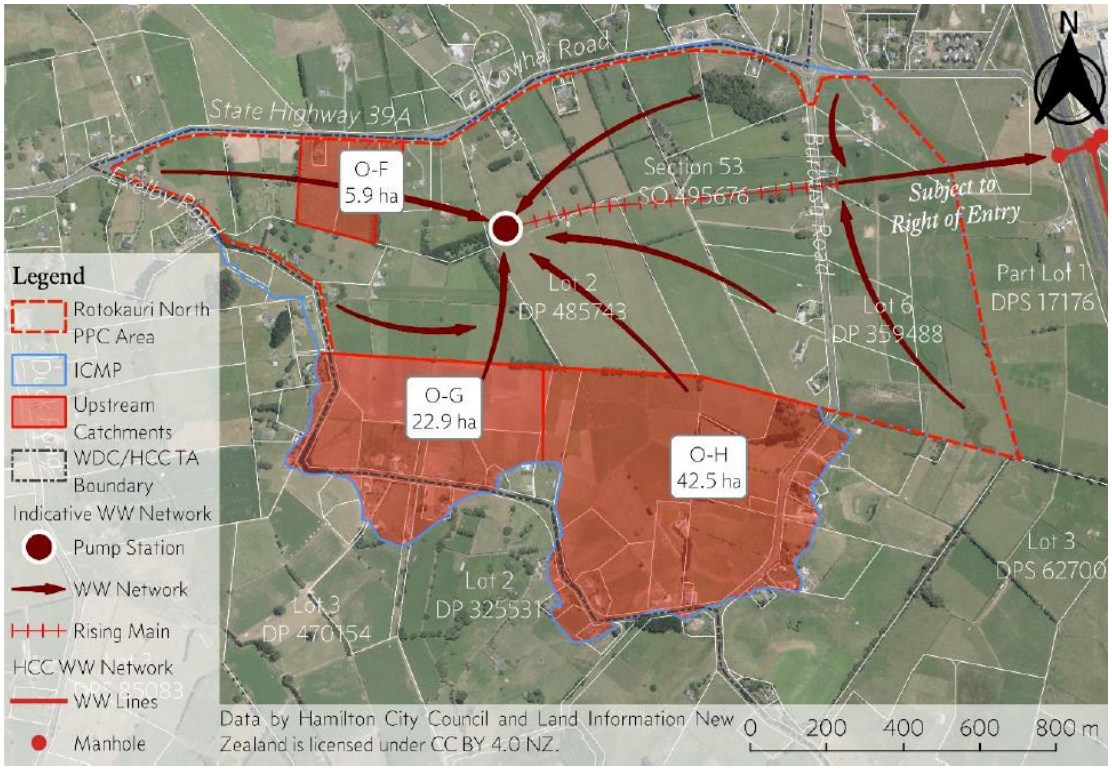
(c) Rotokauri North is likely to increase pipe filling in some sections to nearly 100 percent, thereby utilising capacity as installed or master planned. However as per (b.) above, this is likely to an over estimate of actual pipe filling.

(d) Future development discharges to the FWI in addition to current allowances, and Rotokauri North, may cause new issues or worsen existing network system performance.

7.3 Required Wastewater Infrastructure and Existing Infrastructure Upgrades

In order to serve the RNSP area, the wastewater network needs to be provided as per Figure 15 below.

Figure 15: Indicative Trunk Gravity Network.



8.0 THREE WATERS MANAGEMENT AND CAPACITY - STORMWATER

8.1 Objectives of the Stormwater Strategy

The overarching stormwater objective is to minimise the effects of urban development on the receiving environment by managing the water quality, post development hydrology and the risk of flooding.

The objectives of the ICMP to achieve the overarching objective are:

- Detention of all event (2-, 10- and 100-year events) flows to mitigate onsite and downstream flooding;
- Extended detention of all flows to protect the receiving environment from erosion;
- Treatment of stormwater for pollutants prior to discharge;
- Reticulation of the 2/10-year rainfall event (2-year for residential areas, and 10-year for commercial areas); and
- Accommodation of overland flow paths for the 100 year+cc ARI rainfall event.

8.2 Stormwater Design Parameters

General

This section summarises the key design requirements contained within the IRTS for stormwater and the HCDP's information requirements for a sub-catchment ICMP. It is not exhaustive, but instead covers all those issues considered core requirements in the approach to managing stormwater within the sub-catchment.

The RITS for stormwater sets out the requirements for the design and construction of stormwater systems for land development and subdivision in the following specification documents;

- RITS – Section 4 – Stormwater – May 2018
- Section 4 – Stormwater – Drawings; and
- Section 4 – Stormwater – Forms and Checklists

The key design and construction requirements from these documents (and any predecessor documents) should be used to guide design of specific devices.

Water Efficiencies

HCDP rule 25.13.4.5 requires the use of water efficiency measures being at least one water sensitive technique for stormwater to be incorporated, connected to, achieved or maintained as part of any new residential unit or other new buildings containing a kitchen, laundry or bathroom facility.

Water efficiency measures may consist of any of the following:

- Detention of stormwater to 80% of pre-development runoff by an appropriate means;
- Permeable surface areas emphasised where possible, to achieve at least 20% above the minimum standard of the zone;
- Rainwater tank for non-potable reuse; and
- Other equivalent features.

These measures are required in addition to any quality and quantity requirements under RITS, and are described below and have been incorporated into the overall management of stormwater.

Water Quality

The proposed development will include residential and commercial land use, which are comparatively low contaminant producing activities.

Under RITS the majority of the proposed development would be considered a "normal contaminant load profile", as roads are expected to convey less than 10,000 vehicles per day, buildings will have inert roofs, and the residential areas will not have carpark areas greater than 750m^2.

However, the Neighbourhood Centre (B6Z) may have relatively large uncovered carparks greater than 750m^2, which will be considered "high contaminant load profile" areas.

The RITS stormwater treatment requirements are summarised in Table 9 below:

Table 9: RITS Treatment Train Design Requirements

Landuse Contaminant Category	Treatment Train Requirements
Normal Contaminant Load Profile.	Primary pre-treatment at source via water efficiency measure (e.g., Detention tank, raingarden, rainwater reuse, permeable surfaces, or soakage). Centralised stormwater treatment device (including extended detention volume ("**EDV**") if required).
High Contaminant Load Profile.	Primary pre-treatment at source via a gross pollutant trap or other treatment device (which will include meeting any District Plan requirements) to manage high sediment loads or any contaminants specific to the land use. Centralised stormwater treatment device (including EDV if required).

These measures have been incorporated into the overall stormwater concept below.

8.3 Stormwater Concept

In general land falling within the Mangaheka and Rotokauri South catchments (identified above) should adhere to the BPOs and implementation requirements of those relevant ICMPs. It is not the intention of this ICMP to reassess existing BPOs. **However,** there are some overarching recommendations of this ICMP which impose additional restrictions over and above the adopted ICMPs. These are clearly identified in the breakdown of recommendations below., Where the recommendations of this ICMP exceeded the requirements of the Mangaheka or Rotokauri South ICMPs, the higher requirements imposed under this ICMP shall apply. Refer also to the Stormwater Modelling and MUSIC Modelling report prepared by McKenzie & Co. Consultants (2019).

8.3.1 Strategy

The overarching strategy for stormwater is detailed in section 5 of the Stormwater Modelling and MUSIC Modelling report prepared by McKenzie & Co. Consultants (2019).

It includes a treatment train approach from individual lots to communal devices prior to discharge to the receiving environment and includes the following;

- Quality;
- Retention/Re-use and Detention;
- Conveyance for 10-year$_{cc}$ and 100-year$_{cc}$ rainfall events; and
- Application of Water Sensitive Design for road reserves and lots.

The flow effects will also be mitigated by applying at source stormwater detention wherever practicable.

The McKenzie & Co. Consultants (2019) Modelling report provides greater detail on device and flow sizing, etc., for each component of the "treatment train".

8.3.2 Design Parameters

Overall, a treatment train approach is expected for all development within Rotokauri North, which provides for at source treatment and detention for "standard" lots (> 280m^2), and communal treatment and detention for "small" lots (< 280m^2) prior to discharge to the receiving environment. Key targets and design parameters that the development is expected to achieve in all catchments include the following:

Table 10: Design Parameters

Item/Parameter	Requirement
Flow	
Extended Detention	24mm, 24 hours (RITS)
Peak Flow Attenuation	2, 10 and 100-year storm events (discharge of peak flow at 80% of ED).
Flood Storage (100-year event)	
Flood storage proportional to development	Catchments to provide equitable flood storage to development area. Where land is owned/under control of the same party, flood storage may be provided across catchments.
Flood Storage (General)	Flood storage to be achieved in green corridors, conveyance channels, swales and road reserves sized to detain difference between MPD and 80% ED.
Flood Storage (on lots)	Lots which have sufficient space to provide for flood storage/detention (i.e. single dwelling lots larger than 280m^2) should contribute to flood storage to achieve 5m^3.
Overland Flows	
Overland Flows	Overland flow in roads, conveyance channels, swales or designated green corridors to convey Maximum Probable Development. 100-year flow as per the RITS.
Freeboard	
Residential lot Freeboard	Freeboard shall be provided as per the requirements of the RITS. Where the RITS refers to freeboard above the calculated flood level, the calculated flood level shall be the higher of: • The appropriate flood level based on the subdivision and • development design (i.e. 100-year ARI overland flow paths and local freeboards); • The final design flood level of the major drainage system; and • Further assessment will be required to define these levels.
Water Quality at the discharge point of communal devices (or on lot in the absence of a communal device) and after reasonable mixing	
Stormwater	Increase in concentration <10% of existing

Item/Parameter	Requirement
Discharges	Concentration shall not exceed 100 g/m³ Minimum 75% TSS removal achieved via overall treatment system / treatment train
Temperature	No more than 3°C change in water temperature AND not greater than 23°C
Turbidity	No greater than 25 NTU in the stormwater discharge in a water quality storm (1/3rd of a 2 year 24 hour storm).
Dissolved Oxygen	Greater than 80% of saturation concentration. However, if the concentration of dissolved oxygen in the receiving environment is below 80 percent saturation, any discharge into the water shall not lower it further.
Ammoniacal Nitrogen	<0.88 g/m³
Nitrogen	6.9 mg/L
Colour/Visual Clarity	No conspicuous change in colour or clarity (1/3rd of a 2-year 24-hour storm).
Hydrocarbons	No visible sheen
Gross Pollutants	No gross pollutants
Other Contaminants	Removal in accordance with the RITS. Restrict roofing material (inert only) to avoid further contaminants (zinc/heavy metals) On lot devices may also be required for high use activities.

8.3.3 Stormwater Catchments

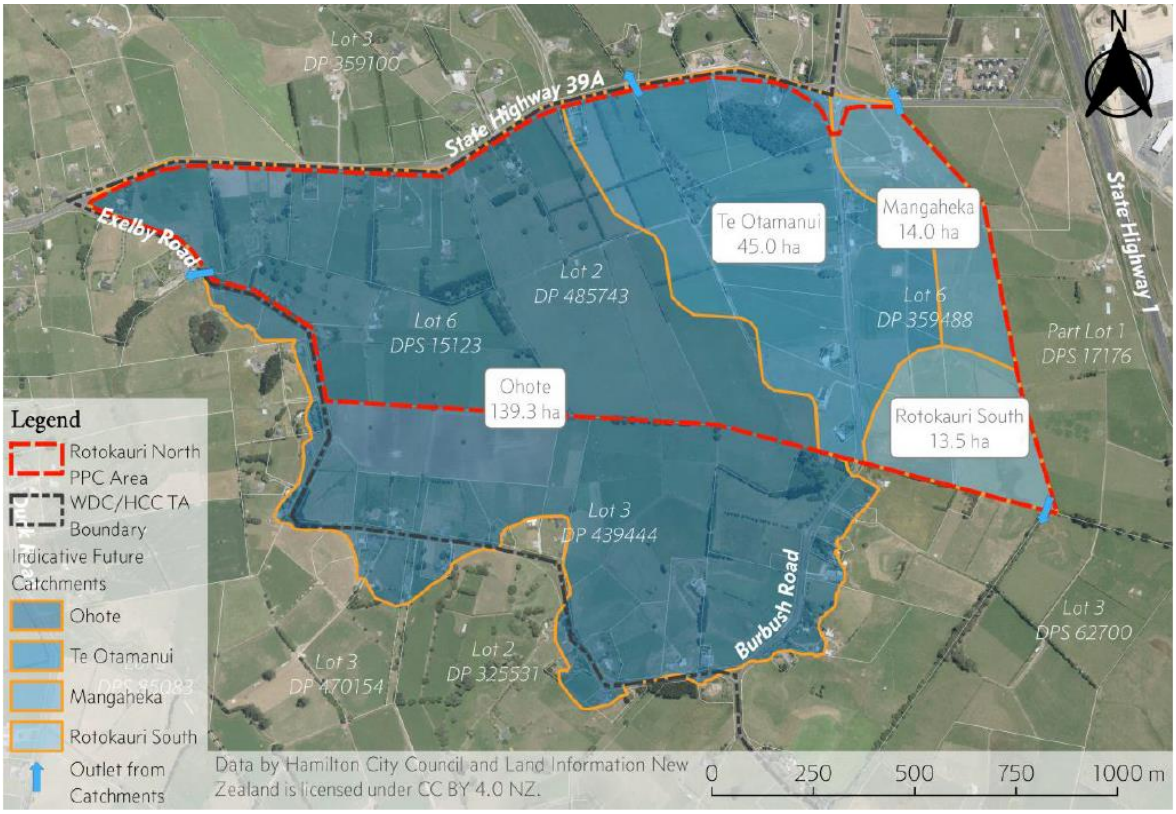
Stormwater Catchments and Sub Catchments Outline

The proposed site topography ties into the existing landform as much as possible (within the requirements of Council design standards), with the road network and green corridors generally following existing natural overland flow path locations. Any changes to the catchments boundaries to align with development roading/green corridors have ensured that the overall flow at discharge points at the ICMP boundaries are the same as/similar to existing scenarios.

Table 11: Proposed Catchment boundaries/areas

Catchment Reference	Existing Area (ha)	Proposed Area (ha)	Comments
Ohote	136.7	139.3	Catchment area was the area upstream of Exelby Road culvert
Te Otamanui West	6.9	0.0	Area to be redirected to Ohote catchment
Te Otamanui East	39.3	45.0	Boundary adjusted with Ohote catchment
Mangaheka	14.9	14.0	Minor adjustment with the Te Otamanui and Rotokauri North catchments
Rotokauri South	14.0	13.5	Minor adjustment with the Mangaheka catchment

Figure 16: Proposed Catchment boundaries/areas



The Ohote catchment has been subdivided further into five indicative sub-catchments; Te Otamanui into two indicative sub-catchments, Mangaheka into three, and Rotokauri South into three indicative sub-catchments. It is expected that each sub-catchment directs stormwater via swales to a wetland (see indicative wetland inlet locations indicated in

Figure 16). Stormwater is then conveyed by swale to the various receiving environment at the

boundary of Rotokauri North. Offline dry detention basins or other similar devices can be used to provide the necessary detention.

Individual catchment extended detention and flows are contained in section 3.7 of the McKenzie & Co. Consultants (2019) Modelling report.

Stormwater Catchment/Flow Options

In addition to the design parameters and catchment descriptions described above, the following options have also been identified for the Ohote Catchment in respect to discharge flows from the catchment:

Table 12: Ohote Catchment Discharge Options

Option	Description	Benefits/Opportunities	Risks/Costs
Option 1	Retain current discharge rate at Exelby culvert.	status quo re downstream erosion effects.	Additional detention volume required to control flows and mitigate against potential flooding and erosion effects downstream.
Option 2	Retain current discharge rate and upgrade culvert to allow 80% ED flow to pass unattenuated.	Potential to reduce onsite detention/flood storage within the RNSP area.	Culvert upgrade required.
Option 3	Increase culvert size to allow greater flow than 80% ED downstream of Exelby Road within third party land. Further assessment can be undertaken prior to and in conjunction with any application to the Regional Council for stormwater discharge. Final sizing of culvert is dependent on this investigation.	Potential to reduce onsite detention/flood storage within the RNSP area.	Culvert upgrade. Downstream mitigation works (potentially).

8.3.4 Evaluation of Device and Location Options (Toolbox)

Table 13 provides a summary of methodologies that could be used to potentially address stormwater management issues in the catchment, with commentary regarding how the option could be implemented and strengths/weaknesses of the devices/options. This was used to evaluate devices to determine the best practicable option.

Table 13: Device Options

Device Type	Application Area				SW Function	Strength/ advantage	Weakness/ limitations	Suitable for Rotokauri North ICMP area
	Res	Business	Roads	Other				
Above ground tanks	Yes	Yes	No	No	Reuse Detention	• Reuse reduces water usage and water demands as water can be re-use on site (dual plumbing and/or garden watering) • Reduces impact of built environment on natural flow regime • Capture first flush runoff • Reduce peak flows for up to 10 year events • Medium volume reduction; • Minor cost reduction of water supply.	• Not viable for impermeable ground surfaces due to surface flow not being able to enter tank. • Reliance on many individual parties maintaining infrastructure (risk) • Moderate cost of installation and ongoing maintenance. • Above ground tanks take up space in rear yards (space varies dependant on type of tank used) • Low peak flow control • Need to consider setback from foundation of house for design purposes • Most effective when designed to meet a specific need for water reuse, i.e., non-potable use within dwelling/apartment building. • Need to consider enabling planning framework in PPC	Yes - but need to be restricted to larger sized lots due to space constraints, or affordability limitations associated with 10% affordable housing

Device Type	Application Area				SW Function	Strength/ advantage	Weakness/ limitations	Suitable for Rotokauri North ICMP area
	Res	Business	Roads	Other				
Below ground tanks	Yes	Yes	Yes	Yes	Reuse Detention	• Reuse reduces water usage and water demands as water can be re-use on site (dual plumbing and/or garden watering) • Reduces impact of built environment on natural flow regime • Capture first flush runoff • Reduce peak flows for up to 10-year events • Medium volume reduction; • Minor cost reduction of water supply.	• Requires hydraulic head or pump to discharge detention volume. • Increased cost to weigh devices down due to high groundwater table • Reliance on many individual parties maintaining infrastructure (risk) • Moderate to high cost of installation and ongoing maintenance. • Low peak flow control • Need to consider setback from foundation of house for design purposes • Most effective when designed to meet a specific need for water reuse, i.e., non-potable use within dwelling/apartment building. • Need to consider enabling planning framework in PPC	Yes - but need to consider tank buoyancy, lot constraints, and affordability limitations associated with 10% affordable housing
Bioretention device (Tree Pit,	Yes	Yes	Yes	Yes	Detention Treatment	• Can be used in all anthropogenic environments;	• Limited ponding depth;	Only in areas where the

Device Type	Application Area				SW Function	Strength/ advantage	Weakness/ limitations	Suitable for Rotokauri North ICMP area
	Res	Business	Roads	Other				
Raingarden, or bioretention swale)						• Medium volume reduction and infiltration; • Low to medium peak flow control; • Average to good water quality treatment; • Flexible in terms of size and infiltration;	• Requires vegetation tolerant of hydrologic variability; • Requires maintenance to ensure long-term viability;	water table is not too high Base of bioretention should be at least 0.5m above water table.
Constructed filters (sand, stone, etc)	Yes	Yes	No	No	Detention Treatment	• Best suited for high intensity development; • Depending on filter media volume reduction can range from medium to good; • Medium peak flow control; • Good water quality treatment;	• Requires regular inspection and maintenance • Not suitable where the water table is too high	Only in areas where the water table is not too high Base of device should be at least 0.5m above water table.
Dry Detention Basin	Yes	Yes	Yes	Yes	Detention Treatment	• Can be used in all anthropogenic environments; • Limited volume reduction and infiltration; • Good peak flow control;	• Requires periodic sediment removal • Space constraints on residential lots	Most appropriate when used in conjunction with other BMP devices.

Device Type	Application Area				SW Function	Strength/ advantage	Weakness/ limitations	Suitable for Rotokauri North ICMP area
	Res	Business	Roads	Other				
						• Low water quality treatment; • Most appropriate when used in conjunction with other devices;		
Gross Pollutant Traps	Yes	Yes	Yes	Yes	Treatment	• Medium water quality treatment; • Best used in conjunction with other devices.	• Operation and maintenance risk. • Most suited to small catchments, but can be used in all anthropogenic environments; • No volume reduction, nor infiltration; • No peak flow control;	May be most suitable in more intensively developed areas of the developmen t AND/OR Business areas
Infiltration Trench	Yes	Yes	Yes	Yes	Detention Treatment	• Can be used in all anthropogenic environments; • Medium volume reduction and good infiltration; • Medium peak flow control; • Good water quality treatment;	• Requires uncompacted soil; • Limit to storage capacity; • Void ratio within the scoria/gravel bed should be high • Not appropriate where the water table is too high • Need to consider setback from foundation of house for design purposes	Not appropriate where the water table is too high Base of device should be at least 0.5m above water table

Device Type	Application Area				SW Function	Strength/ advantage	Weakness/ limitations	Suitable for Rotokauri North ICMP area
	Res	Business	Roads	Other				
Landscape Restoration	No	No	No	Yes	Treatment	• Good water quality treatment; • Minimize fertiliser and pest control programs; • Reduced maintenance costs compared to lawns. • Other ecological and amenity benefits	• Low to medium volume reduction and infiltration; • Low to medium peak flow control; • Potential significant effect on land area available for development, along with housing yields and contributing densities to support infrastructure development	Yes (limited to stream enhancement)
Onsite Soakage	Yes	Yes	No	Yes	Detention Treatment	• Suited to residential, commercial and industrial settings; • Medium volume reduction and infiltration; • Medium peak flow control; • Medium water quality treatment;	• Maintain minimum distance from building foundation (typically 2 to 3m); • Requires observation well; • Requires regular maintenance to remove sediment. • Not appropriate in high water table; • Need to consider setback from foundation of house for design purposes.	Unlikely as the water table is high
Permeable Pavement	Yes	Yes	limited	limited	Detention Treatment	• Most appropriate for use in residential, commercial and industrial settings;	• Requires vacuuming two to three times per year (maintenance risk).	Yes, but may need to be lined when

Device Type	Application Area				SW Function	Strength/ advantage	Weakness/ limitations	Suitable for Rotokauri North ICMP area
	Res	Business	Roads	Other				
						• Medium volume reduction and infiltration; • Medium peak flow control; • Medium water quality treatment (treatment not directly addressed but removes contaminants from catchment). • Achievable within the driveway pavement;	• Void ratio within the scoria/gravel bed under permeable pavement should be high; • Need to be lined to mitigate high groundwater level	groundwater level is high.
Piped Reticulation	Yes	Yes	Yes	Yes	Conveyance	• Underground pipes require less spaces/loss of developable areas	• No volume reduction, nor infiltration; • No peak flow control; • No water quality treatment; • Limited applicability given hydraulic grade.	Where the hydrologic grade allows
Rooftop Disconnection	Yes	Yes	No	No	Detention	• Appropriate for residential and commercial development; • Good volume reduction and infiltration; • Good peak flow control.	• Low water quality treatment	Yes - Redirect rooftop flow to vegetated or permeable areas designed to

Device Type	Application Area				SW Function	Strength/ advantage	Weakness/ limitations	Suitable for Rotokauri North ICMP area
	Res	Business	Roads	Other				
								receive stormwater.
Riparian Planting	No	No	No	Yes	Detention Treatment	• Medium volume reduction and infiltration; • Medium to high water quality treatment; • Helps to maintain hydrologic, hydraulic, and ecological integrity. • Provide some amenity value.	• Limited peak flow control; • Minimum width 10m/loss of developable land	Yes – along watercourses
Stormwater Ponds	No	No	No	Yes	Detention Treatment	• Can be used in most anthropogenic environments – typically not used in intense urban settings; • Good peak flow control; • Medium water quality treatment; • Require large catchments, therefore useful as a communal device; • Can provide an amenity feature.	• Use should be limited given tendency for water temperature to rise is pond. • Limited volume reduction and infiltration; • Colonisation by invasive species could increase maintenance; • Perceived health & safety risks may result in fencing and isolation of the pond.	Not recommended

Device Type	Application Area				SW Function	Strength/ advantage	Weakness/ limitations	Suitable for Rotokauri North ICMP area
	Res	Business	Roads	Other				
Special Value Features	No	No	No	Yes	Detention Treatment	• Identify floodplains, riparian areas, woodlands, steep slopes, etc.; • Protect from development; • High volume reduction and infiltration; • Good peak flow control; • Good water quality treatment.	• Loss of developable land	Appropriate across the development, particularly the drainage reserve and significant natural (tree) area.
Swale	No	Yes	Yes	Yes	Conveyance Treatment	• Good peak flow control; • Good water quality treatment; • Size to convey 10-year storm events; • Designed for non-erosive velocities; • Best designed to aesthetically fit into landscape; • Significantly slow runoff rate.	• Device becomes wide as catchment size increases – limited to 4 hectares catchment • Limited volume reduction and infiltration; Best used in conjunction with other stormwater devices	Yes

Device Type	Application Area				SW Function	Strength/ advantage	Weakness/ limitations	Suitable for Rotokauri North ICMP area
	Res	Business	Roads	Other				
Vegetated/ Grassed Conveyance Channel	No	No	Yes	Yes	Conveyance Treatment	• Good peak flow control; • Good water quality treatment; • Size to convey 10-year storm events; • Designed for non-erosive velocities; • Best designed to aesthetically fit into landscape; • Significantly slow runoff rate.	• Device becomes wide as catchment size increases • Limited volume reduction and infiltration; • Best used in conjunction with other stormwater devices.	Yes
Topsoil depth of 300mm with 10% compost	Yes	Yes	No	No	Treatment	• Medium infiltration; • Medium water quality treatment	• Limited volume reduction; • Limited peak flow control;	Suited for all uncontrolled paved areas. Shed surface runoff across areas of at least an equal area of grassed topsoil.
Vegetated Roof/Wall	Yes	Yes	No	No	Detention Treatment	• Medium volume reduction;	• No infiltration; • Limited peak flow control;	If desired.

Device Type	Application Area				SW Function	Strength/ advantage	Weakness/ limitations	Suitable for Rotokauri North ICMP area
	Res	Business	Roads	Other				
						• Medium water quality treatment;	• Need to consider structural design. • High cost of design and installation, and ongoing maintenance	
Wetland (offline)	No	No	No	Yes	Treatment Detention	• Good peak flow control; • Good water quality treatment; • Require large catchments, therefore useful as a communal device; • Requires sustained baseflow; • Periodic sediment removal and vegetation maintenance; • Performance improved with forebay for sediment collection and removal.	• Limited volume reduction and infiltration; • Requires large land area (loss of developable land) • Periodic sediment removal and vegetation maintenance • Need to be lined to mitigate high groundwater level • Requires adequate baseflow, may therefore need to be lined.	Yes

8.4 Best Practicable Option Analysis

This section identifies options that have been considered to meet the stormwater objectives and which take into account site constraints and opportunities, and the nature of the discharges arising from development within Rotokauri North to confirm that the proposed method/s for managing stormwater are the best practicable option.

The following options have been identified and evaluated:

A. Do Nothing;

B. Toolbox of Options for private lots;

C. Pipe public and private runoff to localised wetlands;

D. Use of swales and local wetlands only; and

E. Use of swales/ local wetlands and the Toolbox from B above.

8.5 Option Description

The above options are detailed below:

Option A – do nothing

This is not possible to achieve development of an urban nature due to existing onsite flooding.

Option B – Toolbox of Options for private lots

On its own this option seems to have a range of on lot options for homeowners and developers to choose from to mitigate full stormwater quality and flood storage. On its own this option would require a significantly lower density of development than that proposed as on lot devices would need to be provided for every lot. This option also carries a large obligation (and associated risk) on individual owners to maintain devices to full operating capacity with regular maintenance.

Option C – Pipe public and private runoff to localised wetlands

Localised off-line wetlands could provide quality treatment and detention at the end of a pipe system, with no requirement for onsite treatment, nor detention on-site. As pipe conveyance has no detention or quality function and no detention is retained on individual sites end of line offline wetlands would need to be significantly larger than would be necessary when adopting a treatment train approach to stormwater management, thereby reducing developable land (and creating large significant assets).

Option D - Use of swales and local wetlands

Similar to option C, localised off-line wetlands would provide quality treatment and detention at the end of a swale and vegetated or grassed conveyance channel system. Some piped network could still be expected in the upper catchments, but no requirement for onsite treatment or detention on-site. This method could produce a partial treatment train for removal of contaminants, however, swales/conveyance channels and wetlands would still be of a significant size thereby reducing developable land (and creating large significant assets).

Option E - Use of swales/ local wetlands and the Toolbox from B

Option E is the preferred option to achieve the design parameters and the strategic and operational objectives, and is essentially a blending of Options B and D.

Option E incorporates a full treatment train approach for the management of stormwater starting on lots (via a range of on lot options for homeowners and developers to choose from) and discharging into swales, conveyance channels and then wetlands prior to discharging into the stream network. While communal assets/devices area still sizable (i.e., wetlands, swales and conveyance channels), some of the detention volume is distributed across the development through the use of on-lot devices for detention and retention/reuse, thereby creating a more equitable but manageable system.

8.6 Option Analysis

The table below analyses options A to E using an analytical hierarchical process (Saaty, 1980) to assign priority to each of the criteria considered.

What is evident from the analysis is that all options outperform the status quo, with options C, D and E addressing the criteria most effectively (and the preferred option E producing the highest outcome against the criteria).

Table 14: BPO Evaluation

	Evaluation Criteria	A	B	C	D	E
		Do nothing	Toolbox of Options for Private Lots	Pipe Public and Private to Local Wetlands	Use of Swales to Local Wetlands	Use of Swales to Local Wetlands & Option B
1	Device Function					
	Retention/Reuse	1	2	1	1	1
	Detention	1	3	5	5	5
	Quality Treatment	1	3	5	4	5
2	Other Compliance					
	Water Safety	5	3	3	3	3
	Code of Practice	1	3	3	4	5
3	Consistent with WSD Approach					
	Interdisciplinary Outcomes	1	4	3	5	5
	Protect Ecosystem	1	3	5	4	5
	Minimal Adverse Effects	1	3	3	3	5
	Uses Natural Systems	1	4	5	4	5
4	Environmental					
	Onsite Streams - permanent	1	3	5	5	5
	Vegetated overland flow paths	1	4	2	5	5
	Downstream Effects	1	2	4	4	5
	Minimal Earthworks	5	2	2	2	2
5	Landscape	3	3	3	5	5
6	Amenity	3	3	3	4	5
7	Development Yeild	1	4	3	3	3
8	Costs					
	Capex	5	3	3	3	3
	Opex	5	2	3	3	3
9	Ownership	C	P	C	C	C / P
10	Viable	×	×	✓	✓	✓
	Total Score	38	61	**69**	**74**	**84**

	Scoring System
1	Significant adverse effects/ Unlikely to be achieved
2	Adverse effects/ Difficult to implement
3	Neutral
4	Beneficial
5	Highly beneficial
C	Council Owned
P	Privately Owned

In summary Option E is considered the best practicable option for the management of stormwater for the area subject to this ICMP.

In addition, the McKenzie & Co Consultants (2019) Stormwater and MUSIC Modelling report analyses the proposed option against the WRC Low Impact Design ("**LID**") Assessment. Option E was assessed to have a total score of 25 (WRC require a minimum score of 15).

9.0 IMPLEMENTATION

In general, land falling within the Mangaheka and Rotokauri South catchments (identified above) should adhere to the implementation requirements of those relevant ICMPs. **However,** there are some overarching recommendations of this ICMP that impose additional restrictions over and above the adopted ICMPs. These are clearly identified in the breakdown of recommendations and implementation guide below. Where the recommendations of this ICMP exceed the requirements of the Mangaheka or Rotokauri South ICMPs, the higher requirements imposed under this ICMP shall apply.

Table 15: Implementation

Lot/Area Type	Requirements		Recommended Devices Options
All Catchments			
Single dwelling, residential lots under 280m²	Detention	LID device to manage SW from all impermeable surfaces on the site.	Tank (above or below ground depending on space constraints) Permeable pavement Green Roof/Wall Bioretention devices
	Treatment	Roof material metals contaminant runoff avoidance	Inert roof materials
	Detention	All driveways and manoeuvrings areas shall be constructed using permeable pavement materials (excluding an access lane/rear lane).	Permeable pavements
Affordable Lots/Houses	Detention	All driveways and manoeuvrings areas shall be constructed using permeable pavement materials	Permeable pavements
	Treatment	Roof material metals contaminant runoff avoidance	Inert roof materials
Single dwelling, residential lots over 280m²			
	Detention	LID devices to manage SW from all impermeable surfaces on the site. Detention device plumped into the dwelling for non-potable uses Detention device sized to a minimum 5m³ per site (which allows for reuse plus some detention in the device).	Tank (above or below ground Permeable pavement Green Roof Bioretention devices
	Treatment	Roof material metals contaminant runoff avoidance	Inert roof materials
	Detention	All driveways and manoeuvrings areas shall be constructed using	Permeable pavements

Lot/Area Type	Requirements		Recommended Devices Options
		permeable pavement materials (excluding an access lane/rear lane).	
Multiple units/duplex product	Detention	LID devices to manage SW from all impermeable surfaces on the site.	Tank (above or below ground Permeable pavement Green Roof Bioretention devices Option to make devices communal
	Treatment	Roof material metals contaminant runoff avoidance	Inert roof materials
	Detention	All driveways and manoeuvrings areas shall be constructed using permeable pavement materials (excluding an access lane/rear lane).	Permeable pavements
Commercial Activities + B6Z	Treatment	Roof material metals contaminant runoff avoidance	Inert roof materials
	Detention	Refer to HCC Three Waters Management Practice Note 06: Detention Tank (~26.5 litres per m^2 of roof)	Tanks (above or below ground) Raingardens
	Treatment	75% TSS	Runoff to main swale / treatment is provided in communal wetland
Roads	Conveyance	Upper 1.5 hectares of each tributary is managed in the road, and the lower catchment is managed via swales	Roads (no swale) Roads with vegetated or grassed conveyance
Communal Devices	Treatment Detention	75% TSS and 95% total contaminant removal Detention 0.5m above Water Quality Volume (WQV)	Wetlands Swales (vegetated for catchments up to 4 hectares) in some instances

Lot/Area Type	Requirements		Recommended Devices Options
			(see device options)

Rotokauri North Catchment Stormwater Modelling

Ohote Stream Capacity Assessment Model Build Report

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Rotokauri North Catchment Stormwater Modelling

Ohote Stream Capacity Assessment Model Build Report

Client: Hamilton City Council

Co No.: N/A

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Quality Information

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Reviewed by Chris Hardy

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1.0 Introduction

AECOM New Zealand Limited (AECOM) has been engaged by Hamilton City Council (HCC) to undertake hydrologic modelling for the Rotokauri North Catchment Development Area (RNDA). The purpose of the modelling as described in the Consultant Agreement PSP17459 is to:

- Support HCC and the Developer to address some of the recognised future actions / information gaps in the Rotokauri Integrated Catchment Management Plan (ICMP) for the Rotokauri North Catchment.
- Undertake hydrological assessment of the impact of the proposed development will have on the downstream catchment in terms of flood level and extent.
- Help inform the requirement for the upstream storage and detention.

Assessments are being carried out using the Rotokauri North stormwater model which is a version of the Rotokauri Investigations & Design IFS model that has been reduced in its size (to cover only the area of interest).

The original PSP scope allowed for model setup specific to the requirements of the RNDA, the development of a set of baseline scenarios, and optioneering scenarios based on information provided by the Developer and HCC.

Additional stormwater modelling was agreed to be undertaken (Reference Variation 1 to PSP17459) based on the outcome of a workshop with the Developer and HCC. The objective of the additional work was to model a scenario based on unimpeded discharge to the Ohote Stream at Exelby Road.

The potential benefits of modelling an unrestricted discharge as the first option are as follows:

- It is likely to be the worst case scenario so if impacts are negligible, further downstream flood assessment may not be required.
- If it was deemed no further assessment is required, additional flood modelling in regard to flood storage and optimisation may not be required; or at least the number of options could be significantly reduced.

This report describes the additional modelling task only. An overall model build report is planned to be undertaken as per the original scope of PSP17459 that will include baseline scenarios and further discussion of options and proving scenarios.

2.0 Assumptions and limitations

The following assumptions and limitations apply to this assessment:

i. The modelling has been undertaken utilizing the existing model of decreased extent and in general accordance with the *HCC, Standard Stormwater Modelling Methodology, 1 May 2013*. It is noted that this guideline has now been superseded with a newer version; however for the consistency reasons, 2013 version guideline has been adopted and maintained for this model.

ii. Rainfall used in this modelling is as per existing model which uses the *Standard Stormwater Modelling Methodology*, *1 May 2013.*

iii. DHI software, 2016 version, was used.

iv. The terrain has been modified for the purpose of the modelling project. The modified terrain is not representative of the developed terrain. The terrain aspects upstream of the Exelby culvert in the Maximum Probable Development (MPD) scenario have changed. Direct comparison with the Existing Development (ED) scenario areas upstream of the Exelby culvert for baseline comparison purposes is not appropriate.

v. An average imperviousness value of 71% has been applied to all sub-catchments within the Hamilton City Boundary. This value was derived based on information provided by the Developer which is described in more detail in Section 3.2. This methodology will average the runoff across

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the development area; however, given the level of information available at this stage of the project, HCC and the Developer have agreed this methodology is reasonable.

vi. This model build report only documents the factual aspects of the modelling undertaken (e.g. provided input parameters and output results) but does not explain the basis of the parameters and consequential decisions made by the developer.

vii. This report is not intended to be a detail model build report, and serves as an addendum to the main model build report yet to be issued under the commission of the PSP17459.

3.0 Assessment Methodology

The intent of the modelling was to demonstrate the impact of an unimpeded discharge of the proposed development on the Ohote Stream downstream of Exelby Road. An outline of the methodology used for completing this modelling project is described in this section.

3.1 Catchment Overview

The total Rotokauri North catchment size is approximately 176 hectares (Ha). The main catchment outlet to the Ohote Stream is an existing culvert on Exelby Road at the city boundary. Approximately 39.3 Ha of the catchment currently discharges into the neighbouring Te Otomanui catchment via a culvert under Te Kowhai Road.

The catchment comprises undeveloped land that is used for pasture and grazing. The catchment drains via a system of farm drains and culverts into the Ohote Stream and the Te Otomanui Stream, then into the Waipa River.

3.2 Model Build

The following methodology was applied to the model build:

a. The model was developed using Mike Flood (by DHI software) consisting of Mike Urban module and the Mike 21 flexible mesh module to represent the various hydraulic and hydrological components of the catchment.

b. The flexible mesh applied to the model originates from the original 2 m by 2 m rectangular grid (refer to the *Rotokauri Stormwater Modelling, Model Build Report, 23 September 2016, AECOM*).

c. The flexible mesh in areas upstream of the Exelby Road culvert was updated to make sure conveyance into the Ohote Stream is maximised as far as practical without any significant restrictions. This was achieved by manually adjusting the elevation value of mesh vertices at the location of existing farm drains and streams. Channels were made conservatively wide and deep in order to achieve good channel conveyance. The modified mesh file was applied to all three modelled scenarios.

d. The proposed future development (MPD) scenario assumes that the area currently draining into the Te Otomanui catchment will be diverted into the Ohote Stream. This has been achieved by adjusting the terrain of the existing channels as described above, and by increasing the road elevation at the Te Kowhai Road culvert location, to make sure flow cannot enter the neighbouring catchment.

e. An impervious value of 71% was applied to all applied to all sub-catchments within City Boundary. Imperviousness values for sub-catchments outside the City Boundary were not changed from the original Rotokauri ICMP model. The RNDA imperviousness value was derived from information provided by the Developer (Table 1).

Table 1 Information used to derive the average imperviousness value

Land use	Residential	Roads	Commercial	Education	Open space & reserves
Land use area proportion	52%	26%	1%	3%	18%
Land use imperviousness	80 %	95 %	95 %	40 %	15 %

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f. An average roughness coefficient of 24.18 (Manning's M) was applied to grid cells located within the RNDA in the bed resistance file. The bed resistance file is used by the Mike 21 module. This value was derived from information summarised in Table 2.

Table 2 Information used to derive the average roughness coefficient value

Land use	Residential	Roads	Commercial	Education	Open space & reserves
Land use area proportion	52 %	26 %	1 %	3 %	18 %
Manning's M	12	50	11	11	25

g. The Exelby Road culvert was removed from the 1D model (Mike Urban). The model terrain was cut to stream invert level over a width of about 3 m (approximating the existing downstream channel and / or a small single span bridge) at the culvert location to allow virtually unrestricted discharge.

3.3 Run the scenarios

Three MPD model scenarios were run using nested hyetographs with a 24 hour rainfall duration. The simulations were run for 36 hours for the following rainfall events:

- 2 year ARI rainfall event with climate change
- 10 year ARI rainfall event with climate change
- 100 year ARI rainfall event with climate change

4.0 Model Outputs

The following system performance outputs were provided to HCC and the Developer:

1. RNDA-Variation 1-Discharge Hydrographs.xlsx: This spreadsheet contains the discharge time series for the Exelby Road culvert location and Duck Road Bridge for all three event scenarios. The discharge time series is provided in the 5 minute time step interval.
2. Maximum water depth maps: These maps show the maximum water depth achieved during the simulation for each grid cell. A threshold of 100mm has been applied; therefore only depth above 100mm is plotted. The following maps have been provided:
   - RNDA_Variation1_MPD2CC_MaxWaterDepth.pdf
   - RNDA_Variation1_MPD10CC_MaxWaterDepth.pdf
   - RNDA_Variation1_MPD100CC_MaxWaterDepth.pdf
3. Maximum water level maps: These maps show the maximum water level as R.L. achieved during the simulation for each grid cell considered by the model a 'wet cell'. The following maps have been provided:
   - RNDA_Variation1_MPD2CC_MaxWaterLevel.pdf
   - RNDA_Variation1_MPD10CC_MaxWaterLevel.pdf
   - RNDA_Variation1_MPD100CC_MaxWaterLevel.pdf
4. Maximum velocity maps: These maps show the maximum flow velocity achieved during the simulation for each grid cell. A threshold of 0.05m/s has been applied; therefore only the velocity above this threshold value is plotted. The following maps have been provided:
   - RNDA_Variation1_MPD2CC_MaxVelocity.pdf
   - RNDA_Variation1_MPD10CC_MaxVelocity.pdf
   - RNDA_Variation1_MPD100CC_MaxVelocity.pdf
5. Flood extent comparison maps: These maps show the MPD maximum water depth result (as noted in the bullet point 2) for an event with climate change, overlaid with the ED flood extent

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result (for which the maximum water depth exceeds 100mm) for the same rainfall event without climate change. It is noted that comparison of flood extents upstream of the Exelby Road culvert location is not appropriate due to terrain changes applied to the MPD models. The following maps have been provided:

- RNDA_Variation1_MPD2CC vs ED2 Flood Extent.pdf
- RNDA_Variation1_MPD10CC vs ED10 Flood Extent.pdf
- RNDA_Variation1_MPD100CC vs ED100 Flood Extent.pdf

6. RNDA_Var1_Raster_Results.gdb: This is ArcGIS geodatabase file compiling raw model result files for the three MPD scenarios in a raster format. The following raster files are included in the *.gdb file:
   - RNDA_Var1_MPD100CC_MaxDepth
   - RNDA_Var1_MPD100CC_MaxV
   - RNDA_Var1_MPD100CC_MaxWL
   - RNDA_Var1_MPD10CC_MaxDepth
   - RNDA_Var1_MPD10CC_MaxV
   - RNDA_Var1_MPD10CC_MaxWL
   - RNDA_Var1_MPD2CC_MaxDepth
   - RNDA_Var1_MPD2CC_MaxV
   - RNDA_Var1_MPD2CC_MaxWL

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5.0 Discussion

The following is noted based on the model outputs taking into account the assumptions and limitations:

a. The channels cut into the model do not represent designed flood storage but they do represent a significant storage volume due to their size and combined length in the flat catchment.

b. A manual peak discharge assessment undertaken by the Developers Engineers yielded a peak flow in the order of 7 m^3/s. This rate was not achieved in the model likely due to the storage volume in the cut conveyance channels and the flat nature of the site (and therefore the channels). The model yielded a peak discharge rate of 2.3 m^3/s.

c. It is anticipated that it will not be practical to increase the discharge rate any further in the model, therefore the final solution will need to provide some degree of conveyance storage volume to suit the final adopted Exelby Road flow control (culvert or bridge).

d. The terrain cut at Exelby Road currently approximates a bridge with a span of 3m. Further consideration and optioneering of the final waterway form will be required for the Exelby Road discharge point in association with the point made above regarding conveyance storage.

e. It should be noted that the velocity maps show velocities for all flooding including under 100mm depth (which is typically removed). Reference should be made to the flood extent maps which do not show flooding less than 100 mm which can be treated as negligible.

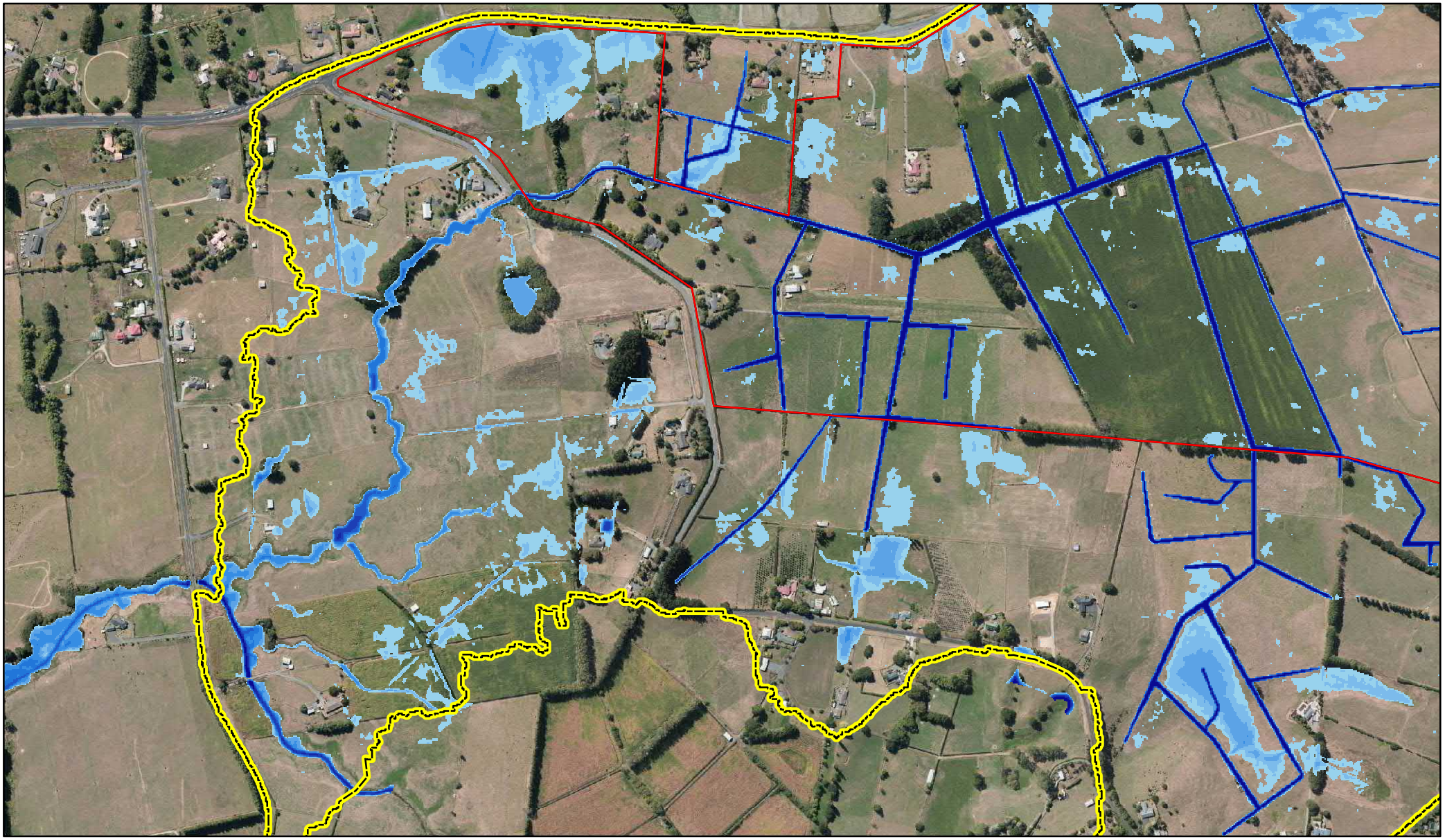
f. The flood extent maps show that the cut channels have reduced surface flooding and adequately discharged runoff from most of the catchment. Minor areas of surface flooding remain in small depressions and very flat areas of the catchment; these are typically impractical to remove and should not occur in reality once earthworks and the final development infrastructure is in place (e.g. roads).

g. The 100 year ARI ED versus MPD comparison map shows that there is a small increase in the extent of flooding downstream of Exelby Road. The flood extent appears to be maintained within the gully channel (i.e. the flooding does not appear to breach the top of the gully bank).

Consent has not been provided by HCC to provide recommendations in regards to the results in terms of impact assessment. Therefore recommendations have not been assessed or provided in this report.

Appendix A

Plans



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Approved		Date	2/10/2018
Designed	SV	Drawn	SV
Checked	JM	Checked	JM

Primary Map No. 60582116 - Maximum Water Depth

Project: **Rotokauri North Catchment Stormwater Modelling**

Title: Maximum Probable Development - 100 year ARI with climate change
Flooding Results - Maximum Water Depth (above 100mm)

Scale: Scale: 1:8,000 (A4 size) 100 50 0 100 Meters

Status: DRAFT | Rev. 0 | Map No. 60582116 - 01

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Rev.	By	App.	Description	Date
0	SV	JM	Draft	2/10/2018

Maximum Water Depth above 100mm

- 0.1001 - 0.2000
- 0.2001 - 0.3000
- 0.3001 - 0.5000
- 0.5001 - 0.7500
- 0.7501 - 1.0000
- 1.0001 - 1.2500
- 1.2501 - 1.5000
- 1.5001 - 2.0000
- > 2.0001

Model Boundary

Rotokauri North Development Area

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MAP FEATURES: depicted in terms of NZGD2000 - NZTM
MAP GRIDS: NZGD2000 - NZTM2000
DATA SOURCES:
HCC Supplied GIS Datasets, Network, Aerial Imagery, Topographical.
LINZ Topo Data, CRS 2011, ESRI Global Map 2010,
BING Satellite Imagery

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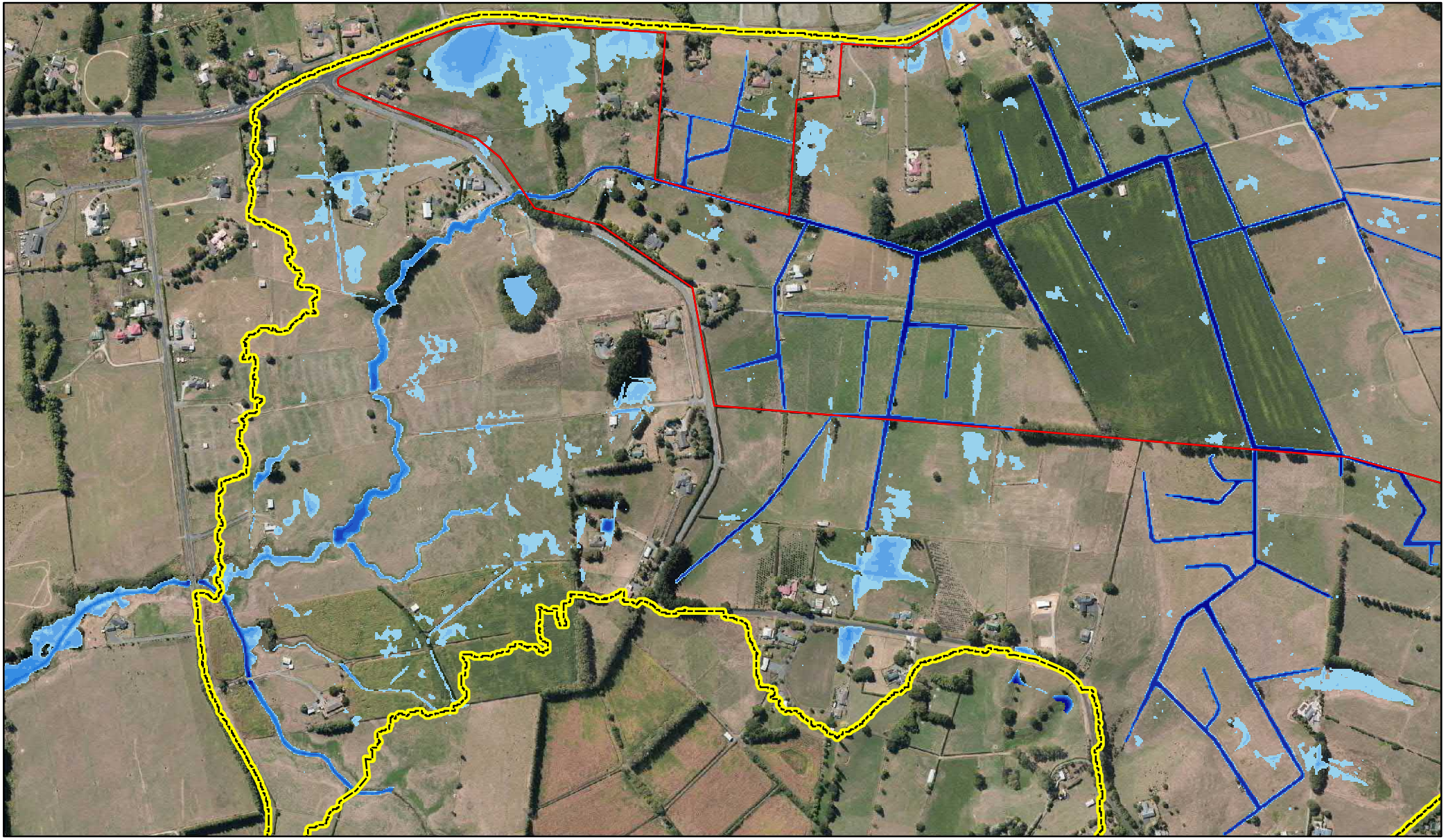

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Approved		Date	2/10/2018
Designed	SV	Drawn	SV
Checked	JM	Checked	JM

Primary Map No. 60582116 - Maximum Water Depth

Project: **Rotokauri North Catchment Stormwater Modelling**

Title: Maximum Probable Development - 10 year ARI with climate change
Flooding Results - Maximum Water Depth (above 100mm)

Scale: Scale: 1:8,000 (A4 size) 100 50 0 100 Meters

Status: DRAFT | Rev. 0 | Map No. 60582116 - 02

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Rev.	By	App.	Description	Date
0	SV	JM	Draft	2/10/2018

Maximum Water Depth above 100mm

- 0.1001 - 0.2000
- 0.2001 - 0.3000
- 0.3001 - 0.5000
- 0.5001 - 0.7500
- 0.7501 - 1.0000
- 1.0001 - 1.2500
- 1.2501 - 1.5000
- 1.5001 - 2.0000
- > 2.0001

Model Boundary

Rotokauri North Development Area

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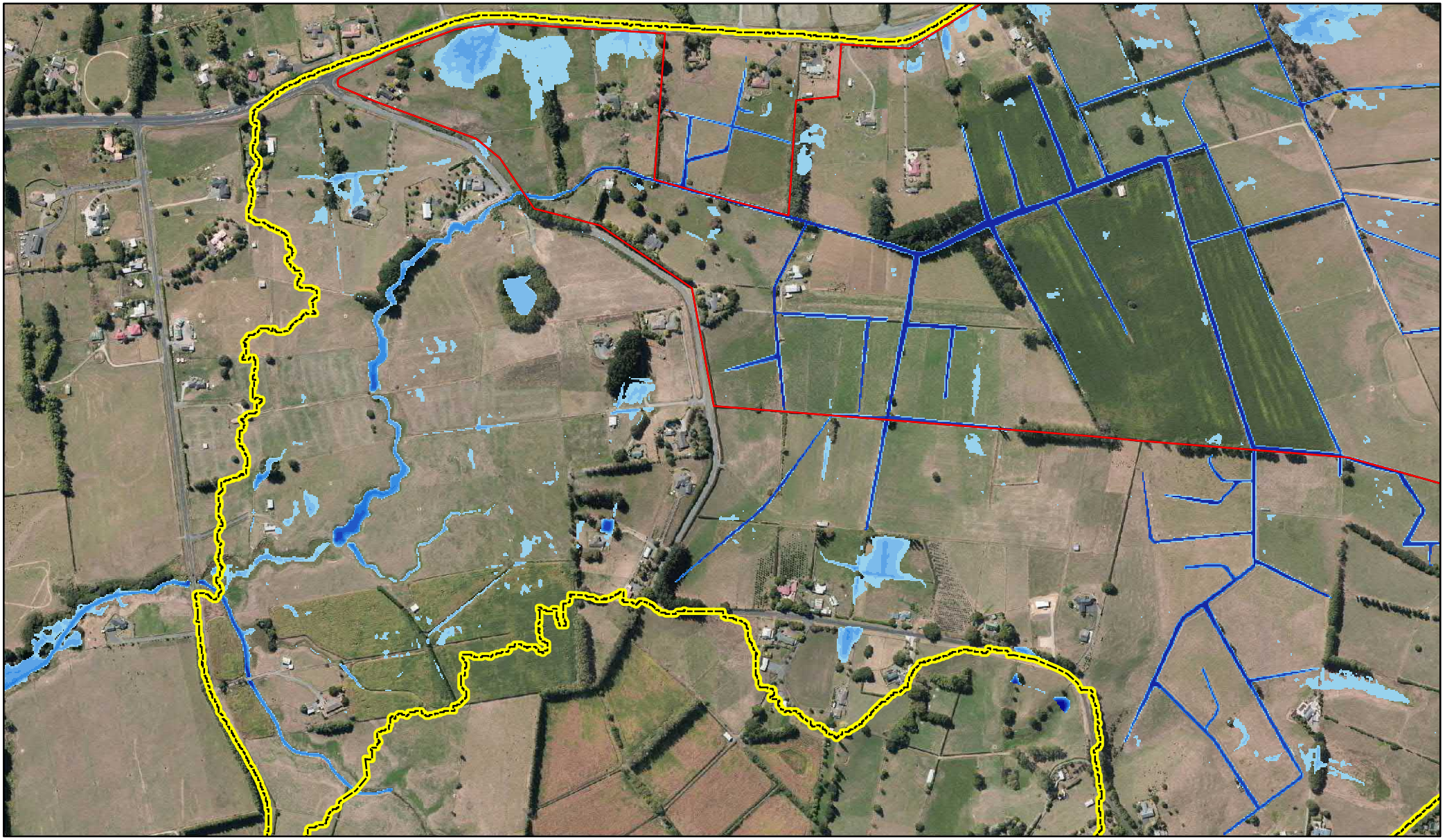

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Printed	4/10/2018 7:22:07 a.m.		
Approved		Date	4/10/2018
Designed	SV	Drawn	SV
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Primary Map No. 60582116 - Maximum Water Depth

Project: **Rotokauri North Catchment Stormwater Modelling**

Title: Maximum Probable Development - 2 year ARI with climate change
Flooding Results - Maximum Water Depth (above 100mm)

Scale: Scale: 1:8,000 (A4 size) 100 50 0 100 Meters

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Rev.	By	App.	Description	Date
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Maximum Water Depth above 100mm

- 0.1001 - 0.2000
- 0.2001 - 0.3000
- 0.3001 - 0.5000
- 0.5001 - 0.7500
- 0.7501 - 1.0000
- 1.0001 - 1.2500
- 1.2501 - 1.5000
- 1.5001 - 2.0000
- > 2.0001

Model Boundary

Rotokauri North Development Area

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Printed	2/10/2018 5:52:15 a.m.		
Approved		Date	2/10/2018
Designed	SV	Drawn	SV
Checked	JM	Checked	JM

Primary Map No. 60582116 - Maximum Water Level

Project: **Rotokauri North Catchment Stormwater Modelling**

Title: Maximum Probable Development - 100 year ARI with climate change
Flooding Results - Maximum Water Level

Scale: Scale: 1:10,000 (A4 size) 100 50 0 100 200 Meters

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Rev.	By	App.	Description	Date
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Maximum Water Level R.L. above 18.0m

- 18.0001 - 20.0000
- 20.0001 - 22.0000
- 22.0001 - 24.0000
- 24.0001 - 26.0000
- 26.0001 - 28.0000
- 28.0001 - 30.0000
- 30.0001 - 35.0000
- 35.0001 - 40.0000
- > 40.0001

Model Boundary

Rotokauri North Development Area

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Approved		Date	2/10/2018
Designed	SV	Drawn	SV
Checked	JM	Checked	JM

Primary Map No. 60582116 - Maximum Water Level

Project: **Rotokauri North Catchment Stormwater Modelling**

Title: Maximum Probable Development - 10 year ARI with climate change
Flooding Results - Maximum Water Level

Scale: Scale: 1:10,000 (A4 size) 100 50 0 100 200 Meters

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Maximum Water Level R.L. above 18.0m

- 18.0001 - 20.0000
- 20.0001 - 22.0000
- 22.0001 - 24.0000
- 24.0001 - 26.0000
- 26.0001 - 28.0000
- 28.0001 - 30.0000
- 30.0001 - 35.0000
- 35.0001 - 40.0000
- > 40.0001

Model Boundary

Rotokauri North Development Area

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Printed	4/10/2018 7:38:15 a.m.		
Approved		Date	4/10/2018
Designed	SV	Drawn	SV
Checked	JM	Checked	JM

Primary Map No. 60582116 - Maximum Water Level

Project: **Rotokauri North Catchment Stormwater Modelling**

Title: Maximum Probable Development - 2 year ARI with climate change
Flooding Results - Maximum Water Level

Scale: Scale: 1:10,000 (A4 size) 100 50 0 100 200 Meters

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Rev.	By	App.	Description	Date
0	SV	JM	Draft	4/10/2018

Maximum Water Level R.L. above 18.0m

- 18.0001 - 20.0000
- 20.0001 - 22.0000
- 22.0001 - 24.0000
- 24.0001 - 26.0000
- 26.0001 - 28.0000
- 28.0001 - 30.0000
- 30.0001 - 35.0000
- 35.0001 - 40.0000
- > 40.0001

Model Boundary

Rotokauri North Development Area

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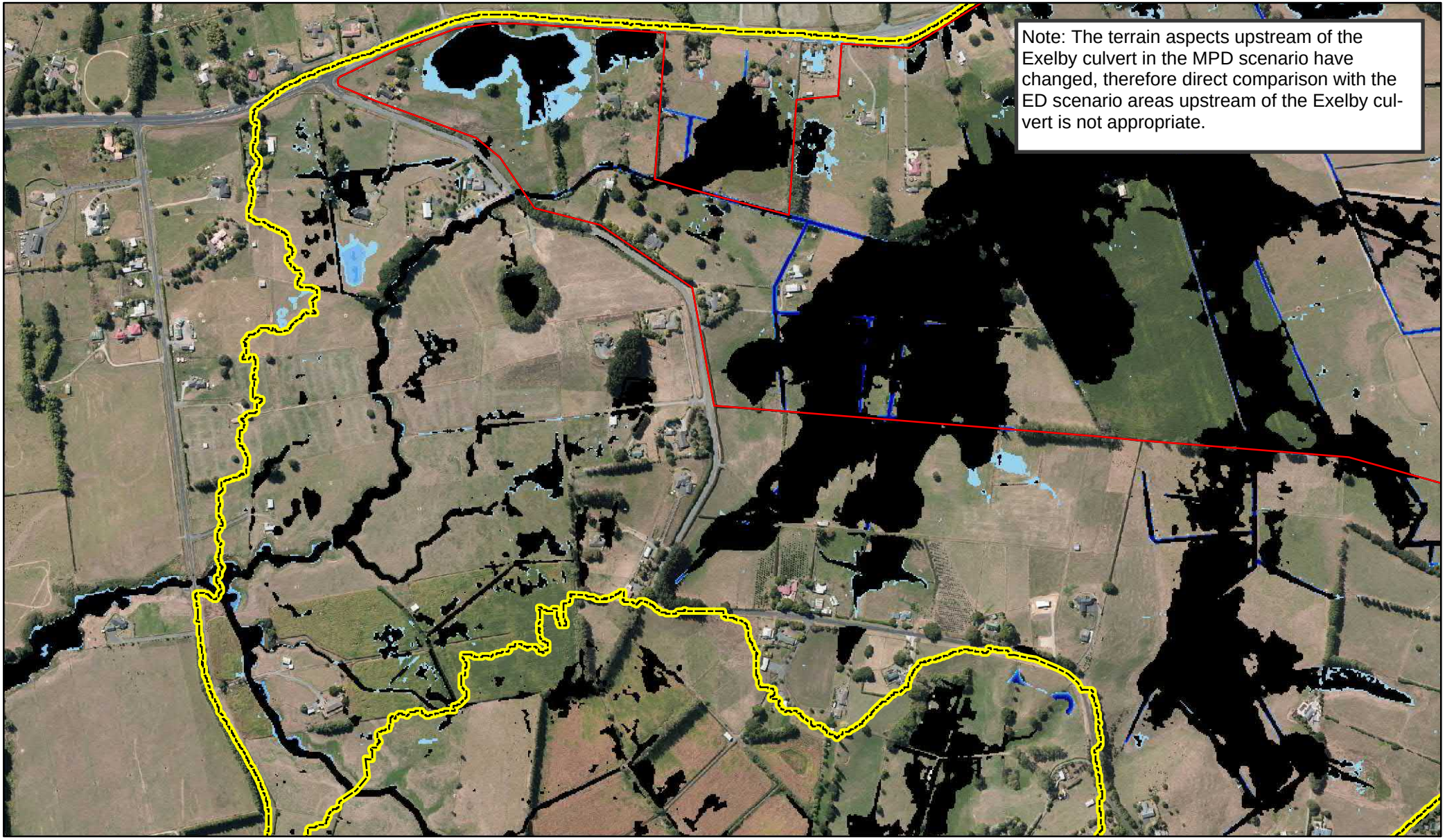

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Printed	2/10/2018 7:10:18 a.m.		
Approved		Date	2/10/2018
Designed	SV	Drawn	SV
Checked	JM	Checked	JM
Primary Map No.	60582116 - Flood Extent Comparison		

Project: **Rotokauri North Catchment Stormwater Modelling**

Title: Maximum Probable Development (MPD) - 100 year ARI with climate change Flooding Extent Comparison with Existing Development (ED)

Scale: Scale: 1:8,000 (A4 size) 100 50 0 100 Meters

Status: DRAFT | Rev. 0 | Map No. 60582116 - 07

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Rev.	By	App.	Description	Date
0	SV	JM	Draft	2/10/2018

MPD Maximum Water Depth above 100mm
- 0.1001 - 0.2000
- 0.2001 - 0.3000
- 0.3001 - 0.5000
- 0.5001 - 0.7500
- 0.7501 - 1.0000
- 1.0001 - 1.2500
- 1.2501 - 1.5000
- 1.5001 - 2.0000
- > 2.0001

- Model Boundary
- Rotokauri North Development Area
- ED Flooding Extent (maximum water depth above 100mm) for 100 year ARI

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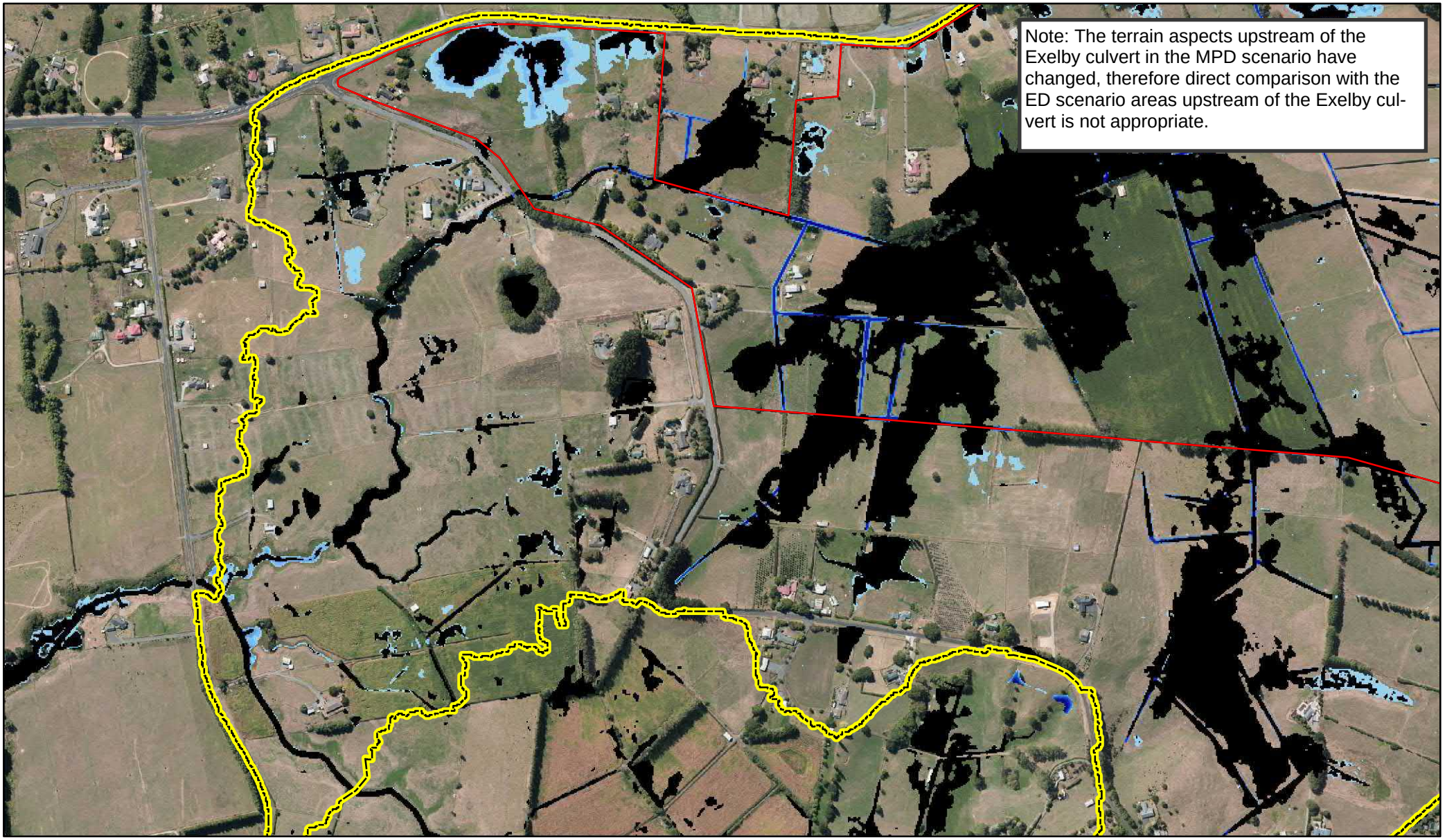

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Printed	2/10/2018 7:22:48 a.m.		
Approved		Date	2/10/2018
Designed	SV	Drawn	SV
Checked	JM	Checked	JM

Primary Map No. 60582116 - Flood Extent Comparison

Project: **Rotokauri North Catchment Stormwater Modelling**

Title: Maximum Probable Development (MPD) - 10 year ARI with climate change Flooding Extent Comparison with Existing Development (ED)

Scale: Scale: 1:8,000 (A4 size) 100 50 0 100 Meters

Status: DRAFT | Rev. 0 | Map No. 60582116 - 08

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Rev.	By	App.	Description	Date
0	SV	JM	Draft	2/10/2018

MPD Maximum Water Depth above 100mm
- 0.1001 - 0.2000
- 0.2001 - 0.3000
- 0.3001 - 0.5000
- 0.5001 - 0.7500
- 0.7501 - 1.0000
- 1.0001 - 1.2500
- 1.2501 - 1.5000
- 1.5001 - 2.0000
- > 2.0001

- Model Boundary
- Rotokauri North Development Area
- ED Flooding Extent (maximum water depth above 100mm) for 10 year ARI

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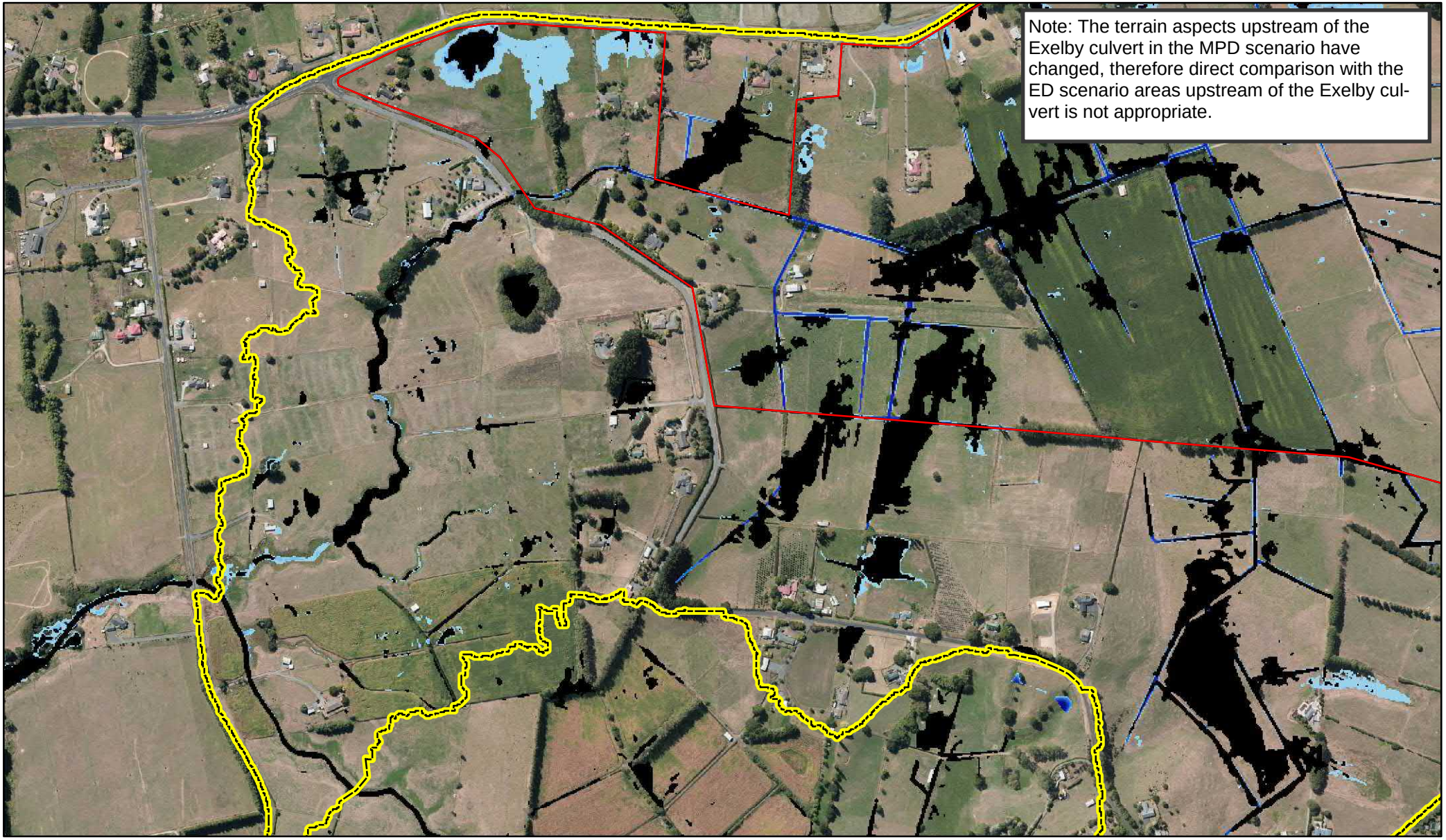

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Printed	4/10/2018 7:06:27 a.m.		
Approved		Date	4/10/2018
Designed	SV	Drawn	SV
Checked	JM	Checked	JM

Primary Map No. 60582116 - Flood Extent Comparison

Project: **Rotokauri North Catchment Stormwater Modelling**

Title: Maximum Probable Development (MPD) - 2 year ARI with climate change Flooding Extent Comparison with Existing Development (ED)

Scale: Scale: 1:8,000 (A4 size) 100 50 0 100 Meters

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Rev.	By	App.	Description	Date
0	SV	JM	Draft	4/10/2018

MPD Maximum Water Depth above 100mm

- 0.1001 - 0.2000
- 0.2001 - 0.3000
- 0.3001 - 0.5000
- 0.5001 - 0.7500
- 0.7501 - 1.0000
- 1.0001 - 1.2500
- 1.2501 - 1.5000
- 1.5001 - 2.0000
- > 2.0001

- Model Boundary
- Rotokauri North Development Area
- ED Flooding Extent (maximum water depth above 100mm) for 2 year ARI

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Checked	JM	Checked	JM

Primary Map No. 60582116 - Peak Velocity

Project: **Rotokauri North Catchment Stormwater Modelling**

Title: Maximum Probable Development - 100 year ARI with climate change
Peak Velocity Result

Scale: Scale: 1:8,000 (A4 size) 100 50 0 100 Meters

Status: DRAFT | Rev. 0 | Map No. 60582116 - 10

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Rev.	By	App.	Description	Date
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Peak Velocity
- 0.0501 - 0.1000 m/s
- 0.1001 - 0.5000 m/s
- 0.5001 - 1.0000 m/s
- 1.0001 - 3.0000 m/s
- > 3.0001 m/s

Model Boundary

Rotokauri North Development Area

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Printed	4/10/2018 10:57:18 a.m.		
Approved		Date	4/10/2018
Designed	SV	Drawn	SV
Checked	JM	Checked	JM

Primary Map No. 60582116 - Peak Velocity

Project: **Rotokauri North Catchment Stormwater Modelling**

Title: Maximum Probable Development - 10 year ARI with climate change
Peak Velocity Result

Scale: Scale: 1:8,000 (A4 size) 100 50 0 100 Meters

Status: DRAFT | Rev. 0 | Map No. 60582116 - 11

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Rev.	By	App.	Description	Date
0	SV	JM	Draft	4/10/2018

Peak Velocity
- 0.0501 - 0.1000 m/s
- 0.1001 - 0.5000 m/s
- 0.5001 - 1.0000 m/s
- 1.0001 - 3.0000 m/s
- > 3.0001 m/s

Model Boundary

Rotokauri North Development Area

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Printed	4/10/2018 10:45:14 a.m.		
Approved		Date	4/10/2018
Designed	SV	Drawn	SV
Checked	JM	Checked	JM

Primary Map No. 60582116 - Peak Velocity

Project: **Rotokauri North Catchment Stormwater Modelling**

Title: Maximum Probable Development - 2 year ARI with climate change
Peak Velocity Result

Scale: Scale: 1:8,000 (A4 size) 100 50 0 100 Meters

Status: DRAFT | Rev. 0 | Map No. 60582116 - 12

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Rev.	By	App.	Description	Date
0	SV	JM	Draft	4/10/2018

Peak Velocity
- 0.0501 - 0.1000 m/s
- 0.1001 - 0.5000 m/s
- 0.5001 - 1.0000 m/s
- 1.0001 - 3.0000 m/s
- > 3.0001 m/s

Model Boundary

Rotokauri North Development Area

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Memorandum

To	Nathanael Savage
Copy	Jackie Colliar
From	Rodrigo Gonzalez / Michael Howe
Office	Hamilton Environmental Office
Date	4 February 2019
File	3-39300.00 - Te Otamanui Stream
Subject	Flood Impact Assessment

1 Introduction

WSP Opus was engaged by Hamilton City Council (HCC) and Waikato District Council (WDC) to develop a flood model of the Te Otamanui Stream to identify existing flooding constraints. This report was submitted on December 2018 *"WSP-Opus (2018) Assessment of Existing Flood Constraints in the Te Otamanui Stream. Reference No. 3-39300.00"*

In addition, the model was developed to be used to assess potential flood impacts of options for discharging of water from the proposed Rotokauri North Development Area (RNDA) and from the Mangaheka Stream Catchment.

This memorandum sets out the flood impact assessment of the proposed inflows from the RNDA catchments. Modelling has been undertaken for the 50%, 10% and 1% Annual Exceedance Probability (AEP) design flood events.

The inflows from the RNDA are located in the upper part of the catchment. Draining through culverts under Te Kowhai Road.

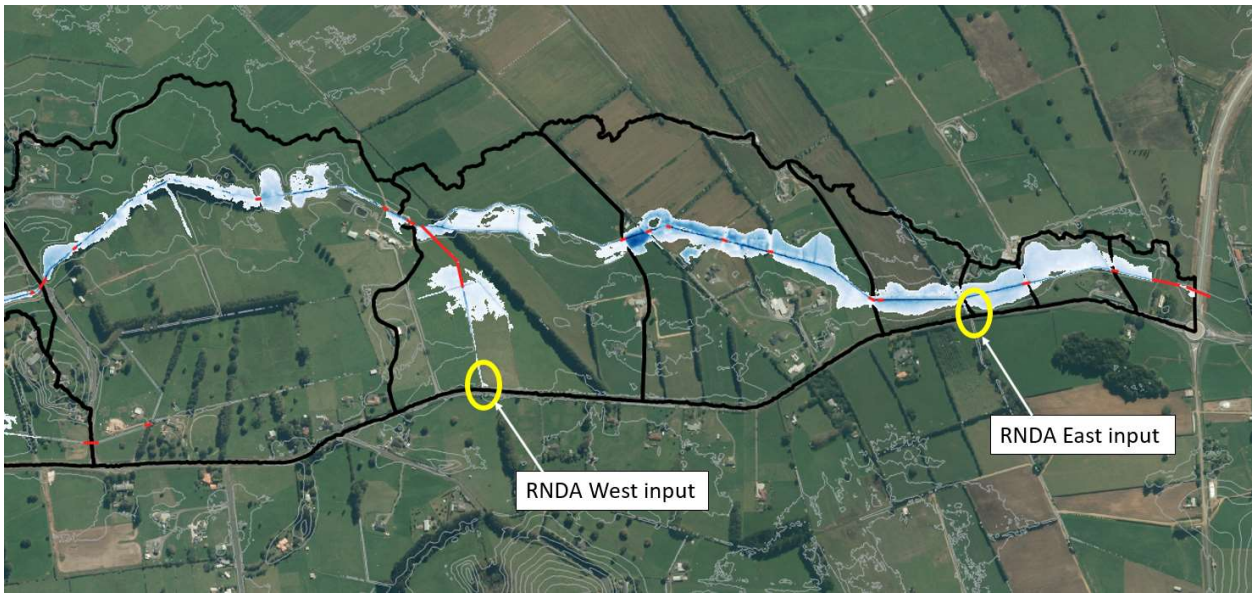


Figure 1-1 : Inputs from RNDA area

2 Background Information & Methodology

A report developed by WSP Opus (December 2018) titled "Te Otamanui Stream SW Modelling – Assessment of Existing Flood Constraints in the Te Otamanui Stream" identified the existing main constrains in the Te Otamanui Stream. To satisfy the above requirement and achieve a strong understanding of the impacts on flooding in the catchment, WSP Opus undertook a detailed hydrological assessment of the Te Otamanui catchment and developed a 1D-2D linked hydraulic model based upon the available data.

The hydraulic model has been used in this stage to assess flood impacts related to potential options of discharging from the proposed Rotokauri North Development Area (RNDA)

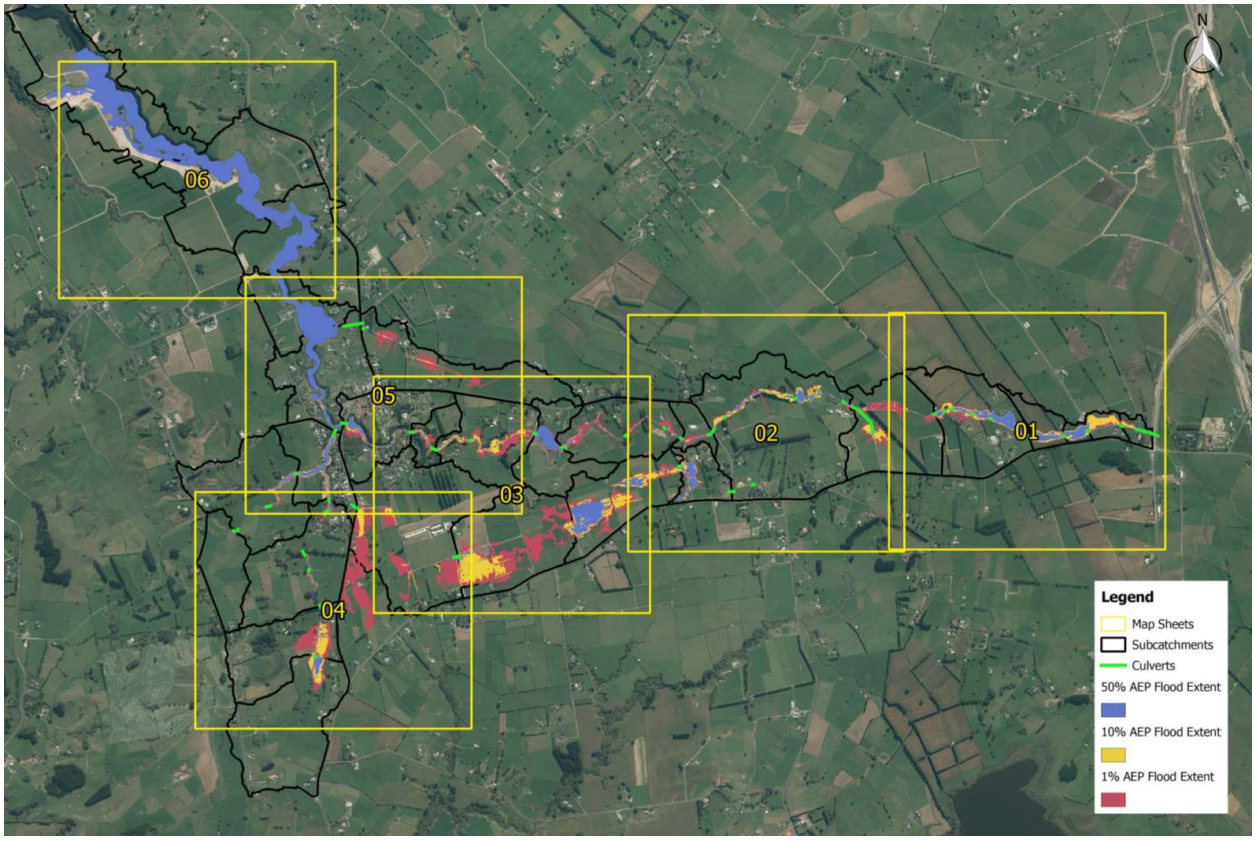


Figure 2-1 : Assessment of main constrains in Te Otamanui Stream

The inputs through the culverts under Te Kowahi Road were provided by McKenzie Engineering Consultants for the existing and proposed case for the RNDA.

- The undeveloped scenario was considered in the RNDA Catchments for the analysis of the main constraints in the Te Otamanui Stream
- The assessment of the flood impacts was develop considering the discharges from the wetland/detention basin for the Maximum Probable Development (MPD), based on conceptual/feasibility design of said devices. They are conceptual/feasibility designs only, with the hydraulic controls having been primarily developed to mitigate the 1% AEP flows to the 80% Existing Development (ED) peak value.

The results of the impact assessment show the increase/decrease on the maximum water level in the Te Otamanui Stream because on the discharge of water from the new developed areas.

3 Flood Impact Assessment

For the impact assessment, the 2D/1D hydraulic model was run with the new inputs from the RNDA:

- As highlighted in the previous section the detention basin was designed, in the RNDA East Catchment, to mitigate the 1% AEP flows to the 80% of the existing peak value. Analysing the hydrographs provided, the proposed peak flows (RNDA east inflows) are far smaller than existing flows for 10% and 50% events and the 80% of the existing peak for the 1% AEP event target was achieved. These new hydrographs are assumed to be with Climate Change rainfall for the Maximum Probable Development (MPD) scenario
- Regarding the RNDA West catchment, the plan change area will be redirect the runoff from this area to the Ohote catchment to the south. Therefore, RNDA West catchment can be considered to have no contribution to the downstream catchment and was not considered in the modelling for the Maximum Probable Development (MPD) scenario.
- It is to be noted that at the time of the reporting WSP-Opus did not have access to the details of the proposed stormwater management systems within the RNDA prior to discharging to the Te Otamanui Stream. The hydrographs provided by McKenzie Engineering Consultants can be found in Appendix D.

Table 3-1 : RNDA Catchment, peak discharge flows

Catchment	50% AEP		10% AEP		1% AEP	
	Base Case	MPD	Base Case	MPD	Base Case	MPD
RNDA West	0.11 m^3/s	0 m^3/s	0.12 m^3/s	0 m^3/s	0.13 m^3/s	0 m^3/s
RNDA East	1.62 m^3/s	0.16 m^3/s	1.86 m^3/s	0.44 m^3/s	1.98 m^3/s	1.47 m^3/s

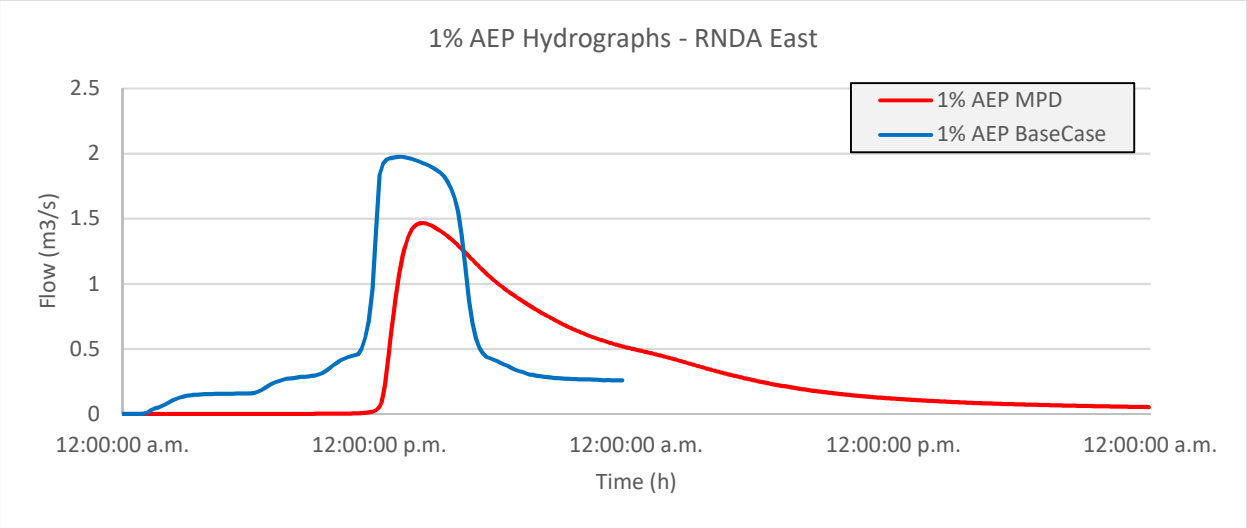


Figure 3-1 : 1% AEP Hydrographs. RNDA East

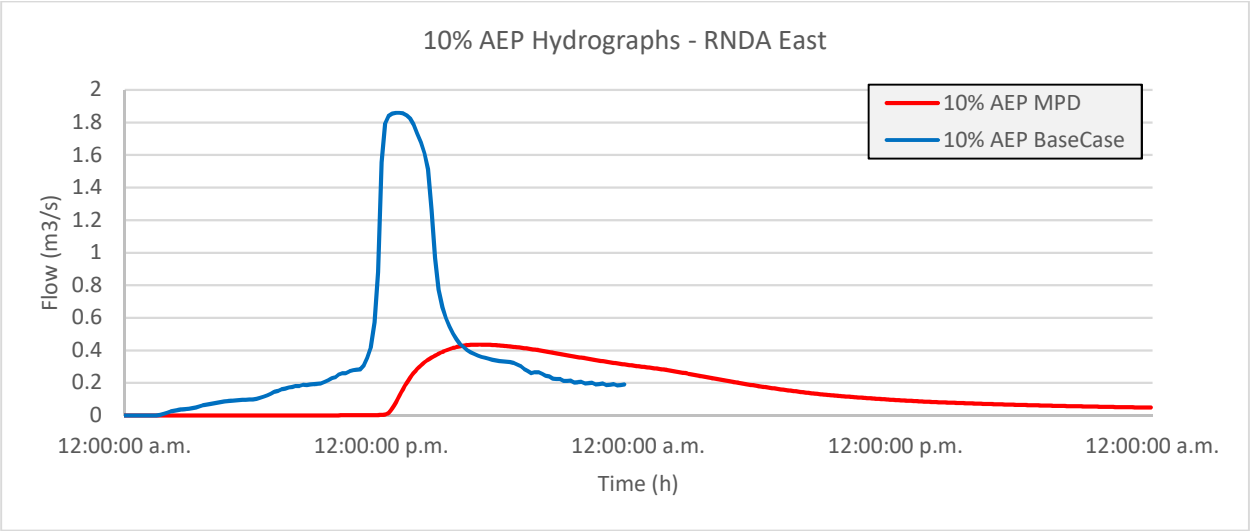


Figure 3-2 : 10% AEP Hydrographs. RNDA East

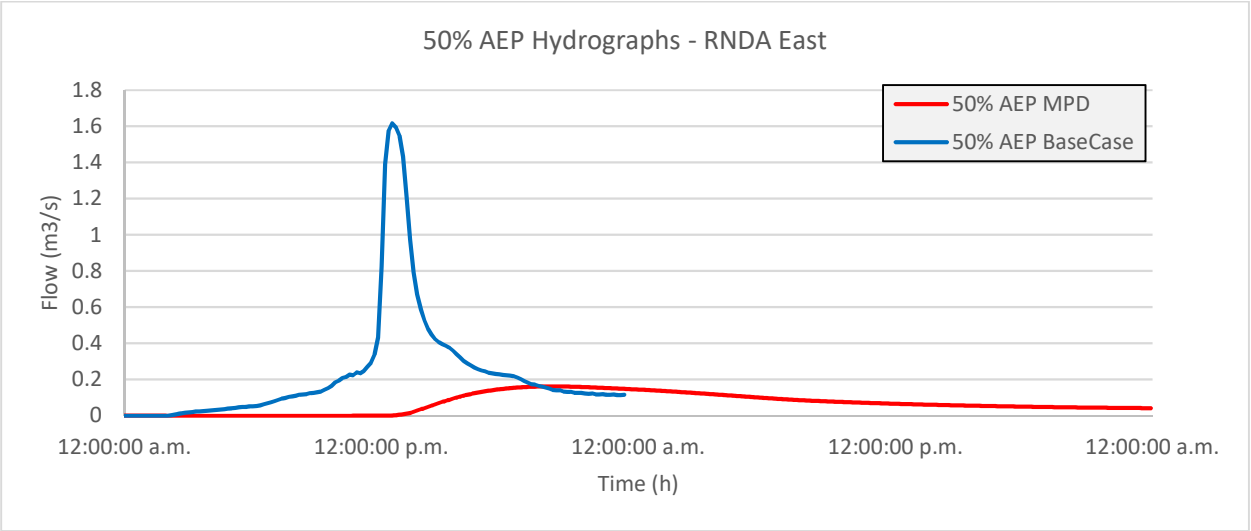


Figure 3-3 : 50% AEP Hydrographs. RNDA East

Due to the storage on the attenuation devices, the hydrograph shapes are elongated at the peak and delay the flow of water down the streams.

The same hydrographs have been maintained in the rest of the subcatchments along the Te Otamanui Stream between the existing case and the development scenario. Therefore, the flood impact analysis only shows the effect of the new Hydrograph on RNDA East and the removal of the RNDA West input. For the characteristics of the rest of the subcatchments and the model build report refer to the previous report "*Assessment of Existing Flood Constraints in the Te Otamanui Stream*"

2 Control Lines (CL) were placed along Te Otamanui Stream to analyse the effect of the new Hydrographs in the flow discharge through the stream:

- CL01: Downstream of the RNDA East input.
- CL02: At the end of the stream, near Te Kowhai, before discharging through the culvert under Horotiu Rd.

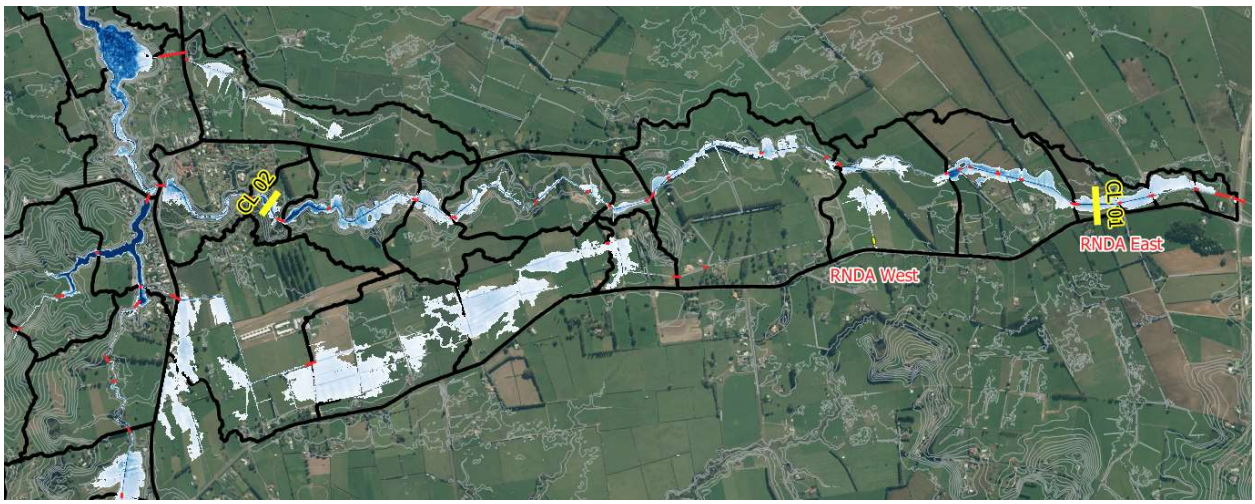


Figure 3-4 : Flood depth for the 1% AEP event in Te Kowhai and Control Lines. (CL)

The results show an attenuation on the peak flow due to the elimination of the RNDA West inflows and the reduction of the peak flow in combination with elongation of the receding limb of the hydrograph at RNDA East due to the attenuation devices at RNDA East. Refer to Figure 3-5 and 3-6 for the comparison on the hydrographs at the control lines.

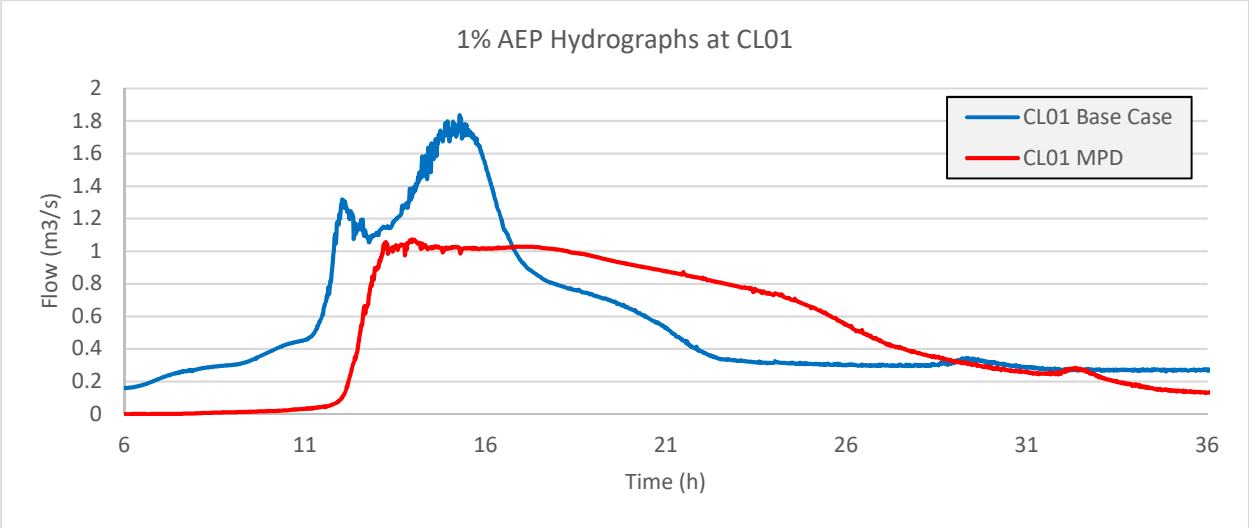


Figure 3-5 : Flow in the Te Otamanui Stream at the control Line CL01

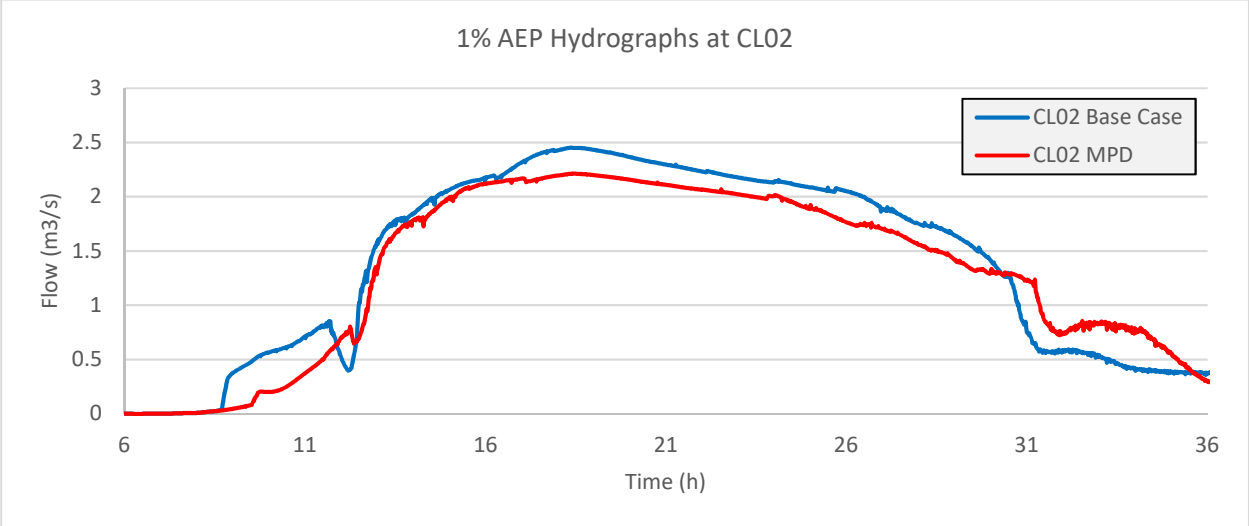


Figure 3-6 : Flow in the Te Otamanui Stream at the control Line CL02

4 Results

The impact assessment predicted a reduction in the flood extent and levels along the Te Otamanui Stream because of the reduction on the Peak Flow from the RNDA East catchment and the redirection of the runoff from the RNDA West to the Ohote catchment.

Mapping of the Te Otamanui catchment was split in 6 sheets (Refer to Figure 4-11 and Appendix A, B & C) to allow for clearer viewing of the assessment. The breakdown of the maps is provided below:

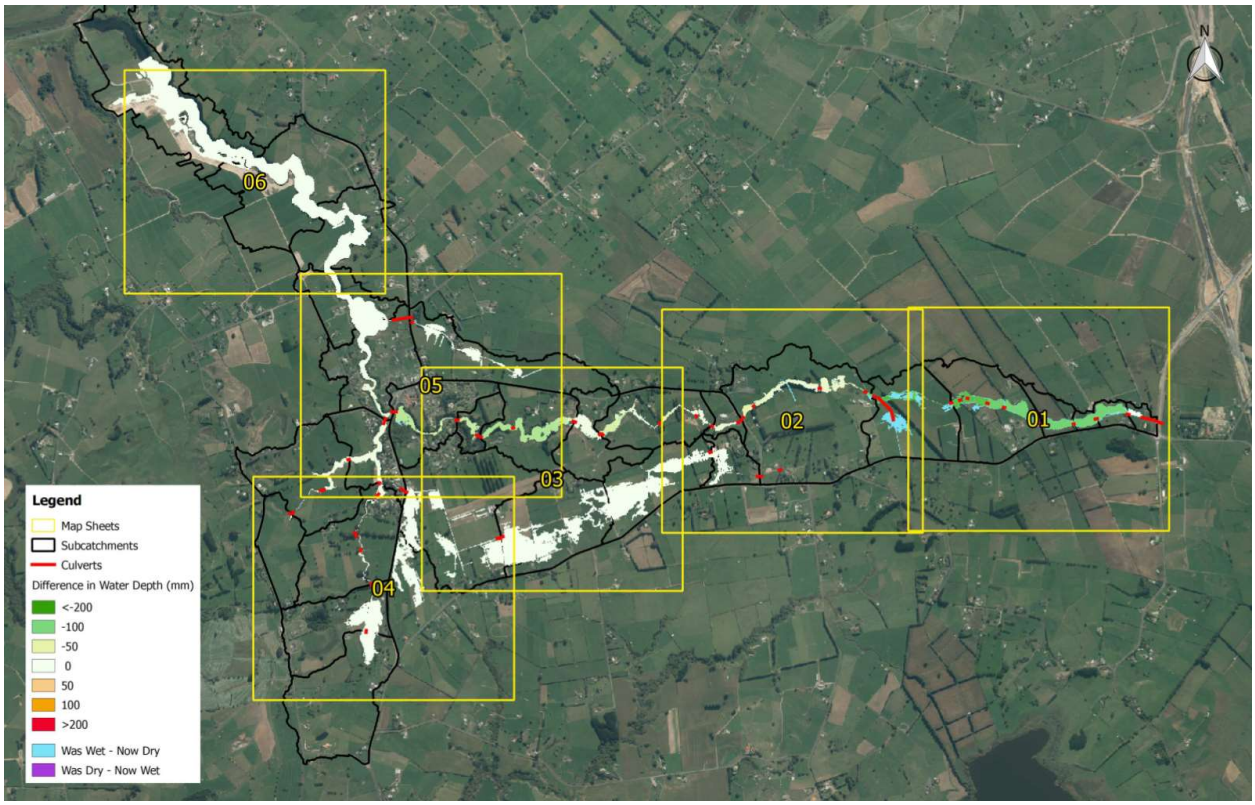


Figure 4-1 : Map sheets in the Te Otamanui Catchment

15 Control points were placed along the stream to allow the measure of the flood levels.

As expected, the RNDA hydrographs only induce changes on the branch upstream of the Horotiu Road in Te Kowhai, with the maximum effect happening upstream of culvert 24 (sheets 01 & 02). The impacts to flood levels reduce downstream from Horotiu Road, this can be mainly attributed to the large floodplain storage within the wetland and the Waipa River levels adopted in the hydraulic model.

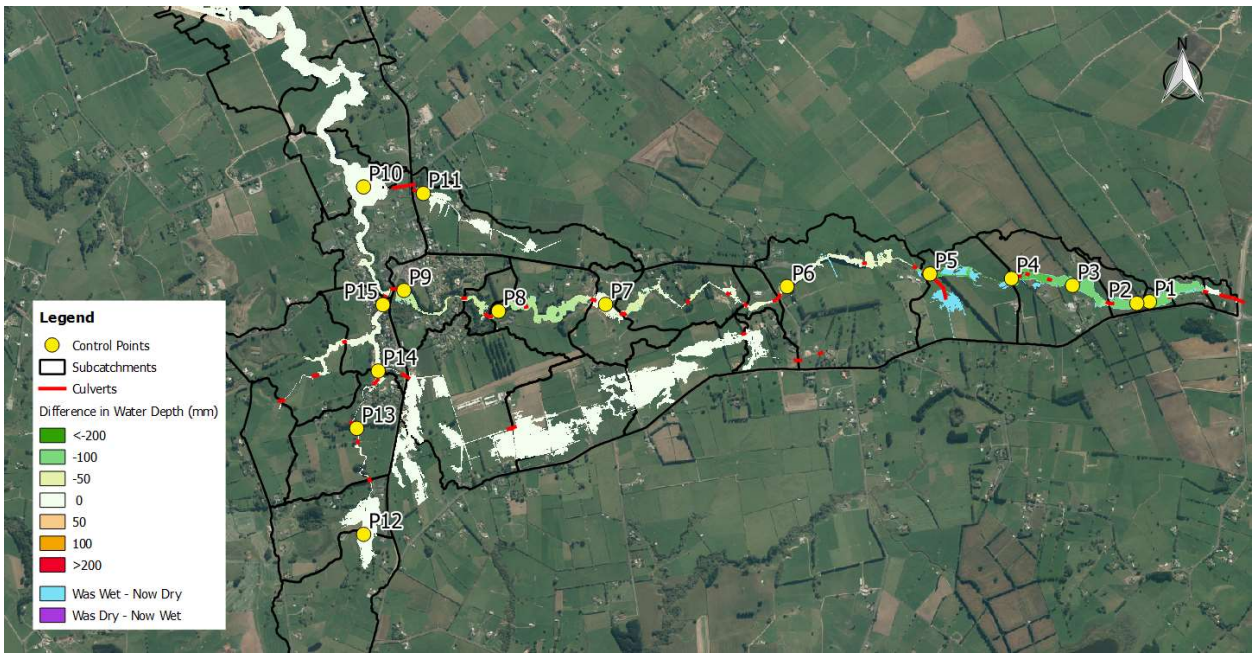


Figure 4-2 : Flood depth impacts for the 1% AEP event in Te Kowhai and Control Points.

Table 4-1 :Increment/Decrease on the Water Flood Levels along the stream at the control points

Control Point ID	Difference in Water Level between Base Case and MPD Scenario (m)		
	50% AEP Event	10% AEP Event	1% AEP Event
P1	-0.42	-0.63	-0.11
P2	-1.22	-0.92	-0.11
P3	-1.08	-0.61	-0.11
P4	-0.65	-0.63	-0.14
P5	-0.34	-0.34	-0.16
P6	-0.14	-0.04	-0.05
P7	-0.05	0.00	-0.01
P8	-0.35	-0.09	-0.07
P9	-0.12	-0.03	-0.07
P10	0.00	0.00	0.00
P11	0.00	0.00	0.00
P12	0.00	0.00	0.00
P13	0.00	0.00	0.00
P14	0.00	-0.01	-0.01
P15	-0.01	-0.01	-0.01

Significant reductions in the peak flows from the RNDA East catchment (particularly for the 50% and 10% AEP events) result in the large flood extents/levels changes of the Te Otamanui Stream.

The maps with the comparison in the flood depth between the existing case and the MPD scenario have been developed for the 1%, 10% and 50% AEP events. Appendix A, B & C present the maps showing the impacts in the flood levels.

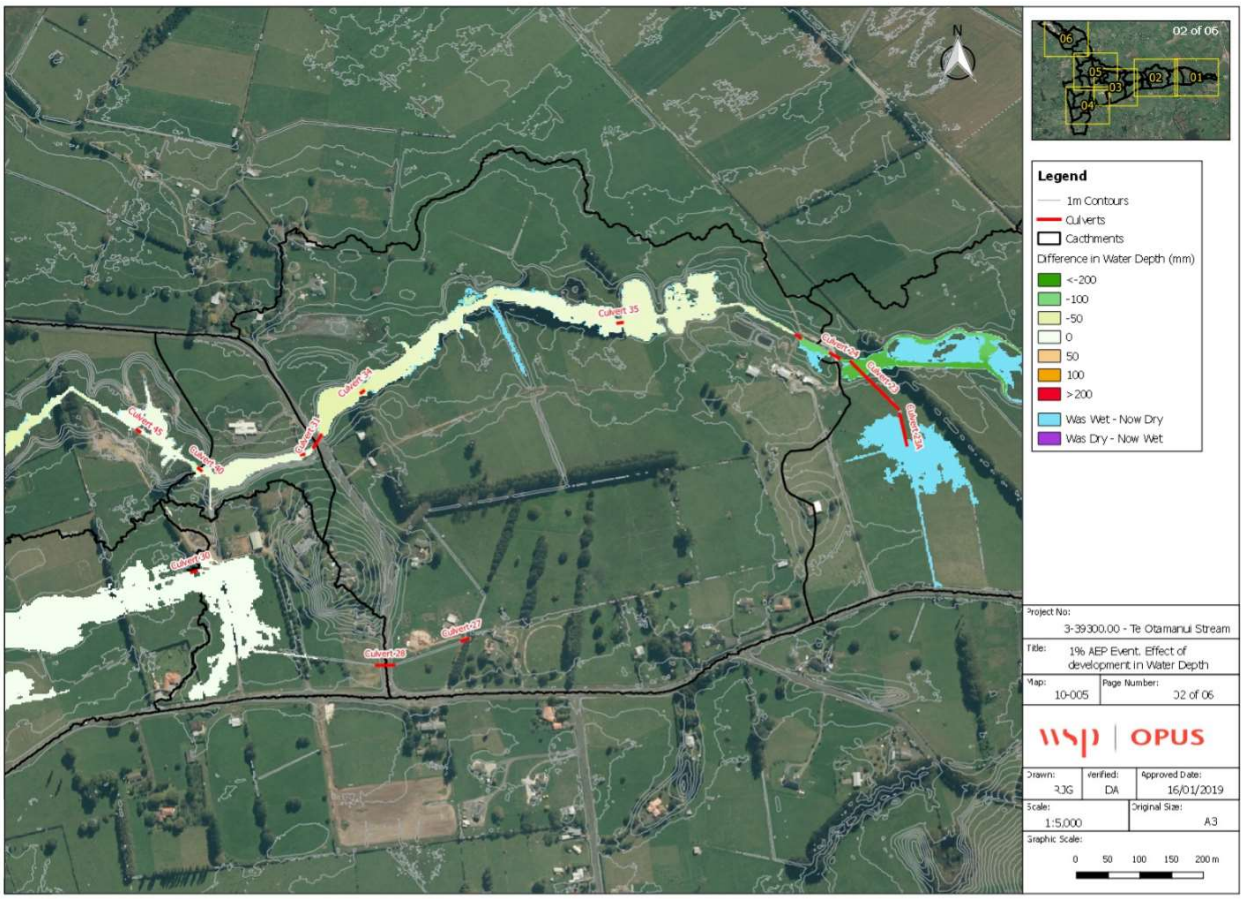


Figure 4-3 : 1% AEP event. Effect of the RNDA inputs in flood depth. Sheet 02

5 Conclusions and Recommendations

The Te Otamanui stream is characterized by a low slope (0.25% average along the stream), which results in long times of concentrations in the subcatchments and elongated hydrographs. Therefore, substantial changes in the inputs are likely to impact the baseline flood results.

The assessment of the flood impacts was developed considering the discharges from the wetland/detention basin from the RNDA Catchment for the MPD, based on conceptual/feasibility design of said devices. They are conceptual/feasibility designs only, with the hydraulic controls having been primarily developed to mitigate the 1% AEP flows to the 80% Existing Development (ED) peak value. It is likely that with further design of the hydraulic controls the discharge relationship will change for the 10% and 50% events.

The input from RDNA west was excluded in the MPD Scenario since the plan change area proposes to redirect the runoff from this area to the Ohote catchment to the south.

The reduction in the peak flows from the RNDA catchment predict a significant to the flood extents within the Te Otamanui Stream. The maximum impact was predicted upstream of culvert 24 (just downstream of the RNDA West input). The modification in the hydrographs have more influence for the 50% and 10% events, since the reduction in the peak flow from RNDA East are substantial for these events.

6 References

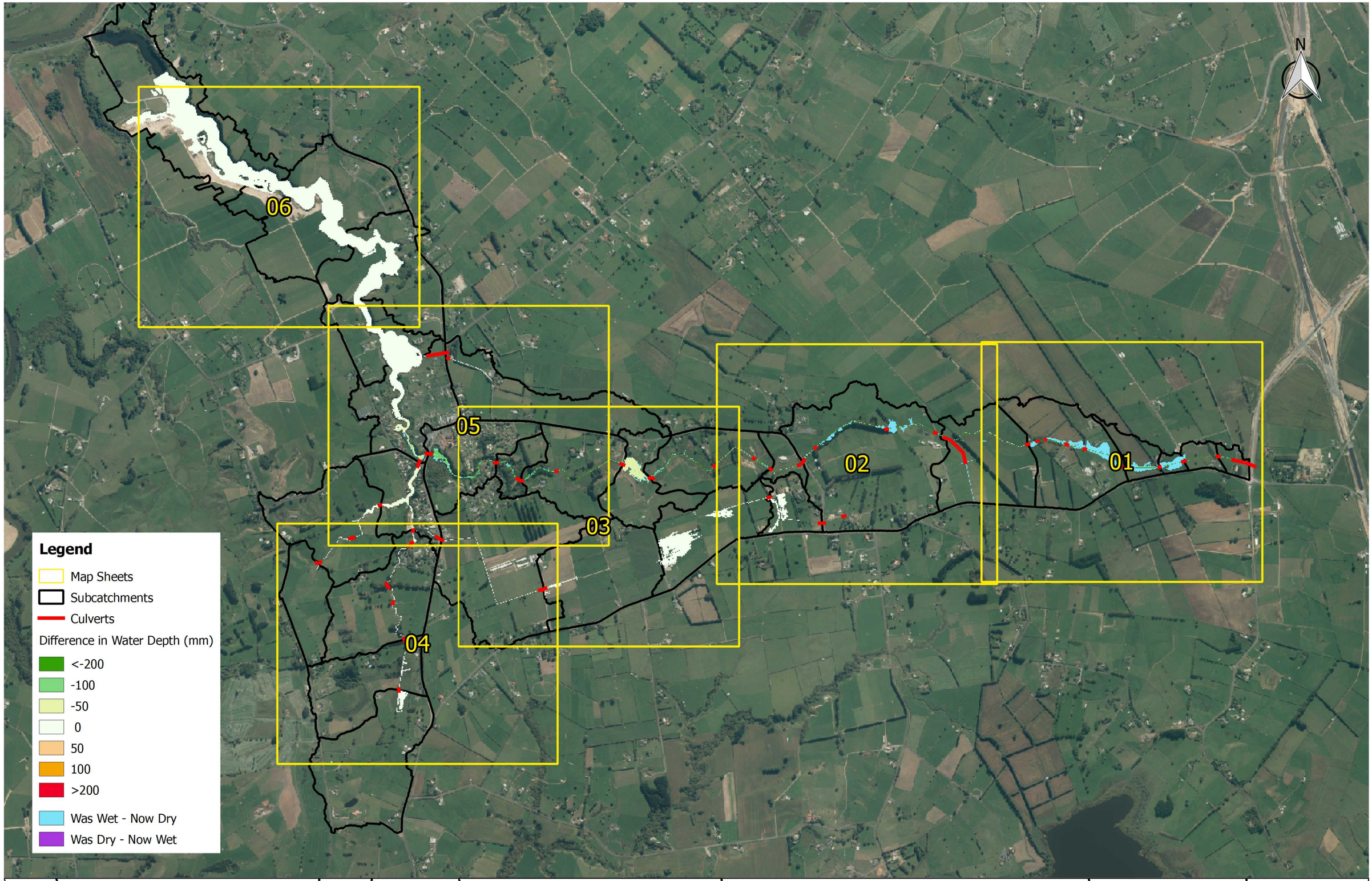
WSP-Opus (2018) Te Otamanui Stream – Assessment of Exisitng Flood Constraints in the Te Otamanui Stream. Prepared by WSP- Opus for Hamilton City Council. Reference No. 3-39300.00.

Shaver E., 2018. Waikato stormwater management guideline (TR2018/01). Hamilton

Shaver E., 2018. Waikato stormwater runoff modelling guideline (TR2018/02). Hamilton

Appendix A
Flood Assessment Results

50% AEP - Effect of the RNDA inputs in the Te Otamanui Stream



Revision	Amendment	Approved	Approved Date

wsp | OPUS

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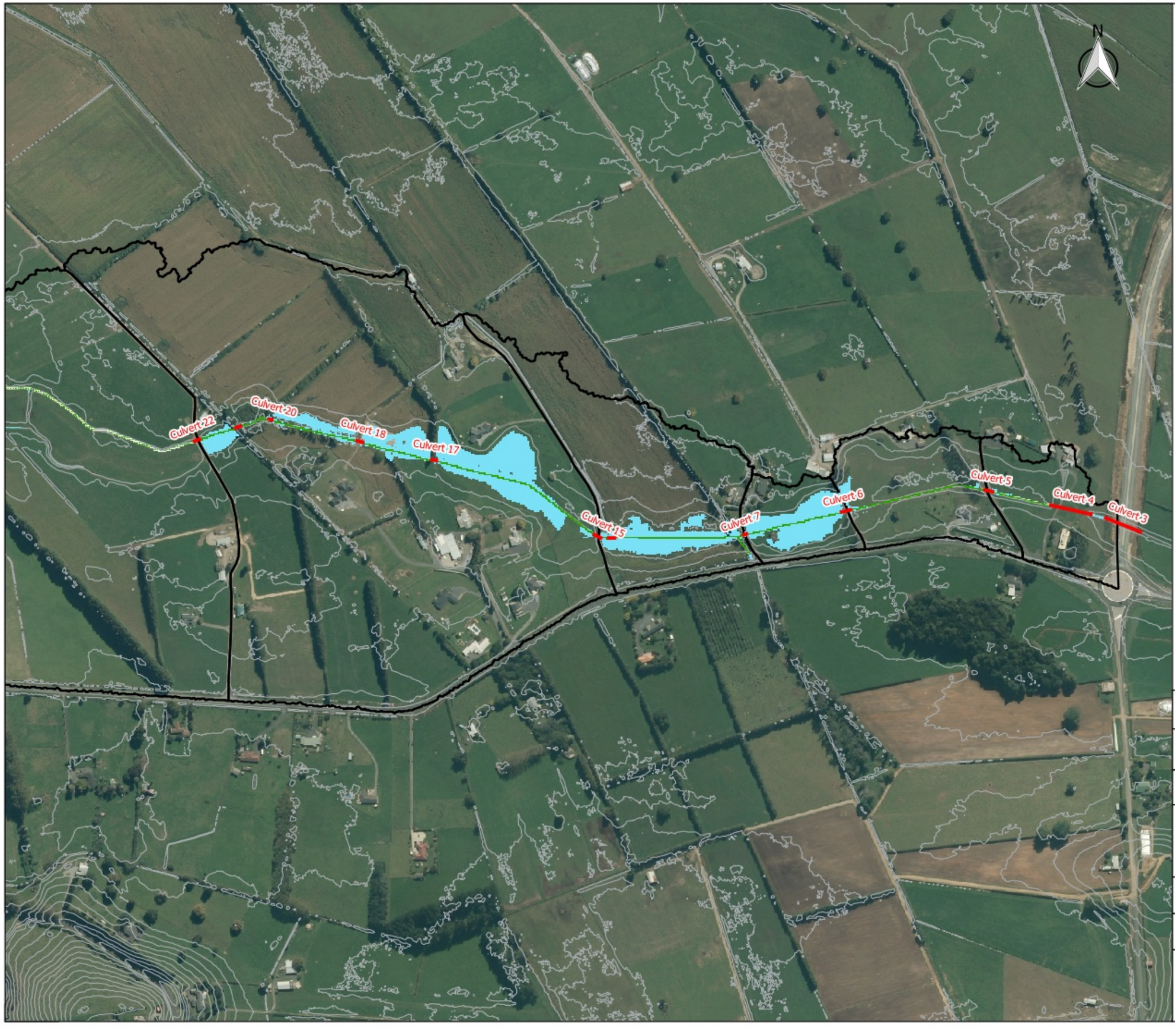
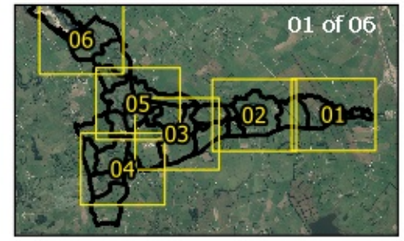
Drawn: RJG	Verified: DA	Approved Date: 16/01/2019	





Legend

- 1m Contours
- Culverts
- Catchments

Difference in Water Depth (mm)

- <-200
- -100
- -50
- 0
- 50
- 100
- >200
- Was Wet - Now Dry
- Was Dry - Now Wet

Project No:	3-39300.00 - Te Otamanui Stream
Title:	50% AEP Event. Effect of development in Water Depth
Map:	10-001
Page Number:	01 of 06

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Drawn:	Verified:	Approved Date:
RJG	DA	16/01/2019

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Graphic Scale:

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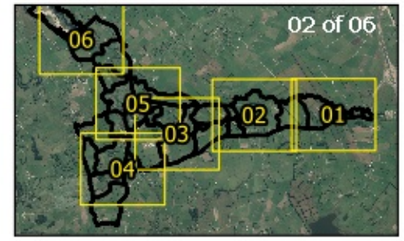

Legend

- 1m Contours
- Culverts
- Catchments

Difference in Water Depth (mm)

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- 50
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- >200
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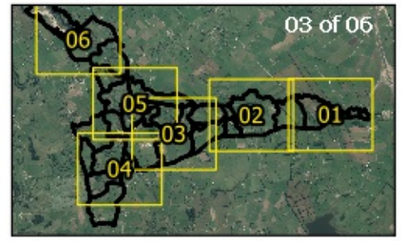

Legend

- 1m Contours
- Culverts
- Catchments

Difference in Water Depth (mm)

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- >200
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Project No:	3-39300.00 - Te Otamanui Stream
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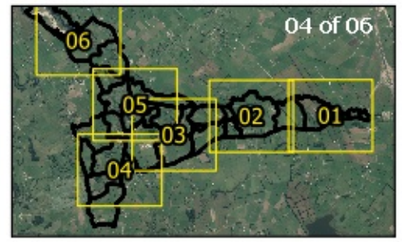

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- 1m Contours
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- 100
- >200
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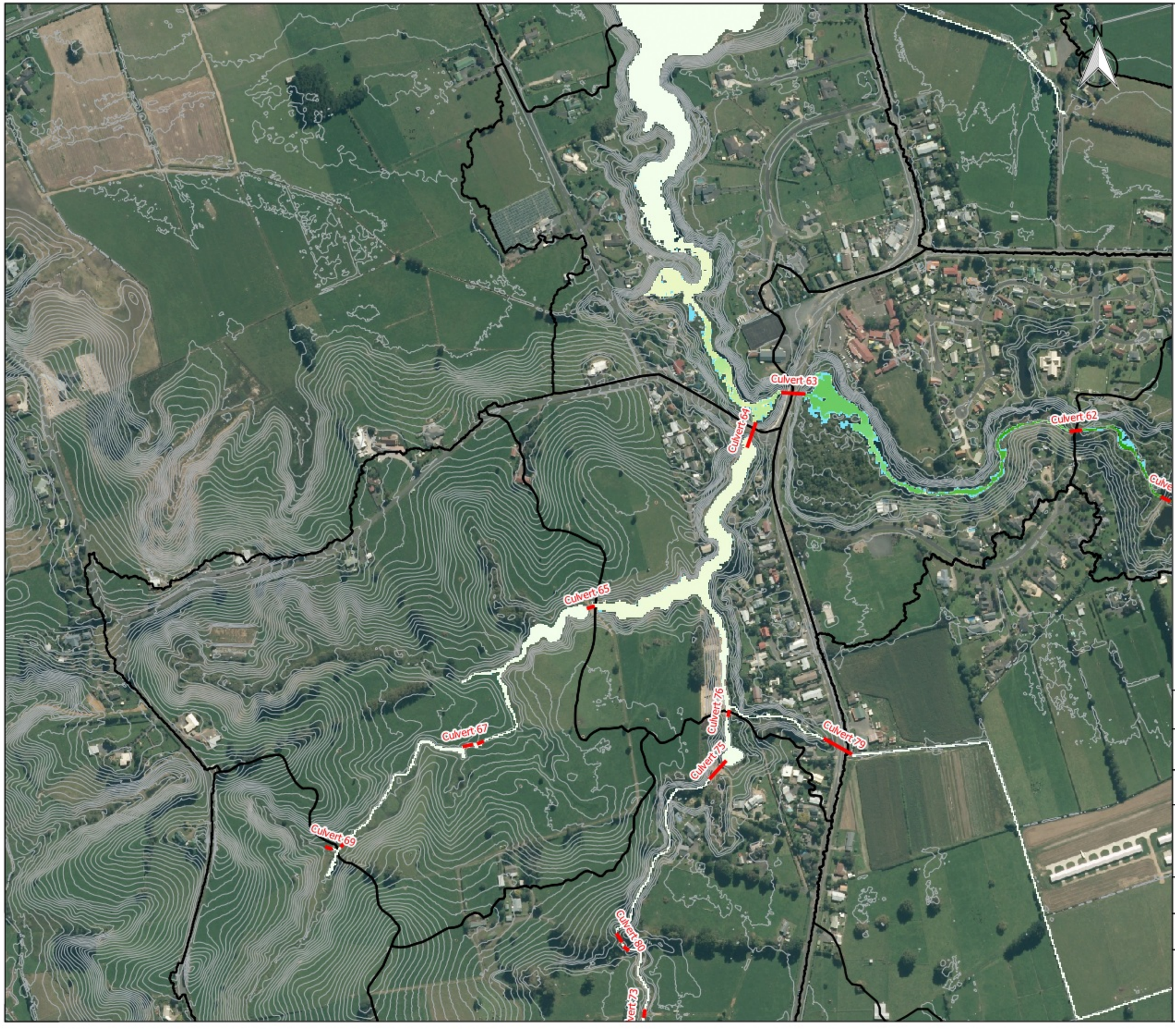

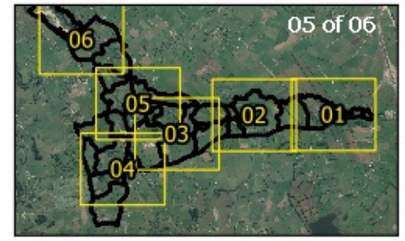

Legend

- 1m Contours
- Culverts
- Catchments

Difference in Water Depth (mm)

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- 0
- 50
- 100
- >200
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- Was Dry - Now Wet

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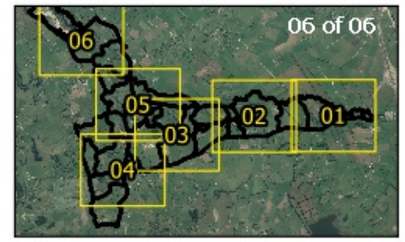

Legend

- 1m Contours
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- 100
- >200
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Title:	50% AEP Event. Effect of development in Water Depth
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Drawn: RJG	Verified: DA
Approved Date: 16/01/2019	
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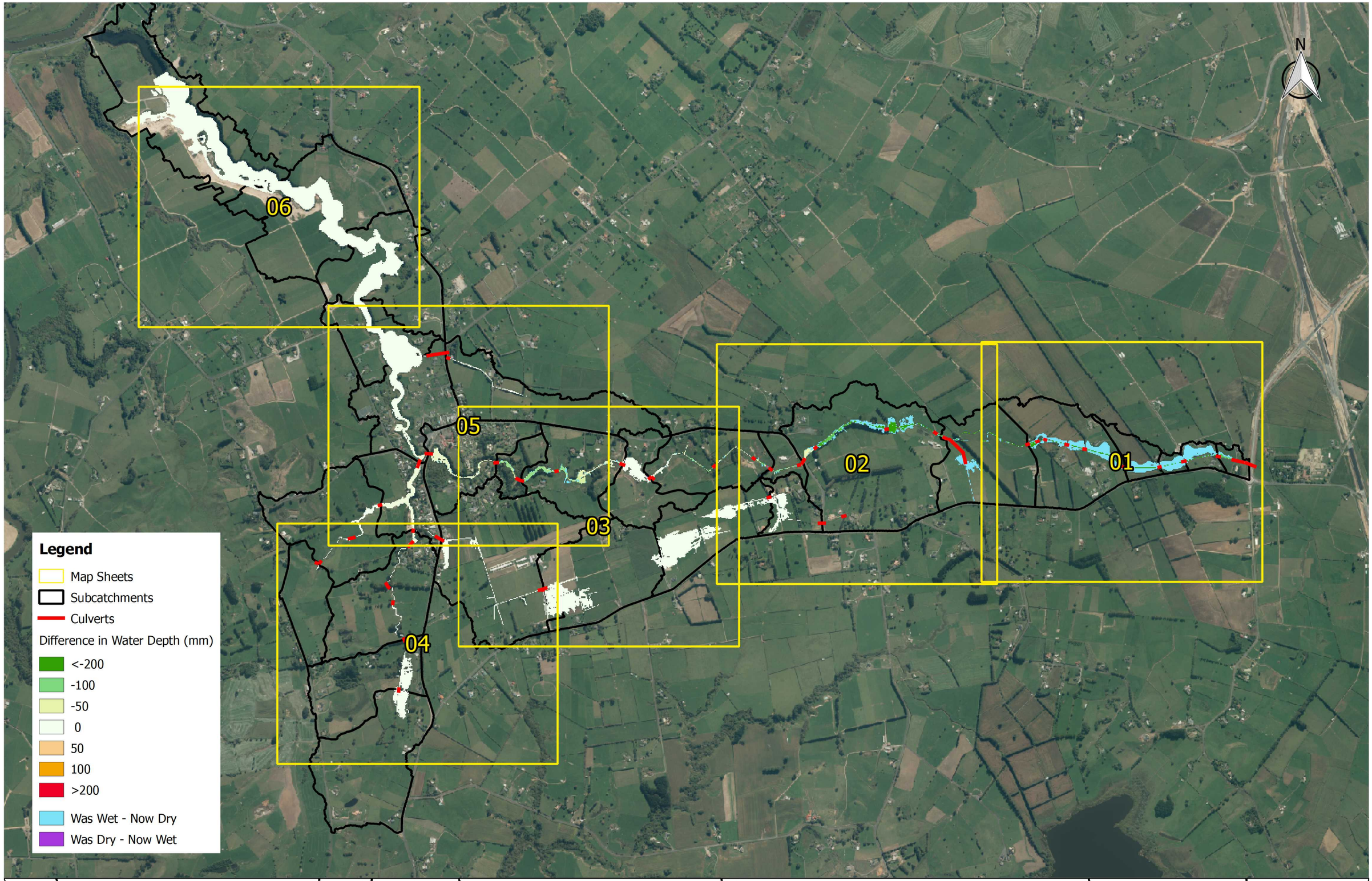
Appendix B
Flood Assessment Results

10% AEP - Effect of the RNDA inputs in the Te Otamanui Stream



Revision	Amendment	Approved	Approved Date

wsp | OPUS

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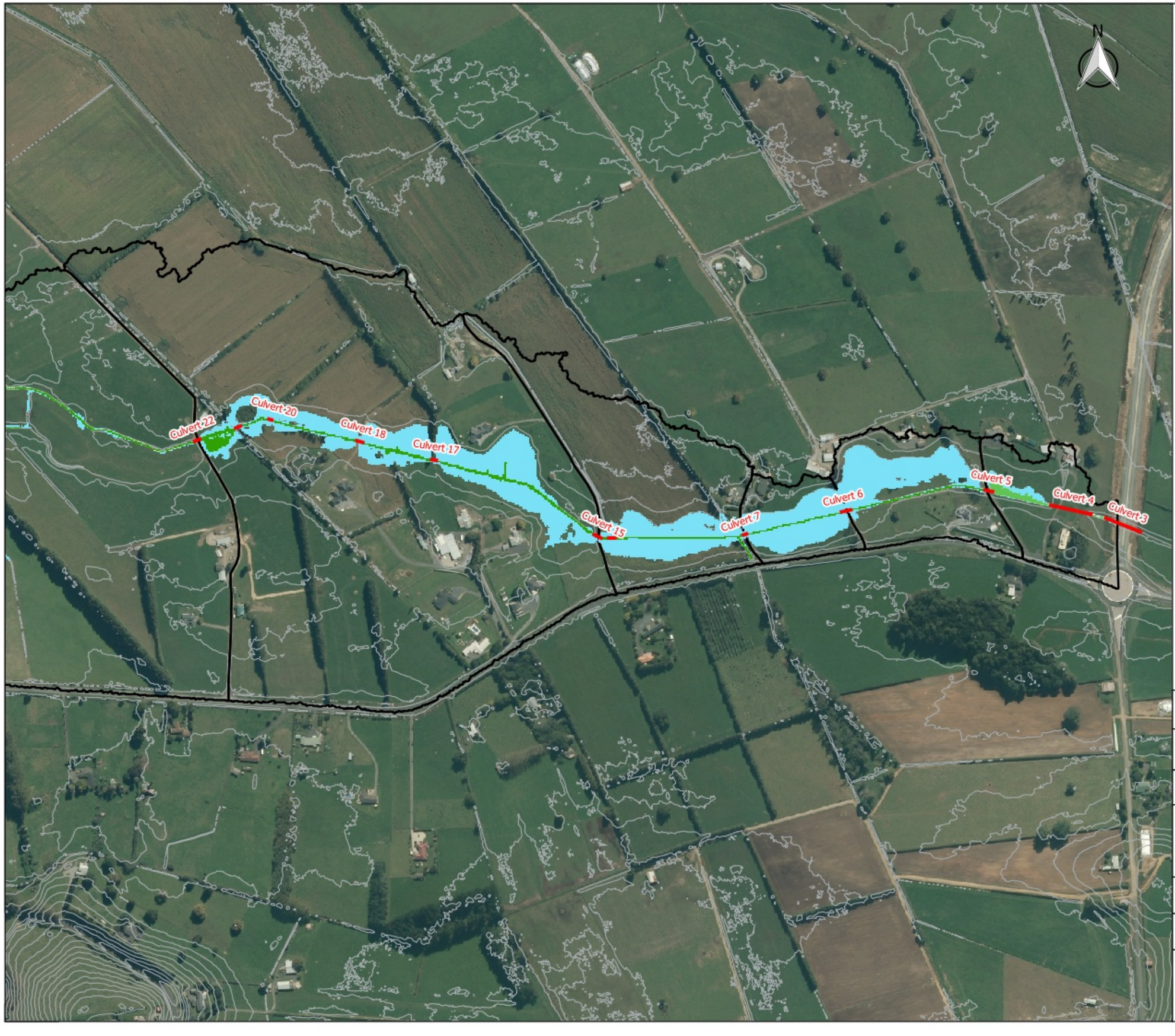

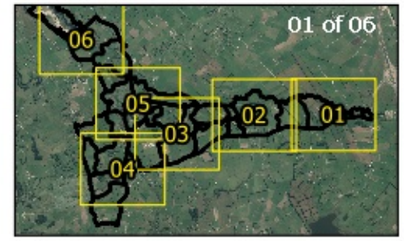

Legend

- 1m Contours
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- -100
- -50
- 0
- 50
- 100
- >200
- Was Wet - Now Dry
- Was Dry - Now Wet

Project No: 3-39300.00 - Te Otamanui Stream		
Title: 10% AEP Event. Effect of development in Water Depth		
Map: 10-003	Page Number: 01 of 06	
WSP | OPUS		
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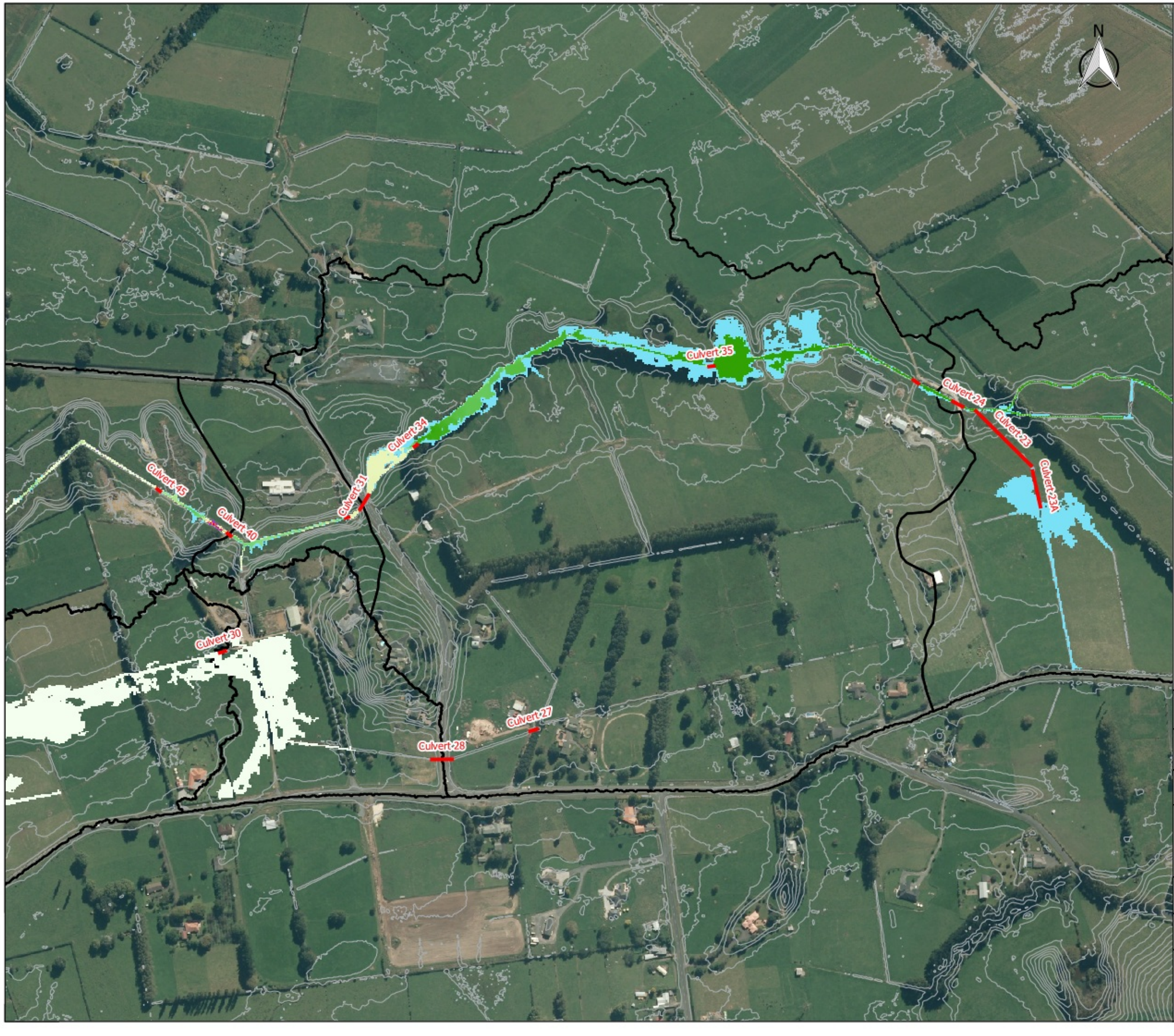

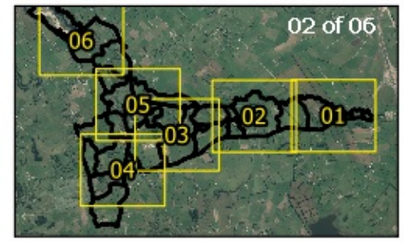

Legend

- 1m Contours
- Culverts
- Catchments

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- 100
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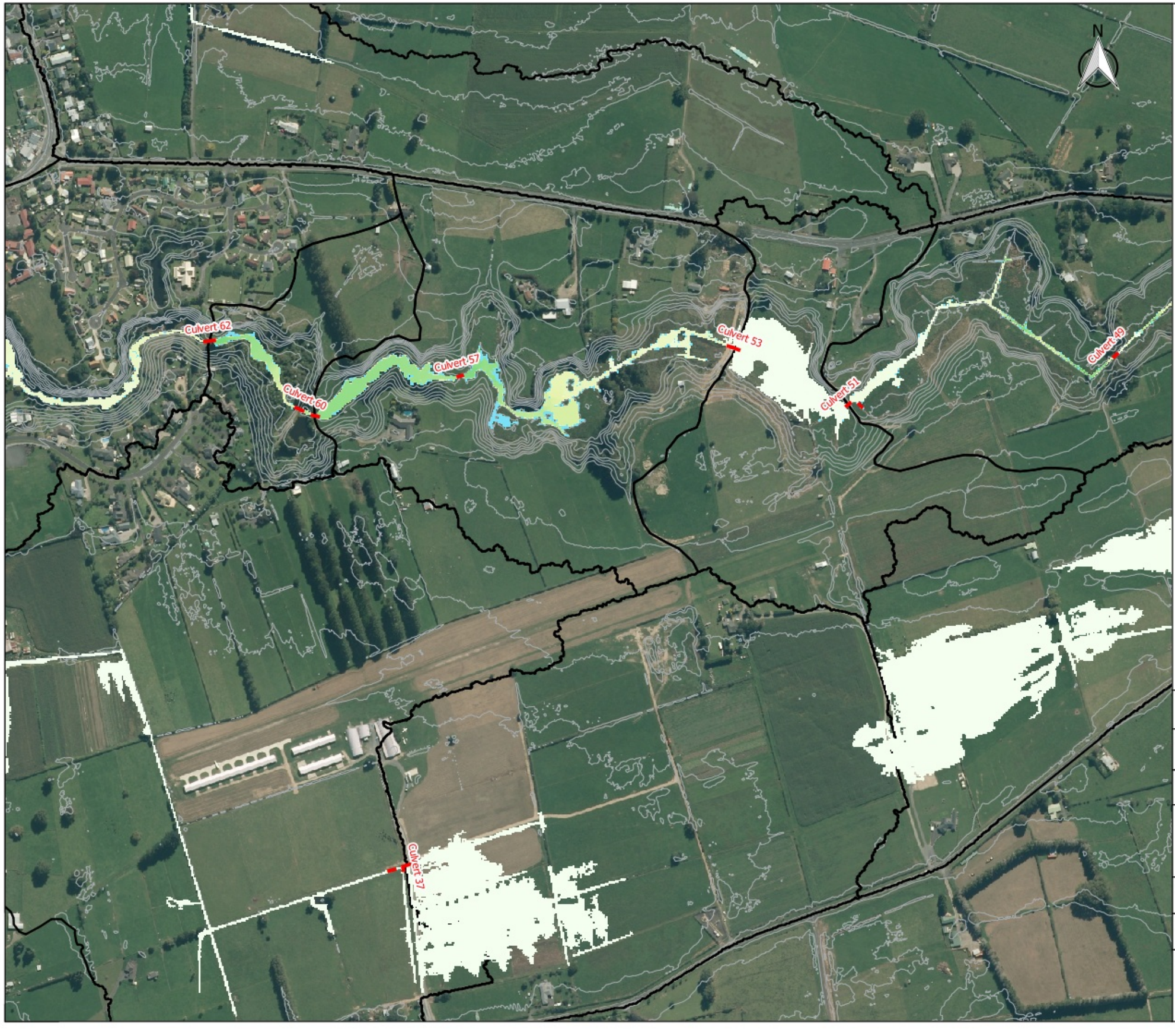

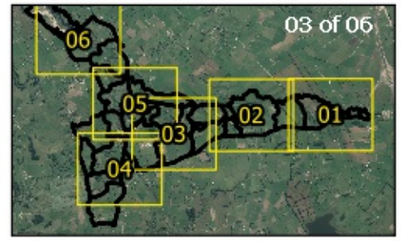

Legend

- 1m Contours
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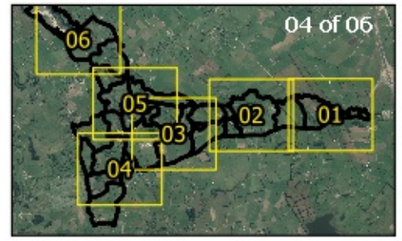

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Map: 10-003	Page Number: 04 of 06
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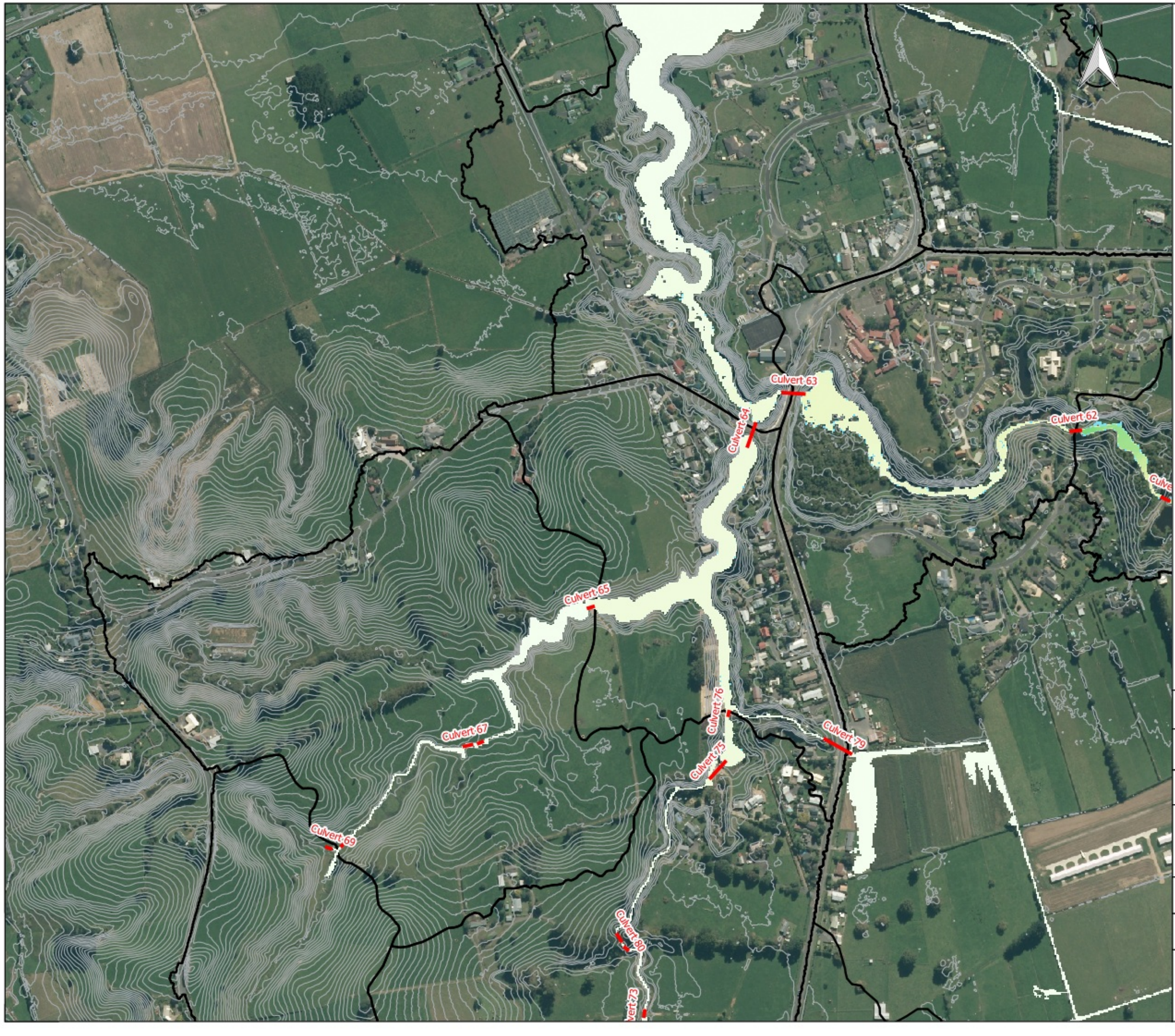

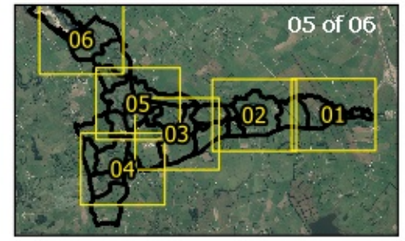

Legend

- 1m Contours
- Culverts
- Catchments

Difference in Water Depth (mm)

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- -50
- 0
- 50
- 100
- >200
- Was Wet - Now Dry
- Was Dry - Now Wet

Project No:	3-39300.00 - Te Otamanui Stream
Title:	10% AEP Event. Effect of development in Water Depth
Map: 10-003	Page Number: 05 of 06
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Approved Date: 16/01/2019	
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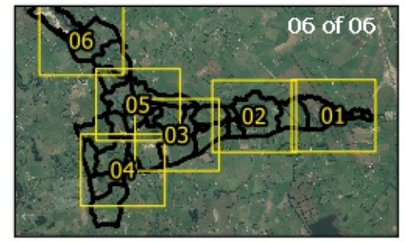

Legend

- 1m Contours
- Culverts
- Catchments

Difference in Water Depth (mm)

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- -50
- 0
- 50
- 100
- >200
- Was Wet - Now Dry
- Was Dry - Now Wet

Project No:	3-39300.00 - Te Otamanui Stream
Title:	10% AEP Event. Effect of development in Water Depth
Map: 10-003	Page Number: 06 of 06
WSP | OPUS	
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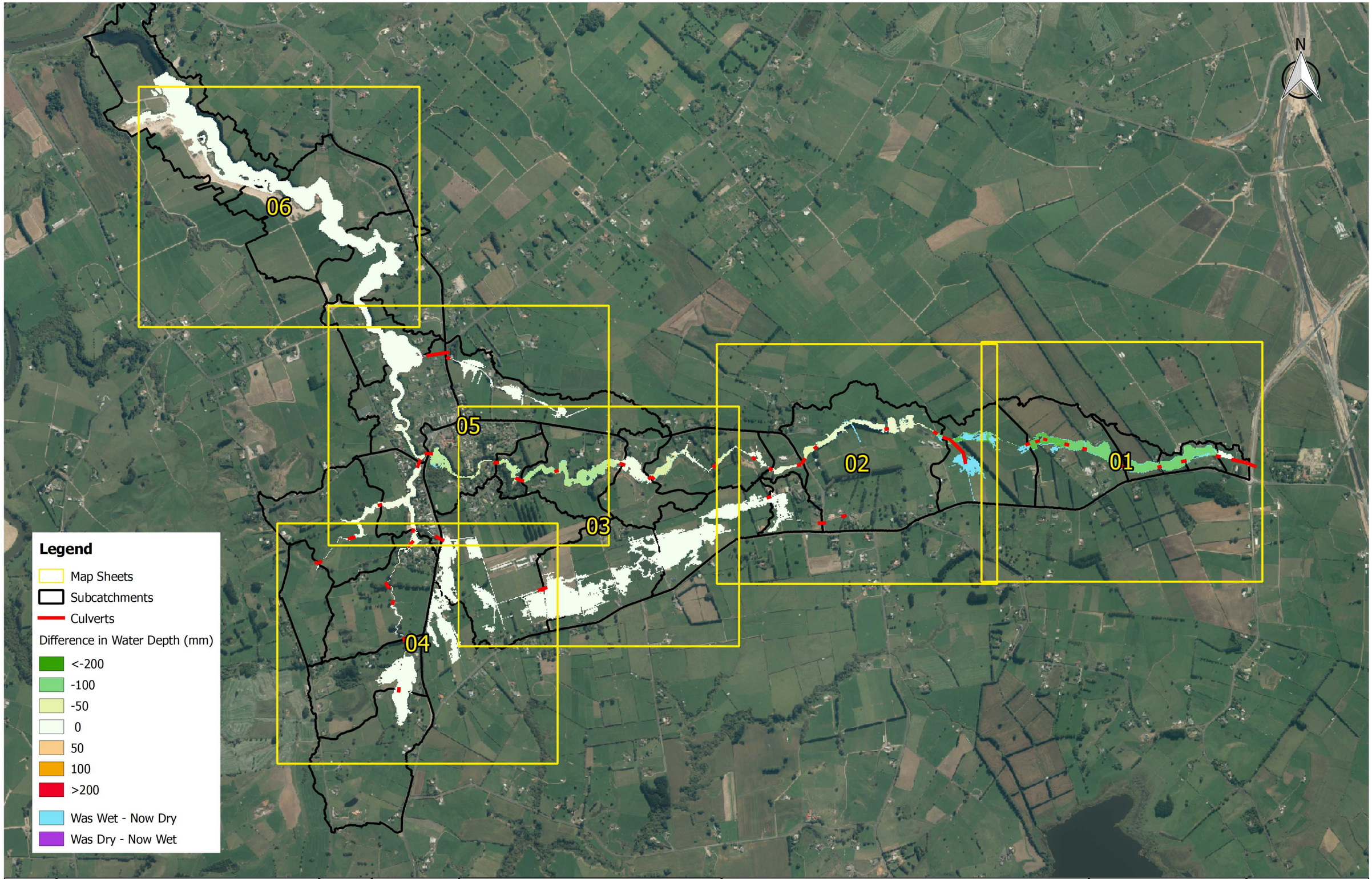
Approved Date: 16/01/2019	
Scale: 1:5,000	Original Size: A3

Graphic Scale: 0 50 100 150 200 m

Appendix C
Flood Assessment Results

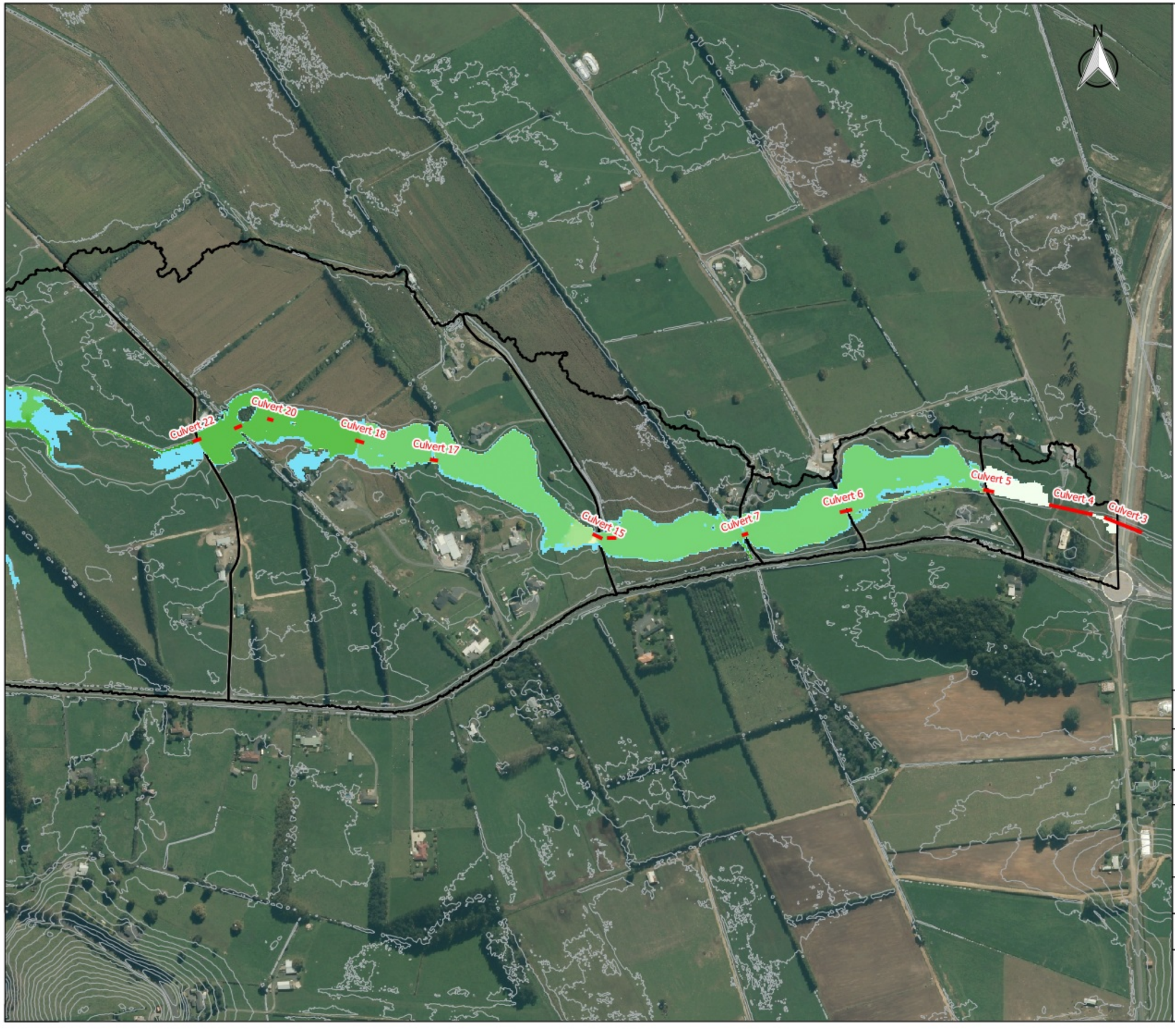
1% AEP - Effect of the RNDA inputs in the Te Otamanui Stream

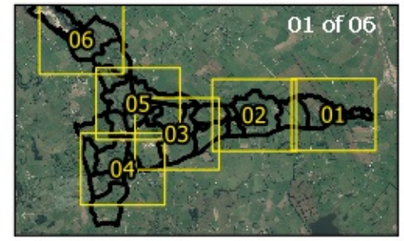


Revision	Amendment	Approved	Approved Date

wsp | OPUS

Title: Te Otamanui Sheets Location. 1% AEP Event			Scale: 1:20,000	Original Size: A3
Project No: 3-39300.00-Te Otamanui Stream	Map: 10-005	Sheet No: 000	Graphic Scale: 0 250 500 750 1000 m	
Drawn: RJG	Verified: DA	Approved Date: 16/01/2019		





Legend

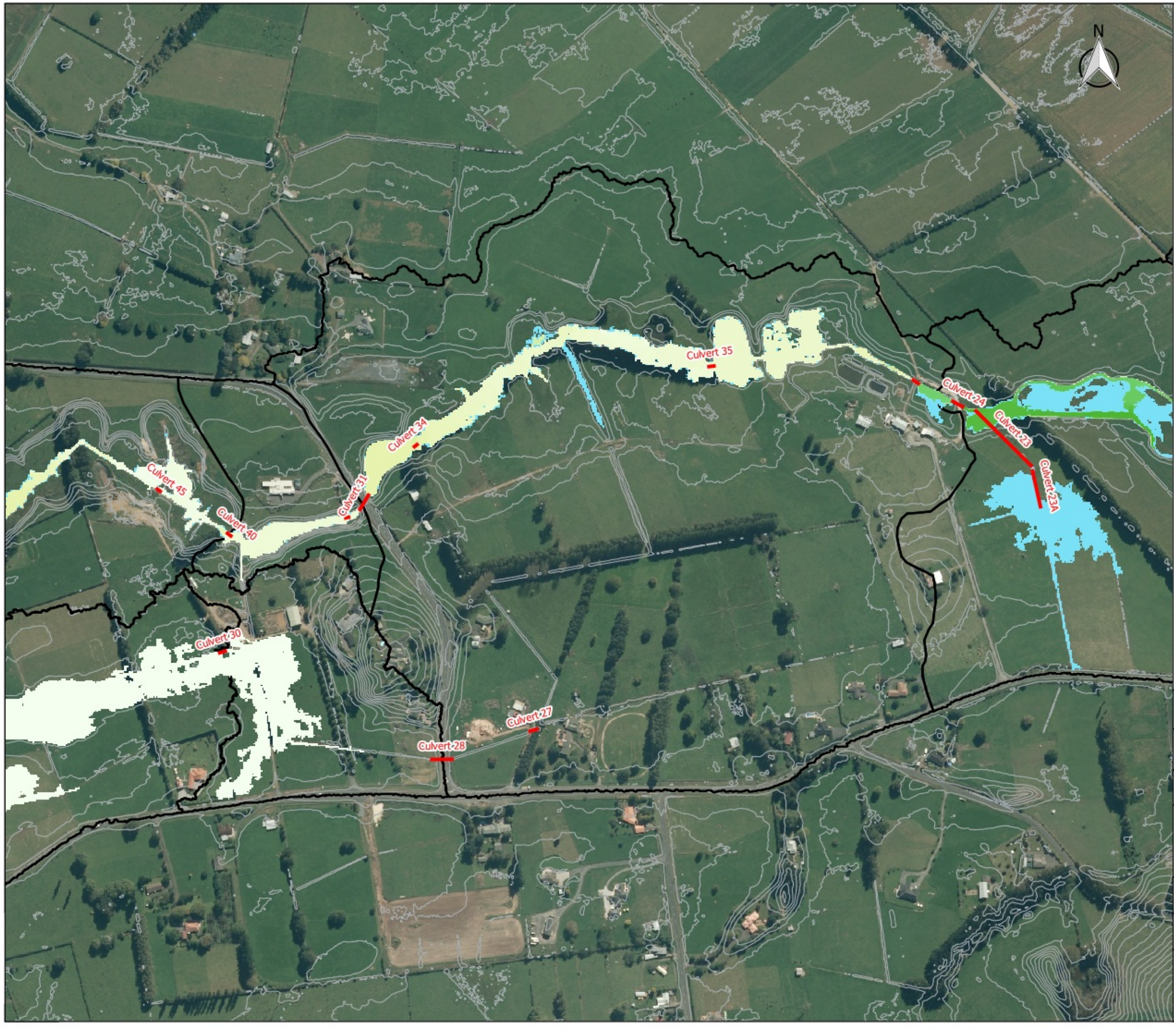
- 1m Contours
- Culverts
- Catchments

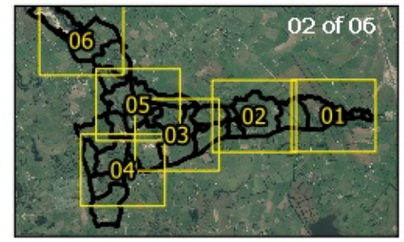
Difference in Water Depth (mm)

- <-200
- -100
- -50
- 0
- 50
- 100
- >200
- Was Wet - Now Dry
- Was Dry - Now Wet

Project No:	3-39300.00 - Te Otamanui Stream
Title:	1% AEP Event. Effect of development in Water Depth
Map:	10-005
Page Number:	01 of 06
Drawn:	RJG
Verified:	DA
Approved Date:	16/01/2019
Scale:	1:5,000
Original Size:	A3

Graphic Scale: 0 50 100 150 200 m





Legend

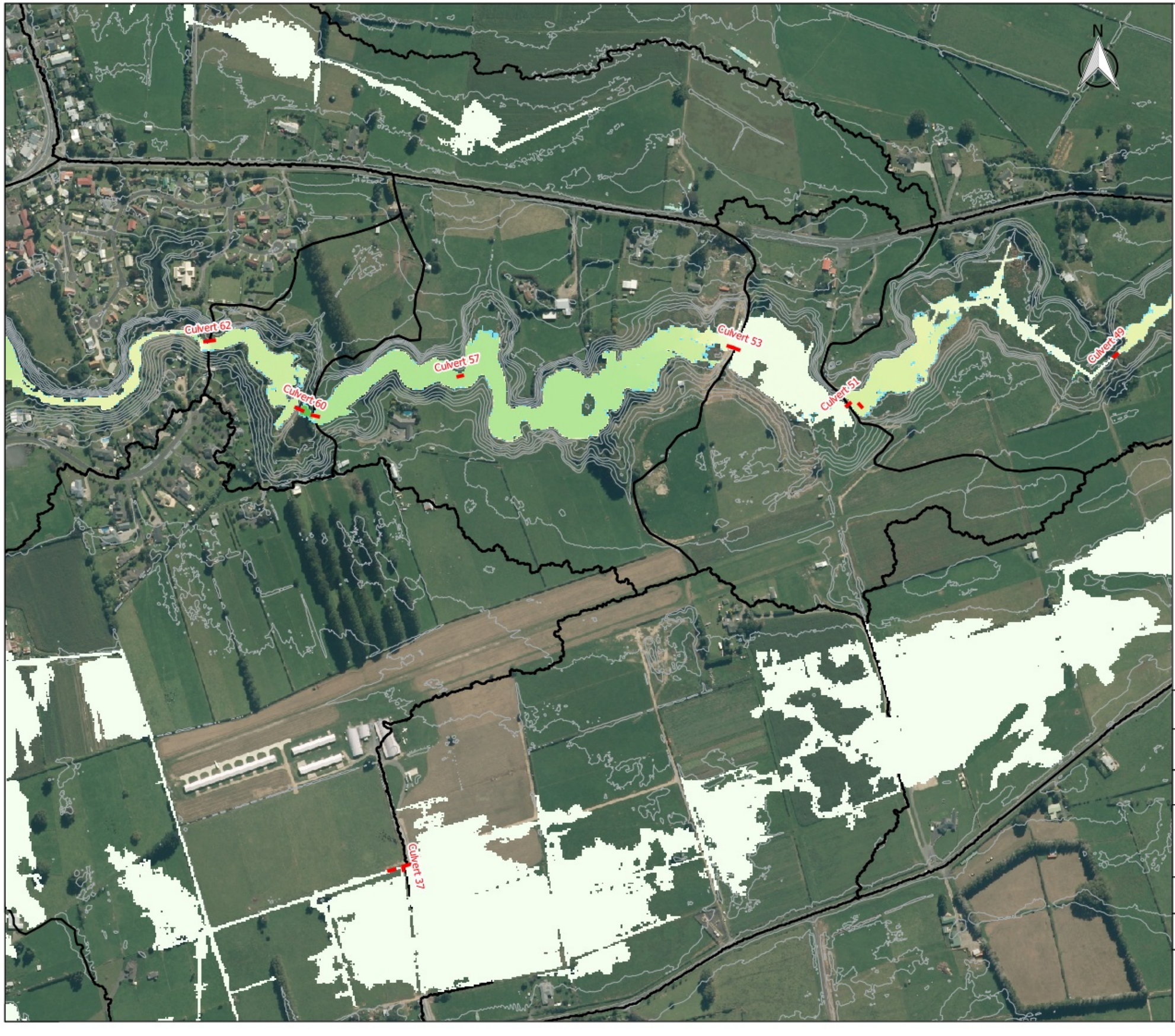
- 1m Contours
- Culverts
- Catchments

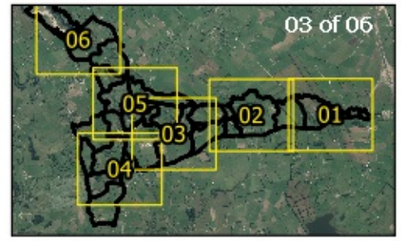
Difference in Water Depth (mm)

- <-200
- -100
- -50
- 0
- 50
- 100
- >200
- Was Wet - Now Dry
- Was Dry - Now Wet

Project No:	3-39300.00 - Te Otamanui Stream
Title:	1% AEP Event. Effect of development in Water Depth
Map: 10-005	Page Number: 02 of 06
Drawn: RJG	Verified: DA
Approved Date: 16/01/2019	
Scale: 1:5,000	Original Size: A3

Graphic Scale: 0 50 100 150 200 m





Legend

- 1m Contours
- Culverts
- Catchments

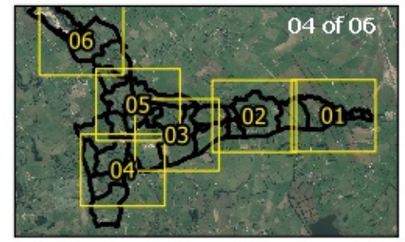
Difference in Water Depth (mm)

- <-200
- -100
- -50
- 0
- 50
- 100
- >200
- Was Wet - Now Dry
- Was Dry - Now Wet

Project No:	3-39300.00 - Te Otamanui Stream
Title:	1% AEP Event. Effect of development in Water Depth
Map: 10-005	Page Number: 03 of 06
Drawn: RJG	Verified: DA
Approved Date: 16/01/2019	
Scale: 1:5,000	Original Size: A3

Graphic Scale: 0 50 100 150 200 m





Legend

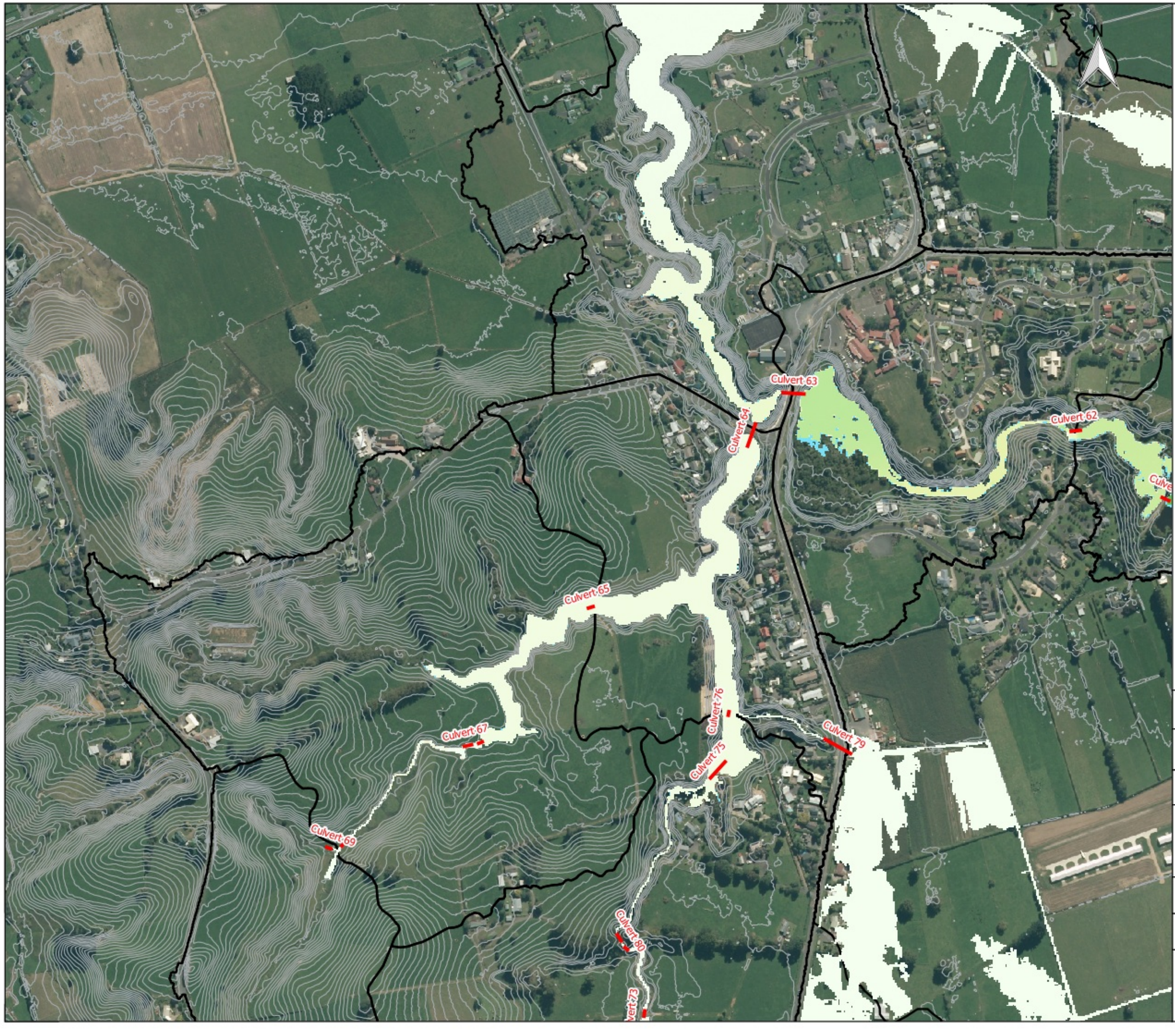
- 1m Contours
- Culverts
- Catchments

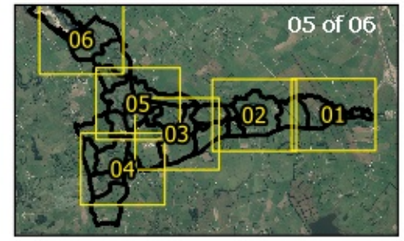
Difference in Water Depth (mm)

- <-200
- -100
- -50
- 0
- 50
- 100
- >200
- Was Wet - Now Dry
- Was Dry - Now Wet

Project No:	3-39300.00 - Te Otamanui Stream
Title:	1% AEP Event. Effect of development in Water Depth
Map: 10-005	Page Number: 04 of 06
Drawn: RJG	Verified: DA
Approved Date: 16/01/2019	
Scale: 1:5,000	Original Size: A3

Graphic Scale: 0 50 100 150 200 m





Legend

- 1m Contours
- Culverts
- Catchments

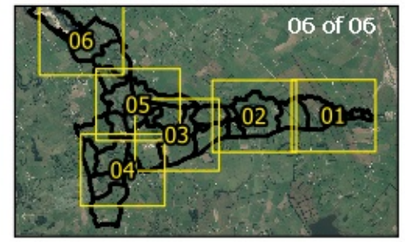
Difference in Water Depth (mm)

- <-200
- -100
- -50
- 0
- 50
- 100
- >200
- Was Wet - Now Dry
- Was Dry - Now Wet

Project No:	3-39300.00 - Te Otamanui Stream
Title:	1% AEP Event. Effect of development in Water Depth
Map: 10-005	Page Number: 05 of 06
Drawn: RJG	Verified: DA
Approved Date: 16/01/2019	
Scale: 1:5,000	Original Size: A3

Graphic Scale: 0 50 100 150 200 m





Legend

- 1m Contours
- Culverts
- Catchments

Difference in Water Depth (mm)

- <-200
- -100
- -50
- 0
- 50
- 100
- >200
- Was Wet - Now Dry
- Was Dry - Now Wet

Project No:	3-39300.00 - Te Otamanui Stream
Title:	1% AEP Event. Effect of development in Water Depth
Map: 10-005	Page Number: 06 of 06
Drawn: RJG	Verified: DA
Approved Date: 16/01/2019	
Scale: 1:5,000	Original Size: A3

Graphic Scale: 0 50 100 150 200 m

Appendix D
Hydrographs from RNDA Catchments

Hydrographs provided by McKenzie Engineering Consultants

1% AEP Basecase Results

Te Ota (West)	Total	Weir	Culvert
Max	0.13	0.00	0.13
Min	0.00	0.00	0.00
Average	0.07	0.00	0.07

	Total	Weir	Culvert
1/01/2018 0:00	0	0	0
1/01/2018 0:10	0	0	0
1/01/2018 0:20	0	0	0
1/01/2018 0:30	0	0	0.0002
1/01/2018 0:40	0.002	0	0.0022
1/01/2018 0:50	0.004	0	0.0041
1/01/2018 1:00	0.006	0	0.0058
1/01/2018 1:10	0.007	0	0.0072
1/01/2018 1:20	0.008	0	0.0083
1/01/2018 1:30	0.009	0	0.0092
1/01/2018 1:40	0.01	0	0.0099
1/01/2018 1:50	0.01	0	0.0104
1/01/2018 2:00	0.011	0	0.0108
1/01/2018 2:10	0.011	0	0.0111
1/01/2018 2:20	0.011	0	0.0113
1/01/2018 2:30	0.012	0	0.0116
1/01/2018 2:40	0.012	0	0.0122
1/01/2018 2:50	0.013	0	0.0131
1/01/2018 3:00	0.014	0	0.0137
1/01/2018 3:10	0.014	0	0.0142
1/01/2018 3:20	0.015	0	0.0145
1/01/2018 3:30	0.015	0	0.0147
1/01/2018 3:40	0.015	0	0.0149
1/01/2018 3:50	0.015	0	0.0151
1/01/2018 4:00	0.015	0	0.0153
1/01/2018 4:10	0.015	0	0.0154
1/01/2018 4:20	0.016	0	0.0155
1/01/2018 4:30	0.016	0	0.0155
1/01/2018 4:40	0.016	0	0.0155
1/01/2018 4:50	0.016	0	0.0155
1/01/2018 5:00	0.016	0	0.0156
1/01/2018 5:10	0.016	0	0.0156
1/01/2018 5:20	0.016	0	0.0157
1/01/2018 5:30	0.016	0	0.0157
1/01/2018 5:40	0.016	0	0.0158
1/01/2018 5:50	0.016	0	0.0159
1/01/2018 6:00	0.016	0	0.0161
1/01/2018 6:10	0.018	0	0.0177
1/01/2018 6:20	0.02	0	0.0201
1/01/2018 6:30	0.022	0	0.0222
1/01/2018 6:40	0.024	0	0.0238
1/01/2018 6:50	0.025	0	0.0252
1/01/2018 7:00	0.026	0	0.026
1/01/2018 7:10	0.027	0	0.0265
1/01/2018 7:20	0.027	0	0.0267
1/01/2018 7:30	0.027	0	0.0269
1/01/2018 7:40	0.027	0	0.0271
1/01/2018 7:50	0.027	0	0.0272
1/01/2018 8:00	0.027	0	0.0273
1/01/2018 8:10	0.027	0	0.0274
1/01/2018 8:20	0.028	0	0.0275
1/01/2018 8:30	0.028	0	0.0276
1/01/2018 8:40	0.028	0	0.0277
1/01/2018 8:50	0.028	0	0.0278
1/01/2018 9:00	0.028	0	0.0281
1/01/2018 9:10	0.03	0	0.0295
1/01/2018 9:20	0.031	0	0.0314
1/01/2018 9:30	0.033	0	0.0329
1/01/2018 9:40	0.034	0	0.0341
1/01/2018 9:50	0.035	0	0.0347
1/01/2018 10:00	0.035	0	0.0351
1/01/2018 10:10	0.036	0	0.0356
1/01/2018 10:20	0.036	0	0.0359
1/01/2018 10:30	0.036	0	0.0358
1/01/2018 10:40	0.036	0	0.0358
1/01/2018 10:50	0.036	0	0.0361
1/01/2018 11:00	0.038	0	0.0375
1/01/2018 11:10	0.048	0	0.0478
1/01/2018 11:20	0.061	0	0.0611
1/01/2018 11:30	0.075	0	0.0754
1/01/2018 11:40	0.104	0	0.1035
1/01/2018 11:50	0.114	0	0.1142
1/01/2018 12:00	0.124	0	0.1239

Te Ota (West)	Total	Weir	Culvert
1/01/2018 12:10	0.129	0	0.1288
1/01/2018 12:20	0.13	0	0.1304
1/01/2018 12:30	0.132	0	0.1316
1/01/2018 12:40	0.132	0	0.1322
1/01/2018 12:50	0.133	0	0.1326
1/01/2018 13:00	0.133	0	0.1328
1/01/2018 13:10	0.133	0	0.1328
1/01/2018 13:20	0.133	0	0.1328
1/01/2018 13:30	0.133	0	0.1328
1/01/2018 13:40	0.133	0	0.1327
1/01/2018 13:50	0.133	0	0.1326
1/01/2018 14:00	0.133	0	0.1325
1/01/2018 14:10	0.133	0	0.1325
1/01/2018 14:20	0.132	0	0.1324
1/01/2018 14:30	0.132	0	0.1323
1/01/2018 14:40	0.132	0	0.1322
1/01/2018 14:50	0.132	0	0.1321
1/01/2018 15:00	0.132	0	0.132
1/01/2018 15:10	0.132	0	0.1319
1/01/2018 15:20	0.132	0	0.1317
1/01/2018 15:30	0.132	0	0.1316
1/01/2018 15:40	0.131	0	0.1314
1/01/2018 15:50	0.131	0	0.1313
1/01/2018 16:00	0.131	0	0.1311
1/01/2018 16:10	0.131	0	0.131
1/01/2018 16:20	0.131	0	0.1308
1/01/2018 16:30	0.131	0	0.1306
1/01/2018 16:40	0.13	0	0.1304
1/01/2018 16:50	0.13	0	0.1304
1/01/2018 17:00	0.131	0	0.1305
1/01/2018 17:10	0.13	0	0.1303
1/01/2018 17:20	0.13	0	0.1301
1/01/2018 17:30	0.13	0	0.1299
1/01/2018 17:40	0.13	0	0.1297
1/01/2018 17:50	0.13	0	0.1295
1/01/2018 18:00	0.129	0	0.1293
1/01/2018 18:10	0.129	0	0.129
1/01/2018 18:20	0.129	0	0.1288
1/01/2018 18:30	0.129	0	0.1286
1/01/2018 18:40	0.128	0	0.1283
1/01/2018 18:50	0.128	0	0.1281
1/01/2018 19:00	0.128	0	0.1278
1/01/2018 19:10	0.128	0	0.1275
1/01/2018 19:20	0.127	0	0.1273
1/01/2018 19:30	0.127	0	0.127
1/01/2018 19:40	0.127	0	0.1268
1/01/2018 19:50	0.127	0	0.1265
1/01/2018 20:00	0.126	0	0.1262
1/01/2018 20:10	0.126	0	0.126
1/01/2018 20:20	0.126	0	0.1257
1/01/2018 20:30	0.125	0	0.1254
1/01/2018 20:40	0.125	0	0.1251
1/01/2018 20:50	0.125	0	0.1249
1/01/2018 21:00	0.125	0	0.1246
1/01/2018 21:10	0.124	0	0.1243
1/01/2018 21:20	0.124	0	0.124
1/01/2018 21:30	0.124	0	0.1237
1/01/2018 21:40	0.123	0	0.1234
1/01/2018 21:50	0.123	0	0.1232
1/01/2018 22:00	0.123	0	0.1229
1/01/2018 22:10	0.123	0	0.1226
1/01/2018 22:20	0.123	0	0.1227
1/01/2018 22:30	0.123	0	0.1225
1/01/2018 22:40	0.122	0	0.1222
1/01/2018 22:50	0.122	0	0.1219
1/01/2018 23:00	0.122	0	0.1216
1/01/2018 23:10	0.121	0	0.1212
1/01/2018 23:20	0.121	0	0.1209

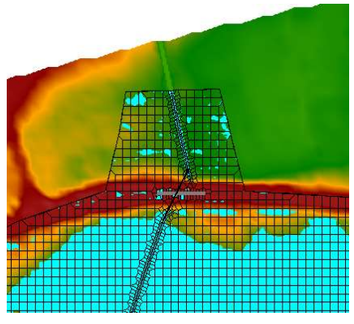
Te Ota (East)	Total	Weir	Culvert
Max	1.98	0.00	1.98
Min	0.00	0.00	0.00
Average	0.55	0.00	0.55

	Total	Weir	Culvert
1/01/2018 0:00	0	0	0
1/01/2018 0:10	0	0	0
1/01/2018 0:20	0	0	0.0001
1/01/2018 0:30	0	0	0
1/01/2018 0:40	0	0	0.0001
1/01/2018 0:50	0	0	0
1/01/2018 1:00	0.003	0	0.0025
1/01/2018 1:10	0.011	0	0.0112
1/01/2018 1:20	0.029	0	0.0288
1/01/2018 1:30	0.042	0	0.0415
1/01/2018 1:40	0.051	0	0.0512
1/01/2018 1:50	0.062	0	0.0615
1/01/2018 2:00	0.074	0	0.0743
1/01/2018 2:10	0.089	0	0.0891
1/01/2018 2:20	0.104	0	0.1035
1/01/2018 2:30	0.116	0	0.1157
1/01/2018 2:40	0.126	0	0.126
1/01/2018 2:50	0.134	0	0.1341
1/01/2018 3:00	0.14	0	0.1397
1/01/2018 3:10	0.143	0	0.1434
1/01/2018 3:20	0.147	0	0.1468
1/01/2018 3:30	0.149	0	0.1487
1/01/2018 3:40	0.151	0	0.1505
1/01/2018 3:50	0.152	0	0.152
1/01/2018 4:00	0.153	0	0.1527
1/01/2018 4:10	0.154	0	0.1537
1/01/2018 4:20	0.155	0	0.1546
1/01/2018 4:30	0.155	0	0.1551
1/01/2018 4:40	0.155	0	0.1554
1/01/2018 4:50	0.156	0	0.156
1/01/2018 5:00	0.156	0	0.1562
1/01/2018 5:10	0.156	0	0.1563
1/01/2018 5:20	0.157	0	0.1566
1/01/2018 5:30	0.157	0	0.1572
1/01/2018 5:40	0.157	0	0.1571
1/01/2018 5:50	0.158	0	0.1575
1/01/2018 6:00	0.159	0	0.1593
1/01/2018 6:10	0.164	0	0.1636
1/01/2018 6:20	0.173	0	0.1731
1/01/2018 6:30	0.186	0	0.1856
1/01/2018 6:40	0.202	0	0.2015
1/01/2018 6:50	0.219	0	0.2187
1/01/2018 7:00	0.234	0	0.2339
1/01/2018 7:10	0.246	0	0.2455
1/01/2018 7:20	0.255	0	0.255
1/01/2018 7:30	0.264	0	0.2638
1/01/2018 7:40	0.27	0	0.2696
1/01/2018 7:50	0.274	0	0.2736
1/01/2018 8:00	0.277	0	0.2774
1/01/2018 8:10	0.282	0	0.2817
1/01/2018 8:20	0.285	0	0.2849
1/01/2018 8:30	0.287	0	0.2867
1/01/2018 8:40	0.289	0	0.289
1/01/2018 8:50	0.292	0	0.2923
1/01/2018 9:00	0.295	0	0.2954
1/01/2018 9:10	0.302	0	0.3018
1/01/2018 9:20	0.315	0	0.3146
1/01/2018 9:30	0.333	0	0.3327
1/01/2018 9:40	0.353	0	0.3532
1/01/2018 9:50	0.374	0	0.3736
1/01/2018 10:00	0.391	0	0.3908
1/01/2018 10:10	0.41	0	0.4096
1/01/2018 10:20	0.424	0	0.424
1/01/2018 10:30	0.435	0	0.4353
1/01/2018 10:40	0.444	0	0.444
1/01/2018 10:50	0.451	0	0.4507
1/01/2018 11:00	0.458	0	0.4583
1/01/2018 11:10	0.501	0	0.5006
1/01/2018 11:20	0.587	0	0.5869
1/01/2018 11:30	0.712	0	0.712
1/01/2018 11:40	0.963	0	0.9632
1/01/2018 11:50	1.413	0	1.4131
1/01/2018 12:00	1.837	0	1.8368

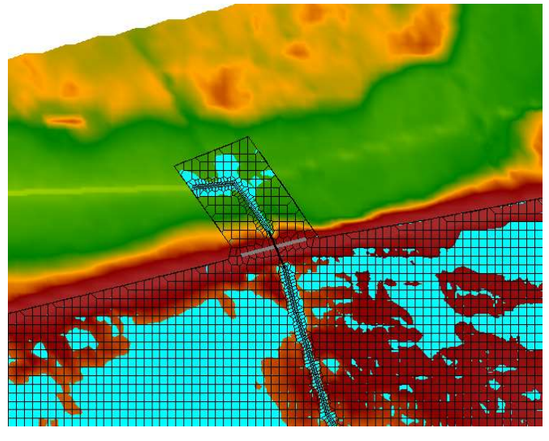
Te Ota (East)	Total	Weir	Culvert
1/01/2018 12:10	1.924	0	1.9243
1/01/2018 12:20	1.954	0	1.9539
1/01/2018 12:30	1.964	0	1.9642
1/01/2018 12:40	1.97	0	1.9697
1/01/2018 12:50	1.974	0	1.974
1/01/2018 13:00	1.976	0	1.976
1/01/2018 13:10	1.973	0	1.9725
1/01/2018 13:20	1.966	0	1.9658
1/01/2018 13:30	1.96	0	1.9596
1/01/2018 13:40	1.95	0	1.9499
1/01/2018 13:50	1.941	0	1.9407
1/01/2018 14:00	1.929	0	1.9292
1/01/2018 14:10	1.919	0	1.9186
1/01/2018 14:20	1.906	0	1.9061
1/01/2018 14:30	1.89	0	1.8902
1/01/2018 14:40	1.874	0	1.8738
1/01/2018 14:50	1.853	0	1.8531
1/01/2018 15:00	1.827	0	1.8273
1/01/2018 15:10	1.785	0	1.7854
1/01/2018 15:20	1.734	0	1.7337
1/01/2018 15:30	1.662	0	1.6616
1/01/2018 15:40	1.556	0	1.5556
1/01/2018 15:50	1.381	0	1.3809
1/01/2018 16:00	1.126	0	1.1258
1/01/2018 16:10	0.879	0	0.8792
1/01/2018 16:20	0.702	0	0.7024
1/01/2018 16:30	0.58	0	0.58
1/01/2018 16:40	0.507	0	0.5072
1/01/2018 16:50	0.466	0	0.4655
1/01/2018 17:00	0.438	0	0.4376
1/01/2018 17:10	0.429	0	0.4285
1/01/2018 17:20	0.415	0	0.4152
1/01/2018 17:30	0.406	0	0.4059
1/01/2018 17:40	0.391	0	0.3912
1/01/2018 17:50	0.379	0	0.3788
1/01/2018 18:00	0.369	0	0.3693
1/01/2018 18:10	0.353	0	0.353
1/01/2018 18:20	0.34	0	0.3401
1/01/2018 18:30	0.331	0	0.3309
1/01/2018 18:40	0.322	0	0.3215
1/01/2018 18:50	0.313	0	0.3133
1/01/2018 19:00	0.303	0	0.3033
1/01/2018 19:10	0.3	0	0.2998
1/01/2018 19:20	0.294	0	0.2943
1/01/2018 19:30	0.29	0	0.2899
1/01/2018 19:40	0.286	0	0.2859
1/01/2018 19:50	0.283	0	0.2829
1/01/2018 20:00	0.28	0	0.2797
1/01/2018 20:10	0.277	0	0.2773
1/01/2018 20:20	0.276	0	0.2755
1/01/2018 20:30	0.274	0	0.2742
1/01/2018 20:40	0.271	0	0.2706
1/01/2018 20:50	0.27	0	0.2704
1/01/2018 21:00	0.268	0	0.268
1/01/2018 21:10	0.269	0	0.2687
1/01/2018 21:20	0.267	0	0.2674
1/01/2018 21:30	0.266	0	0.2662
1/01/2018 21:40	0.265	0	0.2654
1/01/2018 21:50	0.265	0	0.2647
1/01/2018 22:00	0.264	0	0.2643
1/01/2018 22:10	0.263	0	0.2632
1/01/2018 22:20	0.262	0	0.2624
1/01/2018 22:30	0.26	0	0.2596
1/01/2018 22:40	0.261	0	0.2613
1/01/2018 22:50	0.26	0	0.2604
1/01/2018 23:00	0.26	0	0.26
1/01/2018 23:10	0.26	0	0.2595
1/01/2018 23:20	0.258	0	0.2581



Te Ota (West) - Model Result Example



Te Ota (East) - Model Result Example



10% AEP Basecase Results

Te Ota (West)	Total	Weir	Culvert
Max	0.12	0.00	0.12
Min	0.00	0.00	0.00
Average	0.06	0.00	0.06
	Total	Weir	Culvert
1/01/2018 0:00	0	0	0
1/01/2018 0:10	0	0	0
1/01/2018 0:20	0	0	0
1/01/2018 0:30	0	0	0
1/01/2018 0:40	0	0	0
1/01/2018 0:50	0	0	0.0001
1/01/2018 1:00	0.001	0	0.0014
1/01/2018 1:10	0.002	0	0.0024
1/01/2018 1:20	0.003	0	0.003
1/01/2018 1:30	0.003	0	0.0034
1/01/2018 1:40	0.004	0	0.0038
1/01/2018 1:50	0.004	0	0.0041
1/01/2018 2:00	0.005	0	0.005
1/01/2018 2:10	0.006	0	0.0059
1/01/2018 2:20	0.007	0	0.0066
1/01/2018 2:30	0.007	0	0.0072
1/01/2018 2:40	0.008	0	0.0076
1/01/2018 2:50	0.008	0	0.008
1/01/2018 3:00	0.008	0	0.0082
1/01/2018 3:10	0.008	0	0.0082
1/01/2018 3:20	0.008	0	0.0083
1/01/2018 3:30	0.008	0	0.0084
1/01/2018 3:40	0.009	0	0.0085
1/01/2018 3:50	0.009	0	0.0085
1/01/2018 4:00	0.009	0	0.0086
1/01/2018 4:10	0.009	0	0.0085
1/01/2018 4:20	0.009	0	0.0085
1/01/2018 4:30	0.009	0	0.0086
1/01/2018 4:40	0.009	0	0.0086
1/01/2018 4:50	0.009	0	0.0086
1/01/2018 5:00	0.009	0	0.0086
1/01/2018 5:10	0.009	0	0.0086
1/01/2018 5:20	0.009	0	0.0086
1/01/2018 5:30	0.009	0	0.0086
1/01/2018 5:40	0.009	0	0.0086
1/01/2018 5:50	0.009	0	0.0086
1/01/2018 6:00	0.009	0	0.0087
1/01/2018 6:10	0.01	0	0.0096
1/01/2018 6:20	0.011	0	0.0113
1/01/2018 6:30	0.013	0	0.0127
1/01/2018 6:40	0.014	0	0.0142
1/01/2018 6:50	0.015	0	0.0151
1/01/2018 7:00	0.016	0	0.0158
1/01/2018 7:10	0.016	0	0.0161
1/01/2018 7:20	0.017	0	0.0166
1/01/2018 7:30	0.017	0	0.0169
1/01/2018 7:40	0.018	0	0.0175
1/01/2018 7:50	0.018	0	0.0178
1/01/2018 8:00	0.018	0	0.0182
1/01/2018 8:10	0.018	0	0.0184
1/01/2018 8:20	0.019	0	0.0186
1/01/2018 8:30	0.019	0	0.0186
1/01/2018 8:40	0.019	0	0.0187
1/01/2018 8:50	0.019	0	0.0187
1/01/2018 9:00	0.019	0	0.0189
1/01/2018 9:10	0.02	0	0.0204
1/01/2018 9:20	0.022	0	0.0223
1/01/2018 9:30	0.024	0	0.024
1/01/2018 9:40	0.025	0	0.025
1/01/2018 9:50	0.026	0	0.0259
1/01/2018 10:00	0.026	0	0.0263
1/01/2018 10:10	0.027	0	0.0267
1/01/2018 10:20	0.027	0	0.0269
1/01/2018 10:30	0.027	0	0.027
1/01/2018 10:40	0.027	0	0.0271
1/01/2018 10:50	0.027	0	0.0274
1/01/2018 11:00	0.028	0	0.0281
1/01/2018 11:10	0.036	0	0.0355
1/01/2018 11:20	0.044	0	0.0438
1/01/2018 11:30	0.055	0	0.0546
1/01/2018 11:40	0.075	0	0.0753
1/01/2018 11:50	0.106	0	0.1057
1/01/2018 12:00	0.113	0	0.1134

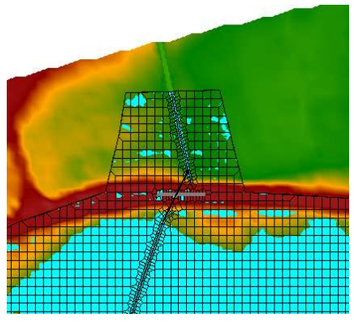
Te Ota (West)	Total	Weir	Culvert
1/01/2018 12:10	0.119	0	0.1187
1/01/2018 12:20	0.121	0	0.1211
1/01/2018 12:30	0.123	0	0.1225
1/01/2018 12:40	0.124	0	0.1235
1/01/2018 12:50	0.124	0	0.1238
1/01/2018 13:00	0.124	0	0.1239
1/01/2018 13:10	0.124	0	0.1239
1/01/2018 13:20	0.124	0	0.1239
1/01/2018 13:30	0.124	0	0.1238
1/01/2018 13:40	0.124	0	0.1237
1/01/2018 13:50	0.124	0	0.1236
1/01/2018 14:00	0.123	0	0.1234
1/01/2018 14:10	0.123	0	0.1233
1/01/2018 14:20	0.123	0	0.1231
1/01/2018 14:30	0.123	0	0.123
1/01/2018 14:40	0.123	0	0.1228
1/01/2018 14:50	0.123	0	0.1227
1/01/2018 15:00	0.123	0	0.123
1/01/2018 15:10	0.123	0	0.1228
1/01/2018 15:20	0.123	0	0.1226
1/01/2018 15:30	0.122	0	0.1223
1/01/2018 15:40	0.122	0	0.1221
1/01/2018 15:50	0.122	0	0.1218
1/01/2018 16:00	0.122	0	0.1215
1/01/2018 16:10	0.121	0	0.1213
1/01/2018 16:20	0.121	0	0.121
1/01/2018 16:30	0.121	0	0.1207
1/01/2018 16:40	0.121	0	0.1205
1/01/2018 16:50	0.12	0	0.1202
1/01/2018 17:00	0.12	0	0.1199
1/01/2018 17:10	0.12	0	0.1196
1/01/2018 17:20	0.119	0	0.1193
1/01/2018 17:30	0.119	0	0.119
1/01/2018 17:40	0.119	0	0.1186
1/01/2018 17:50	0.118	0	0.1183
1/01/2018 18:00	0.118	0	0.1178
1/01/2018 18:10	0.117	0	0.1174
1/01/2018 18:20	0.117	0	0.1169
1/01/2018 18:30	0.117	0	0.1169
1/01/2018 18:40	0.116	0	0.1163
1/01/2018 18:50	0.116	0	0.1156
1/01/2018 19:00	0.115	0	0.1148
1/01/2018 19:10	0.114	0	0.114
1/01/2018 19:20	0.113	0	0.113
1/01/2018 19:30	0.112	0	0.1118
1/01/2018 19:40	0.111	0	0.1106
1/01/2018 19:50	0.109	0	0.1091
1/01/2018 20:00	0.106	0	0.1056
1/01/2018 20:10	0.096	0	0.0956
1/01/2018 20:20	0.07	0	0.0697
1/01/2018 20:30	0.056	0	0.0563
1/01/2018 20:40	0.051	0	0.0507
1/01/2018 20:50	0.048	0	0.0476
1/01/2018 21:00	0.045	0	0.0453
1/01/2018 21:10	0.044	0	0.044
1/01/2018 21:20	0.043	0	0.0428
1/01/2018 21:30	0.042	0	0.0417
1/01/2018 21:40	0.041	0	0.0408
1/01/2018 21:50	0.04	0	0.04
1/01/2018 22:00	0.039	0	0.0393
1/01/2018 22:10	0.039	0	0.0387
1/01/2018 22:20	0.038	0	0.0381
1/01/2018 22:30	0.038	0	0.0375
1/01/2018 22:40	0.037	0	0.037
1/01/2018 22:50	0.037	0	0.0365
1/01/2018 23:00	0.036	0	0.0361
1/01/2018 23:10	0.036	0	0.0357
1/01/2018 23:20	0.035	0	0.0353

Te Ota (East)	Total	Weir	Culvert
Max	1.86	0.00	1.86
Min	0.00	0.00	0.00
Average	0.38	0.00	0.38
	Total	Weir	Culvert
1/01/2018 0:00	0	0	0
1/01/2018 0:10	0	0	0.0001
1/01/2018 0:20	0	0	0.0003
1/01/2018 0:30	0	0	0
1/01/2018 0:40	0	0	0.0002
1/01/2018 0:50	0	0	0.0002
1/01/2018 1:00	0	0	0
1/01/2018 1:10	0	0	0
1/01/2018 1:20	0	0	0.0001
1/01/2018 1:30	0	0	0
1/01/2018 1:40	0.003	0	0.0031
1/01/2018 1:50	0.009	0	0.0092
1/01/2018 2:00	0.017	0	0.0166
1/01/2018 2:10	0.025	0	0.0245
1/01/2018 2:20	0.03	0	0.0298
1/01/2018 2:30	0.034	0	0.0336
1/01/2018 2:40	0.037	0	0.0373
1/01/2018 2:50	0.04	0	0.0397
1/01/2018 3:00	0.042	0	0.0423
1/01/2018 3:10	0.046	0	0.0461
1/01/2018 3:20	0.05	0	0.0503
1/01/2018 3:30	0.055	0	0.0552
1/01/2018 3:40	0.062	0	0.0615
1/01/2018 3:50	0.067	0	0.0671
1/01/2018 4:00	0.071	0	0.0712
1/01/2018 4:10	0.075	0	0.0752
1/01/2018 4:20	0.079	0	0.0791
1/01/2018 4:30	0.082	0	0.0822
1/01/2018 4:40	0.086	0	0.0859
1/01/2018 4:50	0.089	0	0.0886
1/01/2018 5:00	0.09	0	0.0899
1/01/2018 5:10	0.092	0	0.0923
1/01/2018 5:20	0.094	0	0.0935
1/01/2018 5:30	0.096	0	0.0955
1/01/2018 5:40	0.096	0	0.0963
1/01/2018 5:50	0.098	0	0.0975
1/01/2018 6:00	0.099	0	0.0991
1/01/2018 6:10	0.102	0	0.1015
1/01/2018 6:20	0.108	0	0.1077
1/01/2018 6:30	0.116	0	0.1157
1/01/2018 6:40	0.124	0	0.1243
1/01/2018 6:50	0.133	0	0.1326
1/01/2018 7:00	0.145	0	0.1445
1/01/2018 7:10	0.152	0	0.1524
1/01/2018 7:20	0.161	0	0.1606
1/01/2018 7:30	0.165	0	0.1649
1/01/2018 7:40	0.171	0	0.1706
1/01/2018 7:50	0.175	0	0.1747
1/01/2018 8:00	0.181	0	0.181
1/01/2018 8:10	0.181	0	0.1809
1/01/2018 8:20	0.189	0	0.1886
1/01/2018 8:30	0.186	0	0.1859
1/01/2018 8:40	0.191	0	0.1913
1/01/2018 8:50	0.193	0	0.1929
1/01/2018 9:00	0.195	0	0.1948
1/01/2018 9:10	0.196	0	0.1963
1/01/2018 9:20	0.207	0	0.2069
1/01/2018 9:30	0.217	0	0.2165
1/01/2018 9:40	0.229	0	0.2291
1/01/2018 9:50	0.233	0	0.233
1/01/2018 10:00	0.251	0	0.2511
1/01/2018 10:10	0.26	0	0.2596
1/01/2018 10:20	0.259	0	0.2591
1/01/2018 10:30	0.272	0	0.2716
1/01/2018 10:40	0.277	0	0.2769
1/01/2018 10:50	0.281	0	0.2814
1/01/2018 11:00	0.283	0	0.2826
1/01/2018 11:10	0.307	0	0.3068
1/01/2018 11:20	0.353	0	0.3531
1/01/2018 11:30	0.416	0	0.4162
1/01/2018 11:40	0.573	0	0.5729
1/01/2018 11:50	0.881	0	0.8811
1/01/2018 12:00	1.555	0	1.5553

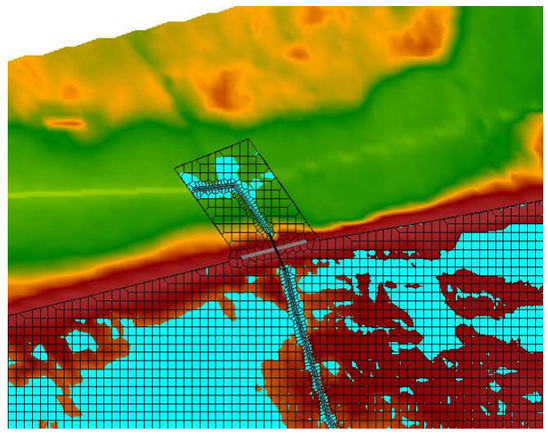
Te Ota (East)	Total	Weir	Culvert
1/01/2018 12:10	1.794	0	1.7937
1/01/2018 12:20	1.84	0	1.8396
1/01/2018 12:30	1.855	0	1.8546
1/01/2018 12:40	1.859	0	1.8592
1/01/2018 12:50	1.859	0	1.8588
1/01/2018 13:00	1.857	0	1.857
1/01/2018 13:10	1.845	0	1.845
1/01/2018 13:20	1.826	0	1.8264
1/01/2018 13:30	1.788	0	1.7878
1/01/2018 13:40	1.733	0	1.7332
1/01/2018 13:50	1.678	0	1.6781
1/01/2018 14:00	1.611	0	1.6112
1/01/2018 14:10	1.512	0	1.5119
1/01/2018 14:20	1.265	0	1.2648
1/01/2018 14:30	0.968	0	0.968
1/01/2018 14:40	0.773	0	0.7727
1/01/2018 14:50	0.664	0	0.6637
1/01/2018 15:00	0.598	0	0.5976
1/01/2018 15:10	0.546	0	0.5458
1/01/2018 15:20	0.504	0	0.5037
1/01/2018 15:30	0.469	0	0.4685
1/01/2018 15:40	0.439	0	0.4392
1/01/2018 15:50	0.42	0	0.4195
1/01/2018 16:00	0.402	0	0.402
1/01/2018 16:10	0.388	0	0.3884
1/01/2018 16:20	0.377	0	0.377
1/01/2018 16:30	0.368	0	0.3676
1/01/2018 16:40	0.359	0	0.3594
1/01/2018 16:50	0.353	0	0.3528
1/01/2018 17:00	0.348	0	0.3476
1/01/2018 17:10	0.343	0	0.3427
1/01/2018 17:20	0.339	0	0.3386
1/01/2018 17:30	0.335	0	0.3354
1/01/2018 17:40	0.333	0	0.3329
1/01/2018 17:50	0.331	0	0.3307
1/01/2018 18:00	0.328	0	0.3284
1/01/2018 18:10	0.323	0	0.3231
1/01/2018 18:20	0.312	0	0.312
1/01/2018 18:30	0.302	0	0.302
1/01/2018 18:40	0.286	0	0.2861
1/01/2018 18:50	0.273	0	0.2727
1/01/2018 19:00	0.26	0	0.2603
1/01/2018 19:10	0.266	0	0.266
1/01/2018 19:20	0.265	0	0.2654
1/01/2018 19:30	0.255	0	0.2548
1/01/2018 19:40	0.243	0	0.2433
1/01/2018 19:50	0.24	0	0.2399
1/01/2018 20:00	0.226	0	0.226
1/01/2018 20:10	0.225	0	0.2248
1/01/2018 20:20	0.224	0	0.2241
1/01/2018 20:30	0.212	0	0.2124
1/01/2018 20:40	0.213	0	0.2134
1/01/2018 20:50	0.214	0	0.2138
1/01/2018 21:00	0.203	0	0.2026
1/01/2018 21:10	0.205	0	0.2045
1/01/2018 21:20	0.206	0	0.206
1/01/2018 21:30	0.196	0	0.1958
1/01/2018 21:40	0.198	0	0.1983
1/01/2018 21:50	0.2	0	0.2002
1/01/2018 22:00	0.191	0	0.1909
1/01/2018 22:10	0.193	0	0.1927
1/01/2018 22:20	0.196	0	0.196
1/01/2018 22:30	0.187	0	0.1872
1/01/2018 22:40	0.189	0	0.1892
1/01/2018 22:50	0.193	0	0.1927
1/01/2018 23:00	0.184	0	0.1841
1/01/2018 23:10	0.187	0	0.1865
1/01/2018 23:20	0.19	0	0.1903



Te Ota (West) - Model Result Example



Te Ota (East) - Model Result Example



50% AEP Basecase Results

Te Ota (West)	Total	Weir	Culvert
Max	0.11	0.00	0.11
Min	0.00	0.00	0.00
Average	0.03	0.00	0.03

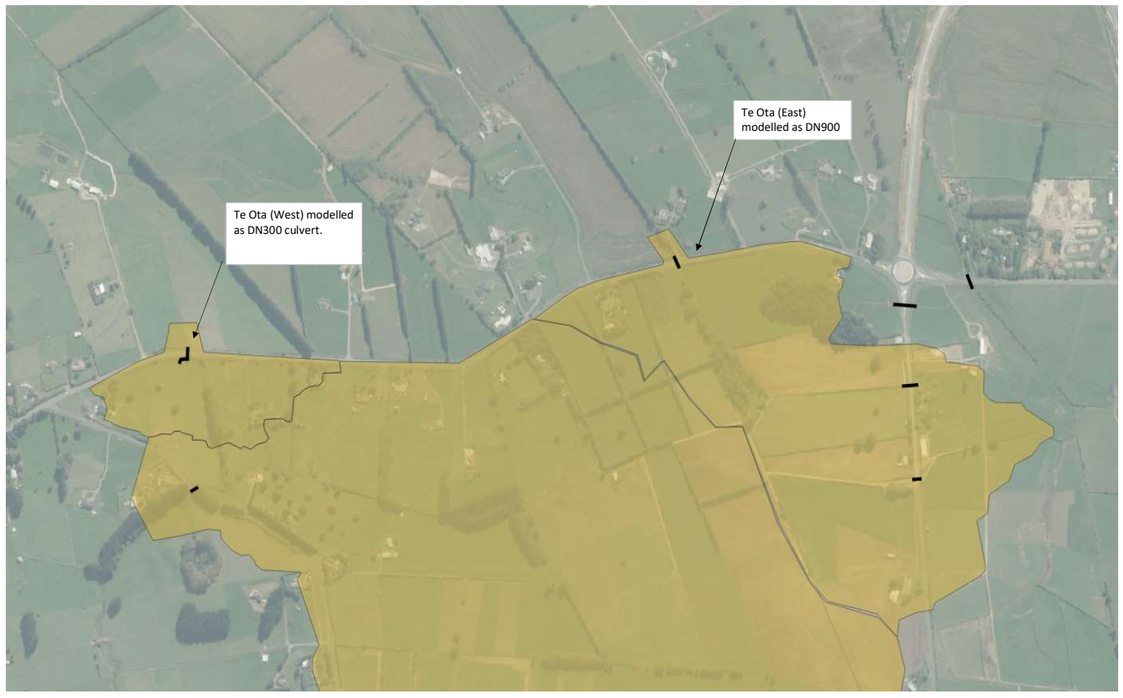
	Total	Weir	Culvert
1/01/2018 0:00	0	0	0
1/01/2018 0:10	0	0	0
1/01/2018 0:20	0	0	0
1/01/2018 0:30	0	0	0
1/01/2018 0:40	0	0	0
1/01/2018 0:50	0	0	0
1/01/2018 1:00	0	0	0
1/01/2018 1:10	0	0	0.0003
1/01/2018 1:20	0.001	0	0.0009
1/01/2018 1:30	0.002	0	0.0015
1/01/2018 1:40	0.002	0	0.0018
1/01/2018 1:50	0.002	0	0.002
1/01/2018 2:00	0.002	0	0.0022
1/01/2018 2:10	0.002	0	0.0023
1/01/2018 2:20	0.003	0	0.0025
1/01/2018 2:30	0.003	0	0.0026
1/01/2018 2:40	0.003	0	0.0028
1/01/2018 2:50	0.003	0	0.0032
1/01/2018 3:00	0.004	0	0.0038
1/01/2018 3:10	0.004	0	0.0042
1/01/2018 3:20	0.005	0	0.0046
1/01/2018 3:30	0.005	0	0.0048
1/01/2018 3:40	0.005	0	0.0049
1/01/2018 3:50	0.005	0	0.0052
1/01/2018 4:00	0.005	0	0.0053
1/01/2018 4:10	0.005	0	0.0053
1/01/2018 4:20	0.006	0	0.0055
1/01/2018 4:30	0.006	0	0.0055
1/01/2018 4:40	0.005	0	0.0054
1/01/2018 4:50	0.006	0	0.0055
1/01/2018 5:00	0.006	0	0.0055
1/01/2018 5:10	0.006	0	0.0055
1/01/2018 5:20	0.006	0	0.0056
1/01/2018 5:30	0.006	0	0.0056
1/01/2018 5:40	0.006	0	0.0055
1/01/2018 5:50	0.006	0	0.0056
1/01/2018 6:00	0.006	0	0.0057
1/01/2018 6:10	0.006	0	0.0062
1/01/2018 6:20	0.007	0	0.0071
1/01/2018 6:30	0.008	0	0.0083
1/01/2018 6:40	0.009	0	0.0092
1/01/2018 6:50	0.01	0	0.0097
1/01/2018 7:00	0.01	0	0.0102
1/01/2018 7:10	0.01	0	0.0103
1/01/2018 7:20	0.011	0	0.0106
1/01/2018 7:30	0.011	0	0.0106
1/01/2018 7:40	0.011	0	0.0107
1/01/2018 7:50	0.011	0	0.0108
1/01/2018 8:00	0.011	0	0.0108
1/01/2018 8:10	0.011	0	0.011
1/01/2018 8:20	0.011	0	0.011
1/01/2018 8:30	0.011	0	0.0111
1/01/2018 8:40	0.011	0	0.0112
1/01/2018 8:50	0.011	0	0.0113
1/01/2018 9:00	0.012	0	0.0116
1/01/2018 9:10	0.013	0	0.013
1/01/2018 9:20	0.016	0	0.0156
1/01/2018 9:30	0.017	0	0.0173
1/01/2018 9:40	0.019	0	0.0186
1/01/2018 9:50	0.02	0	0.0197
1/01/2018 10:00	0.021	0	0.0205
1/01/2018 10:10	0.021	0	0.0212
1/01/2018 10:20	0.022	0	0.0218
1/01/2018 10:30	0.022	0	0.022
1/01/2018 10:40	0.022	0	0.0224
1/01/2018 10:50	0.022	0	0.0223
1/01/2018 11:00	0.023	0	0.0228
1/01/2018 11:10	0.026	0	0.026
1/01/2018 11:20	0.031	0	0.0305
1/01/2018 11:30	0.035	0	0.0347
1/01/2018 11:40	0.044	0	0.0439
1/01/2018 11:50	0.071	0	0.0708
1/01/2018 12:00	0.108	0	0.1082

Te Ota (West)	Total	Weir	Culvert
1/01/2018 12:10	0.114	0	0.1136
1/01/2018 12:20	0.114	0	0.1141
1/01/2018 12:30	0.114	0	0.1138
1/01/2018 12:40	0.113	0	0.1127
1/01/2018 12:50	0.112	0	0.1115
1/01/2018 13:00	0.111	0	0.1108
1/01/2018 13:10	0.109	0	0.1089
1/01/2018 13:20	0.107	0	0.1067
1/01/2018 13:30	0.1	0	0.1001
1/01/2018 13:40	0.082	0	0.0817
1/01/2018 13:50	0.071	0	0.0708
1/01/2018 14:00	0.067	0	0.0665
1/01/2018 14:10	0.066	0	0.0657
1/01/2018 14:20	0.066	0	0.066
1/01/2018 14:30	0.066	0	0.0664
1/01/2018 14:40	0.067	0	0.067
1/01/2018 14:50	0.067	0	0.0671
1/01/2018 15:00	0.067	0	0.0669
1/01/2018 15:10	0.064	0	0.0644
1/01/2018 15:20	0.062	0	0.0615
1/01/2018 15:30	0.059	0	0.059
1/01/2018 15:40	0.057	0	0.0569
1/01/2018 15:50	0.055	0	0.0551
1/01/2018 16:00	0.054	0	0.0536
1/01/2018 16:10	0.052	0	0.0523
1/01/2018 16:20	0.051	0	0.0512
1/01/2018 16:30	0.05	0	0.0503
1/01/2018 16:40	0.049	0	0.0494
1/01/2018 16:50	0.049	0	0.0487
1/01/2018 17:00	0.048	0	0.048
1/01/2018 17:10	0.047	0	0.0473
1/01/2018 17:20	0.047	0	0.0467
1/01/2018 17:30	0.046	0	0.0462
1/01/2018 17:40	0.046	0	0.0457
1/01/2018 17:50	0.045	0	0.0453
1/01/2018 18:00	0.045	0	0.0446
1/01/2018 18:10	0.043	0	0.0428
1/01/2018 18:20	0.041	0	0.0406
1/01/2018 18:30	0.039	0	0.0386
1/01/2018 18:40	0.037	0	0.0369
1/01/2018 18:50	0.036	0	0.0355
1/01/2018 19:00	0.034	0	0.0342
1/01/2018 19:10	0.034	0	0.0335
1/01/2018 19:20	0.033	0	0.0327
1/01/2018 19:30	0.032	0	0.0317
1/01/2018 19:40	0.031	0	0.0309
1/01/2018 19:50	0.03	0	0.0302
1/01/2018 20:00	0.03	0	0.0296
1/01/2018 20:10	0.029	0	0.029
1/01/2018 20:20	0.028	0	0.0284
1/01/2018 20:30	0.028	0	0.0279
1/01/2018 20:40	0.028	0	0.0275
1/01/2018 20:50	0.027	0	0.0272
1/01/2018 21:00	0.027	0	0.0267
1/01/2018 21:10	0.026	0	0.0262
1/01/2018 21:20	0.026	0	0.0258
1/01/2018 21:30	0.025	0	0.0254
1/01/2018 21:40	0.025	0	0.0253
1/01/2018 21:50	0.025	0	0.0251
1/01/2018 22:00	0.025	0	0.0248
1/01/2018 22:10	0.025	0	0.0246
1/01/2018 22:20	0.024	0	0.0243
1/01/2018 22:30	0.024	0	0.0242
1/01/2018 22:40	0.024	0	0.0241
1/01/2018 22:50	0.024	0	0.0239
1/01/2018 23:00	0.024	0	0.0236
1/01/2018 23:10	0.024	0	0.0235
1/01/2018 23:20	0.023	0	0.0233

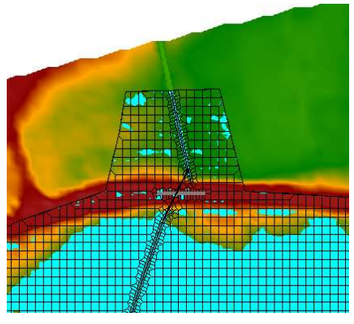
Te Ota (East)	Total	Weir	Culvert
Max	1.62	0.00	1.62
Min	0.00	0.00	0.00
Average	0.23	0.00	0.23

	Total	Weir	Culvert
1/01/2018 0:00	0	0	0
1/01/2018 0:10	0	0	0
1/01/2018 0:20	0	0	0.0002
1/01/2018 0:30	0	0	0.0001
1/01/2018 0:40	0	0	0.0001
1/01/2018 0:50	0	0	0.0001
1/01/2018 1:00	0	0	0
1/01/2018 1:10	0	0	0.0003
1/01/2018 1:20	0	0	0
1/01/2018 1:30	0	0	0
1/01/2018 1:40	0	0	0.0001
1/01/2018 1:50	0	0	0.0002
1/01/2018 2:00	0	0	0.0002
1/01/2018 2:10	0.003	0	0.0025
1/01/2018 2:20	0.006	0	0.0058
1/01/2018 2:30	0.009	0	0.0091
1/01/2018 2:40	0.013	0	0.0126
1/01/2018 2:50	0.016	0	0.0158
1/01/2018 3:00	0.019	0	0.0185
1/01/2018 3:10	0.021	0	0.0206
1/01/2018 3:20	0.023	0	0.0225
1/01/2018 3:30	0.024	0	0.0239
1/01/2018 3:40	0.025	0	0.0253
1/01/2018 3:50	0.027	0	0.0268
1/01/2018 4:00	0.029	0	0.0285
1/01/2018 4:10	0.03	0	0.03
1/01/2018 4:20	0.032	0	0.0316
1/01/2018 4:30	0.034	0	0.0335
1/01/2018 4:40	0.036	0	0.0359
1/01/2018 4:50	0.039	0	0.0385
1/01/2018 5:00	0.041	0	0.0411
1/01/2018 5:10	0.043	0	0.0434
1/01/2018 5:20	0.047	0	0.0465
1/01/2018 5:30	0.048	0	0.0477
1/01/2018 5:40	0.049	0	0.0493
1/01/2018 5:50	0.052	0	0.0515
1/01/2018 6:00	0.052	0	0.0522
1/01/2018 6:10	0.054	0	0.0543
1/01/2018 6:20	0.058	0	0.058
1/01/2018 6:30	0.062	0	0.0623
1/01/2018 6:40	0.068	0	0.0675
1/01/2018 6:50	0.074	0	0.0736
1/01/2018 7:00	0.08	0	0.0803
1/01/2018 7:10	0.087	0	0.0868
1/01/2018 7:20	0.094	0	0.0941
1/01/2018 7:30	0.098	0	0.0983
1/01/2018 7:40	0.103	0	0.1034
1/01/2018 7:50	0.107	0	0.1068
1/01/2018 8:00	0.111	0	0.111
1/01/2018 8:10	0.115	0	0.1154
1/01/2018 8:20	0.118	0	0.1178
1/01/2018 8:30	0.12	0	0.1204
1/01/2018 8:40	0.125	0	0.1253
1/01/2018 8:50	0.126	0	0.1258
1/01/2018 9:00	0.129	0	0.1288
1/01/2018 9:10	0.133	0	0.1325
1/01/2018 9:20	0.144	0	0.1438
1/01/2018 9:30	0.153	0	0.153
1/01/2018 9:40	0.166	0	0.1664
1/01/2018 9:50	0.184	0	0.1842
1/01/2018 10:00	0.193	0	0.1927
1/01/2018 10:10	0.207	0	0.2074
1/01/2018 10:20	0.213	0	0.2129
1/01/2018 10:30	0.228	0	0.2278
1/01/2018 10:40	0.223	0	0.2232
1/01/2018 10:50	0.239	0	0.2386
1/01/2018 11:00	0.235	0	0.2349
1/01/2018 11:10	0.246	0	0.2463
1/01/2018 11:20	0.269	0	0.2688
1/01/2018 11:30	0.291	0	0.2909
1/01/2018 11:40	0.339	0	0.3386
1/01/2018 11:50	0.432	0	0.4317
1/01/2018 12:00	0.823	0	0.8225

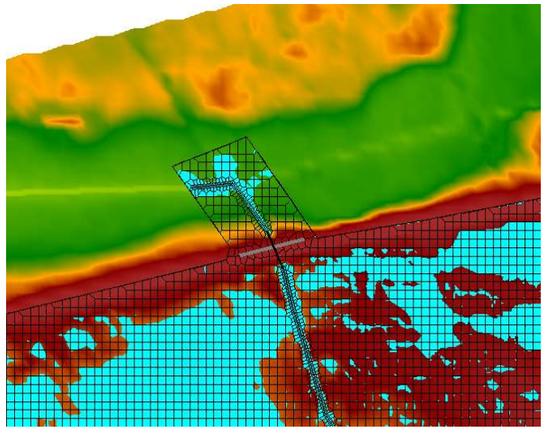
Te Ota (East)	Total	Weir	Culvert
1/01/2018 12:10	1.392	0	1.3922
1/01/2018 12:20	1.576	0	1.5764
1/01/2018 12:30	1.617	0	1.6174
1/01/2018 12:40	1.594	0	1.5944
1/01/2018 12:50	1.547	0	1.5467
1/01/2018 13:00	1.433	0	1.4329
1/01/2018 13:10	1.212	0	1.212
1/01/2018 13:20	0.975	0	0.9748
1/01/2018 13:30	0.792	0	0.792
1/01/2018 13:40	0.67	0	0.6703
1/01/2018 13:50	0.587	0	0.5872
1/01/2018 14:00	0.526	0	0.526
1/01/2018 14:10	0.481	0	0.481
1/01/2018 14:20	0.448	0	0.4475
1/01/2018 14:30	0.423	0	0.4228
1/01/2018 14:40	0.408	0	0.4079
1/01/2018 14:50	0.396	0	0.3958
1/01/2018 15:00	0.387	0	0.3865
1/01/2018 15:10	0.376	0	0.376
1/01/2018 15:20	0.36	0	0.3599
1/01/2018 15:30	0.341	0	0.3405
1/01/2018 15:40	0.322	0	0.3218
1/01/2018 15:50	0.304	0	0.3042
1/01/2018 16:00	0.29	0	0.2899
1/01/2018 16:10	0.278	0	0.278
1/01/2018 16:20	0.267	0	0.2674
1/01/2018 16:30	0.258	0	0.2584
1/01/2018 16:40	0.251	0	0.251
1/01/2018 16:50	0.245	0	0.2446
1/01/2018 17:00	0.238	0	0.2381
1/01/2018 17:10	0.235	0	0.2347
1/01/2018 17:20	0.231	0	0.2314
1/01/2018 17:30	0.229	0	0.2289
1/01/2018 17:40	0.226	0	0.2258
1/01/2018 17:50	0.224	0	0.2238
1/01/2018 18:00	0.222	0	0.2224
1/01/2018 18:10	0.218	0	0.2182
1/01/2018 18:20	0.211	0	0.2113
1/01/2018 18:30	0.202	0	0.2019
1/01/2018 18:40	0.192	0	0.1921
1/01/2018 18:50	0.183	0	0.1827
1/01/2018 19:00	0.175	0	0.1751
1/01/2018 19:10	0.172	0	0.1723
1/01/2018 19:20	0.166	0	0.1659
1/01/2018 19:30	0.16	0	0.1596
1/01/2018 19:40	0.154	0	0.1536
1/01/2018 19:50	0.149	0	0.1493
1/01/2018 20:00	0.143	0	0.1433
1/01/2018 20:10	0.14	0	0.1403
1/01/2018 20:20	0.14	0	0.1401
1/01/2018 20:30	0.133	0	0.1326
1/01/2018 20:40	0.131	0	0.1311
1/01/2018 20:50	0.132	0	0.1319
1/01/2018 21:00	0.126	0	0.1263
1/01/2018 21:10	0.126	0	0.1255
1/01/2018 21:20	0.126	0	0.1261
1/01/2018 21:30	0.122	0	0.1216
1/01/2018 21:40	0.121	0	0.121
1/01/2018 21:50	0.122	0	0.1224
1/01/2018 22:00	0.118	0	0.1176
1/01/2018 22:10	0.118	0	0.1178
1/01/2018 22:20	0.119	0	0.1192
1/01/2018 22:30	0.116	0	0.1156
1/01/2018 22:40	0.116	0	0.1156
1/01/2018 22:50	0.117	0	0.1171
1/01/2018 23:00	0.114	0	0.1135
1/01/2018 23:10	0.114	0	0.1139
1/01/2018 23:20	0.116	0	0.1156



Te Ota (West) - Model Result Example



Te Ota (East) - Model Result Example



1% AEP MPD

Te Ota (East) Total

Max	1.47
Min	0.00
Average	0.31

Date	cu.m/sec	Date	cu.m/sec	Date	cu.m/sec	Date	cu.m/sec	Date	cu.m/sec	Date	cu.m/sec	Date	cu.m/sec
7/11/2018 0:00	07/11/2018 00:00:00 0.00003105	7/11/2018 7:40	07/11/2018 07:40:00 0.000713	7/11/2018 15:20	07/11/2018 15:20:00 1.344571	7/11/2018 23:00	07/11/2018 23:00:00 0.535366	8/11/2018 6:40	08/11/2018 06:40:00 0.22054	8/11/2018 14:20	08/11/2018 14:20:00 0.096093	8/11/2018 22:00	08/11/2018 22:00:00 0.058709
7/11/2018 0:05	07/11/2018 00:05:00 0.00002969	7/11/2018 7:45	07/11/2018 07:45:00 0.000779	7/11/2018 15:25	07/11/2018 15:25:00 1.332744	7/11/2018 23:05	07/11/2018 23:05:00 0.531418	8/11/2018 6:45	08/11/2018 06:45:00 0.218123	8/11/2018 14:25	08/11/2018 14:25:00 0.095414	8/11/2018 22:05	08/11/2018 22:05:00 0.058455
7/11/2018 0:10	07/11/2018 00:10:00 0.00002834	7/11/2018 7:50	07/11/2018 07:50:00 0.000846	7/11/2018 15:30	07/11/2018 15:30:00 1.320433	7/11/2018 23:10	07/11/2018 23:10:00 0.527538	8/11/2018 6:50	08/11/2018 06:50:00 0.215729	8/11/2018 14:30	08/11/2018 14:30:00 0.094742	8/11/2018 22:10	08/11/2018 22:10:00 0.058202
7/11/2018 0:15	07/11/2018 00:15:00 0.00002699	7/11/2018 7:55	07/11/2018 07:55:00 0.000916	7/11/2018 15:35	07/11/2018 15:35:00 1.307805	7/11/2018 23:15	07/11/2018 23:15:00 0.523723	8/11/2018 6:55	08/11/2018 06:55:00 0.21336	8/11/2018 14:35	08/11/2018 14:35:00 0.094078	8/11/2018 22:15	08/11/2018 22:15:00 0.057952
7/11/2018 0:20	07/11/2018 00:20:00 0.00002565	7/11/2018 8:00	07/11/2018 08:00:00 0.000987	7/11/2018 15:40	07/11/2018 15:40:00 1.294871	7/11/2018 23:20	07/11/2018 23:20:00 0.519975	8/11/2018 7:00	08/11/2018 07:00:00 0.211014	8/11/2018 14:40	08/11/2018 14:40:00 0.09342	8/11/2018 22:20	08/11/2018 22:20:00 0.057703
7/11/2018 0:25	07/11/2018 00:25:00 0.00002431	7/11/2018 8:05	07/11/2018 08:05:00 0.00106	7/11/2018 15:45	07/11/2018 15:45:00 1.281594	7/11/2018 23:25	07/11/2018 23:25:00 0.516291	8/11/2018 7:05	08/11/2018 07:05:00 0.208692	8/11/2018 14:45	08/11/2018 14:45:00 0.092769	8/11/2018 22:25	08/11/2018 22:25:00 0.057457
7/11/2018 0:30	07/11/2018 00:30:00 0.00002297	7/11/2018 8:10	07/11/2018 08:10:00 0.001135	7/11/2018 15:50	07/11/2018 15:50:00 1.268027	7/11/2018 23:30	07/11/2018 23:30:00 0.512671	8/11/2018 7:10	08/11/2018 07:10:00 0.206392	8/11/2018 14:50	08/11/2018 14:50:00 0.092125	8/11/2018 22:30	08/11/2018 22:30:00 0.057212
7/11/2018 0:35	07/11/2018 00:35:00 0.00002165	7/11/2018 8:15	07/11/2018 08:15:00 0.001212	7/11/2018 15:55	07/11/2018 15:55:00 1.254309	7/11/2018 23:35	07/11/2018 23:35:00 0.509282	8/11/2018 7:15	08/11/2018 07:15:00 0.204116	8/11/2018 14:55	08/11/2018 14:55:00 0.091488	8/11/2018 22:35	08/11/2018 22:35:00 0.05697
7/11/2018 0:40	07/11/2018 00:40:00 0.00002032	7/11/2018 8:20	07/11/2018 08:20:00 0.00129	7/11/2018 16:00	07/11/2018 16:00:00 1.240554	7/11/2018 23:40	07/11/2018 23:40:00 0.505954	8/11/2018 7:20	08/11/2018 07:20:00 0.201864	8/11/2018 15:00	08/11/2018 15:00:00 0.090857	8/11/2018 22:40	08/11/2018 22:40:00 0.056729
7/11/2018 0:45	07/11/2018 00:45:00 0.00001901	7/11/2018 8:25	07/11/2018 08:25:00 0.00137	7/11/2018 16:05	07/11/2018 16:05:00 1.226656	7/11/2018 23:45	07/11/2018 23:45:00 0.502681	8/11/2018 7:25	08/11/2018 07:25:00 0.199635	8/11/2018 15:05	08/11/2018 15:05:00 0.090234	8/11/2018 22:45	08/11/2018 22:45:00 0.05649
7/11/2018 0:50	07/11/2018 00:50:00 0.0000177	7/11/2018 8:30	07/11/2018 08:30:00 0.001452	7/11/2018 16:10	07/11/2018 16:10:00 1.212658	7/11/2018 23:50	07/11/2018 23:50:00 0.499462	8/11/2018 7:30	08/11/2018 07:30:00 0.19743	8/11/2018 15:10	08/11/2018 15:10:00 0.089616	8/11/2018 22:50	08/11/2018 22:50:00 0.056253
7/11/2018 0:55	07/11/2018 00:55:00 0.00001639	7/11/2018 8:35	07/11/2018 08:35:00 0.001535	7/11/2018 16:15	07/11/2018 16:15:00 1.1987	7/11/2018 23:55	07/11/2018 23:55:00 0.496297	8/11/2018 7:35	08/11/2018 07:35:00 0.19525	8/11/2018 15:15	08/11/2018 15:15:00 0.089005	8/11/2018 22:55	08/11/2018 22:55:00 0.056018
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10% AEP MPD

Te Ota (East)	Total
Max	0.44
Min	0.00
Average	0.15

Date	cu.m/sec	Date	cu.m/sec	Date	cu.m/sec	Date	cu.m/sec	Date	cu.m/sec	Date	cu.m/sec	Date	cu.m/sec	Date	cu.m/sec
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50% AEP MPD

Te Ota (East)	Total
Max	0.16
Min	0.00
Average	0.07

Date			cu.m/sec	Date			cu.m/sec	Date			cu.m/sec	Date			cu.m/sec	Date			cu.m/sec	Date			cu.m/sec
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Tonkin+Taylor

Job No: 1008263
7 December 2018

Hamilton City Council
Private Bag 3010
Hamilton 3240

Attention: Nathanael Savage

Dear Nathanael

Rotokauri North Development Area: Technical review of stream classifications

This report presents our independent assessment of the classification of the watercourses present on the Proposed Rotokauri North Development area located off Te Kowhai Rd, Hamilton. The report has been prepared for Hamilton City Council (HCC) as our client[1] with the intention that it will be made available to Green Seed Consultants Limited (GSCL) to assist with the preparation of a sub-catchment ICMP.

1 Introduction

We understand that GSCL is proposing to develop an area of land to the south of Te Kowhai Road, Hamilton as a Special Housing Area (SHA). The location of the site is shown on Figure 1 (Appendix A).

We understand that GSCL and HCC are seeking clarity on watercourse classifications under the Waikato Regional Plan (WRP) in order to progress stormwater and watercourse management options for the site. The purpose of this letter is to provide an assessment of site watercourse classification with respect to WRP definitions. The report does not assess the ecological values of site watercourses.

2 Methods

The methodology for this assessment has comprised:

- A site visit and walkover inspection of the watercourses at the site by a Principal T+T ecologist accompanied by Nathanael Savage of HCC and Mark Tollemache of Tollemache Consultants Ltd (GSCL's consultant planners). The walkover inspection covered two main tributary systems on site, an unnamed tributary of the Te Otamanui Stream and an unnamed tributary of the Ohote Stream. The site visit was undertaken on the morning of Wednesday 24 October 2018. Weather conditions were fine at the time of the site visit and there had been no rainfall recorded at the Ruakura rain gauge in the preceding 10 days (data from NIWA's CLiFlo website). The nearest rainfall event to the site visit was 11 days earlier with 14 and 10.8 mm recorded on 12 and 13 October 2018 respectively.

[1] The report has been prepared in accordance with our Instruction for Service agreement with HCC dated 17 September 2018 (PSP 18104).

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- A review of relevant data including available GIS maps on T+T files[2], the historic aerial photographs available on the Retrolens website and the preliminary hydrogeological report for the site[3].
- Consideration of the status of site watercourses based on the above and with respect to watercourse definitions in the WRP (see Appendix B).

3 Stream classification assessment

This section outlines our assessment of the status of the watercourses on site. We have provided brief overview information for site context, presented the key definitions relevant to the site and then addressed watercourse classifications separately for the unnamed tributaries of the Te Otamanui and Ohote Streams.

3.1 General site context

The Rotokauri ICMP ecology report provides good background on historic land use, topography and geology of the general area[2]. The site has rolling hills around the southern and eastern edges but is largely flat. The unnamed tributaries of the Ohote Stream on site largely fall within an area of historic fen wetland and this broadly coincides with organic soils (Figures 26 and 23 respectively in Kessels Ecology, 2016). We have provided Landcare Research's historical wetland layer on Figure 1, which is an indicative extent of likely wetland habitat prior to human modification.

The unnamed tributaries of the Te Otamanui stream drain allophanic soils the tributaries and drains are largely located outside of the approximate extent of historic fen wetland (refer Figure 1).

We encountered the owner of 350 Exelby Road (Michael Vickers) during the site walkover. He commented that his family had been farming in the area for the past 60 years and could remember his father and neighbours constructing several of the tributary drainage channels within the site. Apart from the main channel he could not recall there being any notable natural channels. Prior to the drains being dug they had significant ponding issues.

3.2 Key WRP definitions

WRP watercourse definitions relevant to stream classification in general are provided in Appendix B. The definitions for ephemeral streams, perennial streams, modified watercourse and artificial watercourse are most relevant to the site and this assessment. We note that based on WRP definitions "farm drain" is a type of artificial watercourse. We also note that wetlands have been historically present in the subject catchments but there is no guidance in the WRP on how to deal with modification to wetlands (i.e. if the drainage of wetlands with channels results in a modified or artificial watercourse). On the whole the drainage channels have been constructed for the purpose of draining the historic wetlands.

We understand from the preliminary hydrogeological report for the site that groundwater levels are generally near the ground surface and respond directly to rainfall. The site walkover for this assessment was in spring but followed a period of dry weather. There was a variable depth of water present in site watercourses, and for upper catchment zero order tributaries (watercourses not appearing on the 1:50,000 map series) this appeared to change with channel depth. Our view is that observed water levels in site watercourses at the time of the walkover reflected a combination of channel depth and groundwater levels.

[2] Figures supporting the Rotokauri ICMP Ecological Assessment, Kessels Ecology (2016). Consultancy project undertaken by Kessels Ecology for Hamilton City Council.
[3] Beca, 2018. RNDA ICMP: Desktop Review of Hydrogeological Conditions Influencing Stormwater Design rev2. Letter from Roy Nutsford to Nathanael Savage Dated 8 September 2018.

Most of the watercourses on site would likely flow (or hold water) for at least three months of the year between March and September. However, it is highly likely that the bulk of the zero order watercourses (most of the watercourses on site) dry out for a period during summer and are therefore ephemeral in nature. However, we assume that the ephemeral and perennial stream definitions follow the definition of a river (see Appendix B) and apply to streams and modified watercourses but not artificial watercourses. Most of the watercourses on site are more consistent with the definition of artificial watercourse (see later), so the ephemeral / perennial definitions may be irrelevant.

None of the watercourses on site are completely unmodified. The most relevant watercourse definitions to this assessment are therefore "modified watercourse" vs "artificial watercourse". The key difference between the two definitions is the presence of "natural portions" or "channels". According to the definitions a modified watercourse has a "natural channel" at its headwaters whereas an artificial watercourse has "no natural portions" from its confluence with a river or stream to its headwaters. We address watercourse classifications for the unnamed tributary of Te Otamanui Stream and the unnamed tributary of the Ohote Stream in the following sections.

3.3 Unnamed tributary of Te Otamanui Stream

The unnamed tributary of Te Otamanui Stream comprises a network of managed channels within an agricultural setting and all of the watercourses on site are straightened. The watercourse network is shown on Figure 1, including the labels we have provided for each of the tributaries as referred to below. We have reviewed the historic aerial photography available on the Retrolens website to assist in determining which of the watercourses on site are artificial vs modified. Photographs date back to 1952 and are provided in Appendix C.

The aerial photograph from 1952 shows a straightened channel network is present, although with slightly different alignments to the present situation. At this time some channel locations appear to be consistent with the current network while others have since been filled or constructed. The main stem (TM) and tributaries T4, T5 and T6 appear to be present. A wetland area appears to be present in the uppermost headwaters but there is no obvious surface stream linking to the main stem. Photographs from 1963 show a similar drainage pattern but with the wetland area reduced in size, and subsequently completely gone by 1974. A similar pattern is shown in 1979. Tributaries T1, T2 and T3 appear to have been constructed post 1979.

In its current state the entire network is arguably "artificial watercourse" given there are no natural portions or channels from headwaters to the confluence with a river or stream. However, it is highly likely there would have been a stream drainage feature from this area prior development of the land for agriculture. Only the main stem is likely to be in the vicinity of any original watercourse alignment with any certainty and our view is that the lower portion of this would be appropriately classified as "modified watercourse". This upstream extent of the section of "modified watercourse" is arbitrary other than it is the likely upstream extent of perennial flow. The remainder of the watercourses within the Te Otamanui Stream catchment within the site in our view are artificial. Our assessment of watercourse classifications is summarised in Table 3.1 and presented on Figure 1.

Table 3.1: Classification of the unnamed tributaries of Te Otamanui Stream against WRP definitions

Stream reach	Watercourse classification	Reasoning
TM (lower)	Modified watercourse	Likely to be in the vicinity of an original stream feature.
T1	Artificial watercourse	No natural portions or channel sections. Likely constructed post 1979.

Stream reach	Watercourse classification	Reasoning
T2	Artificial watercourse	No natural portions or channel sections. Likely constructed post 1979.
T3	Artificial watercourse	No natural portions or channel sections. Likely constructed post 1979.
T4	Artificial watercourse	No natural portions or channel sections.
T5	Artificial watercourse	No natural portions or channel sections.
T6	Artificial watercourse	No natural portions or channel sections.

3.4 Unnamed tributary of Ohote Stream

The unnamed tributary of Ohote Stream also comprises a network of managed channels within an agricultural setting. All of the watercourses are straightened other than a 200 m long reach of the main stem at the downstream end of the site, although this also appears to have a modified channel (deepened). The watercourse network is shown on Figure 1.

Aerial photographs for the site date back to 1952. Similar to the unnamed tributary of the Te Otamanui Stream, the aerial photograph from 1952 shows a straightened channel network is present with the most channels in the current alignment. An extensive wetland area is present in the uppermost headwaters in the vicinity of tributaries O5 and O6 (refer Figure 1). By 1963 the headwater wetland feature has been cleared and drains have been installed in the current alignment. Some changes to the minor channel network appear to have occurred, particularly with channels that appear to cross catchment boundaries.

In our view the lower reach of the main stem would be appropriately classified as “modified watercourse”. This is on the basis that the most downstream section follows the natural topography and that a stream would have been present historically in the vicinity of the main channel. The upstream extent of the section of “modified watercourse” is arbitrary other than it is the likely upstream extent of perennial flow. The remainder of the watercourses on site in our view are artificial and constructed for land drainage purposes. Our assessment of watercourse classifications is summarised in Table 3.2 and presented on Figure 1.

Table 3.2: Classification of the unnamed tributaries of Ohote Stream against WRP definitions

Stream reach	Our view on stream classification	Reasoning
OM (lower)	Modified watercourse	Alignment follows natural topography in lower reach with straightened reach likely in the vicinity of an original stream feature.
OM (upper)	Artificial watercourse	No natural portions or channel sections.
O1	Artificial watercourse	No natural portions or channel sections.
O2	Artificial watercourse	No natural portions or channel sections.
O3	Artificial watercourse	No natural portions or channel sections.
O4	Artificial watercourse	No natural portions or channel sections.
O5	Artificial watercourse	No natural portions or channel sections.
O6	Artificial watercourse	No natural portions or channel sections.

4 Conclusion

We have made an assessment of watercourse status for the Rotokauri North Development site on the basis of a desktop review, a site walkover and in regard to the definitions in the WRP. In our view

the majority of the watercourses on site are consistent with the WRP definition for an “artificial watercourse”. In our view the appropriate classification for the lower reaches of the unnamed tributaries of Te Otamanui and Ohote Streams on site is “modified watercourse” as shown on Figure 1.

5 Applicability

This report has been prepared for the exclusive use of our client Hamilton City Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:	Authorised for Tonkin & Taylor Ltd by:
.....	.....
Dean Miller	Peter Cochrane
Principal Freshwater Ecologist	Project Director

Technical review completed by Justine Quinn, Senior Freshwater Ecologist

DCM
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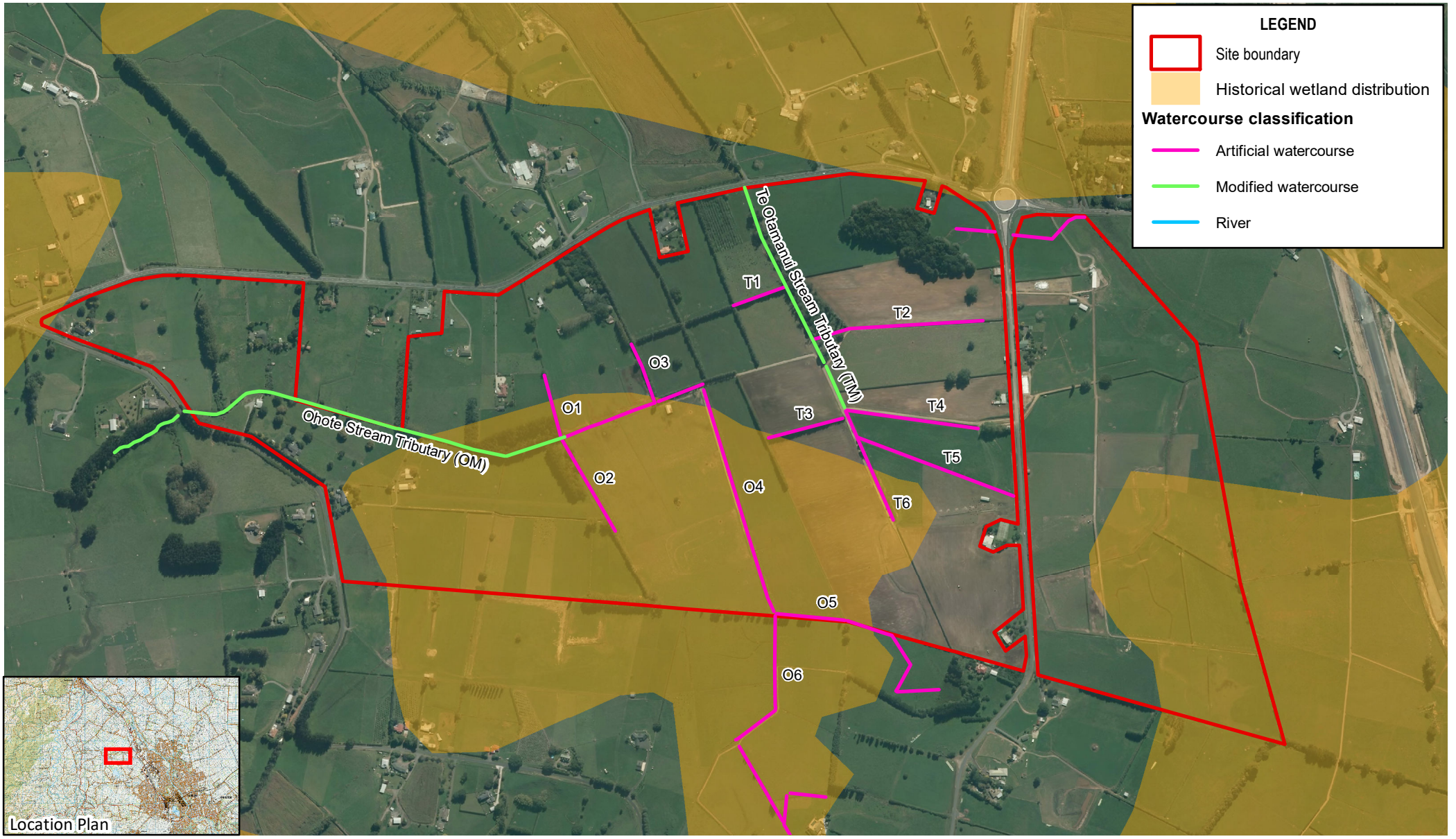
Appendix A: Figure

- **Figure 1: Rotokauri North Streams Watercourse Classification**



Notes: Aerial photography obtained from Waikato Regional Council (WRAPS 2012), Creative Commons BY 4.0
Coordinate Datum: New Zealand Transverse Mercator (NZTM)
Historical wetland distribution data obtained from Ministry for the Environment, Creative Commons 3.0

0 0.08 0.16 0.24 0.32 (km)

A4 SCALE 1:10,000

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DRAWN	ADPU	Oct.18
CHECKED	DCM	Dec.18
APPROVED	PRC	Dec.18

ARCFILE
Rotokauri north stream_ADPU.mxd

SCALE (AT A4 SIZE)
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PROJECT No.
1008263.3000

HAMILTON CITY COUNCIL
Rotokauri North Streams
Watercourse Classification

FIGURE No. Figure 1.

Rev. 1

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Appendix B: Waikato Regional Plan Definitions

Waikato Regional Plan – Glossary of Terms

Term	Definition
Ephemeral streams	Streams that flow continuously for at least three months between March and September but do not flow all year.
Perennial streams	A stream that flows all year round assuming average annual rainfall.
River	A continually or intermittently flowing body of fresh water, and includes a stream and modified watercourse; but does not include any artificial watercourse (including an irrigation canal, water supply race, canal for the supply of water for electricity power generation, and farm drainage canal).
Modified watercourse	An artificial or modified channel that may or may not be on the original watercourse alignment and which has a natural channel at its headwaters.
Artificial watercourse	A watercourse that contains no natural portions from its confluence with a river or stream to its headwaters and includes irrigation canals, water supply races, canals for the supply of water for electricity power generation and farm drainage canals.
Farm drainage canal	An artificial watercourse on a farm that contains no natural portions from its confluence with a river or stream to its headwaters, and includes a farm drain or a farm canal.

Appendix C: Historic Aerial Photographs



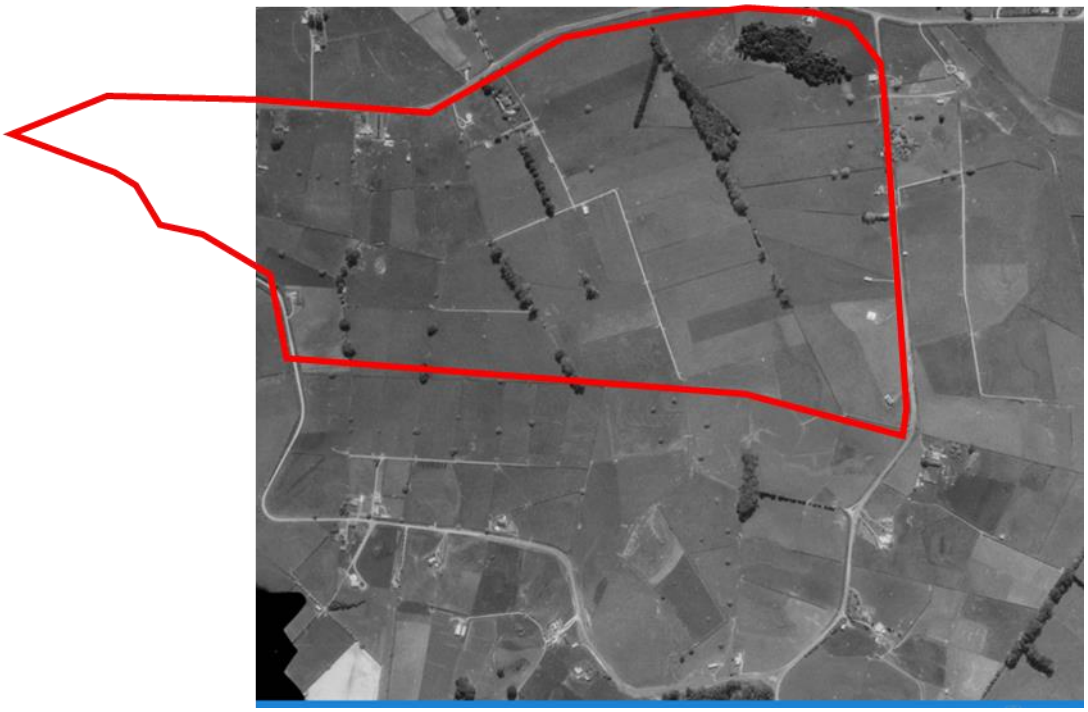
Aerial photograph SN525 / 2, dated 26 September 1952. Sourced from Retrolens and licensed by LINZ



Aerial photograph 3280 / 16, dated 13 February 1963. Sourced from Retrolens and licensed by LINZ



Aerial photograph SN3730 / 7, dated 13 September 1974. Sourced from Retrolens and licensed by LINZ



Aerial photograph SN5479 / 17, dated 27 September 1979. Sourced from Retrolens and licensed by LINZ

MORPHUM ENVIRONMENTAL LTD

Engineers & Consultants

Receiving Environment and Rapid Erosion Assessment

Rotokauri North Sub-Catchment

Draft

Prepared for Hamilton City Council by Morphum Environmental Ltd
September 2018



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Executive Summary

Morphum Environmental Ltd (Morphum) was engaged by Hamilton City Council (HCC) to undertake a watercourse assessment of the Rotokauri North sub-catchment and its receiving environments of the Te Otamanui Tributary and Ohote Stream, as outlined in Figure 1. The watercourses were assessed using two sets of HCC guidance 'modules'; the Receiving Environment Module (REM) and the Rapid Geomorphic Erosion Assessment (RGEA), developed by Morphum for HCC. All interpretation of data should be used in conjunction with these documents. Overall, 10 km of watercourse was assessed in July and August 2018, including 107 stormwater inlet and outlet structures.

The aim of this watercourse assessment was to collect baseline information on the channel morphology, riparian vegetation, ecological condition and erosion susceptibility within the sub-catchment and its receiving environments. This information is intended to be used to assist in determining the potential effects for increased volumes and flows from the Rotokauri North sub-catchment and the proposed diversion from part of the Mangaheka catchment to the Te Otamanui tributary.

This report summaries these findings and proposes erosion mitigation projects with associated approximate costs. The report also highlights enhancement opportunities within the sub-catchment and the receiving environments to improve the amenity, conveyance and ecological values of these watercourses, along with recommended options for managing the effects of existing and future issues and pressures.

The Rotokauri North sub-catchment is a relatively small catchment (~180 hectares), situated at the Northern extent of the larger Rotokauri catchment (~788 hectares). The Rotokauri North Development Area (RNDA) encompasses a total area of 163 hectares. The proposed development includes a new special housing area, with a public school and major roads. The development of this area will see a shift in land use from a predominately rural landscape to a suburban setting. An overview of the RNDA and scoped watercourses for this assessment report is provided in Figure 1.

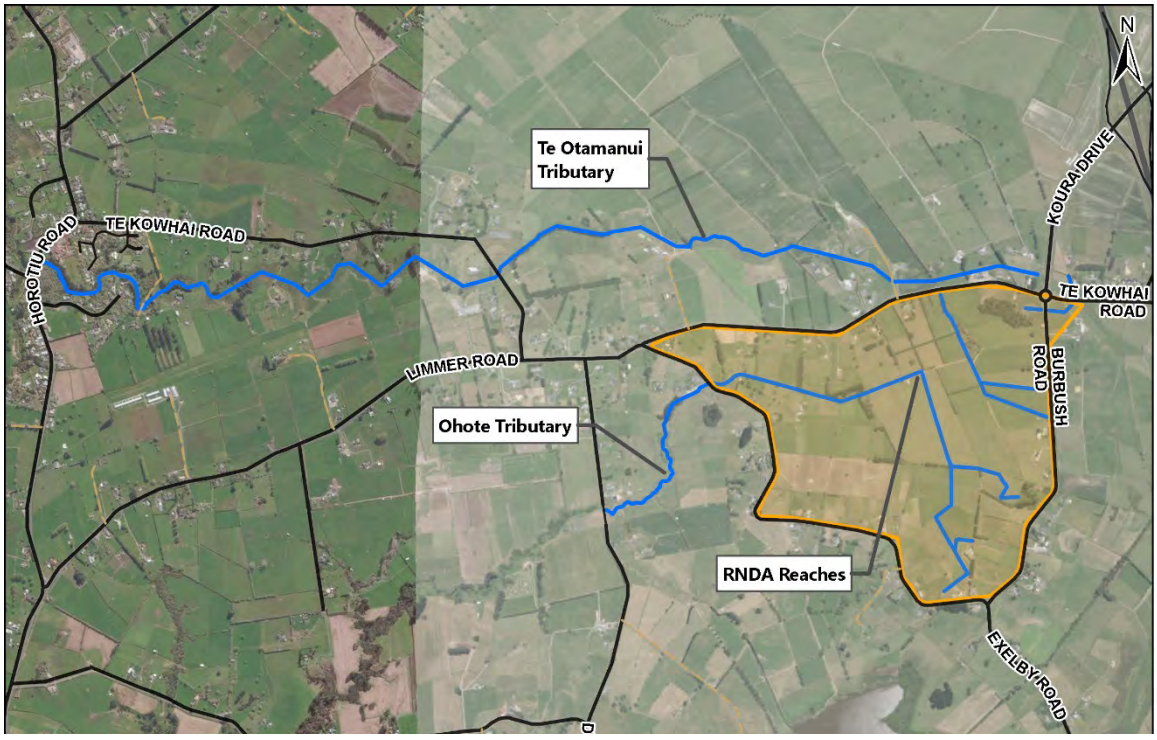

Figure 1: Overview of the Rotokauri North Development Area

The sub-catchment has four receiving environments; Mangaheka to the North, Ohote and Te Otamanui to the West, and Lake Rotokauri to the South. The watercourses within the Rotokauri North Development Area (RNDA) drain to each of these receiving environments.

The majority of the watercourses within the surveyed extent are located within agricultural pastoral land, with small areas of rural residential land use. These agricultural streams have little to no native woody riparian vegetation and direct stock access to the stream channel is common with damage from stock, such as pugging of banks, evident along many reaches. Modifications of the watercourses such as straightening, deepening and diversion of flows were recorded throughout the surveyed extent. In addition, an extensive farm drainage network exists in the Rotokauri North sub-catchment, assessment of which was not within the scope of this watercourse assessment. It is noted that HCC have engaged independent consultation on the classification of watercourses within the RNDA. Where this classification differs from that outlined in Appendix 2, we would advocate that HCC are best placed to define the interpretation to be carried forward. This will require communication with WRC so that they can provide their position on this issue.

Surveys for black mudfish were conducted at 4 sites, while sediment and water quality were conducted at five sites within the surveyed extent. No black mudfish were recorded at the sample sites. Water quality results indicate poor water quality, with five measured parameters – including nitrogen and phosphorus exceeding Australian and New Zealand Environment and Conservation Council (ANZECC) trigger values. Sediment quality was indicative of agricultural land use, with high concentrations of arsenic at one site, but relatively low concentrations of heavy metals such as zinc and lead across the sampled sites. Guidelines proposed in the National Policy Statement for Freshwater Management (NPS-FM), ANZECC and supporting Waikato Regional Council (WRC) documents suggest that the watercourses in the Rotokauri North Sub-Catchment and the receiving environments are degraded, and therefore should be enhanced through development where possible.

Existing erosion and bank instability issues in the Rotokauri North sub-catchment and its receiving environments are primarily driven by a lack of riparian vegetation, straightened channels with steep banks, and stock damage. The RGEA methodology identified nine 'unstable' reaches and two 'moderately unstable' reaches. A total of six erosion hotspots were observed in the sub-catchment, all located in the receiving environments of the RNDA.

The proposed management approach presented in this report aims to anticipate and plan for the increase in conveyance demands on stream systems. The management approach identifies key issues, objectives to address these issues, and options and actions to mitigate the actual and potential adverse effects associated with these issues. The broad management objectives outlined in this report align with the outcomes sought by the Stormwater Master Plan (HCC, 2016), the Rotokauri ICMP (2017), the Waikato vision and strategy document (2011), the NPS-FM (2016) and the Proposed Waikato Regional Plan Change (2018).

Fourteen erosion mitigation projects have been identified along the receiving watercourses of Rotokauri North sub-catchment and the receiving environments. Erosion remediation within the RNDA has not been included as part of this assessment, as it is anticipated that the developer will address any existing issues as part of the planned development. The erosion mitigation projects are comprised of four broad types; grade control, bank batter, erosion planting and toe protection. These engineered approaches aim to remediate existing erosion issues and mitigate further increases in erosion due to increased runoff within the catchment.

The mitigation projects identified in this assessment arise from existing issues that have the potential to be exacerbated by changes in the contributing catchment. It should not be inferred that the costs of these projects would be borne entirely by upstream greenfield growth areas. A further process of

assessing the contributing catchment, and existing and proposed on-site mitigation is necessary to consider a fair and reasonable allocation of costs between existing contributors and growth areas.

The total estimated cost, including contingency, of the physical works for the proposed erosion mitigation projects is approximately $2.5 Million. Unit costs rates are applied to represent high-level estimates of physical works only.

Five enhancement opportunity projects have been proposed within the Rotokauri North sub-catchment and the receiving watercourses. These projects highlight opportunities for the developer and Hamilton City Council to increase the amenity and ecological value of the watercourses, and improving resilience to land use changes in the future. The total estimated cost of the enhancement projects is approximately $1.2 Million.

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1.0 Introduction

1.1 Overview

The purpose of this watercourse assessment report is to collect baseline data on the ecological and physical attributes of the watercourses in the Rotokauri North sub-catchment and receiving environments, outlined in Figure 1. A specific objective of this watercourse assessment was to identify existing erosion issues and assess the potential effects of increased volumes and flows from the Rotokauri North sub-catchment and the proposed diversion from part of the Mangaheka catchment to the Te Otamanui tributary. In addition, the report recommends erosion mitigation projects and enhancement opportunities for managing existing and potential future erosion issues.

The watercourses that were assessed can be broken into three categories; reaches within the Rotokauri North Development Area (RNDA), reaches along the Ohote Stream tributary and reaches along the Te Otamanui Stream tributary, the latter two of which are downstream of the development area.

Assessing the watercourses within the greenfields development area (RNDA) has identified watercourses, indigenous vegetation and habitats that are recommended to be safeguarded and enhanced. Assessment of the Ohote Stream and Te Otamanui Stream tributaries has identified reaches that may be susceptible to the effects of urban development within the upstream greenfields catchment area.

1.2 Scope

Morphum Environmental Ltd (Morphum) was engaged by Hamilton City Council (HCC) to undertake a watercourse assessment of the Rotokauri North sub-catchment and its receiving environments.

The scope of works within the Rotokauri North sub-catchment and its receiving environments includes the following:

Field assessment of 10 km of open watercourse in accordance with ICMP Receiving Environment Module (HCC, 2011)

- Field assessment of 10 km of open watercourse using the updated HCC Rapid Geomorphic Erosion Assessment Methodology (HCC, 2018)
- Black Mudfish surveys at four sites[1]
- Sediment and water quality at five sites
- Macroinvertebrate sampling at five sites
- High-level identification of habitable and non-habitable buildings at risk of flooding from increased flows
- The development of a programme of works to manage existing issues and mitigate future erosion issues (concept level with high level costing)
- Selection and development of enhancement opportunities and potential management options and actions.

A literature review of available information and datasets in the catchment was outside the scope of this report. However, a comprehensive review has previously been conducted as part of the Rotokauri Integrated Catchment Management Plan (ICMP) (HCC, 2017). The outputs from the literature review

[1] Initial scope included black mudfish sampling at five sites. The variation in the number of sites reflects the absence of suitable habitats in the survey area.

include a number of technical investigations and assessments being undertaken to support the ICMP. These are outlined in Table 1.

Table 1: ICMP technical investigations and assessment documents

Document Author and Title	TRIM Reference
AECOM, 2016. Rotokauri ICMP - Major Drainage: Options Report	D-2230265
AECOM, 2016. Rotokauri ICMP - Major Drainage: Preferred Option & Stormwater Management Solution Report	D-2230077
AECOM, 2016. Rotokauri ICMP – Three Waters Infrastructure: Integration Report	D-2238224
CH2M Beca, 2016. Rotokauri: Hydrogeological Interpretive Report to Support ICMP	D-2230274
CH2M Beca, 2015. Rotokauri - Additional Hydrogeological Investigations (Factual Report	D-2006869
Kessels Ecology, 2016. Rotokauri ICMP – Ecological Assessment and Inputs	D-2230270
Opus, 2015. Pukete Reservoir Bulk Water Main – Conceptual Design Report	D-1969497
Morphum Environmental Ltd, 2016. Rotokauri Erosion Susceptibility Assessment	D-2230277
Morphum Environmental Ltd, 2016. Rotokauri ICMP - Water Quality Treatment Concept Development Report	D-2200277
Mott MacDonald, 2015. Rotokauri Water Supply Capacity Assessment	D-2172097
Streamlined Environmental Ltd, 2015. Rotokauri ICMP - Broad Scale Water Quality Assessment	D-1998549

The extent of the watercourse assessment was defined by Morphum Environmental and agreed with the Hamilton City Council prior to the assessment survey being conducted. It should be noted that an extensive farm drainage network exists in the Rotokauri North sub-catchment, which was not part of this assessment scope. In some instances, these additional watercourses were recorded, but not assessed. The extent of the watercourse assessed is summarised in the catchment overview map in Figure 1.

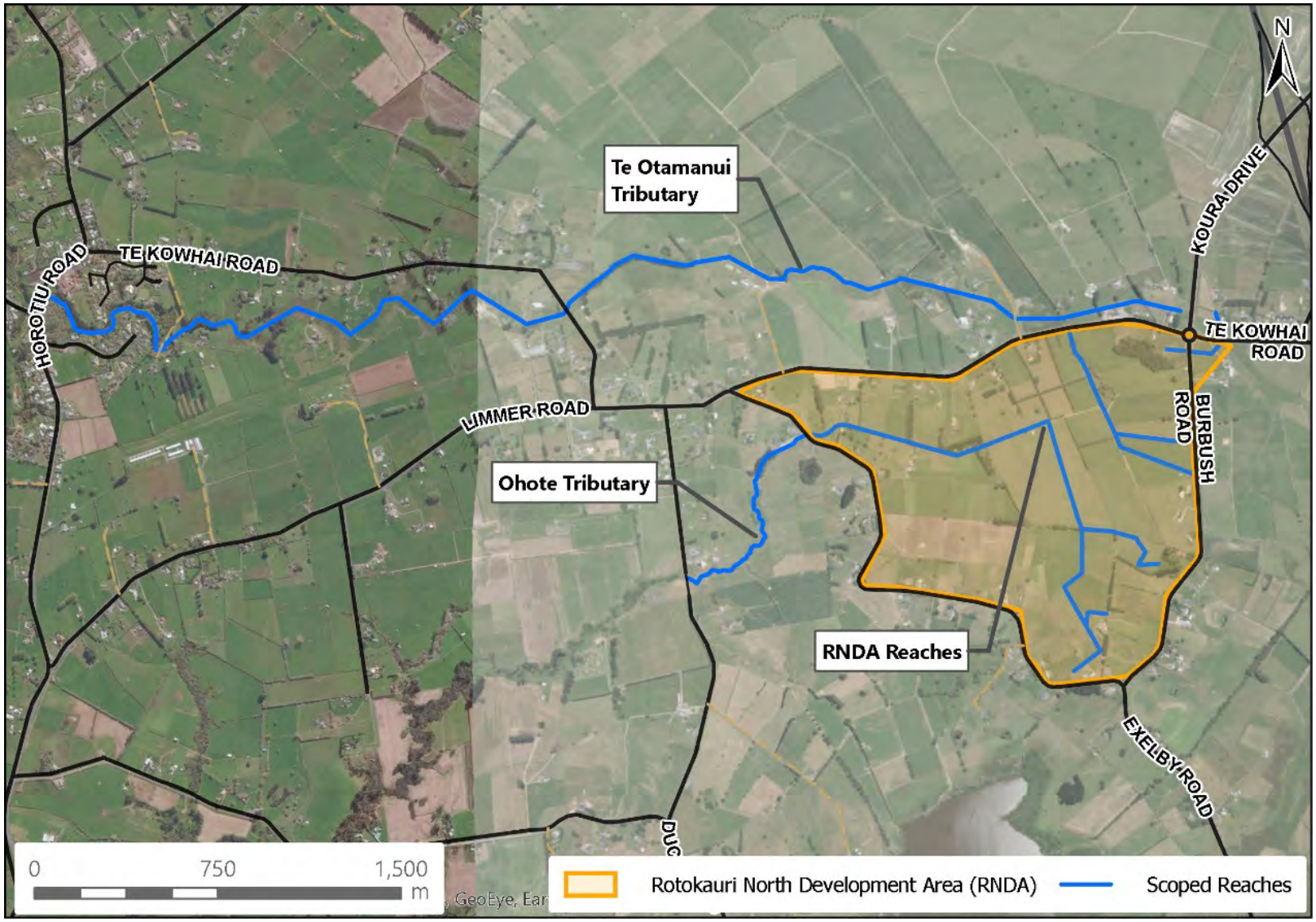


Figure 2: Watercourses scoped for assessment

1.3 Reach Naming Convention

The document provides references to each stream reach using a tributary code. The boundaries of each stream reach or 'ecoline' are defined by factors such as riparian cover, topography and channel morphology, as described in the Receiving Environment Module (REM). The numbering convention of the tributary codes is based on the number of tributaries entering the main stem of the network. For example:

- TEO_MAIN_1 is the 1st downstream reach of the main channel in the Te Otamanui Tributary
- OHO_TRIB1_5 is the 5th reach of the first tributary (heading upstream) of the Ohote Stream

The tributary codes are displayed against each reach as depicted in Figure 2 and on maps provided as Appendices.

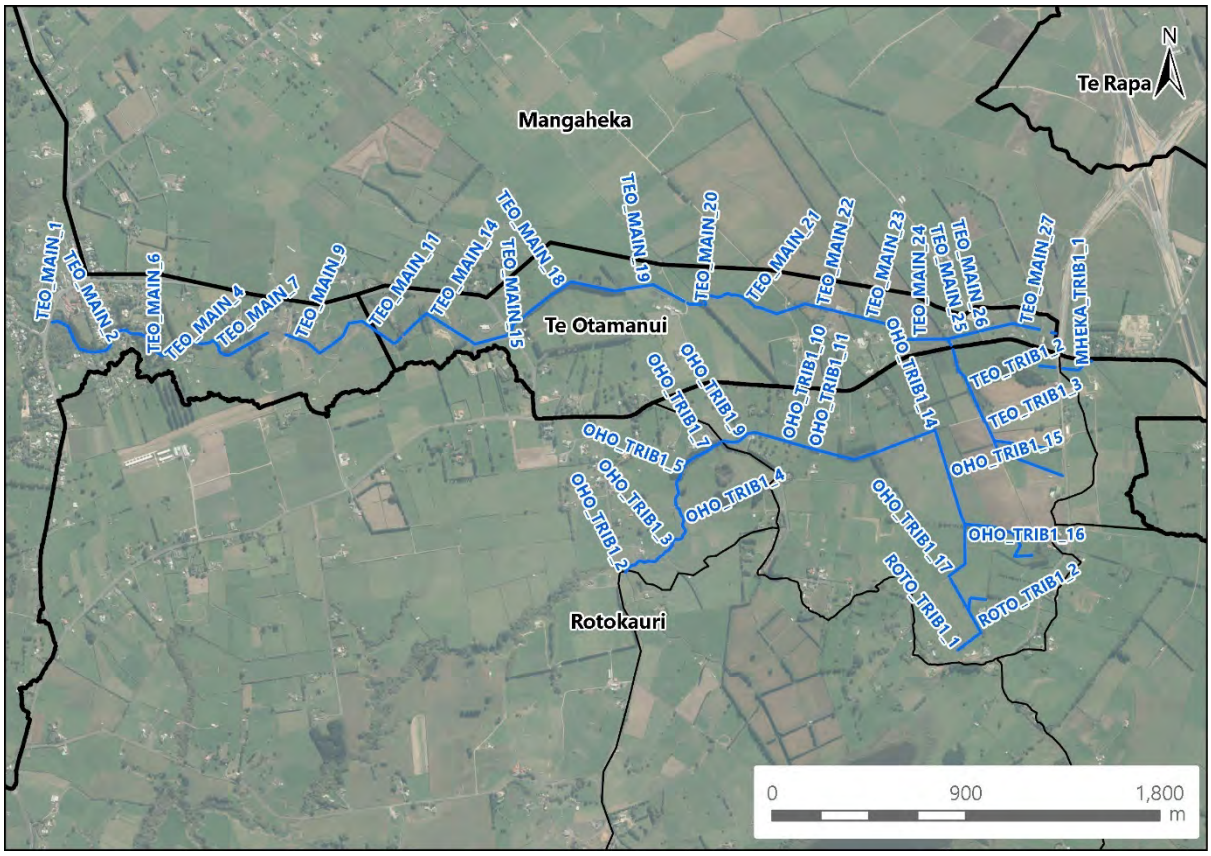


Figure 3: Reach naming convention

2.0 Catchment Overview

2.1 Catchment Location and Drainage

The Rotokauri North sub-catchment is a small, predominantly pasture and arable greenfields catchment, of approximately 180 hectares, at the northern extent of the wider 788 hectares Rotokauri catchment. The Rotokauri North sub-catchment incorporates the Rotokauri North Development Area (RNDA) and is located in the north-western area of Hamilton City. The Rotokauri South Development Area, also part of the Rotokauri ICMP, (RSDA) consists of three main sub-catchments; Waiwhakareke, Central Development Area and the Lake Rotokauri Development Area which were not assessed as part of this investigation.

The RNDA has four drainage points; the Exelby Road northern culvert, the Te Kowhai Road culvert, the Burbush Road Culvert and Exelby Road southern culvert.

- Exelby Road northern culvert primarily drains from east to west via a culvert under Exelby Road, where it continues to a confluence with the Ohote Stream at Duck Road. The Ohote Stream receives flows from the wider Rotokauri Catchment.
- Te Kowhai Road culvert flows north, under Te Kowhai Road, into a tributary of the Te Otamanui stream within the Te Otamanui Catchment.
- Burbush Road culvert drains north out of the north eastern extent of the RNDA and into the Mangaheka drain at the head of the of the Mangaheka catchment.
- Exelby Road southern culvert flows south under Exelby Road and into Lake Rotokauri however, this is a much smaller outlet and may primarily be active during high flows.

2.2 Land Use

2.2.1 Historic Land Use

The Te Reo name 'Rotokauri' translates to mean 'Lake of Kauri Trees', with the Lake gaining its name following the discovery of ancient buried kauri logs that were found in the bed of the lake. The historic landscape was typified by two predominant land types; rolling hills and ranges densely forested with kauri (*Agathis australis*), totara (*Podocarpus totara*), tawa (*Beilschmiedia tawa*), matai (*Prumnopitys taxifolia*) and miro (*Prumnopitys ferruginea*) whereas, the forests of the peat swamps and plains in areas such as the RNDA, were dominated by kahikatea (*Dacrycarpus dacrydioides*), titoki (*Alectryon excelsus*), raupo (*Typha* Spp.) and harakeke (*Phormium tenax*).

Within the RNDA area, a majority of the landscape was part of a large fen wetland; a type of wetland that is usually fed by mineral-rich surface water or groundwater. Fen wetlands are typically dominated by grasses, sedges and sphagnum mosses and appear on slopes, flats or depressions where surface water and ground water accumulate. Historical fen wetlands have typically been drained in the Waikato to accommodate agricultural land use, through the development of farm drains that disrupt and re-direct natural flow regimes.

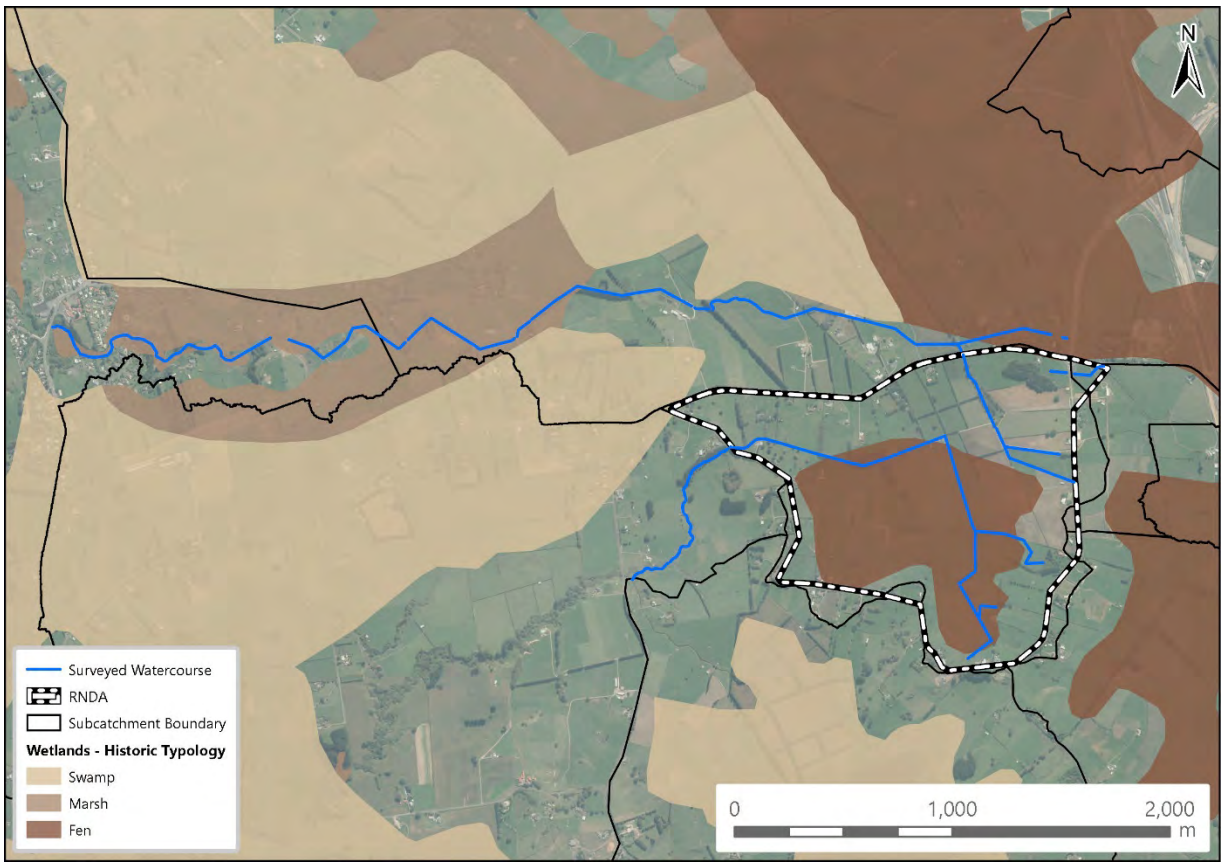


Figure 4: Historic Fen wetland within RNDA and receiving environments of Ohote Stream and Te Otamanui Tributary

2.2.2 Current Land Use

The Rotokauri North sub-catchment land use is currently entirely rural, 97.4% of land classified as high producing exotic grassland, 1.6% classified as exotic forest and the remaining 1.0% classified as indigenous forest as per the Land Cover Database (version 4.1) as depicted in Figure 4. The grasslands are used for a mixture of dairy grazing, recreation grazing and some arable cropping.

2.2.3 Future Land Use

The sub-catchment is zoned as 'future urban' under the HCC Operative Plan with land use currently being primarily 'high producing exotic grassland' (New Zealand Land Cover Database v4, 2017). The Rotokauri Structure Plan proposes a mixture of residential and open space zoning (Figure 4). Developing rural land to residential will increase the impervious areas within the sub-catchment and alter the run-off characteristics during storm events. As part of the Rotokauri ICMP, a network of multi-functional 'Green Corridors' have been planned throughout the Rotokauri structure plan area to manage stormwater flows, whilst also adding landscape and amenity values to the future urban areas.

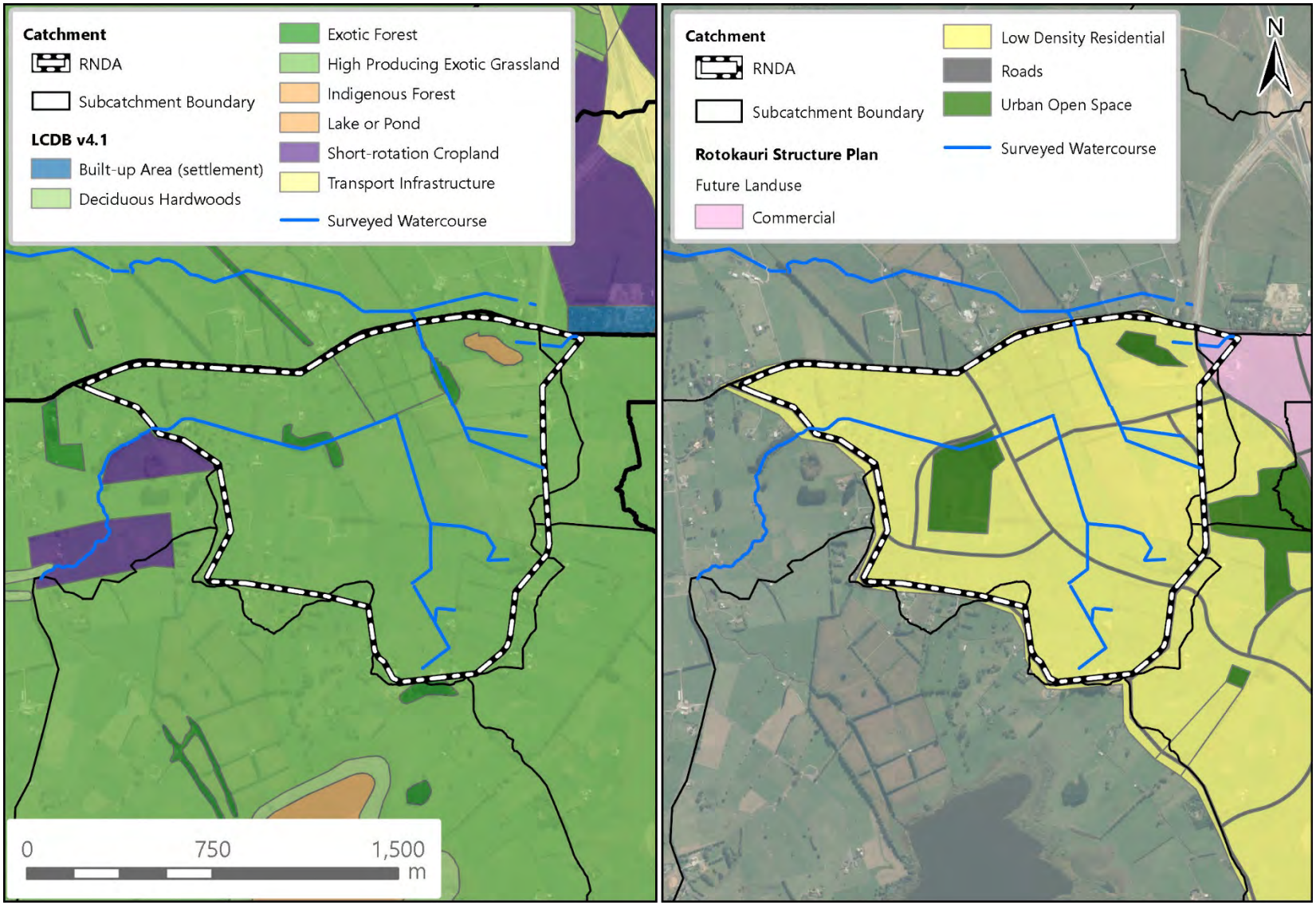


Figure 5: Present and proposed future land use in the RNDA (New Zealand Land Cover Database, 2017; Proposed District Plan – Structure Plan, 2016)

2.3 Catchment Topography

Topography varies from rolling hills along the south eastern boundary to exceptionally flat for a majority of the catchment (Figure 5). The extremely shallow gradient within the RNDA results in shallow watercourse grade and large bodies of standing water during the winter months.

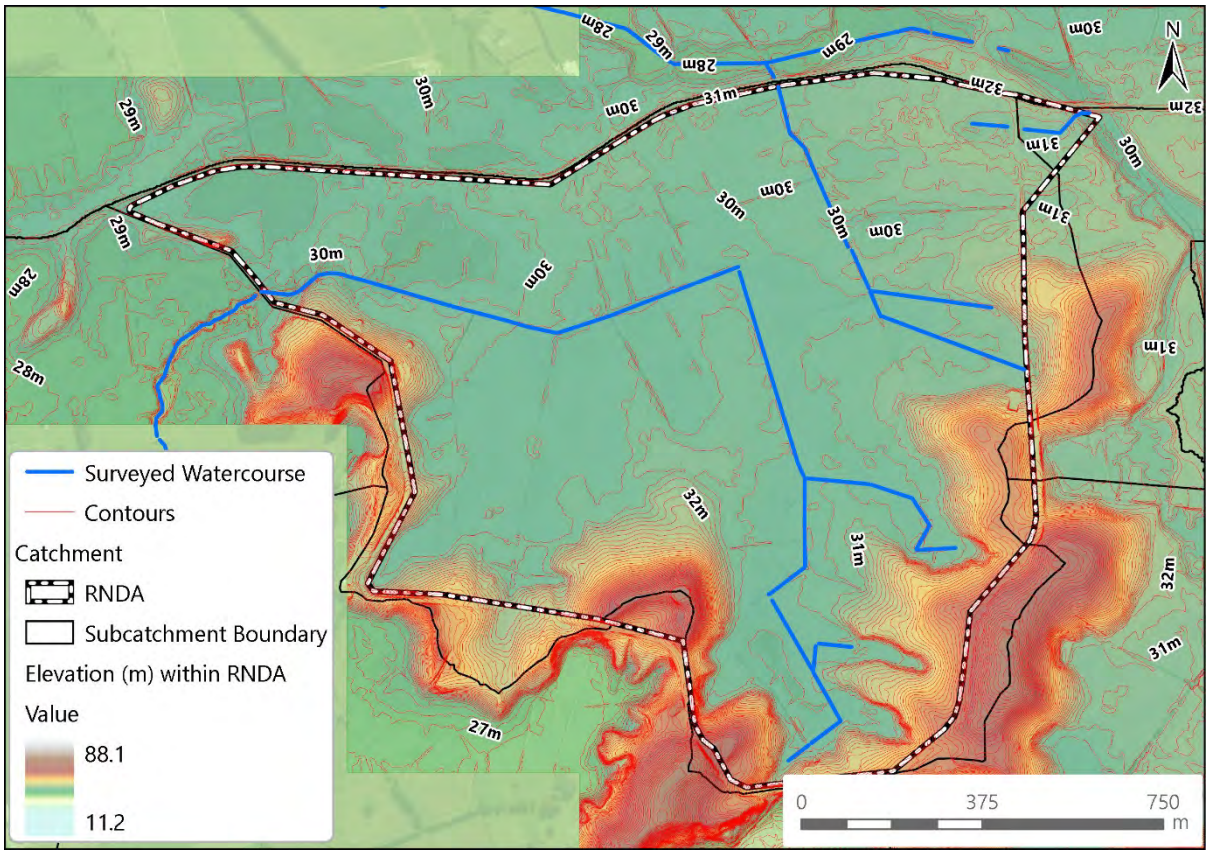


Figure 6: Rotokauri North sub-catchment topography based on 2008 LiDAR

2.4 Catchment Geology

Landcare Research's existing soil database (smap) classifies the dominant soil type within the RNDA as Allophanic and Organic (Figure 5). Allophanic soils are dominated by allophane minerals, sand and silt and are very porous with low density structure and weak cohesive strength. Erosion rates are generally low when soils are vegetated and not on steep slopes. Within the Te Otamanui catchment, the watercourse follows a vein of top soils depicted as recent soils. These recent soils are weakly developed soils that are common along alluvial floodplains as well as unstable steep slopes.

The allophanic soils here are part of the Te Rapa series, described as 'peaty sand', and the Horotui series which is predominately silty sand. The recent soils within the Te Otamanui catchment are also part of the Horotui series. The organic soils form in the partly decomposed remains of the historic fen wetland plants that has now formed as peat. Organic soils have little bearing strength and are prone to shrinkage when dried. The organic soils within the RNDA are part of the Kaipaki series and are usually described as 'loamy peat'. The Brown soil types present in the catchment are part of the Rotokauri series and are identified as 'clay loam' while the Gley soils are part of the Te Kowhai series and are a 'silt and clay loam'.

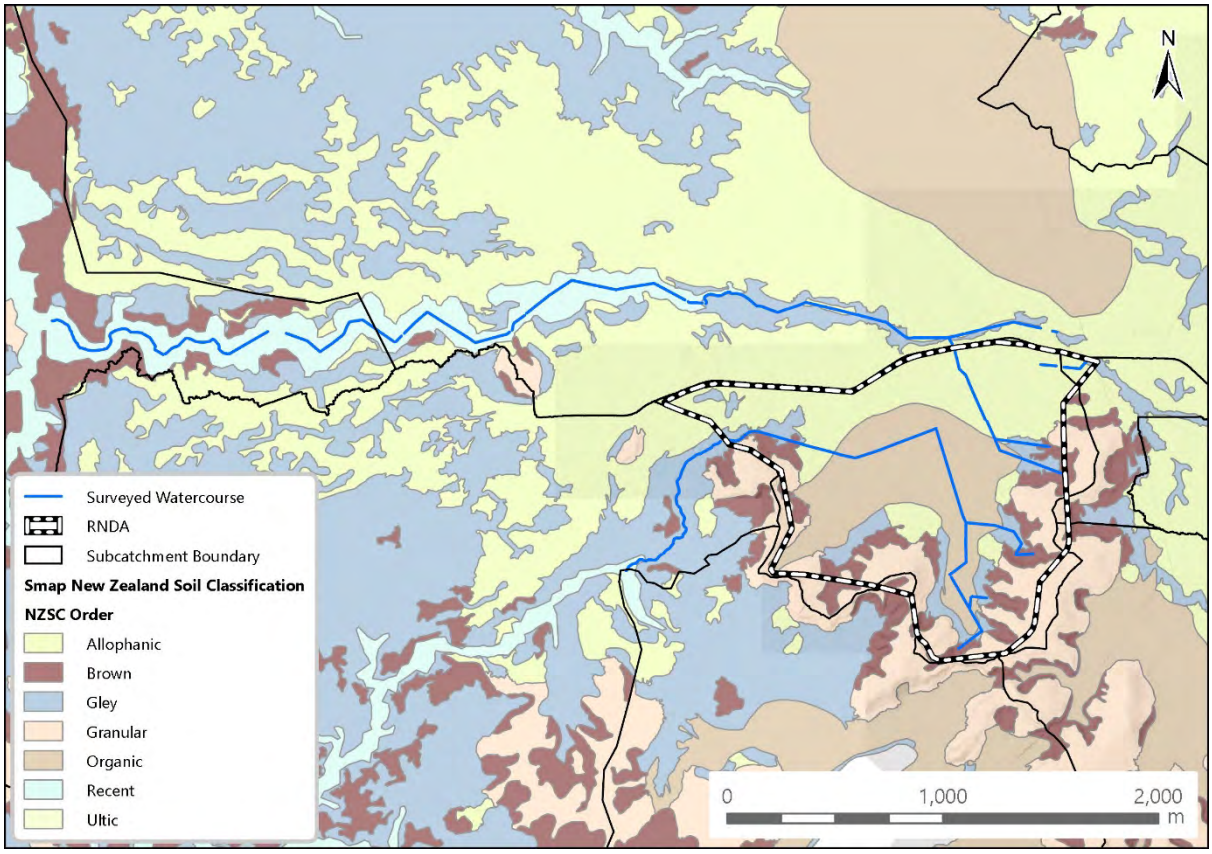


Figure 7: Soil series of the RNDA sub-catchment and receiving environments (source, smap - Landcare Research)

3.0 Methodology

The watercourses in the Rotokauri North sub-catchment and the receiving environments were assessed using two sets of method guidance 'modules'; the Receiving Environment Module (REM) and the Rapid Geomorphic Erosion Assessment (RGEA). The methodology used in this report aims to standardise data collection, modelling, data presentation, and reporting for all future HCC watercourse assessments.

3.1 Receiving Environment Assessment Methodology

The ICMP-REM was developed by Morphum Environmental for Hamilton City Council (HCC, 2015). All interpretation of the data from this report should be used in conjunction with the ICMP REM document. The Waikato Regional Council Plan (WRCP) classifications were used to define watercourse types (Table 2) and watercourse classification (Table 3).

Table 2: WRCP watercourse types

Watercourse type	Definition
River	A stream or modified watercourse that does not include any artificial watercourse
Modified watercourse	An artificial or modified channel that may or may not be on the original watercourse and which has a natural channel at its headwaters.
Farm drainage canal	An artificial watercourse on a farm that contains no natural portions from its confluence with a river or stream to its headwaters and includes a farm drain or a farm canal.

Table 3: WRCP watercourse classification

Watercourse classification	Definition
Perennial	A stream that flows all year round assuming average annual rainfall
Ephemeral	A stream that flows continuously for at least three months between March and September but does not flow all year

3.2 Limitations

The following limitations of the REM methodology should be considered in the interpretation of the data from this report.

Watercourse Classification

The watercourse assessment provides a field estimate of stream classification only and this classification is not specifically intended for Resource Consent purposes. Although specific and detailed assessment is required prior to consent approval for any works within a subject reach, the details contained in this document can be used to guide associated investigations for a resource consent application. Failure to identify a stream reach during this Watercourse Assessment process does not indicate that a stream is not present or that any such stream is ephemeral. The assessment has been based on the regional plan definitions and these definitions are open to considerable interpretation. We would note that this is evidenced by the T&T assessment dated 1 November 2018 which, defines the artificial vs modified

boundary of the subject watercourse, but states the arbitrary nature of their definition also. Furthermore, T&T also acknowledge the presence of the historical wetland and the lack of guidance within the WRP on how to interpret watercourse classification in modified wetlands.

Temporal variations

Watercourse assessments undertaken, as per this methodology, must be considered within the seasonal context. Variables such as water depth and velocity are dependent on the level of base flow, and antecedent conditions such as stormwater inflows prior to the assessment. Factors that are more variable over diurnal time scales, such as temperature, are not recorded as part of this assessment as time series data is required for meaningful and representative results.

Assessment methodology

It is acknowledged that the ICMP REM is largely a 'rapid' assessment of engineering assets, as well as, biological and geomorphologic stream state. Parameters are also typically averaged over the extent of each reach and there will be some variability along this length.

3.3 Rapid Geomorphic Erosion Assessment Methodology

The RGEA provides rapid baseline information on the bank and bed stability of a watercourse. It was developed by Morphum Environmental for Hamilton City Council (HCC, 2018) as a relatively simple assessment to rapidly identify reaches that may require stabilisation interventions. The RGEA records the dominant processes occurring along the subject reaches using twelve criteria that are directed at determining trends of recent channel adjustment, as processes migrate through a channel network with time. As this assessment is essentially a snapshot in time, assessment is usually carried out during summer months, when water levels are lower and more of the lower bank is exposed. The methodology utilises criteria of channel form to infer dominant channel processes and the magnitude of channel instabilities through the following twelve criteria:

1. Bed substrate material
2. Bank material and cohesion
3. Bank height
4. Bank angle
5. Presence of knickpoints/headwall cutting
6. Degree of constriction (relative decrease in top of lower bank width from upstream)
7. Erosion Scars (percentage of reach)
8. Erosion scars resulting from lateral flow sources
9. Established riparian woody vegetative cover
10. Stream bank erosion processes
11. Stage of incised channel evolution
12. Stream curvature

For each assessment reach, the dominant processes are recorded using a geospatial polyline feature class that evaluates the twelve criteria outlined above, to provide a channel stability ranking. Scoring in each criterion is such that a higher value indicates greater potential for erosion and instability. Each criterion has a maximum value of 4 to reduce subjective interpretation and to ensure the relative importance of each criterion is assessed equally. Scores from the twelve criteria are added to give a channel stability ranking (Table 4).

Table 4: Channel stability scores	
Ranking	**Stability Scores**
Highly stable	0 – 10
Moderately stable	11 – 16
Stable	17 – 22
Unstable	23 – 28
Moderately Unstable	29 – 34
Highly Unstable	35 – 44

3.4 New Zealand Black Mudfish Survey

The black mudfish (*Neochanna diversus*) is an endemic freshwater species. Previous surveys show black mudfish populations are present in the Waikato region (Hicks and Barrier, 1996; Ling, 2001). The preferential habitat of black mudfish includes wetlands and small swampy streams, much like the watercourses in the Rotokauri North sub-catchment.

The Department of Conservation methodology for monitoring New Zealand mudfish (Ling *et al.,* 2013) was used to develop a survey design for the Rotokauri North sub-catchment. Four sites in the sub-catchment were selected for sampling (Appendix 2). The selection of these sites was based on their potential to provide suitable habitat for resident mudfish populations. The four sites were also representative of the main habitat types present in the sub-catchment.

At each site, 30 non-baited gee minnow traps were set approximately 5 metres apart along a 150-metre transect. A combination of standard metal traps and collapsible net traps were used, all of which were set overnight and retrieved the following day. Traps were set at sites RNDA1 and OHOTE on 6 August and retrieved on 7 August, while the RNDA2 and TEOT1 sites had traps set on 7 August and retrieved on 8 August.

Upon retrieval of the traps, the number, size class and species of captured fish were recorded. Mudfish size classes were defined as per Ling *et al.,* (2013) (Table 5).

Table 5: Black mudfish size classes	
Age Group	**Size Class (mm total length)** (Ling *et al.,* 2013)
Fry	5 – 30
Juveniles	30 – 50
Adults	> 50

3.5 Macroinvertebrate Community Index (MCI) sampling

Benthic macroinvertebrates are commonly used as bioindicators of ecosystem health in New Zealand. Macroinvertebrate taxa groups have been shown to respond differently to natural and anthropogenic stressors (Stark and Maxted, 2007). As such, the presence or absence of specific taxa can provide insights into the ecological condition of a local site.

Standardised protocols for sampling soft-bottom streams, as outlined in the Regional Guidelines for Ecological Assessments of Freshwater Environments (Environment Waikato, 2005) and described by Stark (2001) and, were used to collect macroinvertebrate samples at five sites within the Rotokauri North sub-catchment.

As per the REM methodology, the presence/absence of taxa, their relative abundance, and the percentage of EPT taxa were identified for each of the five sites. The overall ecological value was compared to MCI threshold scores as per Stark (2001) (Table 6).

The dominant habitat types sampled for macroinvertebrates were in-stream woody debris, macrophytes and undercut banks. The first four samples were collected at the same sample reaches as the black mudfish sites; RNDA1, RNDA2, OHOTE, and TEOT1. An additional site, TEOT2 situated at the downstream reach of the Te Otamanui Tributary was also included. At each of these five sites, water and sediment quality samples were also collected. These sample sites are briefly described in Table 7. Refer to Appendix 1 for the location of these sites.

Table 6: Interpretation of Macroinvertebrate Community Index Scores

Ecological health ranking	**MCI Quality Thresholds (**Stark *et al.,* 2001, 2007)
Excellent	> 119
Good	100 – 119
Fair	80 – 99
Poor	< 80

Table 7: Site descriptions of ecological survey sites

Site Code	Descriptions	
RNDA1 (TEO_TRIB1_3)	Incised, straightened channel surrounded by dairy farm land. No significant riparian shading or in-stream woody debris. Floating duckweed mats present in stream channel.	
RNDA2 (OHO_TRIB2_3)	Shallow, stagnant watercourse surrounded by harvested maize cropland. Riparian vegetation dominated by rank grasses.	
OHOTE (OHO_TRIB1_1)	Wetland-like characteristics. Channel dominated by floating sweetgrass.	

TEOT1 (TEO_MAIN_26)	Incised, straightened channel. Macrophyte cover and overhanging rank grasses.	
TEOT2 (TEO_MAIN_1)	Wide and relatively deep downstream reach of Te Otamanui. Overhanging vegetation and canopy cover.	

4.0 Summary of Findings

The Rotokauri North sub-catchment has four receiving environments; Mangaheka to the North, Ohote and Te Otamanui to the West, and Lake Rotokauri to the South. The watercourses within the Rotokauri North Development Area (RNDA) drain to each of these receiving environments.

The Rotokauri North sub-catchment and the receiving environments are comprised of meandering single thread rivers, modified watercourses and farm drainage canals as per the Waikato Regional Plan (WRP) (Appendix 2). The stream network within the RNDA is comprised of both perennial and ephemeral watercourses.

The physical attributes assessed for watercourses within the Rotokauri North sub-catchment are summarised in Table 8.

Table 8: Summary of physical variables across the extent of watercourse surveyed

Total Length of Surveyed Watercourse (km)	10.03					
Catchment Area (Ha)	180.32					
Catchment Imperviousness	3.92%					
Receiving Environments	Ohote Stream, Te Otamanui Stream, Lake Rotokauri, Mangaheka Stream					
Dominant Substrate Type	Silt Sand					
WRP Stream Classification	**Perennial**				**Ephemeral**	
Length of stream (km)	9.054				0.982	
% of total stream length	90.2				9.8	
WRP Watercourse Type	**River**		**Modified watercourse**		**Farm drainage canal**	
Total stream length (km)	0.772		7.809		1.454	
% of total stream length	7.7		77.8		14.5	
Vegetation	**0 – 10 %**	**10-30%**	**30-50%**	**50-70%**	**70-90%**	**>90%**
Average Overhead Cover (% of total stream length)	37.7	27.8	21.3	9.8	3.3	0
Pfankuch Upper Bank stability assessment	**Excellent**		**Good**	**Fair**		**Poor**
Overall Stability Index (% of total stream length)	0		69	31		0
Erosion scarring	**Percentage of reaches with >60% erosion scarring**			**Total No. Erosion hotspots**		
	36			6		

4.1 WRC Watercourse Types

The three watercourse types present in the Rotokauri North sub-catchment and the receiving environments are meandering single thread rivers, modified watercourses and farm drainage canals. The findings are based on the assessment by the ecologists and geomorphologist involved in the field investigations and conclude that these points are defined as per Appendix 2. As there is no guidance in

the WRP on how to deal with modification to wetlands or how to classify channels that drain wetlands, a precautionary approach has been taken to classify these channels as modified. Additionally, the channels that drain the historic wetland within the RNDA do not clearly fall under the WRP definitions of an artificial or a modified watercourse.

It is noted that HCC have engaged independent consultation on the classification of watercourses within the RNDA. Where this classification differs from that outlined in Appendix 2, we would advocate that HCC are best placed to define the interpretation to be carried forward. This will require communication with WRC so that they can provide their position on this issue. Each of the three watercourse types is briefly described below.

4.1.1 Meandering single thread river

Meandering single thread rivers are natural streams which have retained natural geomorphic features and a meandering channel shape. These reaches have not been modified by anthropogenic activities such as straightening, deepening or widening of the stream channel and bed. This watercourse type was relatively rare within the receiving channels where intense historic and, present land use activities have extensively modified the physical and ecological attributes of these watercourses.

4.1.2 Modified watercourses

Modified watercourses are natural streams which have been modified by anthropogenic activities such as straightening, deepening or widening of the stream channel and bed, primarily through 'drain cleaning' activity which results in an overly steep bank and removal of bed material. Modified watercourses were the most common type of watercourse encountered as part of this assessment.

4.1.3 Farm drainage canals

Farm drainage canals are artificial watercourses on a farm that contain no natural portions from their confluence with a stream or river to their headwaters. An extensive network of farm drainage canals is present within the Rotokauri North sub-catchment. These reaches are straightened, and often deepened channels used to lower the water table and provide additional arable land.

4.2 Reach Summaries

The watercourses in the sub-catchment and the receiving environments are soft-bottom streams and silt/sand are the dominate benthic substrate types. The flat topography of the area is reflected by the slow-flowing streams in the catchment. The numerous farm drains and standing bodies of water (ponds) observed in this assessment indicate a high water-table throughout the sub-catchment and the receiving environments.

Generally, the watercourses show evidence of channel modification such as straightening, widening and deepening. Adjacent land use is dominated by agricultural, pastoral activities. Sparse vegetation consisting of gorse, barberry and poplar dominated these reaches. In the downstream reaches of the Te Otamanui (TEO_MAIN_1 to TEO_MAIN_6) mixed vegetation provides moderate shading to the stream channel.

Erosion scarring of stream banks is largely attributed to anthropogenic activities such as 'drain cleaning', stock access and damage and lack of riparian vegetation. Bank benching, bank instability and fine sediment deposition can be largely attributed to stock damage rather than erosion from high stormwater flows. In the downstream reaches of the Te Otamanui, there is some evidence of fluvial erosion caused by larger flows through constricted channels.

A total of seven debris jams were identified in the Rotokauri North sub-catchment and the receiving environments. The identified debris jams were large fallen trees causing localised changes in water velocity and depth in the stream channel. The identified debris jams did not pose any significant issues to stormwater flows.

The following Tables (Table 9 - Table 12) provide an overview of the channel morphology, riparian condition and erosion in each of the receiving watercourses in the Rotokauri North sub-catchment. For further detail regarding erosion in the Rotokauri North sub-catchment, refer to Section 4.3 of this report.

The reaches within each of the receiving environments have been grouped based on similar characteristics and geographic proximity. Representative photos of each group of reaches are presented in Table 13. Refer to Appendix 3 for stream overhead cover in the sub-catchment.

Table 9: Reach Summaries - Te Otamanui Tributary

Reach	Watercourse type	Watercourse classification	Channel morphology	Riparian condition	Erosion
Downstream reaches (TEO_MAIN_1 to TEO_MAIN_6)	River - Meandering single thread	Perennial	Meandering channel morphology and wide floodplains. Riparian corridors constrained by existing residential dwellings located at the top of the gully banks on TRB. Average wetted width is 1.5 m.	Moderate cover (average 30 – 50% of reach) from riparian vegetation. Riparian corridors constrained by existing residential dwellings located at the top of the gully banks on TRB. Riparian vegetation includes few mature native species such as tree fern, flax and karamu. Dominant vegetation type is exotic weeds; kikuyu, elephant ear and reed sweet grass.	Predominately fluvial erosion on downstream reaches (TEO_MAIN_1 to TEO_MAIN_3). RGEA stability ranking of 'unstable'. Upper reaches (TEO_MAIN_4 to TEO_MAIN_6) are 'moderately stable'.
Mid-reaches (TEO_MAIN_7 to TEO_MAIN_15)	Modified watercourses	Perennial	Agricultural streams with straightened and deepened channels. Floodplain connectivity is 'rare' as modifications contain most flows in the channel. The average wetted width in the channel ranges from 1 - 2.5 m.	Sparse vegetation (< 10%) in this section of the sub-catchment. No canopy cover recorded for 78% of ecolines Pastural land use with stock access noted along the reach.	RGEA stability ranking of 'stable' and 'moderately stable' Two reaches (TEO_MAIN_7 and TEO_MAIN_14) are 'unstable. The incised and steep banks (average 65- 75˚) had evidence of ongoing erosion, with 77% of ecolines showing evidence of recent erosion scarring along 40 - 60% of the lower bank.
Upper reaches (TEO_MAIN_16 to TEO_MAIN_28	Modified watercourses	Perennial	Relatively uniform channel morphology, with straightened channels ranging from 1.1 m – 1.8 m wide Floodplain connectivity recorded as 'rare' to 'occasional' as channels have been modified to contain most flood flows.	Shelter belt of mature deciduous trees on TLB. Natural wetland dominated by Juncus on TRB along lower reaches (TEO_MAIN_16 to TEO_MAIN_18). No riparian vegetation in the upper reaches.	RGEA stability ranking of 'stable' for 53% of ecolines. Stability ranking of 'moderately stable' for 38% of ecolines. TEO_MAIN_21 is 'unstable' due to mass failures on both banks.
Te Otamanui Tributaries (TEO_TRIB1_1 to TEO_TRIB1_4) *Watercourses in the RNDA*	Modified watercourses	Perennial	Watercourses are straightened and intersected by multiple farm track culverts. Sections of stream have stagnant water and emergent macrophytes such as duckweed.	Surrounding land use is a cattle farm. Direct stock access to the watercourse is restricted by electric fences. TEO_TRIB1_1 and TEO_TRIB1_2 have a narrow riparian margin of deciduous trees on the TRB. No other riparian vegetation is present.	RGEA stability ranking of 'stable' for 50% of reaches and 'moderately stable' for 25%. TEO_TRIB1_2 has a ranking of 'unstable'.
Te Otamanui Tributaries (TEO_TRIB2_1 and TEO_TRIB1_5) *Watercourses in the RNDA*	Farm drainage canals	Ephemeral	Straightened and shallow channels with low bank height.	Channels are accessable by stock access and therefore lack definitive channel boundaries. No riparian cover	RGEA stability ranking of 'moderately stable'.

Table 10: Reach summaries - Ohote Stream

Reach	Watercourse type	Watercourse classification	Channel morphology	Riparian condition	Erosion
Wetland reaches (OHO_TRIB1_1 to OHO_TRIB1_7)	Riverine wetland	Perennial	Reaches lack definitive boundaries between stream channel and banks.	Reaches dominated by facultative wetland grasses such as kikuyu, native rushes such as Juncus and mature, individual willow trees.	74% of reaches have a RGEA stability ranking of 'highly stable' OHO_TRIB1_7 is low grade, fully shaded stream with some undercutting and a RGEA stability ranking of 'moderately stable'
Lower-mid reaches (OHO_TRIB1_8 to OHO_TRIB1_9)	Modified watercourses	Perennial	OHO_TRIB1_9 has recently been deepened to increase flow capacity within the channel. Lack of bank stabilisation from these works has resulted in ongoing soil deposition into watercourse.	Modification to riparian and channel morphology due to stock damage. Riparian vegetation includes sparse individual Burberry and other exotic tree species on the TLB.	OHO_TRIB1_8 is 'stable' and OHO_TRIB1_9 is 'unstable'
Mid reaches (OHO_TRIB1_10 to OHO_TRIB1_14) *Watercourses in the RNDA*	Modified watercourses	Perennial	Floodplain connectivity was 'rare' at 80% of the mid-reaches, due to modifications such as straightening and deepening of the channel.	The dominant surrounding land use is low-density residential dwellings and pastoral farms. Downstream reaches (OHO_TRIB1_10 to OHO_TRIB1_12) have relatively high shading from Barberry, tree ferns and pine planting on TRB. OHO_TRIB1_13 to OHO_TRIB1_14 are open, with low cover.	50% of reaches have RGEA stability ranking of 'stable' OHO_TRIB1_11 is 'unstable'
Upper reaches (OHO_TRIB1_15 to OHO_TRIB1_18 & OHO_TRIB2_2) *Watercourses in the RNDA*	Modified watercourses	Perennial	Straightened channels and incised, steep banks. OHO_TRIB2_1 is anoxic, with dense macrophyte cover.	Surrounding land use is cropland – predominately maize. Low riparian vegetation is present along this section of the Ohote Stream, with gorse providing the only shade to the channel. The dominant surrounding land use is maize cropland. Low (<10%) riparian shading on the OHO_TRIB2_1.	Reaches range from 'stable' to 'moderately stable' with no significant issues identified in this section of the sub-catchment.
Headwater Tributary (OHO_TRIB2_2 & OHO_TRIB2_3) *Watercourses in the RNDA*	Farm drainage canals	Ephemeral:	OHO_TRIB2_2 and TRIB2_3 are shallow (~ 0.1 m depth), with dense oxygen weed cover in stream.	No riparian cover was recorded for the ephemeral streams.	RGEA stability ranking of 'moderately stable'

Table 11: Reach summaries - Rotokauri Stream

Reach	Watercourse type	Watercourse classification	Channel morphology	Riparian condition	Erosion
Rotokauri Stream (ROTO_TRIB1_1 to ROTO_TRIB1_4)	Farm drainage canals	Perennial	Natural direction of flow has been altered. Artificial agricultural streams with incised banks, unconsolidated soft sediment deposition in stream channel.	Low (<10%) riparian cover along bank margins. Cattle observed alongside stream banks. Direct stock access is restricted by fences approximately 1 m from top of stream bank.	RGEA stability ranking of 'stable' Some fluvial and mass wasting recorded on both banks of channels.

Table 12: Reach summaries - Mangaheka Stream

Reach	Watercourse type	Watercourse classification	Channel morphology	Riparian condition	Erosion
Mangaheka Stream (MHEKA_TRIB1_1 to MHEKA_TRIB1_2)	Farm drainage canals	Perennial	The downstream reach (MHEKA_TRIB1_1) lacks definitive bank boundaries due to stock modification and have similar characteristics to wetlands.	Severely impacted by stock damage, with evidence of pugging along each reach. No riparian vegetation on either bank. However, an ecologically significant remnant native kahikatea forest patch is present upstream of MHEKA_TRIB1_2.	RGEA stability ranking of 'moderately unstable'

Table 13: Examples of reaches in the Rotokauri North sub-catchment and receiving environments

Meandering single thread river in Te Otamanui	Agricultural reaches modified by stock access	Straightened channel, intersected with farm culverts
		
Wetland reaches in the lower Ohote Stream	**Ephemeral farm drain in the Rotokauri North Development Area**	**Modified watercourse surrounded by cropland**
		

4.3 Erosion

4.3.1 RGEA Stability Ranking

Following the Rapid Geomorphic Erosion Assessment methodology, there were no 'highly unstable' reaches in the Rotokauri North sub-catchment. Most watercourses in the sub-catchment were ranked as 'stable' (Table 14). Refer to Appendix 4 and Appendix 5 in the Appendices for RGEA stability, and upper bank stability in the sub-catchment.

Some sections of the sub-catchment had RGEA stability rankings of 'moderately unstable' and 'unstable' (Table 15). These rankings highlight areas of concern within the sub-catchment which are prone to further erosion and degradation. Mass failure was recorded as the primary erosion process in these 'moderately unstable' and 'unstable' reaches. The high incidence of mass failures can be attributed to the relatively non-cohesive bank soil structure, composed primarily of silt clay loam and the lack of established woody riparian vegetation. Similarly, the dominate bed substrate material in the sub-catchment is clay/silty clay (86%), with a lower proportion of the reaches dominated by gravel (9%) and silt (5%).

The downstream reaches of the Te Otamanui (TEO_MAIN_1 to TEO_MAN_3) were ranked unstable and primarily impacted by fluvial erosion.

These erosion processes are likely exacerbated by surrounding land use activities, including riparian vegetation removal along bank margins, likely as part of pastoral and 'drain cleaning' activities. Riparian vegetation plays an important role in preventing lateral adjustment of watercourses and stabilising stream banks, whilst contributing to channel roughness and helping dissipate erosive forces.

Table 14: RGEA Stability Rating

	Highly Stable	Stable	Moderately Stable	Moderately Unstable	Unstable	Highly Unstable
Te Otamanui	-	17	10	1	7	-
Ohote	5	10	10	-	2	-
Mangaheka	-	-	3	-	-	-
Rotokauri	-	4	-	-	-	-
Total no. of reaches	5	31	13	1	9	-
Total length of watercourse (m)	**683.7**	**4,312.4**	**2,806**	**110.8**	**2,067.9**	**0**
% of watercourse length	6.8	43	28	1	20.6	0

The ten reaches in the Rotokauri North sub-catchment and the receiving environment with RGEA rankings of 'moderately unstable' and 'unstable' are described in Table 15. These low stability reaches are located primarily along the Te Otamanui Tributary (80%), with two unstable reaches identified on the Ohote Stream Tributary.

The Ohote Stream tributary is expected to be the primary receiving environment, downstream of the proposed Rotokauri North Development Area (RNDA). Te Otamanui Tributary is expected to be the secondary receiving environment, with potential additional increased flows from a possible diversion from the Mangaheka Stream.

The changes in land use from a greenfield, pastoral landscape to an urbanised residential land use within the RNDA presents the following pressures on the receiving environments:

- Increased imperviousness and associated changes in hydrograph and impacts on watercourses, including increased potential for channel erosion and reduced base flows
- Reclamation and diversion of watercourses
- Increased channel modification due to development of roads, privates accessways, and associated culvert structures.

Table 15: Summary of low stability reaches

Reach	RGEA Stability Ranking	Description
TEO_MAIN_8	Moderately Unstable	Narrow channel with incised banks, downstream of man-made pond (constructed between 2010 – 2012). Steepened reach with high channel constriction.
TEO_MAIN_1 to TEO_MAIN_3	Unstable	Channel follows a meandering course. Widened channels through bank retreat, located on downstream reaches of the Te Otamanui Tributary.
TEO_MAIN_7	Unstable	Incision and active channel widening of modified watercourse in operational cattle farm.
TEO_MAIN_14	Unstable	Lateral flow erosion scars on both banks. Unstable, excessive undercut banks with leaning riparian sedges in stream channel.
TEO_MAIN_21	Unstable	No riparian vegetation, mass failures on both banks. Lateral flow erosion scars present on TLB. Vertical face present.
TEO_TRIB1_2	Unstable	Fluvial entrainment is the dominant erosion process. Some mass wasting on TRB. Incised channel banks.
OHO_TRIB1_9b	Unstable	Artificial reshaping of the existing banks through 'drain cleaning' activities. Banks steepened and straightened. Deposition of material on bed.
OHO_TRIB1_11	Unstable	Excessive undercutting of banks. Leaning and fallen vegetation from shelter belt present in stream channel.

To mitigate further degradation in the sub-catchment and minimise adverse impacts on the receiving environments, a programme of erosion mitigation projects is presented in Section 5.2.

4.3.2 Erosion Hotspots

Erosion hotspots are identified as discrete locations of severe erosion causing environmental, infrastructure, and health and safety risk. An erosion hotspot is defined as severe erosion located within the channel and or, lower or upper banks, resulting in slumping and exposed soil surfaces and must be:

- Actively eroding,
- Exceed two metres in length or have a total surface area of > 5 m^2

The instability score (3 or 4) classifies erosion hotspots as 'shallow' or 'deep'. The asset risk score (1 to 4) indicates the risk that erosion poses to surrounding infrastructure, with scores of 1 indicating open spaces with negligible impacts and 4 indicating risk to major structures such as roads and services. The

overall risk value is determined from the instability and asset risk scores. If the sum of the two scores is greater than 6, the hotspot is classed as 'high risk', while scores of 4 – 5 are classed as 'medium risk'.

A total of six erosion hotspots were identified in the Rotokauri North sub-catchment, summarised in Table 16. These identified erosion hotspots were all located outside the RNDA (Appendix 5). The erosion hotspots did not pose a significant risk to infrastructure and were classed as medium risk.

At two erosion hotspots located on the Te Otamanui Tributary; TEO_MAIN_19 and TEO_MAIN_1, it was identified that maintenance to assets are required. The asset at TEO_MAIN_19 is a private farm culvert, whilst TEO_MAIN_1 is a Council owned asset draining stormwater flows from Horotiu Road. The recommended maintenance types include redesign and replacement of culverts to facilitate future flows following development of the upstream catchment areas.

The most common contributing factors for erosion hotspots were minimal riparian vegetation, poorly maintained private stormwater assets, and channel modification (i.e. drain cleaning). Of the six erosion hotspots, 33% were assessed as caused by fluvial (flow) processes, 50% were attributed to steep banks and minimal riparian vegetation and the cause of one erosion hotspot on TEO_MAIN_21 (16%) was unknown.

Table 16: Summary of erosion hotspots.

Attribute			
Total Length of Surveyed Watercourse (km)		10.03	
Total Length of Erosion Hotspots (m)		207.6	
Total Number of Erosion Hotspots		6	
	Mean	**Min**	**Max**
Height of erosion (m)	2.5	2	4
Depth of erosion (m)	0.8	0.5	2
Length of erosion (m)	14	3	30
Erosion Type	**Shallow Instability**	**Deep Instability**	
% of erosion hotspots	83.3	16.7	

4.4 Biodiversity

4.4.1 Black Mudfish Survey

The survey did not identify any black mudfish at the four samples sites in the Rotokauri North sub-catchment. The invasive mosquitofish (*Gambusia affinis*) was abundant (> 100 individuals) throughout and captured in traps at all sites except RNDA2. A single native shortfin eel (*Anguilla australis*) was recorded at TEOT1 (Figure 22).



Figure 8: Small shortfin eel and a number of mosquitofish captured in a Gee minnow trap at TEO1

The absence of black mudfish from the surveyed watercourses is most likely due to a lack of suitable habitat for this species throughout the sub-catchment. In addition, the presence of fish barriers (discussed further in Section 4.4.2) is likely to impede the migration of individuals in the watercourse network.

The Rotokauri North sub-catchment mudfish sample sites were highly modified watercourses, with mineralised substrates dominated by silt. Preferential habitat features for black mudfish such as emergent and overhanging vegetation, tree roots, and peat substrates were largely absent in the sub-catchment. Additionally, as Hicks and Barrier (1996) suggest, the invasive mosquitofish can exclude black mudfish from perennial habitats by outcompeting the native species for habitat and food resources.

The OHOTE site had wetland characteristics and good riparian vegetation with dense sedges and small thickets of willows present along the survey transect. However, the mineralised river silt and the dominance of *Glyceria* indicated a high level of disturbance in the system.

It is acknowledged that the detection of black mudfish was limited to a single night at each site. However, the extensive sample area (150 metre), concentrated trapping effort (30 traps at 5 metres spacing), and the inclusion of a range of habitat types in the sub-catchment indicates a comprehensive survey was undertaken. The results suggest that the presence of black mudfish populations in the Rotokauri North sub-catchment is unlikely.

4.4.2 Fish Passage

Barriers to fish passage can severely limit native fish populations by restricting the amount of stream habitat that they can access. Many native species complete their larval life-stage in the marine environment before migrating into freshwater catchments as juveniles, where they continue to develop into adults once they are established in suitable upstream habitats. Artificial and natural barriers in freshwater systems can limit this migration.

All barriers to fish passage were classified into one of three categories (Swimmer, Climber or Anguilliform) according to the locomotory function of the fish that were likely to impede. Barriers to swimmers will affect species that are only capable of swimming (e.g. inanga, common bully), while barriers to climbers will also prevent species such as banded kokopu and redfin bully from migrating

upstream. The most difficult instream barriers will also affect anguilliformes (adult eels), which are capable of traversing short distances across land between waterbodies.

Two artificial barriers to fish passage were identified in the receiving environments of the RNDA. These barriers were;

- Perched private farm culvert (Asset ID: UNK026)
- Series of perched farm culverts and artificial pond (Asset ID: UNK094 – UNK097)

No natural in-stream fish barriers such as cascades, waterfalls or dams were found in the sub-catchment.

One of the most notable fish barriers present within the Rotokauri North sub-catchment is located on a downstream reach of the Ohote Stream (OHO_TRIB_1). The outlet of a private 1000 mm concrete culvert (ID: UNK026) is perched 0.35 m, forming a complete barrier to swimming and climbing species (depending on water levels). The structure impedes fish passage to more than 2 km of upstream reaches of the Ohote Stream.



Figure 9: Fish barrier for swimming fish species located on the culvert outlet (Asset ID: UNK026)

The second fish passage barrier is a series of perched farm culverts upstream of a constructed online pond. The culverts were noted to be poor – average condition due to a lack of maintenance. The culverts form a complete barrier for swimming fish species, and a partial barrier to climbing species.

It should be acknowledged that assessment of potential fish barriers was conducted during winter between July and August. The water depth in the watercourses was elevated, and flooded culverts were noted throughout the sub-catchment. It is possible that additional farm and road culverts are partial or complete barriers for various fish locomotory groups during drier months of the year, these were not identified as part of this study.

4.4.3 Macroinvertebrate Community Index

Macroinvertebrate Community Index (MCI) samples were taken at five sites in the Rotokauri North sub-catchment along 100 metre reaches. The summary of the biodiversity index scores for the five sites are listed in Table 15. Overall, MCI scores in the catchment were indicative of 'poor' to 'fair' ecological health.

The highest MCI score (97.2) was recorded in the agricultural site RNDA1. The pollution-sensitive EPT taxa group was only found at the RNDA1 site, with a single stick caddisfly (Triplectides) recorded in the sample.

The site TEOT1, situated in the mid-reaches of the Te Otamanui Tributary, had a MCI score of 90. Similarly, TEOT2 situated further downstream of the Te Otamanui had a MCI score of 87. These scores indicate 'fair' ecological value. The most common taxa at these sites were midges (Orthoclad), seed shrimps (Ostracoda) and worms (Oligochaetes). These taxa are often abundant in unshaded, nutrient-enriched streams with prolific algal growth.

The remaining two sample sites (OHOTE and RNDA2) had MCI scores ranging from 77 to 79, indicating poor ecological condition. Similar to Te Otamanui Tributary sites, these sites were dominated by taxa groups such as worms and midges which are indicative of moderate to high organic pollution.

MCI guidelines proposed in the NPS-FM suggests that discharges, subdivision use and development in this area should be managed to enhance freshwater values. It should also be noted that base flows were slightly elevated at time of sampling in winter (July - August 2018).

Table 17: Summary of biodiversity index values across sites

Site Code	MCI	No. Taxa	EPT Taxa	MCI Ecological Quality Threshold
RNDA1	97.2	16	1	Fair
RNDA2	77.0	10	0	Poor
OHOTE	79.5	19	0	Poor
TEOT1	90	14	0	Fair
TEOT2	87	19	0	Fair

4.5 Water Quality

As per the project scope, one water quality grab sample was obtained at each of the five sample sites. A summary of the water quality parameters is provided in Table 18 below.

The results indicate that the water quality of the watercourses in the Rotokauri North sub-catchment is poor. Five parameters exceeded the ANZECC trigger values set for lowland rivers and streams (protection of 95% of species) and the 'satisfactory' levels set by Waikato Regional Council for river water quality in the region (WRC, 2012). These exceedances are shown in red, and orange shows exceedances of one set of guidelines in Table 18.

Turbidity exceeded the guideline values at all five sites, and by a magnitude of five at TEOT2 (25 NTU). Turbidity indicates water clarity and studies have shown turbidity levels above 5 NTU have adverse effects on underwater light – and thus on plant and invertebrate production (Davies-Colley, 1991). Loss in water clarity also adversely impacts migration of common native freshwater fish species (Boubee et al., 1997). High sediment loads from the surrounding land use is contributing to high turbidity in the sub-catchment.

Total nitrogen concentrations also exceeded the guideline values at all five sites. The highest concentrations were recorded in RNDA1 (4 g/m^3) and TEOT1 (4.3 g/m^3). Similarly, Total Kieldahl Nitrogen, which indicates the concentrations of biologically available nitrogen, exceeded guideline values at these two sites. The nitrogen concentrations results fall within the 'C' attribute state of the

NPS-FM indicating an adverse effect on some sensitive species. These sites are downstream of cattle farms and stock access to the stream was recorded upstream of both these sites.

Total phosphorus concentrations were also high in RNDA (0.18 g/m^3), TEOT1(0.03 g/m^3) and TEOT2 (0.07 g/m^3). Additionally, the site OHOTE, situated in the downstream reaches of the Ohote Stream (OHO_TRIB_1) also exceeded WRC guideline concentrations. Overall, the high concentrations of nutrients (N and P) are reflective of intensive agricultural land use in the sub-catchment.

It is acknowledged that these results provide only a single 'snapshot' in time of water quality in the sub-catchment.

Table 18: Surface water quality results

Contaminant	Unit	RNDA1	RNDA2	OHOTE	TEOT1	TEOT2	ANZECC Lowland[1]	WRC[3]
pH		6.4	6.2	6.8	6.2	6.6	7.2 – 7.8	6.5 – 9
Suspended Sediment (TSS)	g/m^3	19	6	9	10	15	-	-
Turbidity	NTU	18.3	9.2	8.7	22	25	5.6	5
Total Nitrogen	g/m^3	4	0.9	1.53	4.3	2.9	0.614	0.5
Total Kieldahl Nitrogen (TKN)	g/m^3	1.45	0.43	0.75	1.07	0.84	-	0.88
Total Phosphorus	g/m^3	0.178	0.03	0.063	0.036	0.076	0.033	0.04
Total Iron	g/m^3	5.2	1.33	1.74	4.7	3.9	-	-
Total Nickel	mg/m^3	2.9	3.7	1.6	1.6	0.9	11[2]	-
Total Lead	mg/m^3	0.14	0.11	0.15	<0.11	0.15	-	-
Total Copper	mg/m^3	1.22	5	0.92	0.53	0.68	-	-
Total Zinc	mg/m^3	40	23	15.1	80	13.1	8000	-
PAH's	ug/L	<0.008	<0.008	<0.008	<0.008	<0.008	-	-
E. coli	E. coli/100 mL	99	96	85	70	260	-	550
cBOD	g O^2/m^3	3	<2	<2	<2	<2	-	-

[1]95% protection level for freshwater
[2] Values for protection of species are more appropriately applied to dissolved values than total values
[3] Satisfactory levels from the WRC River water quality levels
- No value or Insufficient Data

Anaerobic conditions were noted throughout the low and mid-reaches of the Te Otamanui Tributary. These reaches were characterised by stagnant water, macrophytes and a thick layer (~0.2 m) of unconsolidated soft sediment in the stream channel. Anaerobic conditions were identified as strong sulphuric odours and bubbling from the dark benthic sediment. Other indicators of poor water quality such as white foam and sheens were also present in the Rotokauri North sub-catchment.

4.6 Sediment Quality

Composite sediment samples were taken along each of the five MCI (100 metre) sample reaches. These samples were analysed for heavy metals including copper, lead, zinc, chromium, arsenic and nickel.

The ANZECC Interim Sediment Quality Guidelines (ISQG) low trigger values are the single-contaminant thresholds where adverse biological effects could occur as an early warning for management intervention. The ISQG high trigger values are indicative of contaminant concentrations where significant biological effects are expected.

Arsenic concentrations exceeded ISQG high trigger values at the Te Otamanui Tributary site TEO1. The site TEOT1 is situated in the mid-reaches of the Te Otamanui Tributary, with surrounding land dominated by pastoral land use. The other tested heavy metals did not exceed ISQG trigger values at the five sites.

Overall, sediment contaminant results are reflective of the predominately intensive agricultural land use in the Rotokauri North catchment. The sediment concentrations of heavy metals such as nickel and zinc are low, reflecting the low urban land use.

As Rotokauri undergoes a land use change from agricultural to urban areas, there is likely to be a shift in the contaminants most of concern. For instance, nutrients such as nitrogen and phosphorus will likely decrease in concentrations overtime, whilst heavy metals such as zinc and copper are likely to increase. Management strategies which aim to improve water quality in the region should consider these land use changes and their associated pressures over time.

Table 19: Summary of sediment contaminants (mg/kg/dry wt)

	Zn	**Cu**	**Pb**	**As**	**Cr**	**Ni**
	(>200 (Low) >410 (high))	*(>65 (Low) >270 (high))*	*(>50 (Low) >220 (high))*	*(>20 (Low) >70 (high))*	*(>80 (Low) > (370 high))*	*(>21 (Low) > (52 high))*
RNDA1	28	5.2	7.1	6	5.1	2.4
RNDA2	24	2.8	3.7	4.8	3.8	3.1
OHOTE	38	1.9	2.9	2.9	2.5	2.3
TEOT1	74	5.9	4.3	71	7.8	3.6
TEOT2	80	5.6	4.5	32	4.2	4.2

Cells highlighted in red exceed ISQG – High limits.

4.7 Infrastructure

Stormwater inlet and outlet structures were assessed in the Rotokauri North sub-catchment, following the methodology outlined in the REM (HCC, 2015). At each inlet and outlet, a number of variables were recorded, including asset ownership, material of structure, erosion issues and structural safety Table 20.

Of the 106 surveyed assets:

- 92% were inlets or outlets with no headwall, wingwall or dissipating structure
- 8 % were inlets or outlets, with headwalls and/or wingwalls
- 43% were inlets or outlets in the Rotokauri North Development Area

Most of the stormwater infrastructure in the Rotokauri North sub-catchment are private farm track culverts. A large proportion (72%) of these assets do not present significant risks of flooding or erosion.

However, 51% of assets had a condition rating of 'average' or lower and require some form of remedial action.

Common issues noted for stormwater infrastructure in the sub-catchment include:

- Aging culvert material (spalling, cracking, displacement, rust of reinforcing)
- Scour at inlets and outlets
- Undercutting below culvert outlets due to erosion
- Erosion to banks around structures caused by stock access
- Excessive macrophytes and debris blocking inlets and outlets

Table 20: Summary of stormwater assets (inlets/outlets) and significant issues and remedial actions

	Assets Surveyed				
Number of assets (inlets/outlets)	107				
Condition Assessment	**Very Good**	**Good**	**Average**	**Poor**	**Very Poor**
Condition of structure	2	46	48	9	2
Erosion Assessment	**None**	**Slight**	**Moderate**	**Severe**	
Extent of erosion	32	45	15	15	

Table 21: Engineering structure safety risk matrix for structures (inlets/outlets)

		Access			
Safety		**Appears Safe**	**Not Safe**	**Not Safe (Drop 1.5m)**	**Uncertain**
Pedestrian Access	Easy	4			
	Moderate	45	1	4	1
	Difficult	47	2	1	2
Erosion severity		**None**	**Slight**	**Moderate**	**Severe**
Asset Ownership	Unknown	-	-	-	-
	Council	6	7	1	2
	Private	26	38	14	13

Two structures in the sub-catchment present risks to infrastructure and stream channel. These are described below:

- The inlet at Te Kowhai Road (UNK031) is in relatively good condition, with some iron bacteria recorded upstream of the culvert and inside of the pipe. However, the 1200 mm Ø pipe appears to be undersized and is causing backwater, scour and erosion on both banks upstream of the culvert (Figure 9).

- The outlet at Horotiu Road (UNK107) is a near-vertical outflow draining from the main road. The discharge of flows from a height of approximately 2 metres into the stream channel below has caused severe erosion at the downstream end of the Te Otamanui stream. It is recommended that this infrastructure is upgraded or replaced with a design which mitigates channel erosion.



Figure 10: Left: Erosion and coir lining on banks upstream of the Te Kowhai Road culvert (UNK031); Right: Erosion downstream of outlet UNK107

4.8 Flood Floor Levels

As part of the watercourse assessment, Morphum conducted initial flagging of both habitable and non-habitable buildings that may potentially be at risk of flooding from increased flows. The assessment was a visual inspection only, using an inclinometer to identify building floor levels that were within 1.75 m elevation of the top of the bank. It is anticipated that this initial assessment will be used in conjunction with the flood assessment to identify areas for further investigation. All houses within the Rotokauri North development area were excluded from this assessment. As a result of the investigation, two houses were identified as being within 1.75 m of the top of the bank and are illustrated in Figure 10. The houses within this area require further investigation into the risk of flooding from development within the upstream catchment, however these are new dwellings, so a resource consent process is considered likely to have assessed flood levels.



Figure 11: Results of Habitable Floor Level Surveying

5.0 Options and Actions

5.1 Management Zones

Four management zones have been identified in the Rotokauri North sub-catchment and the receiving environments based on reaches with similar pressures, issues and opportunities. A brief description of each of the management zones is outlined in Table 22, while a detailed description of each management zone is described in Sections 5.1.1 to 5.1.4.

The common pressures on watercourses identified within the surveyed extent result from historic and existing rural land uses. The most common pressures and their effects within each management zone are outlined in Table 23, while further issues and pressures specific to each management zone are described in Table 24 - Table 27.

In addition to existing land uses, proposed future growth and development also poses potential issues and pressures on watercourses within the catchment. There is, however, an opportunity to remedy and mitigate existing and future pressures through the greenfields development process and manage rural land use issues in areas outside of the RNDA.

The proposed management approach presented in this report aims to anticipate and plan for the increase pressures on watercourses. The management approach identifies key issues, objectives to address these issues, and recommends options and actions to mitigate their actual and potential adverse effects.

A summary of possible objectives to manage these pressures within each management zone in the Rotokauri North sub-catchment and the receiving environments is presented in Table 28. The broad management objectives outlined in this report align with the outcomes sought by (but not limited to) the Stormwater Master Plan (HCC, 2016), Rotokauri ICMP (2017), the Waikato vision and strategy document (2011), the NPS-FM (2016) and the Proposed Waikato Regional Plan Change (2018).

Table 22: Summary of Management Zones

	Management Zone	Description
MZ1	Rotokauri North Development Area	Encompasses 163 hectares of greenfields land marked for the Rotokauri North Special Housing Area
MZ2	Ohote Tributary downstream of Exelby Road and TEO_MAIN_18	Watercourse with wetland-like characteristics, wide floodplains and high ecological potential
MZ3	Lower Te Otamanui Tributary (TEO_MAIN_1 to TEO_MAIN_7)	Meandering watercourses with moderate riparian cover and wide floodplains with erosion issues caused by fluvial processes and stock access
MZ4	Upper Te Otamanui Tributary	Incised and straightened channels, modified for efficient conveyance but degraded ecological value. Surrounding landscape is primarily agricultural with stock access issues

Table 23: Common pressures across management zones in the Rotokauri North sub-catchment and the receiving environments

Common Issues across the management zones	Description of impacts	Suggested Objectives	Impacted management zone
Stock access to waterways	Reduced water quality through faecal contamination. Reduced bank stability. Increased suspended sediments and deposition. Change in morphology and hydrodynamics of the watercourse.	Exclude stock from watercourses. Establish set-backs from the stream and plant riparian vegetation buffers.	Management Zones 1, 2,3 and 4.
Channel erosion	Ecological impacts include; • increased sediment deposition on the channel bed from erosion of upper and lower banks, which can adversely affect macroinvertebrates through change in habitat and loss of interstitial space. • Fish populations are also affected by availability of habitat for spawning and food supply. Channel erosion can impact private/public land and is particularly an issue where it poses a risk to assets such as walkways, roads, fences, buildings and/or channel lining.	Soft engineering approaches which aim to improve conveyance capacity and mitigate future erosion, whilst enhancing the ecological value of these watercourses. This can include the regrading and naturalisation of stream channels to restore natural channel morphology and planting on banks.	Management Zones 1, 2, 3 and 4. The severity and the processes driving erosion in these reaches varies across the management zones. Specific issues are discussed for each management zone in the sections below.
Lack of riparian margin vegetation	The lack of riparian vegetation impacts the biochemical and geomorphic processes in streams including; • Decreased channel shading, resulting in increased macrophyte abundance and increased temperatures • Loss of dissolved oxygen levels • Reduction in non-point source filtration, both in surface flow and groundwater • Reduced stable organic matter input • Loss of fish spawning habitat and habitat for adult stages of macroinvertebrates • Loss of habitat connectivity (both freshwater and terrestrial fauna) • Loss of root reinforcement provided by riparian plants, reducing bank stability	Establishing set-backs and riparian planting as per the guidelines in the Proposed Waikato Regional Plan Change 1 (2018) to support ecological outcomes.	Management Zones 1, 2, 3 and 4.
Degraded water quality	Degraded water quality due agricultural land use and agricultural sourced contaminants such as sediment, nutrients and heavy metals. Impacts include; • High suspended or deposited sediment levels • Low dissolved oxygen • High temperatures • High nutrient levels These water quality conditions adversely impact the aquatic life in these watercourses and have cumulative impacts on the low energy downstream receiving environments	Implementing treatment devices to address stormwater discharges. Ensuring best practice measures are in place during the development phase to reduce sediment inputs into these systems	Management Zones 1,2,3 and 4.

5.1.1 Management Zone 1 – Rotokauri North Development Area

Description

Management Zone 1 is comprised primarily of perennial watercourses however there are small ephemeral watercourses present in the headwaters of these tributaries.

The perennial watercourses are dominated by pastoral land use, with sparse riparian cover and low channel shading. The channels show evidence of straightening, deepening and widening, and have incised, steep gradient banks. At the time of sampling, slow flows were observed in the channels, and emergent macrophytes such as duckweed on the water surface were recorded along some reaches.

The watercourses are drained to the Te Otamanui Tributary through a culvert under Te Kowhai Road and to Ohote Stream through a culvert under Exelby Road. Field assessment of these inlets and outlets indicated that these assets are likely to be undersized for managing existing flows. For example, the Te Kowhai Road culvert (Inlet Asset ID: UNK032) shows evidence of severe erosion caused by flows and backwater pooling upstream of the culvert. This issue is likely to be exacerbated with increased flows and discharge from the proposed development.

These watercourses are all within the development footprint for the proposed Rotokauri North Special Housing Area. As a result, these watercourses will undergo a shift from agricultural streams to urban streams. The specific issues and suggested objectives and actions associated with the RNDA are outlined in Table 24.

The susceptibility of the catchment to erosion and the impacts of associated sediment in the immediate receiving environments (Te Otamanui and Ohote Stream) and further downstream (Waipa River) are long term issues that are likely to increase in severity through the development of the Rotokauri area. The proposed development also has the potential to increase the source of other contaminants such as heavy metals associated with urban runoff. It is therefore critical that increased peak flows and contaminant loads associated with urban development in the RNDA are controlled and managed before reaching the receiving environment in order to minimise impacts. In the short-term, sediment control measures will be required during the land development phase to ensure that contaminants are not being flushed into the receiving environment. Water quality treatment for sediment and contaminants can be met through the implementation of the HCC Regional Infrastructure Technical Specification (RITS) Standard at the development stage. The treatment of greenfield areas to a minimum of RITS standards is required by the WRC Stormwater Discharge Consents. The following management objectives are based on baseline data collected in this report.

Table 24: MZ1 Issues and Objectives

Specific Issues	Suggested Objectives and Actions	Guiding/ Statutory documents
Potential piping, diversions and/or reclamations of watercourses.	Preserve remaining open watercourses within the sub-catchment. Streams and wetlands should only to be piped and culverted in exceptional circumstances where no other practical alternative exists. Any diversion of watercourses should consider the groundwater recharge implications and maintain or improve pre-diversion hydrology and habitat. Existing groundwater seepages should also be considered. In some instances, the surrounding low-gradient topography and location of existing ponds or pugged wetland-like reaches within the catchment may be suitable for the creation of wetlands for the primary purpose of stormwater treatment. Naturalisation or enhancement of stream corridors to improve ecological values and provide amenity value through green spaces.	WRC Plan Section 3.6. Damming and Diverting WRC Plan Section 4.3. River and Lake Bed Disturbances, 4.3.1 Issues Supported by RMA, 1991
Modified hydrographs due to increased impervious surfaces in the RNDA	Advocate for best practice stormwater management controls above the receiving environment Implementation of a water sensitive design including re-use or infiltration practices	Regional Infrastructure Technical Specifications (RITS) WRC Stormwater Discharge Consents
Contaminants such as sediment, heavy metals, pollutants associated with development and urban land use	Stormwater quality treatment upstream of the receiving environment to reduce impacts	The NPS-FM sets two compulsory values (ecosystem health and human health for recreation) Water quality parameters set in; - the Proposed Healthy Waters Wai Ora Plan Change, - ANZECC guideline levels - WRC trigger values Reference in Rotokauri ICMP
Potential undersized road culverts (Inlet Asset ID: UNK032)	Redesign and upgrade of culverts to manage increased discharges at greater velocities, whilst also including erosion mitigation at both the inlet & outlet, including energy dissipating structures where required. Redesign of culverts should also consider best practice guidelines for fish passage. Options for reducing barriers to fish.	New Zealand Fish Passage Guidelines, NIWA Regional Infrastructure Technical Specifications (RITS)

5.1.2 Management Zone 2 – Ohote Tributary downstream of Exelby Road

Description

Management Zone 2 is comprised of peat-like wetland reaches. These reaches have high (~3 metre) upper gully banks and wide floodplains. There is low (10 – 30%) riparian cover along these reaches, and pastoral grasses are the dominant vegetation type. One erosion hotspot was recorded in this management zone.

Some parts of this management zone are fenced off from stock and OHO_TRIB1_7 has newly planted riparian vegetation on the TRB. However, the lower sections show evidence of stock damage along bank margins and in the stream channel.

The channel and floodplains are dominated by extensive floating mats of *Glyceria*. The reaches appear to be heavily modified due to vegetation clearance on the banks and surrounding land use. As a relatively rare habitat type in the area, peat/ boggy wetlands have ecological values that should be protected.

The reach (OHO_TRIB1_7) directly downstream of the Exelby Road culvert is narrow, incised and near (~ 20 m) an existing residential property. The reach is susceptible to further erosion and bank instability issues as a result of increased flows from the development upstream. There is also potential that contaminant aggregation can occur within the wetland reaches if not treated to adequate standards in the upstream development area.

Table 25: MZ2 Issues and Objectives

Specific Issues	Suggested Objectives and Actions	Guiding/ Statutory documents
Increased erosion susceptibility in reach OHO_TRIB1_7 directly downstream of Exelby Road culvert	Redesign of culvert in accordance with RITS Standards. Engineering approaches to provide armouring – e.g. rock rip rap, gabion. Bank regrading to introduce a transition with gradual bank slope, widening stream channel to dissipate flows and riparian planting. Advocating for stormwater retention/detention above the receiving environment	Regional Infrastructure Technical Specifications (RITS)
Potential loss or further deterioration of peat-wetland	Exclusion of stock. Fencing on both banks. Removal of weed and exotics such as willow, parrots feather and *Glyceria*. Planting gully banks and upper stream banks to promote connectivity with wetlands directly downstream of Duck Road. Planting to also promote in-stream conditions such as temperature and provide potential fish spawning habitat on banks	Healthy Rivers Proposed Waikato Regional Plan Change. Rule 1 and Rule 2 farming activities. Rotokauri ICMP (2017) and as highlighted in an objective generic for ICMPS: Maintaining natural hydrology "groundwater level in peat soils are sustained"

5.1.3 Management Zone 3 – Lower Te Otamanui Tributary

Description

Management Zone 3 includes the downstream reaches of the Te Otamanui Tributary, which are dominated by low-density residential land use. The surrounding land use also a public school. The lower reaches have wide floodplains and the top of the high gully banks (~4 metres) are planted with mature pine on the TRB. The floodplains are dominated by exotic weed species such as *Glyceria*. Similarly, further upstream (TEO_MAIN_3 to TEO_MAIN_5), the TRB has moderate riparian cover from mixed native and exotic vegetation.

There are multiple small, informal crossings along the stream channel, as well as a public access way and walking bridge from Horotiu Road to the stream.

Table 26: MZ3 Issues and Objectives

Specific Issues	Suggested Objectives and Actions	Guiding/ Statutory documents
Fluvial erosion caused by constricted channel flows	Engineering approaches to naturalise the stream channel and improve engagement with floodplain.	Stormwater Master Plan, 2016
Pest plant species within the riparian corridor	Weed control and enhancement of existing riparian corridor. Encourage greater diversity of native vegetation which reflect the ecological district and historic vegetation. Planting should also consider the functional requirements of species to provide the required stability and filtration. Improving amenity and aesthetics values, as well as maintaining and enhancing public access	Waikato Pest Management Plan 2014 - 2024 Maintenance of riparian areas and public green spaces can assist towards goals outlined in the Hamilton Plan (2015)
Outfall erosion at Horotiu Road	Redesign in accordance with RITS standards. Consideration for altered hydrology from upstream development.	Regional Infrastructure Technical Specifications (RITS) New Zealand Fish Passage Guidelines, NIWA

5.1.4 Management Zone 4 – Upper Te Otamanui Tributary

Description

Watercourses transect multiple private properties which are dominated by agricultural and cropland activities. The channels are heavily modified, with little to no riparian cover. Stock exclusion is limited to single electric wires along bank margins of some reaches, whilst other reaches have open stock access. Bank slumping and erosion in these channels can be largely attributed to stock damage rather than erosion caused by stormwater flows.

It is understood that a potential diversion from part of the Mangaheka catchment to the Te Otamanui tributary is being investigated by BECA and WSP Opus. It is further understood that only flows generated

from events greater than a 1 in 10-year event are proposed to be diverted. Therefore, dependant on flows, the increased risk on channel and bank erosion is not considered to be significant as these flows are greater than the anticipated channel forming flow for these reaches and are likely to be assimilated within overbank floodplains which exist for a majority of the upper reaches. Further investigation is recommended to determine the actual anticipated changes in flow regime and risks this poses on flooding and erosion based on rainfall scenario modelling.

The Stormwater Master Plan for HCC (2016), outlines management priorities for open watercourses and drains, much like the reaches found in this management zone. These management actions include channel erosion remediation, outfall erosion remediation, improvement of riparian corridors and vegetation, mitigation of fish barriers and improved water quality.

Management objectives such as naturalisation of channels are considered low priority as there are often land constrictions on private land. Nevertheless, there are opportunities for Council, supported by guiding documents such as the Proposed Healthy Waters Waikato Regional Plan Change, to engage with landowners to improve the ecological outcomes in these reaches. The properties surrounding the Te Otamanui Tributary can be categorised as small and low intensity rural properties under 4.1 ha.

Table 27: MZ4 Issues and Objectives

Specific Issues	Suggested Objectives and Actions	Guiding/ Statutory/ Reference documents
Direct stock access, causing erosion and damage to bank margins	Set-backs, fencing to exclude stock, and riparian planting.	Proposed Healthy Waters Waikato Regional Plan Change 1. Schedule C – stock exclusion. Rule 1 and Rule 2 apply to properties surrounding Te Otamanui Tributary
Multiple undersized private culverts	Redesign and upgrade to improve conveyance, particularly with potential increased flows from the upstream development and diversion of the Mangaheka Stream. Redesign of culverts should also consider removing redundant culverts and fish passage friendly infrastructure	Regional Infrastructure Technical Specifications (RITS) New Zealand Fish Passage Guidelines, NIWA
Incised, steep channels with localised areas of severe erosion	Engineering approaches to address existing erosion issues and mitigate further erosion in the channel	Stormwater Master Plan (2016)
Online pond upstream of TEO_MAIN_7	Restoration to natural hydrology and removal of a series of culverts which are barriers to mitigation	Regional Infrastructure Technical Specifications (RITS) New Zealand Fish Passage Guidelines, NIWA Waikato Regional Plan; Section 3.6
Proposed diversion from part of the Mangaheka catchment to the Te Otamanui tributary	Further investigation is required to determine the actual anticipated changes in flow regime and risks on flooding	Potential catchment inflows from Mangaheka stream identified in Rotokauri ICMP (2017)

Table 28: **Summary of Management Zones and Objectives**

Management Zones		Stream Naturalisation	Erosion Remediation and Sediment Control	Stock Exclusion and Fencing	Riparian Vegetation Enhancement	Wetland Enhancement	Pest Plant Control	Water Sensitive Communities	Infrastructure Remediation	Fish Passage Remediation	Artificial Pond Remediation	Conveyance Improvement
MZ1	Rotokauri North Development Area	✓	✓		✓			✓	✓			
MZ2	Ohote Tributary downstream of Exelby Road and TEO_MAIN_18		✓	✓	✓	✓	✓			✓		✓
MZ3	Lower Te Otamanui TEO_MAIN_1 to TEO_MAIN_ 8		✓	✓			✓		✓			
MZ4	Upper Te Otamanui Tributary		✓	✓	✓						✓	✓

5.2 Erosion Mitigation Projects

The conversion of greenfield areas to developed urban areas will result in an increase in impervious surfaces, and associated changes in the hydrograph of receiving watercourses. These changes in the hydrograph often include 'flashy' hydrology with elevated flow depths and velocity, as well as lower base flows.

Mitigation of frequent flow changes is likely to be incorporated in development proposals, however there will be a residual potential that upstream development in the RNDA will increase the erosion and channel instability downstream. Remediation of current instabilities is important to mitigate this further erosion risk in the sub-catchment resulting from the proposed development. Engineering approaches to remediate channel instabilities include reducing channel bank grade, placement of boulders for bank protection, and planting riparian vegetation buffers.

The mitigation projects identified in this assessment arise from existing issues that have the potential to be exacerbated by changes in the contributing catchment. It should not be inferred that the costs of these projects would be borne entirely by upstream greenfield growth areas. A further process of assessing the contributing catchment, and existing and proposed on-site mitigation is necessary to consider a fair and reasonable allocation of costs between existing contributors and growth areas.

Where erosion hotspots, 'moderately unstable' or 'unstable' reaches were identified, engineering approaches to mitigate further erosion are recommended. A summary of these erosion mitigation projects is presented in Table 30. Refer to Appendix 6.

It should be noted that the primary objective of these erosion mitigation projects is to manage existing erosion issues and mitigate residual future erosion effects only. The scope of these erosion mitigation projects does not provide mitigation solutions for agricultural best practices such as stock exclusion to waterways and have therefore not been costed for but have been noted where applicable. The projects do not directly seek but may have co-benefits to improve water quality, ecological enhancement, or amenity values. For enhancement opportunities within the Rotokauri North sub-catchment where erosion mitigation is not the primary driver, refer to Section 5.3.

High-level costs for the proposed erosion mitigation measures within each reach are provided in Table 29. It is recommended that a detailed options analysis and planning assessment is conducted to inform capital works. Table 30 describes the erosion mitigation projects and expected outcomes.

The unit rates and costs applied to erosion mitigation works are derived from quotes and invoices from physical works in the last five years in the Auckland market. The rates are therefore considered conservative. The final costings presented in this report should be considered as indicative only with further refinement required during concept design.

Table 29: Proposed erosion mitigation works costs ($)

Reach/Tributary	Bank Batter Excavation	Coir Matting	Newbury Rock Riffle	Keystone Boulders	Cost Planting	Total Cost	Design and Feasibility (10%)	Resource Consent (3%)	Defects Liability (10%)	Sub-total	Total including 20% Contingency
TEO_MAIN_1	141,457	7,777			63,751	212,985	21,298	6,390	21,298	261,971	314,365
TEO_MAIN_2	34,904	2,728			19,574	57,205	5,721	1,716	5,721	70,363	84,435
TEO_MAIN_3	28,889	2,252			20,089	51,230	5,123	1,537	5,123	63,013	75,615
TEO_MAIN_4	-				13,360	13,360	1,336	401	1,336	16,433	19,720
TEO_MAIN_7	7,348	1,643		67,044	27,170	103,205	10,321	3,096	10,321	126,942	152,331
TEO_MAIN_8	28,957	3,871	44,270	-	23,720	100,818	10,082	3,025	10,082	124,006	148,807
TEO_MAIN_9	-			25,404	-	25,404	2,540	762	2,540	31,247	37,497
TEO_MAIN_11	200,161	5,575		-	15,794	221,531	22,153	6,646	22,153	272,483	326,979
TEO_MAIN_14	52,222	9,014		-	45,618	106,854	10,685	3,206	10,685	131,430	157,716
TEO_MAIN_15	28,026	2,758		13,852	9,815	54,451	5,445	1,634	5,445	66,975	80,370
TEO_MAIN_21	401,441	15,131		-	53,924	470,496	47,050	14,115	47,050	578,710	694,452
TEO_MAIN_24	-			-	25,838	25,838	2,584	775	2,584	31,781	38,137
TEO_MAIN_26	28,503	6,088		89,068	32,146	155,806	15,581	4,674	15,581	191,641	229,969
TEO_TRIB1_1	1,207	2,630	50,418		2,812	57,067	5,707	1,712	5,707	70,192	84,230
OHO_TRIB1_3	1,813	159			17,116	19,089	1,909	573	1,909	23,479	28,175
OHO_TRIB1_7	-	-			10,223	10,223	1,022	307	1,022	12,574	15,088
Total costs ($)	954,929	59,626	94,688	195,368	380,950	1,685,561	168,556	50,567	168,556	2,073,240	
Total overall costs for erosion mitigation works with 20% contingency											**2,487,888**

** Unit rates used to calculate costs are in Appendix 9*

Table 30: Proposed Erosion Mitigation Works in the Rotokauri North Sub-Catchment

Location in the sub-catchment	Issue	Proposed Erosion Mitigation Works	Approximate area or length of proposed works	Expected Outcomes
TEO_MAIN_1 to TEO_MAIN_3	Fluvial erosion resulting in highly incised, steep stream banks. Constricted, narrow channel with wide floodplains.	Bank battering to a 1:3 grade. Weed plant removal and riparian planting with coir matting.	Earthworks removal = 10518 m^3 Floodplain planting = 2892 m^2 Grade control = 53 m^3	Reduce channel incision and bank angle. Increase floodplain connectivity. Riparian planting to reduce upper bank and floodplain erosion and improve cohesive strength of soils.
TEO_MAIN_4	Highly incised, steep stream banks. Mass wasting from banks and undercutting on TLB Bare or minimum groundcover on TLB.	Riparian planting on TLB.	Floodplain planting = 760 m^2	Riparian planting to reduce upper bank and floodplain erosion on TLB.
TEO_MAIN_7	Incised banks with active bank widening. Toe erosion and degradation. Direct stock access, and damage to banks.	Bank battering to a 1:3 grade. Placement of keystone boulders. Riparian planting with coir matting	Earthworks removal area = 164 m^3 Keystone boulders = 45 m^2 Floodplain planting = 760 m^2	The keystone boulders will provide toe protection and bank stabilisation without requiring additional grading of banks. Planting of banks to improve riparian vegetation condition, stock exclusion is recommended.
TEO_MAIN_8	Constructed pond at head of reach has caused steepening of the reach. Active incision, with channel and bed scour, and Knick points.	Bank battering to a 1:3 grade. Newbury Rock Riffle Riparian planting with coir matting	Floodplain planting = 664 m^2 Earthworks removal = 598 m^3	Reduce channel grade, dissipate flows and protect the stream bed from further degradation. Increase habitat complexity
TEO_MAIN_9	Straightened channel with steep banks	Placement of keystone boulders	Keystone boulders = 35 m^2	Toe protection and stream bank stabilisation to reduce further erosion
TEO_MAIN_11	Straightened channel with steep banks Bank erosion exacerbated by stock access	Riparian planting with coir matting	Floodplain planting = 442 m^2	Reduce sediment release and discharge from the channel. Protect the morphology and hydrodynamics of the watercourse and planting of banks to improve riparian vegetation condition. Stock fencing exclusion is recommended.
TEO_MAIN_14	Steep, incised banks. Toe scour.	Bank battering to a 1:3 grade. Riparian planting with coir matting	Earthworks removal = 423 m^3 Floodplain planting = 1276 m^2	Reduce channel incision and bank angle and stabilise bank with riparian buffer planting. Increase floodplain connectivity.
TEO_MAIN_15	Unstable undercutting on both banks, bank and bed scour leading to deepening of stream and incision	Placement of keystone boulders Riparian planting with coir matting	Erosion mitigation planting = 275 m^2 Keystone boulders = 19 m^2	Toe protection to mitigate further toe erosion and widening of the stream bed. Riparian planting to reduce bank slumping.
TEO_MAIN_21	Erosion on low lying TRB primarily exacerbated by stock access. Toe undercutting caused by fluvial processes and bank slumping	Bank battering to a 1:3 grade Riparian planting with coir matting	Earthworks removal = 6918 m^3 Floodplain planting = 1508 m^2	Stability from riparian planting and gradual slope to prevent further bank slumping. Fencing for stock exclusion is recommended.
TEO_MAIN_24	Drain cleaning resulting in loose, exposed soils slumping into stream channel	Riparian planting with coir matting	Floodplain planting = 723 m^2	Planting to provide bank stability for resilience against increased flows and retention of valuable top soils
TEO_MAIN_26	Erosion hotspot on TLB. Bank slumping recorded along the length of reach. Ongoing toe erosion leading to widening of stream channel. No significant risk to existing infrastructure.	Bank batter to a 1:3 grade Riparian planting Placement of keystone boulders	Floodplain planting = 899 m^2 Earthworks removal = 503.7 m^3 Keystone boulders = 123 m^2	Protection against loss of further land from adjacent property. Reduce channel incision and bank angle. Increase floodplain connectivity. Riparian planting to reduce upper bank and floodplain erosion and improve cohesive strength of soils.
TEO_TRIB1_1	Steepened and deepened channel. Increased flow velocity causing scouring along banks and at the confluence	Bank batter to a 1:3 grade Riparian planting with coir matting	Earthworks removal = 40.8 m^3 Floodplain planting = 78 m^2	Dissipate energy from flows to prevent further scouring of banks. Riparian vegetation providing bank stability and soil retention

Location in the sub-catchment	Issue	Proposed Erosion Mitigation Works	Approximate area or length of proposed works	Expected Outcomes
OHO_TRIB1_3	Erosion hotspot on the upper banks and gully banks due to lack of riparian vegetation and stock access	Bank batter to a 1:3 grade Riparian planting with coir matting	Earthworks removal = 91.2 m^3 Floodplain planting = 479 m^2	Riparian planting to reduce upper bank and floodplain erosion and improve cohesive strength of soils.
OHO_TRIB1_7	Erosion on TLB, primarily due to a lack of riparian vegetation and stock access	Riparian planting	Floodplain planting = 286 m^2	Reduce sediment release and discharge from the channel. Protect the morphology and hydrodynamics of the watercourse and increase bank stabilisation with riparian planting.

5.3 Enhancement Opportunities

Five enhancement opportunities were identified in the Rotokauri North sub-catchment and receiving environments. In some instances, these enhancement opportunities are intended to work in tandem with the proposed erosion mitigation works to improve management outcomes. Other enhancement projects highlight opportunities to utilise water sensitive design and best practice green infrastructure design to minimise adverse impacts on watercourses within the RNDA and the receiving environments as discussed in Sections 5.1 and 5.2 above. Enhancement opportunities are intended to increase the amenity and ecological value of the watercourses, whilst improving flow conveyance and improving resistance to further changes to surrounding land use.

The enhancement projects identified in this assessment represent opportunities only. It should not be inferred that these projects are allocated to any particular party to implement. The enhancement information has value in that it can inform a range of parties (e.g. HCC, WDC, WRC, land owners) who may be considering or undertaking other works in the vicinity. Parties will be able use this information to, if they choose, influence project scoping to deliver or maximise environmental benefits, perhaps with no significant additional investment required. Identifying these opportunities also provides an information base for not-for-profit or environmentally focused delivery agencies looking for opportunities to invest in environmental improvement works (e.g. Streamcare groups, WRC, WRA).

All the enhancement opportunities are located within the Waikato District and are not on public land. In order for these enhancement opportunities to be realised, co-operation with landowners will be required and, in some cases, easements developed for maintenance of these areas.

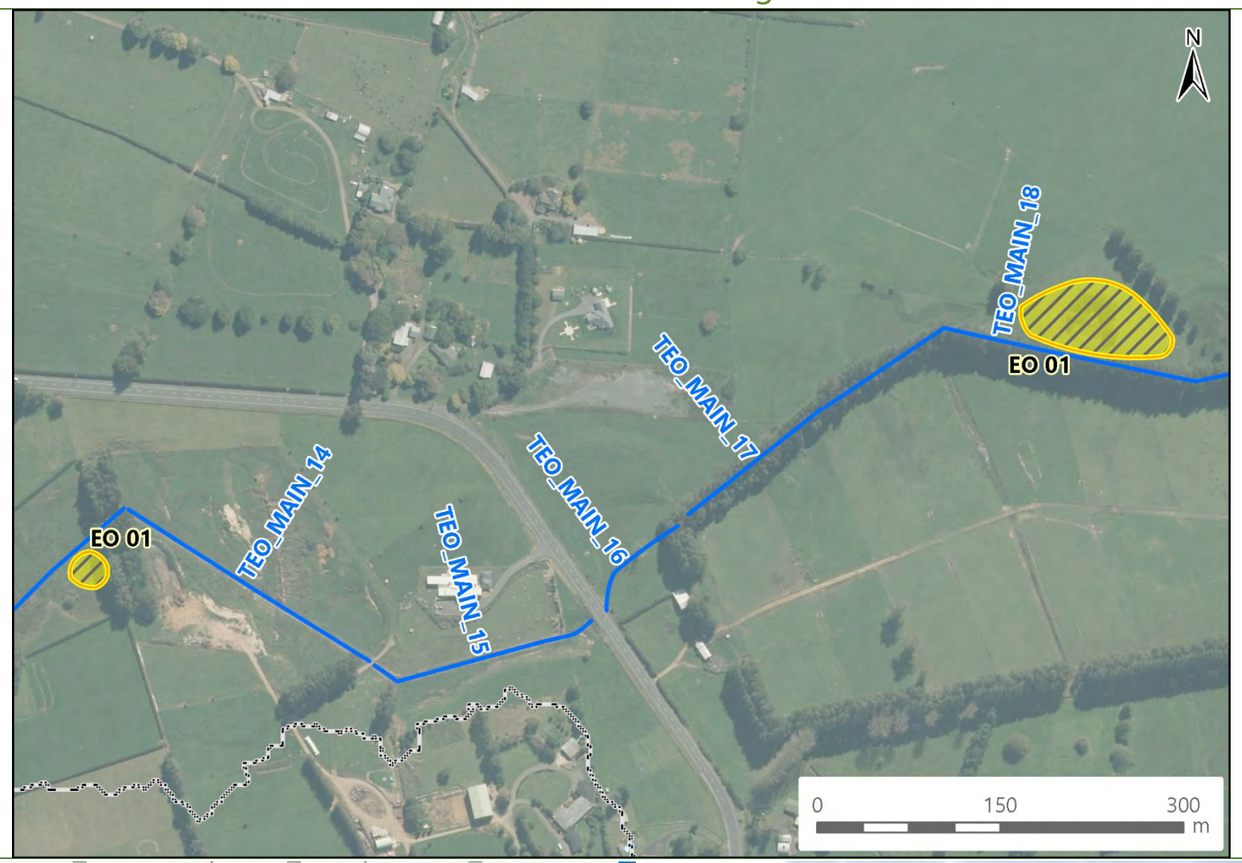
As per the REM methodology, each enhancement opportunity is assigned a high-level prioritisation score based on the potential benefits to the public and local amenity values, ecological values such as biodiversity and habitat improvements, and conveyance. An overview of the projects and their prioritisation is presented in Table 31. Refer to Appendix 7 for the location of these areas.

Table 31: Summary of prioritisation of enhancement opportunities.

Enhancement Opportunity	Management Zone	Description	Amenity	Ecology	Conveyance	Overall Score	Prioritisation Score
EO 1	MZ4	Wetland naturalisation and planting at two existing wetland sites along the mid- Te Otamanui Stream	L	M	M	8	3
EO 2	MZ2	Wetland naturalisation and planting along the lower reaches of the Ohote Tributary	M	H	H	11	1
EO 3	MZ4	Pond naturalisation at head of TEO_MAIN_8	L	M	H	9	2

Enhancement Opportunity	Management Zone	Description	Amenity	Ecology	Conveyance	Overall Score	Prioritisation Score
EO 4	MZ3	Stock exclusion and riparian enhancement along erosion prone reaches	L	H	M	9	2
EO 5	MZ4	Stock exclusion and riparian restoration along Te Otamanui Tributary	L	M	M	8	3

EO1- Wetland naturalisation and enhancement along mid-Te Otamanui Stream



Location: Upper Te Otamanui Tributary

Tributary ID: TEO_MAIN_18 and TEO_MAIN_13 **Ownership:** Private

Priority score: 3

Description: Opportunity for the restoration of wetlands to help regulate stream flows and enhance ecological functions.

Currently modified straightened and incised channels drain pastoral land use along the Te Otamanui. The floodplains maintain some wetlands with species such as Juncus, but the land has been planted with pastoral grasses and heavily modified by stock access.

The source of flow is likely comprised of groundwater seepage and rain fall. These areas can be defined as natural palustrine wetlands.

At TEO_MAIN_18, existing artificial farm pond can be naturalised and connected to the wider wetland area.

Upstream Catchment Area:	Wetland Area:	Wetland Area as Percentage of Upstream Catchment:
284 Hectares	0.64 Hectares	0.2%

Considerations

These areas outside the RNDA will likely remain private. Enhancement and stream management in these receiving environments requires land-owner cooperation. Opportunity for Council and community engagement

Enhancement Types	Stakeholders
Naturalisation	Residents
Fencing/Stock Exclusion	HCC
Conveyance Improvements	Community groups
Aquatic Weed Control	



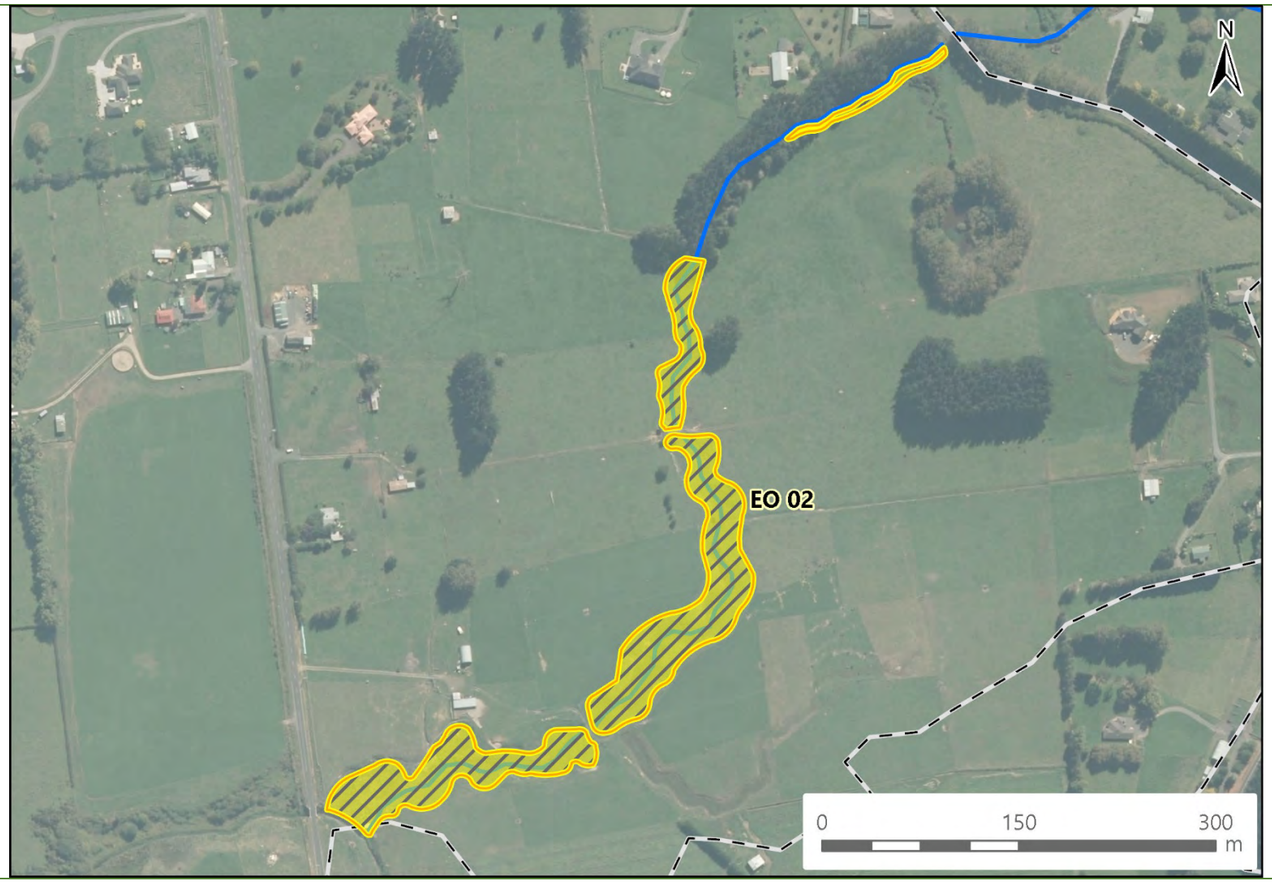
Artificial farm pond on TRB of TEO_MAIN_18 embedded in a natural palustrine wetland





Palustrine wetlands heavily modified by stock damage and planted by pastoral grasses

EO2- Wetland naturalisation and enhancement in lower Ohote Stream reaches



Location: Ohote Stream downstream of Exelby Road

Tributary ID: OHO_TRIB1_1 to OHO_TRIB1_7

Ownership: Private

Priority score: 1

Area: 1.79 Ha

Description:

The downstream reaches of the Ohote Stream are identified as low grade, meandering channels which vary from single thread channel to anastomosing channels during periods above normal flow. In these riverine wetland-like reaches, the floodplains have secondary and tertiary channels that are highly connected. These riverine wetland-like reaches provide valuable water filtering and sediment retention services.

Opportunity to exclude stock, create set-backs of 10 metre riparian buffers and plant the gully banks with native vegetation will improve the ecological value of this watercourse type in the sub-catchment. In addition, removal and re-design of the farm culvert which is a fish barrier to upstream habitat.

Considerations

- Erosion and scour protection
- Weed removal and planting appropriate, eco-sourced vegetation
- Fish passage
- Maintaining conveyance capacity
- Flooding risk to reach directly downstream of the culvert

Enhancement Types	Stakeholders
Naturalisation	Residents
Fencing/Stock Exclusion	HCC
Conveyance Improvements	Community groups
Aquatic Weed Control	

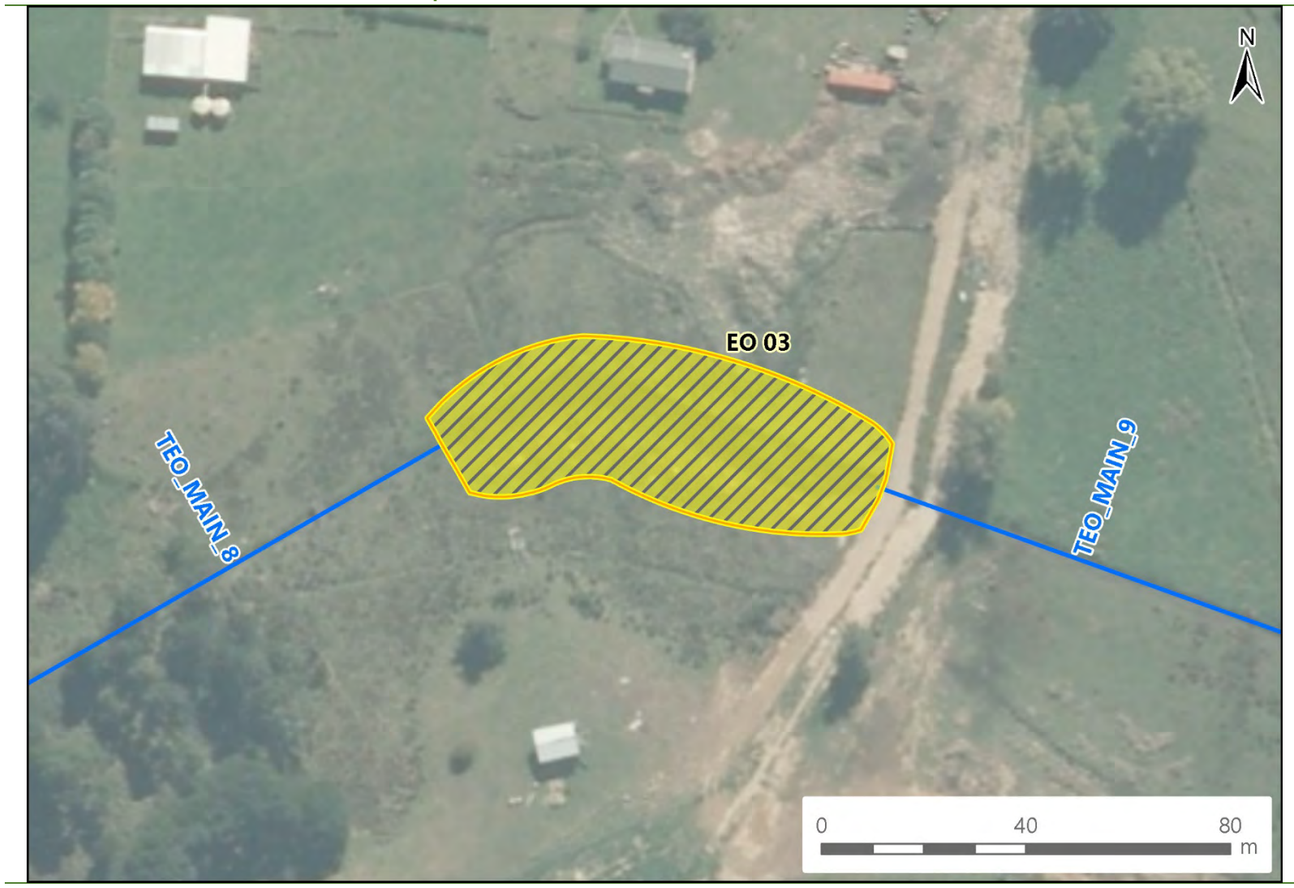






Riverine wetland-like reaches in the downstream reaches of the Ohote Stream

EO3– Pond naturalisation upstream of TEO_MAIN_8



Location: Lower Te Otamanui Tributary

Tributary ID: TEO_MAIN_8

Ownership: Private

Priority Score: 2

Area: 0.24 Ha

Description

Artificial farm pond created through damming on private property. WRC Plan recognises farm damming as a permitted activity where it does not adversely impact neighbouring properties or increase erosion and flooding risk. The aesthetic farm pond has altered local hydrology and ecological processes. The reaches directly downstream of the pond are unstable, and highly prone to erosion.

Opportunity to naturalise the pond, stabilise stream banks, remove fish barriers and enhance the riparian margins with native riparian vegetation.

The pond is on private property and therefore requires co-operation with landowners for stream management and remediation works.

Considerations

- Maintenance required for conveyance efficiency
- Downstream effects of naturalising pond to a stream channel
- Erosion and scour protection
- Remediation of fish barrier
- Earthworks required for re-shaping of channel
- Weed and pest control

Enhancement Types	Stakeholders
Conveyance Improvements	HCC
Fish Barrier	Residents
Erosion Protection	
Weed Control and Planting	



Artificial pond

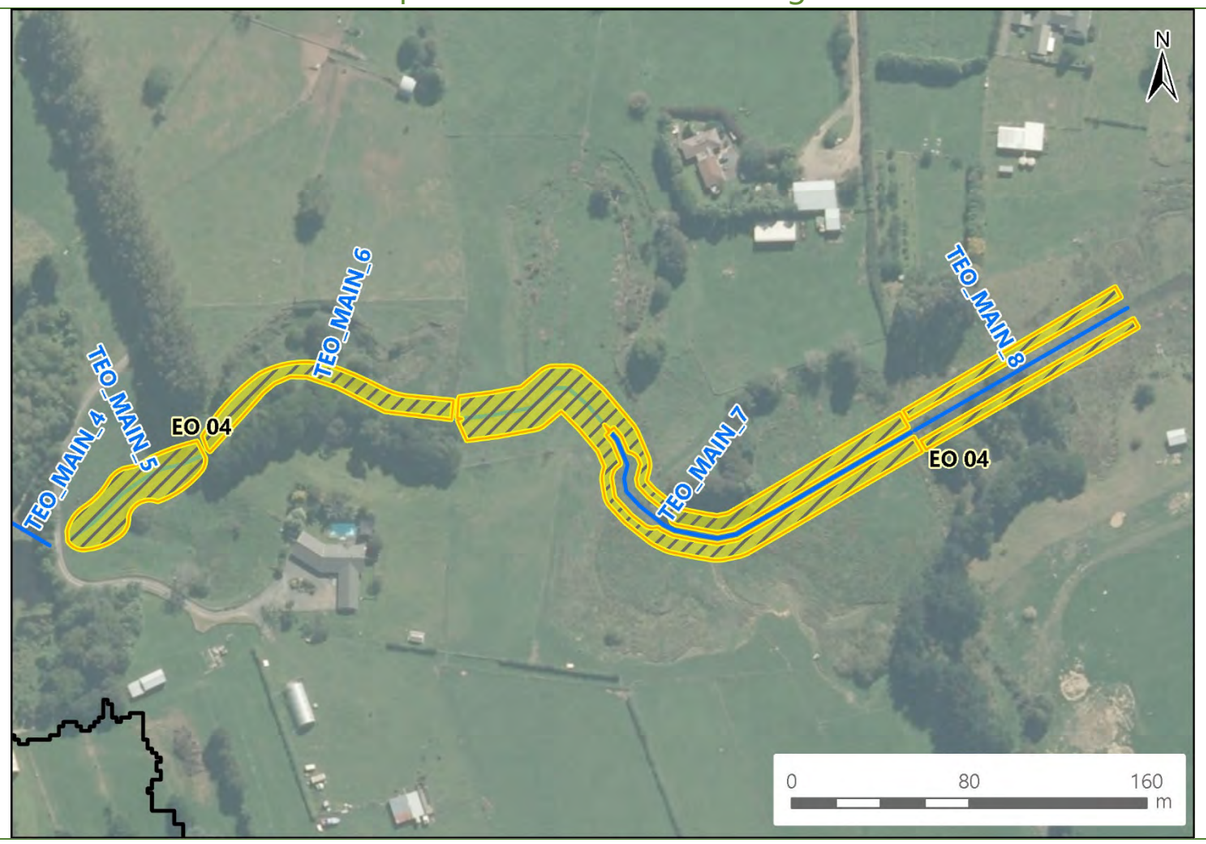


Downstream reach erosion



Culvert requiring remediation upstream of pond

EO4 – Stock exclusion and riparian enhancement along the lower Te Otamanui Tributary



Location: Lower Te Otamanui Tributary

Tributary ID: TEO_MAIN_1 to TEO_MAIN_8

Ownership: Private

Priority Score: 2

Area: 0.74 Ha

Description

This enhancement opportunity augments erosion mitigation works previously outlined in this report. In addition to the minimal works required to address current erosion mitigation issues, there is an opportunity to improve the ecological outcomes by maximising riparian buffer to the recommended 20 metre width.

Opportunity to create wider set-backs with exclusion fencing and native vegetation riparian buffers. The larger-scale management approach mitigates further risk whilst enhancing the stream habitats. Privately owned land. Enhancement and stream management in these receiving environments will therefore require landowner co-operation. There are also opportunities to create community projects which encourage community engagement.

Considerations

- Maximising riparian buffer width to reduce extent of edge habitat
- Maintaining required conveyance capacity through floodplain appropriate species
- Linking any remnant vegetation patches to minimise impacts of fragmentation

Enhancement Types	Stakeholders
Weed Control and Planting	HCC
Erosion Protection	Residents
Fencing/ Stock Exclusion	

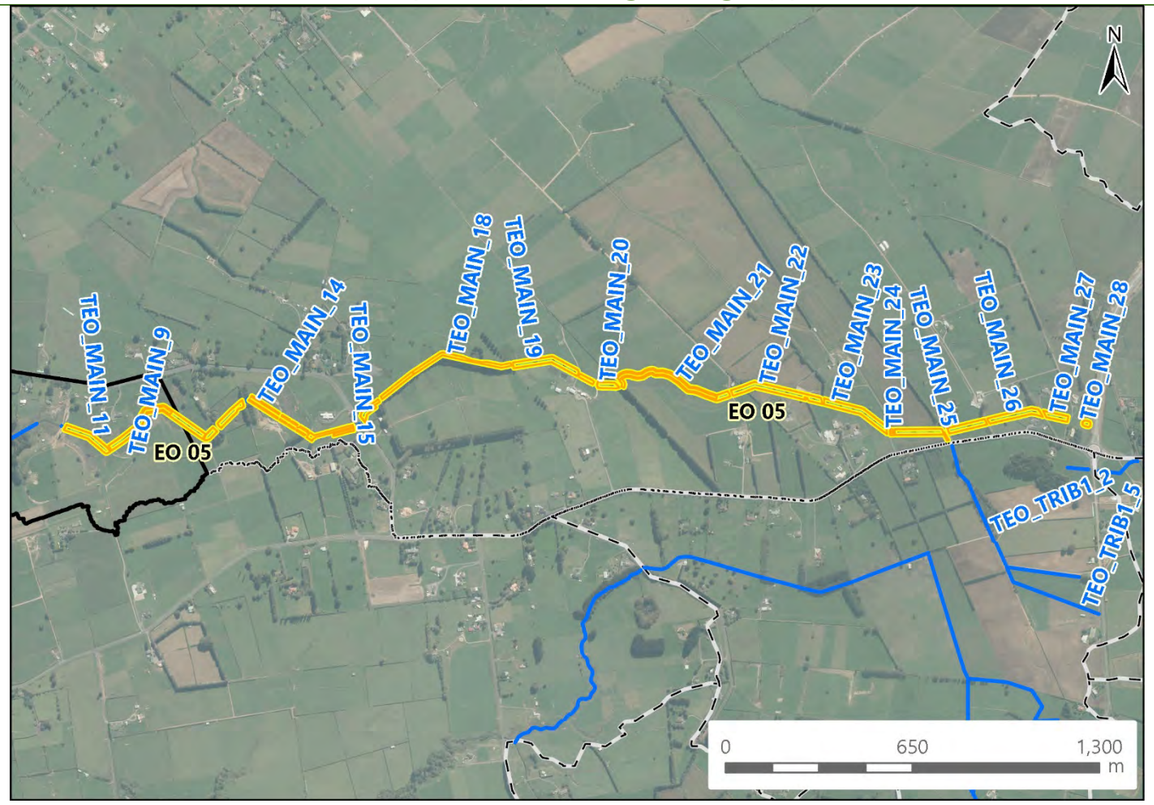






Downstream reaches of the Te Otamanui Stream, creating dominated by low growing exotic plant species

EO5 – Stock exclusion and riparian planting along upper Te Otamanui Tributary



Location: Upper Te Otamanui Tributary

Tributary ID: TEO_MAIN_9 to TEO_MAIN_28

Ownership: Private

Priority Score: 3

Area: 5.94 Ha

Description

This enhancement opportunity augments erosion mitigation works previously outlined in this report. The Te Otamanui Tributary consists of heavily modified reaches with stock damage on stream banks, poor water quality and little to no riparian cover. As an alternative to *ad-hoc* localised erosion mitigation works exclusively in highly prone reaches, there is an opportunity to create set-backs with exclusion fencing and 20 metre riparian buffers along the Te Otamanui Tributary. The larger-scale management approach mitigates further risk whilst enhancing the stream habitats.

Privately owned land. Enhancement and stream management in these receiving environments will therefore require landowner co-operation. There are also opportunities to create community projects which encourage community engagement.

Considerations

- Maximising riparian buffer width to reduce extent of edge habitat
- Maintaining required conveyance capacity through floodplain appropriate species
- Maintenance of channel to mitigate flood risks
- Linking any remnant vegetation patches to minimise impacts of fragmentation
- Long term maintenance requirements

Enhancement Types	Stakeholders
Weed Control and Planting	HCC
Erosion Protection	Residents
Fencing/ Stock Exclusion	







Upper Te Otamanui Tributary reaches with no riparian cover, stock access and high erosion susceptibility

Table 32: Summary of Enhancement Opportunity Costs

Enhancement Opportunity	Enhancement Planting Cost	Exclusion Fencing	Pond Naturalisation	Land Purchase	Total
EO1	$46,191	$5,190.48	-	$7,922	$59,304.04
EO 2	$129,618	$4,803.73	-	$22,229	$156,651.98
EO 3	-	$3,591.12	$126,940	$2,971	$133,502.50
EO 4	$53,654	$8,460.40	-	$9,201	$71,316.26
EO 5	$430,603	$72,762.70	-	$73,850	$577,216.52
Total overall costs for enhancement opportunity works with 20% contingency					**$1,210,372**

** Unit rates used to calculate costs are in Appendix 9*

6.0 Conclusions

In summary, the observations made during the field assessment indicate that the receiving watercourses downstream of the Rotokauri North Development Area are dominated by agricultural pastoral land uses, with small areas of rural residential land use. As a result, these predominately agricultural streams display a varying level of channel stability with stock access and stock damage of both the upper and lower banks evident across the survey extent.

The lack of established native woody riparian vegetation and high incidence of channel modifications have resulted in a system that often displayed unnatural channel geometry, a lack of geomorphic features and vegetation to support a healthy freshwater ecosystem. Of the 61 reaches identified, one was classified as moderately unstable and nine as unstable.

The proposed management approach presented in this report aims to anticipate and plan for the increase in conveyance demands on stream systems. The management approach identifies key issues, objectives to address these issues, and recommends options and actions to mitigate their actual and potential adverse effects.

The broad management objectives outlined in this report align with the outcomes sought by the Stormwater Master Plan (HCC, 2016), Rotokauri ICMP (2017), the NPS-FM (2016) and the Proposed Waikato Regional Plan Change (2018). The erosion mitigation projects highlight areas of concern and provide remediation options to address localised issues. The enhancement opportunities aim to address broader issues within the survey extent to enhance the ecological, conveyance and amenity values.

The fourteen erosion mitigation projects have been developed at a high level consists of four types; grade control, bank batter, erosion planting and toe protection. These engineered approaches aim to remediate existing erosion issues and mitigate further risk within the receiving watercourses.

The total estimated cost including contingency of the physical works for the proposed erosion mitigation projects is approximately $2.5 Million. Unit costs rates are applied to represent high-level estimates of physical works only.

Six enhancement opportunity projects have been proposed within the Rotokauri North sub-catchment and the receiving watercourses. These projects highlight enhancement opportunities for the developer, private land owners and Hamilton City Council to increase the amenity and ecological value of the watercourses, whilst improving flow conveyance and improving resistance to further changes to surrounding land use. The total estimated cost of the enhancement projects is approximately $1.2 Million.

Erosion remediation within the RNDA has not been included as part of this assessment, as it is anticipated that the developer will address any existing issues as part of the planned development. Enhancement opportunities have been identified within the development area and it is recommend that, where possible, the developer reduces diversion or piping of existing watercourses and instead, incorporates enhancement of existing features into any urban landscape design plans.

It is anticipated that the baseline data, summary of findings and recommendations proposed in this report will go towards supporting decision making in the development process.

7.0 References

Gardiner, D. 2017. Applying an ecosystem services approach to policy development. Waikato Regional Council. Hamilton

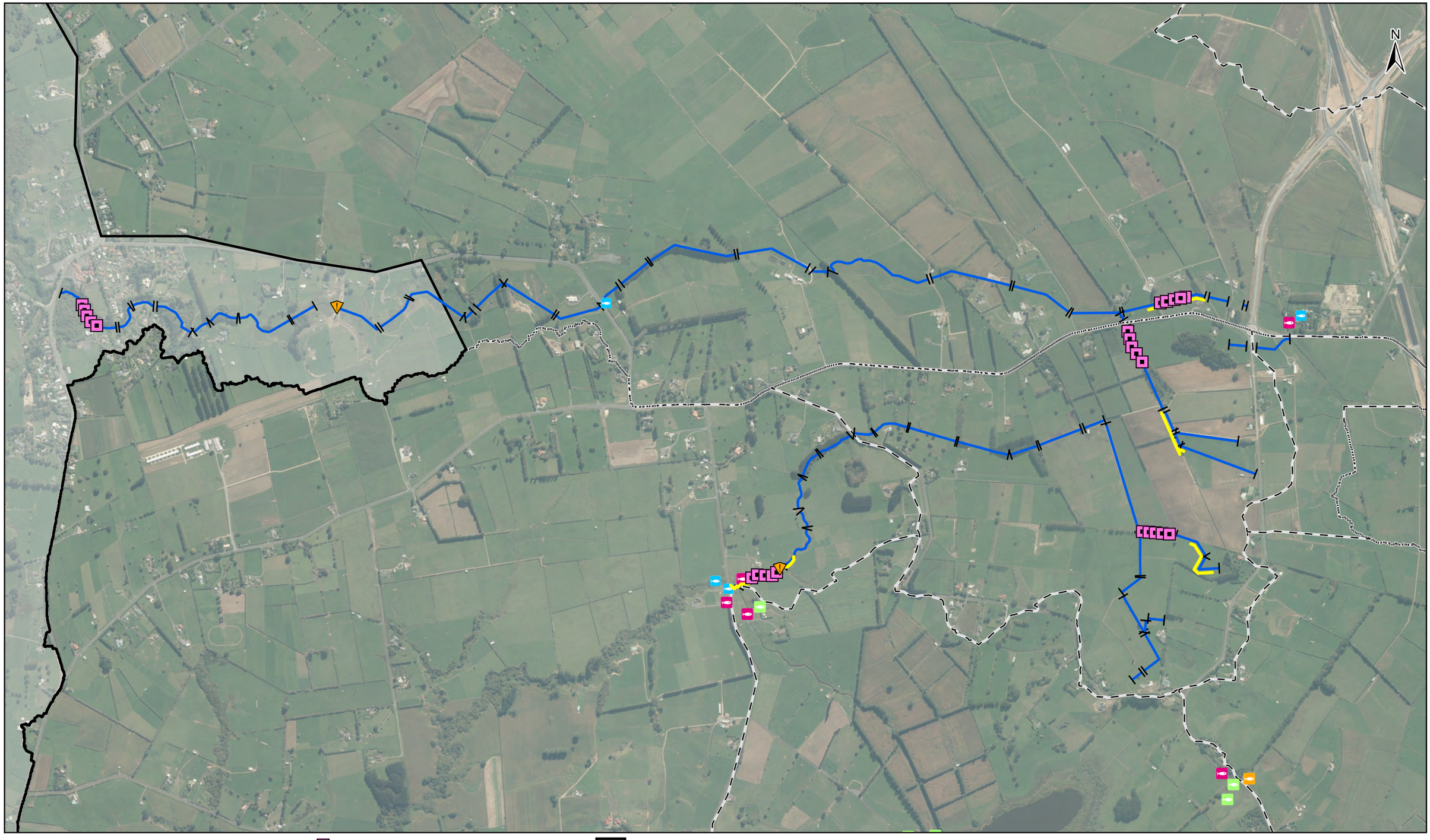
Ling, N. 2001. New Zealand mudfishes: a guide. Department of Conservation, Wellington

Stark, J. D., & Maxted, J. R. 2007. A user guide for the Macroinvertebrate Community Index. *Prepared for the Ministry for the Environment*, 58.

Stark, JD, Boothroyd, IKG, Harding, JS, Maxted, JR, Scarsbrook, MR. 2001. Protocols for sampling macroinvertebrates in wadeable streams. New Zealand Macroinvertebrate Working Group Report No. 1. Prepared for the Ministry for the Environment. Sustainable Management Fund Project No. 5103. 57p.

Appendix 1 Fish Survey and Fish Barriers

ROTOKAURI NORTH - FISH SURVEY & FISH BARRIER



W:\Morphum_GIS\Projects\Councils\Hamilton City Council\P01733 Rotokauri North Assessment\ArcPro\P01733 Rotokauri North REM\P01733 Rotokauri North REM.aprx Layout: 01 Fish Survey and Fish Barrier

NZFFDB

- Anguilliform
- Climber
- Swimmer
- Exotic

Eng. Barrier to:

- Climbers

- Water and Sediment Sample Points
- Black Mudfish Survey Locations
- Ecoline
- ICMP Catchment Boundary
- ICMP Subcatchments

Client HAMILTON CITY COUNCIL

Project **ROTOKAURI NORTH REA**

0 500 1,000 m

Project no. P01733

Date 14 Nov 2018

Drawn SM

Approved CC

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Appendix 2 Stream Watercourse Classification

ROTOKAURI NORTH - STREAM WATERCOURSE CLASSIFICATION

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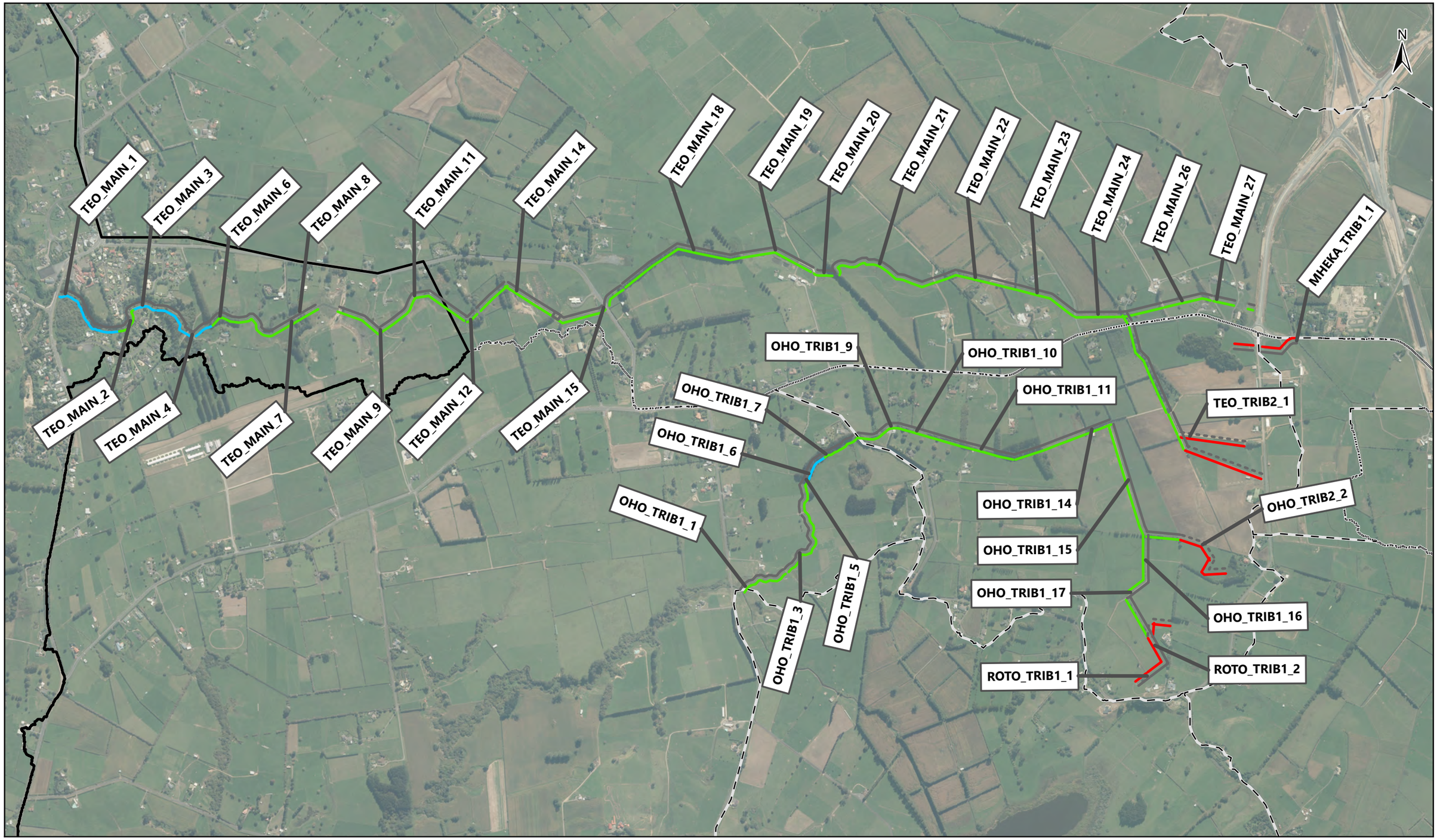

WRC Classification

- Farm drainage canal
- Modified watercourse
- River

WRC Type

- Ephemeral
- Perennial

- ICMP Catchment Boundary
- ICMP Subcatchments

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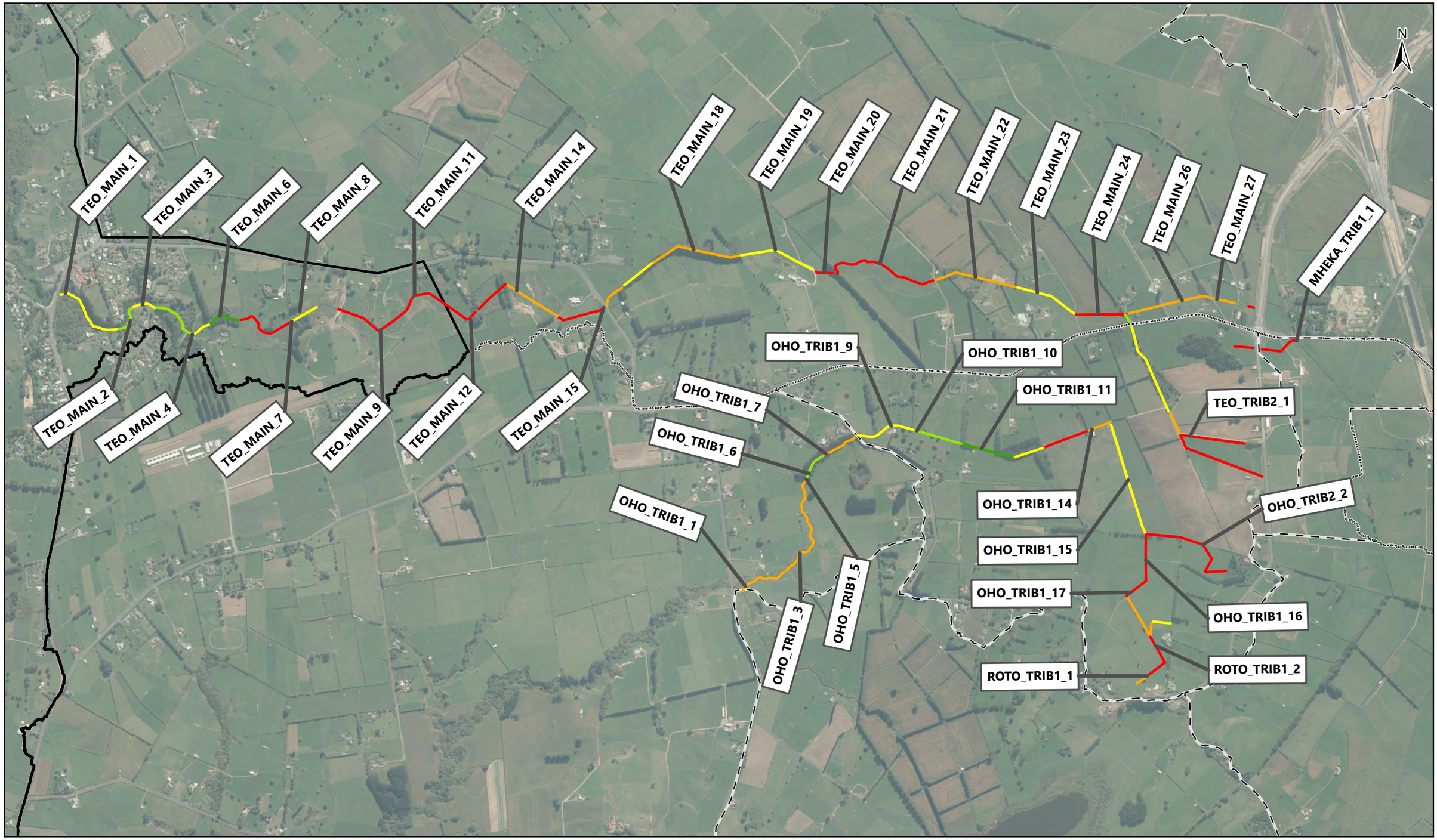
Appendix 3 Stream Overhead Cover

ROTOKAURI NORTH - STREAM OVERHEAD COVER

MORPHUM ENVIRONMENTAL LTD



Overhead Cover %

- <10%
- 10-30%
- 30-50%
- 50-70%
- 70-90%
- >90%

- ICMP Catchment Boundary
- ICMP Subcatchments

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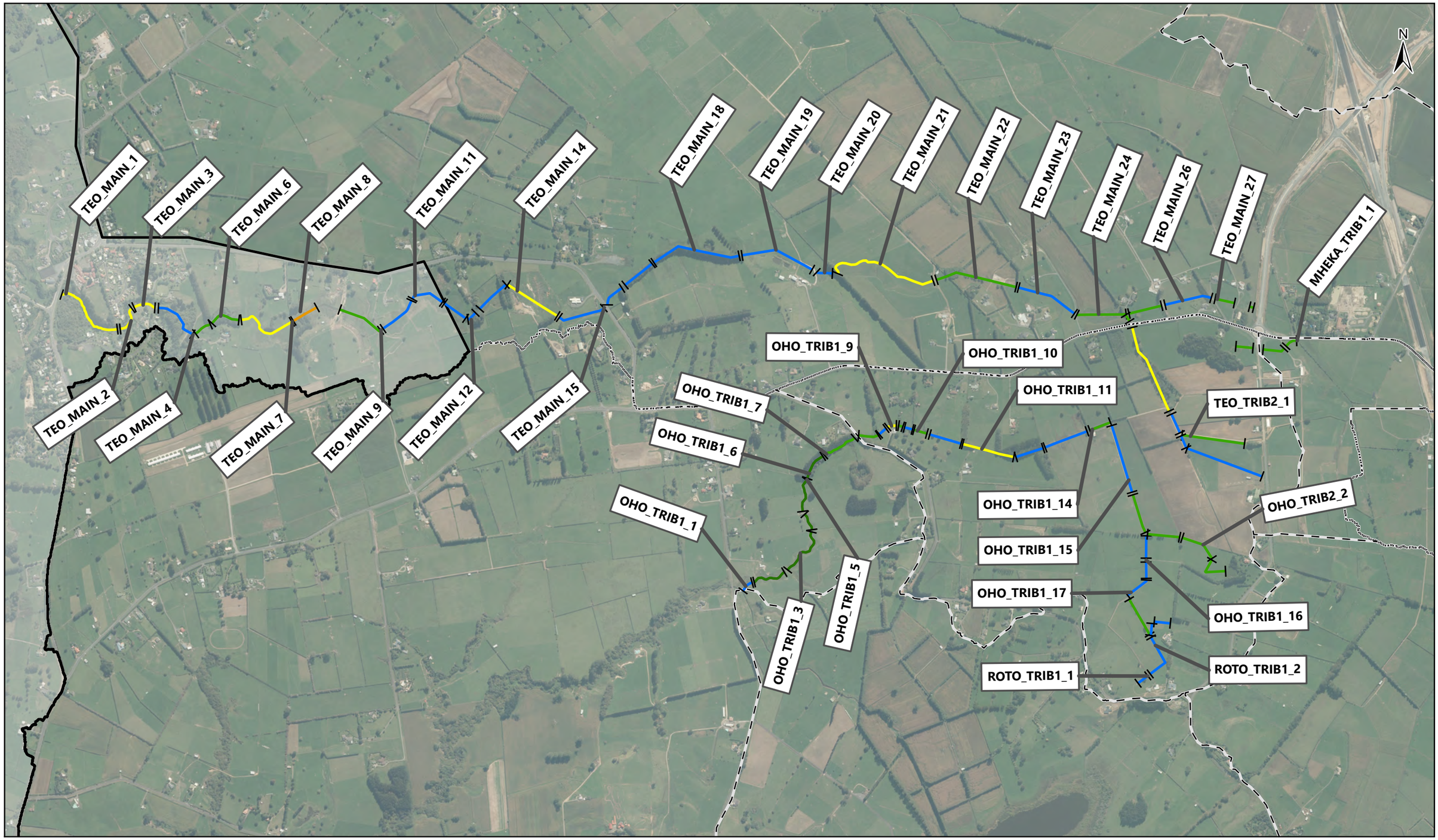
Appendix 4 Stream Erosion Susceptibility

ROTOKAURI NORTH - STREAM EROSION SUSCEPTIBILITY



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Erosion Susceptibility

- Highly Stable
- Moderately Stable
- Stable
- Unstable
- Moderately Unstable

- ICMP Catchment Boundary
- ICMP Subcatchments

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Project **ROTOKAURI NORTH REA**

0 500 1,000 m

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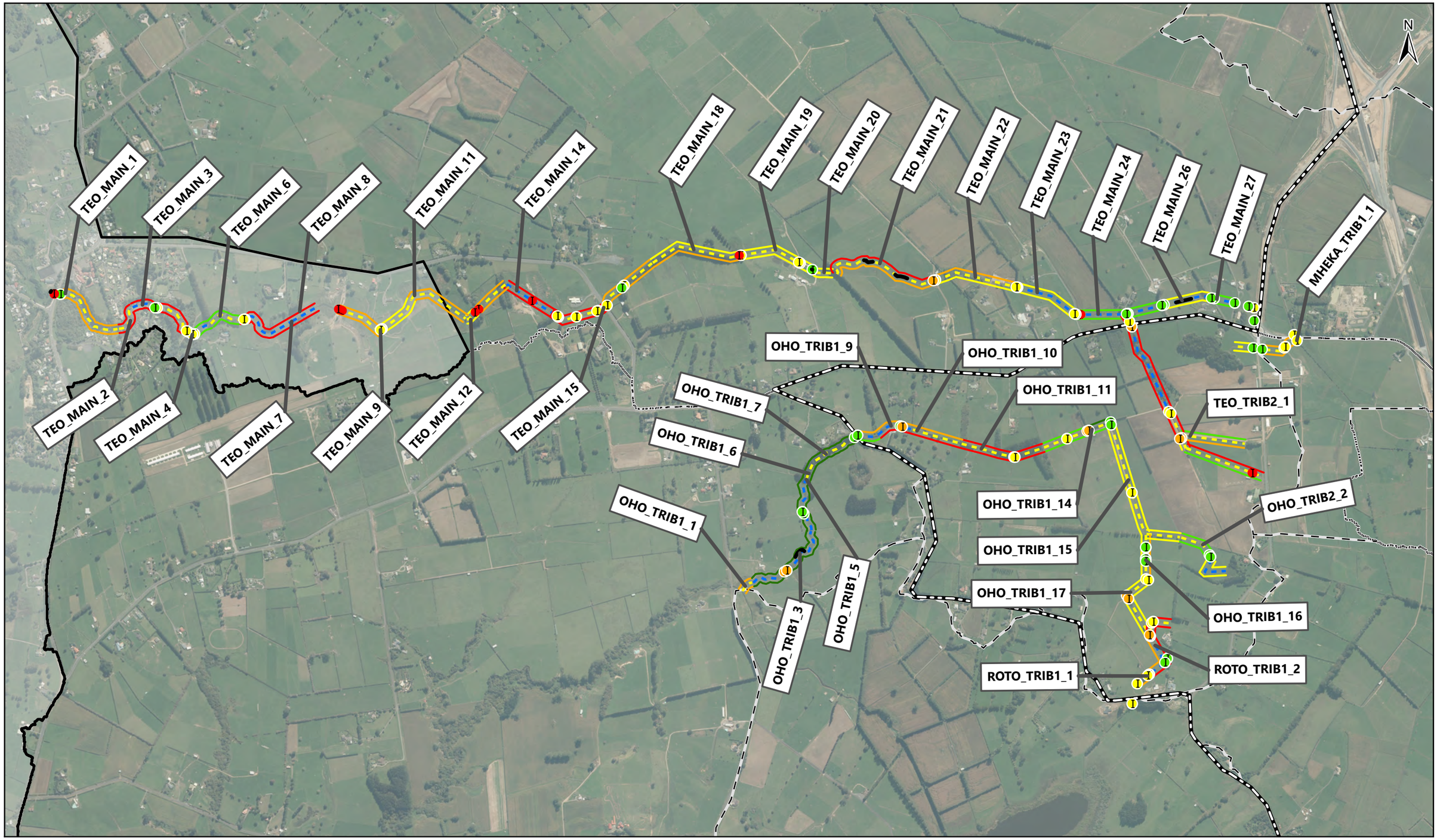
Appendix 5 Stream Erosion & Upper Bank Stability

ROTOKAURI NORTH - STREAM EROSION & UPPER BANK STABILITY



Current Erosion Bank %

- None
- <20%
- 20-40%
- 40-60%
- >60%

Upper Bank Stability Score

- Excellent
- Good
- Fair
- Poor

Erosion Hotspot

Overall Risk Value

- Medium

Infrastructure Erosion

- None
- Slight
- Moderate
- Severe

- ICMP Catchment Boundary
- ICMP Subcatchments

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0 500 1,000 m

Project no. P01733

Date 14 Nov 2018

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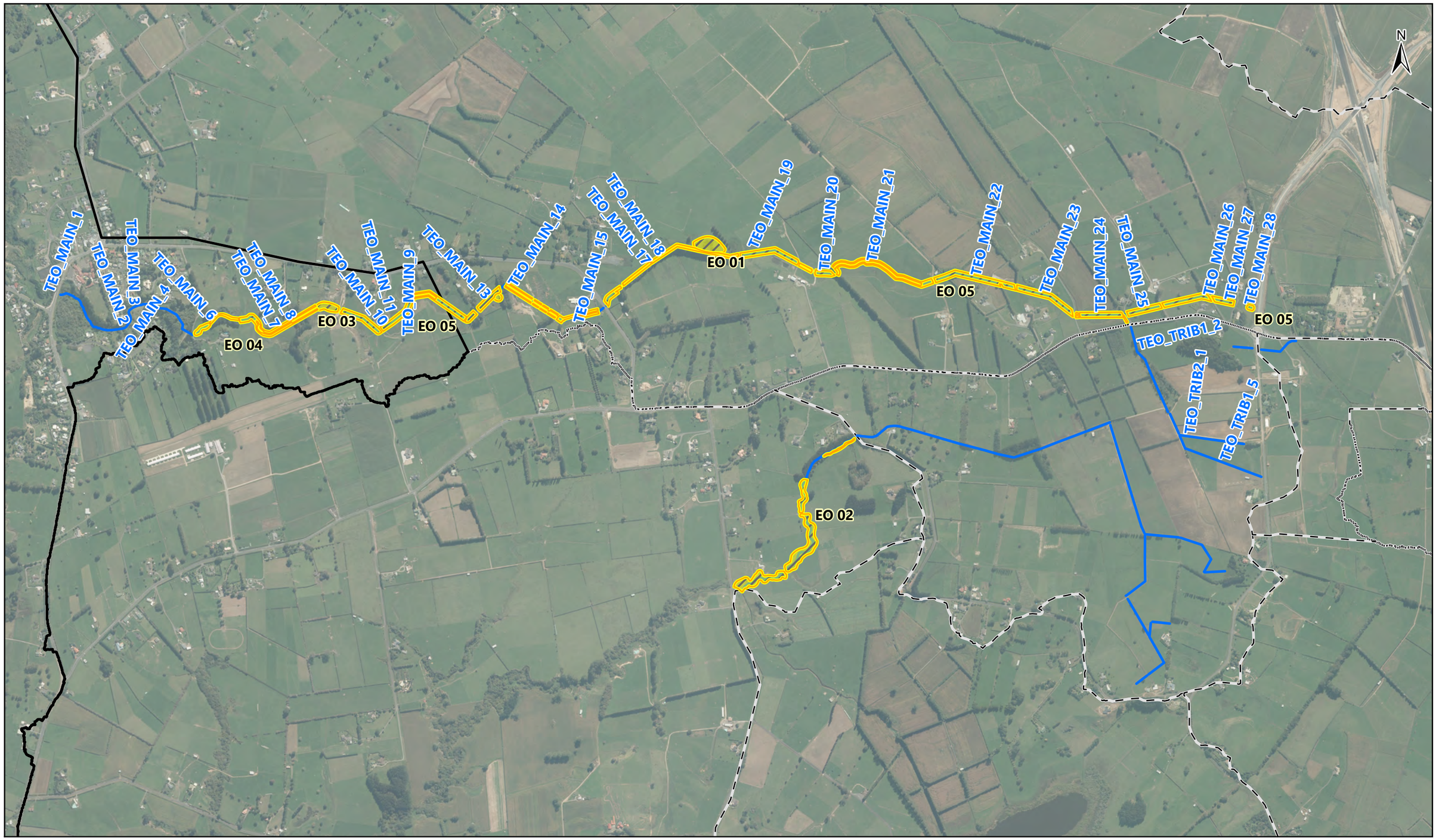
Appendix 6 Stream Enhancement

ROTOKAURI NORTH - STREAM ENCHANCEMENT



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Enhancement Opportunities

Ecoline

ICMP Catchment Boundary

ICMP Subcatchments

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Project **ROTOKAURI NORTH REA**

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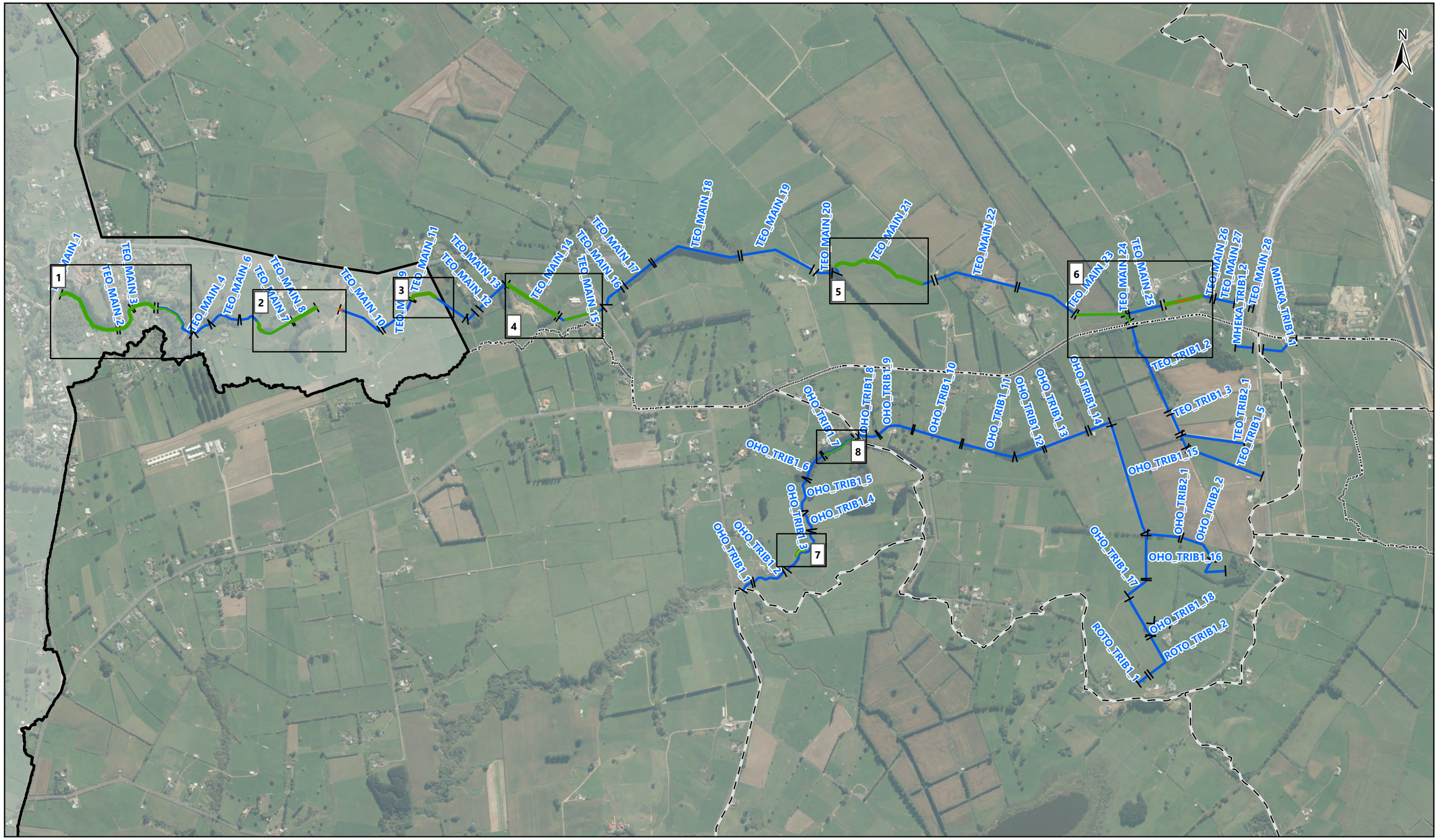
Appendix 7 Erosion Remediation Projects

ROTOKAURI NORTH - EROSION REMEDIATION PROJECTS: OVERVIEW



Erosion Mitigation Works

- Toe Protection
- Bank Batter
- Erosion Planting
- Grade Control

- Ecoline
- ICMP Catchment Boundary
- ICMP Subcatchments

Client HAMILTON CITY COUNCIL

Project **ROTOKAURI NORTH REA**

0 500 1,000 m

Project no. P01733

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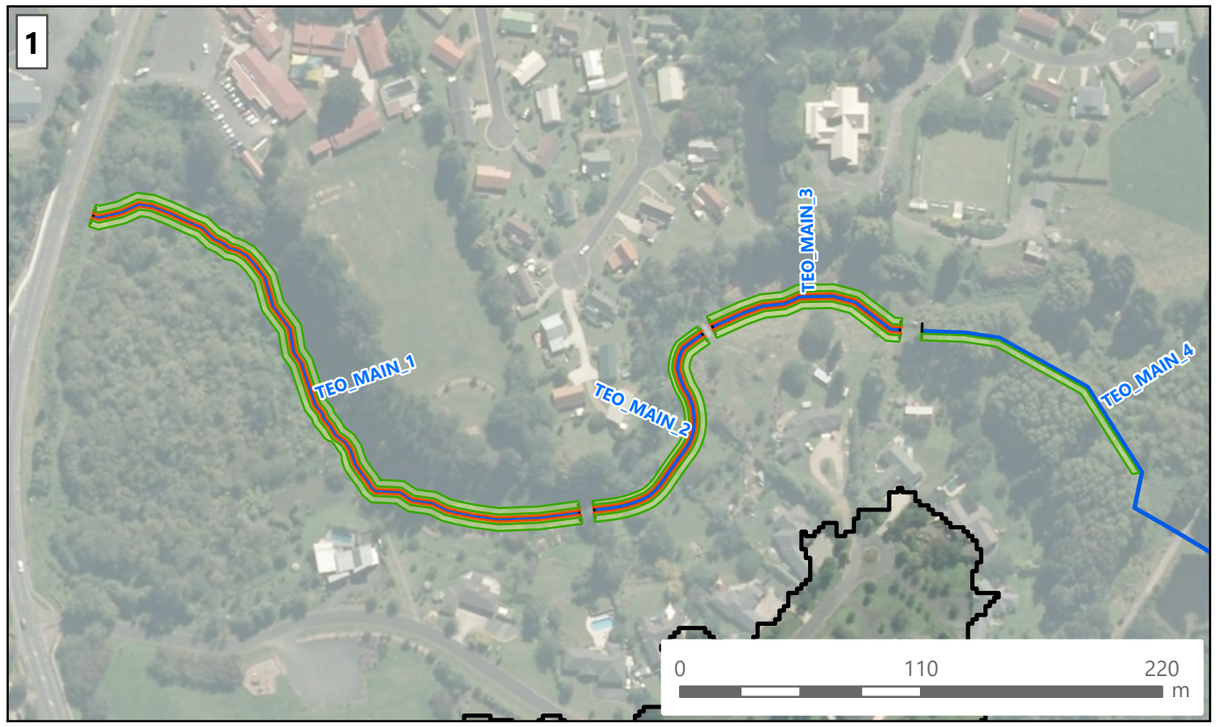
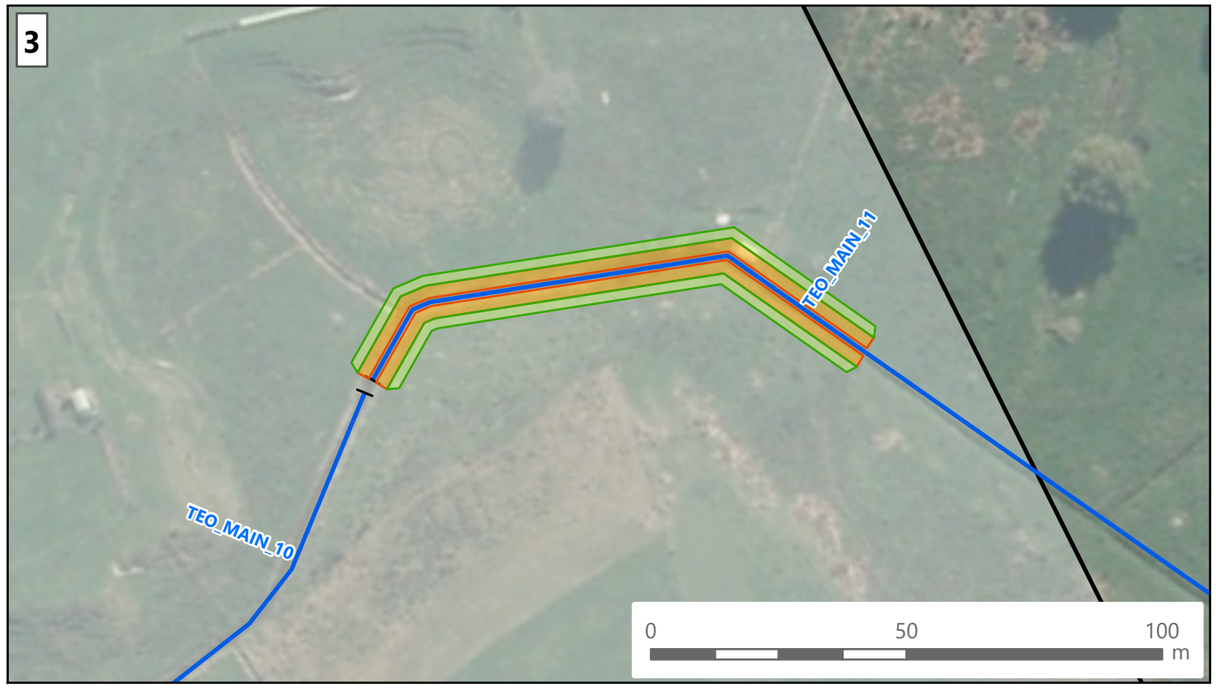
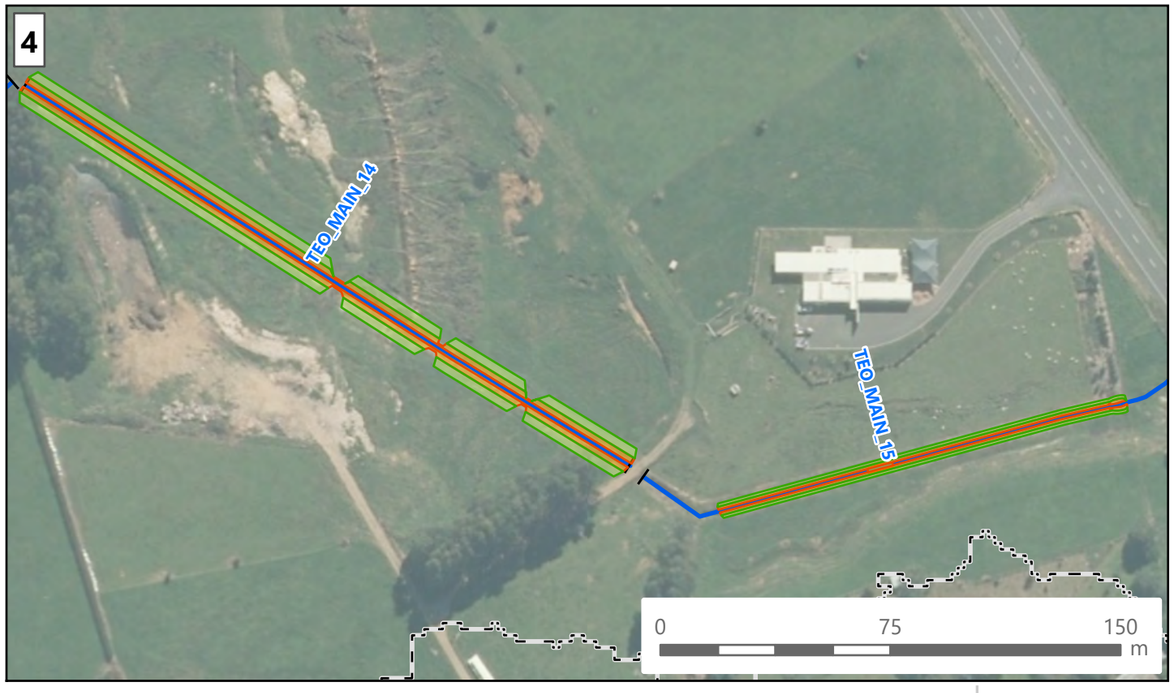
ROTOKAURI NORTH - EROSION REMEDIATION PROJECTS









Erosion Mitigation Works

- Toe Protection
- Bank Batter
- Erosion Planting
- Grade Control

- Ecoline
- ICMP Catchment Boundary
- ICMP Subcatchments

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Project **ROTOKAURI NORTH REA**

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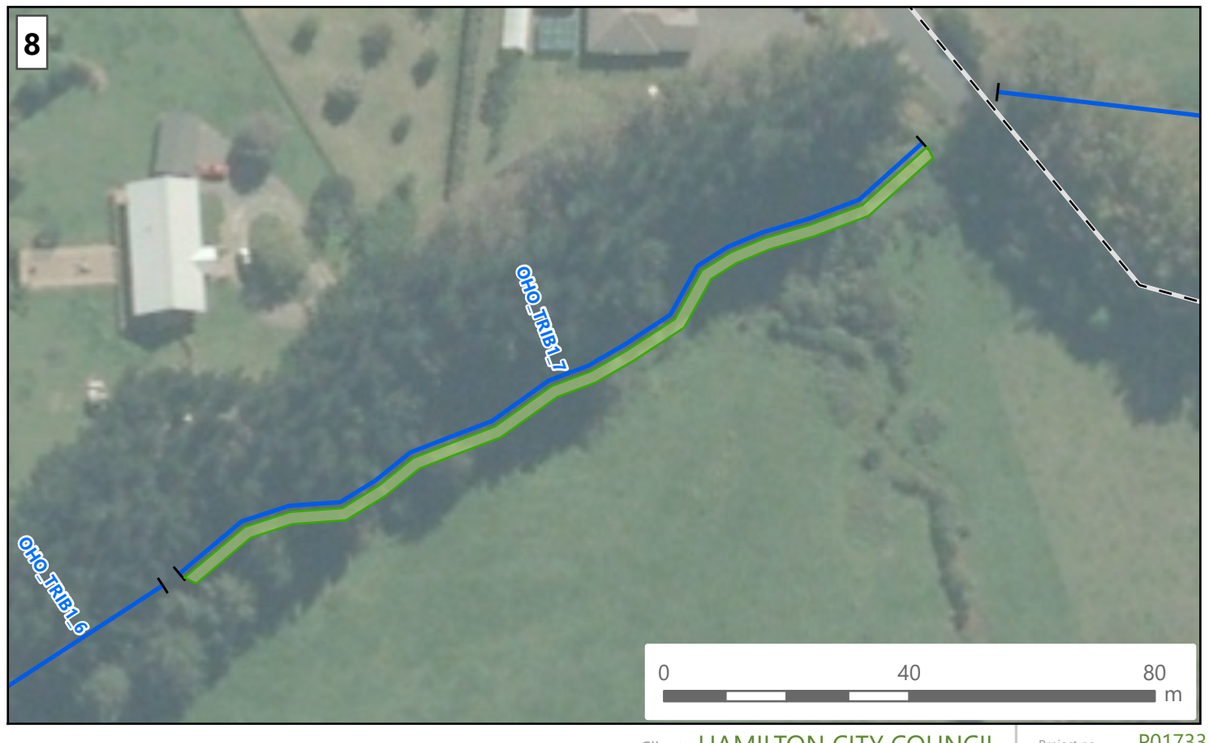
ROTOKAURI NORTH - EROSION REMEDIATION PROJECTS









Erosion Mitigation Works

- Toe Protection
- Bank Batter
- Erosion Planting
- Grade Control

- Ecoline
- ICMP Catchment Boundary
- ICMP Subcatchments

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Project **ROTOKAURI NORTH REA**

Project no. P01733

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Appendix 8 Management Zones

ROTOKAURI NORTH - MANAGAMENT ZONES

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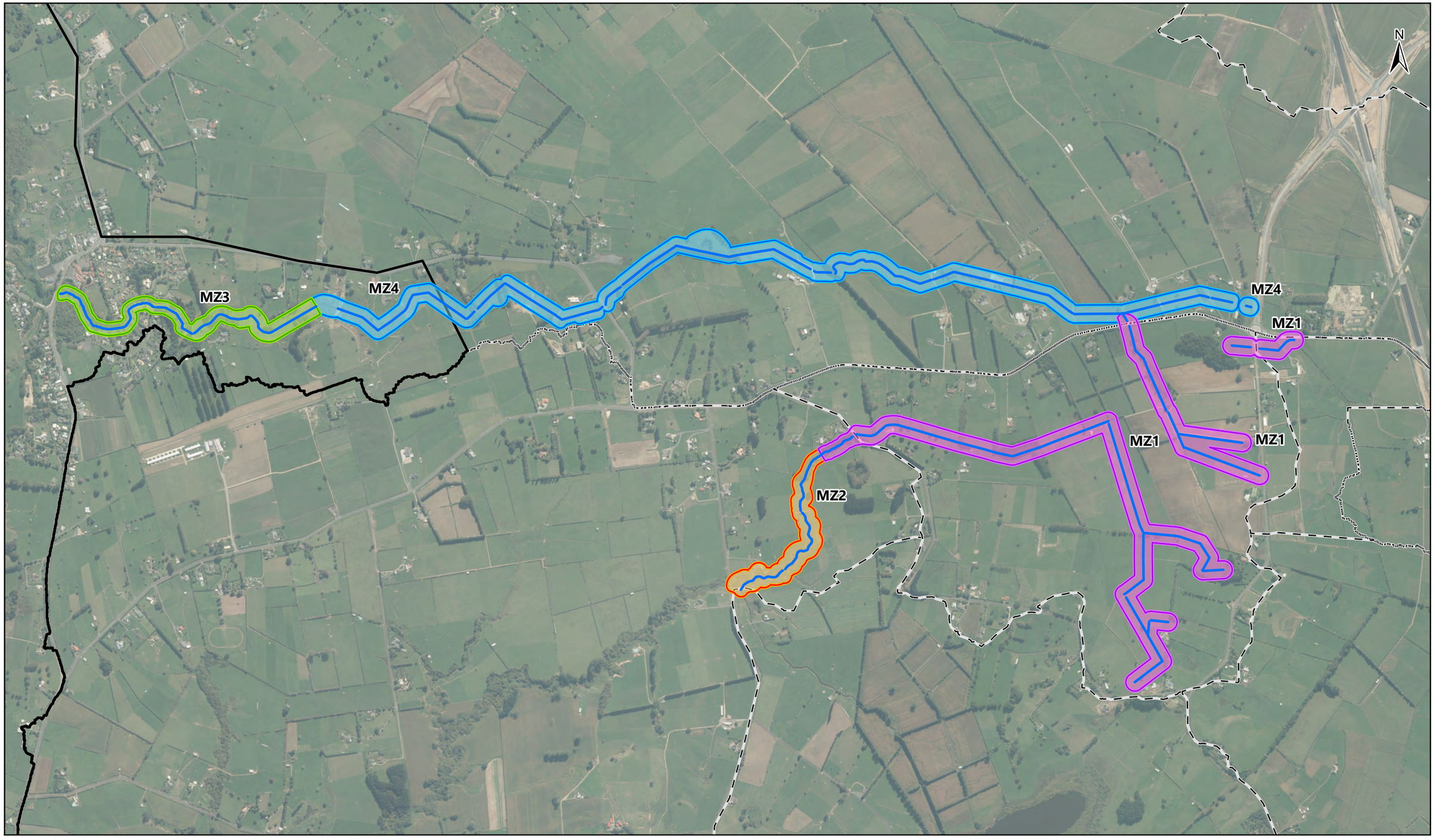

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Management Zones
- MZ1
- MZ2
- MZ3
- MZ4

- Ecoline
- ICMP Catchment Boundary
- ICMP Subcatchments

Client HAMILTON CITY COUNCIL

Project **ROTOKAURI NORTH REA**

0 500 1,000 m

Project no. P01733

Date 12 Sep 2018

Drawn SM

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Appendix 9 Cost & Unit Rates for Mitigation Options

Mitigation	Unit	Cost	Assumptions and exclusions
Planting of Banks and Floodplains	m^2	$35	Includes boom spray of glyphosate single application; Planting at up to 4 plants per m2. *Carex, Juncus*, toetoe, flax and cabbage tree; Plant grade PB3s; Assumes team of 6 planting 350 plants each per day; Cost includes vegetation removal, planting, weeding and maintenance for 5 years.
Newbury Rock Riffles as Grade Control	m^2	$950	Import and place rock riffles. Weirs to be 400-500 mm boulders, riffles to be D_{50}=300 mm well graded angular rip rap in combination with 5-50mm railway ballast, approximately 20m^3 of rip rap per riffle. 50mm bedding layer of GAP30 installed over existing ground surface. Crushed aggregate D_{50}=50 mm to be installed to fill gaps around rip rap.
Bank batter	m^3	$70	$50/m^3$ for excavation; $20/m^3$ for haulage away from site and disposal to clean fill; Does not include setting up diversions/erosion and sediment control; Assumes 45° banks from toe of existing bank, does not include the excavation required to install the rip rap. The rip rap volume may need to be excavated also for installation of the rip rap. This could be avoided by placing the rip rap directly on the cut bank. Rip rap may not be required at all sites of bank batter but has been used here to allow for the cost of stabilisation. Determination of the best stabilisation material will be decided during concept design or detailed design.
Keystone Boulders	m^3	$1,500	600 mm boulders placed within a 400 mm deep trench
Fencing	m	$7.50	7 wire fencing with 5 m posting.
Grazing Land Purchase	m^2	$1.24	Based on 10% of average land sale cost in Waikato Region as reported by REINZ 2018; 10% assumes land lease rather than sale; http://www.interest.co.nz/rural/resources/farm-sales.
Pond Restoration	-	$126,940	Planting cost: $ 50, 000.00 Outlet Installation includes outfall wingwall and rip rap $ 2,500.00 Scruffy Dome with man hole. Scruffy dome is ~ 10m of pipe $ 20,000.00 Embankment stabilising, assumes 0.5m3/1m2 at $40/ m^3. Total: $ 14,620.00 Scour protection includes rip rap at inlet: $ 2,500.00 Sediment removal includes $ 5,000 to drain and prepare for removal. Removal of 0.5m depth at $40/$m^3$. Total: $ 37,320.00

Rotokauri North SHA: archaeological assessment

report to
Ma Development Enterprises Ltd

Arden Cruickshank

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Rotokauri North SHA: archaeological assessment

report to
Ma Development Enterprises Ltd

Prepared by: .....
Arden Cruickshank

Reviewed by: .....
Jacqueline Craig

Date: 3 December 2018
Reference: 18-0874

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Rotokauri North SHA:
archaeological assessment

Ma Development Enterprises Ltd propose developing a special housing area on 21 properties in Rotokauri North on Te Kowhai Road, between Exelby and Burbush Roads (Lots 2 and 3 DP 334215; Lots 2, 4, 5 and 6 DP 359488; Lots 1 and 2 DP 485743; Lots 3, 5 and 6 DPS 15123; Lots 1, 3, 4 and Pt Lot 2 DPS 15254; Lots 9, 10 , 11 and Pt Lot 7 DPS 15255; Sections 23 and 53 SO 495676). Although there are no recorded archaeological sites within the proposed development, the prevalence of modified gardening soils along the Waikato river and the presence of suitable soil for pre-European horticulture in the northern half of the property meant that there was a possibility of previously unrecorded archaeological sites being present within the area. Michael Gao from Ma Developments Ltd commissioned CFG to undertake an archaeological assessment of the proposed development to aid in their resource application.

Statutory requirements

All archaeological sites, whether recorded or not, are protected by the provisions of the Heritage New Zealand Pouhere Taonga Act 2014 and may not be destroyed, damaged or modified without an authority issued by Heritage New Zealand Pouhere Taonga (HNZPT).

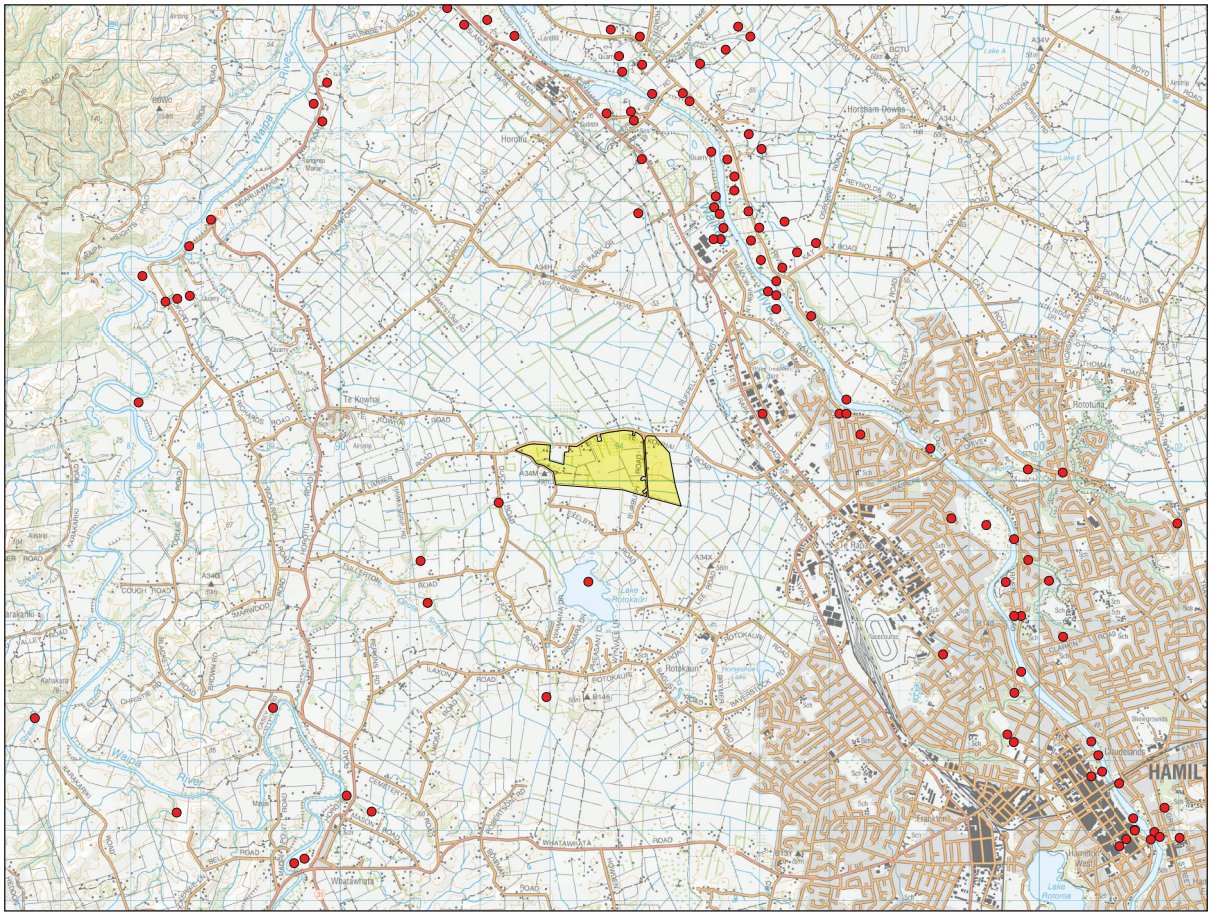

Figure 1. Map of Rotokauri North showing recorded archaeological sites in the area.

An archaeological site is defined in the Heritage New Zealand Pouhere Taonga Act as:

(a) any place in New Zealand, including any building or structure (or part of a building or structure), that—
  (i) was associated with human activity that occurred before 1900 or is the site of the wreck of any vessel where the wreck occurred before 1900; and
  (ii) provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand; and
(b) includes a site for which a declaration is made under section 43(1).

The Resource Management Act 1991 requires City, District and Regional Councils to manage the use, development, and protection of natural and physical resources in a way that provides for the wellbeing of today's communities while safeguarding the options of future generations. The protection of historic heritage from inappropriate subdivision, use, and development is identified as a matter of national importance (Section 6f).

Historic heritage is defined as those natural and physical resources that contribute to an understanding and appreciation of New Zealand's history and cultures, derived from archaeological, architectural, cultural, historic, scientific, or technological qualities.

Historic heritage includes:

- historic sites, structures, places, and areas
- archaeological sites;
- sites of significance to Maori, including wahi tapu;
- surroundings associated with the natural and physical resources (RMA Section 2).

These categories are not mutually exclusive and some archaeological sites may include above ground structures or may also be places that are of significance to Maori.

Where resource consent is required for any activity the assessment of effects is required to address cultural and historic heritage matters.

Methodology

The New Zealand Archaeological Association (NZAA) Site Recording Scheme (SRS) was searched for records of archaeological sites in the vicinity, which were incorporated into the project GIS. The Heritage New Zealand Pouhere Taonga digital library was searched for archaeological reports written about the area. Old maps and plans held by Land Information New Zealand (LINZ) and in other online archives were searched. Historic aerial photography was accessed through Retrolens (http://retrolens.nz/). Old newspaper articles were accessed through the Papers Past online database (http://paperspast.natlib.govt.nz/cgibin/paperspast). The University of Waikato Library Digital Collections and the National Library of New Zealand were searched for relevant images and maps. Geological maps of the area were accessed through GNS Science (http://data.gns.cri.nz/geology/). Soil information was obtained from the S-MAPONLINE database maintained by Landcare Research (https://smap.landcareresearch.co.nz/).

The lots were surveyed on foot. Due to the large scale of the survey area (approximately 133 hectares) and the relatively flat landscape of many of the lots, a targeted survey methodology was implemented. This methodology involved focussing on areas where drains, erosion, fence lines, animal damage and tree throw have exposed the soil in which evidence of previous modification of the landscape may be evident. No invasive methods such as test pitting were employed. Field assessment was undertaken by Arden Cruickshank of CFG Heritage Ltd on 22 June 2018.

Background

Lake Rotokauri is the largest of more than 40 lakes between Te Kauwhata and Te Awamutu. The lakes are of national importance as the largest remaining collection of such habitats within one area in New Zealand. These lakes are the remnants of once widespread wetlands, which supported productive and diverse bird and fish populations. The wetlands are recorded on early 1860s maps (Figure 2) and were drained during the early 20th century to enable roads to be established in the area. Rotokauri and the wider wetlands would have provided resources such as waterfowl, eel, and freshwater mussels, probably for the same people who were consuming the vegetable produced in the largescale gardening systems evident along the edges of the Waikato River.

On a survey map of the area from 1919 (DP 14534) the area of the proposed development is listed as 'drained swamp country' with 'undulating country in grass' to the East, in the vicinity of Burbush Road. This is confirmed by Landcare Research, who have recorded the central portion of the proposed development as containing a mellow humic organic soil of the Utuhina family. This is a poorly drained loamy peat with high water logging vulnerability which would not be suitable for pre-European horticulture. The northern portion of the proposed development however, contains well drained loams of the Otorohanga family which could have been used for pre-European horticulture. The remainder of the soil types within the property appear to be variants of poorly to moderately well drained clays.

Pre-European and 19th century Maori

Most sites in the wider area are pre-European Maori gardening sites, mostly identified from 1940s aerial photos, and many have not been field checked by an archaeologist. Maori horticultural sites (principally garden soils and borrow pits) are commonly recorded around the greater Hamilton Basin.

The first settlers in the Waikato landed at Kawhia in the *Tainui* waka, but archaeological evidence is not entirely clear on when they settled in the Area. Radiocarbon dates from archaeological sites near the Waikato River indicate large scale occupation and gardening in the area began around AD 1500. Other dates from around the Waikato Basin, such as Mangakaware, Taupiri and Horitu, suggest people began to occupy the landscape more intensively in the mid-17th (Bellwood 1978, Campbell and Harris 2011; Hoffmann 2011; Gumbley and Hoffmann 2013). Very little in-depth temporal research into land use between the Waikato and Waipa River, and the wider Waikato, means this information is tentative.

The only information that seems to be available about Maori in the area during the 19th century is mentions of kauri gum digging within the wetlands surrounding Rotokauri lake. One such mention was a result of a European settler in the 1890s who removed eel weirs from an outlet on Lake Rotokauri to lower the water level, after which local Maori searched the area and found a 'considerable quantity' of kauri gum (*Waikato Times*, 10 January 1891: 2.)

European settlers

Little information is available on Rotokauri and its surrounds. Roads are plotted in several 1880s survey maps, but there is no recorded evidence of land use or buildings until the 20th century (Figure 2). This was likely due to the area being dominated by wetland; and as the drainage and roading boards slowly lowered the water levels in the area, more land became available for settling. The Rotokauri School was opened in 1911 (Rotokauri 1986), with per-

manent road access available to the school around 1917 (*Waikato Times*, 11 January 1917: 4). There was no evidence found to indicate European people lived within the project area before the 1900s.

The property is part of Allotment 215, Parish of Pukete, which was granted to Robert Gillies and 'others' in January 1871 (Waikato Deed Index 2W 846). This Allotment was then on-sold to Orbell in 1872, who only took out one mortgage for the property at time of purchase and started splitting up the Allotment in 1899. The proposed subdivision was part of a subdivided section 'Part 215' which was sold by Orbell in 1903 (Waikato Deed Index 3W 354) and went through various hands and mortgages in the following decade. Part 215 was subdivided into smaller farms during the 20th century.

Archaeological survey and investigations

Most of the recorded archaeological sites in the Waikato basin relate to Pre-European Maori gardening. The remains of Pre-European Maori gardening sites are often in the form modified soils, which can be a mix of sand and gravel added to the parent soil (often referred to as Tamahere soils) to improve the drainage and texture of the soil for tuber growth. These sands and gravels are quarried from borrow pits, which are pits dug below the upper volcanic loams to the pumice gravels beneath. The gravels are alluvial, and hence the density of gardening soils with associated borrow pits near waterways in the Waikato basin. The middle and lower portions of the Waikato Basin are estimated to contain over 3000 ha of modified gardening soils.



Figure 2. Survey plan SO 345 drawn in 1868 showing Lot 215. The proposed development is approximately where 'Gillies and Street' is written below 'Lot 215'.



Figure 3. View southeast over Lot 6 DP 359466 showing water retention in the drained wetlands.



Figure 4. View west over central portion of the proposed development, this section has been drained, but still suffers water retention issues.

Some of these soils were mapped in 1939 by Grange et al. around Waipa and Waikato Rivers, none of which were recorded within the project area.

The closest recorded archaeological site to the proposed development is S14/11, a burial reported in 1975 approximately 700m southwest of Exelby road. It was noted as being a crouched burial, which indicates it was most likely a pre-European Maori burial. It was uncovered during sand quarrying, and appears to have been completely removed, although it is not known what happened to the remains. The site was revisited by Alexey Simmons in 2003, where it was noted



Figure 5. View south towards neighbouring properties on the prominent hills surrounding the drained wetland.

that no archaeological material was noted near where the burial was reported, but this is most likely due to the heavy modification of the area caused by the quarrying.

Field Survey

The property was surveyed on 22 June 2018 by Arden Cruickshank. the survey was conducted paddock by paddock, using the races for access. The survey was conducted from east to west.

The eastern paddocks are gently rolling hills, which extend approximately 200m west of Burbush Road. Beyond this, the paddocks are generally flat, drained wetland, which again slopes up towards Exelby Road to the west. The extent of the development is essentially a drained wetland surrounded by rolling hills.

The drained wetland still suffers from water retention, with many of the paddocks within the centre of the proposed development retaining water. This area would not have been suitable for horticultural or agricultural activities prior to the drainage being installed. No evidence of terracing or storage pits were observed on the higher portions on the peripheries of the proposed development. There are more prominent hills surrounding the drained wetland which have a higher potential for pre-European occupation, but these are outside the project area.

Summary

No evidence of pre-1900 archaeology or heritage, or significant 20th century heritage including built heritage, was found in the proposed development, either during the historic research or the field survey. The most suitable areas for pre-European Maori horticulture is in the northern portion of the proposed development but there is no evidence that this was ever undertaken here. The soils within the vicinity of the Waikato river are much more suited to it, and this is evident by the large number of borrow pits, modified gardening soils and other associated archaeological sites that have been recorded along the river. The area of the proposed develop-

ment does not appear to have been settled by Europeans until the 20th century, when drainage improvements to the soil allowed the land to be used.

Assessment

The following assessment relates only to archaeological values. Other interested parties, in particular mana whenua, may hold different values regarding the heritage values of the properties.

No evidence of pre-1900 archaeology or heritage, or significant 20th century heritage including built heritage, was found in the proposed subdivision, either during the historic research or the field survey, and no assessment of values or significance can be made.

Recommendations

These recommendations are only made based on the archaeological values that have been outlined above. Any other values associated with special interest groups, including tangata whenua, can only be determined by them. It is recommended that:

- an authority to destroy, damage or modify archaeological sites within the proposed subdivision does not need to be applied for from Heritage New Zealand Pouhere Taonga (HNZPT) under Section 44 of the Heritage New Zealand Pouhere Taonga Act 2014;
- all works should be undertaken following an accidental discovery protocol. An example of such a protocol is amended to this report.
- since archaeological research cannot always detect sites of traditional significance to Maori, or wahi tapu, the appropriate tangata whenua authorities should be consulted regarding the possible existence of such sites, and the recommendations in this report.

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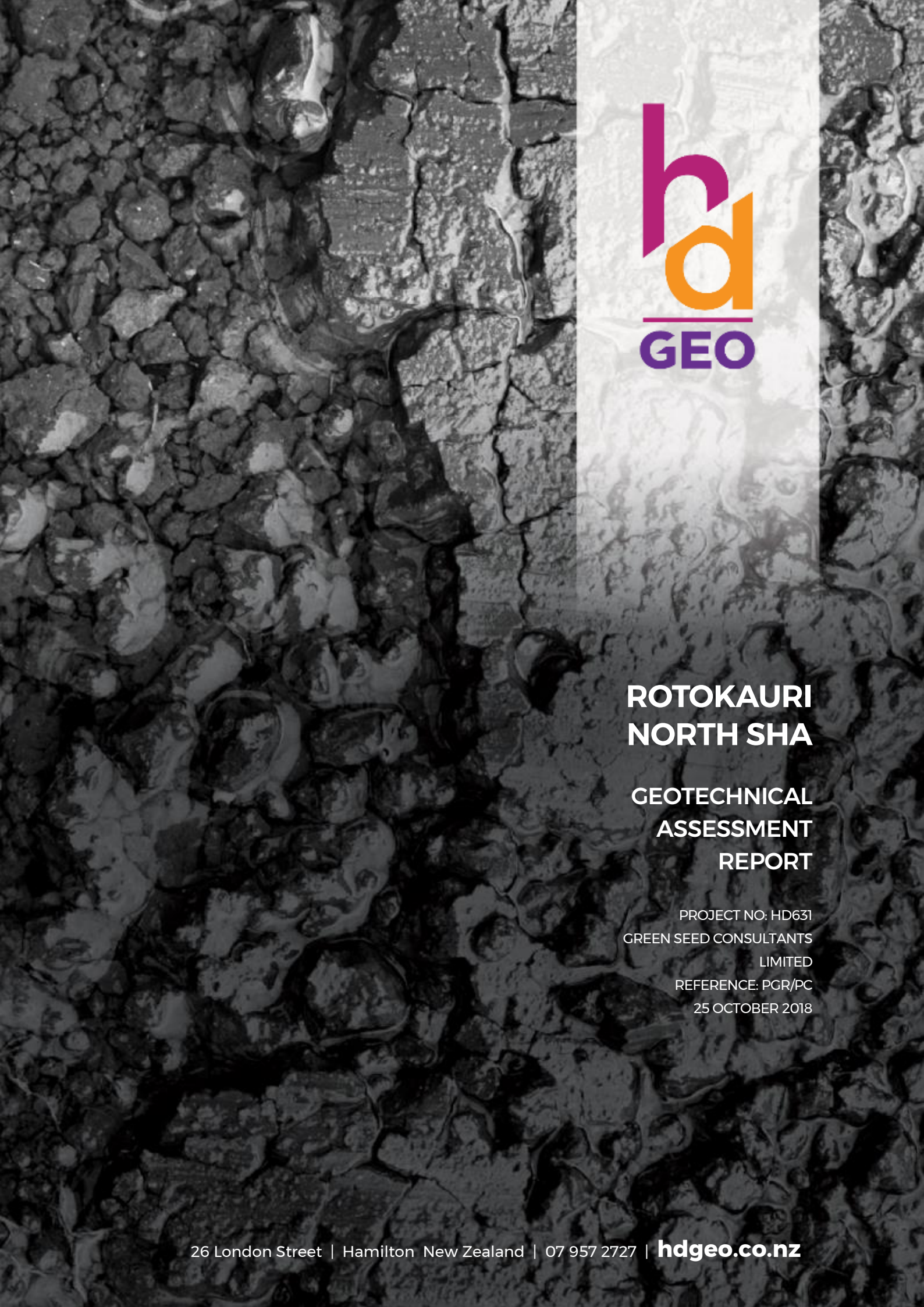
Accidental Discovery Protocol

In the event of the accidental or unexpected discovery of archaeological features, including human remains:

1. All work within the vicinity of the discovery should cease immediately.
2. A buffer of at least 10 m should be set up around the discovery and this should be marked on the ground, preferably with pegs and tape, or similar.
3. All machinery and plant should be removed from the buffer zone where this is possible.
4. The site archaeologist, or other qualified archaeologist, should be informed.
   i Heritage New Zealand Pouhere Taonga (HNZPT) should be informed.
   ii If the discovery is of Maori origin, the relevant tangata whenua authorities should also be informed. Appropriate protocols (tikanga) should be observed.
   iii If the discovery is of human remains, the New Zealand Police should also be informed.
5. The archaeologist should take relevant steps to secure the area of the discovery.
6. The archaeologist will assess the discovery and advise HNZPT and the client on the relevant steps to be taken.
7. Works in the area of the discovery shall not recommence until authorised in writing by the archaeologist in consultation with any identified affected parties or HNZPT.



ROTOKAURI NORTH SHA

GEOTECHNICAL ASSESSMENT REPORT

PROJECT NO: HD631
GREEN SEED CONSULTANTS LIMITED
REFERENCE: PGR/PC
25 OCTOBER 2018

26 London Street | Hamilton New Zealand | 07 957 2727 | hdgeo.co.nz

Executive Summary

Green Seed Consultants Limited have engaged HD Geo to conduct a preliminary geotechnical assessment for the Rotokauri North Special Housing Area (SHA) to accompany an application for plan change. The SHA is located at the northwest extent of Hamilton City and is comprised of approximately 133 ha. Green Seed propose to develop the site into a mixture of standard and medium density residential housing, a commercial neighbourhood centre, public parks and potentially a school.

While there are engineering considerations to be further defined by investigation, and designed for during planning of the site, we consider the site to be suitable for the proposed development subject to the considerations and recommendations in this report.

Our scope included

- a summary of testing completed to date
- an overview of the ground conditions at the site
- assessment of the geology and geo-hazards
- recommendations for further work

What we found

- there is a moderate to high risk of liquefaction at the site
- we expect that the liquefaction risk can be mitigated for residential development with strengthened foundations and/or shallow ground improvements

Further work required

- investigation and assessment to further understand the liquefaction hazard at the site and outline mitigation measures where necessary (currently being undertaken by HD Geo)
- assessment of the liquefaction induced lateral spreading risk adjacent to proposed stormwater swales
- earthworks planning
- infrastructure design (ie. stormwater swales and roading)

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Introduction

Green Seed Consultants Limited propose to develop the site known as the Rotokauri North Special Housing Area (SHA) into a mixture of standard and medium density residential housing, a commercial neighbourhood centre, public parks and potentially a school.

We have been engaged to provide a site-wide preliminary geotechnical assessment to accompany an application for plan change.

While there are engineering considerations to be further defined by investigation, and designed for during planning of the development, the site is considered to be suitable for residential development subject to the considerations and recommendations in this report.

Scope

The scope of this report includes:

- a summary of testing completed to date
- an overview of the ground conditions at the site
- assessment of the geology and geo-hazards
- recommendations for further work

Site description

The site is located at the north west extent of Hamilton City and consists of a total area of approximately 133 ha. It is bounded by the Te Kowhai Road (SH39) to the north, greenfields to the east and south and Exelby Road to the west. Burbush Road runs north to south through the eastern portion of the site. A plan showing the extent of the site is included in Appendix A.

The site lies in an area that consists of rolling hill terrain and flat-lying plains. The hill terrain (herein referred to as 'Hill Terrain') is all ground that is elevated above the flat, low-lying plains of the site (herein referred to as 'Plains').

The Hill Terrain is present at the western and eastern edges of the site, rising up to 18 m above the Plains. These hill areas merge south of the site, forming a south to north draining basin in which the majority of the site lies.

The Plains make up the majority of the west and central portions of site, while also surrounding the eastern Hill Terrain to the west, north and east. The Plains are flat with typically less than 1 m of elevation difference across much of the site. Numerous open drains dissect the Plains ranging from less than 0.5 m in depth and width up to 2 m width and depth. A Waikato River paleochannel, known as the Te Kowhai Channel lies in the northeastern corner of the site. The base of the channel lies approximately 1.5 m below the surrounding area. Parts of the low-lying areas of site are located in areas that are expected to be inundated by a 1 in 100 year flood event (Refer to Rotokauri ICMP Plan[1]).

The site is predominantly used as pasture for grazing cattle with a dairy farm and associated buildings in the northeast of site. There are eight rural residential dwellings and a number of sheds and barns across the remainder of the site.

[1] Hartland Environment Limited (June, 2017) *Rotokauri – Integrated Catchment Management Plan*.

Previous work

HD Geo undertook a preliminary geotechnical assessment of the site in July 2018 to support master planning and conceptual design for the development[2]. This assessment included an investigation which comprised of:

- 13 hand augers up to 3 m depth
- 8 cone penetrometer tests (CPTs) up to 20 m depth
- 3 dissipation tests
- 5 temporary standpipe piezometers

The key outcomes of this assessment were:

- there was a moderate to high liquefaction hazard identified across the Plains areas of the site
- there were no other significant geotechnical constraints to development at the site

In order to further understand the liquefaction hazard at the site additional testing has been undertaken including:

- installation of 5 permanent piezometers (August 2018)
- 6 shear wave velocity tests by seismic cone CPTs up to 20 m depth (October 2018)

The results of these investigations are to be incorporated into a detailed liquefaction hazard study HD Geo is currently undertaking at the site.

Geological setting

The site is located roughly centrally within the Hamilton Basin which is characterised by low rolling hills (Hamilton Hills) and plains with low terraces and gullies draining into the Waipa and Waikato Rivers (Hamilton Lowlands).

The Hamilton Hills are linear, sinuous and discontinuous hills and ridges that are remnant of an older erosion surface. They consist of alluvial material and non-welded ignimbrites (Walton Subgroup) and are typically overlain by a number of metres of airfall volcanic ash (Kauroa Ash Formation and Hamilton Ash Formation). The Hamilton Lowlands are a broad, low angle alluvial fan created by the Waikato River in the Late Quaternary. The fan materials (Piako Subgroup and Hinuera Formation) are derived from rhyolitic eruptions in the central North Island and generally consist of late Pleistocene primary and secondary volcaniclastic sediments. Deposition of the fan materials ceased when the Waikato River entrenched into its current course approximately 17 ka and thin airfall tephra layers accumulated on the fan surface (Hinuera Surface).

The New Zealand Geological map (QMap) for the Waikato Region shows that Walton Subgroup, Hinuera Formation and Piako Subgroup materials are mapped at the site. The Walton Subgroup is mapped in the Hill Terrain and is described as Early Pleistocene to Middle Pleistocene alluvium dominated by primary and re-worked non-welded ignimbrite. The Hinuera Formation and Piako Subgroup are mapped on the Plains. The Hinuera Formation is mapped in the majority of the flat-lying areas of site with small areas in the south and southeast of the site described as the Piako Subgroup. The Hinuera Formation is described as Late Pleistocene cross-bedded pumice sand, silt

[2] HD Geo Limited, 2018. *Rotokauri North SHA Preliminary Geotechnical Report*, HD631.

and gravel with interbedded peat and the Piako Subgroup is described as Late Pleistocene locally derived mud, silt, gravel and peat.

Proposed development

The development will comprise a mixture of standard and medium density residential housing, a commercial neighbourhood centre, public parks and potentially a school. The development will contain numerous new local roads and five collector roads linking internal areas with Te Kowhai Road, Exelby Road, Burbush Road and yet to be constructed roads to the south.

The proposed development consists of two stages, Stage 1 in the western portion of site covering an area of approximately 53 ha and Stage 2 in the eastern portion of site which is approximately 80 ha. The proposed development concept and staging plans are included in Appendix B.

Ground conditions

The ground conditions at the site were typically consistent with the mapped geology. The ground conditions have been grouped into areas based on their geomorphology and the conditions encountered in the investigation. All references to soil types from the CPTs are based on the soil behaviour types as interpreted by the CPT results.

Hill terrain

The Hill Terrain is all ground that is elevated above the flat, low-lying plains of the site. CPT investigations predict layered clay, silt and sand deposits to 20 m. Hand auger investigations found that the upper 3 m of the hill terrain consists of stiff to hard clay and silt consistent with the Hamilton Ash Formation.

Plains

The Plains are areas of site that are flat and low-lying. Hand auger and CPT investigations encountered layered deposits of silt, clay and sand to 20 m depth. The deposits are predominantly sand dominated in the upper 8 m to 10 m, becoming more clay dominated with depth. Sand layers reach a maximum thickness of 6.5 m and uniform clay layers reach a maximum thickness of 6 m.

Groundwater

Groundwater is currently being monitored by five piezometers across the site. Since monitoring began in August 2018, the groundwater level has been very high across the site, with a maximum recorded depth of 0.9 m and a minimum recorded depth of 0 m (ie. ground level).

Geotechnical assessment

This assessment is a collection of general information and advice for the site's suitability for the proposed development. It is intended to provide an overview of the geotechnical elements which require consideration at the site.

Liquefaction

The low-lying Plains at the site contain sand and silt soils with a high groundwater table which can be susceptible to liquefaction under earthquake-induced cyclic loading. As a result, a liquefaction

assessment of the CPT data was undertaken in accordance with NZGS guidelines[3]. The preliminary screening analysis indicated that under ULS (Ultimate limit state) conditions, liquefaction is anticipated to occur across the Plains. The layers that are predicted to liquefy vary throughout the soil profile, however liquefaction is typically predicted to occur within 1 m of the current ground surface. In accordance with NZGS guidelines, the liquefaction risk at the site ranges from L2 (moderate) to L4 (severe).

Preliminary screening of shear wave velocity data indicates that the assessed risk may be reduced in some areas of the site, while the risk in other areas remains unchanged. Further assessment and refinement of this data is currently in progress.

Predicted liquefaction of this magnitude is not uncommon in the Waikato. To allow for residential construction, mitigation in the high to severe risk areas will be achievable through strengthened foundations or shallow ground improvement.

Lateral spreading

Lateral spreading is a phenomenon were liquefied material allows the soil above to move laterally towards a free face, such as a stream bank. The site currently has an isolated lateral spreading risk adjacent to the Te Kowhai Channel in the northeastern corner of site.

Development plans show stormwater swales throughout the site which are likely to be excavated up to 2.0 m below current ground levels. Given the near surface soils have been identified as liquefiable, the formation of these swales is likely to create a lateral spreading hazard.

Specific assessment of the lateral spreading hazard will be required. Potential mitigation options of lateral spreading risks may include:

- dewatering of adjacent ground so liquefaction is unable to occur
- using a buttress of ground improvement along swale edges
- slope stabilisation methods
- specifying foundation types tolerant to lateral spreading in high risk areas

Soft soils and settlement

A screening analysis has been completed on the 13 CPTs that were located on the Plains to determine the susceptibility of the ground to static settlements when loaded. The preliminary analysis indicates that the site generally has a low risk of static settlement as most of the near surface soils are sand-dominated.

While not encountered during this investigation, our experience in the area has shown that organic and soft soils are commonly (but not exclusively) found in paleochannel features and close to the Hill Terrain in 'embayments'. As the risk of consolidation settlements is often greatest in these areas they should be a target area for future investigations.

[3] Ministry of Business, Innovation & Employment and New Zealand Geotechnical Society, 2016. *Earthquake geotechnical engineering practice – Module 3: Identification, assessment and mitigation of liquefaction hazards.*

Earthworks

Earthworks at the site are likely to consist of cut and fill operations in order to ease grades on the site, create level building platforms, fill open drains, form stormwater storage and conveyance, and to raise building platforms above flood levels.

The Hamilton Ash Formation was encountered on the Hill Terrain and is typically suitable as an earthworks material. Although not encountered in the investigations to date, our experience has shown that beneath the ash, soils of the Puketoka Formation are typically encountered. These soils are typically highly sensitive and break down on working, making them unsuitable as an earthworks material. Further investigation should define the materials to be used or exposed in earthworks.

Stability

There are no indications of any recent, large scale instability having occurred at the site, or in the immediate surrounding area. Active observed instability in the area tends to be shallow creep on steeper slopes and is often associated with springs, saturated soils or stock movement.

Earthworks on the site are likely to reduce the overall stability risk by reducing both the heights and grades of current slopes. Earthworks on the Hill Terrain may demand grades that will require retaining and specific design is likely to be required.

Pavements

A number of roads are proposed for the development, including local and collector roads. It is likely road pavement subgrades will be based on materials of the Piako Subgroup, Hinuera Formation, Hamilton Ash Formation and, depending on cut depths in the hill terrain, the sensitive materials of the Puketoka Formation.

Based on these anticipated ground conditions and the testing completed during the investigation, it is likely that natural subgrade CBR will be low. Improvement of the subgrade will likely be required by either compaction or stabilising of the insitu material or by undercutting and replacement with a hardfill subgrade improvement layer. Where organic material is encountered, removal and replacement with suitable backfill will be required. Specific investigation, testing and design will be needed for all pavements.

Recommendations

- the liquefaction hazard at the site should be refined through further investigation and assessment and outline mitigation measures where necessary (currently being undertaken by HD Geo)
- assessment of the liquefaction induced lateral spreading risk adjacent to proposed stormwater swales is completed

Future work

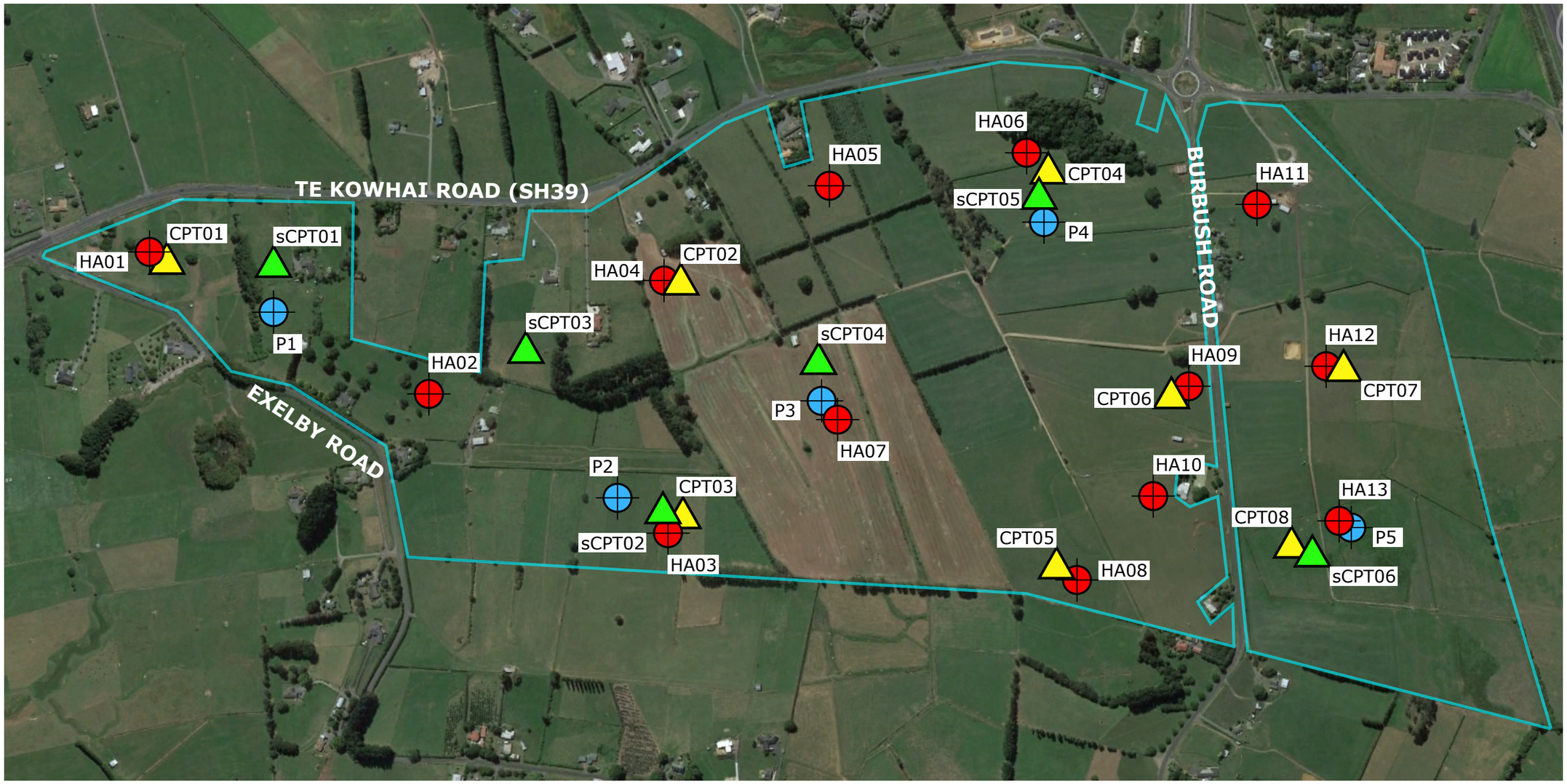
- as the risk of consolidation settlements are often greatest in paleochannels and Hill Terrain embayments, these areas should be targeted by future investigations
- further investigation of the potential cut areas of site should be completed to define the materials to be used or exposed in earthworks

Limitation

This report has been prepared for our client, Green Seed Consultants Limited, for the purpose detailed above and may not be relied on by any other party or for any other purpose. This report contains an assessment based on a site walkover and testing at discrete locations to support plan change for the proposed development.

Further testing and assessment is required prior to finalising the development proposals for the site. Inferences about the conditions at the site have been made based on the testing undertaken and our understanding of the geological environment in which the site lies. The deposits in this area are by nature highly variable both vertically and laterally. We recommend that a geotechnical engineer is engaged to provide input into the design of the development and to undertake further testing, assessment and design. For continuity and to confirm ground conditions, geotechnical observation will also be required during site construction works.

APPENDIX A – SITE PLANS



LEGEND

- Hand auger (HA)
- Cone penetrometer test (CPT)
- Seismic cone penetrometer test (sCPT)
- Piezometer (P)
- Site boundary
- WRC 5m contours

PROJECT:	Rotokauri North SHA
PROJECT NO:	HD631
CLIENT:	Green Seed Consultants Ltd
TITLE:	Geotechnical Investigation Locations
SCALE:	NTS
Drawing No:	HD631/01
Drawing by:	SA
Revision No:	

APPENDIX B – DEVELOPMENT PLANS AND STAGING

Rotokauri North Special Housing Area

February 2018
Green Seed Consultants Ltd

ROTOKAURI NORTH SHA AREA (Figure 1)

Map legend

- Site area
- 1 Stage 1 (53.39ha)
- 2 Stage 2 (79.72ha)

Stages 1 and 2 sought as an SHA.
Total of 133.1109ha.

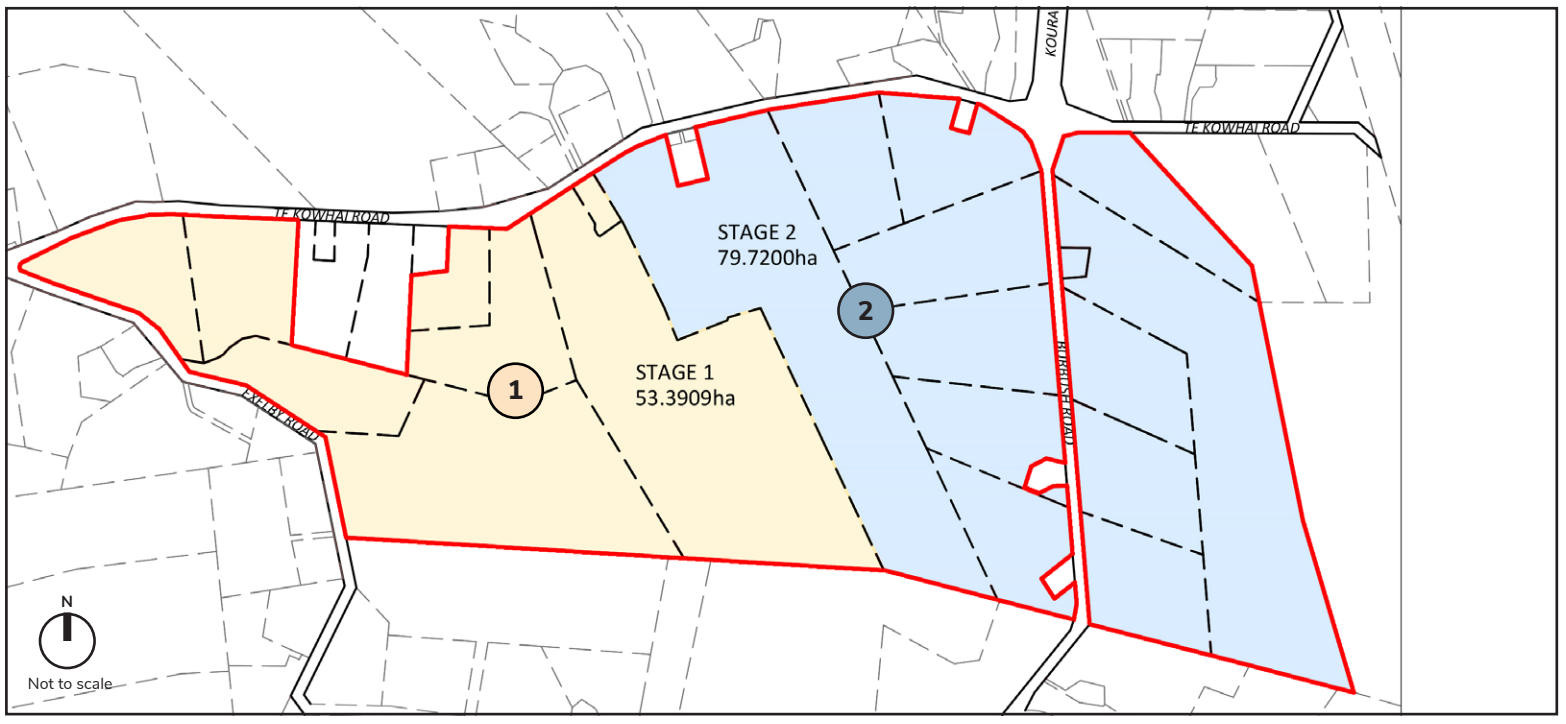


Figure 1: Rotokauri North SHA area

ROTOKAURI NORTH SHA CONCEPT (Figure 2)

Map legend

- Site area
- 1 Optimise connections to east (jobs) as well south.
- 2 Ensure each small centres is focused on its local community.
- 3 Maximise residential catchment around a small centre, and integrate movement network around the centre.
- 4 Provide for necessary stormwater conveyance and storage.
- 5 Provide district-level open space so as to maximise maximise exposure and accessibility to all. Size will be determined by Council acquisition agreement.
- 6 Ensure sensitive slopes can be appreciated as landscape features.

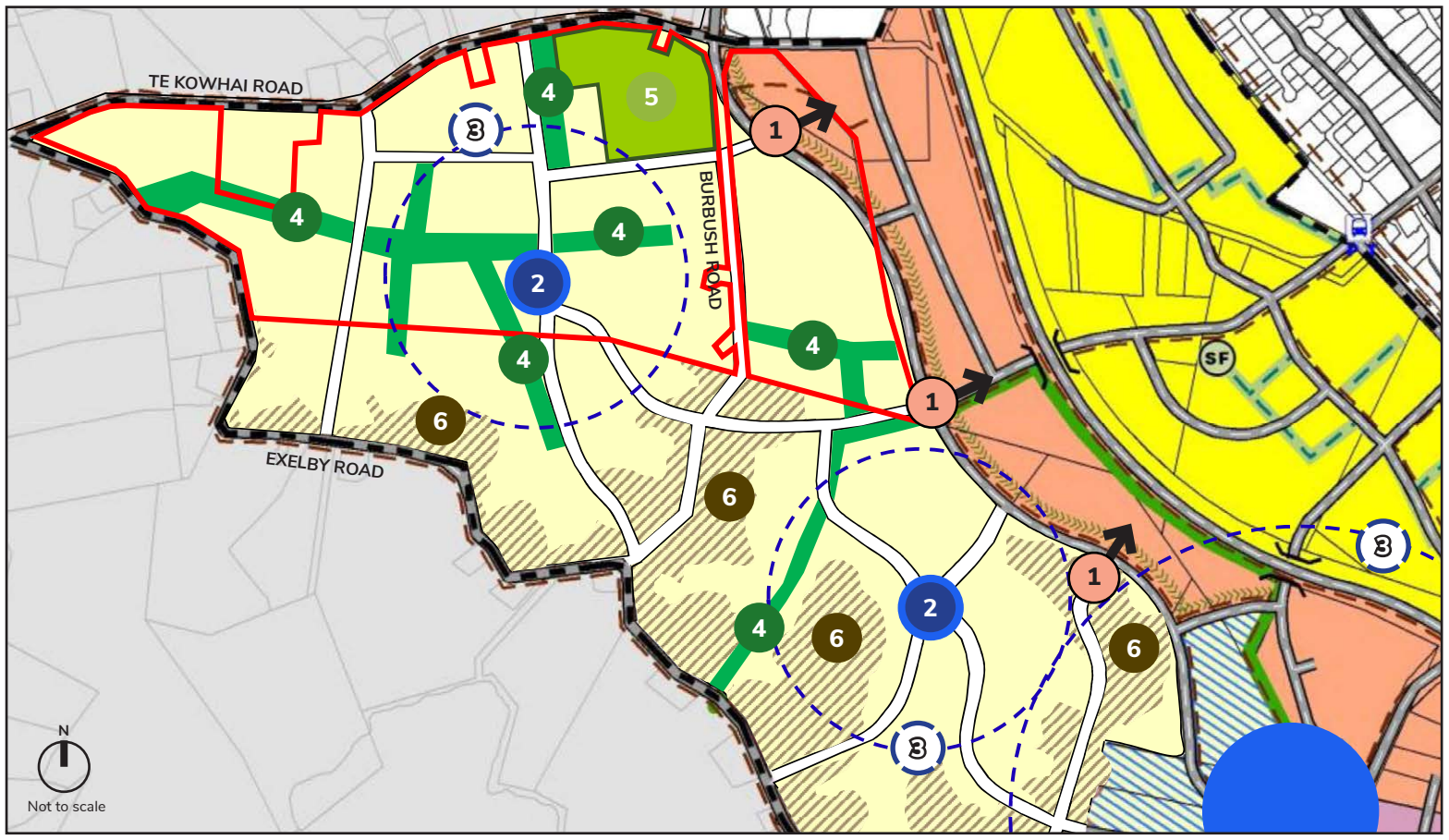


Figure 1: Key structuring elements of Rotokauri North SHA concept

ROTOKAURI NORTH SHA OPTIONS FOR STORMWATER (Figure 3)

Map legend

- Site area
- Floodway basin (conveyance and flood storage)
- Swale (conveyance only)
- Treatment wetlands
- Discharge locations

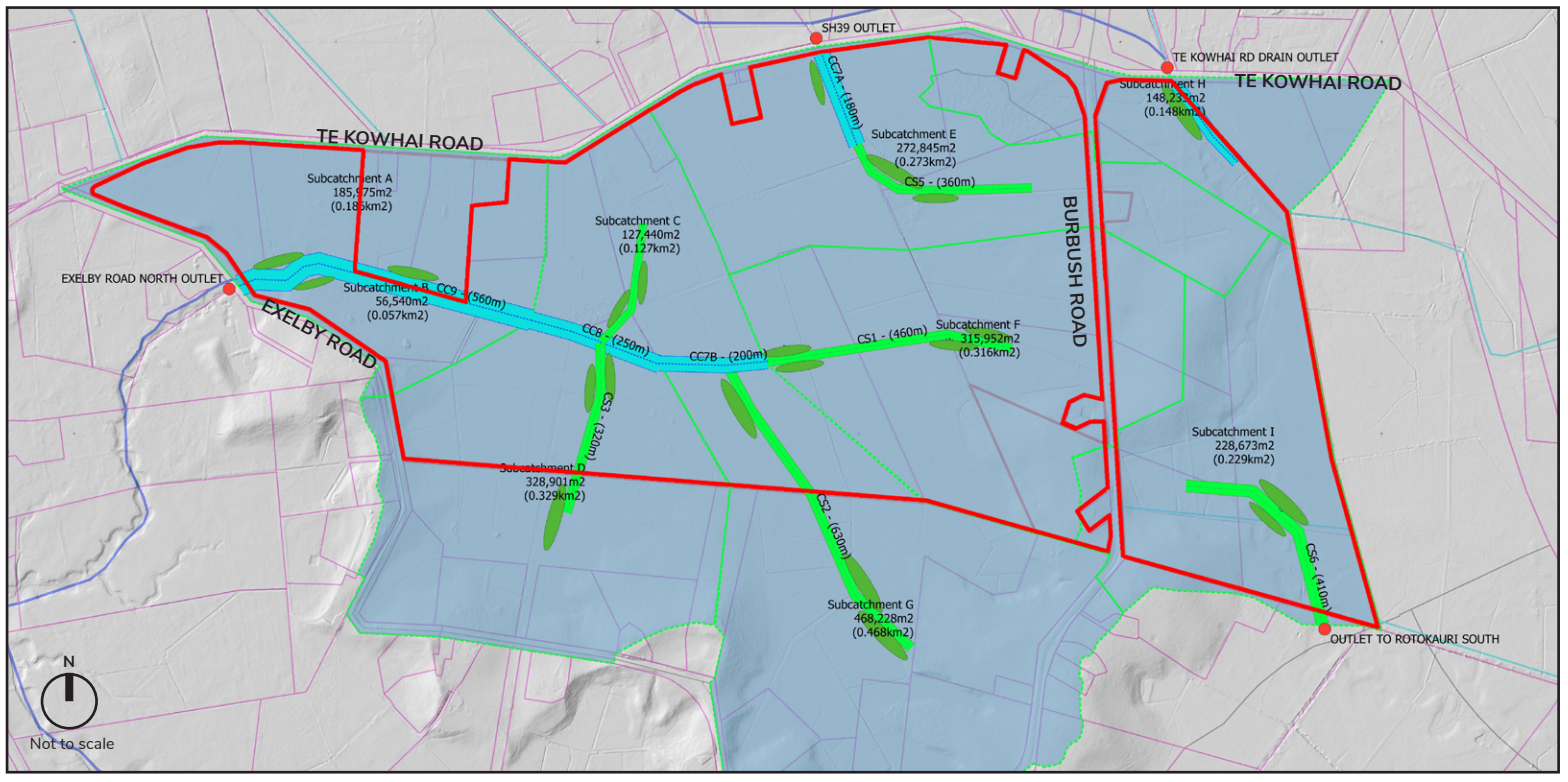


Figure 3: Rotokauri North SHA options for stormwater
Source: CKL Stormwater Solutions

Rotokauri North Special Housing Area

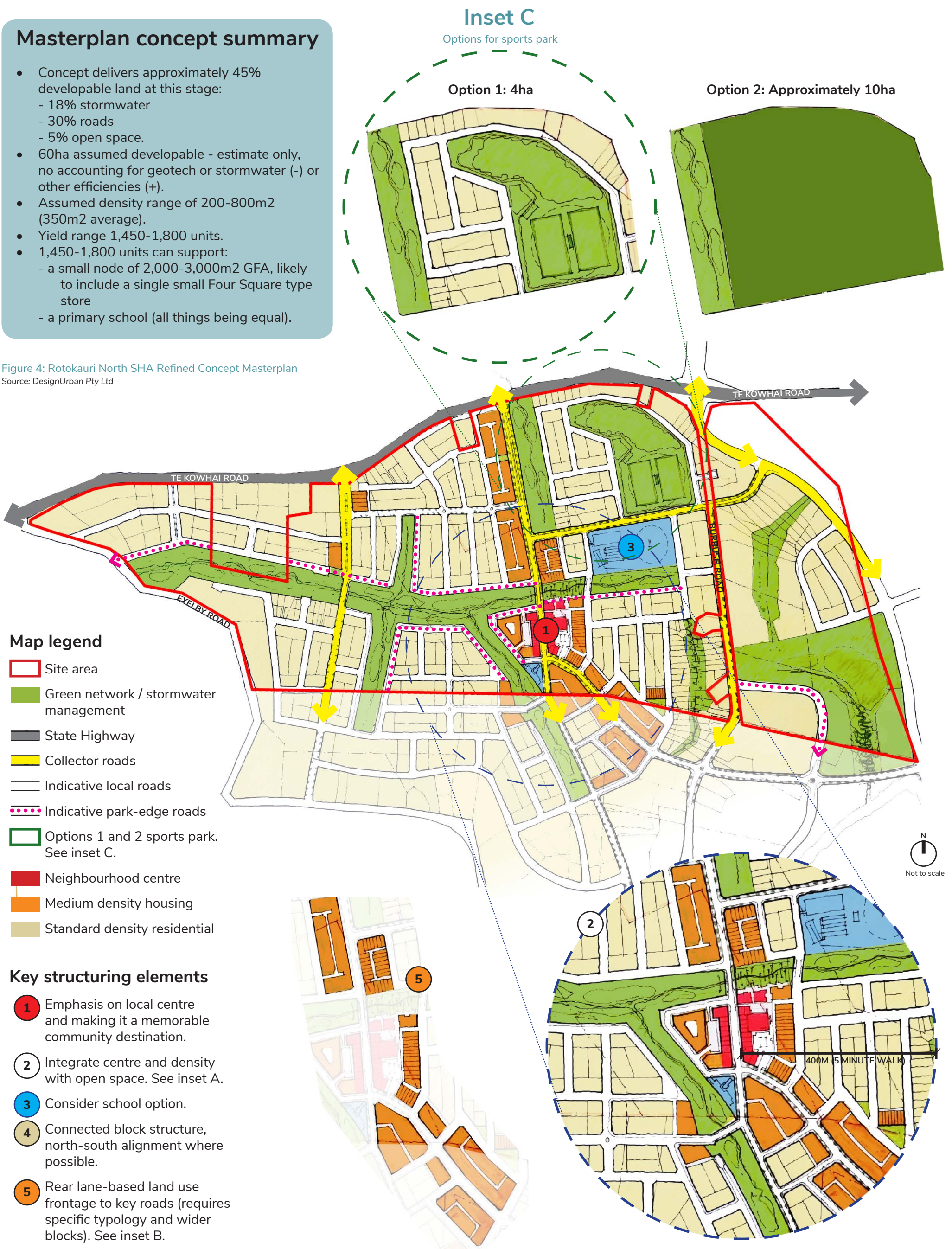
February 2018
Green Seed Consultants Ltd

ROTOKAURI NORTH SHA REFINED MASTERPLAN (Figure 4)

Masterplan concept summary

- Concept delivers approximately 45% developable land at this stage:
  - 18% stormwater
  - 30% roads
  - 5% open space.
- 60ha assumed developable - estimate only, no accounting for geotech or stormwater (-) or other efficiencies (+).
- Assumed density range of 200-800m2 (350m2 average).
- Yield range 1,450-1,800 units.
- 1,450-1,800 units can support:
  - a small node of 2,000-3,000m2 GFA, likely to include a single small Four Square type store
  - a primary school (all things being equal).

Figure 4: Rotokauri North SHA Refined Concept Masterplan
Source: DesignUrban Pty Ltd



27 February 2019

Rotokauri North SHA

c/- Renee Fraser-Smith

Email: renee@tollemache.co

26 London Street
Hamilton 3204
PO Box 9266
Hamilton 3240
New Zealand
64 (0)7 957 2727

HD631 – Rotokauri North SHA – Response to HCC Peer Review

Dear Renee,

I understand that Council's peer reviewer has further questions regarding the liquefaction hazard at the Rotokauri North SHA. My understanding is that at plan change stage, we shouldn't need to provide detailed information on how we are to mitigate the risk (that will be done at later stages of the development design and consenting). The test is whether there is anything there that should preclude the site being zoned for development. To my mind, an appropriate test of this (in relation to liquefaction) is whether there are similar local areas that have recently been developed. There are several such examples locally that have been developed under the current guidance (noting that liquefaction assessment practice has changed significantly in the last 10 years). In our report we have highlighted that there is a liquefaction hazard that needs consideration and, at the subdivision suitability stage, we are aware that we will have to provide detailed information on our mitigation approach to meet the requirements of s106.

To answer the specific questions provided to us:

Further information is required from the applicant to substantiate the conclusion that mitigation of the moderate to severe liquefaction risk is achievable. The further information should demonstrate that the liquefaction risk can be managed at subdivision/land use stage.

The terminology 'moderate to severe' is based on the LSN categories. Based on the MBIE planning guidance, the category for the susceptible areas of the site is generally 'Medium' liquefaction vulnerability with some areas that may be categorised as 'High'.

We based our conclusion that the site is appropriate for development on:

- We have been involved in or have reviewed the assessments for several other sites in Hamilton. The assessed hazard on this site is equivalent to many of the recently developed suburbs in Hamilton including Rotokauri, Rototuna North and Ruakura.
- All of these areas have been assessed for liquefaction and various mitigation has been recommended and implemented during construction.

- The site is assessed as roughly the equivalent of TC2 land in Christchurch. Such land has been, and is, regularly developed.

We note that there is no regional or district policy that sets a framework for accepting/rejecting development based on liquefaction risk and so current practice is a good measure of suitability.

The extent of the liquefaction hazard should be discussed.

The area of the site with geology/geomorphology that indicates it may be subject to a liquefaction risk is the Plains, which covers most of the site. The site geomorphology plan in our preliminary report (attached) identified these areas. While there is variation in the assessed hazard, our study identifies that liquefaction damage is likely across the Plains area and the likely hazard ranges from **Medium** to **High** liquefaction vulnerability. Liquefaction is not a hazard in the Hills areas of the site.

Feasible measures that might be employed to mitigate the risk should be identified and discussed.

Mitigation in the recently developed parts of Hamilton that have a liquefaction hazard included measures such as

- shallow ground improvement (to separate structures from liquefiable layers)
- reinforced raft foundations (varying from simple ribraft to reinforced, resilient raft foundations
- piles to non-liquefying layers
- de-watering to reduce the hazard (usually locally to a lateral spreading hazard)
- setbacks or barrier piles in some locations where lateral spreading was considered to be a risk

The MBIE planning and engineering guidance for potentially liquefaction prone land asks for a Level B assessment at plan change – we have exceeded this with a Level C Area-wide study.

Please let me know if you have any further questions.

Kind regards,

ANDREW HOLLAND
Technical Director
Andrew@hdgeo.co.nz
022 0488 441



Plains

Hill Terrain

PROJECT: Rotokauri North SHA	
PROJECT NO: HD631	
CLIENT: Green Seed Consultants Limited	
TITLE: Site Geomorphology	
SCALE: NTS	
Drawing No: HD631/2	
Drawing by: MM	
Rev Number	
0	Initial

27 February 2019

Rotokauri North SHA

c/- Renee Fraser-Smith

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Hamilton 3204
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- All of these areas have been assessed for liquefaction and various mitigation has been recommended and implemented during construction.

- The site is assessed as roughly the equivalent of TC2 land in Christchurch. Such land has been, and is, regularly developed.

We note that there is no regional or district policy that sets a framework for accepting/rejecting development based on liquefaction risk and so current practice is a good measure of suitability.

The extent of the liquefaction hazard should be discussed.

The area of the site with geology/geomorphology that indicates it may be subject to a liquefaction risk is the Plains, which covers most of the site. The site geomorphology plan in our preliminary report (attached) identified these areas. While there is variation in the assessed hazard, our study identifies that liquefaction damage is likely across the Plains area and the likely hazard ranges from **Medium** to **High** liquefaction vulnerability. Liquefaction is not a hazard in the Hills areas of the site.

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- setbacks or barrier piles in some locations where lateral spreading was considered to be a risk

The MBIE planning and engineering guidance for potentially liquefaction prone land asks for a Level B assessment at plan change – we have exceeded this with a Level C Area-wide study.

Please let me know if you have any further questions.

Kind regards,

ANDREW HOLLAND
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Plains

Hill Terrain

PROJECT: Rotokauri North SHA	
PROJECT NO: HD631	
CLIENT: Green Seed Consultants Limited	
TITLE: Site Geomorphology	
SCALE: NTS	
Drawing No: HD631/2	
Drawing by: MM	
Rev Number	
0	Initial

ROTOKAURI NORTH SHA

PRELIMINARY SITE INVESTIGATION

PROJECT NO: HD637
GREEN SEED CONSULTANTS LTD
REFERENCE: PSI/1
11 JULY 2018

26 London Street | Hamilton New Zealand | 07 957 2727 | hdgeo.co.nz

Executive Summary

HD Consultants NZ Limited (HDC) has been engaged by Green Seed Consultants Limited (the Client) to conduct a Preliminary Site Investigation (PSI) for the Rotokauri North Special Housing Area (SHA). The SHA is comprised of approximately 113.11 ha and is located south of Te Kowhai Road and east of Exelby Road, north of Hamilton (the Site).

A PSI includes review of available information, including Council records and historical aerial photos, combined with a site inspection. The Site inspection was conducted by using unmanned aerial vehicle (drone) photography to identify areas of interest with regard to potential contamination. These areas were then inspected and photographed, and where possible, the property owners were interviewed.

The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) requires that Ministry for the Environment (MfE) Hazardous Activities and Industries List (HAIL) sites be identified and investigated to determine if there is potential risk to human health from subdivision, change in land use, or land disturbance. The purpose of the PSI is to identify HAIL activities and qualitatively evaluate potential risk based on the records review and site inspection. No sampling and analysis is included in the PSI.

The site is largely comprised of farms with pasture land and many have rural residences present. There is an orchard present at one parcel and dairy farms at two parcels. Many of the farms have sheds present which are used for various purposes, including storage of hazardous substances. There is a workshop/scrap yard present at one property.

While the pastures are not considered HAIL sites, there is potential for contamination if superphosphate fertilisers and/or persistent pesticides were used. Orchards, animal spray or dip stations, fuel tanks, and areas where hazardous substances are stored are considered HAIL activities. Buildings which used asbestos-containing materials or lead-based paint may also contribute to soil contamination. In addition, a workshop/scrap yard at one property is classified as a HAIL activity.

Based on the PSI findings, sampling and analysis is recommended to quantify the potential risk from activities conducted at the Site. This includes sampling and analysis of pastures to evaluate the presence of elevated cadmium (from fertiliser) or persistent pesticides. This sampling can be done in the near-term to determine whether activities within the pasture land are permitted activities or if they require consent. For example, sampling and analysis should be conducted for:

- The orchard to evaluate the presence of persistent pesticides;
- The workshop/scrap yard to evaluate the presence of heavy metals, pesticides, and hydrocarbons;
- The dairy farms to evaluate the presence of heavy metals, hydrocarbons, and pesticides; and

- Farm structures to evaluate the presence of asbestos, lead, and stored hazardous substances.

Because activities and land use can change with time, sampling and analysis is not recommended until activities cease at the properties where HAIL activities are (or were) present. Prior to sampling at these sites, a follow-up inspection is required to verify that these above recommendations are still correct (i.e., additional potentially contaminating activities have not occurred).

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Introduction

HD Consultants NZ Limited (HDC) has been engaged by Green Seed Consultants Limited (the Client) to conduct a Preliminary Site Investigation (PSI) for the Rotokauri North Special Housing Area (SHA). The SHA is comprised of approximately 113.11 ha and is located south of Te Kowhai Road and east of Exelby Road north of Hamilton. The entire SHA is hereafter referred to as "the Site", with individual parcels referred to by parcel number and street addresses. Figures showing the Site area and proposed development plan are provided in Appendix A. Parcel numbers and addresses are provided in Appendix B.

The majority of the Site has historically been used for grazing beef and sheep, with rural residential dwellings present, as well as two dairy farms. Numerous farm buildings (sheds, barns) are also present. The Site does not appear to have been used for intensive cropping, with the exception of one parcel that was used as an apple orchard.

With the proposed change in land use and planned future subdivision and earthworks, the National Environmental Standard for Assessing and Managing Contaminants in Soil (NESCS) must be considered. The NESCS applies when hazardous activities and industries list (HAIL) activities have been conducted at a site. These activities include storage and use of persistent pesticides. HAIL activities also include discharges to land which have the potential to cause contaminants to be present at concentrations above acceptable guidelines for protection of human health. In the case of pasture land and farm buildings, the "discharges" could include cadmium from superphosphate fertiliser use, lead from lead-based paint, and asbestos from building materials.

Objectives

The key objective of this PSI is to provide an assessment to evaluate whether there is potential risk to human health from contaminants in soil due to current or past activities.

Scope

To achieve the project objective, the following scope of works, outlined in Table 1 below, was undertaken.

Table 1: Scope of Works

Work Activity	Description
Site Inspection	A walk-over site inspection was undertaken to visually assess actual and potential contamination sources from a walk-over inspection of the Site. The areas inspected were identified from review of footage from aerial photography, including current images captured by a remote aerial vehicle (i.e., drone). The areas most likely to have HAIL activities present were targeted for the visual walk-over inspection.

Work Activity	Description
Site History Review	A desktop review of historical aerial photos and Regional and District Council records was undertaken to identify potentially contaminating practices which may have occurred on the Site. Searches included: review of permits and consents, reported incidents, and review of available previous environmental reports. Historic title records were not reviewed as it was considered unlikely (based on aerial photograph review) that they would reveal useful information.
Geological and hydrogeological review	A search of the Waikato Regional Council's database of bores within a 1 km radius of the site and a review of other relevant geological and hydrogeological resources to assess the general sensitivity of the environment within the vicinity of the site. In addition, this PSI was conducted concurrently with a geotechnical investigation of the Site. This investigation helped inform the geologic and hydrogeological conditions at the Site.
Reporting	Preparation of this report summarising the findings of the PSI.

Site description

The Site is located in an area south of Te Kowhai Road and east of Exelby Road to the north west of Hamilton City. The land is currently owned by numerous parties. The site location and regional setting are shown in HDC Figure 1 in Appendix A. Parcel numbers, addresses, and sizes are listed in Appendix B.

Current and proposed land use

The majority of the Site is used as pasture for grazing cattle. There was also historically some sheep grazing and two parcels are dairy farms. There are several rural residential dwellings as well as sheds and barns present. The Site is zoned Future Urban and is nearly flat with isolated high points. The site is located within the Waikato Regional Council and Hamilton City Council boundaries.

The site will be subdivided and developed for residential purposes.

Surrounding land use

Table 2: Surrounding Land Use

Direction from site	Land Uses
North	State Highway 39 – Te Kowhai Road. Pasture land and rural residential properties further to the north.
South	Pasture land and rural residential properties.
East	Pasture land and rural residential properties. State Highway 1 (Waikato Expressway – Te Rapa Section) further to the east.
West	Exelby Road with pasture land further to the west.

Regional Geology

The site is located roughly centrally within the Hamilton Basin which is characterized by low rolling hills (Hamilton Hills) and plains with low terraces and gullies draining into the Waikato and Waipa Rivers (Hamilton Lowlands).

The Hamilton Hills are linear, sinuous hills and ridges that are remnant of an older erosion surface. They consist of alluvial material and non-welded ignimbrites (Walton Subgroup) and are typically overlain by a number of metres of airfall volcanic ash (Kauroa Ash and Hamilton Ash). The Hamilton Lowlands are a broad, low angle alluvial fan created by the Waikato River in the Late Quaternary. The fan materials are derived from rhyolitic eruptions in the central North Island and generally consist of late Pleistocene primary and secondary volcaniclastic sediments with a wide variety of grain sizes (Piako Subgroup and Hinuera Formation). Deposition of the fan materials ceased when the Waikato River entrenched into its current course approximately 17 ka and thin airfall tephra layers accumulated on the fan surface (Hinuera Surface).

The New Zealand Geological map (QMap) for the Waikato Region maps Walton Subgroup, Hinuera Formation and Piako Subgroup materials at the site. The Walton Subgroup is located on the hills to the east and west of the site, and is described as alluvium dominated by primary and re-worked non-welded ignimbrite. The Hinuera Formation and Piako Subgroup are mapped in the low-lying areas of site. The Piako Subgroup is mapped in the south-eastern corner of the site and is described as locally derived lacustrine mud, silt, gravel and peat. The Hinuera Formation is mapped across the remainder of the site and is described as cross-bedded pumice sand, silt and gravel with interbedded peat.

The HDC geotechnical investigation[1] encountered Hinuera materials in all low-lying areas of the Site.

Hydrogeology

There are three surface water bodies within three km of the Site:

- Lake Rotokauri, located approximately 1.3 km to the south from the southwestern-most extent of the Site;
- Horseshoe Lake, located approximately 2.5 km to the south/southeast from the southeastern-most extent of the Site; and
- The Waikato River, located approximately 2.5 km from the eastern-most extent of the Site.

Surface water flows are expected to generally follow local topography, toward the east, north and west along drainage trenches through the site. These drains flow towards Lake Rotokauri through what appears to be a stream tributaries feeding into the Waipa River. Groundwater is likely to be largely constrained from following the same route by the hills to the east, west and south and is likely to travel north east towards the Waikato River.

A geotechnical investigation conducted at the site by HDC revealed groundwater at a depth of approximately 0.1 to 1.5 m bgs in the low-lying areas and approximately 6 m bgs in the elevated areas.

[1] HDC, 2018. Rotokauri SHA Geotechnical Suitability Report, 13 July.

Site topography and drainage

The site is relatively flat, with two hills present. Drains run broadly north and east to the low-lying area east of the site, which eventually drains to the Waipa River.

Site history

Historical Aerial Photos

Historical aerial photographs were available from Retrolens for 1952, 1963, and 1974, and are provided in Appendix C. Google Earth photos were also available from 2004, 2008, 2010, 2013, and 2016. Observations from the photos are provided in Table 3 below.

Table 3 Historical Aerial Photo Summary

Year	Description
1952	The Site appears to be predominantly grassed, with buildings present at Lot 3 DPS 15123, Lot 1 DPS 46587, Lot 1 DPS 4129, Lot 5 DP 359488, Lot 485743, and Lot 6 DP 359488*. There are sheds and barns present on several properties, with what appear to be rural residential properties on the listed lots. There is a long rectangular structure and stained area at the (present) dairy farm on Lot 6 DP 359488.
1963	There are no significant changes. Additional sheds are present at some of the parcels.
1974	There are buildings present at Section 23 SO 495676 Lot 1 DPS 4129, and Lot 1 DPS 72047. The rectangular structure at the (present) dairy farm is gone and a new structure is present just east of Burbush Road. Some of the sheds present in 1952 and 1963 have been removed and new sheds are now present.
2004	Additional rural residential properties are present along Te Kowhai and Burbush Roads. Most of the sheds are gone. There appears to be an orchard present on a portion of Section 53 SO 495676. Rows which appear to be mowed grass are also present on Section 53 SO 495676. There is a residential dwelling and two rectangular buildings east of the dwelling present on Lot 6 DPS 15123.
2008	The soil in much of Lot 2 DP 485743 has been tilled. There are some additional residential dwellings along Exelby, Burbush, and Te Kowhai Roads. There are no other significant changes from the 2004 photo.
2010	The soil in most of Lot 3 DPS 15123 has been tilled and the previously tilled areas at Lot 2 DP485743 are now grassed. There are no other significant changes from the 2008 photo.
2013	The tilled area at Lot 3 DPS 15123 is now grassed. There are no other significant changes from the 2010 photo.
2016	The soil at Part Lot 2 DPS 15254 has been tilled. There are no other significant changes from the 2013 photo. The market garden and orchard are still present on Section 53 SO 495676.

*Note that some of the lots listed are excluded from the Site. See Appendix A for Site layout.

Council Records

Records were requested from Waikato Regional Council (WRC) and Hamilton City Council (HCC).

Waikato Regional Council Records

Six parcels are on the WRC Land Use Information (LUI) Register. The information provided by WRC is shown in Table 4 below. Figure 2 in Appendix A shows the location of the Land Use Information Register areas.

Table 4. WRC Land Use Information Register Data

WRC Reference	Site Name	Classification	HAIL Activity	Comments
LUI05749	320 Te Kowhai Road	Unverified HAIL	A.10 – Persistent pesticide bulk storage or use	These sites are included on the register for land use information only; there are no reports regarding the presence or otherwise of hazardous substances in the soil.
LUI05751	NWM Trust Management Market Garden	Unverified HAIL		
LUI05752	301 Te Kowhai Road	Unverified HAIL		
LUI05753	HWM Trust Management Limited Orchard	Unverified HAIL		
LUI10871	111 Burbush Road – Soil Investigation	Review pending	Greenfields	A 2011 Soil Investigation Report* has been prepared but has not been reviewed by WRC.
LUI10880	223 Te Kowhai Road PSI	Sampled	Greenfields	A 2014 PSI Report* has been prepared. The PSI concludes that the site is highly unlikely to pose a risk to human health provided development does not occur in the vicinity of farm buildings on site that are to remain in productive use at this time. If development is to occur in these areas, a detailed site investigation may be required to the specific area of concern.

*These reports are described in the next subsection. LUI 10871 is south of the Site. LUI05751 and LUI05749 are north of the Site. However, the land use (pasture) is similar.

The information from WRC also states:

"Rural Land Considerations: Examples of sites that are "more likely than not" to have soil contamination (HAIL sites) include timber treatment activities, service stations and/or petroleum storage, panel beaters, spray painters, etc. Whilst pastoral farming is not included on this list, typical farming activities of horticulture, sheep dipping, chemical storage, petroleum storage and workshops are; but are more difficult to identify and may not be as well represented on the Land Use Information Register. Therefore, individuals interested in pastoral land may be interested in completing further investigations in accordance with Ministry for the Environment Guidelines prior to land purchase and/or development."

"Additional Information: Please note that:

- Significant use of lead-based paint on buildings can, in some cases, pose a contamination risk; the use of lead-based paint is not recorded on the Land Use Information Register.

- Buildings in deteriorated or derelict condition which contain asbestos can result in asbestos fibres in soil; the use of asbestos in building materials is not recorded on the Land Use Information Register.
- The long term, frequent use of superphosphate fertilisers can potentially result in elevated levels of cadmium in soil; the use of superphosphate fertiliser is not recorded on the Land Use Information Register."

Hamilton City Council Records

A request for relevant information was provided to Hamilton City Council. Two environmental investigation reports were received from the Council – one for 223 Te Kowhai Road (also received from Waikato Regional Council) and one for 335 Te Kowhai Road. These reports are summarised below.

Hamilton City Council does not have records for the remaining properties but does note that there may have been HAIL activities, including use of pesticides and persistent pesticides, which should be considered.

Previous Environmental Investigations

As described above, environmental investigations were conducted for the properties located at 111 Burbush Road, 223 Te Kowhai Road, and 335 Te Kowhai Road. Each is summarised below.

111 Burbush Road Soil Investigation Report Summary

A "Soil Contamination Investigation & Assessment" report was prepared for the property at 111 Burbush Road by Soil and Land Evaluation Ltd in August 2011. The report states that "the site has possibly been exposed to potentially contaminating activities such as fertilizer, herbicide and insecticide use in relation to horticulture and agricultural activities." Samples were collected from around the proposed house site and a composite sample was analysed for heavy metals and organochlorine pesticides. All results were below NESCS Soil Contaminant Standards (SCS) for residential land use. The results were also below the NESCS SCS rural residential land use; however, cadmium was detected at 0.79 mg/kg and the NESCS SCS for rural residential land use is 0.8 mg/kg. The NESCS SCS for residential land use is 3 mg/kg.

The report found that the site is suitable for rural residential land use but did state that areas not investigated could have contamination present.

223 Te Kowhai Road PSI Report Summary

A PSI report was prepared by Envirochem Evaluation Limited in 2014 for Lots 1, 3, and 4 DPS 15254 and Pt Lot 7, Lots 9, 10, and 11 DPS 15244. Seven soil samples were collected from across the site and were analysed for cadmium. The NESCS SCS was not exceeded and the report stated that "the average levels of soil contamination in the general pastoral soil are highly unlikely to be a significant risk to human health. This soil is considered suitable for the proposed subdivision and the intended rural-residential land use."

Farm buildings present at the lots investigated included sheds, a shearing barn and dairy milking shed. The report recommended that a detailed site investigation be conducted for those pieces of land where buildings were present due to possible

soil contamination. The report also recommended that any future dwellings be placed 40 to 70 metres away from existing buildings. It also noted that a new dairy effluent pond was proposed and should be taken into consideration with regard to construction of future side dwellings.

335 Te Kowhai Road Land Contamination Screening Report Summary

A *Land Contamination Screening and Heavy Metals Tests* report was prepared by Soil and Land Evaluation in 2004. The report states that there had been historical dairy farming at the site, but that it was currently being used for dry stock farming and grazing. The report also states that there is no history of horticulture or market gardening at the site.

Two samples, comprised of 18 composited single samples, were analysed for heavy metals and organochlorine pesticides. The results were reportedly below guideline values; however, the results were not included with the report provided. The organochlorine pesticide results were below laboratory reporting limits.

Owner Interview

A telephone interview was conducted with the owner of the property located at Sec 53 SO 495676. She stated that the orchard had not been operational since they had purchased the property in 2001. The orchard was previously an apple orchard, and the previous owner had told her that "mainly organic practices" were used.

Site Inspection

The site inspection was first conducted through review of photos and footage from a fly-over with an unmanned aerial vehicle (drone). Areas of interest were then inspected by a suitably qualified practitioner.

Overview

Drone flyover photos were collected in early June 2018. These photos were reviewed by Terre Nicholson, HDC Principal Environmental Consultant, and Matt Moore, HDC Field Technician.

A site inspection was undertaken by Matt Moore, HDC Field Technician, on 14th June 2018. The inspection consisted of conducting a visual inspection while driving and walking around the site, targeting areas of potential environmental concern based on a review of the drone flyover information.

There were hazardous substances (e.g., pesticides, animal drench, paints, lubricants) found in multiple buildings across a majority of the Site. There was minor hydrocarbon staining found in the sheds in Lot 5 DPS 15123 (paved), and Lot 6 DPS 15123 and Lot 2 DP 485743 (unpaved). Rubbish, including empty containers of hazardous substances, was present around and within buildings in the site; the majority of this was located at a workshop/scrap yard in Lot 3 DPS 15123, three of the sheds in the northern side of Lot 6 DPS 15123, and the two sheds and rubbish pit located at the operational dairy farm (Lot 6 DP 359488, PT Lot 7 DPS 15255). The sheds around the Site (Sec 23 SO 495676, Lots 3, 5, 6 DPS 15123, Lot 2 DP 485743, Lots 3-4 DP 15254, Pt Lot 7 DPS 15255, Lot 10 DPS 15255, Lot 6 DP 359488) are

mostly constructed of concrete and metal in varying states of disrepair. Potential asbestos-containing material was observed. There is a dairy effluent sump located next to and connecting to the milking shed, as well as an above ground diesel storage tank/pump within Pt Lot 7 DPS 15255.

Away from the buildings, the Site is predominately covered with grass and is used for grazing. The Site has an undulating terrain, with ridges located on the south, east, and west sides of the side. There are drainage ditches present across the Site running through the paddocks. There were several low-lying areas within the central and eastern sections of the site where surface water was visible. There are numerous gates and fences present which separate the paddocks.

Areas of Environmental Concern

The areas and/or activities of environmental concern and contaminants of potential concern (CoPC) are listed in Table 5.

Table 5. Areas of Environmental Concern

Parcel No.	Areas/activities of concern	CoPC
Entire Site (all parcels)	Super-phosphate fertiliser application	Cadmium
	Persistent pesticide application	Organochlorine pesticides, arsenic, lead
	Buildings with asbestos and/or lead-based paint	Asbestos, lead
	Chemical storage	Hydrocarbons, pesticides, heavy metals
Dairy Farms (Pt Lot 7 DPS 15255, Lot 2 DP 485743)	Effluent ponds	Heavy metals, nitrates
	Animal dip or spray sites	Pesticides, arsenic
	Aboveground diesel tank	Hydrocarbons
Workshop/Scrap Yard (Lot 3 DPS 15123)	Chemical storage	Hydrocarbons, heavy metals, pesticides, solvents
Orchard (Sec 53 SO 495676)	Pesticides	Pesticides, arsenic, lead, copper

Site Evaluation

Conceptual Site Model

Based on the evaluation of available data and identification of the COPCs), a Conceptual Site Model (CSM was constructed. Environmental considerations taken into account in constructing the CSM are shown in Table 6, below.

The primary COPCs for the pasture areas are heavy metals, particularly cadmium, from application of super phosphate fertiliser and organochlorine pesticides from historic use. It is likely that fertiliser was spread across the entire site in a relatively consistent manner as the grassed areas of the Site were used for pasture land rather than for specific crops. The same is true of pesticide application.

There are other COPCs associated with the sheds and buildings (such as hydrocarbons, solvents, animal drenches, lead-based paint, asbestos). In addition,

pesticides, anti-fungal treatments, herbicides, etc., may have been used in the orchard.

Table 6: Conceptual Site Model

Item	Description
Surface Water	Surface water and run off from rain and dust settlement activities may mobilise contaminants (dissolved and particulate) and therefore may contribute to migration of contamination.
Groundwater	Groundwater may contribute to migration of contamination of soluble and mobile contaminants. The depth to groundwater is estimated to be between 0.5 m and 2.1 m bgs in the low-lying areas and up to 6 m bgs in elevated areas. It is considered unlikely that groundwater would be impacted by heavy metals or pesticides; however, hydrocarbons and other organic contaminants may migrate to groundwater.
Subsurface Geology	Subsurface geology may influence migration pathways. For example, contaminants generally travel more quickly through gravel than through clay materials. The site is underlain by alluvium (sand and silt) with peat deposits.
Flora and fauna	The Site is an area which is surrounded by residential and agricultural properties. The Waikato Expressway is located next to the Site and there are no significant areas of native bush. Sensitive species may be present at the Site; however, as it has been pasture land for over 50 years, additional adverse effects are not expected from potential site contamination.
Sensitive Surface Water bodies	Lake Rotokauri is present approximately 1.3 km south of the Site. Horseshoe Lake is south of the Site and the Waikato River is approximately 2.5 km east of the Site.
Vapour Intrusion	Vapours from potential hydrocarbon contamination in soil or groundwater may travel through the gravel fill material on Site, (which will be replaced by vegetation), allowing vapours to pass freely to the atmosphere. Hydrocarbon contamination would be of particular concern, particularly if petrol or solvents have been released. Organochlorine pesticides and heavy metals do not present vapour intrusion risks.

Surface water runoff would be the most likely migration pathway for heavy metals and organochlorine pesticides. Therefore, it is assumed that concentrations in low-lying areas where there has been ponded water from storm events would be likely to have higher contaminant concentrations from the widespread application of pesticides and/or fertiliser.

Based on available information, with the exception of the orchard, the non-occupied areas of the Site have not been routinely tilled and have been used as pasture (grassland). Therefore, the contaminants would likely have the highest concentrations just below the root zone, in shallow near-surface soil.

At the orchard, ground may have been tilled and routinely sprayed with pesticides, anti-fungal treatments, etc. The contamination would likely be at the edges of the tree canopies, directly around the tree trunks, and in tilled rows between the trees.

At the farm buildings (past and present) there is potential for asbestos in building materials, lead-based paint, and hazardous substances storage. Some of the properties have other potentially contaminating activities present, such as rubbish dumps, an aboveground diesel storage tank, and offal pits.

The farm shed entrances also carry a higher risk of contamination because this is the area where fertilisers, pesticides, etc., are typically mixed and loaded into spreading equipment and there is a greater risk of spillage.

Evaluation of Potential Risk

Several potential HAIL activities were noted, which could result in the presence of contamination in soil:

- Many farm buildings historically used asbestos-containing materials and/or with lead-based paint. Farm sheds are often used for storage of pesticides, diesel fuel and petrol, fertilisers, and other hazardous substances.
- Parcel Sec 53 SO 495676 was an apple orchard. According to the site owner, it is unlikely that organochlorine pesticides were used, but it cannot be ruled out, nor can the use of other persistent pesticides, such as those containing arsenic, copper, and lead.
- The workshop/scrap yard at Lot 3 DPS 15123 is used to store hydrocarbons and other hazardous substances. Workshops and scrap yards are considered HAIL activities.
- The dairy farms located at Pt Lot 7 DPS 15255 and Lot 2 DP 485743 may have had spray races present. Past and present effluent ponds are present, along with chemical storage and older buildings. An above ground diesel storage tank is also present.
- Superphosphate fertilisers and persistent pesticides may have been used, resulting in cadmium and pesticides being present in soil.

Recommendations

Based on the review of available information and site inspection, the potential risk to human health from the greenfields (pasture) portions of the site is likely to be low. The risk from hazardous substances associated with farm structures is slightly higher.

Environmental investigations conducted at surrounding properties indicate that while cadmium concentrations are slightly above typical background concentrations, they tend to be well below residential guideline values (10% produce consumption) found in the NESCS. However, farming practices vary among owners, so without sampling and analysis, the potential risk cannot be fully quantified at this time. In the near-term, it is recommended that a strategic sampling plan be developed for the paddocks to confirm the presence or absence of contamination.

As a future activity, site inspections should be conducted as use ceases at properties where HAIL activities have occurred. A sampling and analysis plan

should be developed and implemented for each of the farm structures (current and historical) and the orchard. The sampling and analysis should be tailored to the activities conducted; for example, sampling and analysis for:

- Organochlorine pesticides in select samples from the paddocks;
- Asbestos and lead-based paint around structures;
- Heavy metals, hydrocarbons, and persistent pesticides at shed entrances;
- Heavy metals and hydrocarbons at the workshop/scrap yard;
- Heavy metals, organochlorine pesticides, and hydrocarbons at the dairy farms; and
- Lead, arsenic, copper, and organochlorine pesticides at the orchard.

Note that the activities at the HAIL sites may change over time; therefore, sampling and analysis should not be conducted until activities cease at these sites. Activities must be re-verified before sampling and analysis is conducted and the above example plan amended as appropriate. In addition, it is recommended that rubbish is removed prior to sampling and analysis.

All sample results should be compared with applicable guideline values to assess potential risk and whether remedial action will be required.

Should the samples from the paddocks indicate that there is no significant risk, they will not be classified as HAIL sites and only the areas around potentially contaminating activities (e.g., workshop/scrap yard, orchard, portions of the dairy, farm sheds) should be designated as "pieces of land" for purposes of HAIL classification

Limitations

This document does not include any assessment or consideration of potential health and safety issues under the Health and Safety in Employment Act 1992. HDC has relied upon information provided by the Client and other third parties to prepare this document, some of which has not been fully verified by HDC. This document may be transmitted, reproduced or disseminated only in its entirety. This report has been prepared for the use of the client and may not be relied upon by others without the express written permission of HDC.

From a technical perspective, the subsurface environment at any site may present substantial uncertainty. It is a heterogeneous, complex environment, in which small subsurface features or changes in geologic conditions can have substantial impacts on water, vapour and chemical movement. HDC's professional opinions are based on its professional judgement, experience, and training. It is possible that testing and analysis might produce different results and/or different opinions. Should additional information become available, this report should be updated accordingly. No sampling and analysis was undertaken for this PSI.

Certification

This report presents information from an environmental site investigation conducted by and under the oversight of a Suitably Qualified and Experienced Practitioner with contaminated land experience, as required by the National

Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health and who is a Certified Environmental Practitioner – Soil Contamination. Detailed qualifications are available upon request.



Terre Nicholson, CEnvP-SC # 0509

APPENDIX A - FIGURES

Rotokauri North Special Housing Area

February 2018
Green Seed Consultants Ltd

ROTOKAURI NORTH SHA AREA (Figure 1)

Map legend

- Site area
- 1 Stage 1 (53.39ha)
- 2 Stage 2 (79.72ha)

Stages 1 and 2 sought as an SHA.
Total of 133.1109ha.

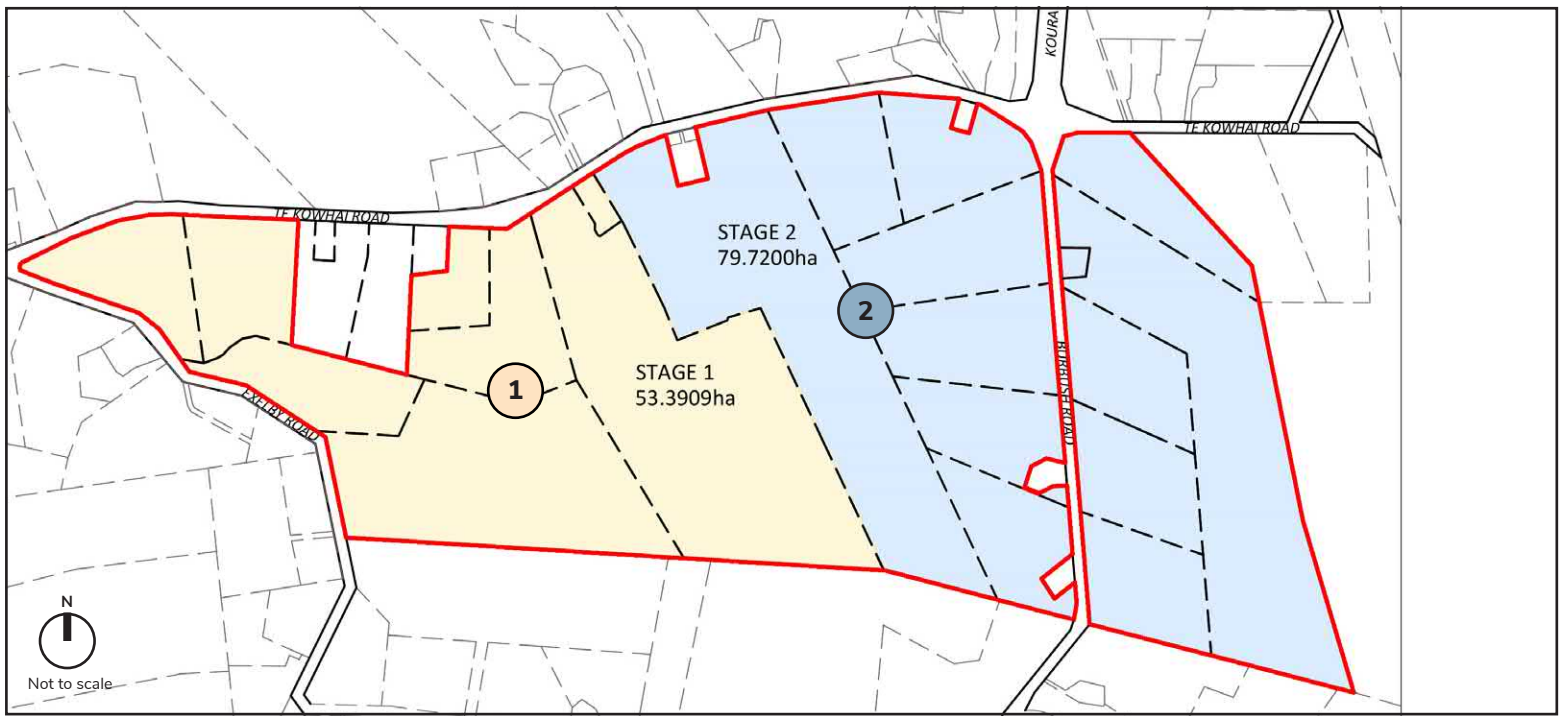


Figure 1: Rotokauri North SHA area

ROTOKAURI NORTH SHA CONCEPT (Figure 2)

Map legend

- Site area
- 1 Optimise connections to east (jobs) as well south.
- 2 Ensure each small centres is focused on its local community.
- 3 Maximise residential catchment around a small centre, and integrate movement network around the centre.
- 4 Provide for necessary stormwater conveyance and storage.
- 5 Provide district-level open space so as to maximise maximise exposure and accessibility to all. Size will be determined by Council acquisition agreement.
- 6 Ensure sensitive slopes can be appreciated as landscape features.

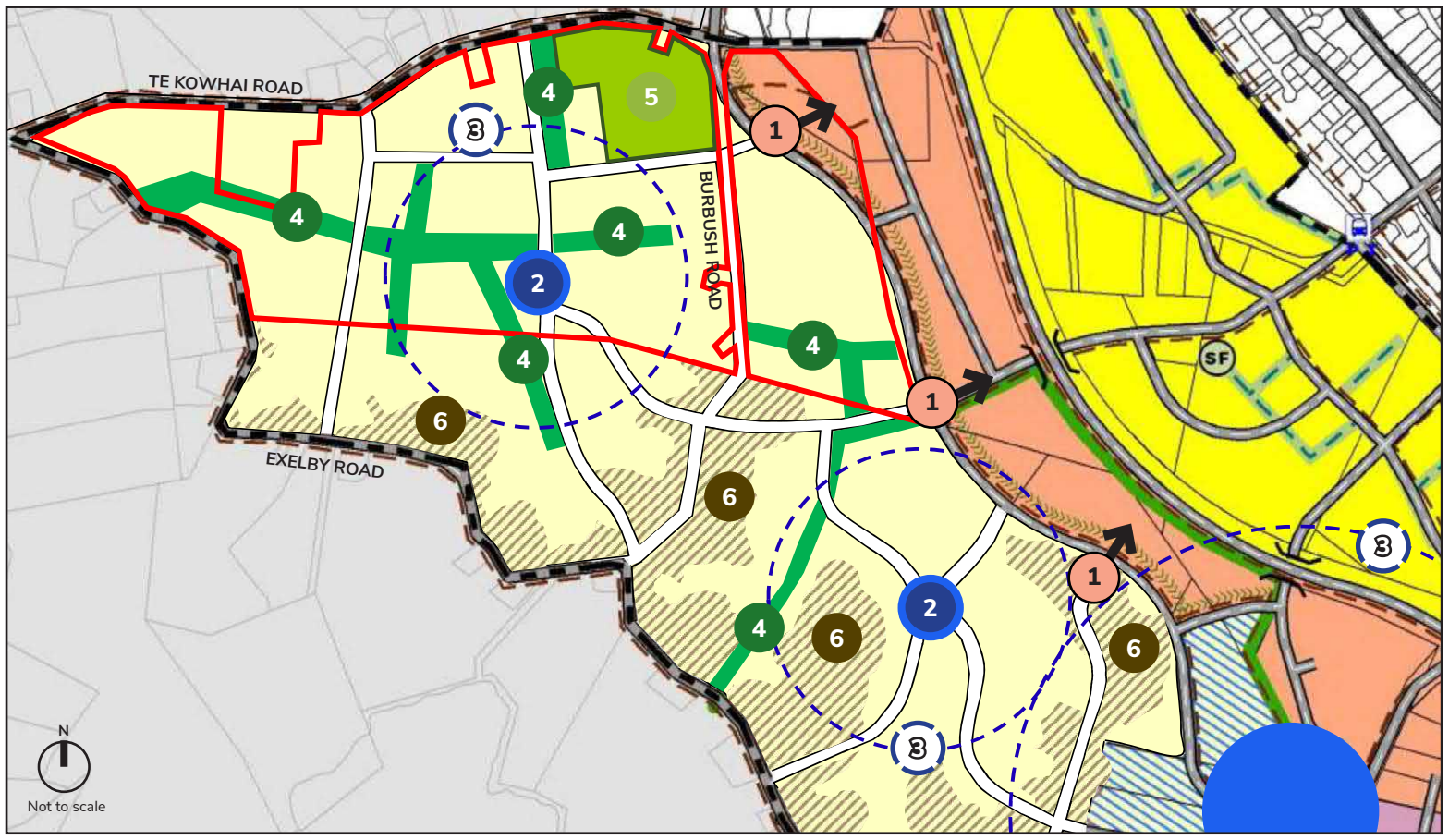


Figure 1: Key structuring elements of Rotokauri North SHA concept

ROTOKAURI NORTH SHA OPTIONS FOR STORMWATER (Figure 3)

Map legend

- Site area
- Floodway basin (conveyance and flood storage)
- Swale (conveyance only)
- Treatment wetlands
- Discharge locations

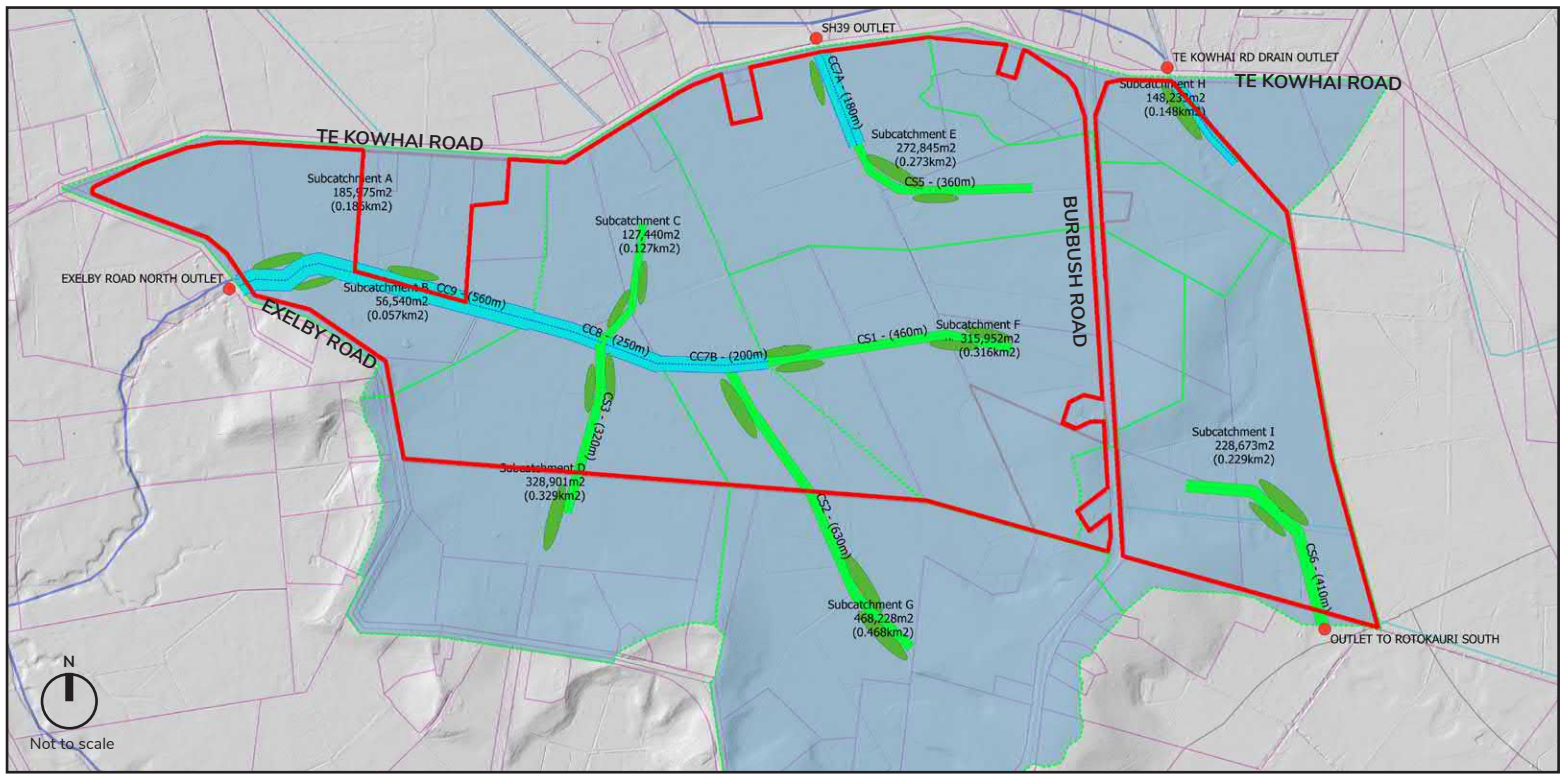


Figure 3: Rotokauri North SHA options for stormwater
Source: CKL Stormwater Solutions

Rotokauri North Special Housing Area

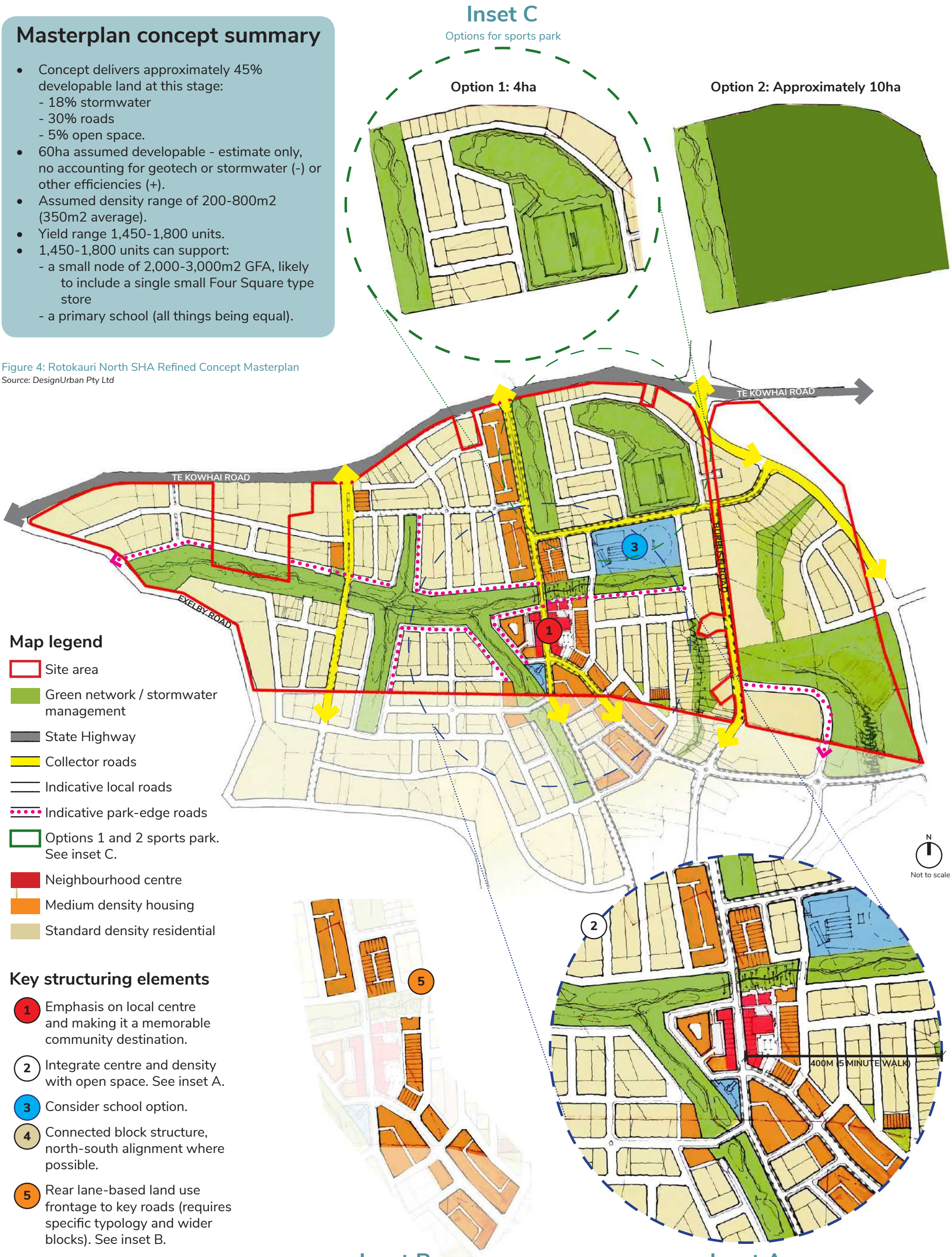
February 2018
Green Seed Consultants Ltd

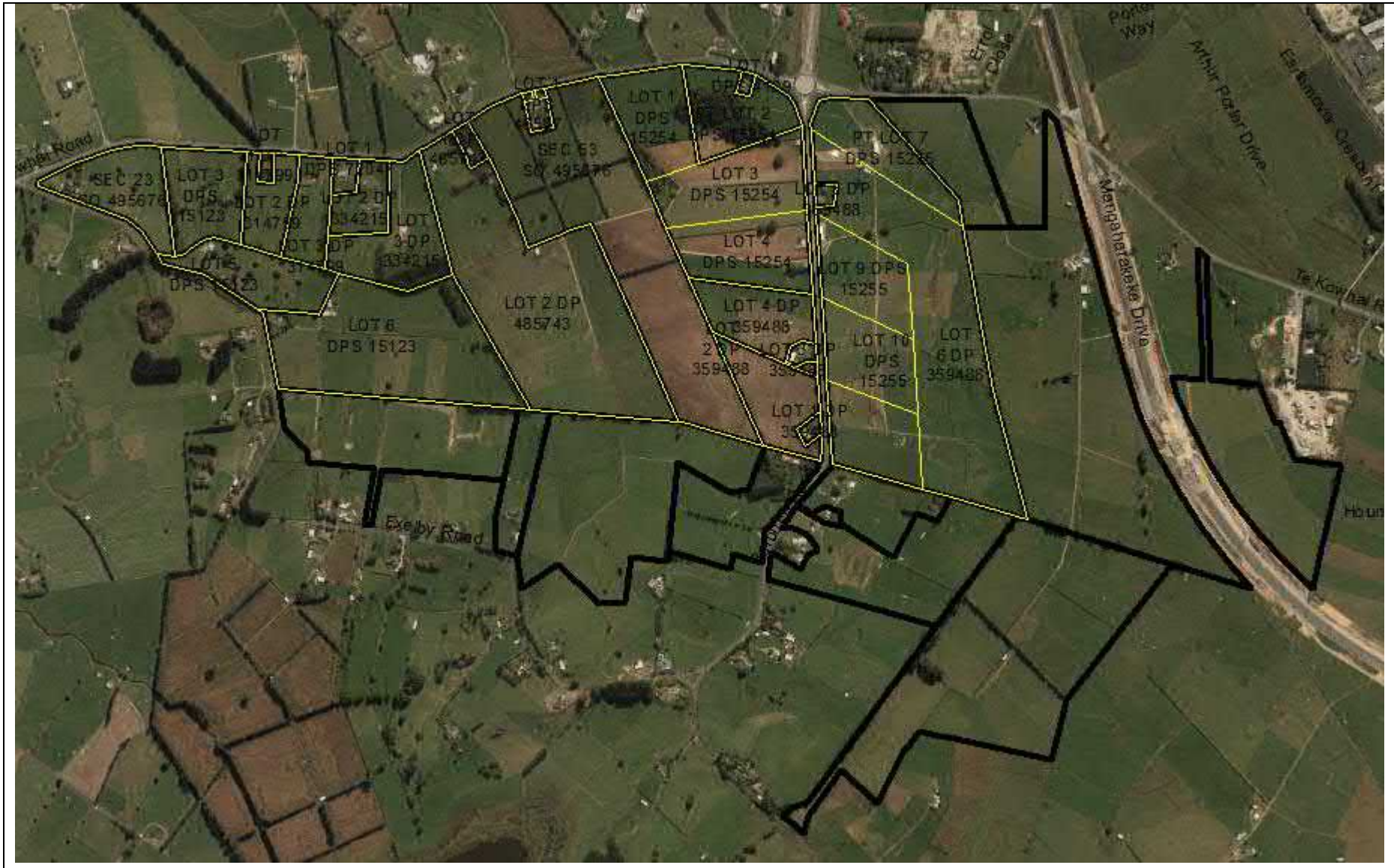
ROTOKAURI NORTH SHA REFINED MASTERPLAN (Figure 4)

Masterplan concept summary

- Concept delivers approximately 45% developable land at this stage:
  - 18% stormwater
  - 30% roads
  - 5% open space.
- 60ha assumed developable - estimate only, no accounting for geotech or stormwater (-) or other efficiencies (+).
- Assumed density range of 200-800m2 (350m2 average).
- Yield range 1,450-1,800 units.
- 1,450-1,800 units can support:
  - a small node of 2,000-3,000m2 GFA, likely to include a single small Four Square type store
  - a primary school (all things being equal).

Figure 4: Rotokauri North SHA Refined Concept Masterplan
Source: DesignUrban Pty Ltd





Approximate Site Boundary

PROJECT: Rotokauri SHA	
PROJECT NO: HD637	
CLIENT: Mark Tollemache	
TITLE: Site Location	
SCALE: NTS	
Drawing No. 1	
Drawing by: TN	
Rev Number	
0	Initial



GEO

LUIR Areas

PROJECT: Rotokauri SHA	
PROJECT NO: HD637	
CLIENT: Mark Tollemache	
TITLE: LUIR Locations	
SCALE: NTS	
Drawing No. 2	
Drawing by: TN	
Rev Number	
0	Initial

APPENDIX B – PROPERTY INFORMATION

Rotokauri Special Housing Area Property Information

Parcel Number	Address*	Area (square metres)**
Sec 23 SO 495676	415 Te Kowhai Road	42,547
Lot 3 DPS 15123	383 Te Kowhai Road	42,134
Lot 2 DP 334215	341 Te Kowhai Road	20,005
Lot 3 DP 334215	335 Te Kowhai Road	51,425
Lot 2 DP 485743	329 Te Kowhai Road	195,546
Lot 1 DP485743	321 Te Kowhai Road	4,501
Sec 53 SO 495676	Te Kowhai Road	197,859
Lot 1 DPS 15254	Te Rapa Road	42,589
Lot 2 DPS 15254	153 Te Kowhai Road	41,241
Lot 3 DPS 15254	Te Rapa Road	57,876
Lot 4 DPS 15254	38 Burbush Road	50,733
Lot 4 DP 359488	56 Burbush Road	39,486
Lot 2 DP 359488	76 Burbush Road	39,309
Pt Lot 7 DPS 15255	153 Te Kowhai Road	39.451
Lot 6 DP 359488	17 Burbush Road	164,788
Lot 5 DPS 359488	29 Burbush Road	2,626
Lot 9 DPS 15255	Burbush Road	40,475
Lot 10 DPS 15255	223 Te Kowhai Road	40,475
Lot 11 DPS 15255	223 Te Kowhai Road	40,476
Lot 5 DPS 15123	372 Exelby Road	40,643
Lot 6 DPS 15123	350 Exelby Road	137,239

*Source: http://gisviewer.hcc.govt.nz/templates/PropQuery/. Accessed 18 June 2018

** Source: https://data.linz.govt.nz/data/category/property-ownership-boundaries/global/oceania/new-zealand/waikato/hamilton-city/?s=n. Accessed 18 June 2018.

APPENDIX C – HISTORIC AERIAL PHOTOS



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1952

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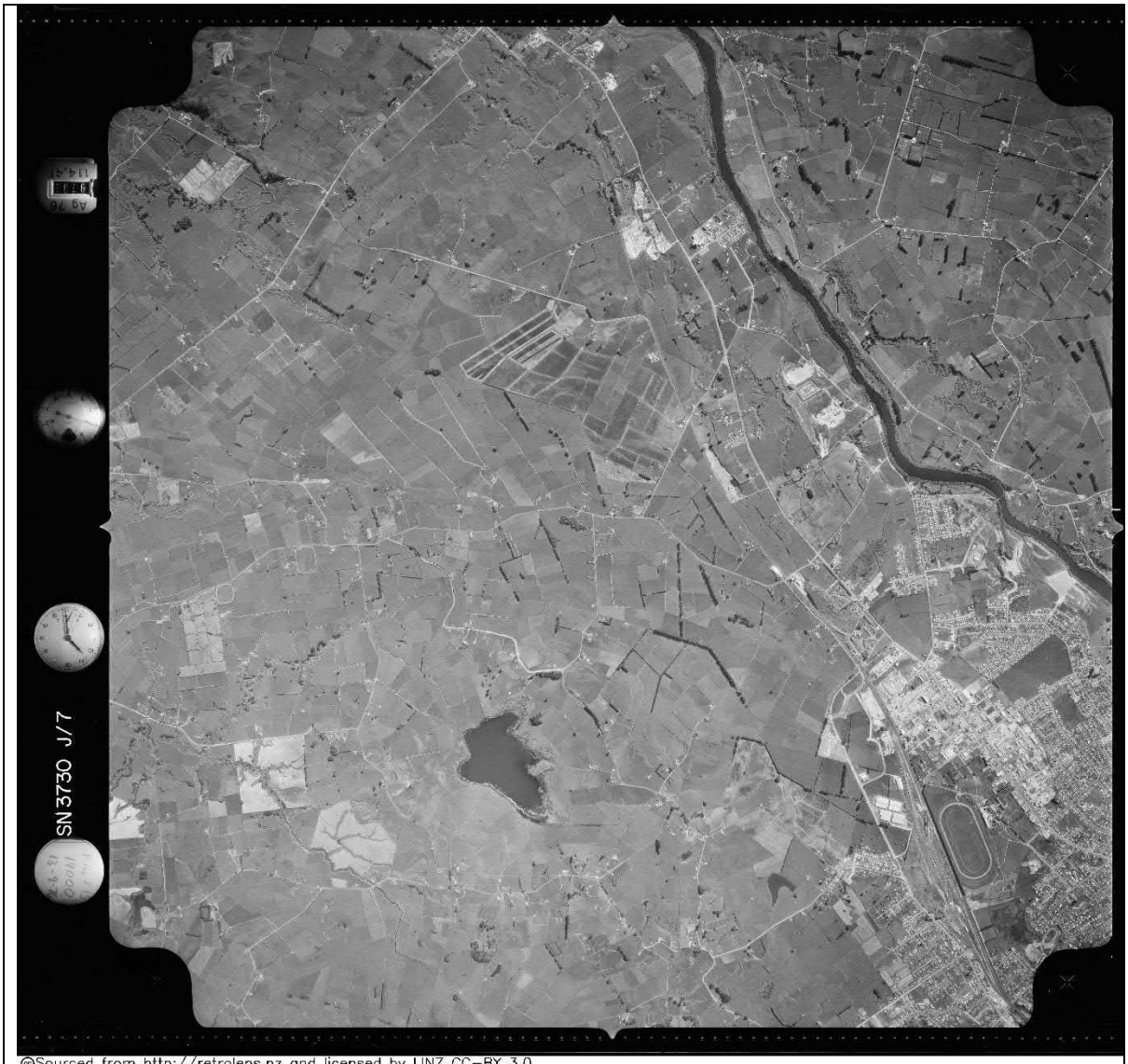
1963



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APPENDIX D – SITE PHOTOS

Site Photos – Rotokauri North SHA – 21st June, 2018



Photo 1. Hydrocarbon staining on floor of shed, facing west. Lot 5 DPS 15123.



Photo 2. Unknown storage tank, facing north. SEC 23 SO 495676.



Photo 3. Unknown metal tank (leaking) with generator & herbicide tank, facing west. SEC 23 SO 495676.



Photo 4. Fuel and oxidizing bottles, facing north. LOT 6 DPS 15123.



Photo 5. Potentially hydrocarbon stained soil, inside barn facing north-east. LOT 6 DPS 15123.



Photo 6. Glyphosate (organophosphorus) herbicides in shed. LOT 6 DPS 15123.



Photo 7. Formalin containers. LOT 3 DPS 15123.



Photo 8. Shelves of paint in storage shed. LOT 3 DPS 15123.

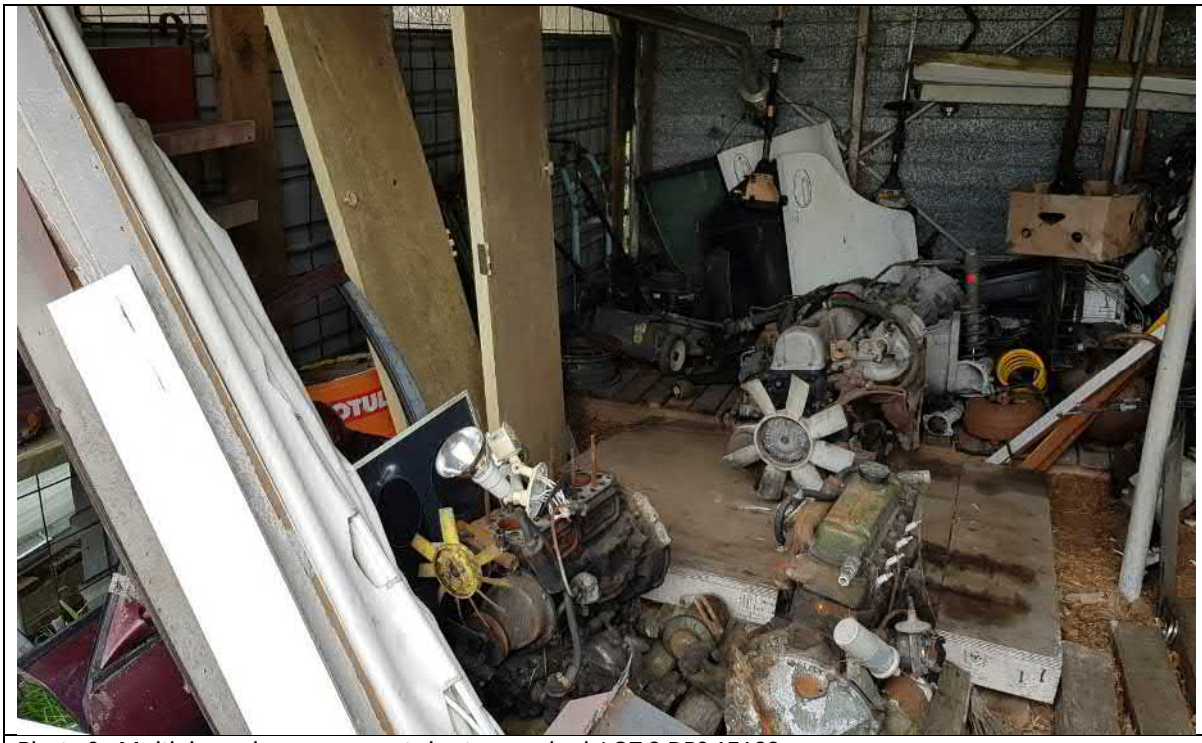

Photo 9. Multiple engine components in storage shed. LOT 3 DPS 15123.



Photo 10. Dairy cattle milking station, facing south. LOT 2 DP 485743.



Photo 11. Hydrocarbon staining under vehicles in storage shed, facing south. LOT 2 DP 485743.



Photo 12. Storage shed, facing south-east. LOT 2 DP 485743.



Photo 13. IntenSE container and pichloram+triclopyr herbicide in storage barn. LOT 6 DP 359488.

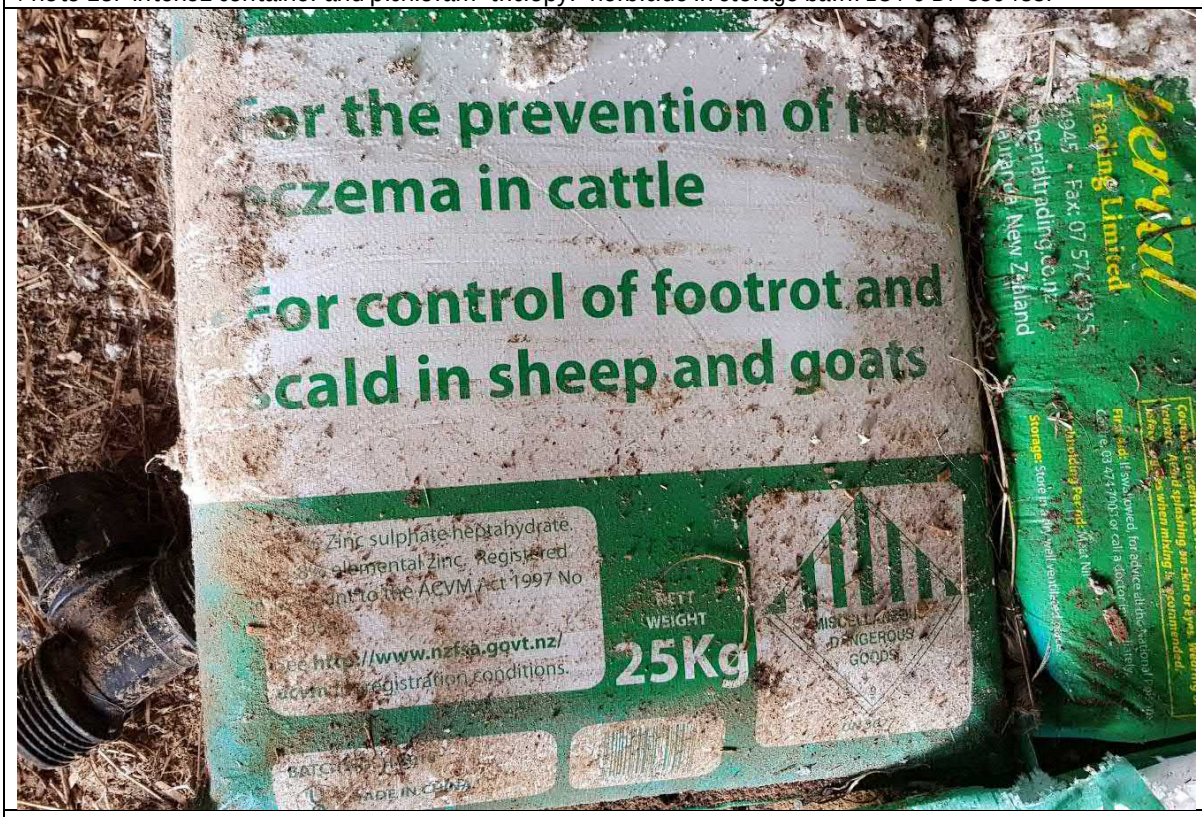

Photo 14. Zinc sulphate heptahydrate in storage barn. LOT 6 DP 359488.



Photo 15. Rubbish pit, facing south-west. PT LOT 7 DPS 15255.



Photo 16. Standing diesel tank, facing south-west. PT LOT 7 DPS 15255.

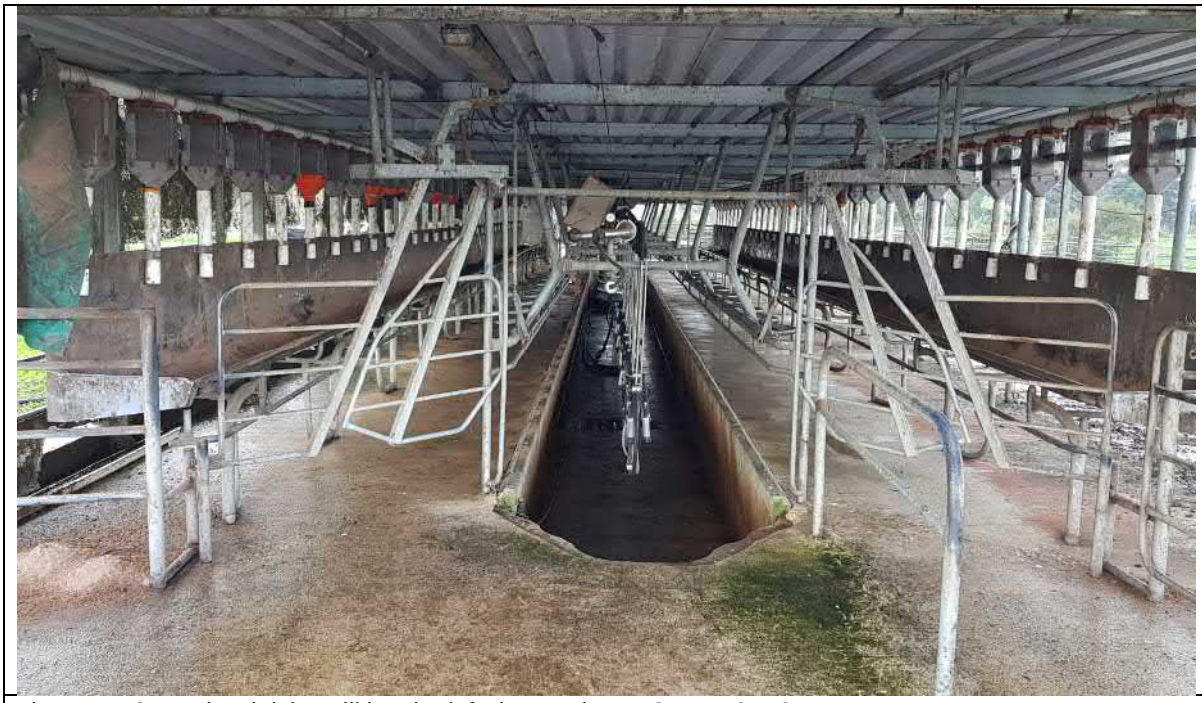

Photo 17. Operational dairy milking shed, facing south. PT LOT 7 DPS 15255.



Photo 18. Effluent sump, connected to milking shed. PT LOT 7 DPS 15255.



Photo 19. Wood storage shed with connecting pig pen, facing west south-west. LOT 3 DPS 15254.

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Hamilton City Council
Private Bag 3010
Hamilton 3240
New Zealand

17 July 2018

Attention: Nathanael Savage

Dear Nathanael

Rotokauri North ICMP: Desktop Review of Hydrogeological Conditions Influencing Stormwater Design

Draft for review

1 Introduction

Hamilton City Council (HCC) proposes to develop the Rotokauri North Development Area (RNDA) in accordance with the Rotokauri Structure Plan. Beca has been engaged by HCC to undertake a desk top review of the current state of knowledge of the hydrogeological conditions at RNDA.

A key outcome of this review is an initial assessment of potential implications for stormwater design to inform the Rotokauri North Integrated Catchment Management Plan (herein referred to as the Rotokauri ICMP). The conceptual stormwater design options are set out in the report “Stormwater Catchment Management Plan” (prepared by CKL, herein referred to as CKL (2017)).

This letter report presents the findings of the desktop assessment and identifies what additional investigation or analysis would be needed to confirm option viability or provide a higher level of certainty to support design.

2 Stormwater Design Options

A conveyance system is required to take runoff within the Rotokauri North catchment to the Waipa Stream, with smaller out flows towards SH 39 to the North, Te Kowhai Rd drain outlet to the North East, and Rotokauri South outlet to the South East. Various options for conveyance and attenuation of stormwater have been considered with the objective of maximizing discharge to the downstream catchment, whilst providing sufficient upstream attenuation and storage for a 100 year ARI. Options that preserve and promote ecological and landscape character are preferred.

The preferred concept option has been identified as a central drain / green corridor (Figure 1). The typical depth of the channel is intended to be 2 m. It is proposed in the center of the corridor, a relatively small main channel (26-30 m wide) will support permanent base-flows in a run-riffle-pool type arrangement, with the wider corridor (53-76 m wide) profiled to accommodate larger events, similar to that outlined for the overarching Rotokauri ICMP.

Where storage basins are required they are likely to be largely accommodated within the corridor footprint; however, offline storage in adjacent reserves could still be required.

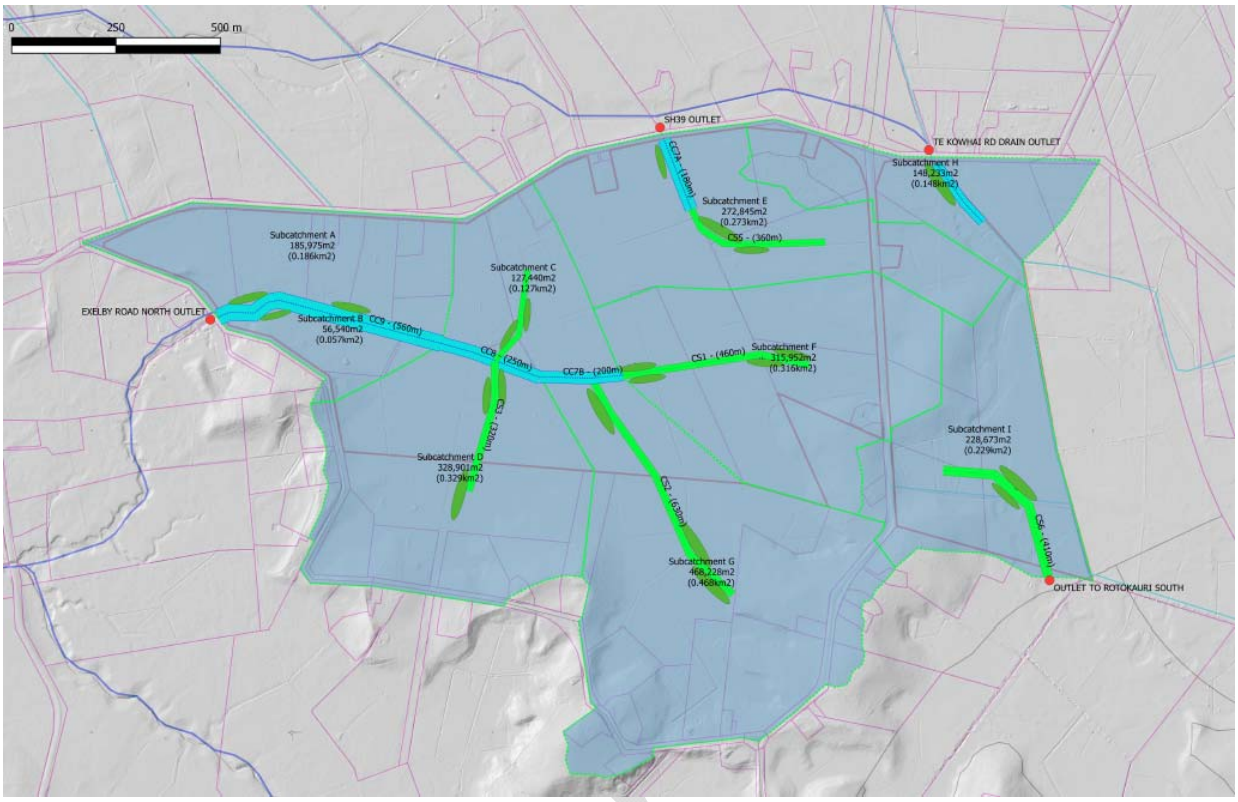
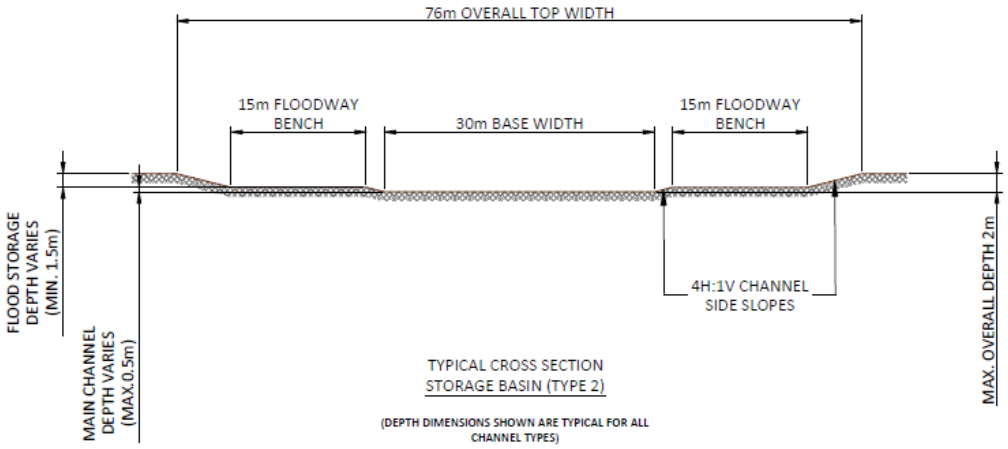


Figure 1: Rotokauri north development area concept stormwater layout (CKL, 2017)



CONCEPT

Figure 2: Typical details of Storage channels (CKL, 2017). The center of the corridor, a relatively small main channel will support permanent base-flows in a run-riffle-pool type arrangement, with the wider corridor profiled to accommodate larger events

3 Hydrogeological Setting

3.1 Geology

The published geological map identifies that the site is liekly to be underlain by Hinuera Formation (Figure 3, which in turn is underlain by Walton Subgroup.

The Hinuera Formation soils were deposited in a fluvial environment and so it is expected that individual layers will vary in thickness and extent.

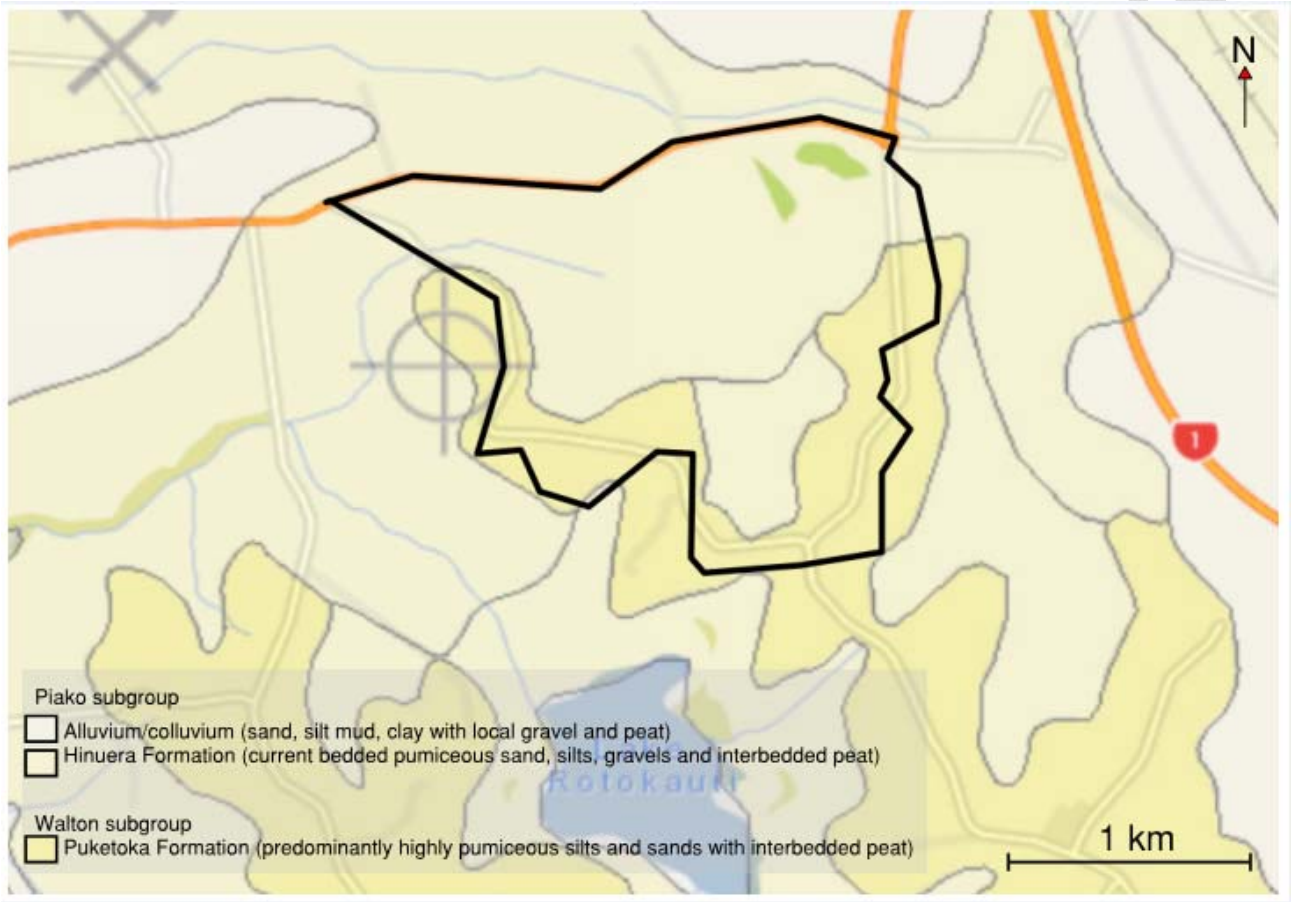


Figure 3: Geological map indicating the site is underlain by Hinuera Formation overlaying Walton Subgroup.

Review of limited, available site investigation data confirms that the profile across the site is comprised of soils (sands, silts and gravels) of the Piako Sub-group (Hinuera Formation). Feasibility level investigations undertaken by HD Geotechnical have been shallow (< 2.4 m depth); however, the upper part of the soil profile is consistent with that identified in the wider Rotokauri Structure Plan area (Table 1). On this basis the near surface Piako Subgroup soils are liekly to range from 0.5 m to 3 m thickness across the RNDA.

The underlying Walton Sub-group outcrops, through the Piako formation forming the low lying hills along the southern boundary of the RNDA.

No peat has been identified in prior investigations at the site, however it was identified (be it inconsistent, both spatially and in thickness) during investigations for the Rotokauri ICMP; therefore, there is some possibility of peat being encountered within the RNDA.

3.2 Hydrogeological Properties of Soils

High level hydrogeological properties of the soils have been determined from initial ground investigations at site, publically available borehole investigation data, relevant Environment Waikato bore data, and experience for similar projects in the area, notably investigations from the neighbouring Rotokauri ICMP (that included long term groundwater level monitoring, in-situ permeability testing and grain size analyses).

Layer descriptions (and their corresponding expected hydrogeological properties) are presented in Table 1 below. The depth and soil properties are largely based on deep investigation drilling undertaken in Rotokauri, however, initial site investigation data from RNDA (HD Geotechnical, 2018) indicates hydraulic conductivities that are likely in the range of $1x10^{-6}$ to $4x10^{-7}$ and hence are broadly consistent.

Layer 1 is likely to have an overall low hydraulic conductivity, controlled by the fines component of the soils and are likely to be strongly anisotropic (that is, the layering in the alluvial soils means that flow occurs more rapidly in a horizontal direction than in a vertical direction, albeit slowly in both cases).

Site specific investigations for Rotokauri indicated that it was possible to further distinguish a coarser, more permeable unit with depth (layer 2). Investigations undertaken for the RNDA to date are not of sufficient depth to confirm if such a layer is present across the site. If present, layer 2 is likely to have a coarser grain size and will likely be more permeable.

Table 1: High-level assessment of liekly hydrogeological properties of the RNDA

Unit	Layer	Description	Depth to top of layer (m bgl)	Thickness (m)	Hydraulic Conductivity (m/s)	K_v/K_h ratio
Piako Subgroup	1	Sandy silty CLAY/sandy SILT	0	0.1 – 10 (typical=1.5)	10^{-6} to 10^{-8} (Low)	0.1
	2	Fine to coarse SAND/ silty fine SAND/ gravelly SAND/SILT	1 – 10	0.5 - 21.5+ (typical=8.7)	1×10^{-5} (mod-high)	1

3.3 Groundwater Levels

The RNDA consists of three sub-catchments which are understood to drain to three separate outlet locations (CKL, 2017). The surface water catchments are constrained by ridgelines formed from low lying Walton Subgroup hills that are located along the southern boundary (coincident with Exelby Road) and running north-south (along Burbush Road). The majority of surface water runoff occurs within these two ridgelines and is expected to drain west towards the Exelby Road North culvert which is at an elevation of ~29 m.

A broadly similar pattern is expected in the groundwater though there is limited site specific investigation to confirm.

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Te Rapa bypass investigation (Te Rapa bypass, 2005) undertaken within the RNDA compiled mostly of hand auger data indicted groundwater levels were 1-1.5 meters below ground level (m bgl). The measurements were taken in July 2005, immediately after drilling.

An initial site investigation (for high level assessment of geotechnical feasibility) was recently undertaken by HD Geotechnical. As part of this investigation shallow, temporary piezometers were installed to depths of 0.6 m to 1.3 m bgl and data loggers were deployed for one week to record the short term groundwater response to rainfall.

These piezometers indicate that groundwater levels ranged from 0.1 m bgl (i.e. near ground surface level) and 1.1 m bgl. Groundwater levels (in individual piezometers) varied by typically 0.3 m but up to 0.5 m over the period of monitoring in response to rainfall. Using the water table method (where recharge can be assumed based on specific yield and the observed change in groundwater level) the rainfall recharge over this limited period is estimated to be close to 100 % indicating a very direct connection to rainfall.

4 Key Hydrogeological and Geotechnical Constraints for Stormwater Design

4.1 Stormwater Options

A central drain / green corridor has been identified as the preferred option. The corridor is nominally 50 m to 70 m wide with a maximum depth of 2 m. Where storage basins are required they are likely to be largely accommodated within the corridor footprint (to the scale shown in Figure 1).

A preferred option has been identified; however we understand some further design development is likely hence the following sub-sections have considered catchment-wide constraints.

With the preferred stormwater conveyance channel option in mind, and the existing publically available data it is possible to draw some high-level assessment of potential constraints and opportunities relating to stormwater management. A typical cross section summarising this information is seen in figure 4.

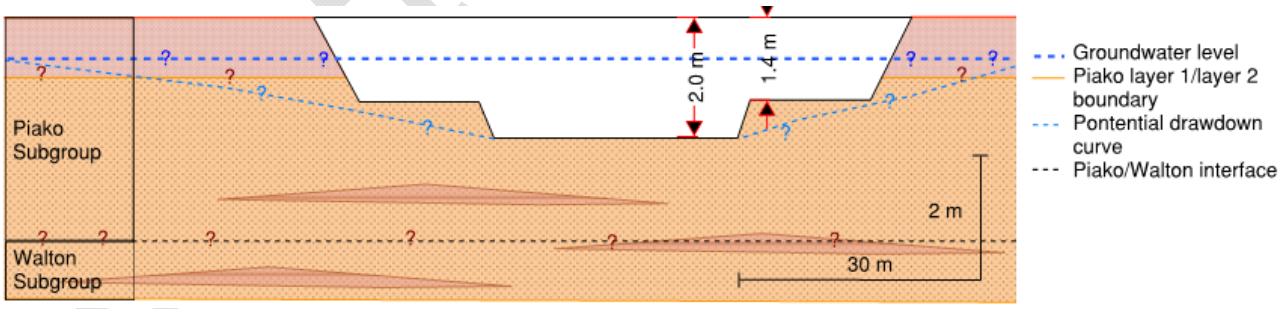

Figure 4: Simplified sketch (not to scale) indicating a typical Conveyance Channel, geological profile, groundwater level and potential drawdown.

For review

4.2 Hydrogeological Constraints

4.2.1 Depth to groundwater

Initial (short duration) results from the high level feasibility investigations indicate a winter groundwater level that is a maximum of 1.1 m bgl, but in locations as high as 0.1 m bgl with a direct response to rainfall. Levels could be higher after large rain events such that the water table is likely to be encountered at or close to ground surface in some locations. This may locally constrain the maximum achievable unlined channel (or basin) depth. If an unlined basin or channel extends below the groundwater table in places, part of the storage will be taken up by groundwater which may drain from a wider area up-gradient.

Where excavations are in soil of low permeability, excavations are unlikely to encounter significant inflows. However should more permeable layers be encountered, groundwater inflows, in addition to being a construction nuisance, could reduce the storage capacity of the channel / basin.

Conversely, should the summer groundwater levels drop below the base of the channels it could be difficult to maintain a wetted base.

Uncertainties:

- What are the current groundwater levels at the specific location of the proposed channels?
- Are the shallowest groundwater levels (indicated by the 2018 investigations) perched (i.e. would they discharge on excavation through them)?
- What is the seasonal variation of groundwater levels across the site?

4.2.2 Drawdown of the groundwater table

Where excavations are required below the groundwater table, drawdown (as shown on Figure 3) could occur with the potential for:

- Groundwater drawdown induced consolidation settlement. This is a risk in areas where excavation of the waterway will encounter sandy materials that are located below the ground water level. In this situation the channel could drain groundwater from further away causing settlement of the overlying compressible soils. The risk of settlement to neighbouring structures requires further consideration as the need to limit drawdown may be a constraint on the maximum depth of cut.
- Loss of channel or storage basin capacity. If the channel is unlined, some of the volume would be taken up by groundwater; if it is lined then upward groundwater pressures would need to be considered in design.
- Groundwater drawdown could affect surface water bodies, however, our desktop study has not identified any significant natural surface waterbodies.

In general, a shallow drain could be expected to have less groundwater impact in terms of drawdown (as well as lesser geotechnical issues) however initial indications are that the excavations will be below the groundwater level. Key to understanding the potential risk of consolidation will be understanding the summer low groundwater levels.

Where the excavation is fully within silty soils, the extent of drawdown and associated effects are likely to be more localised, however drawdown in the more permeable sand layers may extend somewhat further.

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Uncertainties:

- How far is any drawdown likely to extend from the basins/ channel in the long term?

4.2.3 Infiltration Rates

Generally within the Hamilton area, soakage (with storage) is expected to be utilised for on-site management of stormwater where soils are indicated to be of high permeability.

There is limited hydraulic conductivity or infiltration data available for the site (in terms of either existing rainfall recharge at the surface or site specific testing of vertical infiltration rates) however given the shallow depth to groundwater, relatively low permeability and strong rainfall response indicated by short term testing and expected low overall vertical permeability of the upper soils, there is likely to be limited potential for larger scale infiltration of stormwater.

Even where more permeable layers are present at the surface they may be underlain by lower permeability layers which will constrain the rate of any larger scale vertical infiltration. However, where these layers are encountered in basin or channel excavations above the groundwater table some losses of stormwater to the ground through the base and sides, are likely to occur. Whilst this could be of some benefit for stormwater management it could also result in groundwater mounding and associated effects discussed in later sections.

Uncertainties:

- Could water conveyed or stored in channels and basins infiltrate the ground?
- How consistent is the soil profile across the site?

4.2.4 Other design considerations

a. Lining of Channels and Basins

As noted above some gains to or losses from the channels could occur. Based on limited monitoring to date the water table is expected to be above the base of the channels/ basins, hence water is expected to discharge from the ground into the waterway(s). It may be necessary to line sections of channels / basins where groundwater infiltration is sufficiently high that it reduces storage capacity or impacts on channel or basin slope stability.

b. Groundwater seepage/infiltration leading to mounding

There is a risk that where stormwater is able to infiltrate through the base or sides of a channel or basin, it could lead to elevated groundwater levels (localised mounding) that reach or exceed the ground surface and result in surface flooding. This would be particularly significant for newly developed low-lying land or overland flow paths. It may be necessary to restrict groundwater infiltration in areas with shallow depths to water and limited freeboard.

4.3 Geotechnical Constraints

4.3.1 Stability of cuts

A shallow depth to groundwater (and the potential for seepage to reduce the stability of batter slopes) may require lower slope angles which would increase the area of the channel or basin. This is likely to be most

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significant where deep excavations are planned that are located below the groundwater level and in the more permeable layers.

In these areas there may be constraints on cut slope angle, and/ or maximum depth of excavation.

4.3.2 Lateral Spreading

Lateral spreading occurs when earthquake shaking induces soil to lose cohesion and move, resulting in the soil mass acting like a fluid. Three key elements are all required for liquefaction, and thus lateral spreading, to occur:

1. Loose non-plastic soil (typically sands and silts)
2. Saturated soil
3. Sufficient ground shaking

While a geotechnical evaluation is required to understand the liquefaction potential of the site (and this not within the scope of our work) the soil types that are present at the site are considered potentially susceptible to liquefaction (MBIE, 2017) e.g. quaternary aged soils that are below the groundwater table or are saturated.

Where a wetted base occurs in a swale or basin (either due to ponded or stored water in the base, or, due to being excavated close to or below the groundwater level) the side slopes may be susceptible to lateral spreading, as the underlying material will be saturated and likely to liquefy during an earthquake. This will require specific consideration during further design phases.

5 Recommendations

5.1 Additional Site Investigation

The existing publically available data, and high level site investigations undertaken by HD Geotechnical, provide a high-level overview of the ground and groundwater conditions at the site and the uncertainties/ issues that might need to be addressed. It highlights some unknowns that are likely to influence the selection and design of the preferred stormwater option.

Preliminary site specific investigations are now required, with the intention to get a better representation of the geological conditions, groundwater levels and permeabilities at the site. This will allow for a higher level of certainty in this assessment.

We suggest that additional investigations be staged, with an initial first group of investigations aimed at confirming ground and groundwater conditions to support option selection. Should further design development than alter the locations of specific features, further site specific investigations may be required as part of design optimisation.

Indicative timings and a rough order of costs for the initial confirmatory investigations are provided for programme / budgeting purposes.

This first group of investigations is aimed at answering the following questions:

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- What are the current groundwater levels at the site, and what are the seasonal ranges in water level.
- Are the shallow groundwater levels recorded locally perched? If so, does it matter if they are drained or should / could these areas be avoided?
- What are the permeabilities of the soils

Indicative locations for the confirmatory site investigations are shown below (Figure 5).

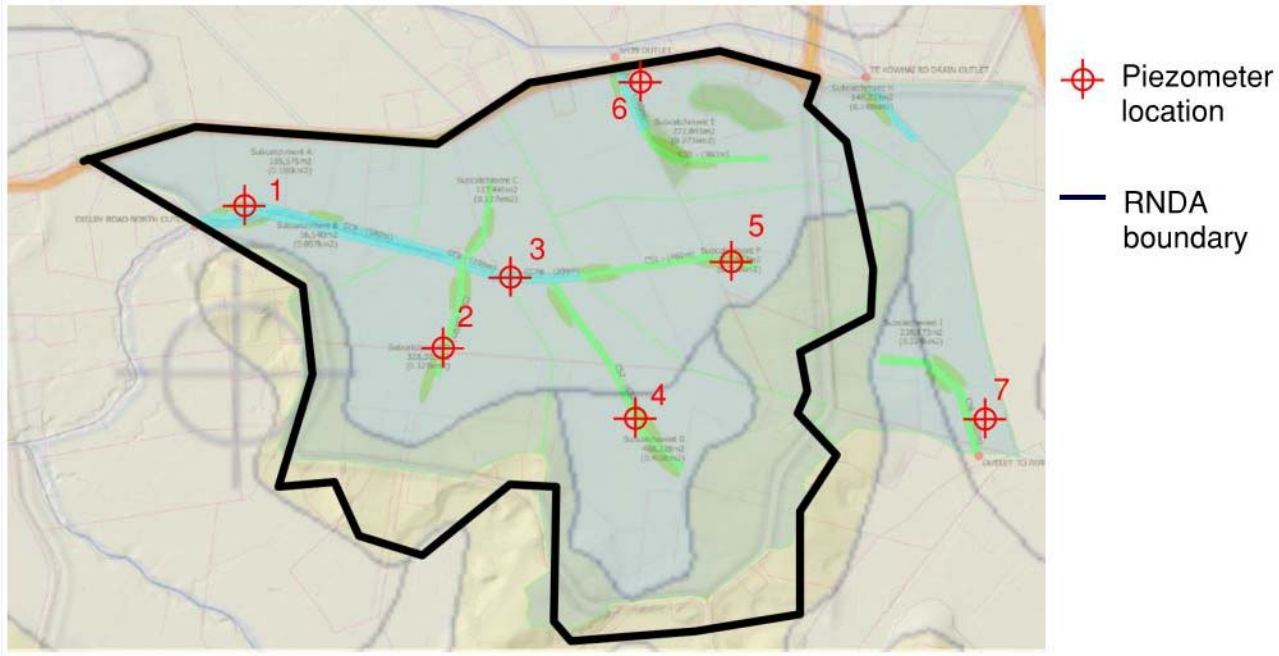

Figure 5: Indicative (approximate) locations showing ideal piezometer locations relative to the concept catchment plan. Note: the locations shown have not taken into account any real-world / logistical restrictions that maybe encountered on site.

a. Investigation drilling and installation of piezometers

Boreholes should be completed as piezometers screened at or just below proposed excavation depth and would comprise a minimum of 1 piezometer at each of the locations shown above in order to assess local variability (particularly where the wetland / basin areas are large). It would also be prudent at a selection of locations to install a deeper piezometer immediately adjacent to confirm if the shallow water table identified in the recent investigations is perched. Each site is likely to take 1 – 2 days to drill and complete at an estimated contractor cost of $2,500 per day (not including any geological logging).

Piezometers installed at these locations would ideally be monitored for one year. This will give confidence in the annual groundwater variation and better constrain groundwater levels.

It is recommended that data loggers be installed to record the more detailed variations in groundwater level that will allow better correlation with changes in environmental conditions.

Data loggers could take up to 3 weeks to be shipped (depending on local availability) and we suggest disbursements of $11,000 ex GST for their purchase (assumes 10 No. data loggers) and around $2,500 for

installation. This cost allows for all shallow piezometers and two deeper piezometers across the catchment to be monitored continuously with manual monitoring in the remaining deep piezometer.

Once installed the data loggers could be downloaded every 1 to 3 months (at a rough cost of $2,100 per download). Groundwater level data will be available after the first download, with a good feel for winter groundwater levels available by mid to late September 2018. We suggest a first download 2 weeks after installation to check all loggers are operating correctly.

b. In-situ permeability testing in piezometers

Permeability testing will be important to inform the need for lining, and for calculation of inflows and the extent of drawdown or mounding during construction and in the long term. In-situ permeability testing will provide an indication of the horizontal permeability at the site.

We suggest allowance for say 3 days of field work to undertake tests in new piezometers ($4,200). It is likely that such work could be undertaken at the same time as investigations in 5.1.1a (above) to limit cost duplication.

c. Vertical infiltration testing

Should the developer wish to progress with soakage, site specific infiltration testing will be required to confirm the likely capacity of the site. Noting the findings above (that soakage may not be practical) we have not proposed any testing at this time.

d. Grain size distribution analysis

To support the permeability analysis, it is recommended that grain size distribution analysis be completed at key locations to assist in refining the permeability of the soils at the site.

We suggest 12 samples (allowance for 1 to 2 per piezometer site) at a cost of ~$10,000+ GST.

e. Factual reporting of the above

Indicative costs for coordinating the investigation, geological logging and factual reporting are likely to be of the order of $30,000.

5.2 Numerical analysis

Previous assessments at Rotokauri have included 2D and 3D groundwater modelling in order to better understand the potential magnitude and extent of groundwater effects. It is recommended that the existing 3D groundwater model for the Rotokauri area be updated to consider RNDA, including results of additional investigations and the effects of the selected stormwater option.

The model can be used to:

- Better understand the overall groundwater catchment
- Assess the magnitude and extent of any drawdown resulting from excavation (for use in consolidation settlement calculations)
- Assess the magnitude of groundwater inflows during construction and in the long term

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- Assess the potential for losses through the base and sides of unlined channels / basins and the extent of groundwater mounding.

The model can be developed without the final design solution in mind, and hence could be used to test the effects of different options such that it can also contribute to optioneering and design optimisation.

The existing Rotokauri groundwater model can be updated to include the Rotokauri North Development Area. Depending on the site specific investigations, the model may require re-calibrating. In this case we suggest allowance of $40,000 (for the analysis and reporting) and a period of six weeks to complete. However, it is possible the model will be suffice as is, in which case time and effort could be reduced.

Whilst the model can be developed without the final concept in mind, model construction will be most efficient if undertaken once the bulk of any new site investigations have been completed (in order to avoid rework). We therefore recommend that this work be commenced once the confirmatory investigations have been completed.

6 Summary and Conclusion

We understand an optimised Stormwater catchment solution is likely to comprise a central channel associated with a green corridor some 30 m to 70 m wide and up to 2 m deep. Short term groundwater monitoring indicate levels across the site varies between near ground level to some 1.1 m bgl, and so it is anticipated that there will be excavation below the groundwater table in some areas.

Where there are sensitive surface features or settlement sensitive structures, there may be constraints on the depth and extent of excavations in order to reduce the potential for adverse effects. In other areas while there may not be environmental constraints, design or construction issues could include the management of construction inflows (for constructability and slope stability considerations), the need for lining etc. These constraints are consistent with observations and recommendations for Rotokauri.

Additional site investigations are recommended at the specific locations of large or deep excavations to better inform design. Such work should include the updating of the existing Rotokauri 3D groundwater model which can be used for both environmental assessment and design optimisation.

Indicative costs and timeframes have been provided for the additional investigations however we would be pleased to provide a more detailed scope and fee and cost estimate for the suggested additional work as the programme proceeds, and look forward to the opportunity to discuss this with you and the wider team in more detail so that key elements can be prioritised.

Yours sincerely

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Hydrogeologist

on behalf of

Beca Limited

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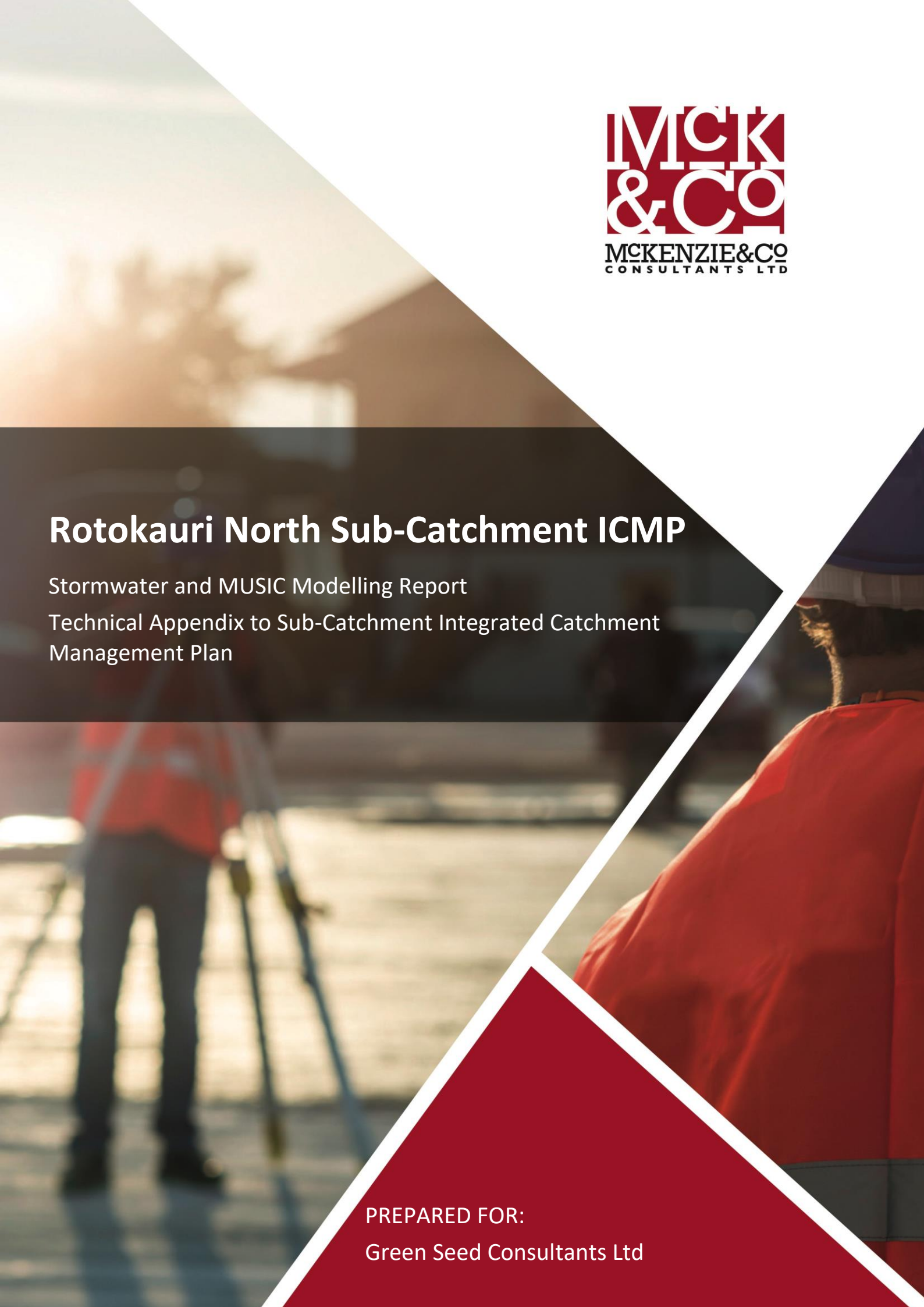

Rotokauri North Sub-Catchment ICMP

Stormwater and MUSIC Modelling Report

Technical Appendix to Sub-Catchment Integrated Catchment Management Plan

PREPARED FOR:

Green Seed Consultants Ltd

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Revision	Date	Originator	Checker	Approver	Description
DRAFT	11/18	BJR	AJSH	AJSH	Draft for client review
1	12/18	BJR	AJSH	AJSH	Draft for HCC
2	2/19	BJR	AJSH	AJSH	Addressed HCC comments from draft; added sensitivity analysis for WRC
3	3/19	BJR	AJSH	AJSH	Addressed WRC and Morphum comments

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Appendix B – Primary Network

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Appendix I – Existing Ohote Stream Hydraulics

Appendix J – Downstream Works Ohote Stream Hydraulics

1.0 INTRODUCTION

McKenzie & Co. Consultants (McK) have been engaged by Green Seed Consultants Ltd (GSCL) to prepare a stormwater modelling report to assess pre-development stormwater flows for the Rotokauri North Sub-Catchment Integrated Catchment Management Plan (ICMP). This report has been prepared alongside a Private Plan Change (PPC) to rezone 133 ha (within the ICMP area) for medium density housing and a neighbourhood centre.

The full extent of modelling (including that in this report) covers the extent of land identified in Figure 1, based on existing topographical catchments. However, the ICMP covers approximately 203 hectares as shown in Figure 1 below, and is only based on land falling inside the HCC Territorial Authority Boundary.

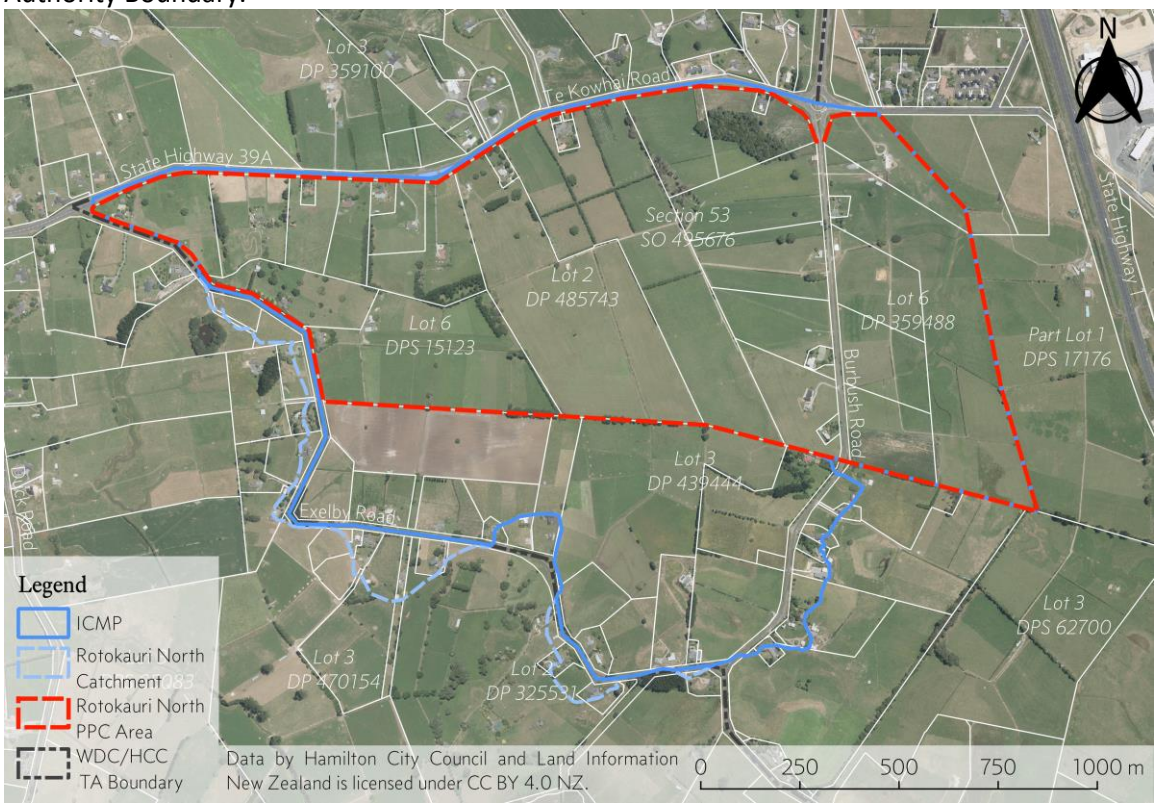

Figure 1: ICMP Area and Rotokauri North Catchment

This report outlines the methodology and results of stormwater analysis including MUSIC modelling for the Plan Change area. The design within this report is to a feasibility level to support the Private Plan Change application.

2.0 SITE DESCRIPTION

The site is located at the edge of Hamilton City's urban limit toward the northwest corner of the city. The site is bounded to the north by State Highway 39 (Te Kowhai Road), and generally on the west and south by Exelby Road. The Waikato Expressway lies to the east and Burbush Road passes through (North – South) the middle of the site – see Figure 2.

The site is comprised of farmland pastures, with a small number of farmhouses/residential dwellings, and farm utility buildings present.

The landform is generally very flat with around 2 m fall across the site. Burbush Road is elevated some 10 m above the site to the south. The total elevation range across the ICMP catchment is from RL 27m to RL 47m.

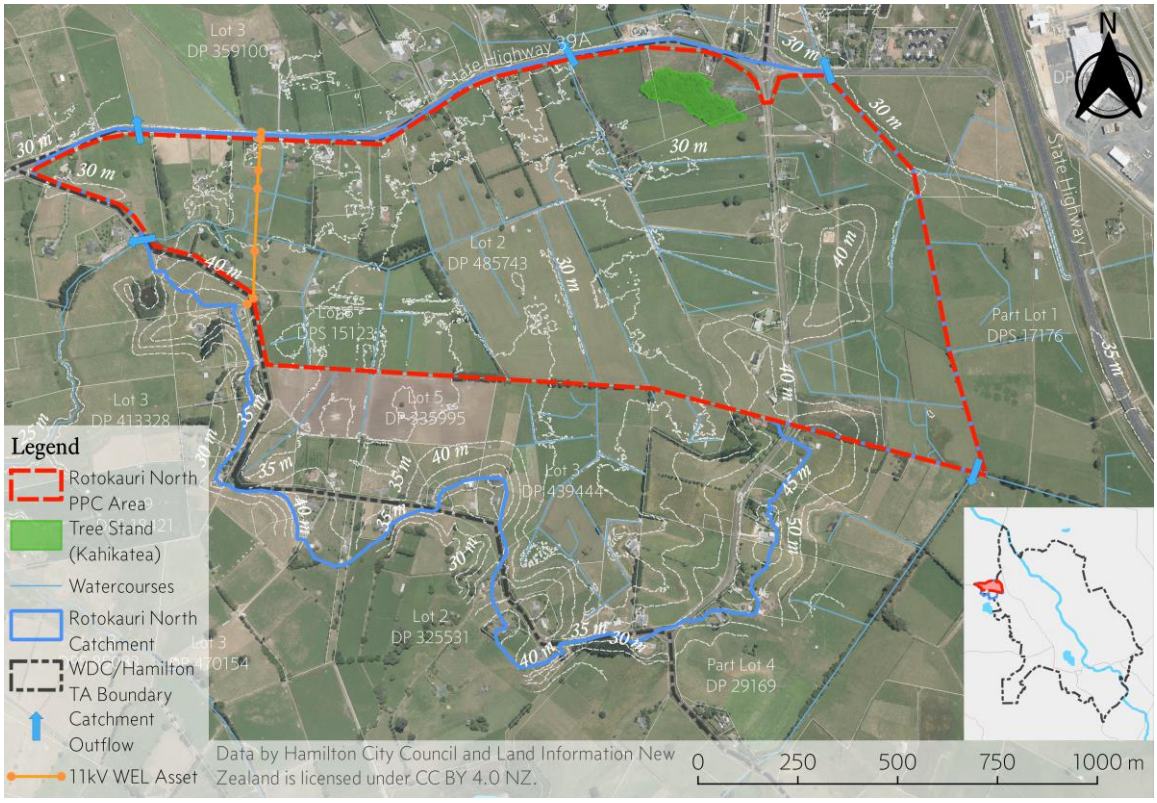

Figure 2 Site Location

3.0 STORMWATER BACKGROUND

3.1 ICMP Objectives

The Subcatchment ICMP objectives have been summarised in the following tables (Table 1 and Table 2). For detailed objective descriptions please refer to Section 2 of the ICMP.

Table 1: Strategic Objectives (All ICMPs)

Reference Number	Strategic Objective
SO1	Protect freshwater systems - Maintain, protect and enhance freshwater ecosystems and natural drainage systems.
SO2	Protect terrestrial systems - Maintain, protect and enhance indigenous biodiversity values and functions.
SO3	Kaitiakitanga - Give effect to the relationship of tangata whenua as kaitiaki of receiving water bodies and including the relationship of Waikato-Tainui with the Waikato River.
SO4	Stormwater Management - Stormwater management related to land use and development shall encourage and enable low impact design and incorporate best practicable mitigation measures to minimise actual and potential adverse effects
SO5	Wastewater Management - Wastewater management shall incorporate best practicable options
SO6	Potable Water Management - Water supply is planned and provided for in a way that meets existing and future requirements
SO7	Three Waters Management - Three waters networks are planned, managed and operated in an integrated manner to meet existing and future development requirements

The following strategic objectives are specific to the Rotokauri North Subcatchment ICMP. As the site falls within both the Mangaheka and Rotokauri ICMPs the strategic objectives of both of these catchments have been considered and are incorporated below.

Table 2: Strategic Objectives (Applicable to this ICMP)

Reference Number	Strategic Objective
CS1	Alignment with the Rotokauri North Structure Plan - manage stormwater in a manner that minimises the effects of development on downstream receiving waters.
CS2	Provide flood protection and downstream level of service.
CS3	Protecting water quality - Require the stormwater network to incorporate a treatment train approach to improve water quality of onsite watercourses.

3.2 Existing Catchment Overview

The Rotokauri North area falls at the intersection of the Ohote, Te Otamanui, Mangaheka and Rotokauri South catchments. Modelling and reporting on these catchments were undertaken by external consultants for Hamilton City Council (HCC) previous to the consideration of the Rotokauri North Plan Change Area. Previous reports have been referenced in Section 13.0.

The majority of stormwater catchment discharge is via the Ohote catchment, which runs predominantly east-west through Rotokauri North. The Ohote catchment ultimately discharges to the Waipa River approximately six kilometres downstream. The catchment drains through a culvert located at Exelby Road, which is also the western boundary of the Rotokauri North catchment.

The Te Otamanui catchment within Rotokauri North (portions south of Te Kowhai Road) also falls within the HCC territorial authority boundary. The remainder of the Te Otamanui catchment (downstream of the Rotokauri North Plan Change area) is within Waikato District Council's jurisdiction. Two culverts under Te Kowhai Road convey flow from the southern to northern portions of the Te Otamanui catchment. The Te Otamanui catchment discharges north westerly to the Waipa River approximately eight kilometres to the west northwest of Rotokauri North.

The Mangaheka catchment flows from south to north along the eastern edge of Rotokauri North. The upper portion of the Mangaheka catchment within HCC jurisdiction falls within Rotokauri North. The catchment eventually discharges to the Waipa River approximately 2.5 kilometres south of Ngaruawahia. This catchment has an approved Integrated Catchment Management Plan (ICMP) (Adams, 2018a), for which the stormwater management requirements have been confirmed.

The Rotokauri South sub-catchment has a higher level of detail within the approved Integrated Catchment Management Plan (Hart, 2017). As such, the stormwater management requirements have been confirmed for that portion of the Rotokauri North area. The portion within the Rotokauri North area covers the upper reach of the Rotokauri South sub-catchment. The catchment flows south westerly to Rotokauri Lake approximately 1.5 kilometres away.

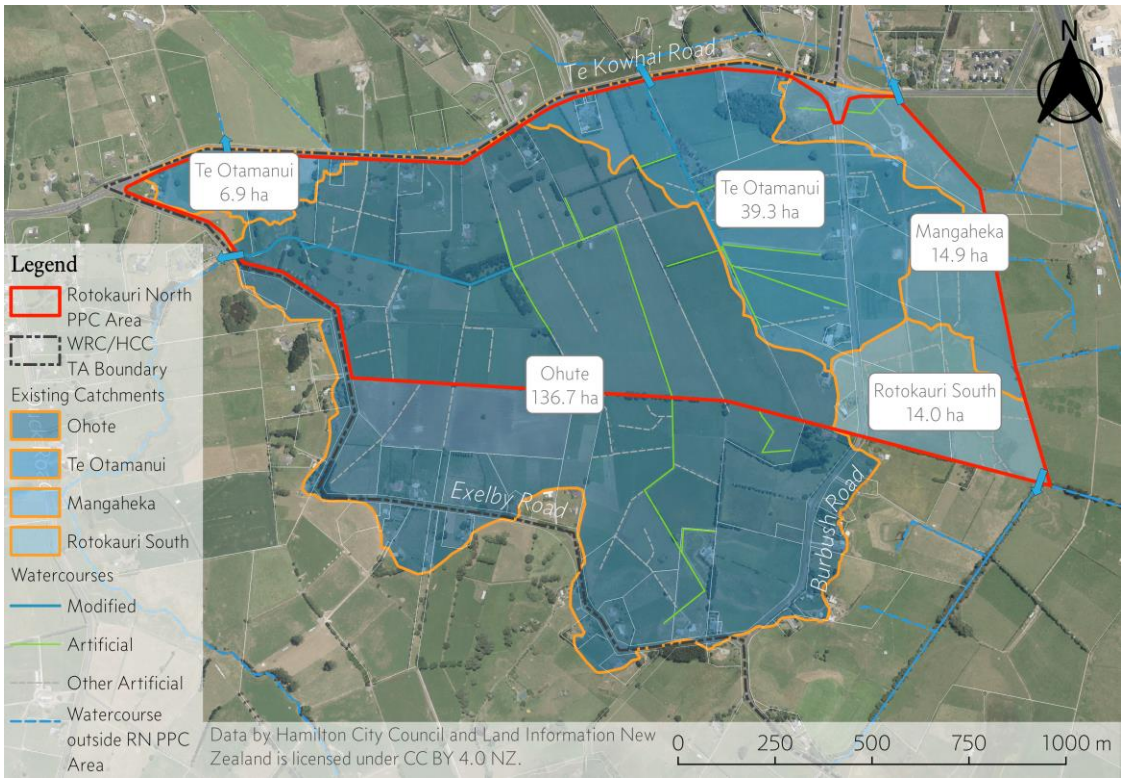

Figure 3: Current Catchment Boundaries

Refer to Appendix A – Catchment Extent Plans for larger figure.

3.3 Proposed Catchment Overview

The Rotokauri North Plan Change area will have catchment boundaries amended to suit the proposed master plan development and topography. The amendment will direct the western Te Otamanui 6.9 ha catchment area into the Ohote catchment, thereby increasing the overall size of that catchment. The eastern portion of Te Otamanui catchment has a revised boundary primarily with Ohote.

The Mangaheka and Rotokauri North catchments have only minor adjustments.

Amendments and adjustments to the catchment boundaries would be expected to occur based on changes to topography through earthworks and stormwater conveyance systems following road networks.

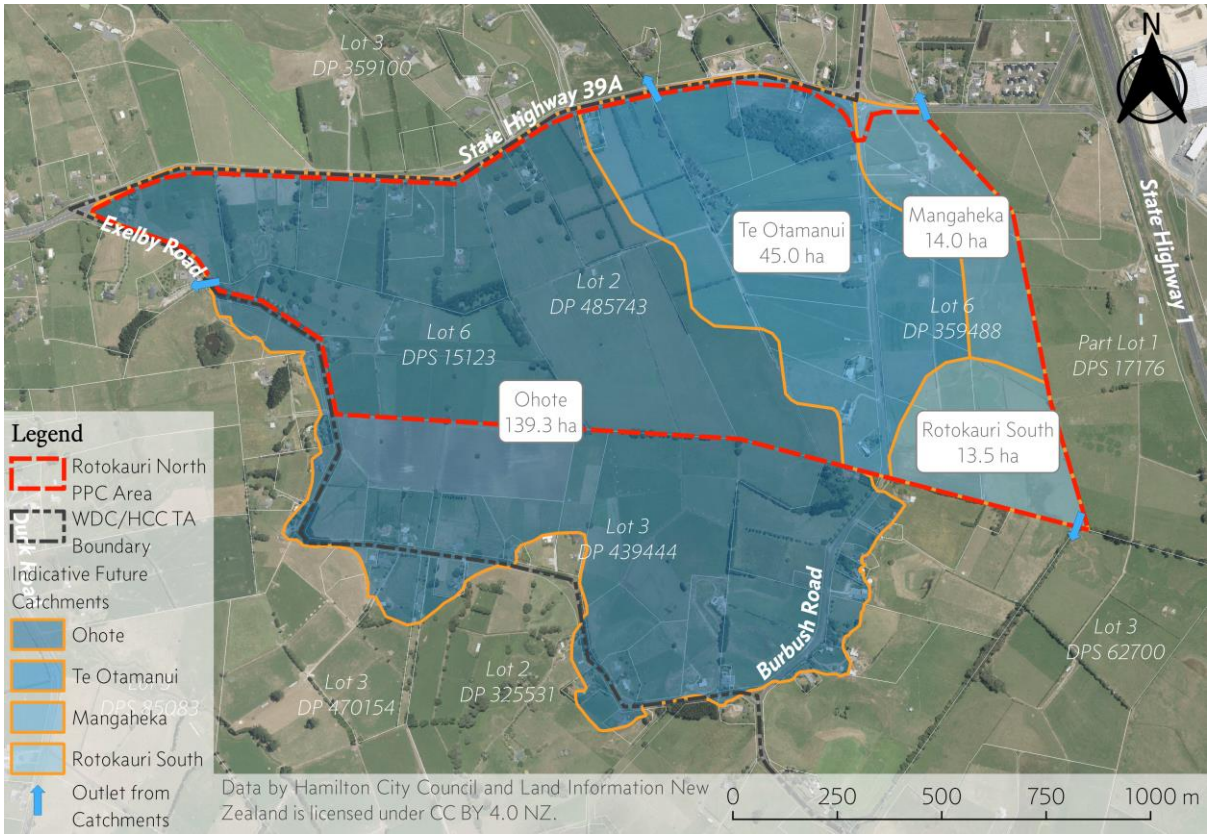

Figure 4: Proposed Catchment Boundaries

Refer to Appendix A – Catchment Extent Plans for a larger figure.

The changes to the contributing catchment areas have been summarised as per the following table (Table 3).

Table 3: Existing and Proposed Catchment Areas

Catchment Reference	Existing Area (ha)	Proposed Area (ha)	Comments
Ohote	136.7	139.3	Catchment area was the area upstream of Exelby Road culvert
Te Otamanui West	6.9	0.0	Area to be redirected to Ohote catchment
Te Otamanui East	39.3	45.0	Boundary adjusted with Ohote catchment
Mangaheka	14.9	14.0	Minor adjustment with Te Otamanui and Rotokauri North catchments
Rotokauri South	14.0	13.5	Minor adjustment with the Mangaheka catchment
TOTAL	211.8	211.8	

3.4 Consents

Stormwater discharge consents will form part of the future Qualifying Development (under HASHAA) and resource consent applications (under RMA).

3.5 Ecological Assessment

Two ecological reports were completed for the Rotokauri North Plan Change area:

1. Rotokauri North Sub-Catchment, Receiving Environment and Rapid Erosion Assessment (Morphum, 2018 Draft); and
2. Rotokauri North Development Area: Technical review of stream classifications (Miller, 2018 Draft)

A key stormwater management opportunity for the Plan Change area will be the ecological enhancement of the receiving environments as per the reports above.

3.6 Geotechnical and Hydrogeology

A geotechnical desktop assessment has been documented within:

1. Rotokauri North SHA, Geotechnical Assessment Report (Alder, 2018).

The key risk identified within the report was the moderate to high risk of liquefaction at the site. It is expected that this risk can be mitigated for residential development, subject to further detailed investigation and analysis.

Hydrogeological assessment has been documented in:

2. RNDA ICMP: Desktop Review of Hydrogeological Conditions Influencing Stormwater Design (Nutsford, 2018).

The report noted two specific soil types across the Plan Change area:

- Sandy CLAY – low hydraulic conductivity, typical layer thickness of 0.5m.
- SAND – moderate to high hydraulic conductivity, anisotropic, typical layer thickness of 3.75m.

Groundwater levels ranged across the site from 0.1 m to 1.5 m below ground level and were noted to be much shallower than those recorded for the adjacent Rotokauri South area.

Using the water table method on limited monitoring results estimated that rainfall recharge was ~100%, indicating a very direct connection between ground water levels and rainfall.

3.7 Existing Hydrology and Hydraulics

The existing hydrology of the site, and the related hydraulics have been documented in the following reports and correspondence:

1. Rotokauri North Private Plan Change, Catchment Modelling (Rudsits, 2019b)
2. Ohote Catchment 2D Modelling Sensitivity (Rudsits, 2018a)
3. Rotokauri North Catchment Stormwater Modelling, Ohote Stream Capacity Assessment Model Build Report (Vajlikova, 2018)
4. Rotokauri ICMP – Major Drainage Options (AECOM, 2016)

The modelling analysis and reports have estimated the Existing Development (ED) flows relevant to the Plan Change area. The peak flow predictions were for the locations at the interface of development area and receiving environments. The peak flow predictions were for the whole of the contributing catchment, including areas outside of the Plan Change area.

Peak flow predictions were based on 24-hour 50%, 10% and 1% Average Exceedance Probability design rainfall events excluding climate change factors.

Due to the differences in modelling software and input datasets used by AECOM and McKenzie & Co. it was recommended that the peak value of 0.7m³/s be adopted as per the previous Rotokauri ICMP for the 1% AEP design rainfall event. The final value to be used for ED flows can be further refined in the future during Resource Consenting, subject to additional information being gathered (topography) and runoff analyses agreed between all relevant parties (GSCL, HCC, WRC).

Table 4: Peak ED Flows

Location	50% AEP (m³/s)	10% AEP (m³/s)	1% AEP (m³/s)
Exelby Road Culvert (Ohote)	0.33[1]	0.50[1]	0.70
Te Otamanui - Te Kowhai Road (West)	0.10	0.11	0.12
Te Otamanui - Te Kowhai Road (East)	0.85	1.50	1.81
Mangaheka	1.49	2.38	3.21
Rotokauri South	0.46	0.18	1.77

1. The AECOM modelling was acknowledged as providing a catchment level assessment primarily for assessing flooding for 1% AEP. The model was not configured as a detailed planning tool for the 50% and 10% AEP flows, as per correspondence between AECOM and HCC[1].

Additionally, as per comments in Section 3.3, the Te Kowhai Road (West) catchment will be directed towards the Exelby Road culvert. The flow values for the Exelby Road culvert will form the limiting ED flows for this catchment regardless of any redirection.

[1] Email Chris Hardy (AECOM) to Jackie Colliar (HCC), 19 November 2018, "Rotokauri North Hydrology".

3.8 Upstream Catchments

Catchments outside the Plan Change area but included within subcatchment ICMP boundary area were analysed as part of the catchment modelling. These areas (O-G and O-H, refer to Figure 5) will contribute to flows within the Ohote catchment.

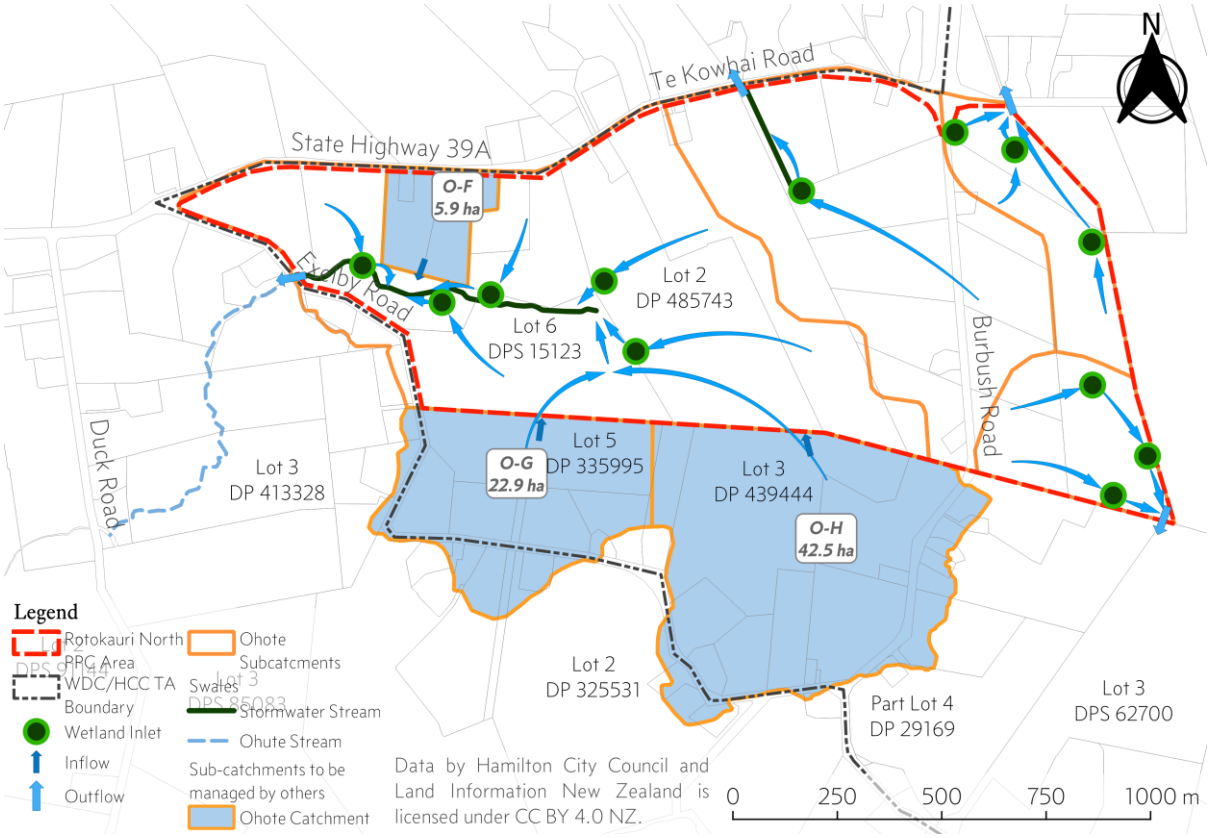

Figure 5: Upstream Ohote Catchments

These upstream catchment areas (identified as 'O-G' and 'O-H) 'have been assumed to provide water quality treatment and detention within their catchments. The Plan Change area has allowed for the stormwater flows from these areas to be conveyed through to the green corridor by dedicated conveyance channels. Dedicated conveyance channels were proposed as the stormwater from the upstream catchments can be considered 'clean' when it discharges to the green corridor.

If the upstream catchment flows were combined with the local swale/conveyance channels, this would result in the receiving wetland being considerably larger to treat the increased catchment area. This was not considered acceptable as the Plan Change area would need to have additional land allocated for stormwater management from catchments external to the Plan Change area.

The flow estimates for these upstream catchments were based on the McK modelling results, as they were more conservative than the AEOCM modelling results.

Table 5: Upstream Ohote Catchment Peak Flows

Location	50% AEP (m^3/s)	10% AEP (m^3/s)	1% AEP (m^3/s)	80% of 1% AEP (m^3/s)
Area 'O-G'	0.23	0.43	0.78	0.62
Area 'O-H'	0.68	0.79	0.87	0.70

The dedicated conveyance channels were sized for the 10% AEP peak flows, with flows in excess to managed through overland flow paths along/within road reserves. The 1% AEP peak flow to be

accommodated within the Plan Change areas was based on 80% of peak flow for the 1% AEP storm event as per HCC requirements.

4.0 WATER QUALITY REQUIREMENTS

The post development water quality requirements have been summarised as per Table 6.

Table 6: Water Quality Requirements

Water Quality Parameter	Limit	Comment
Suspended Solids	Increase in concentration <10% of existing	WRC Regional Plan Section 3.2.4.6
	Concentration shall not exceed 100 g/m³	WRC Regional Plan Section 3.2.4.6
	75% removal of post development load	Waikato Local Authority Shared Services Regional Infrastructure Technical Specifications (Waikato Local Authority, 2018) (Waikato LASS RITS)
Temperature	No more than 3°C change in water temperature AND not greater than 23°C	Waikato LASS RITS (Waikato Local Authority, 2018)
Turbidity	No greater than 25 NTU in the stormwater discharge in a water quality storm (1/3rd of a 2-year 24-hour storm).	Waikato LASS RITS (Waikato Local Authority, 2018)
Dissolved Oxygen	Greater than 80% of saturation concentration - however if the If the concentration of dissolved oxygen in the receiving environment is below 80 percent saturation concentration, any discharge into the water shall not lower it further.	Waikato LASS RITS (Waikato Local Authority, 2018)
Ammoniacal Nitrogen	<0.88 g/m³	Waikato LASS RITS (Waikato Local Authority, 2018)
	<0.03 mg/L (<0.03 g/m³) annual mean	National Policy Statement - Freshwater Management, Attribute State 'A' (Ministry for the Environment, 2017)
	<1.30 mg/L (<1.30 g/m³) annual mean	National Policy Statement - Freshwater Management, Attribute State 'D' (Ministry for the Environment, 2017)
Total Nitrogen	Maximum practical removal possible	Waikato LASS RITS (Waikato Local Authority, 2018)
Total Phosphorus	Maximum practical removal possible	Waikato LASS RITS (Waikato Local Authority, 2018)

Water Quality Parameter	Limit	Comment
Total Metals	Maximum practical removal possible	Waikato LASS RITS (Waikato Local Authority, 2018)
Colour/Visual Clarity	No conspicuous change in colour or clarity (1/3rd of a 2-year 24-hour storm).	Waikato LASS RITS (Waikato Local Authority, 2018)
Hydrocarbons	No visible sheen	Waikato LASS RITS (Waikato Local Authority, 2018)
Gross Pollutants	No gross pollutants	Waikato LASS RITS (Waikato Local Authority, 2018)
Other Contaminants	Removal in accordance with the RITS.	Waikato LASS RITS (Waikato Local Authority, 2018)

The analysis and reporting within this document were related to design rainfall events. It is recommended that an annualised time series be completed as part of a future application for stormwater discharge consent. That would allow assessment of annual performance of the water quality devices for consideration and comparison with the National Policy Statement – Freshwater Management.

5.0 STORMWATER STRATEGY

The stormwater management strategy for Rotokauri North will implement the objectives of the Rotokauri North Sub-catchment ICMP and will meet the Hamilton City Council (HCC) requirements for a Greenfields development which follow Water Sensitive Design considerations. This includes the following:

- Quality;
- Retention and Detention;
- Conveyance for 10-year$_{cc}$ and 100-year$_{cc}$ rainfall events; and
- Application of Water Sensitive urban design for road reserves.

The flow effects will also be mitigated by applying at source stormwater management.

5.1 Conveyance

The limited topographic change across the Plan Change area limited the use of a piped gravity network, therefore swales and conveyance channels were preferred. Swales would be planted with high growing vegetation to reduce flow velocities to aid water quality outcomes. The conveyance channels would primarily be used for moving flow through the network, with water quality outcomes a secondary benefit.

The conveyance of the 10-year$_{cc}$ rainfall event will be via a swale network which will discharge into wetlands and detention basins (via high-flow bypass) prior to the outlet of each catchment to the receiving environment. Details of the proposed primary network for the development are provided in Appendix B.

The conveyance system in the Plan Change area was based on upper sub-catchment reaches using the road/carriageway for conveyance of stormwater flows, for maximum catchment area of 1.5 ha. The carriageways used for conveyance are expected to generally be local roads with a fixed 6.0m width. The maximum flow depth of 100mm was based on conveying the 10% AEP$_{cc}$ within the carriageway.

Conventional vegetated swales would be used for catchments up to 4.0 ha. Conveyance channels are proposed for conveyance within subcatchments with contributing areas exceeding 4.0 ha. The swales and channels within the Ohote catchment will discharge to the green corridor where wetlands and a naturalised stream section (green corridor) are located.

Table 7: Swale/Channel Designs (10% AEP_{cc})

Swale/Channel Reference	Max. Upstream Catchment Size (ha)	Base width (m)	Top Width (m)	Side Slopes
A (Swale)	<4.0	0.6	3.75	1:3
B (Channel)	4.6	0.85	4	1:3
C (Channel)	6.4	1	4.5	1:3
D (Channel)	17.3	3	7.5	1:3
E (Channel)	25.7	3.8	9	1:3

Manning's n Values

RITS (Waikato Local Authority, 2018) recommends a Manning's *n* values of 0.25 for design of planted swales, which was adopted for the Type 'A' swales above. However, the larger swales and conveyance channels within the Plan Change area are primarily for conveyance. These swales and conveyance channels are expected to comprise cobbled bases and grassed sides, with planting proposed above the 10% AEP_{cc} water level. Subsequently the hydraulic analyses have used an equivalent Manning 'n' value of 0.05 for design of those swales.

Should planted treatment swales be adopted during future detailed design for swales other than Type 'A', the RITS value of 0.25 should be adopted.

Planting to be used as part of the swales/channels shall be selected from RITS Table 4-35 based on hydraulic and landscaping requirements.

5.2 Quality

The proposed development will include Single Housing, Duplex Housing and Terrace housing urban typologies. These residential typologies are considered to be a comparatively low contaminant producing activity. The majority of roads are designed to have water sensitive design elements included, such as swales.

The development proposes to apply at-source (on site/on lot) treatment systems for the Single and Duplex Housing. The remaining lot typologies and roads are expected to achieve water quality outcomes via communal systems. Several practical treatment options have been considered for the Plan Change area, which include the following options, and can be applied in a treatment train approach that includes but is not limited to:

- Minimisation of impervious surfaces as far as practically possible;
- Inert or low contaminant generating cladding material for buildings;
- Proprietary treatment devices;
- Bioretention devices;
- Detention basins;
- Swales;
- Wetlands; and
- Permeable paving in shared spaces, car parking bays and driveways.

The proposed catchment has relatively shallow surface gradient zones which can accommodate at-source treatment within the residential lots, shared spaces, and road reserves.

Wetland Design

Wetlands were proposed for the treatment of stormwater flows downstream of the conveyance system. The wetlands have been designed for the water quality volume (WQV) as calculated using Auckland Council TP10 (Auckland Regional Council, 2003) design information, in addition to providing extended detention volume (EDV) as per RITS. Rainfall design depth values used were based on local (Waikato) values, excluding adjustments for initial abstraction, were:

- WQV = 23.6mm (Auckland Regional Council, 2003 Chapter 3)
- EDV = 28.3mm (Auckland Regional Council, 2003 Chapter 5), adjusted for local conditions including additional 20% for unstable receiving environment.

When the extended detention volume within the wetland is reached, the flows will bypass at the forebay. This ensures higher flows bypass the wetland with minimal effect on wetland operating levels.

The wetlands are expected to be designed based on an assumption of banded wetlands with the following levels relative to Normal Water Level (NWL):

- PSZ Macrophyte zone 0m - 0.2m deep from NWL
- PSZ Macrophyte zone 0.2m - 0.35m deep from NWL
- PSZ Inlet Pool 0.35m - 1.5m deep from NWL
- PSZ Outlet Pool 0.35m -2.0m deep from NWL

Wetland area has been taken as the area at Normal Water Level with EDV water depth set at 0.5m.

Discharge from the wetlands to the receiving green corridors will be through flow limiting orifice so as to maximise treatment and detention time.

Design specifics of the wetlands are as per the following summary table (Table 8), with detailed information included in Appendix C – Wetland Design.

Table 8: Wetland Designs

Subcatchment Reference	WQV (m^3)	EDV (m^3)	Inlet Pond / Forebay (m^3)	Wetland Area (m^2)	Max Release Rate (m^3/s)
Ohote A	1640	3230	370	4860	0.08
Ohote B	1730	3410	390	5130	0.08
Ohote D	800	1570	180	2360	0.04
Ohote E	670	1330	160	1990	0.03
Te Otamanui	3280	6480	740	9750	0.15
Mangaheka A	160	300	40	410	0.01
Mangaheka B	390	760	90	1050	0.03
Mangaheka C	460	910	110	1260	0.03
Rotokauri South A	210	410	50	560	0.01
Rotokauri South B	80	160	20	210	0.01
Rotokauri South C	80	160	20	220	0.01
TOTAL	9500	18 720	2170	27 800	-

Consideration of wetland liner requirements has not been undertaken as long-term hydrogeological monitoring and analysis has not been completed. Plant selection and planting plans have not been considered. These two items are considered matters for design at Resource Consent stage.

The WQV values above include 33% additional volume allowance for vegetation and planting.

5.3 Treatment

The Rotokauri North catchment will consist of predominantly residential land use, which is generally a comparatively low contaminant producing activity. Road runoff would be collected by road swales and related water sensitive devices.

The overarching principle of the development is to consider treatment of runoff. Several practical at source treatment options have been considered for this catchment, which include the following:

- Rainwater tanks
- Permeable paving in shared spaces, car parking bays and driveways; and
- Swales
- Wetlands
- Detention basins.

5.4 Retention, reuse and detention

Stormwater management options for retention, reuse and detention must achieve the ICMP objectives by utilising a combination of at-source retention and detention with centralised detention facility for areas that cannot apply at-source solutions.

The application of retention and reuse within residential lot is limited by space available onsite. Residential lots will provide onsite retention through the provision of retention tanks, permeable pavement and sheet flow to an equivalent pervious area. Detention from Single lots and Duplex lots will be detained by detention tank and released over 24 hours. The detention volume from affordable, terraced and duplex lots will be directed off site to downstream detention devices, which will hold and release the detention volume over 24 hours, this being a measure to manage affordability of said lot types within the Plan Change area.

No retention requirements for road reserves are required. Detention shall be managed within road corridor swales and downstream detention devices.

An analysis of the application of the best practical option with respect to retention and detention has been undertaken with the outcomes documented within the Rotokauri North Sub--catchment ICMP.

6.0 RUNOFF MODEL COMPARISON

Previous runoff analysis for the project by others was undertaken using Auckland Council TP108 methodology. Additionally the Waikato Regional Council "Waikato stormwater runoff modelling guideline' (SRM) (Shaver, Wood, & Grant, 2018) would also be an applicable methodology for estimating runoff.

The swale network analysis was modelled using MUSIC, with some amendments to replicate local conditions. The results from of the MUSIC modelling were compared with the estimated runoff using TP108 and WRC SRM.

A sample sub-catchment from within the overall MUSIC model was interrogated to determine the peak flows predicted for the 1% AEP_{cc} design rainfall event. The MUSIC model was initially configured with variables such as effective storage as per WRC Stormwater Modelling methodology. Further the primary links were configured with no routing values, as the differential for flow transferring between modelled elements such as roofs and rainwater tanks was considered to be minimal. Rainfall threshold was set as 0 mm/day so as to provide volume conservation.

Effective storage calculation was based on Group B soils with CN = 69. The effective storage calculation was applied with this CN value to the pervious area within the MUSIC catchment. It is noted that the TP108 and SRM calculation uses the effective CN value of the whole catchment, i.e., factored based on impervious and pervious CN values. For a sample sub-catchment draining to the Ohote A wetland as used within Rotokauri North MUSIC model:

- MUSIC Effective Storage = 114mm
- TP108/SRM = 24.67mm

A TP108 analysis was undertaken on sample sub-catchment of Ohote A wetland to determine the peak flows for the same rainfall event. The differences in the analysis of TP108 vs MUSIC predicted flows are summarised in the following table (Table 9). This analysis was also undertaken using stormwater runoff calculations as per SRM for the sample sub-catchment. The sample sub-catchment was analysed for four reaches each with decreasing contributing catchment area.

For the rainfall depth, HIRDS V4 DCP6.0 was adopted as per previous project modelling, rather than the values within WRC methodology.

The WRC methodology involved greater consideration for time of concentration calculations in comparison to TP108.

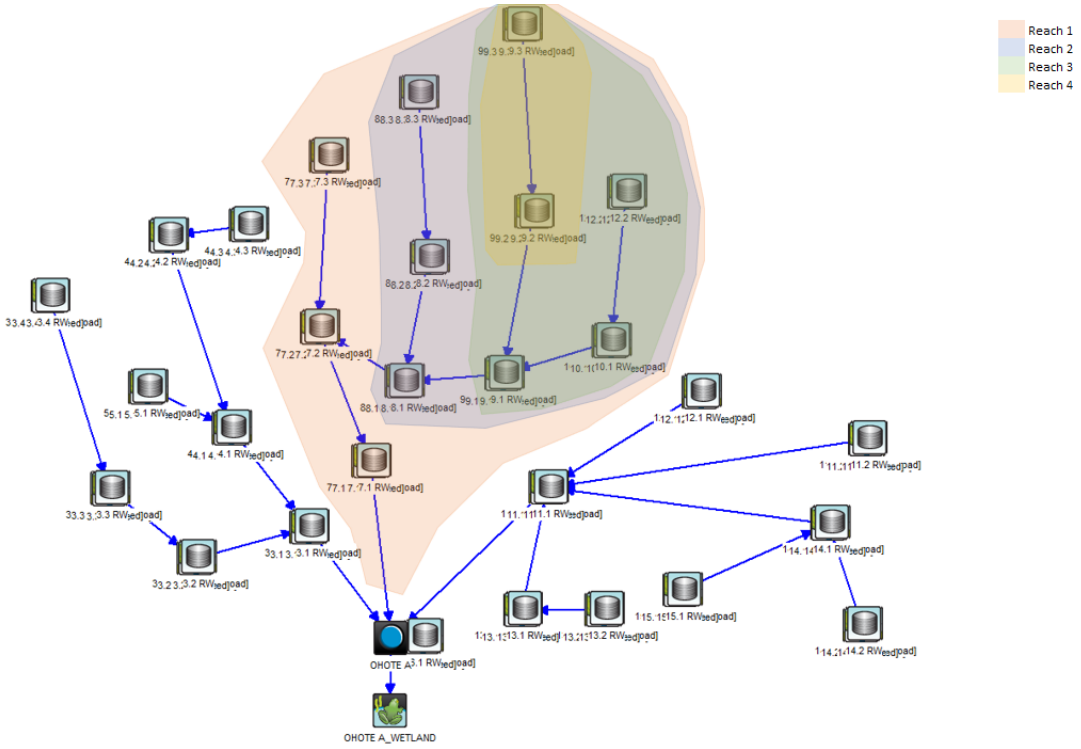

Figure 6: Ohote A Subcatchment Reaches

The results and differences have been noted in the following tables (Table 9 and Table 10).

Table 9: MUSIC vs TP108 vs WRC Peak Flows

Item	Whole of Ohote A	Reach 1	Reach 2	Reach 3	Reach 4
Catchment Size (ha)	18.33	6.89	5.09	1.65	0.75
Catchment Size (km^2)	0.183	0.069	0.051	0.016	0.007
Catchment Imp Area (km^2)	0.137	0.052	0.038	0.012	0.006
Catchment Length (m)	680	680	464	252	73
Effective Curve Number	90.6	90.68	90.7	90.6	91.15
TP108 Flow (m^3/s)	3.32	1.25	1.04	0.39	0.20
WRC Flow (m^3/s)	2.60	0.98	0.82	0.30	0.17
MUSIC Flow (Base)(m^3/s)	6.04	2.06	1.74	0.81	0.36
% Diff. (TP108)	182%	165%	168%	153%	179%
% Diff. (WRC)	232%	211%	213%	198%	210%

The MUSIC model overestimated peak flow compared to TP108 and WRC methodologies. It is noted that TP108 estimated higher peak flows than WRC due to the differences in calculation of time of concentration.

Due to the overestimation of the MUSIC peak flows, the following amendments were made to the MUSIC model to reflect the runoff factors as per TP108:

- Change 1 - Effective storage for all catchments set to 25mm, with field storage set to 20mm.
- Change 2 – Rainfall threshold set to 1.26 mm, based on effective curve number of 90.7 as per TP108.
- Change 3 – All primary links configured with routing value of 10 minutes (as per TP108 minimum time of concentration.
- Change 4 – All of the above changes.
- Change 5 - All primary links configured with routing value of 17 minutes (as per WRC minimum time of concentration for sheet flow on the example sub-catchment.

These sensitivity results have been presented in the table below (Table 10).

Based on the results above, amending the primary link routing values was the largest contributor to change in the predicted peak flows.

Table 10: MUSIC vs TP108 vs WRC Sensitivity Analysis

Item	Whole of Ohote A	Reach 1	Reach 2	Reach 3	Reach 4
TP108 Flow (m^3/s)	3.32	1.25	1.04	0.39	0.20
WRC Flow (m^3/s)	2.60	0.98	0.82	0.30	0.17
MUSIC Flow (Base)(m^3/s)	6.04	2.06	1.74	0.81	0.36
Difference	182%	165%	168%	206%	179%
Change 1 – Effective Storage					
MUSIC Flow (m^3/s)	6.81	2.3	1.95	0.66	0.39
% Dif (TP108)	205%	184%	188%	168%	194%
% Dif (WRC)	262%	235%	239%	218%	227%
Change 2 – Rainfall Threshold					
MUSIC Flow (m^3/s)	6.06	2.06	1.74	0.6	0.36
% Dif (TP108)	182%	165%	168%	153%	179%
% Dif (WRC)	233%	211%	213%	198%	210%
Change 3 – Primary Links Routing (TP108)					
MUSIC Flow (m^3/s)	3.22	1.19	1.10	0.44	0.28
% Dif (TP108)	97%	95%	106%	111%	139%
% Dif (WRC)	124%	122%	134%	144%	163%
Change 4 - All Changes					
MUSIC Flow (m^3/s)	3.6	1.31	1.22	0.47	0.31
% Dif (TP108)	108%	105%	118%	120%	152%
% Dif (WRC)	138%	134%	149%	155%	178%
Change 5 – Primary Links Routing (WRC)					
MUSIC Flow (m^3/s)	2.5	0.87	0.84	0.38	0.27
% Dif (TP108)	75%	69%	81%	97%	132%
% Dif (WRC)	96%	88%	103%	125%	155%

The Change 3 sensitivity scenario was adopted for sizing of the swale network, wetland sizing and detention basin sizing. This scenario was considered suitable based on following:

- Minor under estimation compared with TP108 flows for larger catchments, but over estimation when compared with WRC methodology.
- Over estimation compared with TP108 and WRC for smaller catchments.

Based on the predictions typically being over estimated in comparison to TP108 and WRC, the predictions can be considered conservative. As such they were considered suitable for the purpose of stormwater infrastructure sizing at the current level of design.

7.0 MUSIC METHODOLOGY

With the range of different water sensitive measures across the development, a MUSIC (eWater, 2012) (Model for Urban Stormwater Improvement Conceptualisation) model was developed. MUSIC (eWater, 2012) offered the advantage of modelling both the on-lot measures, the swale and channel conveyance system, wetlands and ponds. It provided hydraulic and water quality predictions for the Plan Change area of the Rotokauri North sub-catchment ICMP.

The model was configured with 12 catchments, modelling the locations where swales and conveyance channels would be connected with green corridors or wetlands. The 12 catchments were named after the overall catchment for which they contribute:

- Ohote – A, B, D, E.
- Te Otamanui
- Mangaheka – A, B, C.
- Rotokauri South – A, B, C.

7.1 Model Resolution

With the large number of lots proposed within the development, modelling each lot individually was not considered appropriate. Grouped catchments were developed based on the number of probable lots that would discharge to stormwater infrastructure.

Lots

The impervious and pervious areas of the lots were separated into two catchments:

- Roof area = Single lot housing roofs have been assumed to discharge to rain water tanks. Imperviousness was assumed at 100%, draining to rain water tank node.
- Remain Area = This catchment area covered the impervious area of single lots, excluding roof area, and the area of all other lots (duplex, terrace). The percentage pervious/impervious was based on addition of roof areas, not serviced by rain water tanks, plus an allowance for outdoor paving, driveways. entranceways etc. This area was configured to discharge to the swale node.
- Based on 50% of the resultant lot area (Lot area less roof area) draining to an infiltration device such as well liner or soakage pit. Imperviousness was estimated at 54 %
- Front of Lot = Based on 50% of the resultant lot area (Lot area less roof area) draining to the conveyance swale. Imperviousness was estimated at 54 %

Road carriageway

The road carriageway was modelled as a specific catchment with 100% impervious surface draining to the swale node.

Berm

The berm was modelled as a catchment area with variable impervious/pervious split based on area of the road reserve less the road carriageway area.

Schematically the arrangement for a grouped catchment has been presented in Figure 7.

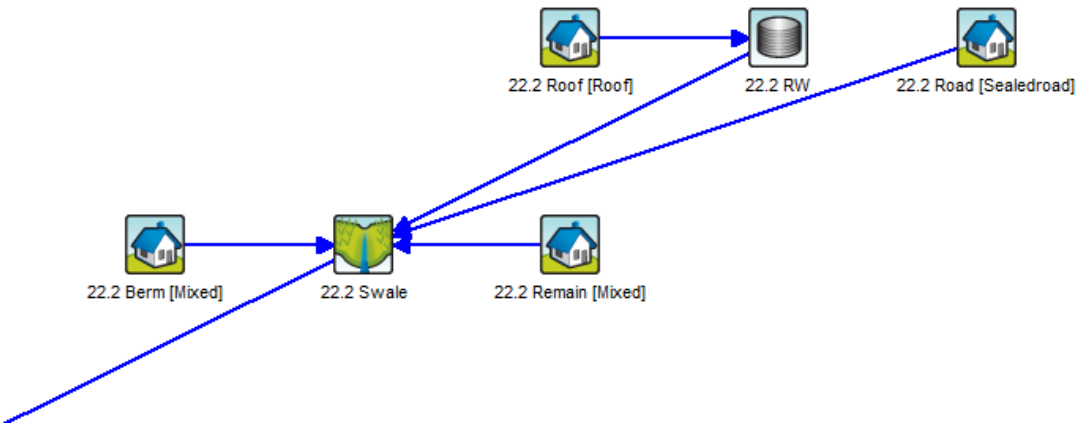

Figure 7: Schematic Lot Arrangement

Typical lot parameters have been summarised in Table 11 below for the different lot/housing typologies. These parameters are based on generalised lot information, derived from a maximum of 80% impervious surfacing. Individual lot areas and roof sizes will vary across the development, however the average values presented below are considered appropriate for the catchment wide modelling.

Table 11: Average Lot Runoff Sources

Lot Typology	**Single**	**Small Lots**	**Duplex (parent lot)**	**Terrace**
General Lot Dimensions (m)	14 x 28	10 x 28	12.5 x 28	6 x 28
Lot Area (m²)	392	280	350	168
Roof Area (m²)	196	140	175	92
Other Impervious Area (m²)	118	84	105	50
Impervious (%)	80	80	80	85
Pervious Area (m²)	78	56	70	34
Pervious (%)	20	20	20	20

Two additional potential subcatchments types were identified – Neighbourhood Parks and Neighbourhood Centre. These subcatchments types were modelled as combinations of the lot typologies in Table 11 above. While the individual flows from these sub-catchment types may differ, at a conceptual level they were not considered to be sufficiently different to necessitate specific parameters.

7.2 Rainfall Runoff Parameters

Default MUSIC (eWater, 2012) rainfall runoff parameters have been included within Appendix D. The parameters amended for this modelling were as per the following adjustments:

Rainfall Threshold

All catchments have rainfall threshold of 0.0mm/day.

Soil Storage Capacity

The Waikato Regional Council (WRC) Stormwater Runoff Modelling (SRM) Guideline (2018)was used to determine the soil storage capacity. For impervious areas a Curve Number (CN) of 69 was assumed based on Table 5-2 of the WRC SRM (2018). The CN value was based on assumption of "Open Space, Fair Condition (grass cover 50%-75%), Group B soils". The resultant soil storage capacity was 114 mm based on Equation 5-2 WRC SRM (2018), as applied to the pervious surfaces only.

Field Capacity

Based on high level comments within the BECA hydrogeological report (Nutsford, 2018), the soils within the development area were predicted to have low permeabilities. The field capacity value was adjusted to 91mm corresponding to 80% of the Soil Storage Capacity.

Potential Evapotranspiration

The value for daily potential evapotranspiration (PET) was based on NIWA's (Chappell, 2014) "The Climate and Weather of Waikato 2nd Edition". Table 21 for the report has mean yearly PET of 807 mm at Hamilton, Ruakura.

The daily PET values were derived by averaging the Mean value in Table 21 by number of days in each month.

Design Rainfall

The modelling was based on two separate analyses:

- Analysis 1 — nested design rainfall events over a 24-hour simulation period as per the normalised 24-hour pattern in Table 4-1 of WRC SRM (2018). The rainfall event depths were as per HIRDS V4 (NIWA, 2017), including climate change scenario RCP6.0 (2081-2100). This climate change scenario had the best correlation with the HIRD V3 rainfall allowing for climate change increase as per in Table 4-3 of WRC SRM (2018). Refer Table 12 and Figure 8.
- Analysis 2 — Long term rainfall record from 1 January 2006 to 31 December 2010, based on 5-minute increments. This rainfall record was supplied by Morphum Environmental to ensure modelling is comparable to other Hamilton City Council stormwater quality improvement projects.

Table 12: Analysis 1 - Design Rainfall Depths

Design Rainfall AEP (%)	HIRDS V3 Depth (mm)	HIRDS V3 Depth + Climate Change (mm)	HIRDS V4 RCP6.0
50%	64.5	70.5	70.7
10%	92.6	104.9	109.0
1%	145.3	169.7	169.0

The design rainfall hyetographs as per the following have been included within Appendix E – Design Rainfall Hyetographs.

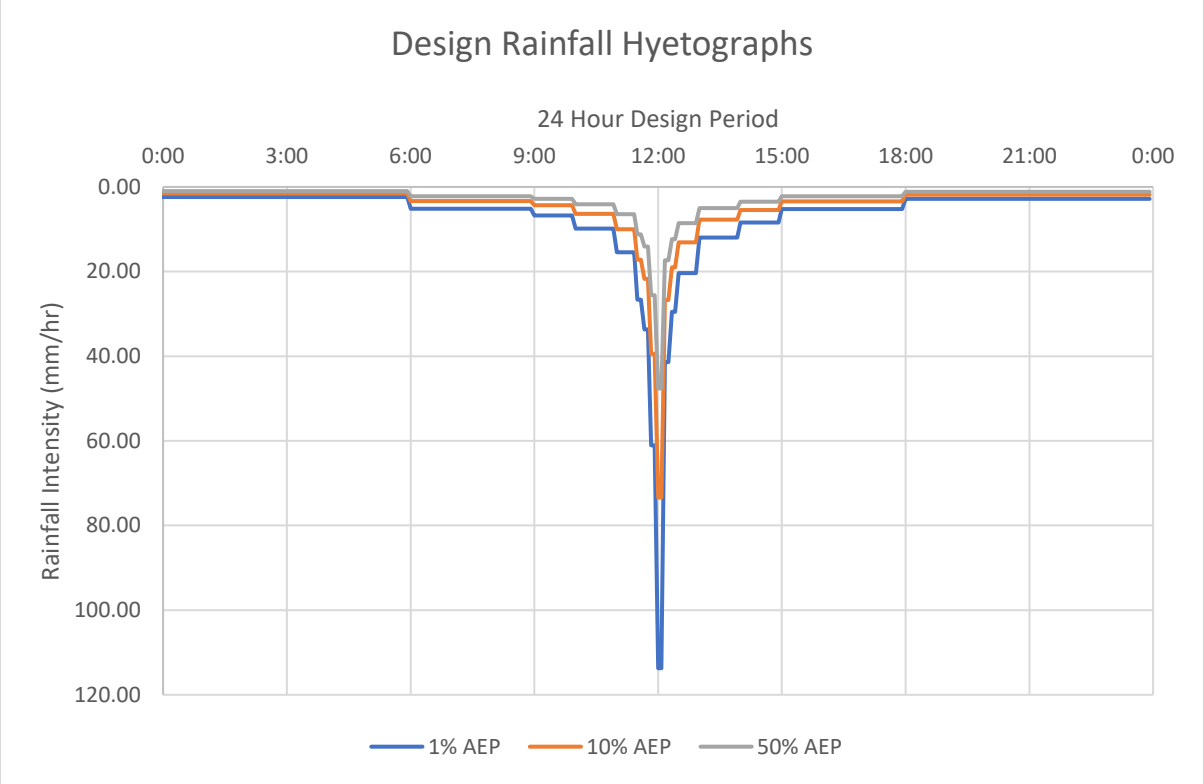

Figure 8: Analysis 1 - Design Rainfall Hyetographs (Including Climate Change)

Long term rainfall record from historical data was based on the hyetograph in Figure 9 below.

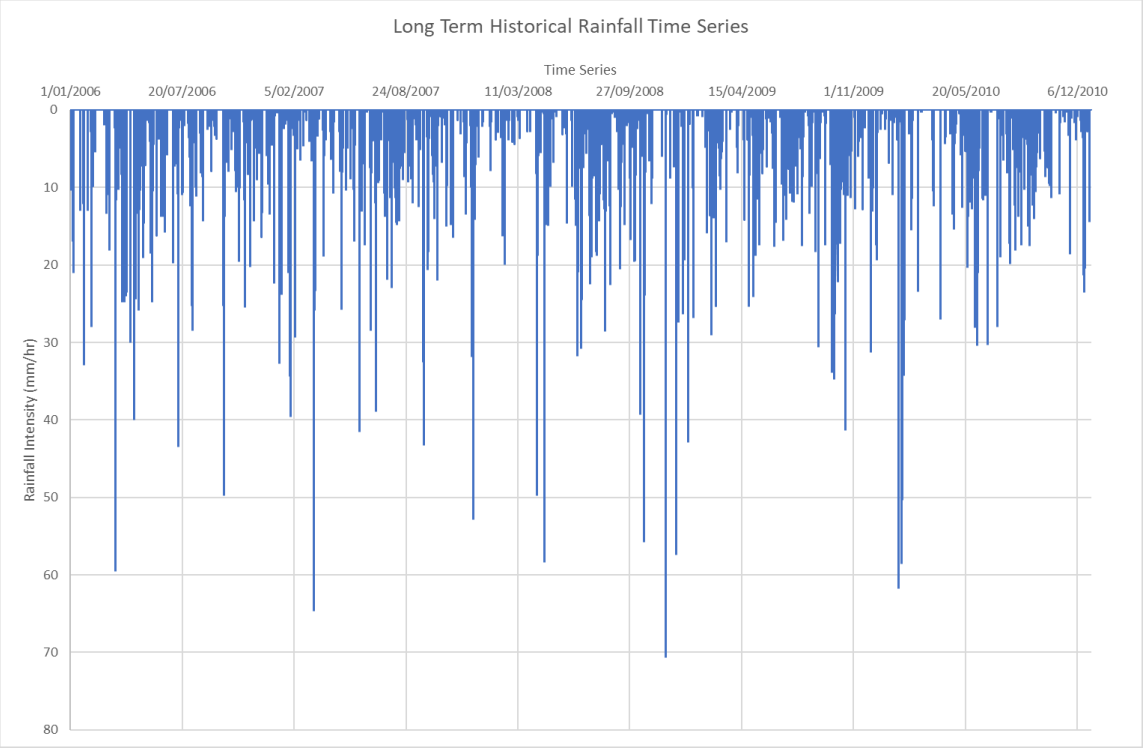

Figure 9: Analysis 2 – Long Term Historical Rainfall Hyetographs (Source: Morphum Environmental)

7.3 Swale Parameters

Bed Slope

All swales were modelled with Bed Slope of 0.4% based on the conceptual road design. While specific future road design may have steeper slopes, adopting a standardised value was considered suitable for the conceptual modelling.

Carriageway Swales

Parts of the Plan Change area were designed to use the road/carriageway for conveyance of stormwater flows. The carriageways used for conveyance were local roads with a fixed 6.0m wide carriageway.

As the carriageway cannot be modelled as a channel within MUSIC it was modelled as swale with equivalent area to the carriageway with assumed maximum depth of 100mm. A further limitation was vegetation height value within MUISC which cannot be reduced below 0.005m. Therefore, the carriageways modelled as swales had a Manning N of 0.052, higher than typically asphaltic concrete value of 0.016.

Based on typical slope of 0.4% and cross-sectional area of 0.3m², the maximum flow through modelled swale was 48 l/s, compared with an asphalt road of 157 l/s.

The water quality parameters for carriageway swales were all set zero, i.e., no treatment benefits.

Vegetated Swales

Vegetation height was adjusted for vegetated swales so as to achieve Manning's *n* as per Section 5.1.

Water quality parameters were unchanged from the default values within MUSIC. These should be verified during future modelling for consistency with rates achieved by similar HCC devices.

7.4 Rain Water Tanks

Volume Below Overflow Pipe

Modelling was based on providing 5.0m³ to the single lots. Detention and retention storage for the other lots would be provided within the communal downstream devices (ponds, wet lands etc).

Surface Area

Tanks were assumed to have a diameter of 2.2m and corresponding area of 3.8m².

Depth above overflow

The maximum depth above the overflow was set at 2.0m, a height considered sufficient to force overflow through the overflow orifice rather than predicting tank overflow using weir estimation.

Overflow Pipe Diameter

All overflow pipes were modelled as 100mm diameter.

Reuse – Daily Demand

Set to 0.225 kL/day based on assumptions within HCC Three Waters Practice Notes (Hamilton City Council, 2016c, 2016b, 2016a).

Water quality parameters were unchanged from the default values within MUSIC (eWater, 2012). These should be verified in future modelling for consistency with rates achieved by similar HCC devices.

Primary Drainage Links

All primary drainage links within the MUSIC model were configured using a 10-minute translation, as per analysis in Section 6.0.

7.5 Contaminant Loading Rates

The contaminant loading rates for roof, residential and road surfaces were updated to match the values within Table 12-5 of Waikato Stormwater Management Guidelines TR2018/01 (Shaver, 2018) – see Table 13. Annual rainfall of 1,300mm was used to calculate the average mg/l loading rate for Total Suspended Solids (TSS), Total Nitrogen (TN) and Total Phosphorus (TP). The conversion from kg/ha/year within Table 12-5, to mg/l was based on unit area (hectare) assumption.

All roofs were assumed to be either galvanised steel or zinc/aluminium coated; roads supporting 5,000-20,000 vehicles per day category; and remaining subcatchments as paved residential areas.

No distinction was made between base or storm flows within the modelling. Therefore, these modelling values were comparable to the converted WRC SMG values. The *log* values were calculated for each contaminant loading rate for inclusion within MUSIC.

The default values within MUSIC (eWater, 2012) have been included within Table 13 for reference. Note that the values presented are the *log* values.

The performance of the treatment train to reduce contaminant values should be verified during future modelling for consistency with rates achieved by similar HCC devices.

Table 13: Contaminant Loading Rates

Values	Roof	Roads	Residential
WRC SGM Values (kg/ha/year)[1.]			
TSS	54.2	574.2	346.7
TN	16.3	21.7	15.2
TP	1.2	2.1	6.0
Rainfall (l/ha/year)	13,000,000		
Contaminant Loading Rates (mg/l)			
TSS	4.2	44.2	26.7
TN	1.3	1.7	1.2
TP	0.09	0.4	0.5
Contaminant Loading Rates (*log* mg/l)			
TSS	0.62	1.65	1.43
TN	0.1	0.22	0.07
TP	-1.04	-0.41	-0.34
MUSIC Default Contaminant Loading Rates (*log* mg/l) Base Flow / Storm Flow			
TSS	1.1 / 1.3	1.2 / 2.43	1.1 / 2.2
TN	0.32 / 0.30	0.22 / 0.30	0.07 / 0.15
TP	-0.82 / -0.89	-0.85 / -0.30	-0.82 / -0.45

1. Adjusted from Table 12-5 (Shaver, 2018) values with assumed 1,300mm rainfall.

7.6 Wetlands

Wetlands were initially sized based on application of Auckland Regional Council TP10 (2003). The wetland designs have been documented in section 5.2. The relevant information for use within MUSIC (eWater, 2012) is summarised in Table 14.

Note, Te Otamanui has a single wetland servicing the western (Te Otamanui A) and eastern catchments (Te Otamanui B).

Contaminate treatment parameters were as per the MUSIC (eWater, 2012) default values. It is recommended that these treatment values be verified during future detailed wetland design with performance information from other similar HCC devices.

Table 14: Wetland Modelling Parameters

Subcatchment Reference	Inlet Pond Volume (m3)	Wetland Surface Area (m2)	Extended Detention Depth (m)	Permanent Pool Volume (m3)	Outlet Pipe Diameter (mm)	Overflow Weir Width (m)
Ohote A	370	4860	0.5	1640	260	3
Ohote B	390	5130	0.5	1730	280	3
Ohote D	180	2360	0.5	800	80	3
Ohote E	160	1990	0.5	670	180	3
Te Otamanui	740	9750	0.5	3280	170	3
Mangaheka A	40	410	0.5	160	160	3
Mangaheka B	90	1050	0.5	390	80	3
Mangaheka C	110	1260	0.5	460	100	3
Rotokauri North A	50	560	0.5	210	120	3
Rotokauri North B	20	210	0.5	80	90	3
Rotokauri North C	20	220	0.5	80	50	3

7.7 Initial Detention Basins

The requirements for buffering flows to meet the ED peak flow requirements was achieved by providing detention within the green corridors and areas immediately adjacent to the wetlands for the Ohote, Te Otamanui and Mangaheka catchments. Outflow from the detention basins would be achieved through use of hydraulic controls such as slotted weirs.

The sizing for the detention basins was based on initial HEC-HMS modelling results, to complement and verify the results of the MUSIC model. The HEC-HMS model used the MUSIC hydrograph output (before wetland) as the key boundary condition. For the Ohote catchment the upstream catchments were included as per Section 3.8.

The total required detention volumes to achieve the 1% AEP_{cc} peak flow values as per Table 4 based on HEC-HMS have been summarised below.

Table 15: Detention Volumes

Subcatchment Reference	1% AEP_{cc} Detention Volume (m^3)
Ohote	85,100
Te Otamanui	23,000
Mangaheka	8,400
Rotokauri South	Further modelling required

Within MUSIC, the detention basins have been modelled as “detention” nodes with maximum depth in the Ohote basin of 1.81m and 2.0m in all others. The area used within MUSIC was based on volume required divided by the maximum depth.

Custom outflow relationships were defined within MUSIC, based on separate analysis for slotted weirs to control the downstream discharge for the 1%, 10% and 50% AEP_{cc} peak flows.

Specific to the Ohote Catchment the discharges was limited to 0.7m^3/s as per the existing Rotokauri ICMP. Further, the maximum depth of 1.81m was based on the elevation/storage relationship developed as a preliminary design topography for the basin. The elevation/topography was based on the available land area for the detention basin and maximum water level that would affect upstream infrastructure.

For the HEC-HMS model each stream catchment was modelled with the wetlands, detention storage and discharge reach configured as follows:

- Wetland – storage basin with inflow limited to the volume of the wetland.
- Detention storage – storage basin with outflow limited to a maximum as per Table 18.
- Bypass – Bypass junction modelled such that flow initially directed to the wetland, and when the wetland design volume was reached, all flow then directed to detention storage.

For MUSIC the volumes will be iteratively adjusted such that maximum outflow from the detention basin will match the limiting catchment discharge.

8.0 CATCHMENT RESULT AND STATISTICS

The model results have been summarised from Table 16 through to Table 25 and Figure 10 through to Figure 15. The sub-catchment references were the locations where the stormwater conveyance network discharges to wetlands and green corridors.

8.1 Hydraulics

The catchment analysis was undertaken based on 24-hour design rainfall as per Section 7.2. The results for the 1% AEP_{cc} have been included for completeness. However, the MUSIC model was not configured specifically to model this hydraulic scenario, as the numerical engine assumes flow conservation. Therefore, any flows exceeding swale or channel capacity are assumed to pass through without attenuation to the downstream node. In practical application 1% AEP_{cc} flows would be expected to be conveyed through both the swale/conveyance channels and road reserves with a variable cross-sectional channel with different Manning's values. It would be expected that the peak flow rates would be lower due to the effect of the variable cross-sectional area and range of Manning's values.

Hydraulic analysis based on Long Term Historical Rainfall was limited to the maximum flow predicted over the 5-year time series.

The predicted peak flows from wetlands are based on summation of flow through orifice and overflow spillway.

Table 16: MUSIC Hydraulics Summary

Subcatchment Reference	WQV Peak Flow before Wetland (L/s)	WQV Peak Flow after Wetland (L/s)	50% AEP_{cc} Peak Flow before Wetland (m^3/s)	50% AEP_{cc} Peak Flow after Wetland (m^3/s)	10% AEP_{cc} Peak Flow before Wetland (m^3/s)	10% AEP_{cc} Peak Flow after Wetland (m^3/s)	1% AEP_{cc} Peak Flow before Wetland (m^3/s)	1% AEP_{cc} Peak Flow after Wetland (m^3/s)	Long Term Rainfall Peak Flow before Wetland (m^3/s)	Long Term Rainfall Peak Flow after Wetland (m^3/s)
Ohote A	71	17	0.83	0.24	1.56	1.05	3.59	3.14	0.61	0.40
Ohote B	86	21	0.74	0.25	1.35	0.98	3.10	2.75	0.58	0.39
Ohote D	47	6	0.34	0.09	0.68	0.40	1.46	1.22	0.26	0.20
Ohote E	39	6	0.35	0.11	0.70	0.59	1.60	1.54	0.25	0.19
Te Otamanui	185	18	1.14	0.48	2.13	1.62	5.15	4.19	0.98	0.77
Mangaheka A	17	4	0.13	0.09	0.24	0.23	0.53	0.53	0.097	0.065
Mangaheka B	33	6	0.31	0.15	0.57	0.49	1.37	1.26	0.26	0.16
Mangaheka C	27	7	0.26	0.14	0.48	0.46	1.18	1.14	0.21	0.14
Rotokauri South A	10	3	0.08	0.03	0.17	0.16	0.44	0.44	0.063	0.054
Rotokauri South B	4	1	0.05	0.02	0.09	0.09	0.25	0.25	0.047	0.025
Rotokauri South C	2	<1	0.05	0.02	0.10	0.10	0.22	0.22	0.035	0.032

Hydrographs for the design rainfall events for each wetland have been included in Appendix F – Wetland Hydrographs.

8.2 Detention Volume

A HEC-HMS model was created to complement and verify the results of the MUSIC model. The HEC-HMS model used the MUSIC hydrograph output (before wetland) as the key boundary condition.

The required 1% AEP_{cc} detention volume was based on the predicted maximum volume within the detention storage nodes as modelled in HEC-HMS.

Within MUSIC, the detention basin area was iteratively adjusted such that the detention basin was not predicted to overflow. The two sets of predictions have been summarised in Table 17 below.

Table 17: Detention Basin Volumes

Catchment Reference	Ohote	Te Otamanui	Mangaheka
1% AEP_{cc} MUSIC Volume (m^3)	79,900	24,300	8,720
1% AEP_{cc} HEC-HMS Volume (m^3)	85,100	23,000	8,400

The detention volumes between the two software packages were comparable and considered to be representative of the volumes need to achieve the development discharge requirements.

The final required area and depth of flow to achieve the detention volume would be determined through detailed design of hydraulic structures, final surface levels, landscaping and urban design.

With reference to Section 11.0, the detention volume for the Ohote catchment could be lowered subject to further analysis of the downstream system.

8.3 Post Development Discharge

The allowable development area discharge is based on the ED values and required adjustments as per HCC and WRC requirements. The ED flows have been summarised previously in Section 3.7.

Upstream catchments have been included in the cumulative values as per the flows in Section 3.8. Note that the Mangaheka values are the peak values for the total catchment which includes majority of catchment being external to the ICMP area.

Table 18: Limiting Catchment Discharges

Flow Scenario	Ohote (Exelby Road Culvert) (m^3/s)	Te Otamanui (Te Kowhai Road East) (m^3/s)	Mangaheka (m^3/s)	Rotokauri South (m^3/s)
50% AEP ED / 50% AEP_{cc} Post	0.33	0.85	1.19	0.46
10% AEP ED / 10% AEP_{cc} Post	0.50	1.50	1.90	0.91
80% of 1% AEP ED / 1% AEP_{cc} Post	0.70	1.45	2.57	1.51

Predicted peak flows from the MUSIC modelled detention basins are summarised in the following table (Table 19). Generally, the peak flows can be considered to meet the limiting discharge values. Minor differences were due to numerical rounding and considered to be within modelling confidence levels.

Table 19: Predicted Peak Discharges

Flow Scenario	Ohote (m^3/s)	Te Otamanui (m^3/s)	Mangaheka (m^3/s)[1.]	Rotokauri South (m^3/s)
50% AEP_{cc} Post	0.27	0.16	1.25	Refer below
10% AEP_{cc} Post	0.45	0.97	2.05	Refer below
1% AEP_{cc} Post	0.70	1.45	3.80	Refer below

1. The Mangaheka catchment discharge was inclusive of the external catchment inflows. The peak predicted flow from the ICMP area catchment for the 50%, 10% and 1% AEP_{cc} events was 0.03 m^3/s, 0.08 m^3/s and 0.57 m^3/s respectively. Therefore, any reduction in flows to meet the limiting sub-catchment discharge needs to incorporate upstream mitigation measures on the contributing external catchment. These have been covered in the Mangaheka ICMP (Adams, 2018b)

For the Rotokauri South catchment, the predicted peak discharges are the summation of the individual hydrographs from the wetlands. The requirement for additional detention volume will be need to be checked relative to the assumptions and proposed measures within the Rotokauri South sub-catchment ICMP.

8.4 Water Quality Performance

The performance of the development in regards to water quality has been assessed based on the effectiveness of the treatment options modelled within MUSIC. While a toolbox approach for on lot residential treatment is proposed within the sub-catchment ICMP, the results as modelled are considered to be representative of the effectiveness of the range of treatment options within the toolbox.

The water quality requirements were noted within Section 4.0. The water quality results have been presented for the Long-Term Rainfall event time series as modelled within MUSIC. The results have been presented for the following parameter as modelled:

- Total Suspended Solids (TSS)
- Total Phosphorus (TP)
- Total Nitrogen (TN)

The performance of the treatment train has been considered based on TSS, TN and TP generated at the nodal level, amount present immediately before wetlands, and after wetlands.

The measurement units by MUSIC were kg/year of TSS, TN and TP.

MUSIC – Pollutant Load Calculation Limitation

The calculations undertaken by MUSIC achieve a water balance at each node. However, pollutant load balancing is not undertaken. Instead outgoing pollutant loads from treatment nodes are calculated based on outflow rate and outflow pollutant concentrations. This can lead to the situation where calculated outgoing pollutant loads can exceed incoming pollutant loads.

While this was not observed in the results for this modelling, this comment has been included for reference purposes.

Table 20: WQV Design Rainfall Water Quality Performance – TSS

Subcatchment Reference	Total Generated (All Contributing Nodes) (kg/year)	Before Wetland (kg/year)	% Reduction before wetland	After Wetland (kg/year)	% Reduction by wetland	Total % Reduction
Ohote A	13448	5900	56%	586	40%	96%
Ohote B	14445	7670	47%	724	48%	95%
Ohote D	5799	2880	50%	159	47%	97%
Ohote E	5043	2610	48%	174	48%	97%
Te Otamanui	30551	27700	9%	1800	85%	94%
Mangaheka A	1501	1470	2%	159	87%	89%
Mangaheka B	3765	3610	4%	336	87%	91%
Mangaheka C	4318	4150	4%	352	88%	92%
Rotokauri South A	2007	1940	3%	149	89%	93%
Rotokauri South B	856	841	2%	65.7	91%	92%
Rotokauri South C	536	465	13%	15.4	84%	97%
TOTAL	82269	59236	28%	4520	67%	95%

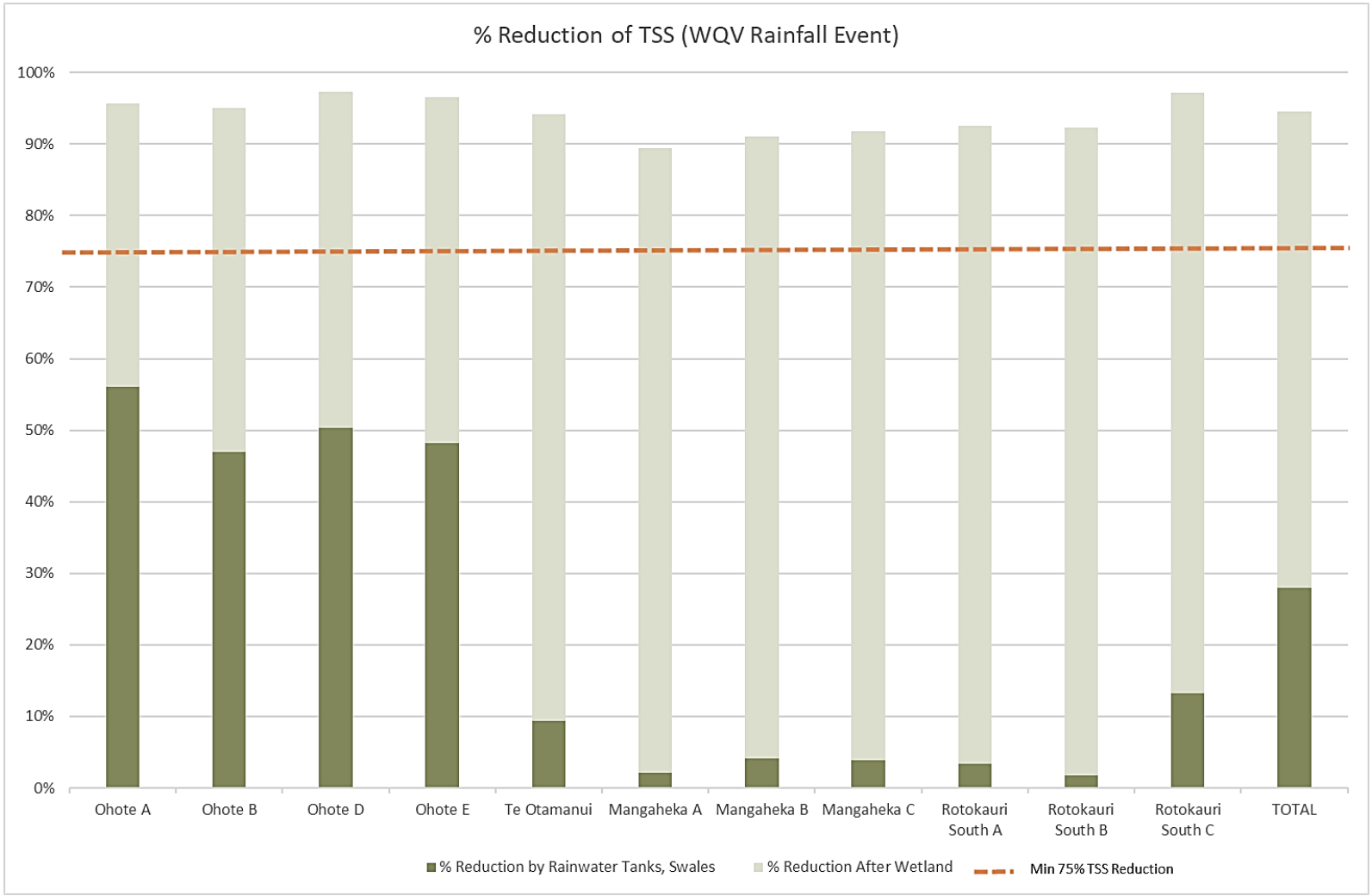

Figure 10: TSS Reduction – WQV Rainfall Event

Table 21: Long Term Rainfall Water Quality Performance – TSS

Subcatchment Reference	Total Generated (All Contributing Nodes) (kg/year)	Before Wetland (kg/year)	% Reduction before wetland	After Wetland (kg/year)	% Reduction by wetland	Total % Reduction
Ohote A	4029	2550	37%	1070	37%	73%
Ohote B	4235	2860	32%	1090	42%	74%
Ohote D	1723	1180	31%	465	42%	73%
Ohote E	1495	1060	29%	418	43%	72%
Te Otamanui	8933	8760	2%	2770	67%	69%
Mangaheka A	427	427	0%	116	73%	73%
Mangaheka B	1087	1087	0%	306	72%	72%
Mangaheka C	1251	1251	0%	327	74%	74%
Rotokauri South A	586	586	0%	141	76%	76%
Rotokauri South B	252	252	0%	53.2	79%	79%
Rotokauri South C	156	156	0%	49.8	68%	68%
TOTAL	24174	20170	17%	6806	55%	72%

Preliminary sensitivity modelling was undertaken for the wetlands predicted to not meet a long-term threshold of 75% TSS removal. Sensitivity results indicated wetland sizing to achieve 75% removal would require a substantial (100%+) increase in wetland surface area. The wetland sizing was retained as per the design completed using Auckland Council TP10 and for which the design rainfall event showed the overall treatment providing 75% removal.

The predicted TSS removal rates in for the long-term rainfall modelling in MUSIC were generally close to the required removal rate for the wetlands designed as per TP10. Considering assumptions and limitations involved in both designs as per TP10 and inputs to MUSIC, the wetlands were considered

functional for the current level of investigation and design. Future wetland detailed design should consider updates to the MUSIC model based on additional field investigations and testing as completed.

Further the long-term rainfall record includes events which have a higher exceedance probability than the design rainfall event used for sizing as per TP10. Therefore, the pollutant loads included in the result tables include these larger intensity events, for which the treatment nodes have lower relative removal efficiency.

We note that the final detention basin proposed for each catchment, to ensure outflows from the catchment do not exceed 80% ED flows, will provide additional TSS polishing. Modelling and assessment of this component is ongoing.

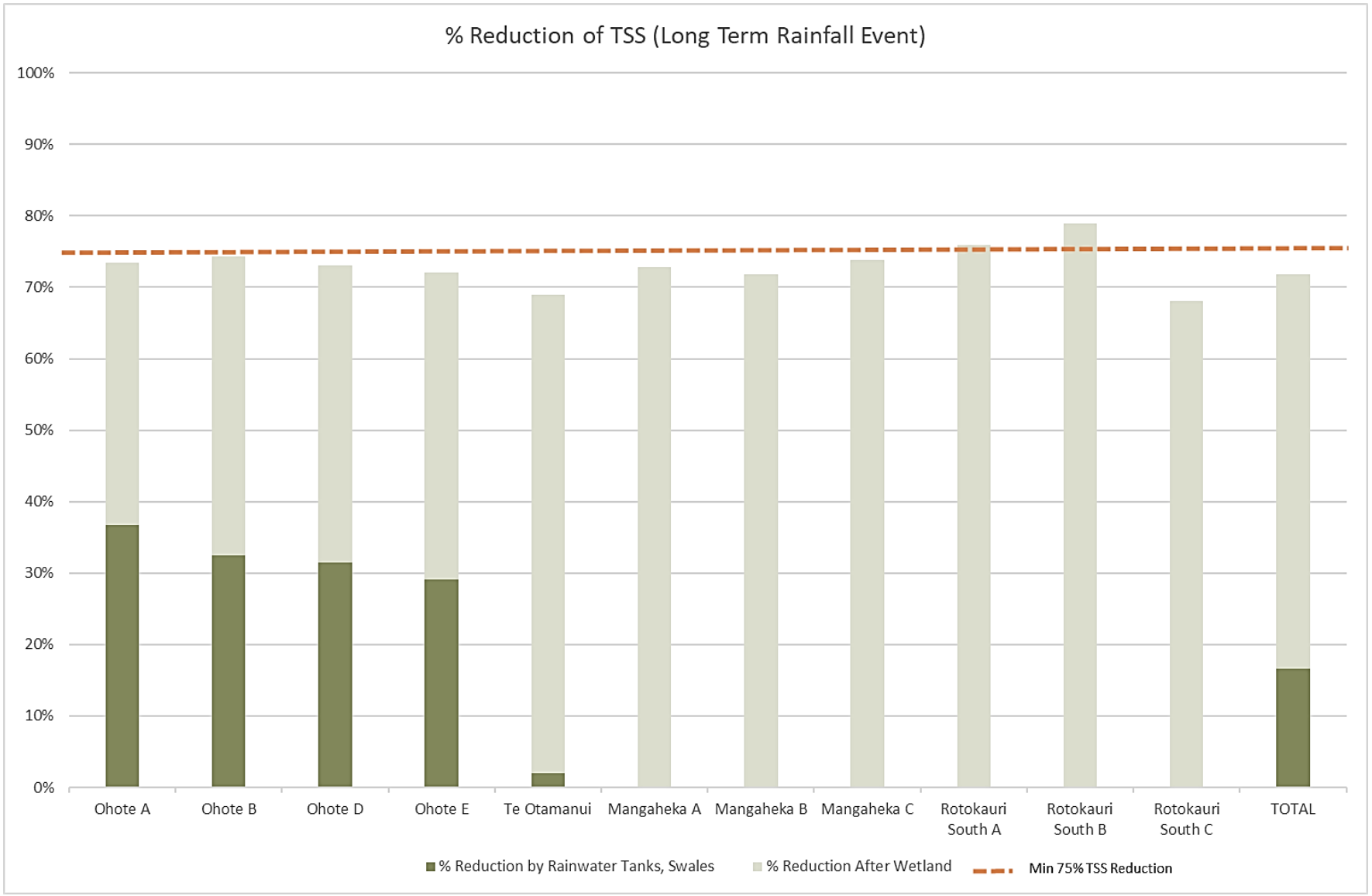

Figure 11: TSS Reduction - Long Term Rainfall

Table 22: WQV Design Rainfall Water Quality Performance - TP

Subcatchment Reference	Total Generated (All Contributing Nodes) (kg/year)	Before Wetland (kg/year)	% Reduction before wetland	After Wetland (kg/year)	% Reduction by wetland	Total % Reduction
Ohote A	200	57.2	71%	5.94	26%	97%
Ohote B	216	60.7	72%	7.34	25%	97%
Ohote D	89	32.6	64%	1.6	35%	98%
Ohote E	78	29.7	62%	1.8	36%	98%
Te Otamanui	465	407	13%	18.8	83%	96%
Mangaheka A	24	23.5	3%	2.1	89%	91%
Mangaheka B	58	55.1	6%	4.0	87%	93%
Mangaheka C	66	62.4	5%	4.1	88%	94%
Rotokauri South A	29	27.5	5%	1.7	89%	94%
Rotokauri South B	11	10.9	2%	0.7	92%	93%
Rotokauri South C	9	7.89	16%	0.2	82%	98%
TOTAL	1247	774	38%	48	58%	96%

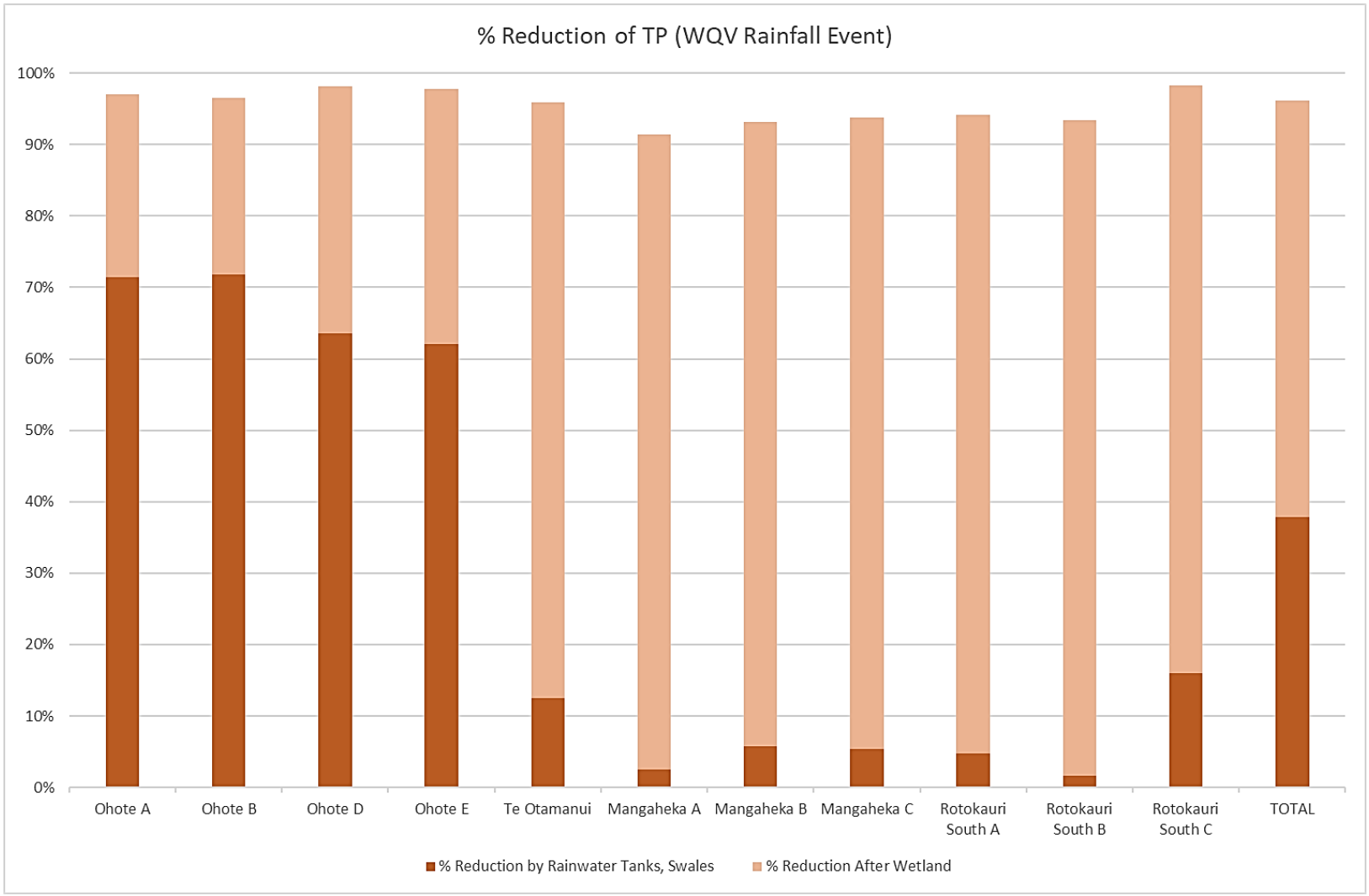

Figure 12: Total Phosphorus Reduction - WQV Design Rainfall

Table 23: Long Term Rainfall Water Quality Performance - TP

Subcatchment Reference	Total Generated (All Contributing Nodes) (kg/year)	Before Wetland (kg/year)	% Reduction before wetland	After Wetland (kg/year)	% Reduction by wetland	Total % Reduction
Ohote A	61	24	61%	11	21%	82%
Ohote B	64	23	64%	11	19%	83%
Ohote D	27	13	53%	5	29%	82%
Ohote E	23	11	52%	4	30%	82%
Te Otamanui	138	129	7%	31	71%	77%
Mangaheka A	7	7	0%	1	79%	80%
Mangaheka B	17	17	1%	4	78%	79%
Mangaheka C	19	19	1%	4	79%	80%
Rotokauri South A	9	9	1%	2	80%	81%
Rotokauri South B	3	3	0%	1	83%	82%
Rotokauri South C	3	3	2%	1	77%	79%
TOTAL	372	258	31%	74	49%	80%

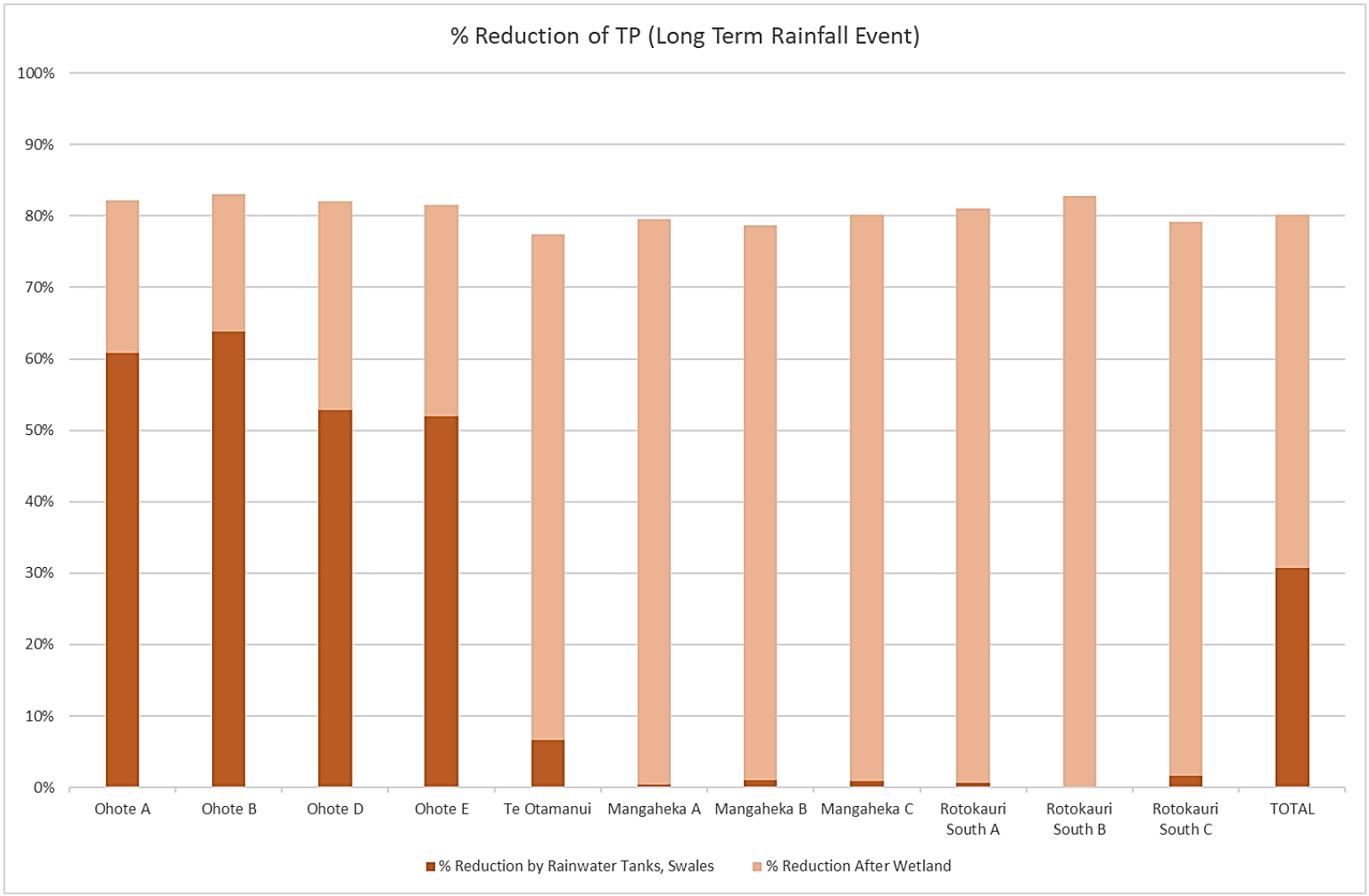

Figure 13: Total Phosphorus Reduction - Long Term Rainfall

Table 24: WQV Design Rainfall Water Quality Performance - TN

Subcatchment Reference	Total Generated (All Contributing Nodes) (kg/year)	Before Wetland (kg/year)	% Reduction before wetland	After Wetland (kg/year)	% Reduction by wetland	Total % Reduction
Ohote A	833	544	35%	108	52%	87%
Ohote B	832	597	28%	134	56%	84%
Ohote D	374	233	38%	28.5	55%	92%
Ohote E	327	204	38%	31.7	53%	90%
Te Otamanui	1595	1230	23%	325	57%	80%
Mangaheka A	71	63	12%	25.2	53%	65%
Mangaheka B	196	153	22%	57.6	49%	71%
Mangaheka C	220	175	20%	61.4	52%	72%
Rotokauri South A	97	80.3	17%	26.5	56%	73%
Rotokauri South B	35	34	2%	12	64%	65%
Rotokauri South C	39	20.3	47%	2.69	46%	93%
TOTAL	4618	3334	28%	813	55%	82%

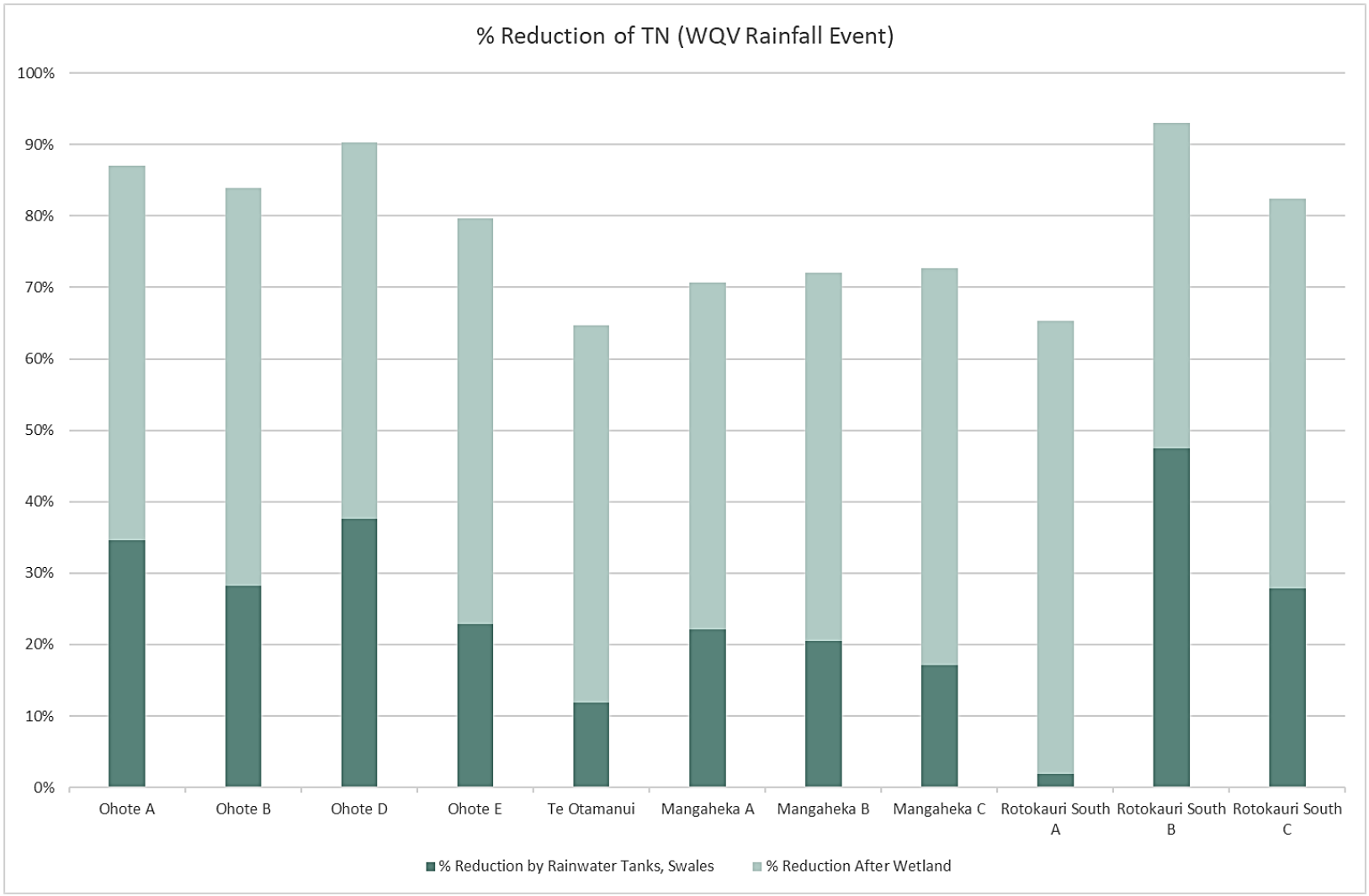

Figure 14: Total Nitrogen Reduction - WQV Design Rainfall

Table 25: Long Term Rainfall Water Quality Performance - TN

Subcatchment Reference	Total Generated (All Contributing Nodes) (kg/year)	Before Wetland (kg/year)	% Reduction before wetland	After Wetland (kg/year)	% Reduction by wetland	Total % Reduction
Ohote A	238	223	6%	180	18%	24%
Ohote B	236	226	4%	182	19%	23%
Ohote D	106	98	8%	79	18%	26%
Ohote E	92	85	8%	69	17%	25%
Te Otamanui	456	456	0%	358	22%	22%
Mangaheka A	20	20	0%	17	16%	16%
Mangaheka B	56	52	7%	45	13%	19%
Mangaheka C	63	63	0%	50	20%	20%
Rotokauri South A	28	28	0%	22	20%	20%
Rotokauri South B	10	10	0%	9	18%	18%
Rotokauri South C	11	9	15%	8	11%	26%
TOTAL	1316	1270	3%	1019	19%	23%

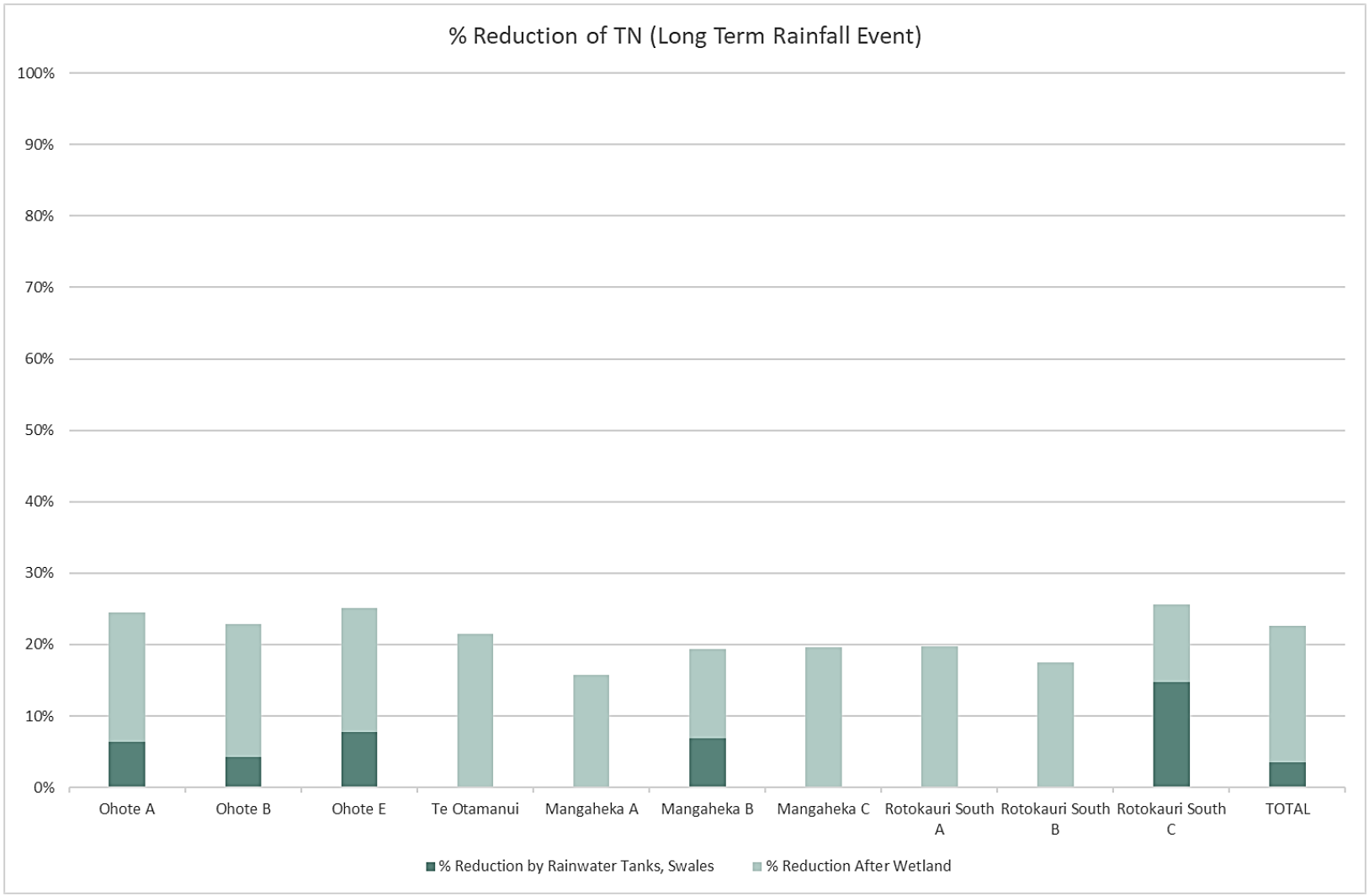

Figure 15: Total Nitrogen Reduction - Long Term Rainfall

Water Quality Results Commentary

Inspection of the water quality results indicates that the larger wetlands appear to be oversized with regards to their performance. Conversely the smaller wetlands, while meeting the quality parameters, appear to be undersized when compared with the performance of the larger wetlands.

The design rainfall event when applied to the MUSIC model shows that the wetland design, and upstream swales and rainwater tank provided positive water quality outcomes. The design rainfall event modelled using MUSIC confirms that the design of the wetlands in accordance with TP10 provides the required reduction in TSS, TP and TN. The long-term rainfall, which includes higher probability rainfall events than those used for TP10 wetland design, provides positive water quality outcomes albeit short of the required reduction quantities for TSS. The higher probability rainfall events within the long-term rainfall series when modelled would have higher pollutant loads (TSS, TP, TN) than those for which the wetlands were designed. As noted previously, preliminary increases in wetland sizes did not achieve overall reduction of TSS to greater than 75%. Due to the differences in modelling of design rainfall events compared with long term rainfall (including higher probability events), the wetlands are considered to be appropriately sized.

8.5 Soil Storage Capacity Sensitivity

The MUSIC model soil storage was based calculated based on Group B soils and Curve Number (CN) of 69. Model sensitivity was assessed by calculating the soil storage based on Group C soils Curve Number of 79. The resultant soil storage capacity was 68 mm based on Equation 5-2 WRC SRM (2018). The field capacity value was also adjusted to 54mm corresponding to 80% of the Soil Storage Capacity.

The Water Quality Volume event was simulated with the adjusted soil storage capacity, and peak flow results exported for the wetlands. The table (Table 26) below shows the peak inflows predicted for the base WQV results and the sensitivity results.

Table 26: Soil Storage Capacity Sensitivity Hydraulics Summary (WQV)

Subcatchment Reference	Base		Sensitivity	
	WQV Peak Flow before Wetland (L/s)	WQV Peak Flow after Wetland (L/s)	WQV Peak Flow before Wetland (L/s)	WQV Peak Flow after Wetland (L/s)
Ohote A	71	17	71	17
Ohote B	86	21	86	21
Ohote D	47	6	47	6
Ohote E	39	6	39	6
Te Otamanui	185	18	185	18
Mangaheka A	17	4	17	4
Mangaheka B	33	6	33	6
Mangaheka C	27	7	27	7
Rotokauri South A	10	3	10	3
Rotokauri South B	4	1	4	1
Rotokauri South C	2	<1	2	<1

The sensitivity results suggest no change to the predicted peak flows. Based on these model predictions the model results are considered insensitivity to changes to the soil group and related CN.

9.0 SWALE NETWORK HYDRAULICS

HEC-RAS was used to model the swale and conveyance channel network for the critical reaches, to demonstrate performance of the proposed swale and channel sizes. Two major upstream inputs to the swale conveyance from external catchments were included within the model.

HEC-RAS was used to develop a series of reaches with cross sectional dimensions as per the previous swale/channel design table. The invert levels for the network were based on the interim levels developed as part of the Qualifying Development (QD) subdivision design (on going).

9.1 Flow Scenarios

The 1% Average Exceedance Probability 24-hour design rainfall event including climate change allowance was modelled.

9.2 Model Configuration

The HEC-RAS model was configured as a one-dimensional network using steady flow analysis to determine the suitability of the swale and channel sizes, and required detention storage areas.

Flow conditions within each reach were based on aggregate of peak flows for the contributing upstream subcatchments.

Wetlands were configured with design water level as corresponding to the Extended Duration Level.

Two models were built, to consider the critical hydraulic path for, the Ohote A Wetland Catchment (Qualifying Development) and the Te Otamanui Wetland Catchment. The critical hydraulic path has been shaded in the figures below.

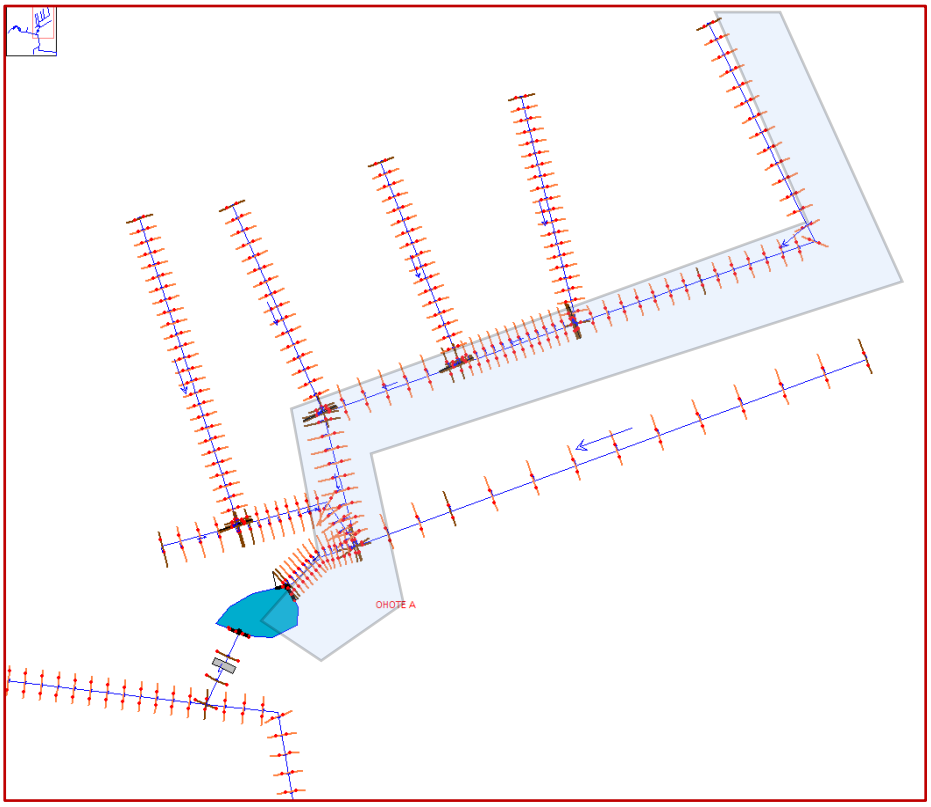

Figure 16: Ohote A Wetland Swale Network

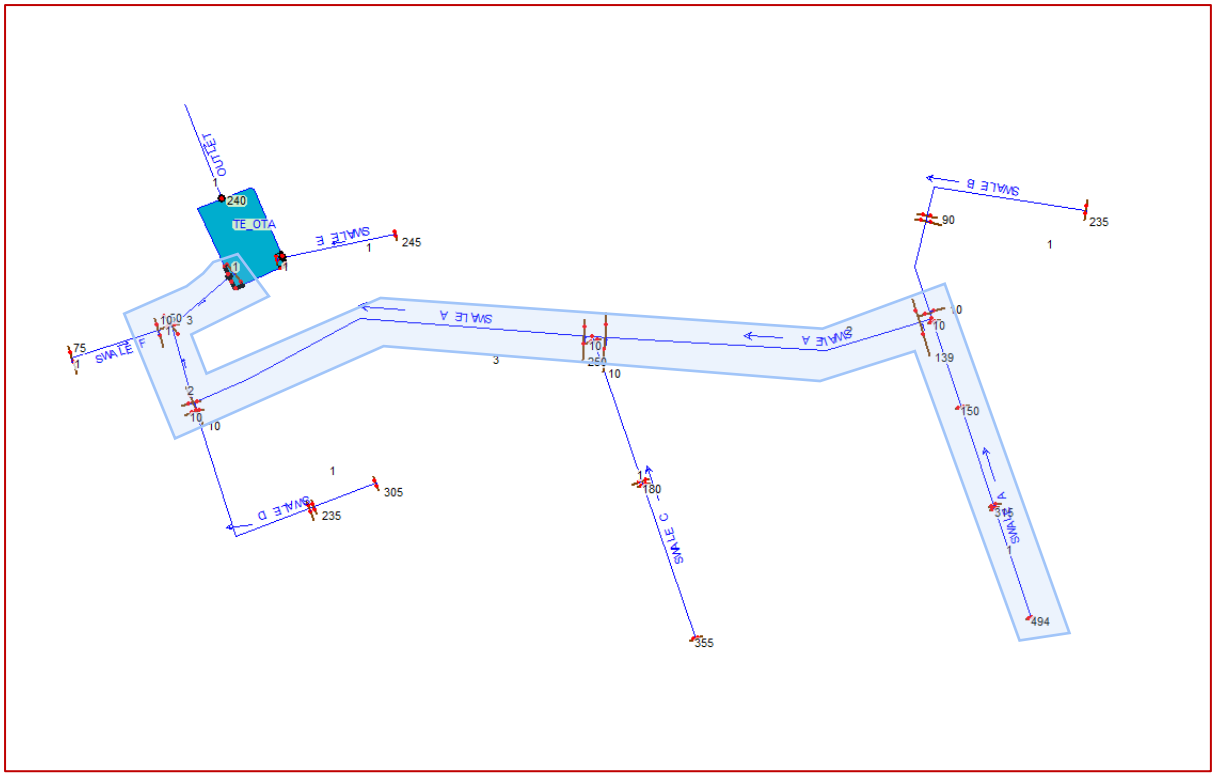

Figure 17: Te Otamanui Wetland Swale Network

Road Network

Parts of the Plan Change area were designed to use the road/carriageway for conveyance of stormwater flows. The road network used for stormwater conveyance of smaller catchments were modelled as standard dual cross fall roads, with the gutter invert matching the gutter invert of the downstream swale profile.

For model stability purposes a weir was added at the connection point of the road to the swale network. The weir profile matched the immediate upstream road profile so as to allow for numerical simulation engine stability where the flow would fall from road level into the lower swale network.

The carriageways used for conveyance were local roads with a fixed 6.0m wide carriageway.

Vegetated Swales

The vegetated swales were modelled with Manning 'n' of 0.06 (Flood plain, brush) for the 1%AEP_{cc} flows. This differs from the value of 0.25 as per RITS, however adopting that value was considered to be too conservative and likely to overestimate water depths for the 1%AEP_{cc} flows.

Conveyance Swales and Channels

These swales and channels were configured with base and sides having Manning's *n* of 0.03. The overbank areas corresponding to roadways were modelled with *n* of 0.015.

9.3 Inflow Hydrographs

Two sources were used for the inflow hydrographs for the reaches.

MUSIC modelling

A MUSIC model prepared previously predicted the inflow and outflow hydrographs for the range of water sensitive design features adopted within the Plan Change Area. MUSIC used the 24-hour

design rainfall to predict the runoff from a range of catchment surfaces, and the conveyance of that runoff through the swale conveyance network.

Peak flows as predicted within the MUSIC model for the contributing subcatchments, were used as inputs for each HEC-RAS reach.

Two-dimensional catchment modelling

Previous catchment modelling of the Ohote Stream was used to determine the inflows from the two external catchments. The catchments were outside the Plan Change area but were included within catchment modelling. These areas (O-G and O-H, refer to) will contribute to flows within the Ohote catchment. Peak flows modelled for the flow scenarios were as per Table 5.

9.4 Wetlands and Detention Storage

Storage Areas within HEC-RAS were used to model the wetlands and detention areas for the ICMP area. The depth/volume relationship for the wetlands was based on the wetland design as per Section 5.2.

9.5 Ohote A Catchment Results

Inspection of the critical hydraulic path showed that the road carriageway and swale network was able to convey the 1%AEP$_{cc}$ flows. The road carriageway flows were predicted to slightly overlap onto front berms, with a maximum predicted depth of flow being 131 mm (from water level to kerb invert). This meets the 150mm requirement of RITS (Waikato Local Authority, 2018, Section 3.3.14.1).

Maximum velocity predicted along the road carriageway was 0.72 m/s. The resultant pedestrian safety factor of 0.09m²/s was less than 0.4 m²/s as per Austroads Guide (Fanning, Richard, 2013).

The footpath was not predicted to have any inundation during the 1%AEP$_{cc}$ rainfall.

The vegetated swale and conveyance channel sections were predicted to contain all the 1%AEP$_{cc}$ flows within the swale/channel banks.

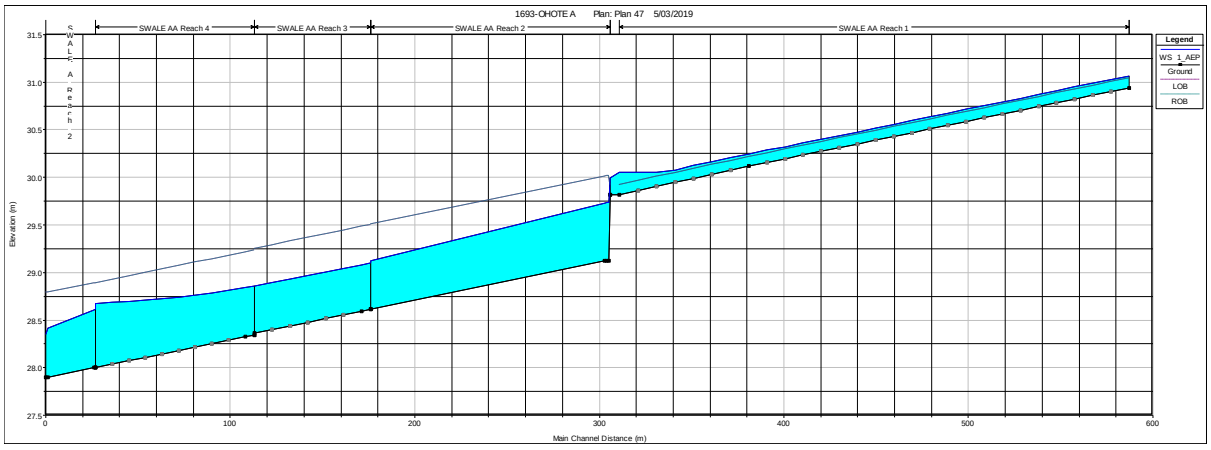

Figure 18: Ohote A Critical Hydraulic Path – 1%AEP$_{cc}$ Results

The maximum velocity within the swales and channels was predicted to be 1.5 m/s, which was comparable with the RITS maximum of 1.5 m/s.

Refer to selected results as per Appendix G –Swale Hydraulic Results.

9.6 Te Otamanui Catchment Results

Inspection of the critical hydraulic path showed that the road carriageway and swale network was able to convey the 1%AEP$_{cc}$ flows. The road carriageway flows were predicted to slightly overlap onto front berms, similar to the Ohote A results. The footpath was not predicted to have any inundation. The maximum predicted depth of flow 149 mm (from water level to kerb invert). This meets the 150mm requirement of RITS (Shaver, 2018, Section 3.3.14.1).

Maximum velocity predicted along the road carriageway was 0.79 m/s. The resultant pedestrian safety factor of 0.12 m²/s was less than 0.4 m²/s as per Austroads Guide Part 5A (Fanning, Richard, 2013).

The footpath was not predicted to have any inundation during the 1%AEP$_{cc}$ rainfall.

The vegetated swale and conveyance channel sections were predicted to contain all the 1%AEP$_{cc}$ flows within the swale/channel banks.

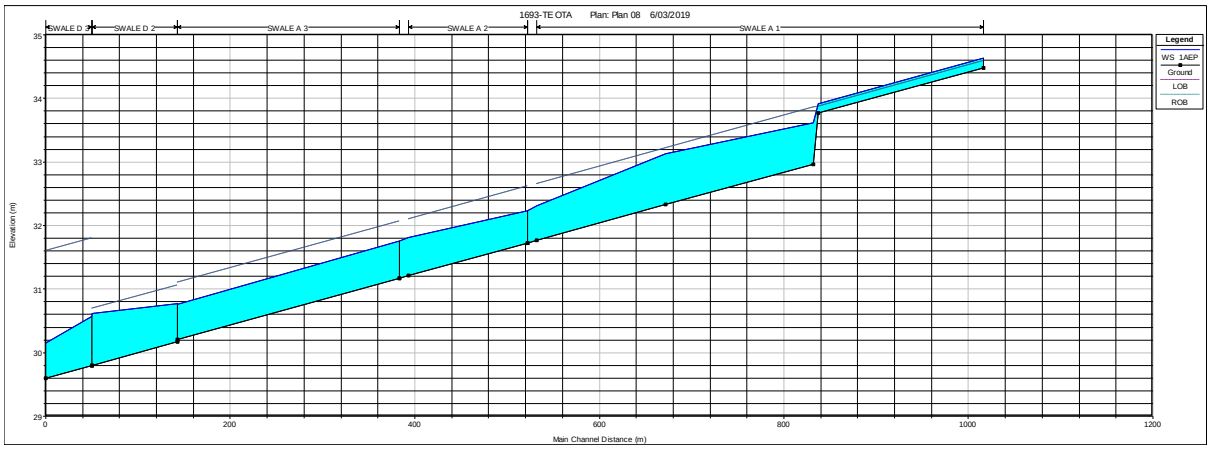

Figure 19: Te Otamanui Critical Hydraulic Path – 1%AEP$_{cc}$ Results

The maximum velocity within the swale and channel network was predicted to be 1.83 m/s, which was greater than the RITS maximum of 1.5 m/s. Inspection of the location with the highest velocity showed that this was the junction of two swales discharging into a larger conveyance channel. The swale velocity upstream of the junction was <1.5 m/s.

Detailed design of the junctions will manage any higher velocities through design features such as additional planting, rip rap and engineered drop structures.

Refer to selected results as per Appendix G –Swale Hydraulic Results.

10.0 LOW IMPACT DESIGN (LID) ASSESSMENT

A high-level water impact (Low Impact Design) assessment as per WRC TR2018/01 (2018) and HCC's Water impact assessment (2016d) was undertaken as per the following table (Table 27).

Table 27: Low Impact Design Assessment

Implementation elements	Typical components	Maximum Individual score	Total score for each item
Source control maximised	Water re-use	0-4 depending on % of runoff capture	3
	Site disturbance reduced from a conventional development approach	0-3 depending on % of runoff capture	0
	Impervious surfaces reduced from a traditional approach	0-3 depending on % of runoff capture	1
	Use of building or site materials that do not contaminate	0 or 1 for residential 0-3 for commercial or industrial	1
	Existing streams and gullies located on site (including ephemeral) are protected and enhanced. The entire stream other than possible crossings shall be protected to qualify for points.	0 or 3	2
	Riparian corridors are protected, enhanced or created	0 or 3	3
	Protection and future preservation of existing native bush areas	0-2 depending on percentage of site area	2
LID stormwater device/practice used	Infiltration devices to reduce runoff volume	0-6 depending on % of runoff capture	1
	Revegetation of open space areas as bush	0-3 depending on % of site covered	0
	Bioretention	0-6 depending on % of runoff capture	1
	Swales and filter strips	0-3 depending on % of site covered	3
	Tree pits	0-6 depending on % of runoff capture	1
Traditional mitigation	Constructed wetlands	0-4 depending on % of runoff capture	4

Implementation elements	Typical components	Maximum Individual score	Total score for each item
	Wet ponds	0-1 depending on % of runoff capture	0
	Innovative devices	0-1 depending on % of runoff capture	0
	Detention ponds (normally dry)	0	1
Urban design	Stormwater management is designed to be an integral and well considered part of the urban design.	0-2	2
Total score			25

Based on the high-level assessment the Rotokauri North Plan Change area exceeds the minimum point value of 15 as required by WRC.

11.0 DOWNSTREAM OHOTE CATCHMENT OPTIONS

The Exelby Road culvert forms the discharge point for the Ohote catchment within the Plan Change area. As per Section 8.0 significant detention volume will be required to buffer peak flows to 80% ED. The following options have been identified for this discharge point so as to potentially lower the invert of Exelby Culvert to minimise earthwork volumes:

- Retain culvert as is;
- Upgrade culvert to allow for 80% of 1% AEP_{cc} ED flow to pass unattenuated;
- Upgrade culvert to allow for >100% of 1% AEP_{cc} ED flow.

Preliminary analysis indicates that retaining the existing culvert will require in the order of 85,100 m^3 of detention, where the flows are limited to the AECOM pre development maximum of 0.7m^3/s.

Increasing the culvert to allow 80% of the McK 1% AEP_{cc} ED flow modelling to pass unattenuated (1200mm Culvert, Q = 2.58m^3/s), reduces detention requirements to approximately 30,000 m^3.

Increasing the culvert further to allow >100% of McK 1% AEP_{cc} ED flow to pass unattenuated (1500mm Culvert, Q = 5.00m^3/s), reduces detention requirements to approximately 23,000 m^3.

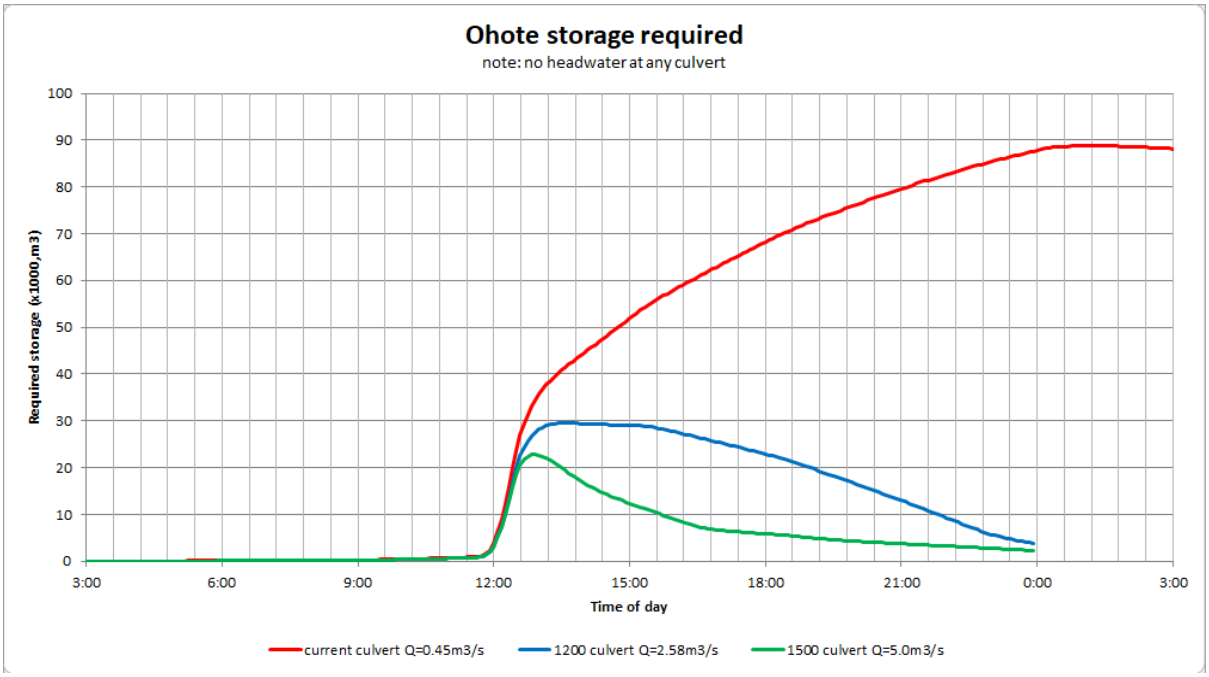

Figure 20: Ohote Storage Requirements

11.1 Downstream Ohote Modelling

Sensitivity modelling on the Ohote Stream downstream of the PPC and ICMP areas was undertaken using HEC-RAS. A one-dimensional model of the existing stream from Exelby Road to Duck Road was created, with stream cross sections derived from a digital elevation model from Lidar flown July 2018.

The following figures show the extent of the modelling, and digital elevation model used for generating cross sections.

The sensitivity modelling considered a range of increasing peak flows from the PPC and ICMP areas, nominally corresponding with different values for the 1%AEP_{cc} peak flow values.



Figure 21: Downstream Ohote Stream 1D Model (Aerial)

Refer to Appendix H –Ohote Stream Model Figure for larger figure.

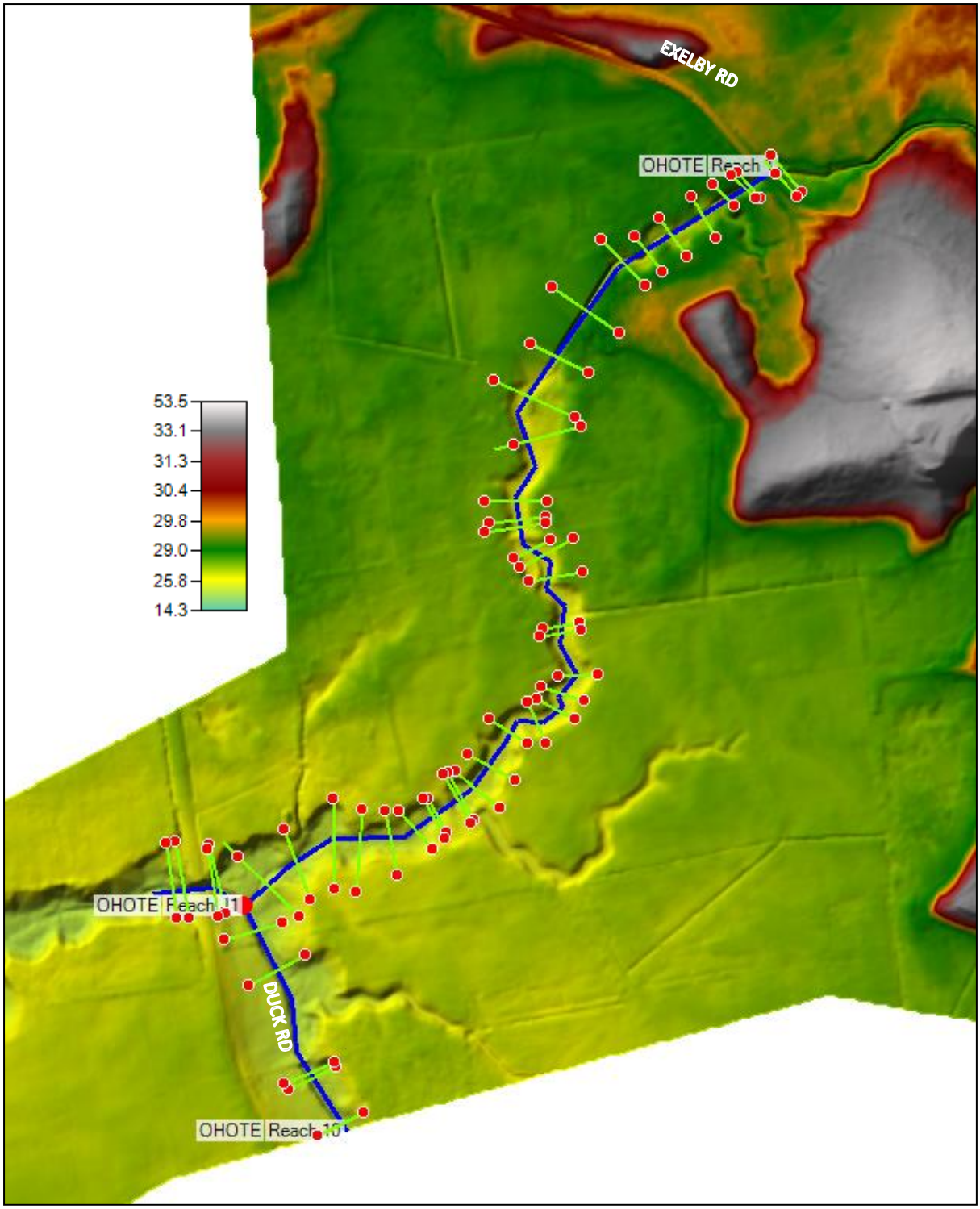

Figure 22: Downstream Ohote Stream 1D Model (Digital Elevation Model)

11.2 Digital Elevation Model Adjustment

A digital elevation model (DEM) was created within 12d software based on the LIDAR information, A small section of topography was manually adjusting such that a channel was added between Chainage 634m and 773m. This was due to a stand of trees and vegetation affecting the LIDAR measured heights. The stream was added with an assumed base width of 2.0m, and the

longitudinal gradient based on matching the gradients of the upstream and downstream sections. The area of adjustment has been shown in the figure below.

The DEM was exported as raster image from 12d and used as the terrain association with HEC-RAS. Two-dimensional (2D) flow areas were defined for the stream catchments within the ICMP area.

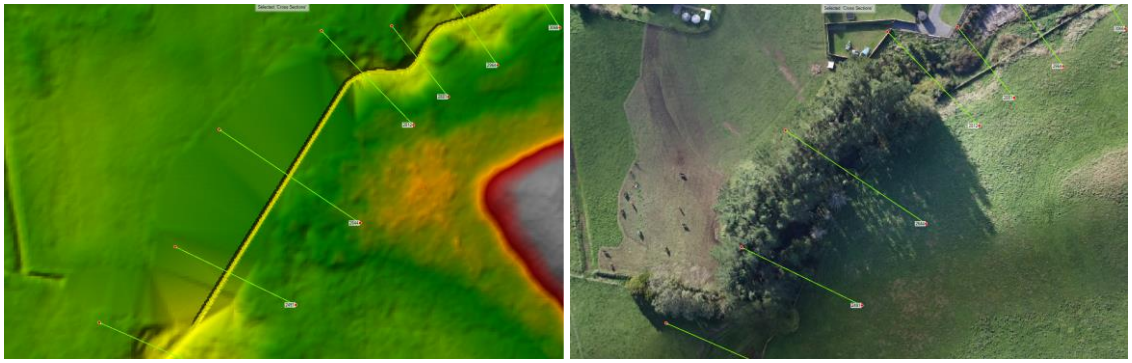

Figure 23: DEM Adjustment

Roughness values for all cross sections were Manning's *n* = 0.045 for all surfaces corresponding to weedy stream.

11.3 Inline Structures

Three inline structures were added to the model based on inspection of the aerial photography. The main structure modelled was the single lane Duck Road culvert, which was modelled with 5.6m span, 2.8m height and 5.5m width. Embankments either side of the bridge were modelled as per the figure below.

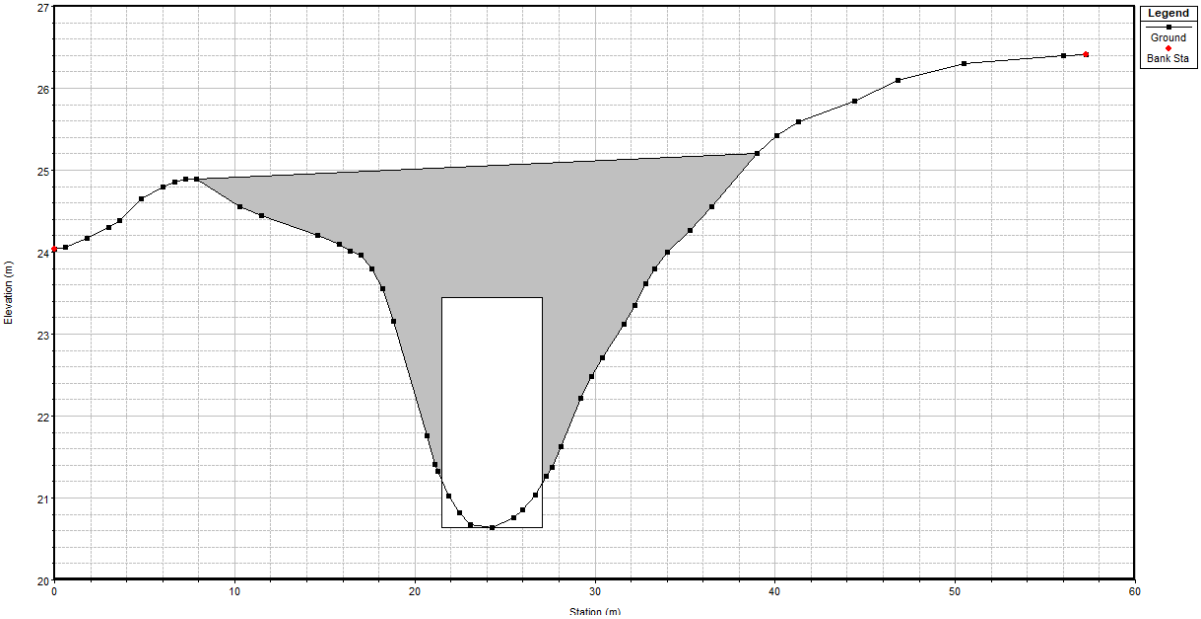

Figure 24: Duck Road Culvert

The other two inline structures were farm culverts added at Chainage 180m and 496m. The culverts were modelled with assumed diameters of 1.05m and 0.9m respectively, based on maximum distance between farm track and stream invert. The top surface of the culverts, typically corresponding with farm access tracks, was modelled as per DEM information.

11.4 Boundary Flow Conditions

The boundary flow conditions for steady state modelling were based on 2 flow rates modelled, one for the upper reach at Exelby Road, and the other at the southern reach. The southern reach modelled inflow from Lake Rotokauri to the Ohote Stream.

Southern Reach (Lake Rotokauri)

The 1% AEP flow from Lake Rotokauri was included, based on peak flow from the modelling in support of the Rotokauri South ICMP (Hart Environmental Ltd, 2017). The modelling report (AECOM, 2016) noted that the peak flow occurring at Duck Road was 6.3 m^3/s.

The contributing peak flow from the Lake Rotokauri catchment was based on pro rata application by contributing area. The contributing areas of catchments were as per Table 28 below.

Table 28: Pro Rata Flows

Name	Description	Area (ha)	% of Contributing Catchment	Pro Rata Peak Flow (m^3s)
Lake Rotokauri	Catchment upstream of Lake Rotokauri	486.3	40.5	2.55
Exelby Road	Catchment upstream of Exelby Road, corresponds to the ICMP area.	181.2	15.1	Refer Exelby Road Section below
Exelby - Duck Road and Lake Rotokauri (E-D - LK)	Contributing area between Exelby Road (ICMP area), Duck Road and downstream of Lake Rotokauri	534.4	44.4	2.80
Total	Total catchment upstream of Duck Road	1201.9	100	6.3

The Lake Rotokauri flow of 2.55 m^3s was modelled at the end of the southern reach. The E-D-LK flow was modelled as three lateral inflow hydrographs equally spaced along the main reach between Exelby Road and Duck Road.

The lateral inflows and locations were:

- Chainage 634m = 0.93m^3/s
- Chainage 410m = 0.93m^3/s
- Chainage 157m = 0.93m^3/s

Exelby Road

Three flow scenarios were considered for Exelby Road:

- Base = 2.7 m^3/s
- Intermediate = 3.7 m^3/s
- Upper = 5.5 m^3/s

These scenarios are to consider the affect of different flow rates on the Ohote Stream, specifically velocity, erosion potential, and sedimentation potential.

11.5 Hydraulic Performance Criteria

Hydraulic performance of the stream was assessed based on Waikato Regional Council Stormwater Modelling Guidelines (Shaver, 2018), and Auckland Regional Council 'Erosion Parameters for Cohesive Sediment in Auckland Streams' (Jowett & Elliot, 2009) with specific criteria noted below:

- Maximum permissible velocity = 1.14 m/s (alluvial silts)
- Critical shear stress = 33 N/m² (Assumed). We note that critical shear stress is a function of grain size/soil type and that soils within the stream corridor have not been specifically assessed.
- Froude <1.0

11.6 Existing Stream Results

For the base case flow of 2.7 m³/s from the ICMP area, the inline farm culverts were predicted to overtop during peak flow. This contributed to instances of velocities exceeding 1.14 m/s, shear stress exceeding 33 N/m² and Froude number exceeding 1.0.

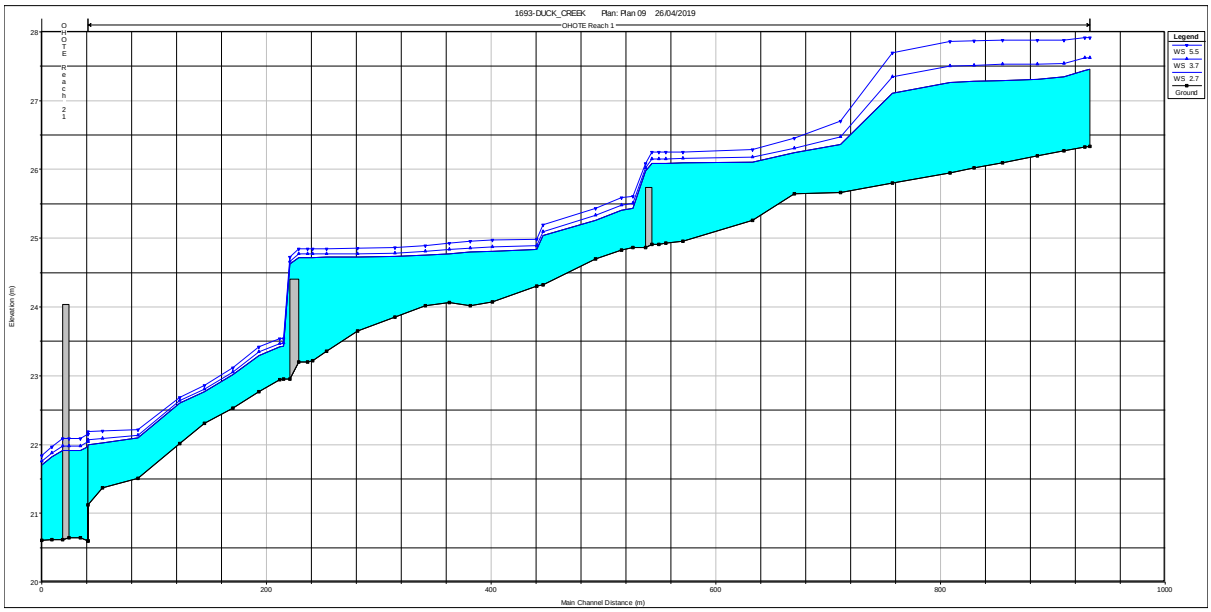

Figure 25: Existing Ohote Stream Water Profiles

The overtopping of the culverts was predicted to increase with increased flow from PPC area. Longitudinal sections showing hydraulic performance have been included within Appendix H.

The Duck Road bridge was not predicted to have any hydraulic deficiencies.

Table 29 below summarises the hydraulic performance criteria results for the Ohote Stream.

Table 29: Existing Downstream Ohote Stream Results

Results	Base (2.7 m³s)	Intermediate (3.7 m³s)	Upper (5.5 m³s)
Mean Velocity (m/s)	0.7	0.8	0.8
Median Velocity (m/s)	0.5	0.6	0.6
Maximum Velocity (m/s)	2.3	2.6	3.0
Minimum Velocity (m/s)	0.1	0.2	0.2
Mean Shear Stress (N/m²)	20	22	24
Median Shear Stress (N/m²)	8	8	10
Maximum Shear Stress (N/m²)	141	180	215
Mean Froude Number	0.34	0.35	0.35
Median Froude Number	0.29	0.28	0.28
Maximum Froude Number	1.00	1.01	1.01

The variability of the velocity, shear stress and Froude number along the alignment have been shown in the charts below, which have been included in detail in Appendix H.

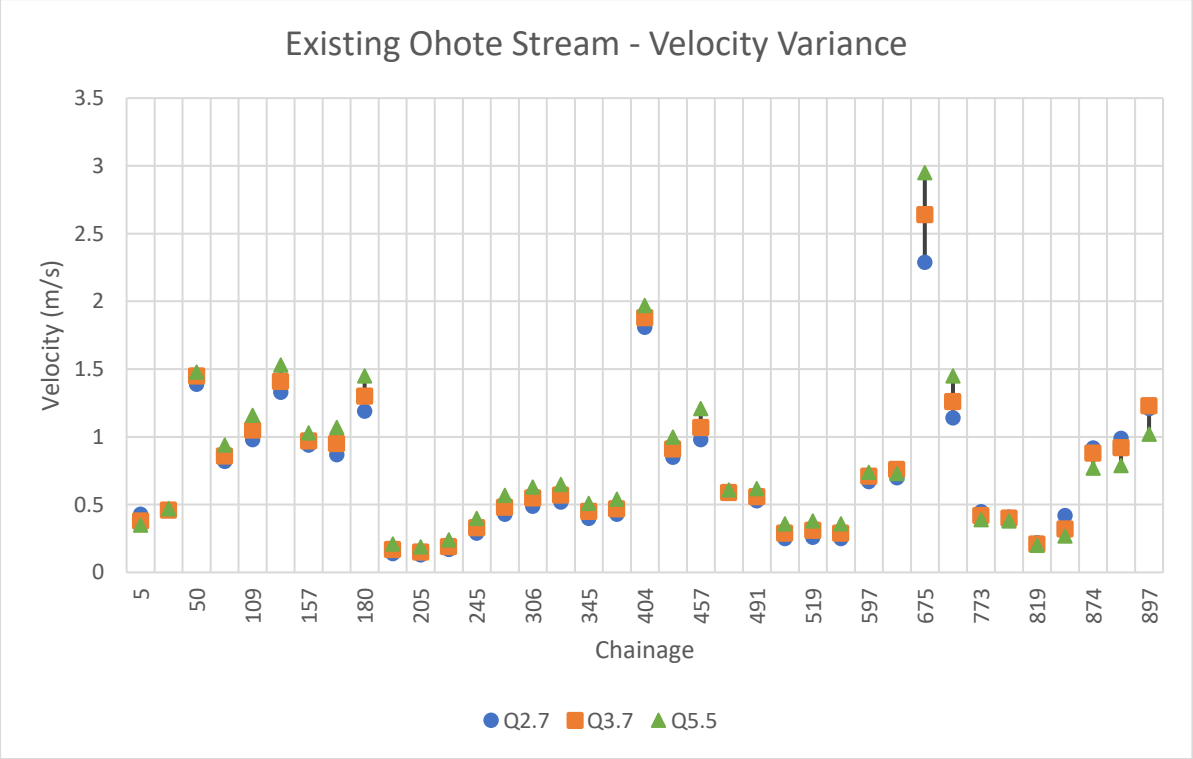

Figure 26: Existing Stream Velocity Variance

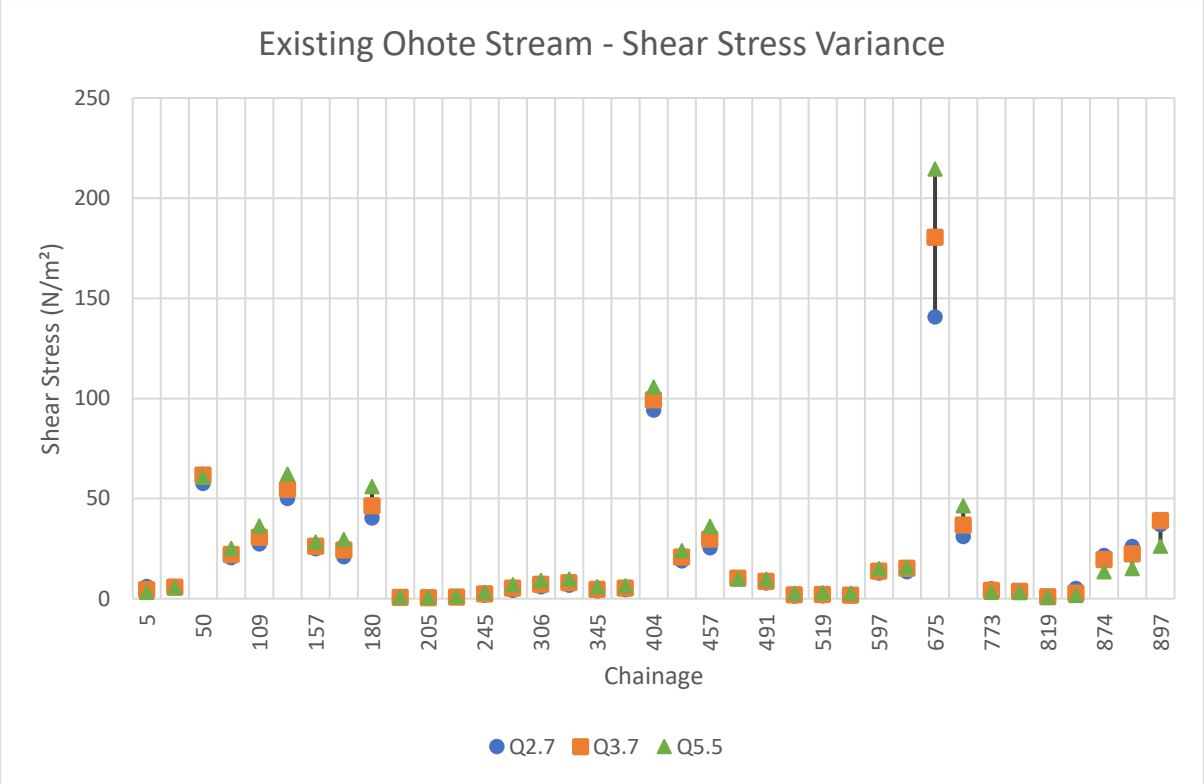

Figure 27: Existing Stream Shear Stress Variance

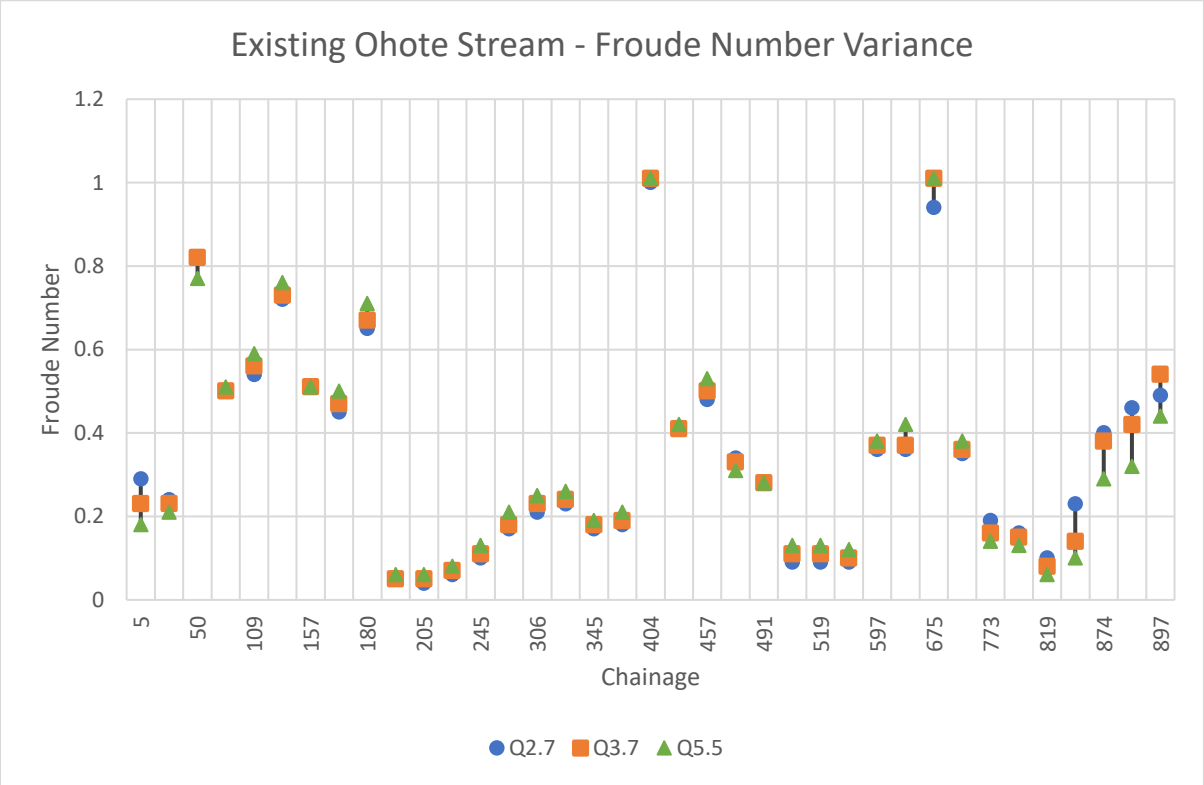

Figure 28: Existing Stream Froude Number Variance

Boxplots below, Figure 29, Figure 30, and Figure 31, give an indication of the distribution of the various parameters for each of the three flow rates. Given the median (thick black line) and the inter quartile range of each of the factors modelled are similar it is apparent that flows ranging between 2.7m^3/s and 5.5m^3/s produce similar metrics. The box plots do highlight a few outliers (stream

locations with relatively high predictions): River Stations 456 (chainage 50), 1603 (chainage 404), and 2491 (chainage 675) – see Figure 32.

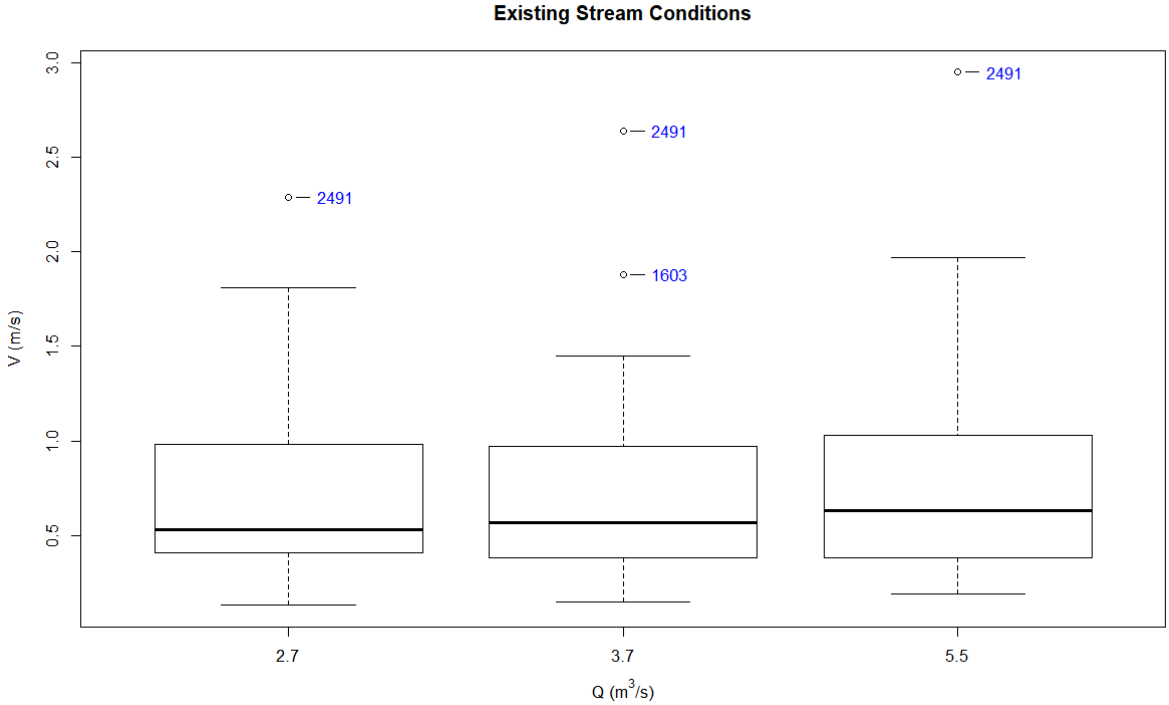

Figure 29: Exisitng Stream – Velocity Box Plot

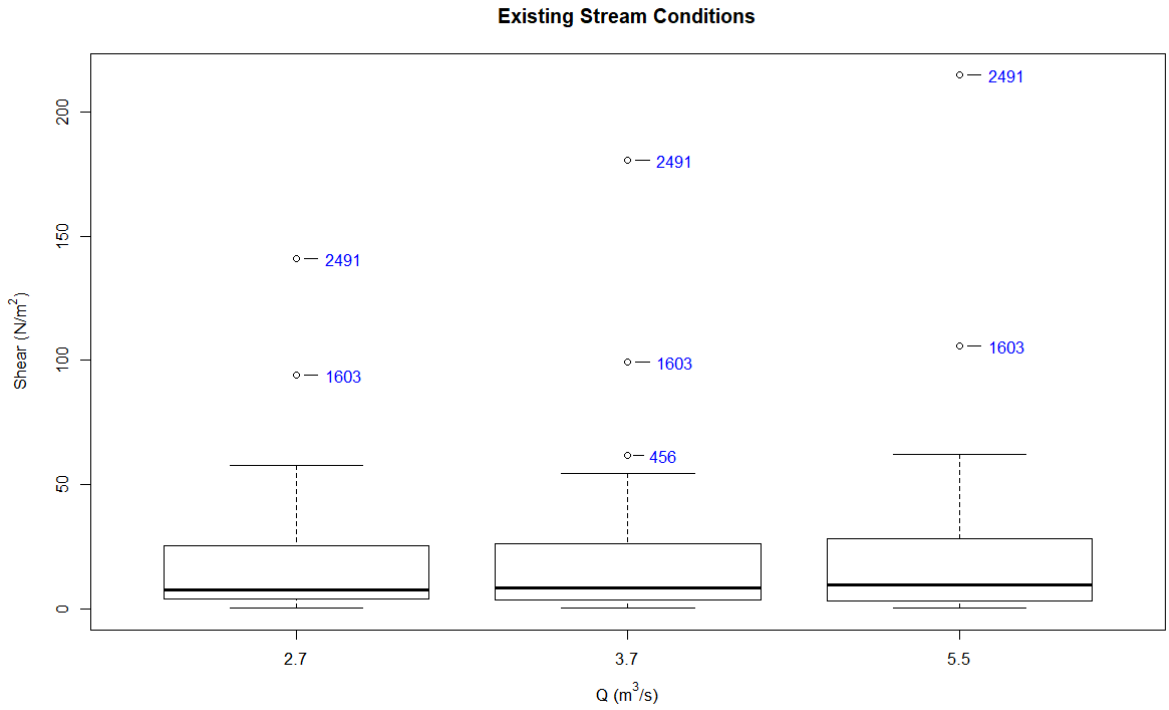

Figure 30: Existing Stream – Shear Stress Box Plot

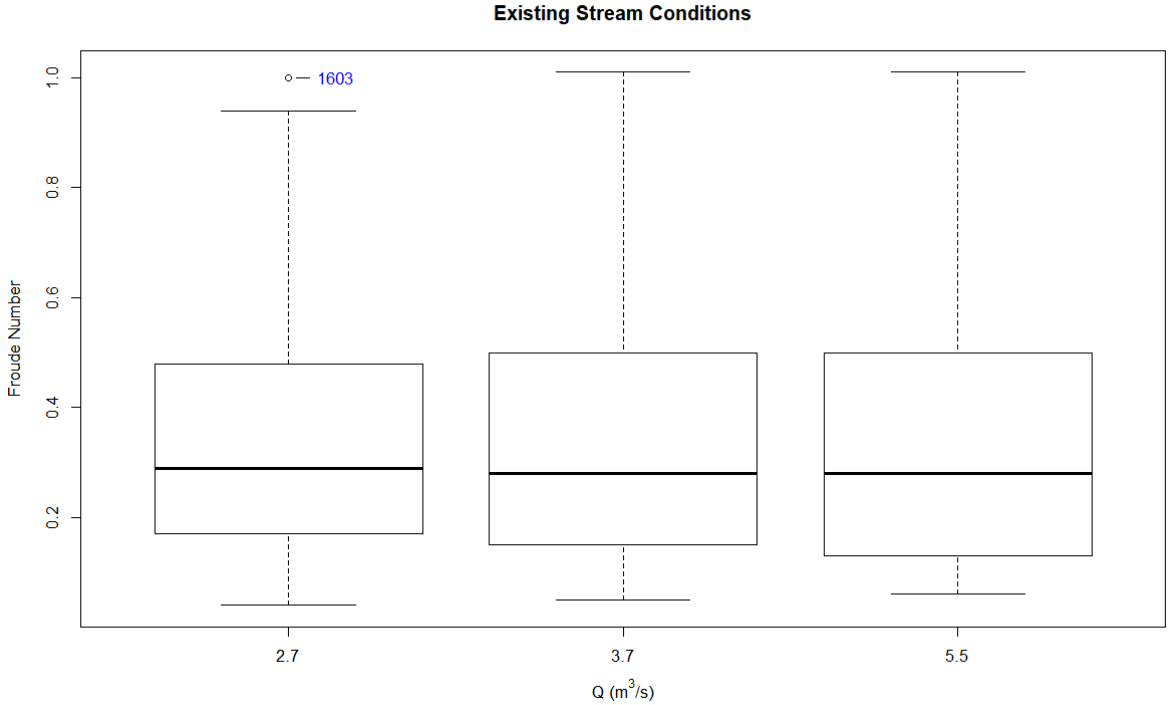

Figure 31: Existing Stream – Froude Number Box Plot

The major variance occurs at Chainage 675, which corresponded with the stream profile that was assumed due to the LIDAR being affected by vegetation. The stream profile should be revised with ground truth data from a topographical survey and remodelled. The other "hotspots" occur where the stream narrows and changes direction.

The hydraulic performance was compared with the information contained within the Morphum Environmental 'Rotokauri North Sub-Catchment – Receiving Environment and Rapid Erosion Assessment" report (Parmar, McArthur, Surrey, & Yeates, 2018). The report identified that the downstream section of Ohote Stream had minimal erosion hot spots. Refer to figure below, extracted from report. Their assessment is validated insofar as the median/average flow velocities along the stream are low, 0.5 to 0.8 m/s (less than 1.14 m/s); median/average Shear Stress are less than 33 N/m^2; and median/average Froude Numbers are less than 1.0.



Figure 32: Most Sensitive sections of Ohote Stream

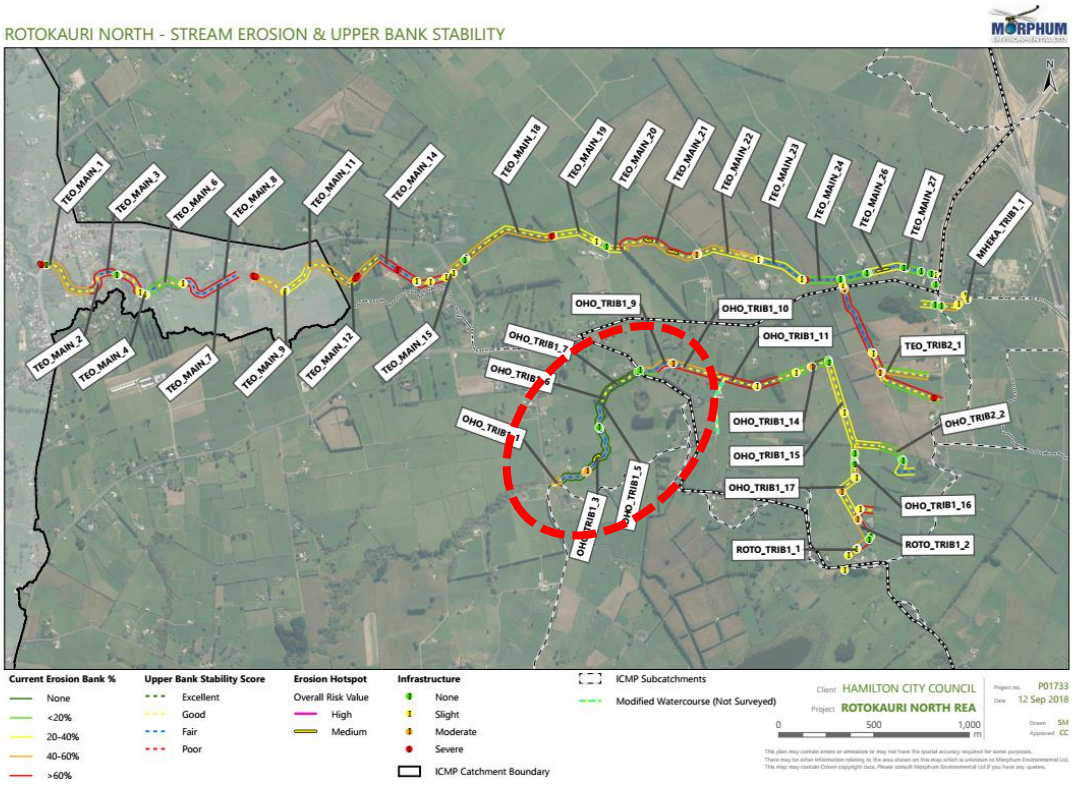

Figure 33: Stream Erosion and Upper Bank Stability (Source: Morphum Environmental)

Statistical Analysis

An Analysis of Variation (*Anova*) was undertaken to allow for comparison of the three flow scenarios. The *Anova* was completed for water level, velocity, shear stress and Froude number, with outputs of specific interest being:

- F-Ratio –measure of whether the different samples means are significantly different or not;
- n^2 value – proportion of variability between the data sets, calculated as sum of squares for between group variability divided by sum of squares for within group variability.

Critical F-Ratio ($F_{critical}$) was estimated based on alpha value of 0.05 (5%) i.e., if the F-Ratio was calculated to be within top 5% of sample data set distribution, then data sets can be considered significantly different. As the sample sizes for all data sets was the same, $F_{critical}$ was the same.

Anova results have been included within following table (Table 30).

Table 30: Anova Results

Variable	F-Ratio	$F_{critical}$	Sum of Squares (Between Group Variability)	Sum of Squares (Within Group Variability)	n^2
Water Level	0.179	3.080	1.074	325	0.33%
Velocity	0.259		0.145	30.15	0.48%
Shear Stress	0.149		347	12634	0.27%
Froude	0.001		0.000	6.88	0.00%

All estimated F-Ratio values were less than $F_{critical}$, indicating statistically the three flow scenarios were similar. Similarly, the low n^2 values indicate minimal difference in variability of the three flow scenarios.

As such, given the data and modelling, there is no significant difference with respect to erosion indicators for flow rates between 2.7m^3/s and 5.5m^3/s. This suggests that differences in modelling approaches have little effect and that flow through the Exelby culvert could be increased to 5.5m^3/s with no additional effect on the downstream environment.

Sections of stream, for all three flow scenarios, did not meet the hydraulic design criteria. Therefore, it is expected that downstream works would be required where design criteria are cannot be met.

11.7 Downstream Works

The Morphum Environmental 'Rotokauri North Sub-Catchment – Receiving Environment and Rapid Erosion Assessment" report, Section 5.3, identified proposed downstream works for enhancement of the Ohote Stream. The hydraulic analysis of the existing stream profile indicated that there are areas where downstream works would be beneficial in achieving design criteria.

The following downstream works were modelled for the three flow scenarios based on enhancement recommendations and iterative amendment to meet the design criteria:

- Farm culverts all removed, future access across stream to be provided by oversized culverts or new stream fords;
- Planting along the whole stream to increase Manning 'n' to 0.06 (Planted floodplain).
- Greater density of planting between Chainages 0m and 180m to increase Manning 'n' to 0.1 (Dense brush).

- Cross section reshaping between Chainages 205m and 217m. Reshaping modelled as constant base width of 10m.
- Cross section reshaping between Chainages 365m and 410m. Reshaping modelled as constant base width of 8m.
- Cross section reshaping between Chainages 597m and 773m. Reshaping modelled as constant base width of 8m. Note that these works are through the area of tree vegetation and additional field survey should be undertaken to confirm stream invert levels before further design.
- Stream invert level amended at Chainage 634m to provide constant gradient.
- Cross section reshaping between Chainages 773m and 897m. Reshaping modelled as constant base width of 6m.

The proposed downstream works were consistent with the enhancement works proposed within Section 5.3 of Morphum Environmental 'Rotokauri North Sub-Catchment – Receiving Environment and Rapid Erosion Assessment" report.

11.8 Downstream Works Results

For the three flow scenarios, generally the downstream works mitigated the erosion potential for the three flow scenarios. The maximum velocity of 1.14 m/s was not exceeded for any flow scenarios, neither was the Froude number predicted to exceed 1.0.

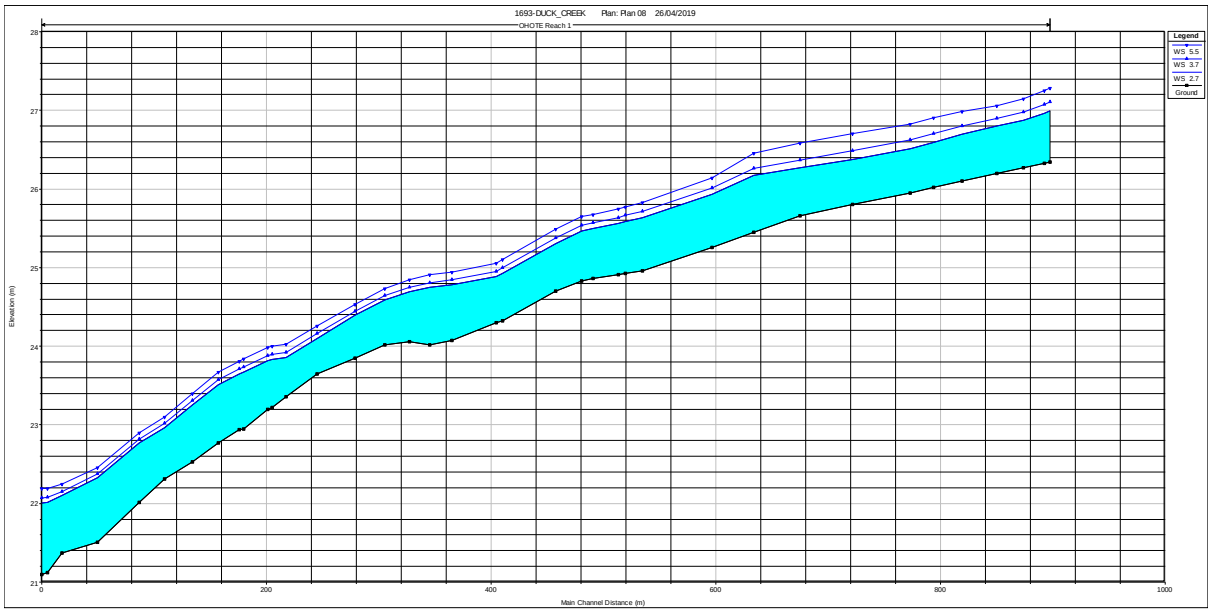

Figure 34: Ohote Stream Water Profiles After Downstream Works

Table 31: Downstream Works Ohote Stream Results

Results	Base (2.7 m³s)	Intermediate (3.7 m³s)	Upper (5.5 m³s)
Mean Velocity (m/s)	0.6	0.7	0.7
Median Velocity (m/s)	0.6	0.7	0.7
Maximum Velocity (m/s)	1.1	1.1	1.1
Minimum Velocity (m/s)	0.2	0.4	0.2
Mean Shear Stress (N/m²)	25	30	33
Median Shear Stress (N/m²)	21	25	26
Maximum Shear Stress (N/m²)	71	79	93
Mean Froude Number	0.29	0.31	0.31
Median Froude Number	0.28	0.28	0.29
Maximum Froude Number	0.59	0.59	0.57

In all instances, maximum values have been reduced substantially, and mean/median values are well within design specification.

The variability of the velocity, shear stress and Froude number along the alignment are shown in Figure 35 to Figure 40 below. Longitudinal sections showing hydraulic performance have been included within Appendix I.

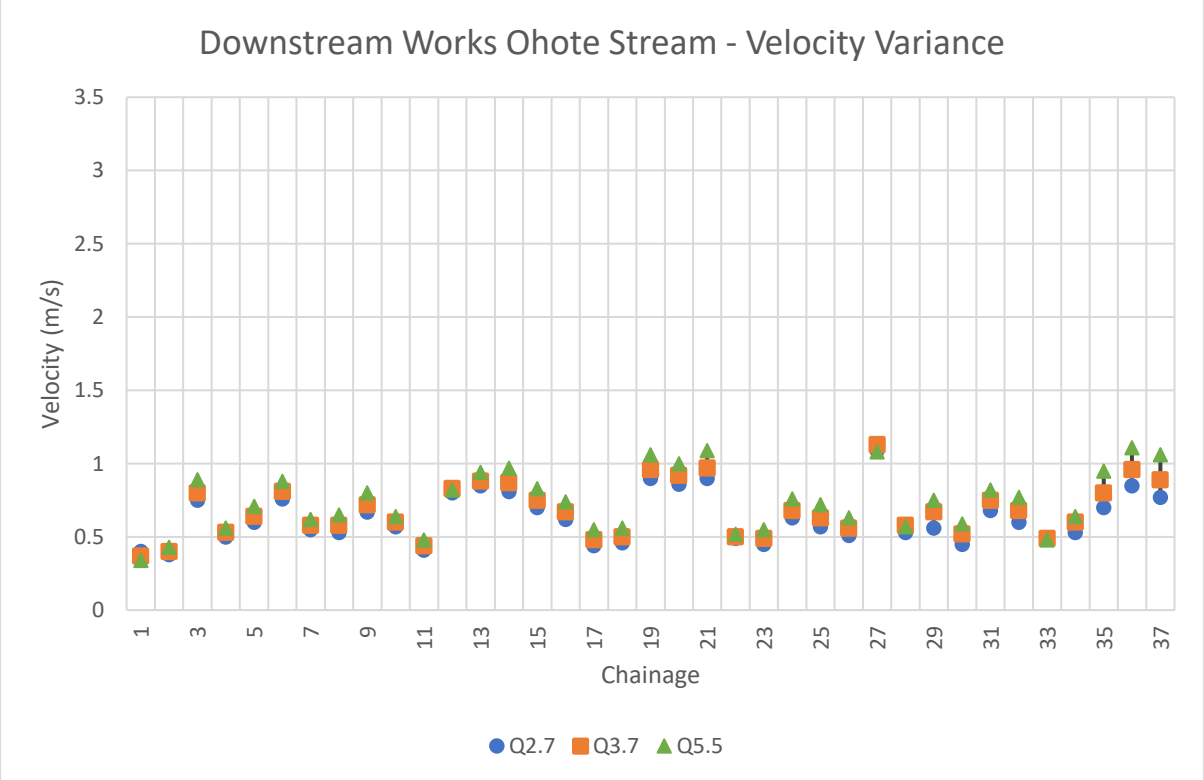

Figure 35: Downstream Works Stream Velocity Variance

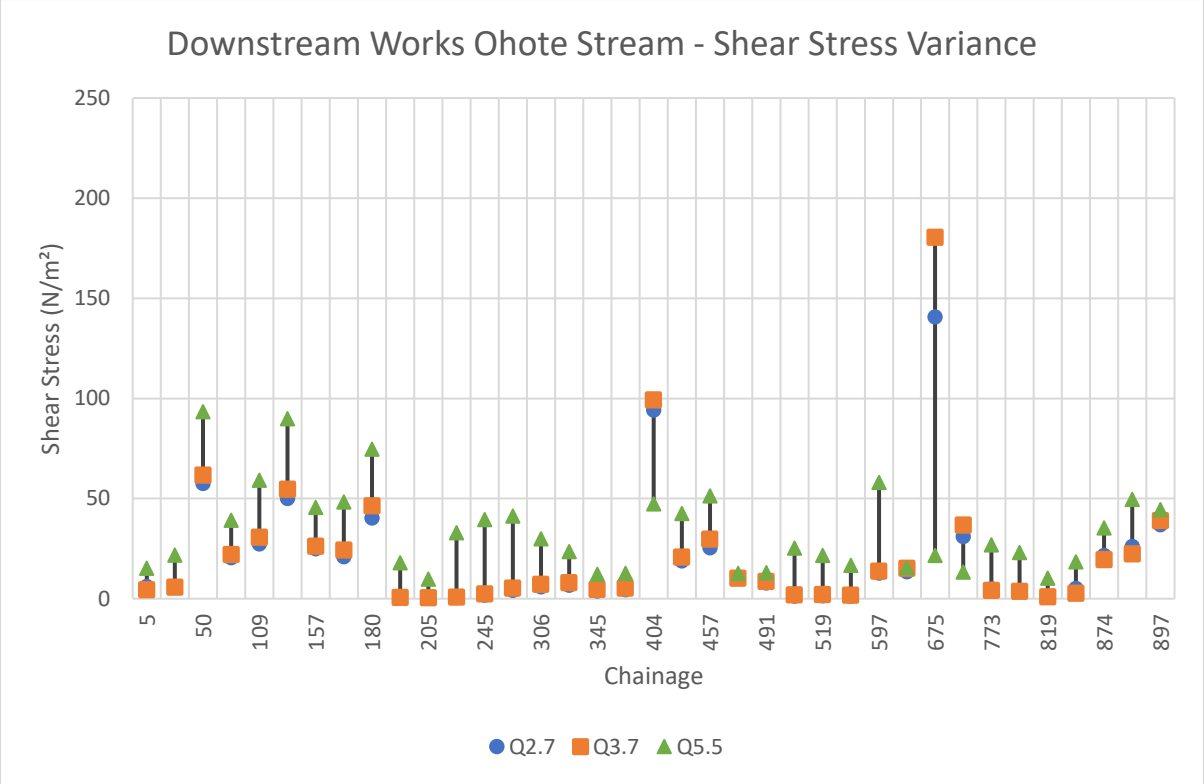

Figure 36: Downstream Works Stream Shear Stress Variance

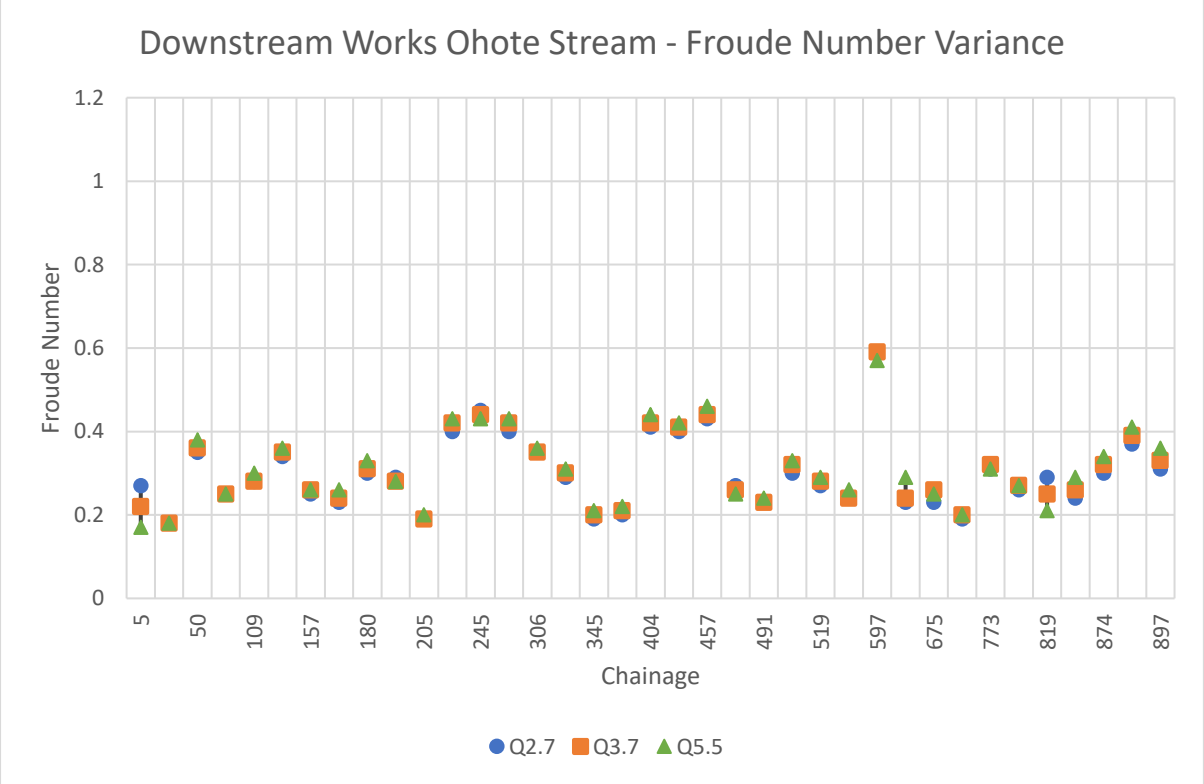

Figure 37: Downstream Works Stream Froude Number Variance

Figure 38, Figure 39 and Figure 40 show indicative distributions of each of the parameters if downstream works described above were undertaken. Figure 38 indicates that expected velocities will be consistent and less than recommended maximum velocities. Figure 39 indicates that average/median Shear forces are under the design threshold with River Stations 456 and 680 being outliers, although 680 is not an outlier at high flows. Froude Numbers are all low.

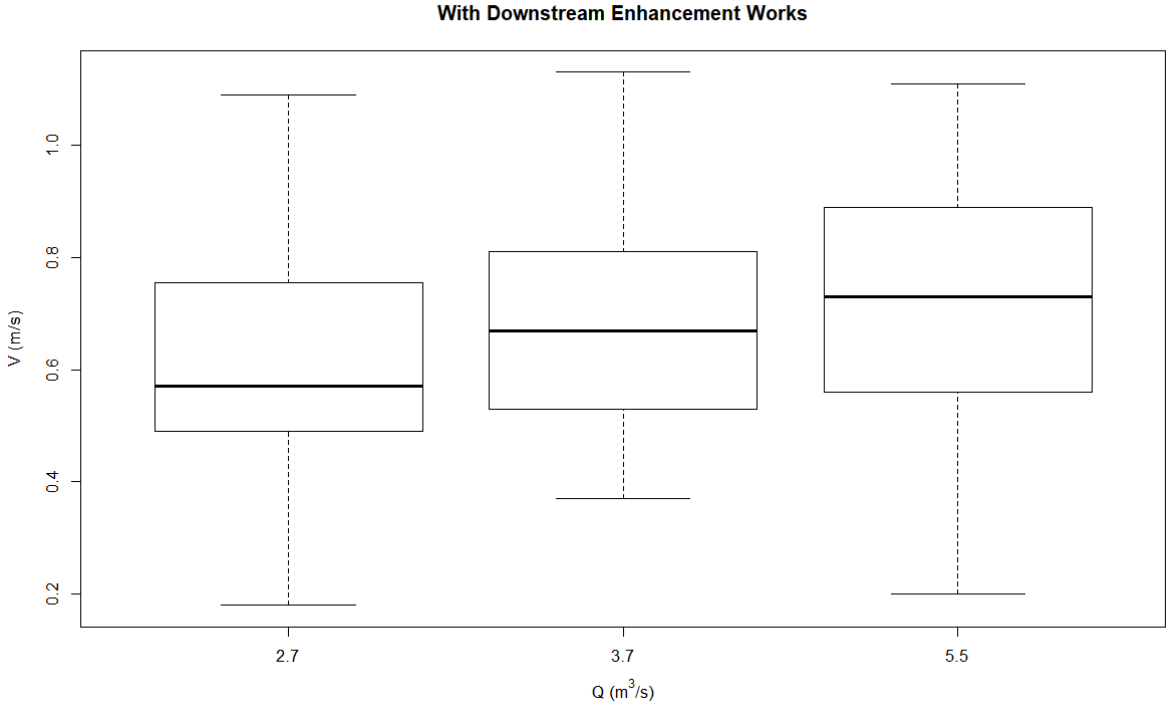

Figure 38: Downstream Works – Velocity Box Plot

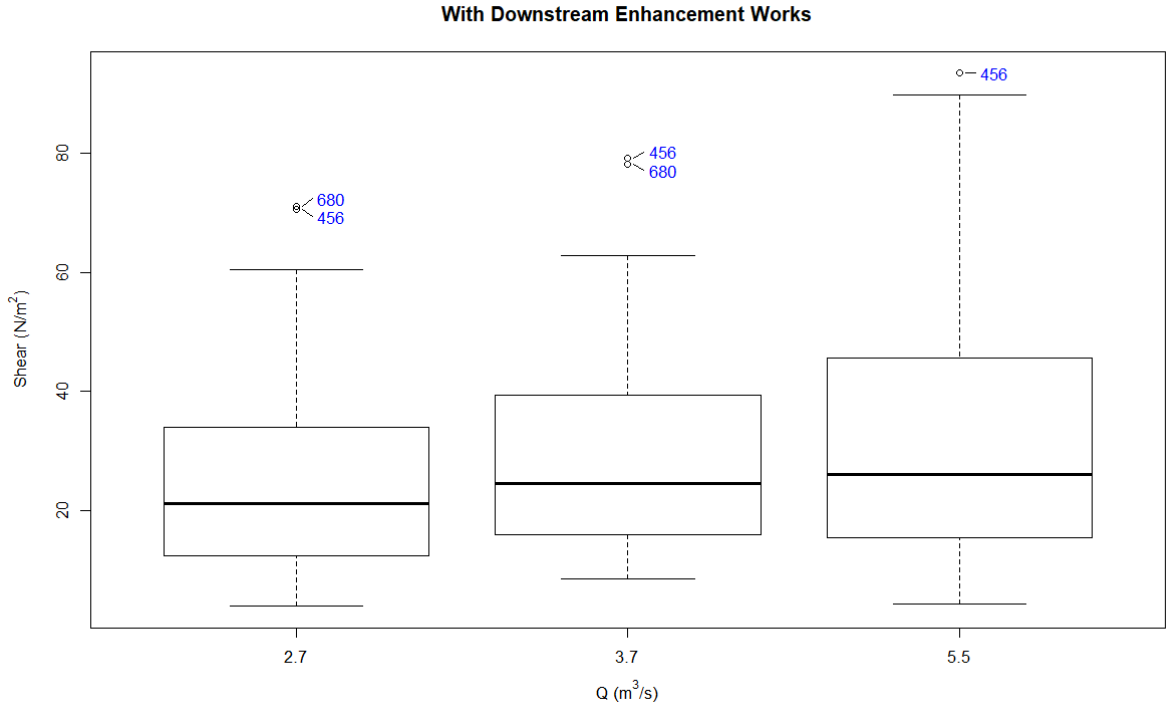

Figure 39: Downstream Works – Shear Stress Box Plot

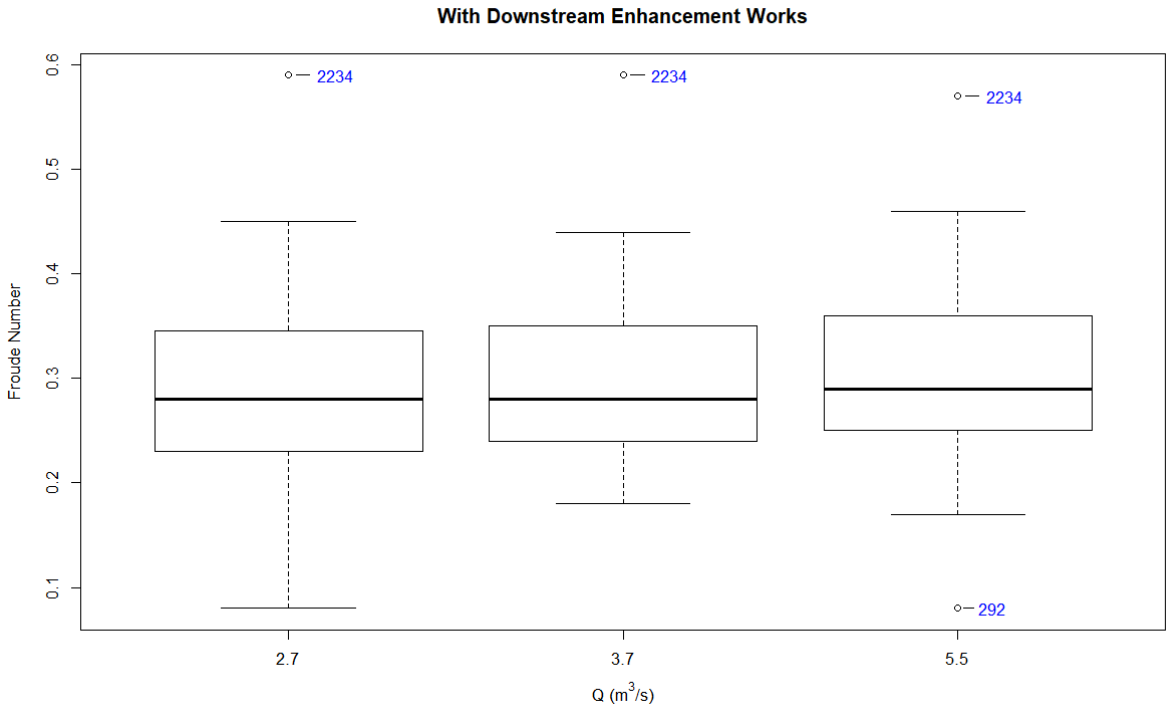

Figure 40: Downstream Works – Froude Number Box Plot

The main section not meeting hydraulic design criteria was between Chainage 50m and 180m, which exceeded the shear stress value of 33 N/m². This section of stream has a steeper gradient of 0.93% than elsewhere resulting in higher shear stresses.

With reference to Auckland Regional Council 'Erosion Parameters for Cohesive Sediment in Auckland Streams', critical shear stress values for streams are dependent on particle size distribution of the underlaying material. It is recommended that geotechnical sampling and testing, specifically particle size distribution (PSD) tests, be undertaken to inform any downstream stream works.

It is expected that a combination of PSD test results will allow for the shear stress hydraulic design criteria to be refined for actual site conditions. Stream design features can then be developed to be meet shear stress design criteria.

Statistical Analysis

An Analysis of Variation (*Anova*) was undertaken as per methodology in Section 9.6. Anova results have been included within following table (Table 32).

Table 32: Downstream Works Anova Results

Variable	F-Ratio	$F_{critical}$	Sum of Squares (Between Group Variability)	Sum of Squares (Within Group Variability)	n^2
Water Level	0.16	3.080	0.76	262	0.29%
Velocity	2.89		0.24	4.56	5.2%
Shear Stress	1.31		974	41307	2.4%
Froude	0.16		0.003	1.01	0.3%

All calculated F-Ratio values were less than $F_{critical}$, indicating statistically the three flow scenarios do not differ significantly.

Statistically, given the proposed downstream enhancement works on the Ohote Stream, flow rates over 2.7 m^3/s up to 5.5m^3/s discharged through the Exelby Road culvert (PPC and ICMP areas) would not be expected to increase the impact of stream erosion.

Summary

The hydraulic modelling and statistical analysis showed that the Exelby Road culvert could be lowered to reduce earthworks, when erosion mitigation measures were applied to downstream properties.

However, these downstream works would be within properties not within the PPC area and/or ICMP area. GSCL would be required to reach agreements with the property owners to undertake the works.

Notwithstanding potential access issues there were information gaps within the hydraulic modelling, specifically regarding topography in the area identified in Figure 23, for which additional investigation was recommended. The erosion potential, particularly critical shear stress, would require further quantification through stream bed testing to ascertain the grain size/soil type.

While there are hydraulic benefits to the PPC area and ICMP area from lowering the culvert and providing stream mitigation works, there are also a number of risks that need to be addressed (property owner consultation, topography survey, soil testing). Consultation, surveying and testing should be undertaken as part of future Resource Consenting to determine if the hydraulic benefits can be realised.

Until the risks above have been addressed the limiting discharge from the PPC area and ICMP area would be 0.7m^3/s as per the existing Rotokauri ICMP.

11.9 Recommendations

If additional discharge from the PPC/ICMP area above the Existing Development value (0.7m^3/s) were to be considered then the following are recommended:

- A detailed topographic survey of the Ohote Stream down stream of Exelby Road to confirm stream alignment, cross sectional shape, and grade.
- Grain size/soil testing to estimate critical shear stress for the Ohote Stream, i.e., what is the streams critical shear stress that activates erosion.
- Consultation with downstream property owners so as to determine likelihood of undertaking erosion mitigation measures for catchment wide benefit.

12.0 CONCLUSION

Stormwater within the Plan Change area and sub-catchment ICMP area will be managed through a water sensitive design philosophy and a suite of stormwater management measures that can be used to comply with Hamilton City Council and Waikato Regional Council retention, detention, and quality requirements within the public and private realms. The selection of a precise treatment train to meet these requirements will be determined at the subdivision consent stage.

The stormwater conveyance network and associated water quality devices were shown to manage the additional runoff from increased impervious surfaces while also marching the maximum Existing Development flows specifically for the 1%AEP_{cc} rainfall. With reference to the investigations and analyses undertaken in the Rotokauri North Private Plan Change: Catchment Modelling Report (Rudsits, 2019b), further work was recommended to refine the maximum Existing Development value.

Modelling of the Ohote stream downstream of Exelby Road has shown that given the data and model there is no significant change in erosion potential for flows between 2.7 m^3/s and 5.5 m^3/s. However, there were a number of risks identified with the modelling that should be addressed as part of future Resource Consenting investigations. Investigation of these risks should be undertaken to determine if there would be any adverse effects from increasing discharge rate above the Existing Development value.

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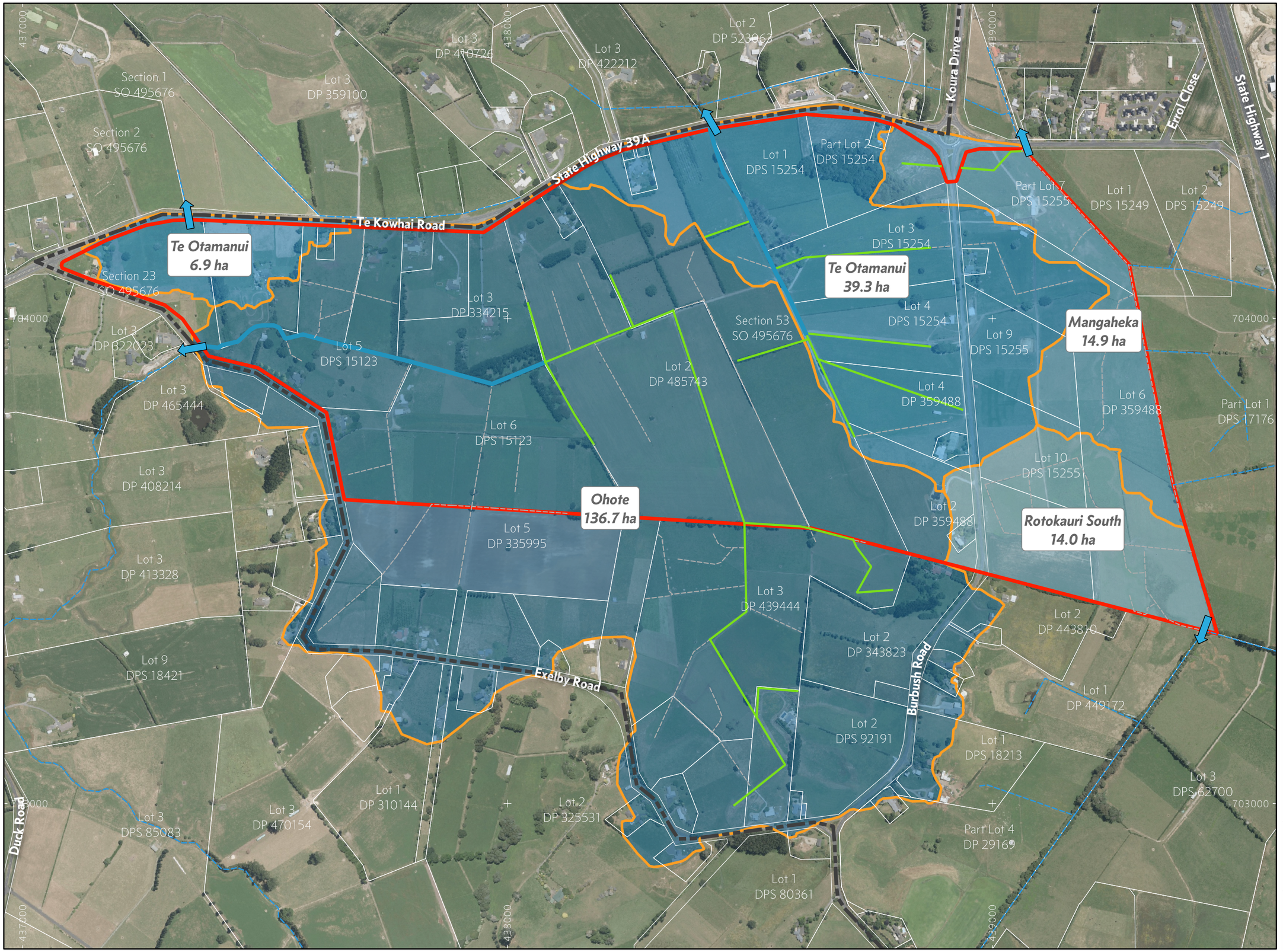
APPENDIX A – CATCHMENT EXTENT PLANS



N

Legend

- Rotokauri North PPC Area
- WDC/HCC TA Boundary

Existing Catchments

- Ohote
- Te Otamanui
- Mangaheka
- Rotokauri South

Watercourses

- Modified
- Artificial
- Other Artificial
- Watercourse outside RN PCC Area

Catchment In/Out Flows

- Outlet

Data License:
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Map Projection:
NZGD2000 / Mount Eden 2000 (EPSG: 2105)

Drawn By:	AJSH	Date: 17/12/2018	Signed:
Checked By:		Date:	Signed:
Approved By:		Date:	Signed:
Plot Date:	28/04/2019		

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Project:
Rotokauri North
Private Plan Change (PPC)
Green Seed Consultants Limited

Title:
Existing Catchment Boundaries and Watercourses

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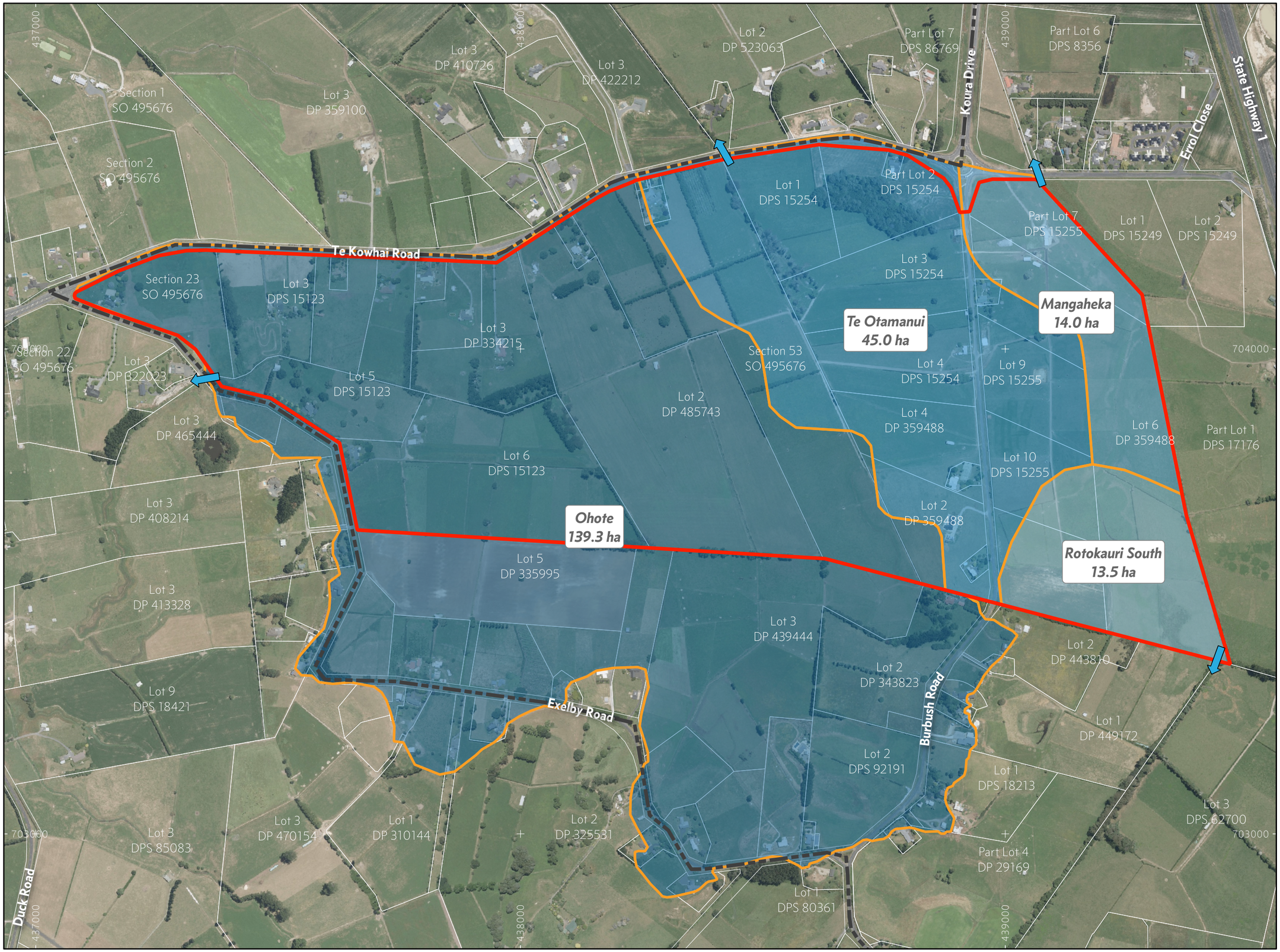
Issue Status:	For Information
Project Number:	1693-0
Drawing Number:	030
Revision:	F
A3 Scale:	1:7500



N

Legend

- Rotokauri North PPC
- WDC/HCC TA Boundary

Indicative Future Catchments

- Ohote
- Te Otamanui
- Mangaheka
- Rotokauri South

Catchment In/Out Flows

- Outlet

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Rotokauri North
Private Plan Change (PPC)
Green Seed Consultants Limited

Title:
Proposed Catchment Boundaries

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Drawing Number:	031
Revision:	F
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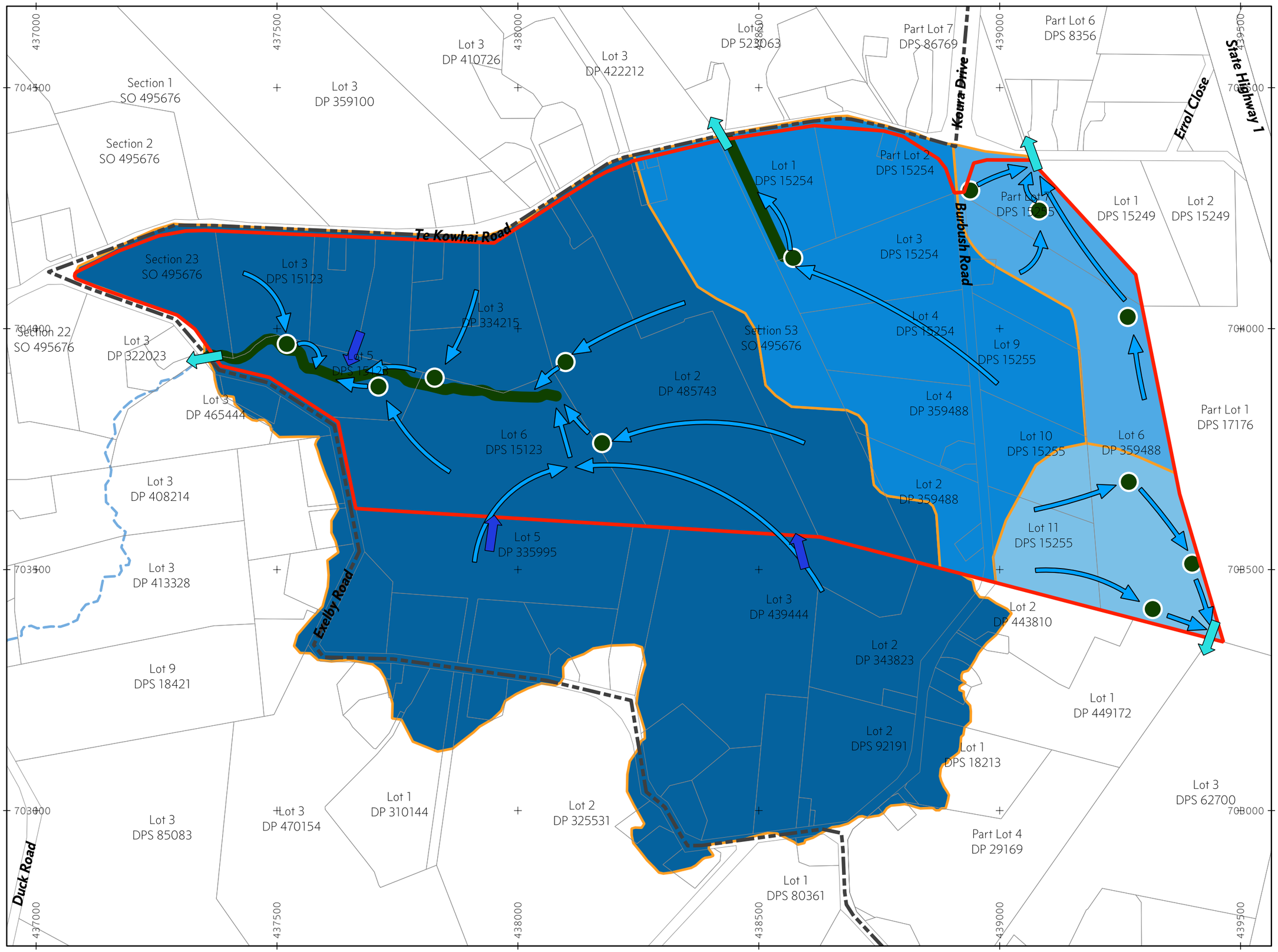
APPENDIX B – PRIMARY NETWORK





Legend

- Rotokauri North PPC Area
- WDC/HCC TA Boundary
- Indicative Wetland Inlet

Catchment in/Out Flows

- Inflow
- Outflow
- Stormwater Network

Swales

- Stormwater Stream
- Ohote Stream

Indicative Future Catchments

- Ohote
- Te Otamanui
- Mangaheka
- Rotokauri South

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Project:
Rotokauri North
Private Plan Change (PPC)
Green Seed Consultants Limited

Title:
Subcatchments with Indicative Swales and Wetland Locations

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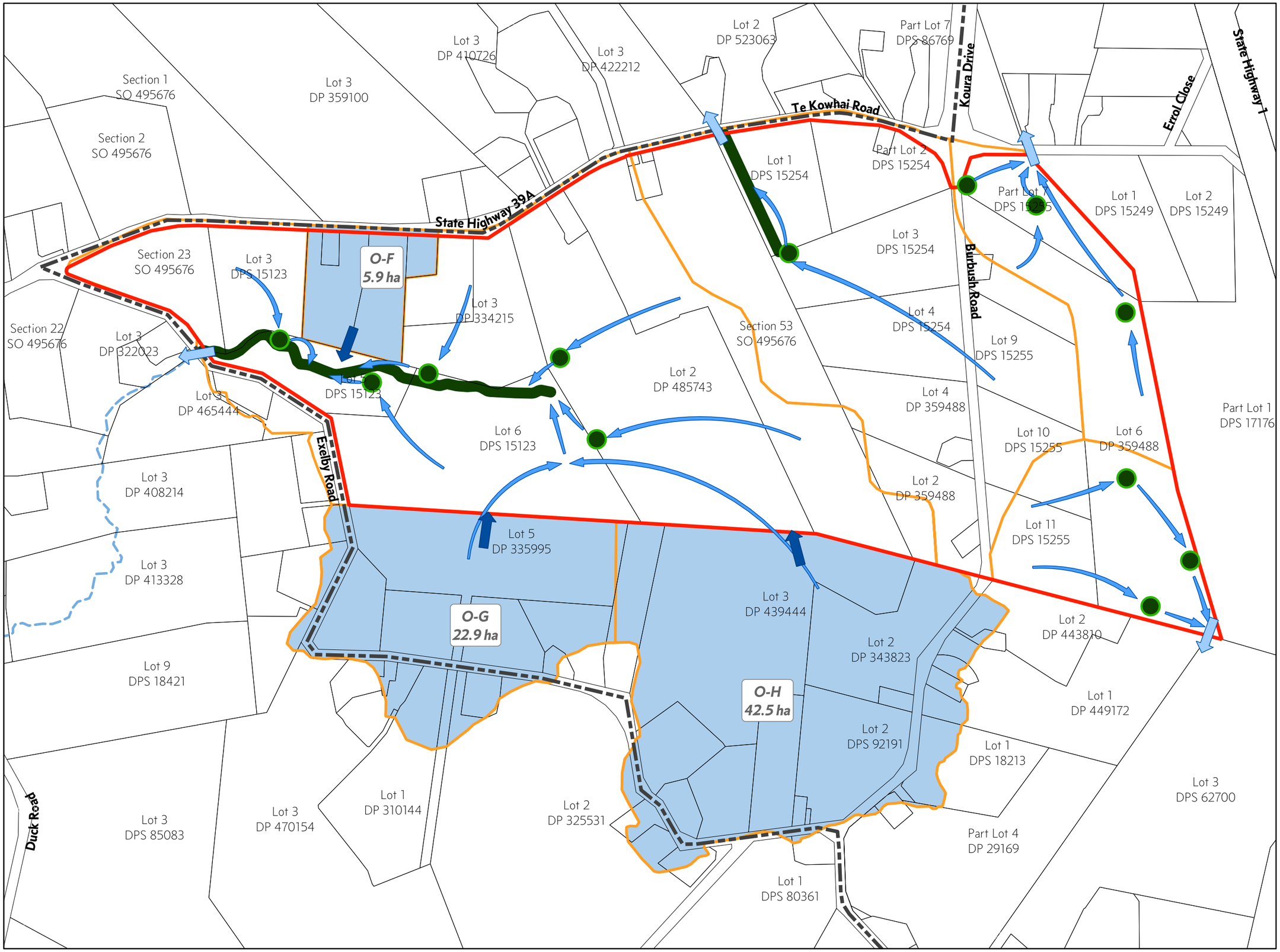
Issue Status:	For Information
Project Number:	1693-0
Drawing Number:	032
Revision:	G
A3 Scale:	1:7500



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Project:
Rotokauri North
Private Plan Change (PPC)
Green Seed Consultants Limited

Title:
Upstream Ohote Catchments to be managed by others

McKENZIE&CO CONSULTANTS LTD

Issue Status:	For Information
Project Number:	1693-0
Drawing Number:	033
Revision:	F
A3 Scale:	1:7500

APPENDIX C – WETLAND DESIGN

1693 Wetland Summary **27/11/2018**

Notes

1 Fall through wetland system is 1.8m, refer drawing 1693-0-908.

Wetland	WQV (m3)	EDV (m3)	Culvert Level	Drop to culvert (m)	Detention base RL	Outlet pipe fall (m)	Out Pool base RL	NWL	EDL	Inflow channel base RL	Channel depth
Ohote A	2216	5014	26.4	0.4	26.8	0.3	27.1	28.6	29.1	28.6	0.5
Ohote B	2559	5788	26.4	0.7	27.1	0.3	27.4	28.9	29.4	28.9	0.5
Ohote C	208	472	26.4	0.3	26.7	0.3	27.0	28.5	29.0	28.5	0.5
Ohote D	1176	2660	26.4	0.1	26.5	0.3	26.8	28.3	28.8	28.3	0.5
Ohote E	994	2248	26.4	0.0	26.4	0.3	26.7	28.2	28.7	28.2	0.5
Te Otamanui	4869	11014	28	0.0	28	0.3	28.3	29.8	30.3	29.8	0.5
Mangaheka A	222	503	28	0.0	28	0.3	28.3	29.8	30.3	29.8	1.1
Mangaheka B	567	1284	28	0.0	28	0.3	28.3	29.8	30.3	29.8	1.1
Mangaheka C	684	1547	28	0.2	28.2	0.3	28.5	30.0	30.5	30.0	1.1
Rotokauri A	304	687	29.5	0.3	29.8	0.3	30.1	31.6	32.1	31.6	0.2
Rotokauri B	113	256	29.5	0.1	29.6	0.3	29.9	31.4	31.9	31.4	1.0
Rotokauri C	115	261	29.5	0.0	29.5	0.3	29.8	31.3	31.8	31.3	1.1

McKENZIE&Co CONSULTANTS LTD

TP10 WETLAND DESIGN CALCULATIONS

PROJECT: Rotokauri BY: BH DATE: 29 November 2018

LOCATION: Rotokauri Checked:

Catchment: Ohote Point A

1 - WATER QUALITY AND EXTENDED DETENTION CALCULATIONS

Calculated in accordance with TP10, chapters 3 and 5

Total Area 177520 % Imp. 80 % Per. 20

Cover Description (cover type, treatment, and hydraulic condition)	Area (m2)	Curve number (CN)*	Product of CN x Area	Chapter 3, TP10: 2 year rainfall Figure A.1	Sd (MM)	Ia (MM)	Storage S (MM)	Runoff depth (MM)	Water Quality Runoff Volume (m3)	Chapter 5, TP10: ED depth (MM)	Runoff Depth (ED) (MM)	ED Vol (m3)
Catchment A - Pervious	35504	74	2627296	70.3	23.4	0	89.2	4.9	173.0	34.5	9.6	342
- Impervious	142016	98	13917568	70.3	23.4	5	5.2	14.4	2043.2	34.5	25.1	3563
Catchment B - Pervious	0	74	0	70.3	23.4	0	89.2	4.9	0.0	34.5	9.6	0
- Impervious	0	98	0	70.3	23.4	5	5.2	14.4	0.0	34.5	25.1	0
Subtotal	177520											
Totals	177520											
Total Area	**177520**							Total WQ Vol	**2216**	subtotal ED Vol		3905

2 - WETLAND POND VOLUME CALCULATIONS

WQV	2216	m3
extended detention reqd?	Yes	
subtotal ED volume	3905	m3
50 % reduction in WQV	1109	m3
Total vol ED reqd	**5014**	m3
forebay size 15% of WQV	332	m3
forebay depth	1.5	m
forebay area	222	m2

2 - WETLAND POND AREA CALCULATIONS

Assume banded wetland			% of area	Area (m2)	Avg Depth (m)	Volume (m3)	
Proposed Wetland area	4625.0	m2					
PSZ Macrophyte zone 0m - 0.2m deep from NWL			40%	1850	0.1	185	
PSZ Macrophyte zone 0.2m - 0.35m deep from NWL			40%	1850	0.275	509	
PSZ Inlet Pool 0.35m - 1.2m deep from NWL			10%	462.5	0.775	358	
PSZ Outlet Pool 0.35m - 1.5m deep from NWL			10%	462.5	0.925	428	
Total PSZ						1480	Greater than 1109 m3, OK

Check PSZ * 0.75 > WQV * 0.50 1110 m3 Greater than 1109 m3, OK

NWL Dimensions @ 5:1	L		W		=	0	m2	Less than 4625 m2, TOO SMALL
NWL Dimensions @ 8:1	L	193	W	24	=	4632	m2	Greater than 4625 m2, OK

3 - OUTLET CONTROL - ED

3.1 Extended detention outlet

EDV 5014 m3

Qi 0.059 m3/s over 24 hrs

Max release rate

2 x Qi 0.118 m3/s At full EDV, max release rate is 2Qi

Assumed orifice outlet

Q =0.62*A*(2*g*h)^.5

Outlet Dia. 0.26 m

ED 0.50

h 0.37

ED Area **10028** m2

Q = 0.089 m3/s OK

Slot ED outlet

Q = 1.7 W D ^1.5

weir width 0.099 m

h	**Q**
0	0
0.0500	0.0019
0.1000	0.0053
0.1500	0.0098
0.2000	0.0151
0.2500	0.0210
0.3000	0.0277
0.3500	0.0348
0.4000	0.0426
0.4500	0.0508
0.5000	0.0595

= 0.059

McKENZIE&CO CONSULTANTS LTD

TP10 WETLAND DESIGN CALCULATIONS

PROJECT: Rotokauri BY: BH DATE: 29 November 2018

LOCATION: Rotokauri Checked:

Catchment: Ohote Point B

1 - WATER QUALITY AND EXTENDED DETENTION CALCULATIONS

Calculated in accordance with TP10, chapters 3 and 5

Total Area 204940 % Imp. 80 % Per. 20

				Chapter 3, TP10						Chapter 5, TP10		
Cover Description (cover type, treatment, and hydraulic condition)	Area (m2)	Curve number (CN)*	Product of CN x Area	2 year rainfall Figure A.1	Sd (MM)	Ia (MM)	Storage S (MM)	Runoff depth (MM)	Water Quality Runoff Volume (m3)	ED depth (MM)	Runoff Depth (ED) (MM)	ED Vol (m3)
Catchment A - Pervious	40988	74	3033112	70.3	23.4	0	89.2	4.9	199.8	34.5	9.6	394
- Impervious	163952	98	16067296	70.3	23.4	5	5.2	14.4	2358.8	34.5	25.1	4114
Catchment B - Pervious	0	74	0	70.3	23.4	0	89.2	4.9	0.0	34.5	9.6	0
- Impervious	0	98	0	70.3	23.4	5	5.2	14.4	0.0	34.5	25.1	0
Subtotal	204940											
Totals	204940											
Total Area	**204940**							Total WQ Vol	**2559**	subtotal ED Vol		4508

2 - WETLAND POND VOLUME CALCULATIONS

WQV	2559	m3
extended detention reqd?	Yes	
subtotal ED volume	4508	m3
50 % reduction in WQV	1280	m3
Total vol ED reqd	**5788**	m3
forebay size 15% of WQV	384	m3
forebay depth	1.5	m
forebay area	256	m2

2 - WETLAND POND AREA CALCULATIONS

Assume banded wetland			% of area	Area (m2)	Avg Depth (m)	Volume (m3)	
Proposed Wetland area	5334.0	m2					
PSZ Macrophyte zone 0m - 0.2m deep from NWL			40%	2133.6	0.1	213	
PSZ Macrophyte zone 0.2m - 0.35m deep from NWL			40%	2133.6	0.275	587	
PSZ Inlet Pool 0.35m - 1.2m deep from NWL			10%	533.4	0.775	413	
PSZ Outlet Pool 0.35m - 1.5m deep from NWL			10%	533.4	0.925	493	
Total PSZ						1707	Greater than 1280 m3, OK

Check PSZ * 0.75 > WQV * 0.50 1280 m3 Greater than 1280 m3, OK

NWL Dimensions @ 5:1	L		W		=	0 m2	Less than 5334 m2, TOO SMALL
NWL Dimensions @ 8:1	L	178	W	30	=	5340 m2	Greater than 5334 m2, OK

3 - OUTLET CONTROL - ED

3.1 Extended detention outlet

EDV 5788 m3

Qi 0.067 m3/s over 24 hrs

Max release rate

2 x Qi 0.134 m3/s At full EDV, max release rate is 2Qi

Assumed orifice outlet

Q =0.62*A*(2*g*h)^.5

Outlet Dia. 0.28 m

ED 0.50

h 0.36

ED Area **11576** m2

Q = 0.101 m3/s OK

Slot ED outlet

Q = 1.7 W D ^1.5

weir width 0.112 m

h	**Q**		
0	0		
0.0500	0.0021		
0.1000	0.0060		
0.1500	0.0111		
0.2000	0.0170		
0.2500	0.0238		
0.3000	0.0313		
0.3500	0.0394		
0.4000	0.0482		
0.4500	0.0575		
0.5000	0.0673	=	0.067

McKENZIE&CO CONSULTANTS LTD

TP10 WETLAND DESIGN CALCULATIONS

PROJECT: Rotokauri BY: BH DATE: 29 November 2018

LOCATION: Rotokauri Checked:

Catchment: Ohote Point C

1 - WATER QUALITY AND EXTENDED DETENTION CALCULATIONS

Calculated in accordance with TP10, chapters 3 and 5

Total Area 16670 % Imp. 80 % Per. 20

Cover Description (cover type, treatment, and hydraulic condition)	Area (m2)	Curve number (CN)*	Product of CN x Area	Chapter 3, TP10: 2 year rainfall Figure A.1	Sd (MM)	Ia (MM)	Storage S (MM)	Runoff depth (MM)	Water Quality Runoff Volume (m3)	Chapter 5, TP10: ED depth (MM)	Runoff Depth (ED) (MM)	ED Vol (m3)
Catchment A - Pervious	3334	74	246716	70.3	23.4	0	89.2	4.9	16.2	34.5	9.6	32
- Impervious	13336	98	1306928	70.3	23.4	5	5.2	14.4	191.9	34.5	25.1	335
Catchment B - Pervious	0	74	0	70.3	23.4	0	89.2	4.9	0.0	34.5	9.6	0
- Impervious	0	98	0	70.3	23.4	5	5.2	14.4	0.0	34.5	25.1	0
Subtotal	16670											
Totals	16670											
Total Area	**16670**							Total WQ Vol	**208**	subtotal ED Vol		367

2 - WETLAND POND VOLUME CALCULATIONS

WQV	208	m3
extended detention reqd?	Yes	
subtotal ED volume	367	m3
50 % reduction in WQV	105	m3
Total vol ED reqd	**472**	m3
forebay size 15% of WQV	31	m3
forebay depth	1.5	m
forebay area	21	m2

2 - WETLAND POND AREA CALCULATIONS

Assume banded wetland			% of area	Area (m2)	Avg Depth (m)	Volume (m3)	
Proposed Wetland area	438.0	m2					
PSZ Macrophyte zone 0m - 0.2m deep from NWL			40%	175.2	0.1	18	
PSZ Macrophyte zone 0.2m - 0.35m deep from NWL			40%	175.2	0.275	48	
PSZ Inlet Pool 0.35m - 1.2m deep from NWL			10%	43.8	0.775	34	
PSZ Outlet Pool 0.35m - 1.5m deep from NWL			10%	43.8	0.925	41	
Total PSZ						140	Greater than 105 m3, OK

Check PSZ * 0.75 > WQV * 0.50 105 m3 Greater than 105 m3, OK

NWL Dimensions @ 5:1	L		W		=	0	m2	Less than 438 m2, TOO SMALL
NWL Dimensions @ 8:1	L	55	W	8	=	440	m2	Greater than 438 m2, OK

3 - OUTLET CONTROL - ED

3.1 Extended detention outlet

EDV 472 m3

Qi 0.006 m3/s over 24 hrs

Max release rate

2 x Qi 0.012 m3/s At full EDV, max release rate is 2Qi

Assumed orifice outlet

Q =0.62*A*(2*g*h)^.5

Outlet Dia. 0.08 m

ED 0.50

h 0.46

ED Area **943** m2

Q = **0.009 m3/s** **OK**

Slot ED outlet

Q = 1.7 W D ^1.5

weir width 0.01 m

h	**Q**		
0	0		
0.0500	0.0002		
0.1000	0.0005		
0.1500	0.0010		
0.2000	0.0015		
0.2500	0.0021		
0.3000	0.0028		
0.3500	0.0035		
0.4000	0.0043		
0.4500	0.0051		
0.5000	0.0060	=	0.006

McKENZIE&CO CONSULTANTS LTD

TP10 WETLAND DESIGN CALCULATIONS

PROJECT: Rotokauri BY: BH DATE: 29 November 2018

LOCATION: Rotokauri Checked:

Catchment: Ohote Point D

1 - WATER QUALITY AND EXTENDED DETENTION CALCULATIONS

Calculated in accordance with TP10, chapters 3 and 5

Total Area 94190 % Imp. 80 % Per. 20

Cover Description (cover type, treatment, and hydraulic condition)	Area (m2)	Curve number (CN)*	Product of CN x Area	Chapter 3, TP10: 2 year rainfall Figure A.1	Sd (MM)	Ia (MM)	Storage S (MM)	Runoff depth (MM)	Water Quality Runoff Volume (m3)	Chapter 5, TP10: ED depth (MM)	Runoff Depth (ED) (MM)	ED Vol (m3)
Catchment A - Pervious	18838	74	1394012	70.3	23.4	0	89.2	4.9	91.8	34.5	9.6	181
- Impervious	75352	98	7384496	70.3	23.4	5	5.2	14.4	1084.1	34.5	25.1	1891
Catchment B - Pervious	0	74	0	70.3	23.4	0	89.2	4.9	0.0	34.5	9.6	0
- Impervious	0	98	0	70.3	23.4	5	5.2	14.4	0.0	34.5	25.1	0
Subtotal	94190											
Totals	94190											
Total Area	**94190**							Total WQ Vol	**1176**	subtotal ED Vol		2072

2 - WETLAND POND VOLUME CALCULATIONS

WQV	1176	m3
extended detention reqd?	Yes	
subtotal ED volume	2072	m3
50 % reduction in WQV	588	m3
Total vol ED reqd	**2660**	m3
forebay size 15% of WQV	176	m3
forebay depth	1.5	m
forebay area	118	m2

2 - WETLAND POND AREA CALCULATIONS

Assume banded wetland			% of area	Area (m2)	Avg Depth (m)	Volume (m3)	
Proposed Wetland area	2451.0	m2					
PSZ Macrophyte zone 0m - 0.2m deep from NWL			40%	980.4	0.1	98	
PSZ Macrophyte zone 0.2m - 0.35m deep from NWL			40%	980.4	0.275	270	
PSZ Inlet Pool 0.35m - 1.2m deep from NWL			10%	245.1	0.775	190	
PSZ Outlet Pool 0.35m - 1.5m deep from NWL			10%	245.1	0.925	227	
Total PSZ						784	Greater than 588 m3, OK

Check PSZ * 0.75 > WQV * 0.50 588 m3 Greater than 588 m3, OK

NWL Dimensions @ 5:1	L	80	W	17	=	1360	m2	Less than 2451 m2, TOO SMALL
NWL Dimensions @ 8:1	L	104	W	13	=	1352	m2	Less than 2451 m2, TOO SMALL

3 - OUTLET CONTROL - ED

3.1 Extended detention outlet

EDV 2660 m3

Qi 0.031 m3/s over 24 hrs

Max release rate

2 x Qi 0.062 m3/s At full EDV, max release rate is 2Qi

Assumed orifice outlet

Q =0.62*A*(2*g*h)^.5

Outlet Dia. 0.18 m

ED 0.50

h 0.41

ED Area **5320** m2

Q = 0.045 m3/s OK

Slot ED outlet

Q = 1.7 W D ^1.5

weir width 0.052 m

h	Q		
0	0		
0.0500	0.0010		
0.1000	0.0028		
0.1500	0.0051		
0.2000	0.0079		
0.2500	0.0111		
0.3000	0.0145		
0.3500	0.0183		
0.4000	0.0224		
0.4500	0.0267		
0.5000	0.0313	=	0.031

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TP10 WETLAND DESIGN CALCULATIONS

PROJECT: Rotokauri BY: BH DATE: 29 November 2018

LOCATION: Rotokauri Checked:

Catchment: Ohote Point E

1 - WATER QUALITY AND EXTENDED DETENTION CALCULATIONS

Calculated in accordance with TP10, chapters 3 and 5

Total Area 79590 % Imp. 80 % Per. 20

Cover Description (cover type, treatment, and hydraulic condition)	Area (m2)	Curve number (CN)*	Product of CN x Area	Chapter 3, TP10: 2 year rainfall Figure A.1	Sd (MM)	Ia (MM)	Storage S (MM)	Runoff depth (MM)	Water Quality Runoff Volume (m3)	Chapter 5, TP10: ED depth (MM)	Runoff Depth (ED) (MM)	ED Vol (m3)
Catchment A - Pervious	15918	74	1177932	70.3	23.4	0	89.2	4.9	77.6	34.5	9.6	153
- Impervious	63672	98	6239856	70.3	23.4	5	5.2	14.4	916.1	34.5	25.1	1598
Catchment B - Pervious	0	74	0	70.3	23.4	0	89.2	4.9	0.0	34.5	9.6	0
- Impervious	0	98	0	70.3	23.4	5	5.2	14.4	0.0	34.5	25.1	0
Subtotal	79590											
Totals	79590											
Total Area	**79590**							Total WQ Vol	**994**	subtotal ED Vol		1751

2 - WETLAND POND VOLUME CALCULATIONS

WQV	994	m3
extended detention reqd?	Yes	
subtotal ED volume	1751	m3
50 % reduction in WQV	497	m3
Total vol ED reqd	**2248**	m3
forebay size 15% of WQV	149	m3
forebay depth	1.5	m
forebay area	99	m2

2 - WETLAND POND AREA CALCULATIONS

Assume banded wetland			% of area	Area (m2)	Avg Depth (m)	Volume (m3)
Proposed Wetland area	2071.0	m2				
PSZ Macrophyte zone 0m - 0.2m deep from NWL			40%	828.4	0.1	83
PSZ Macrophyte zone 0.2m - 0.35m deep from NWL			40%	828.4	0.275	228
PSZ Inlet Pool 0.35m - 1.2m deep from NWL			10%	207.1	0.775	161
PSZ Outlet Pool 0.35m - 1.5m deep from NWL			10%	207.1	0.925	192
Total PSZ						663

Greater than 497 m3, OK

Check PSZ * 0.75 > WQV * 0.50 497 m3 Greater than 497 m3, OK

NWL Dimensions @ 5:1	L		W		=	0	m2	Less than 2071 m2, TOO SMALL
NWL Dimensions @ 8:1	L	130	W	17	=	2210	m2	Greater than 2071 m2, OK

3 - OUTLET CONTROL - ED

3.1 Extended detention outlet

EDV 2248 m3

Qi 0.027 m3/s over 24 hrs

Max release rate

2 x Qi 0.054 m3/s At full EDV, max release rate is 2Qi

Assumed orifice outlet

Q =0.62*A*(2*g*h)^.5

Outlet Dia. 0.17 m

ED 0.50

h 0.42

ED Area **4495** m2

Q = 0.040 m3/s OK

Slot ED outlet

Q = 1.7 W D ^1.5

weir width 0.045 m

h	Q		
0	0		
0.0500	0.0009		
0.1000	0.0024		
0.1500	0.0044		
0.2000	0.0068		
0.2500	0.0096		
0.3000	0.0126		
0.3500	0.0158		
0.4000	0.0194		
0.4500	0.0231		
0.5000	0.0270	=	0.027

McKENZIE&CO CONSULTANTS LTD

TP10 WETLAND DESIGN CALCULATIONS

PROJECT: Rotokauri BY: BH DATE: 29 November 2018

LOCATION: Rotokauri Checked:

Catchment: Mangaheka Point A

1 - WATER QUALITY AND EXTENDED DETENTION CALCULATIONS

Calculated in accordance with TP10, chapters 3 and 5

Total Area 390000 % Imp. 80 % Per. 20

				Chapter 3, TP10						Chapter 5, TP10		
Cover Description (cover type, treatment, and hydraulic condition)	Area (m2)	Curve number (CN)*	Product of CN x Area	2 year rainfall Figure A.1	Sd (MM)	Ia (MM)	Storage S (MM)	Runoff depth (MM)	Water Quality Runoff Volume (m3)	ED depth (MM)	Runoff Depth (ED) (MM)	ED Vol (m3)
Catchment A - Pervious	78000	74	5772000	70.3	23.4	0	89.2	4.9	380.1	34.5	9.6	750
- Impervious	312000	98	30576000	70.3	23.4	5	5.2	14.4	4488.9	34.5	25.1	7828
Catchment B - Pervious	0	74	0	70.3	23.4	0	89.2	4.9	0.0	34.5	9.6	0
- Impervious	0	98	0	70.3	23.4	5	5.2	14.4	0.0	34.5	25.1	0
Subtotal	390000											
Totals	390000											
Total Area	**390000**							Total WQ Vol	**4869**	subtotal ED Vol		8579

2 - WETLAND POND VOLUME CALCULATIONS

WQV	4869	m3
extended detention reqd?	Yes	
subtotal ED volume	8579	m3
50 % reduction in WQV	2435	m3
Total vol ED reqd	**11014**	m3
forebay size 15% of WQV	730	m3
forebay depth	1.5	m
forebay area	487	m2

2 - WETLAND POND AREA CALCULATIONS

Assume banded wetland			% of area	Area (m2)	Avg Depth (m)	Volume (m3)	
Proposed Wetland area	10150.0	m2					
PSZ Macrophyte zone 0m - 0.2m deep from NWL			40%	4060	0.1	406	
PSZ Macrophyte zone 0.2m - 0.35m deep from NWL			40%	4060	0.275	1117	
PSZ Inlet Pool 0.35m - 1.2m deep from NWL			10%	1015	0.775	787	
PSZ Outlet Pool 0.35m - 1.5m deep from NWL			10%	1015	0.925	939	
Total PSZ						3248	Greater than 2435 m3, OK

Check PSZ * 0.75 > WQV * 0.50 2436 m3 Greater than 2435 m3, OK

NWL Dimensions @ 5:1	L	205	W	50	=	10250	m2	Greater than 10150 m2, OK
NWL Dimensions @ 8:1	L		W		=	0	m2	Less than 10150 m2, TOO SMALL

3 - OUTLET CONTROL - ED

3.1 Extended detention outlet

EDV 11014 m3

Qi 0.128 m3/s over 24 hrs

Max release rate

2 x Qi 0.256 m3/s At full EDV, max release rate is 2Qi

Assumed orifice outlet

Q =0.62*A*(2*g*h)^.5

Outlet Dia. 0.3 m

ED 0.50

h 0.35

ED Area **22027** m2

Q = 0.115 m3/s OK

Slot ED outlet

Q = 1.7 W D ^1.5

weir width 0.213 m

h	Q		
0	0		
0.0500	0.0040		
0.1000	0.0115		
0.1500	0.0210		
0.2000	0.0324		
0.2500	0.0453		
0.3000	0.0595		
0.3500	0.0750		
0.4000	0.0916		
0.4500	0.1093		
0.5000	0.1280	=	0.128

McKENZIE&CO CONSULTANTS LTD

TP10 WETLAND DESIGN CALCULATIONS

PROJECT: Rotokauri BY: BH DATE: 29 November 2018

LOCATION: Rotokauri Checked:

Catchment: Mangaheka Point A

1 - WATER QUALITY AND EXTENDED DETENTION CALCULATIONS

Calculated in accordance with TP10, chapters 3 and 5

Total Area 17790 % Imp. 80 % Per. 20

Cover Description (cover type, treatment, and hydraulic condition)	Area (m2)	Curve number (CN)*	Product of CN x Area	Chapter 3, TP10: 2 year rainfall Figure A.1	Sd (MM)	Ia (MM)	Storage S (MM)	Runoff depth (MM)	Water Quality Runoff Volume (m3)	Chapter 5, TP10: ED depth (MM)	Runoff Depth (ED) (MM)	ED Vol (m3)
Catchment A - Pervious	3558	74	263292	70.3	23.4	0	89.2	4.9	17.3	34.5	9.6	34
- Impervious	14232	98	1394736	70.3	23.4	5	5.2	14.4	204.8	34.5	25.1	357
Catchment B - Pervious	0	74	0	70.3	23.4	0	89.2	4.9	0.0	34.5	9.6	0
- Impervious	0	98	0	70.3	23.4	5	5.2	14.4	0.0	34.5	25.1	0
Subtotal	17790											
Totals	17790											
Total Area	**17790**							Total WQ Vol	**222**	subtotal ED Vol		391

2 - WETLAND POND VOLUME CALCULATIONS

WQV	222	m3
extended detention reqd?	Yes	
subtotal ED volume	391	m3
50 % reduction in WQV	112	m3
Total vol ED reqd	**503**	m3
forebay size 15% of WQV	33	m3
forebay depth	1.5	m
forebay area	22	m2

2 - WETLAND POND AREA CALCULATIONS

Assume banded wetland			% of area	Area (m2)	Avg Depth (m)	Volume (m3)	
Proposed Wetland area	467.0	m2					
PSZ Macrophyte zone 0m - 0.2m deep from NWL			40%	186.8	0.1	19	
PSZ Macrophyte zone 0.2m - 0.35m deep from NWL			40%	186.8	0.275	51	
PSZ Inlet Pool 0.35m - 1.2m deep from NWL			10%	46.7	0.775	36	
PSZ Outlet Pool 0.35m - 1.5m deep from NWL			10%	46.7	0.925	43	
Total PSZ						149	Greater than 112 m3, OK

Check PSZ * 0.75 > WQV * 0.50 112 m3 Greater than 112 m3, OK

NWL Dimensions @ 5:1	L		W		=	0	m2	Less than 467 m2, TOO SMALL
NWL Dimensions @ 8:1	L	59	W	8	=	472	m2	Greater than 467 m2, OK

3 - OUTLET CONTROL - ED

3.1 Extended detention outlet

EDV 503 m3

Qi 0.006 m3/s over 24 hrs

Max release rate

2 x Qi 0.012 m3/s At full EDV, max release rate is 2Qi

Assumed orifice outlet

Q =0.62*A*(2*g*h)^.5

Outlet Dia. 0.05 m

ED 0.50

h 0.48

ED Area **1007** m2

Q = 0.004 m3/s OK

Slot ED outlet

Q = 1.7 W D ^1.5

weir width 0.01 m

h	Q		
0	0		
0.0500	0.0002		
0.1000	0.0005		
0.1500	0.0010		
0.2000	0.0015		
0.2500	0.0021		
0.3000	0.0028		
0.3500	0.0035		
0.4000	0.0043		
0.4500	0.0051		
0.5000	0.0060	=	0.006

McKENZIE&CO CONSULTANTS LTD

TP10 WETLAND DESIGN CALCULATIONS

PROJECT: Rotokauri BY: BH DATE: 29 November 2018

LOCATION: Rotokauri Checked:

Catchment: Mangaheka Point B

1 - WATER QUALITY AND EXTENDED DETENTION CALCULATIONS

Calculated in accordance with TP10, chapters 3 and 5

Total Area 45450 % Imp. 80 % Per. 20

				Chapter 3, TP10						Chapter 5, TP10		
Cover Description (cover type, treatment, and hydraulic condition)	Area (m2)	Curve number (CN)*	Product of CN x Area	2 year rainfall Figure A.1	Sd (MM)	Ia (MM)	Storage S (MM)	Runoff depth (MM)	Water Quality Runoff Volume (m3)	ED depth (MM)	Runoff Depth (ED) (MM)	ED Vol (m3)
Catchment A - Pervious	9090	74	672660	70.3	23.4	0	89.2	4.9	44.3	34.5	9.6	87
- Impervious	36360	98	3563280	70.3	23.4	5	5.2	14.4	523.1	34.5	25.1	912
Catchment B - Pervious	0	74	0	70.3	23.4	0	89.2	4.9	0.0	34.5	9.6	0
- Impervious	0	98	0	70.3	23.4	5	5.2	14.4	0.0	34.5	25.1	0
Subtotal	45450											
Totals	45450											
Total Area	**45450**							Total WQ Vol	**567**	subtotal ED Vol		1000

2 - WETLAND POND VOLUME CALCULATIONS

WQV	567	m3
extended detention reqd?	Yes	
subtotal ED volume	1000	m3
50 % reduction in WQV	284	m3
Total vol ED reqd	**1284**	m3
forebay size 15% of WQV	85	m3
forebay depth	1.5	m
forebay area	57	m2

2 - WETLAND POND AREA CALCULATIONS

Assume banded wetland			% of area	Area (m2)	Avg Depth (m)	Volume (m3)	
Proposed Wetland area	1184.0	m2					
PSZ Macrophyte zone 0m - 0.2m deep from NWL			40%	473.6	0.1	47	
PSZ Macrophyte zone 0.2m - 0.35m deep from NWL			40%	473.6	0.275	130	
PSZ Inlet Pool 0.35m - 1.2m deep from NWL			10%	118.4	0.775	92	
PSZ Outlet Pool 0.35m - 1.5m deep from NWL			10%	118.4	0.925	110	
Total PSZ						379	Greater than 284 m3, OK

Check PSZ * 0.75 > WQV * 0.50 284 m3 Greater than 284 m3, OK

NWL Dimensions @ 5:1	L	75	W	16	=	1200	m2	Greater than 1184 m2, OK
NWL Dimensions @ 8:1	L		W		=	0	m2	Less than 1184 m2, TOO SMALL

3 - OUTLET CONTROL - ED

3.1 Extended detention outlet

EDV 1284 m3

Qi 0.015 m3/s over 24 hrs

Max release rate

2 x Qi 0.030 m3/s At full EDV, max release rate is 2Qi

Assumed orifice outlet

Q =0.62*A*(2*g*h)^.5

Outlet Dia. 0.05 m

ED 0.50

h 0.48

ED Area **2567** m2

Q = 0.004 m3/s OK

Slot ED outlet

Q = 1.7 W D ^1.5

weir width 0.025 m

h	**Q**
0	0
0.0500	0.0005
0.1000	0.0013
0.1500	0.0025
0.2000	0.0038
0.2500	0.0053
0.3000	0.0070
0.3500	0.0088
0.4000	0.0108
0.4500	0.0128
0.5000	0.0150

= 0.015

McKENZIE&CO CONSULTANTS LTD

TP10 WETLAND DESIGN CALCULATIONS

PROJECT: Rotokauri BY: BH DATE: 29 November 2018

LOCATION: Rotokauri Checked:

Catchment: Mangaheka Point C

1 - WATER QUALITY AND EXTENDED DETENTION CALCULATIONS

Calculated in accordance with TP10, chapters 3 and 5

Total Area 54770 % Imp. 80 % Per. 20

				Chapter 3, TP10						Chapter 5, TP10		
Cover Description (cover type, treatment, and hydraulic condition)	Area (m2)	Curve number (CN)*	Product of CN x Area	2 year rainfall Figure A.1	Sd (MM)	Ia (MM)	Storage S (MM)	Runoff depth (MM)	Water Quality Runoff Volume (m3)	ED depth (MM)	Runoff Depth (ED) (MM)	ED Vol (m3)
Catchment A - Pervious	10954	74	810596	70.3	23.4	0	89.2	4.9	53.4	34.5	9.6	105
- Impervious	43816	98	4293968	70.3	23.4	5	5.2	14.4	630.4	34.5	25.1	1099
Catchment B - Pervious	0	74	0	70.3	23.4	0	89.2	4.9	0.0	34.5	9.6	0
- Impervious	0	98	0	70.3	23.4	5	5.2	14.4	0.0	34.5	25.1	0
Subtotal	54770											
Totals	54770											
Total Area	**54770**							Total WQ Vol	**684**	subtotal ED Vol		1205

2 - WETLAND POND VOLUME CALCULATIONS

WQV	684	m3
extended detention reqd?	Yes	
subtotal ED volume	1205	m3
50 % reduction in WQV	342	m3
Total vol ED reqd	**1547**	m3
forebay size 15% of WQV	103	m3
forebay depth	1.5	m
forebay area	68	m2

2 - WETLAND POND AREA CALCULATIONS

Assume banded wetland			% of area	Area (m2)	Avg Depth (m)	Volume (m3)	
Proposed Wetland area	1426.0	m2					
PSZ Macrophyte zone 0m - 0.2m deep from NWL			40%	570.4	0.1	57	
PSZ Macrophyte zone 0.2m - 0.35m deep from NWL			40%	570.4	0.275	157	
PSZ Inlet Pool 0.35m - 1.2m deep from NWL			10%	142.6	0.775	111	
PSZ Outlet Pool 0.35m - 1.5m deep from NWL			10%	142.6	0.925	132	
Total PSZ						456	Greater than 342 m3, OK

Check PSZ * 0.75 > WQV * 0.50 342 m3 Greater than 342 m3, OK

NWL Dimensions @ 5:1	L		W		=	0 m2	Less than 1426 m2, TOO SMALL
NWL Dimensions @ 8:1	L	158	W	20	=	3160 m2	Greater than 1426 m2, OK

3 - OUTLET CONTROL - ED

3.1 Extended detention outlet

EDV 1547 m3

Qi 0.018 m3/s over 24 hrs

Max release rate

2 x Qi 0.036 m3/s At full EDV, max release rate is 2Qi

Assumed orifice outlet

Q =0.62*A*(2*g*h)^.5

Outlet Dia. 0.05 m

ED 0.50

h 0.48

ED Area **3094** m2

Q = 0.004 m3/s OK

Slot ED outlet

Q = 1.7 W D ^1.5

weir width 0.03 m

h	Q		
0	0		
0.0500	0.0006		
0.1000	0.0016		
0.1500	0.0030		
0.2000	0.0046		
0.2500	0.0064		
0.3000	0.0084		
0.3500	0.0106		
0.4000	0.0129		
0.4500	0.0154		
0.5000	0.0180	=	0.018

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TP10 WETLAND DESIGN CALCULATIONS

PROJECT: Rotokauri BY: BH DATE: 29 November 2018

LOCATION: Rotokauri Checked:

Catchment: Rotokauri Point A

1 - WATER QUALITY AND EXTENDED DETENTION CALCULATIONS

Calculated in accordance with TP10, chapters 3 and 5

Total Area 24340 % Imp. 80 % Per. 20

				Chapter 3, TP10						Chapter 5, TP10		
Cover Description (cover type, treatment, and hydraulic condition)	Area (m2)	Curve number (CN)*	Product of CN x Area	2 year rainfall Figure A.1	Sd (MM)	Ia (MM)	Storage S (MM)	Runoff depth (MM)	Water Quality Runoff Volume (m3)	ED depth (MM)	Runoff Depth (ED) (MM)	ED Vol (m3)
Catchment A - Pervious	4868	74	360232	70.3	23.4	0	89.2	4.9	23.7	34.5	9.6	47
- Impervious	19472	98	1908256	70.3	23.4	5	5.2	14.4	280.2	34.5	25.1	489
Catchment B - Pervious	0	74	0	70.3	23.4	0	89.2	4.9	0.0	34.5	9.6	0
- Impervious	0	98	0	70.3	23.4	5	5.2	14.4	0.0	34.5	25.1	0
Subtotal	24340											
Totals	24340											
Total Area	**24340**							Total WQ Vol	**304**	subtotal ED Vol		535

2 - WETLAND POND VOLUME CALCULATIONS

WQV	304	m3
extended detention reqd?	Yes	
subtotal ED volume	535	m3
50 % reduction in WQV	152	m3
Total vol ED reqd	**687**	m3
forebay size 15% of WQV	46	m3
forebay depth	1.5	m
forebay area	30	m2

2 - WETLAND POND AREA CALCULATIONS

Assume banded wetland			% of area	Area (m2)	Avg Depth (m)	Volume (m3)
Proposed Wetland area	635.0	m2				
PSZ Macrophyte zone 0m - 0.2m deep from NWL			40%	254	0.1	25
PSZ Macrophyte zone 0.2m - 0.35m deep from NWL			40%	254	0.275	70
PSZ Inlet Pool 0.35m - 1.2m deep from NWL			10%	63.5	0.775	49
PSZ Outlet Pool 0.35m - 1.5m deep from NWL			10%	63.5	0.925	59
Total PSZ						203

Greater than 152 m3, OK

Check PSZ * 0.75 > WQV * 0.50 — 152 m3 — Greater than 152 m3, OK

NWL Dimensions @ 5:1	L		W		=	0	m2	Less than 635 m2, TOO SMALL
NWL Dimensions @ 8:1	L	72	W	9	=	648	m2	Greater than 635 m2, OK

3 - OUTLET CONTROL - ED

3.1 Extended detention outlet

EDV 687 m3

Qi 0.008 m3/s over 24 hrs

Max release rate

2 x Qi 0.016 m3/s At full EDV, max release rate is 2Qi

Assumed orifice outlet

Q =0.62*A*(2*g*h)^.5

Outlet Dia. 0.09 m

ED 0.50

h 0.46

ED Area **1375** m2

Q = 0.012 m3/s OK

Slot ED outlet

Q = 1.7 W D ^1.5

weir width 0.014 m

h	Q		
0	0		
0.0500	0.0003		
0.1000	0.0008		
0.1500	0.0014		
0.2000	0.0021		
0.2500	0.0030		
0.3000	0.0039		
0.3500	0.0049		
0.4000	0.0060		
0.4500	0.0072		
0.5000	0.0084	=	0.008

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TP10 WETLAND DESIGN CALCULATIONS

PROJECT: Rotokauri BY: BH DATE: 29 November 2018

LOCATION: Rotokauri Checked:

Catchment: Rotokauri Point B

1 - WATER QUALITY AND EXTENDED DETENTION CALCULATIONS

Calculated in accordance with TP10, chapters 3 and 5

Total Area 9040 % Imp. 80 % Per. 20

				Chapter 3, TP10						Chapter 5, TP10		
Cover Description (cover type, treatment, and hydraulic condition)	Area (m2)	Curve number (CN)*	Product of CN x Area	2 year rainfall Figure A.1	Sd (MM)	Ia (MM)	Storage S (MM)	Runoff depth (MM)	Water Quality Runoff Volume (m3)	ED depth (MM)	Runoff Depth (ED) (MM)	ED Vol (m3)
Catchment A - Pervious	1808	74	133792	70.3	23.4	0	89.2	4.9	8.8	34.5	9.6	17
- Impervious	7232	98	708736	70.3	23.4	5	5.2	14.4	104.0	34.5	25.1	181
Catchment B - Pervious	0	74	0	70.3	23.4	0	89.2	4.9	0.0	34.5	9.6	0
- Impervious	0	98	0	70.3	23.4	5	5.2	14.4	0.0	34.5	25.1	0
Subtotal	9040											
Totals	9040											
Total Area	**9040**							Total WQ Vol	**113**	subtotal ED Vol		199

2 - WETLAND POND VOLUME CALCULATIONS

WQV	113	m3
extended detention reqd?	Yes	
subtotal ED volume	199	m3
50 % reduction in WQV	57	m3
Total vol ED reqd	**256**	m3
forebay size 15% of WQV	17	m3
forebay depth	1.5	m
forebay area	11	m2

2 - WETLAND POND AREA CALCULATIONS

Assume banded wetland			% of area	Area (m2)	Avg Depth (m)	Volume (m3)	
Proposed Wetland area	240.0	m2					
PSZ Macrophyte zone 0m - 0.2m deep from NWL			40%	96	0.1	10	
PSZ Macrophyte zone 0.2m - 0.35m deep from NWL			40%	96	0.275	26	
PSZ Inlet Pool 0.35m - 1.2m deep from NWL			10%	24	0.775	19	
PSZ Outlet Pool 0.35m - 1.5m deep from NWL			10%	24	0.925	22	
Total PSZ						77	Greater than 57 m3, OK

Check PSZ * 0.75 > WQV * 0.50 58 m3 Greater than 57 m3, OK

NWL Dimensions @ 5:1	L		W		=	0 m2	Less than 240 m2, TOO SMALL
NWL Dimensions @ 8:1	L	42	W	6	=	252 m2	Greater than 240 m2, OK

3 - OUTLET CONTROL - ED

3.1 Extended detention outlet

EDV 256 m3

Qi 0.003 m3/s over 24 hrs

Max release rate

2 x Qi 0.006 m3/s At full EDV, max release rate is 2Qi

Assumed orifice outlet

Q =0.62*A*(2*g*h)^.5

Outlet Dia. 0.05 m

ED 0.50

h 0.48

ED Area **512** m2

Q = 0.004 m3/s OK

Slot ED outlet

Q = 1.7 W D ^1.5

weir width 0.005 m

h	Q		
0	0		
0.0500	0.0001		
0.1000	0.0003		
0.1500	0.0005		
0.2000	0.0008		
0.2500	0.0011		
0.3000	0.0014		
0.3500	0.0018		
0.4000	0.0022		
0.4500	0.0026		
0.5000	0.0030	=	0.003

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TP10 WETLAND DESIGN CALCULATIONS

PROJECT: Rotokauri BY: BH DATE: 29 November 2018

LOCATION: Rotokauri Checked:

Catchment: Rotokauri Point C

1 - WATER QUALITY AND EXTENDED DETENTION CALCULATIONS

Calculated in accordance with TP10, chapters 3 and 5

Total Area 9240 % Imp. 80 % Per. 20

Cover Description (cover type, treatment, and hydraulic condition)	Area (m2)	Curve number (CN)*	Product of CN x Area	Chapter 3, TP10: 2 year rainfall Figure A.1	Sd (MM)	Ia (MM)	Storage S (MM)	Runoff depth (MM)	Water Quality Runoff Volume (m3)	Chapter 5, TP10: ED depth (MM)	Runoff Depth (ED) (MM)	ED Vol (m3)
Catchment A - Pervious	1848	74	136752	70.3	23.4	0	89.2	4.9	9.0	34.5	9.6	18
- Impervious	7392	98	724416	70.3	23.4	5	5.2	14.4	106.4	34.5	25.1	185
Catchment B - Pervious	0	74	0	70.3	23.4	0	89.2	4.9	0.0	34.5	9.6	0
- Impervious	0	98	0	70.3	23.4	5	5.2	14.4	0.0	34.5	25.1	0
Subtotal	9240											
Totals	9240											
Total Area	**9240**							Total WQ Vol	**115**	subtotal ED Vol		203

2 - WETLAND POND VOLUME CALCULATIONS

WQV	115	m3
extended detention reqd?	Yes	
subtotal ED volume	203	m3
50 % reduction in WQV	58	m3
Total vol ED reqd	**261**	m3
forebay size 15% of WQV	17	m3
forebay depth	1.5	m
forebay area	12	m2

2 - WETLAND POND AREA CALCULATIONS

Assume banded wetland			% of area	Area (m2)	Avg Depth (m)	Volume (m3)	
Proposed Wetland area	242.0	m2					
PSZ Macrophyte zone 0m - 0.2m deep from NWL			40%	96.8	0.1	10	
PSZ Macrophyte zone 0.2m - 0.35m deep from NWL			40%	96.8	0.275	27	
PSZ Inlet Pool 0.35m - 1.2m deep from NWL			10%	24.2	0.775	19	
PSZ Outlet Pool 0.35m - 1.5m deep from NWL			10%	24.2	0.925	22	
Total PSZ						77	Greater than 58 m3, OK

Check PSZ * 0.75 > WQV * 0.50 58 m3 Greater than 58 m3, OK

NWL Dimensions @ 5:1	L		W		=	0	m2	Less than 242 m2, TOO SMALL
NWL Dimensions @ 8:1	L	41	W	6	=	246	m2	Greater than 242 m2, OK

3 - OUTLET CONTROL - ED

3.1 Extended detention outlet

EDV 261 m3

Qi 0.004 m3/s over 24 hrs

Max release rate

2 x Qi 0.008 m3/s At full EDV, max release rate is 2Qi

Assumed orifice outlet

Q =0.62*A*(2*g*h)^.5

Outlet Dia. 0.06 m

ED 0.50

h 0.47

ED Area **522** m2

Q = 0.005 m3/s OK

Slot ED outlet

Q = 1.7 W D ^1.5

weir width 0.007 m

h	**Q**
0	0
0.0500	0.0001
0.1000	0.0004
0.1500	0.0007
0.2000	0.0011
0.2500	0.0015
0.3000	0.0020
0.3500	0.0025
0.4000	0.0030
0.4500	0.0036
0.5000	0.0042

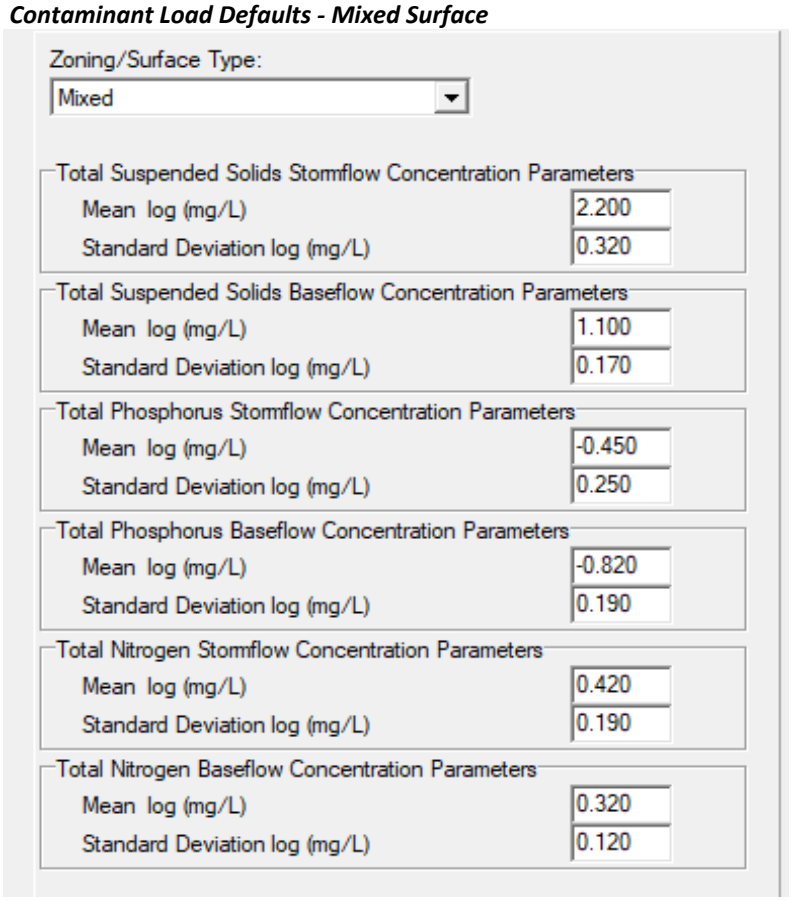
= 0.004

APPENDIX D – DEFAULT MUSIC PARAMETERS

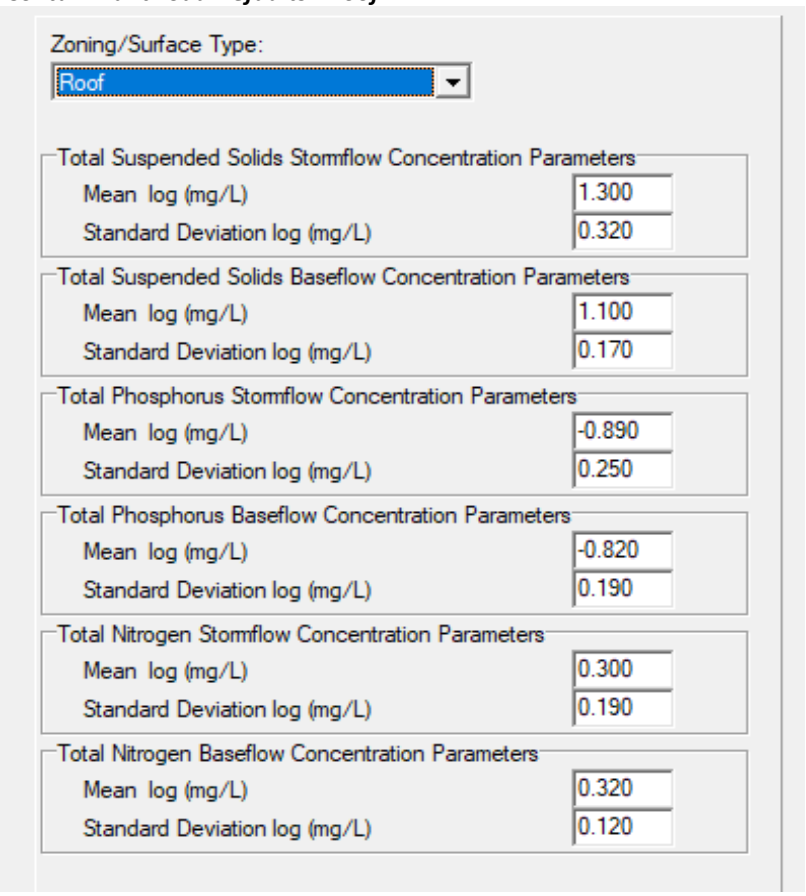
MUSIC - Default Parameters

PROJECT NAME:	Rotokauri North	Created By	BJR	Date	30/11/2018
PROJECT Nos:	1693	Checked By		Date	-

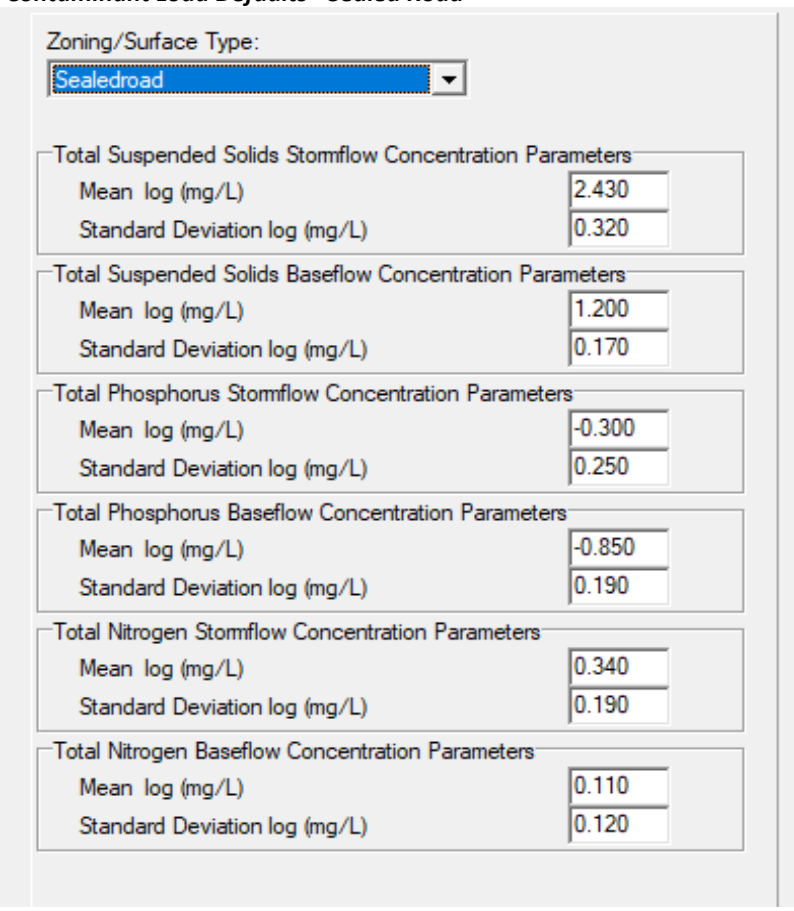
Contaminant Load Defaults - Mixed Surface



Contaminant Load Defaults - Roof



Contaminant Load Defaults - Sealed Road



Rainwater Tank Defaults

Low Flow By-Pass (cubic metres per sec)	0.000
High Flow By-pass (cubic metres per sec)	100.000
Surface Area (square metres)	5.0
Depth above overflow (metres)	0.2
Volume below overflow pipe (kL)	10.0
Overflow Pipe Diameter (mm)	50.0
Orifice Discharge Coefficient	0.60
Number of CSTR Cells	2

	k (m/yr)	C* (mg/L)	C** (mg/L)
Total Suspended Solids	400	12.000	12.000
Total Phosphorus	300	0.130	0.130
Total Nitrogen	40	1.400	1.400

Threshold Hydraulic Loading for C** (m/yr)	0

Swale Defaults

Low Flow By-Pass (cubic metres per sec)			0.000
Length (metres)			100.0
Bed Slope (%)			3.0
Base Width (metres)			1.0
Top Width (metres)			5.0
Depth (metres)			0.50
Vegetation Height (metres)			0.250
Seepage Loss (mm/hr)			0.00
Number of CSTR Cells			10
	k (m/yr)	C* (mg/L)	C** (mg/L)
Total Suspended Solids	8000	20.000	14.000
Total Phosphorus	6000	0.130	0.130
Total Nitrogen	500	1.400	1.400
Threshold Hydraulic Loading for C** (m/yr)			3500

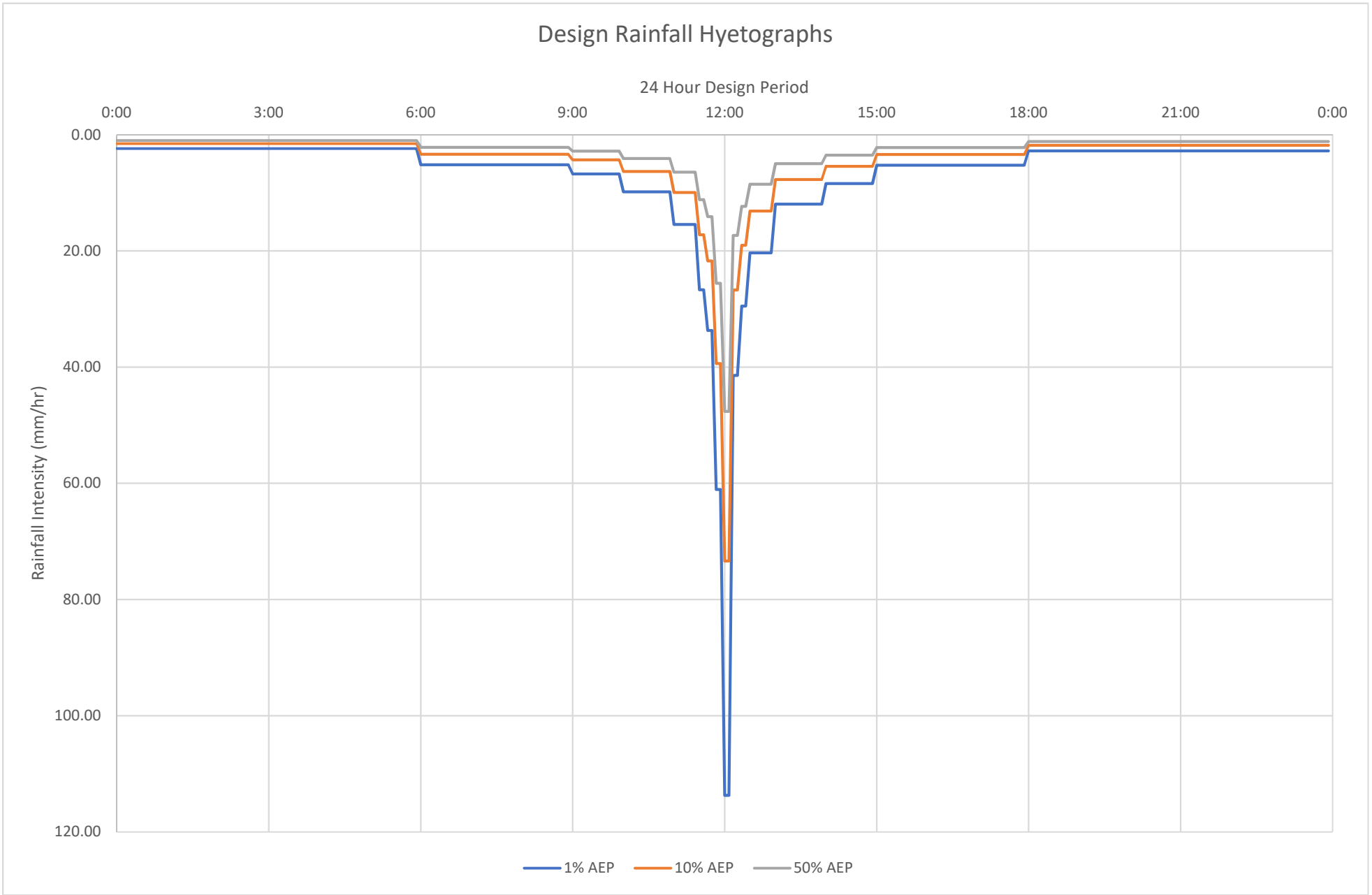
Wetland Defaults

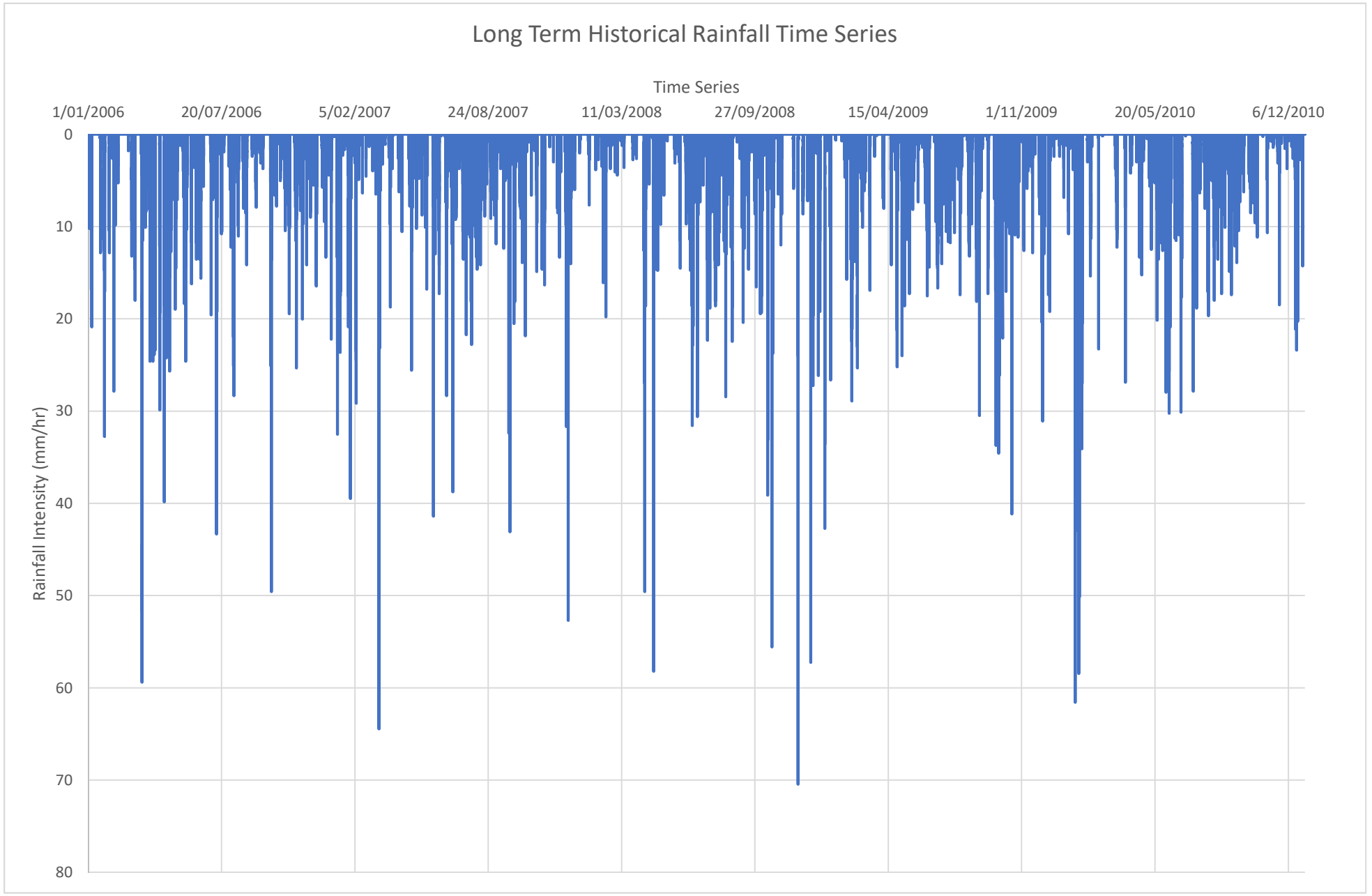
Low Flow By-Pass (cubic metres per sec)	0.000
High Flow By-pass (cubic metres per sec)	100.000
Inlet Pond Volume (cubic metres)	0.0
Surface Area (square metres)	50.0
Extended Detention Depth (metres)	1.0
Permanent Pool Volume (cubic metres)	50.0
Vegetation Cover (% of surface area)	50.0
Seepage Loss (mm/hr)	0.00
Evaporative Loss as % of PET	125.00
Equivalent Pipe Diameter (mm)	200.0
Overflow Weir Width (metres)	3.0
Orifice Discharge Coefficient	0.60
Weir Coefficient	1.70
Number of CSTR Cells	4

	k (m/yr)	C* (mg/L)	C** (mg/L)
Total Suspended Solids	1500	6.000	6.000
Total Phosphorus	1000	0.060	0.060
Total Nitrogen	150	1.000	1.000

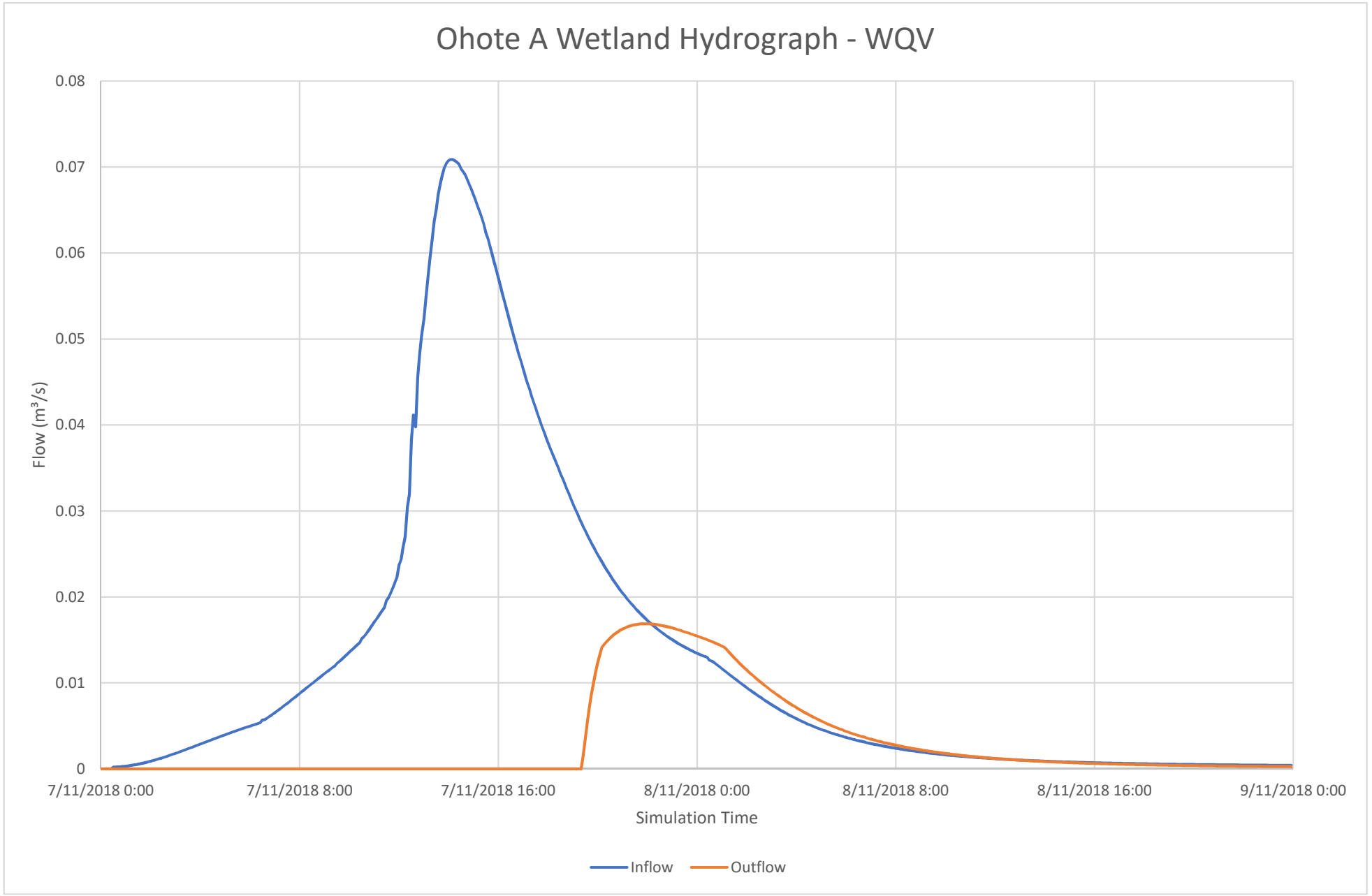
Threshold Hydraulic Loading for C** (m/yr)	3500

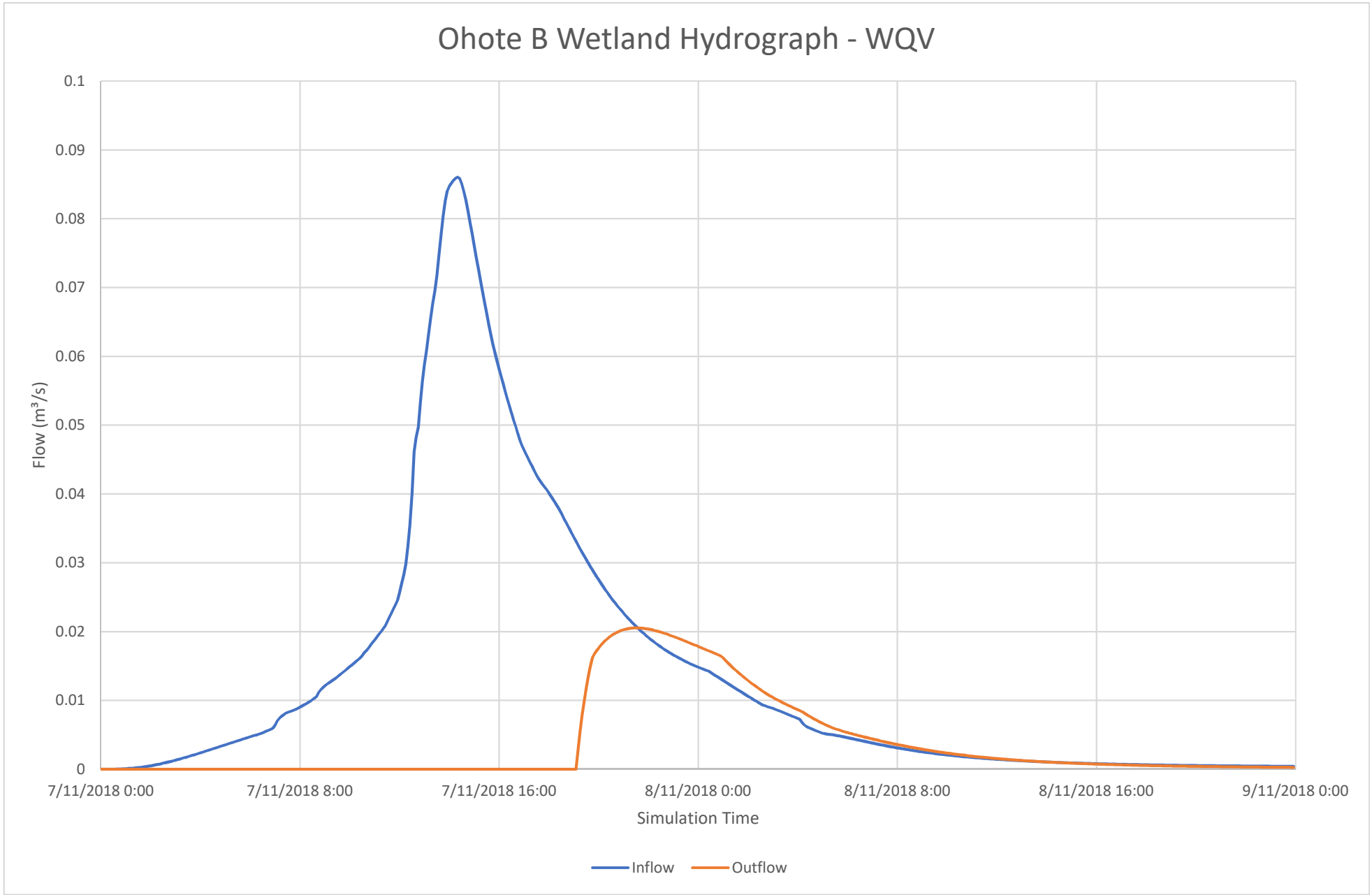
APPENDIX E – DESIGN RAINFALL HYETOGRAPHS

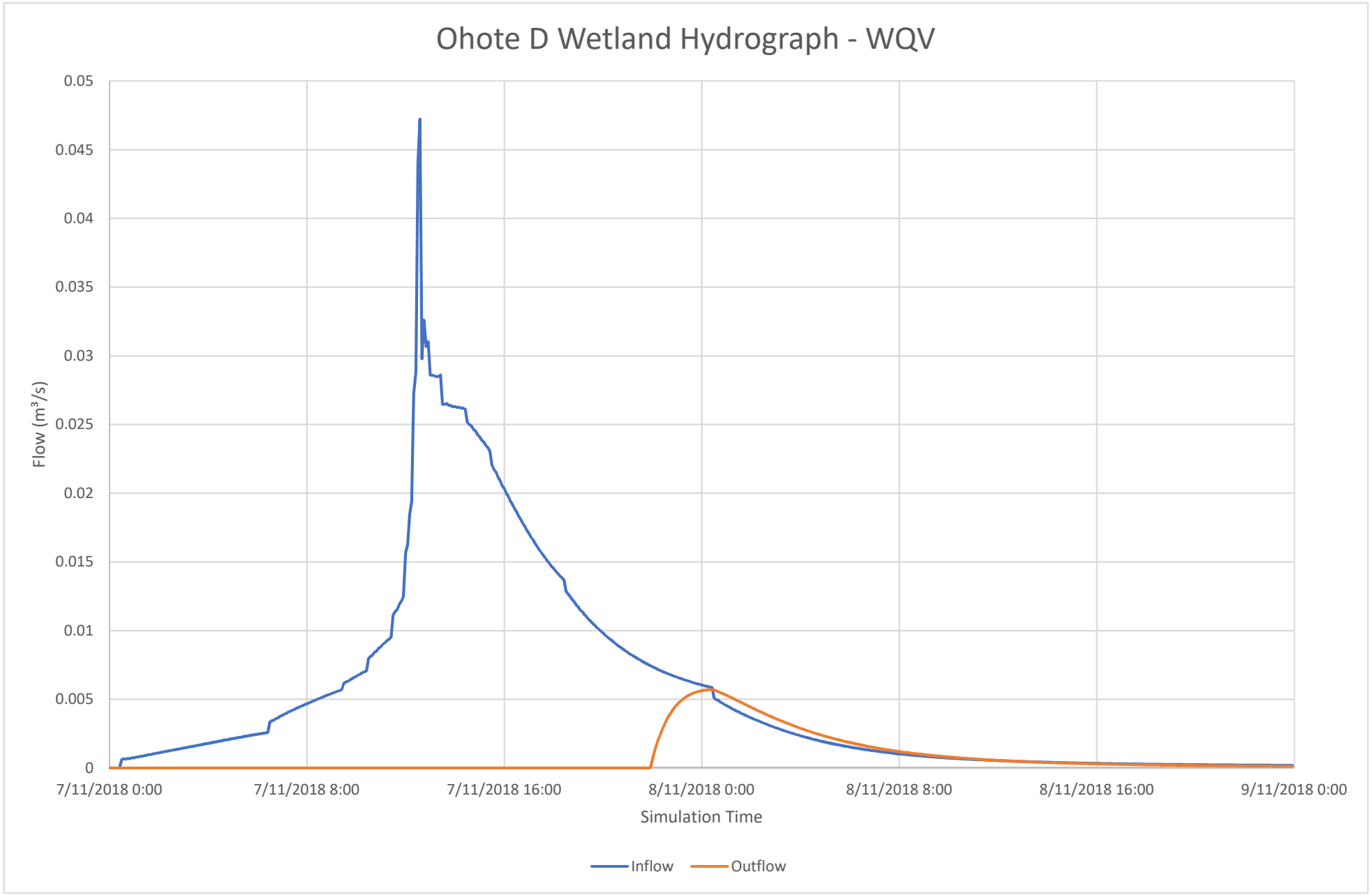

Design Rainfall Hyetographs
24 Hour Design Period
0:00
3:00
6:00
9:00
12:00
15:00
18:00
21:00
0:00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
Rainfall Intensity (mm/hr)
1% AEP
10% AEP
50% AEP

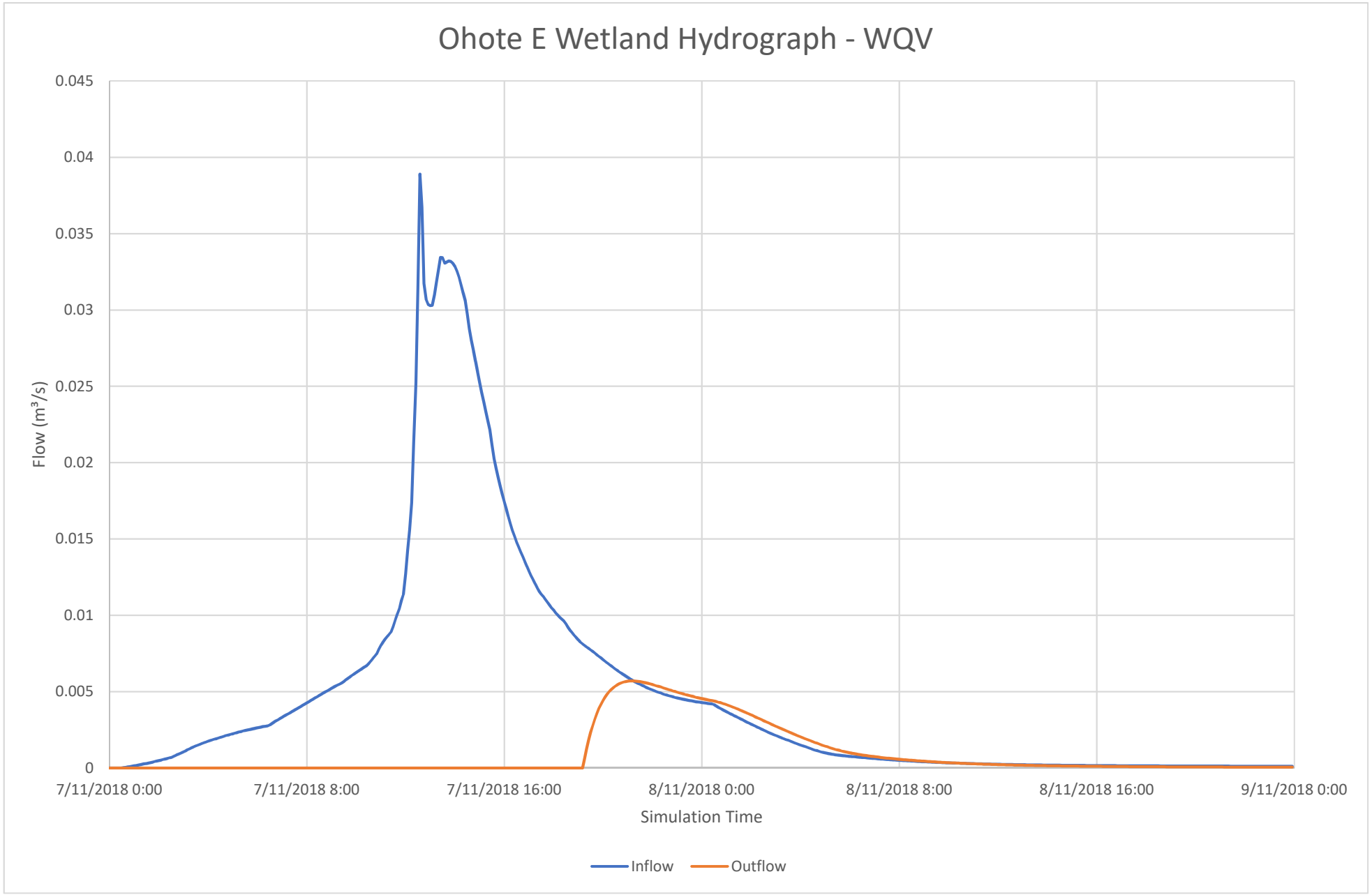

Long Term Historical Rainfall Time Series
Time Series
1/01/2006
20/07/2006
5/02/2007
24/08/2007
11/03/2008
27/09/2008
15/04/2009
1/11/2009
20/05/2010
6/12/2010
Rainfall Intensity (mm/hr)
0
10
20
30
40
50
60
70
80

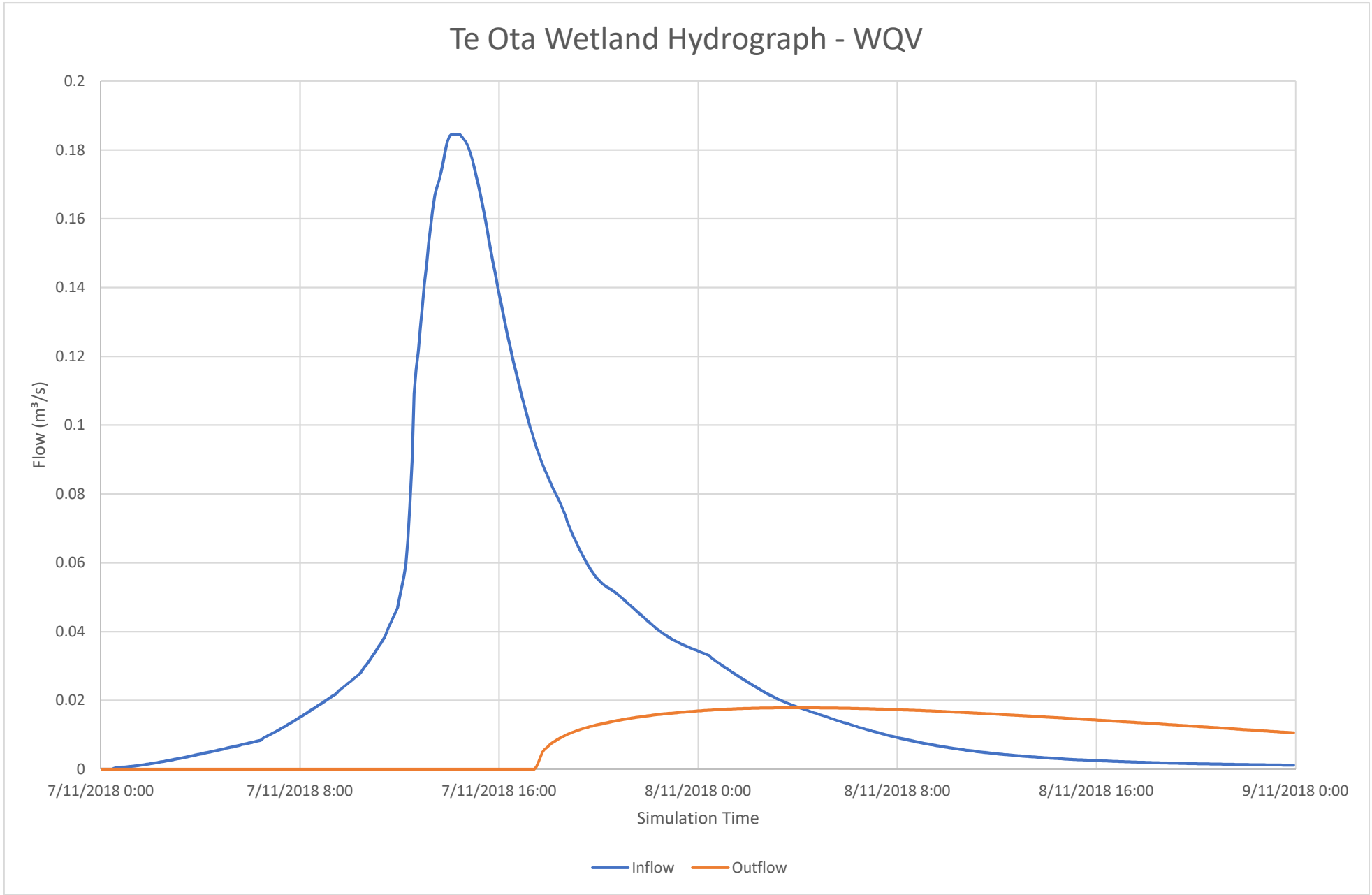
APPENDIX F – WETLAND HYDROGRAPHS

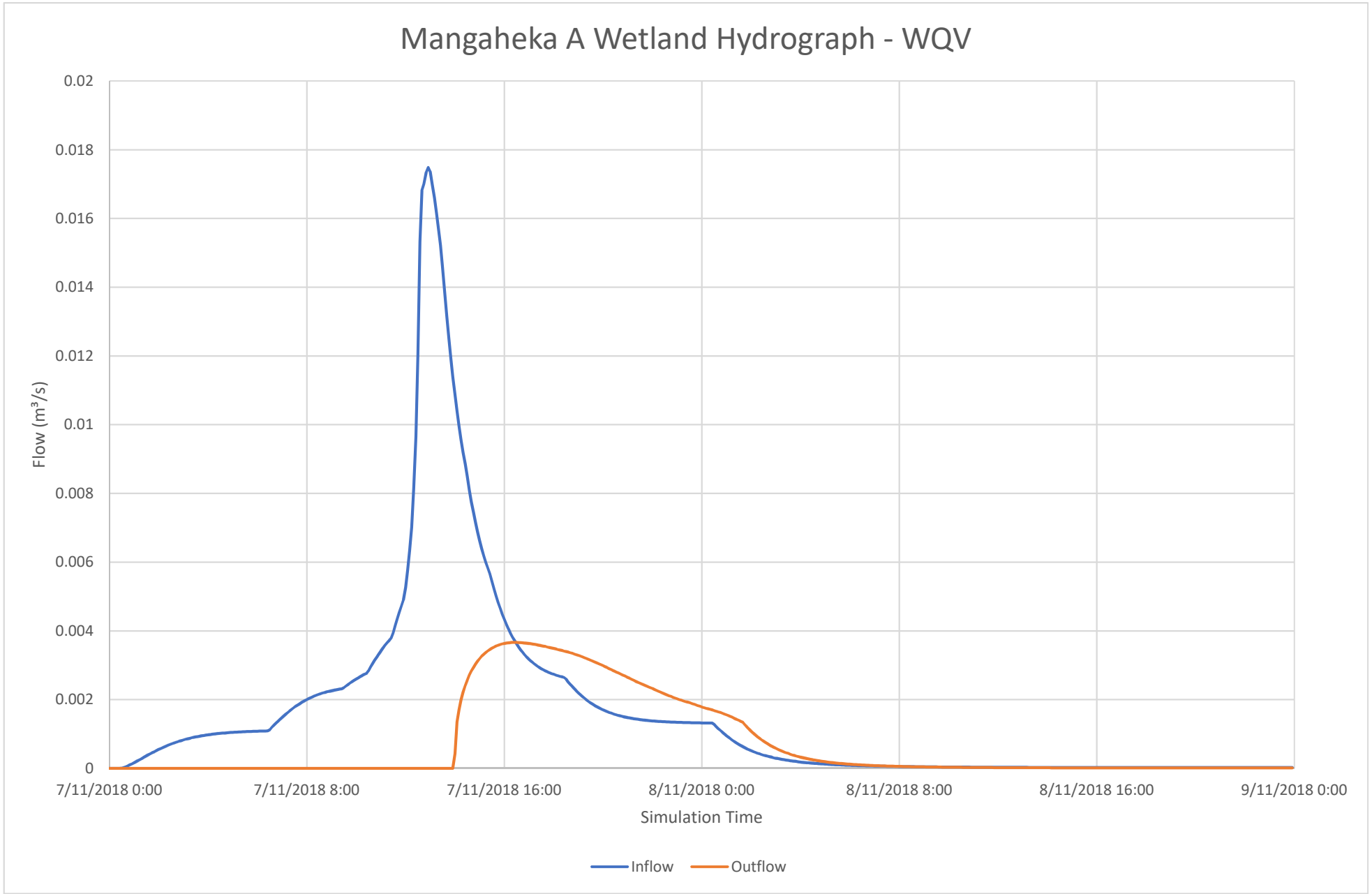

Ohote A Wetland Hydrograph - WQV
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 8:00
7/11/2018 16:00
8/11/2018 0:00
8/11/2018 8:00
8/11/2018 16:00
9/11/2018 0:00
Simulation Time
Inflow
Outflow

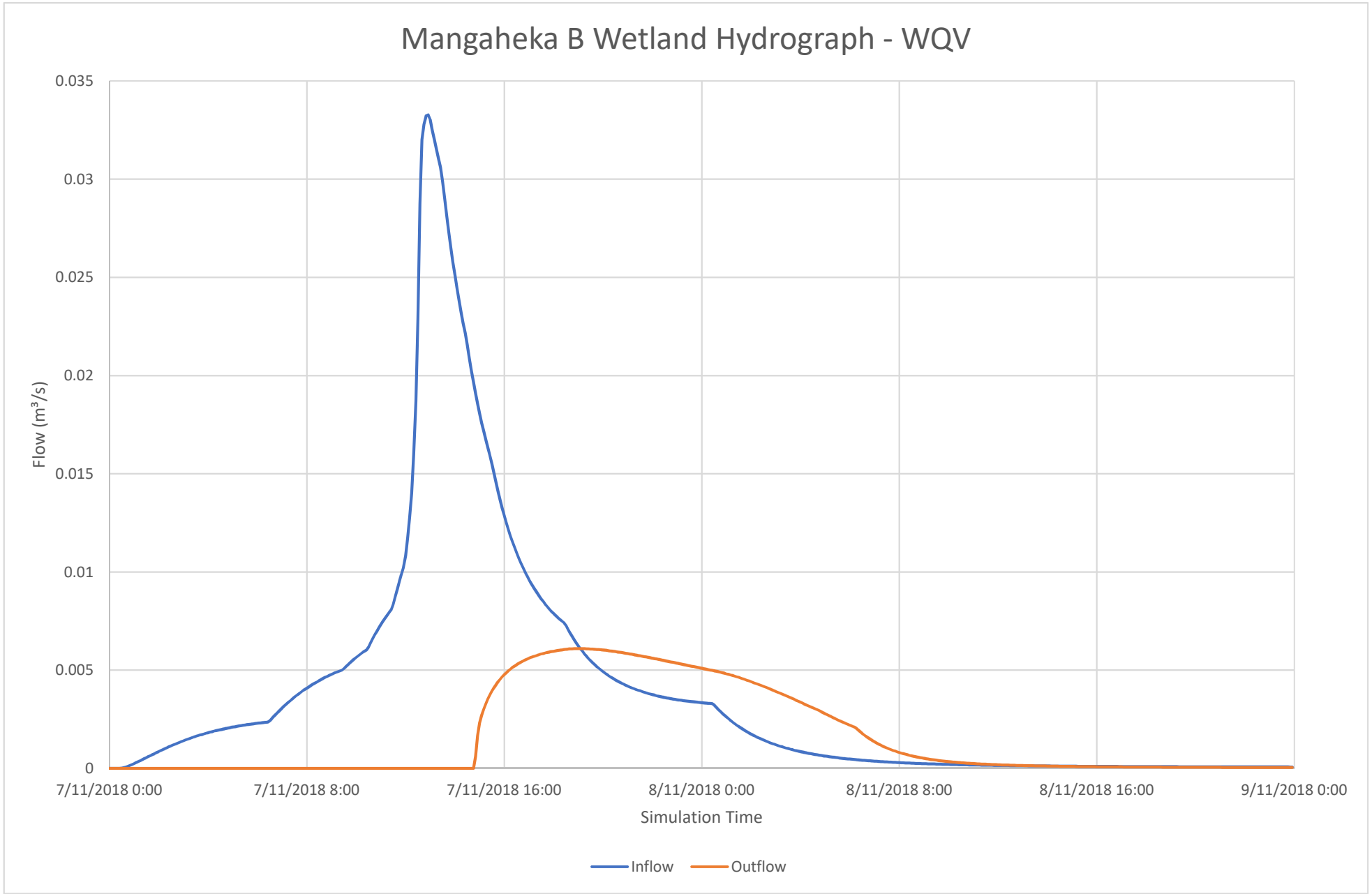

Ohote B Wetland Hydrograph - WQV
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 8:00
7/11/2018 16:00
8/11/2018 0:00
8/11/2018 8:00
8/11/2018 16:00
9/11/2018 0:00
Simulation Time
Inflow
Outflow

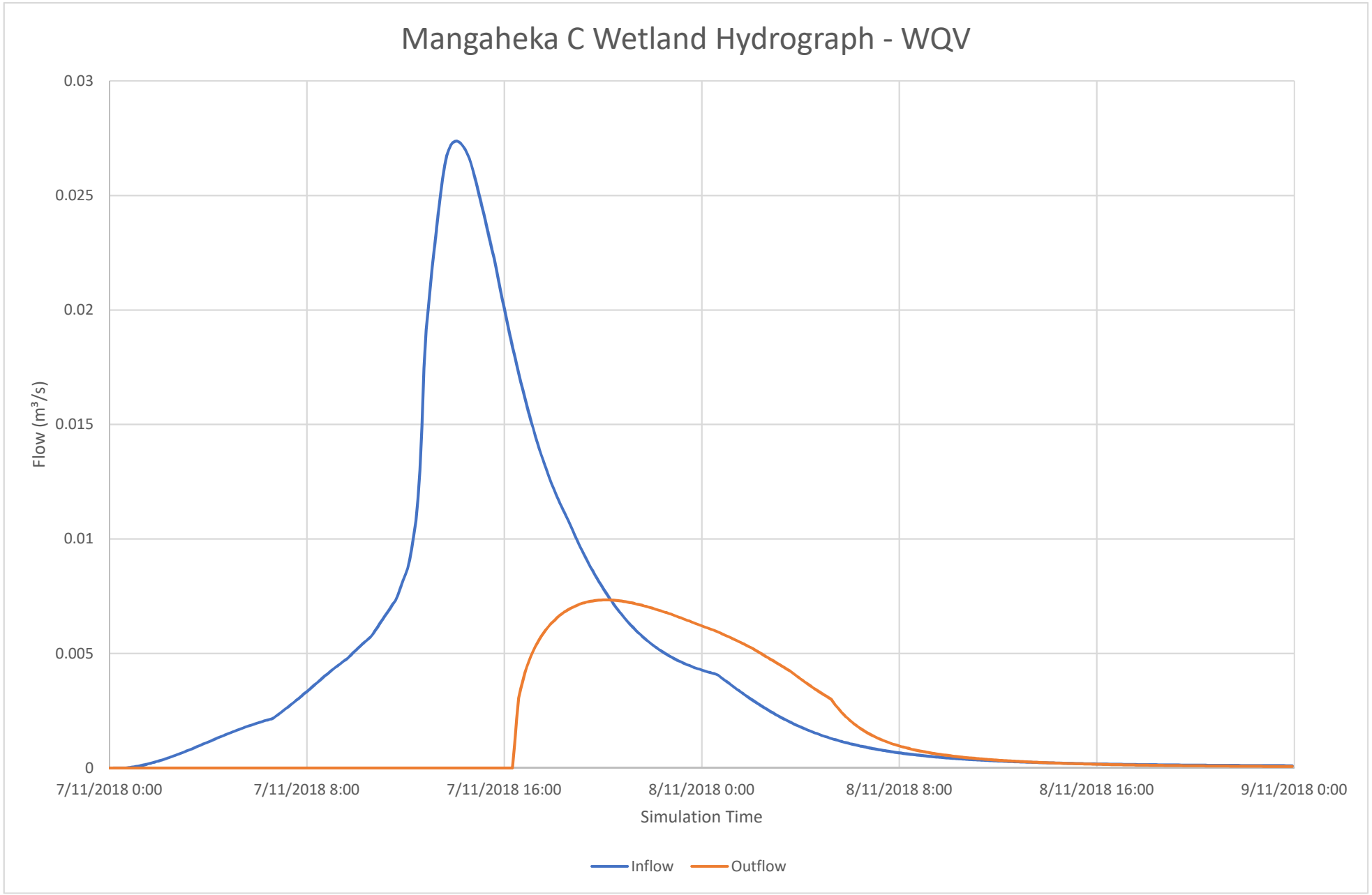

Ohote D Wetland Hydrograph - WQV
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 8:00
7/11/2018 16:00
8/11/2018 0:00
8/11/2018 8:00
8/11/2018 16:00
9/11/2018 0:00
Simulation Time
Inflow
Outflow

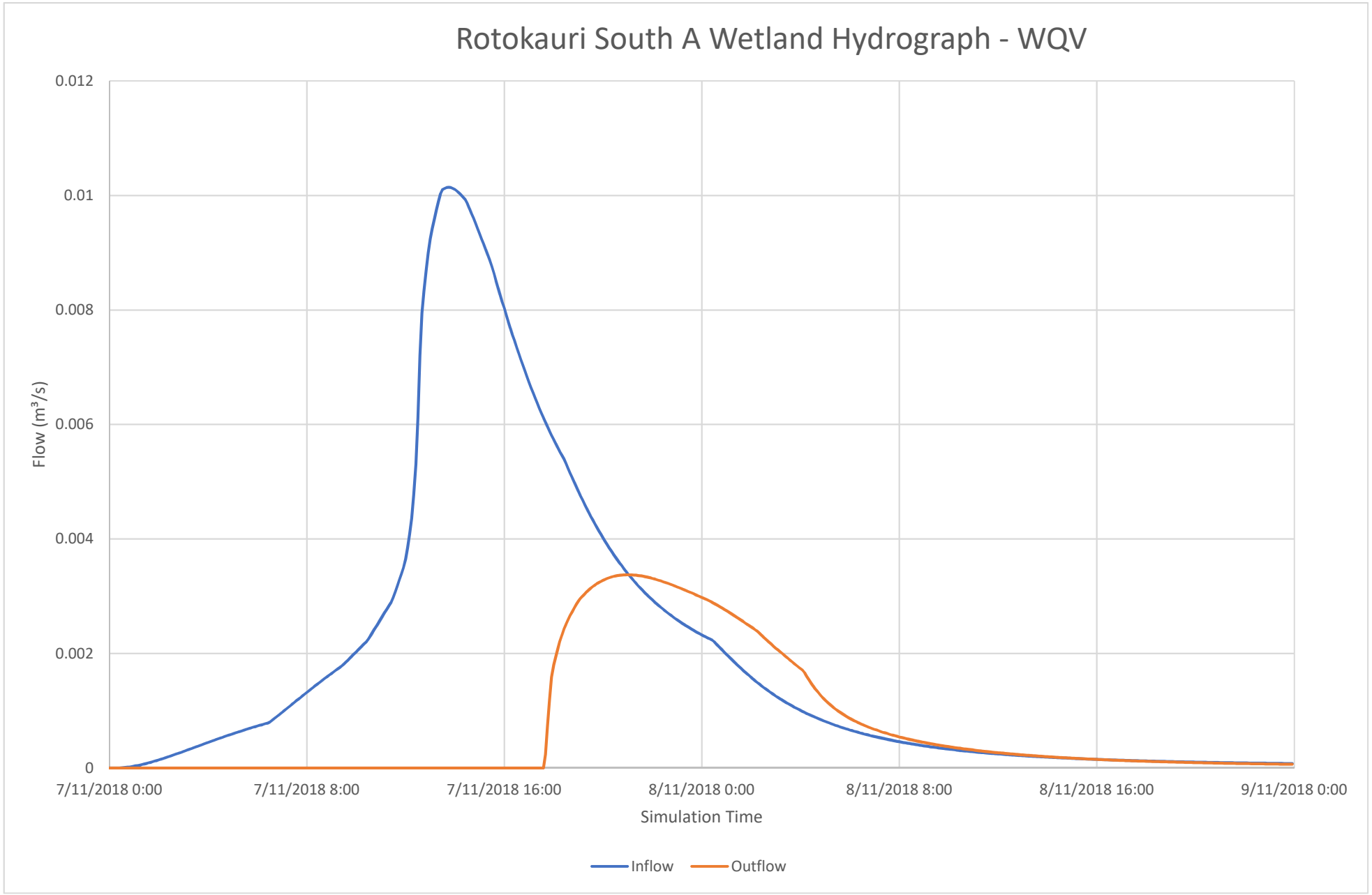

Ohote E Wetland Hydrograph - WQV
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 8:00
7/11/2018 16:00
8/11/2018 0:00
8/11/2018 8:00
8/11/2018 16:00
9/11/2018 0:00
Simulation Time
Inflow
Outflow

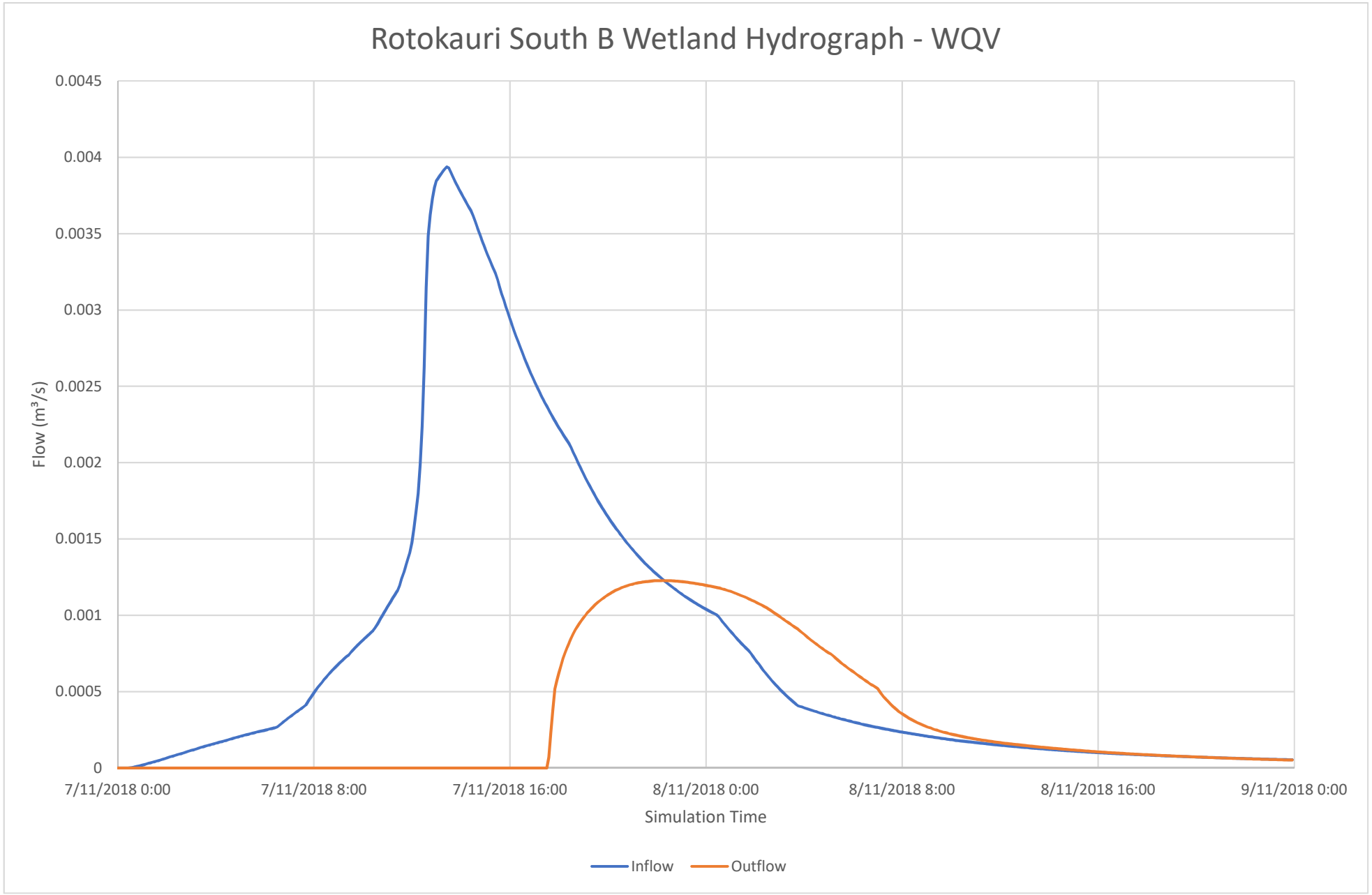

Te Ota Wetland Hydrograph - WQV
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 8:00
7/11/2018 16:00
8/11/2018 0:00
8/11/2018 8:00
8/11/2018 16:00
9/11/2018 0:00
Simulation Time
Inflow
Outflow

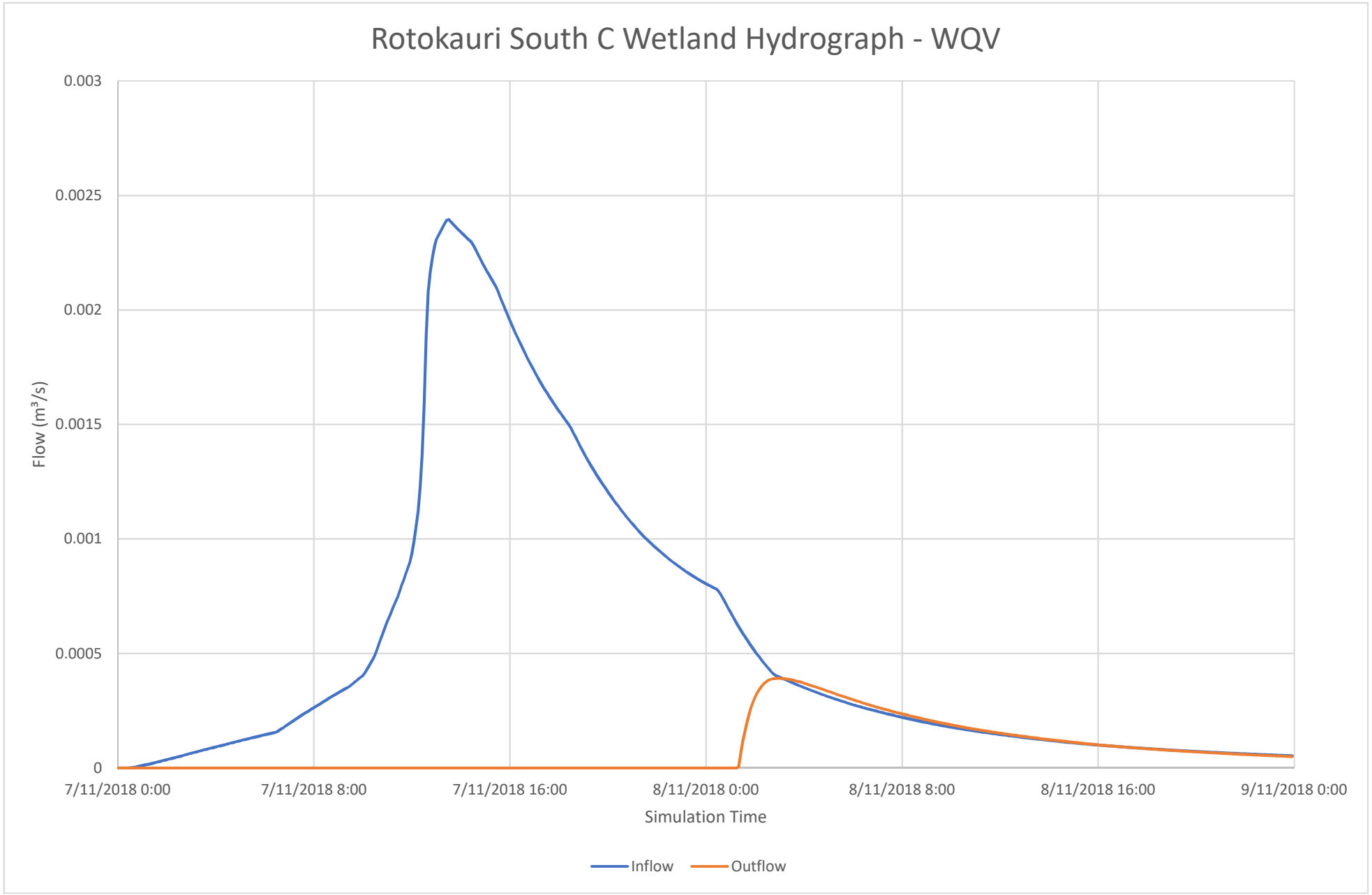

Mangaheka A Wetland Hydrograph - WQV
0.02
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 8:00
7/11/2018 16:00
8/11/2018 0:00
8/11/2018 8:00
8/11/2018 16:00
9/11/2018 0:00
Simulation Time
Inflow
Outflow

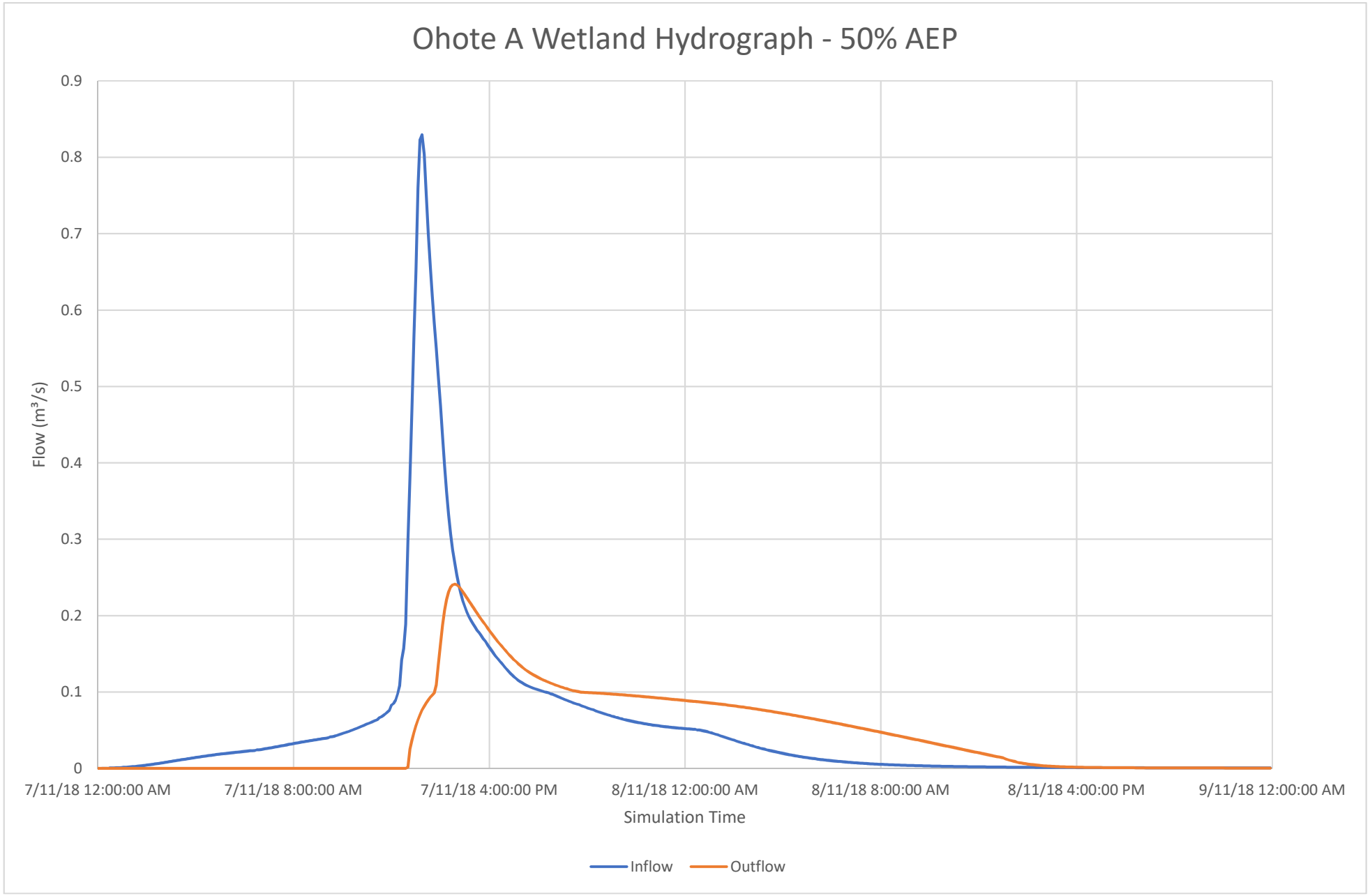

Mangaheka B Wetland Hydrograph - WQV
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 8:00
7/11/2018 16:00
8/11/2018 0:00
8/11/2018 8:00
8/11/2018 16:00
9/11/2018 0:00
Simulation Time
Inflow
Outflow

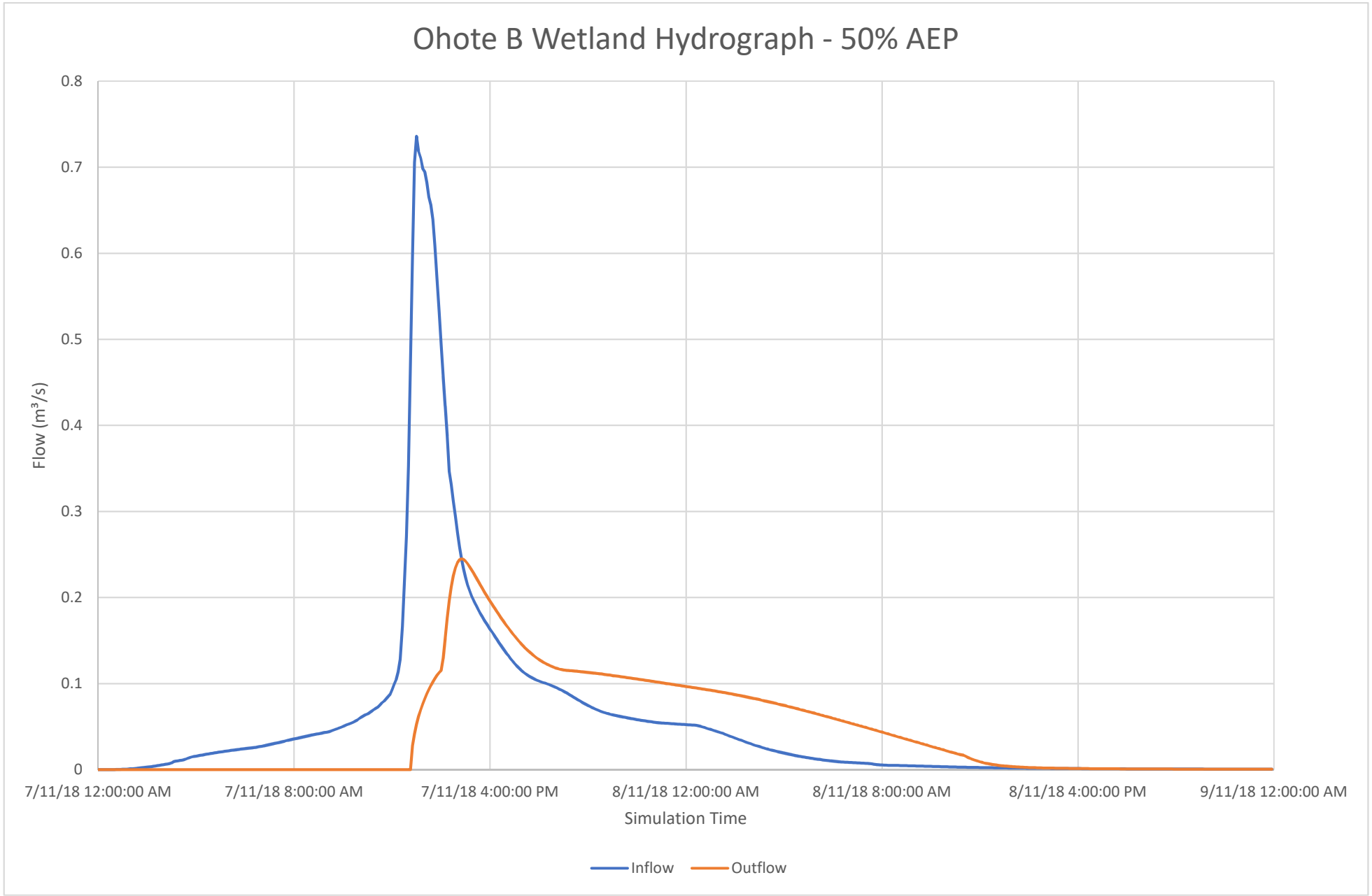

Mangaheka C Wetland Hydrograph - WQV
0.03
0.025
0.02
0.015
0.01
0.005
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 8:00
7/11/2018 16:00
8/11/2018 0:00
8/11/2018 8:00
8/11/2018 16:00
9/11/2018 0:00
Simulation Time
Inflow
Outflow

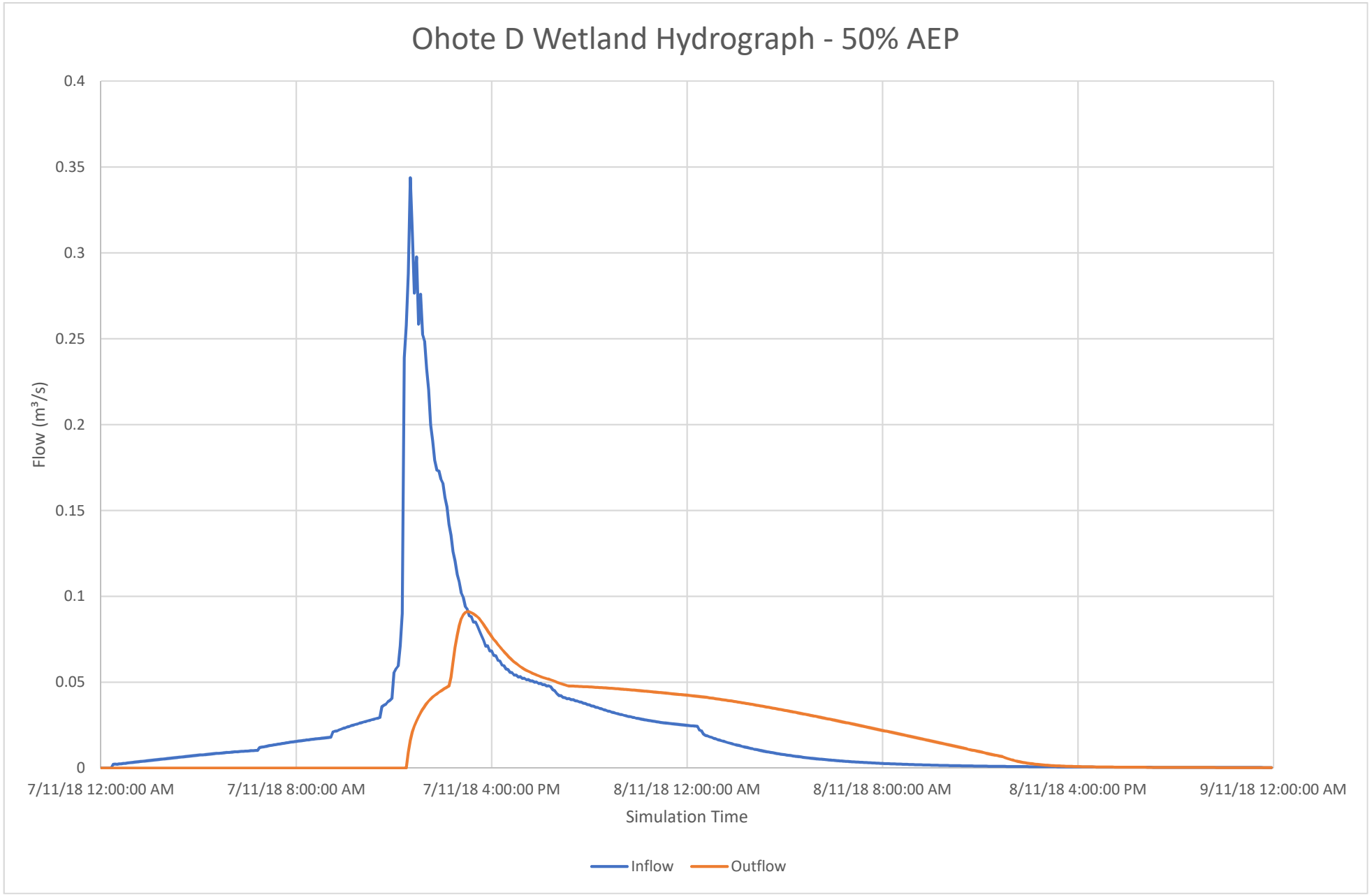

Rotokauri South A Wetland Hydrograph - WQV
0.012
0.01
0.008
0.006
0.004
0.002
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 8:00
7/11/2018 16:00
8/11/2018 0:00
8/11/2018 8:00
8/11/2018 16:00
9/11/2018 0:00
Simulation Time
Inflow
Outflow

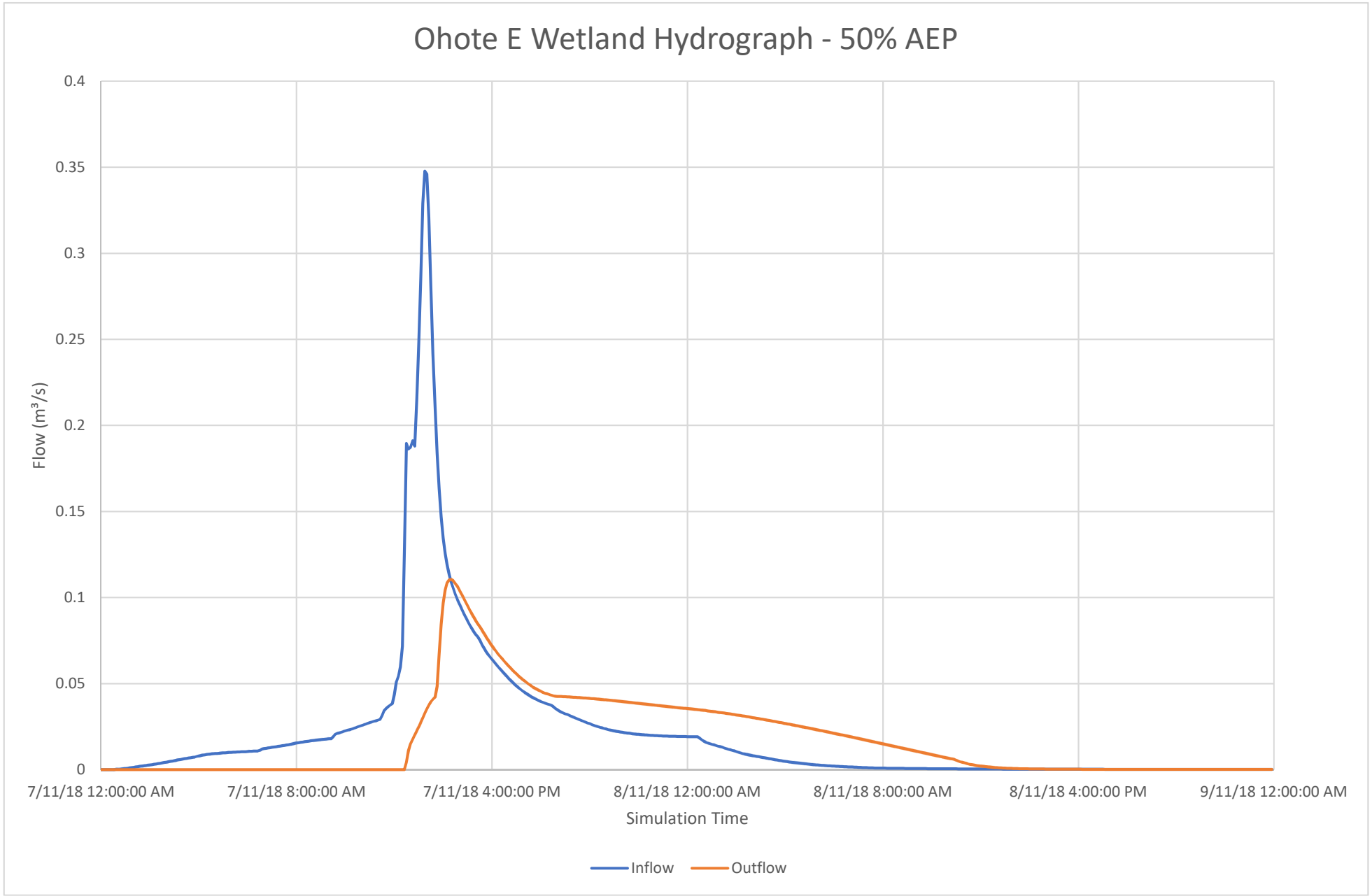

Rotokauri South B Wetland Hydrograph - WQV
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 8:00
7/11/2018 16:00
8/11/2018 0:00
8/11/2018 8:00
8/11/2018 16:00
9/11/2018 0:00
Simulation Time
Inflow
Outflow

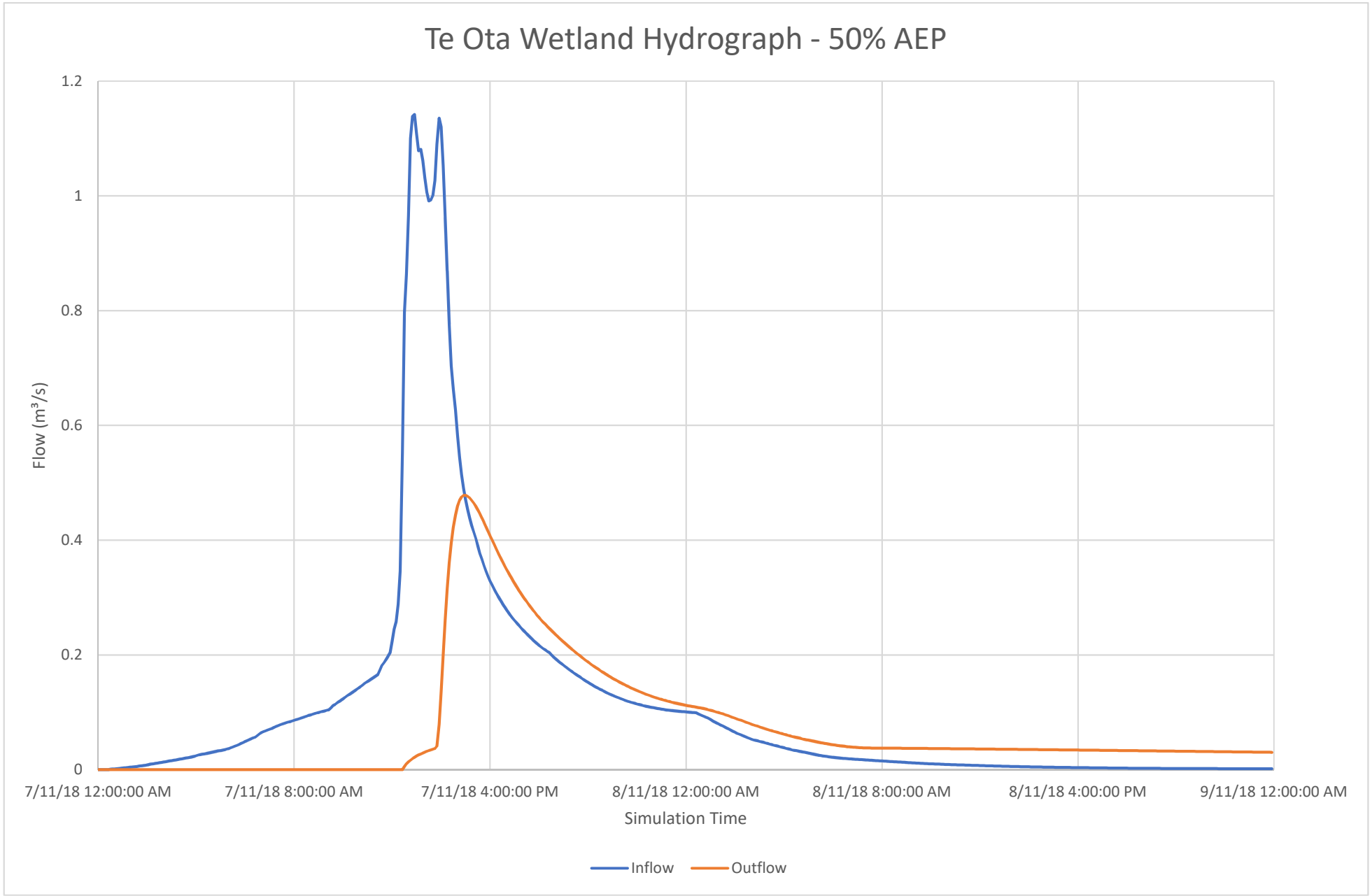

Rotokauri South C Wetland Hydrograph - WQV
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 8:00
7/11/2018 16:00
8/11/2018 0:00
8/11/2018 8:00
8/11/2018 16:00
9/11/2018 0:00
Simulation Time
Inflow
Outflow

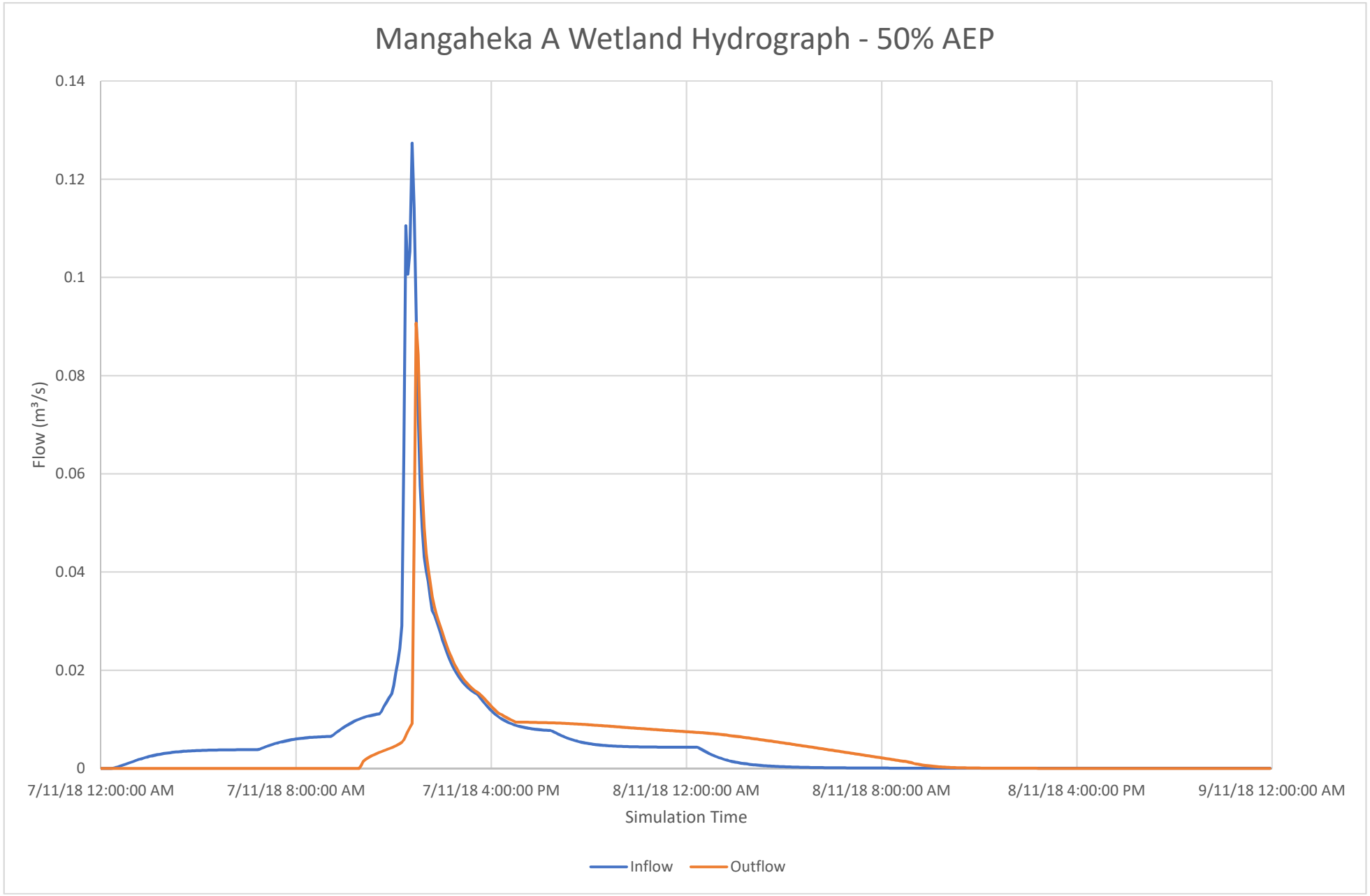

Ohote A Wetland Hydrograph - 50% AEP
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Flow (m³/s)
7/11/18 12:00:00 AM
7/11/18 8:00:00 AM
7/11/18 4:00:00 PM
8/11/18 12:00:00 AM
8/11/18 8:00:00 AM
8/11/18 4:00:00 PM
9/11/18 12:00:00 AM
Simulation Time
Inflow
Outflow

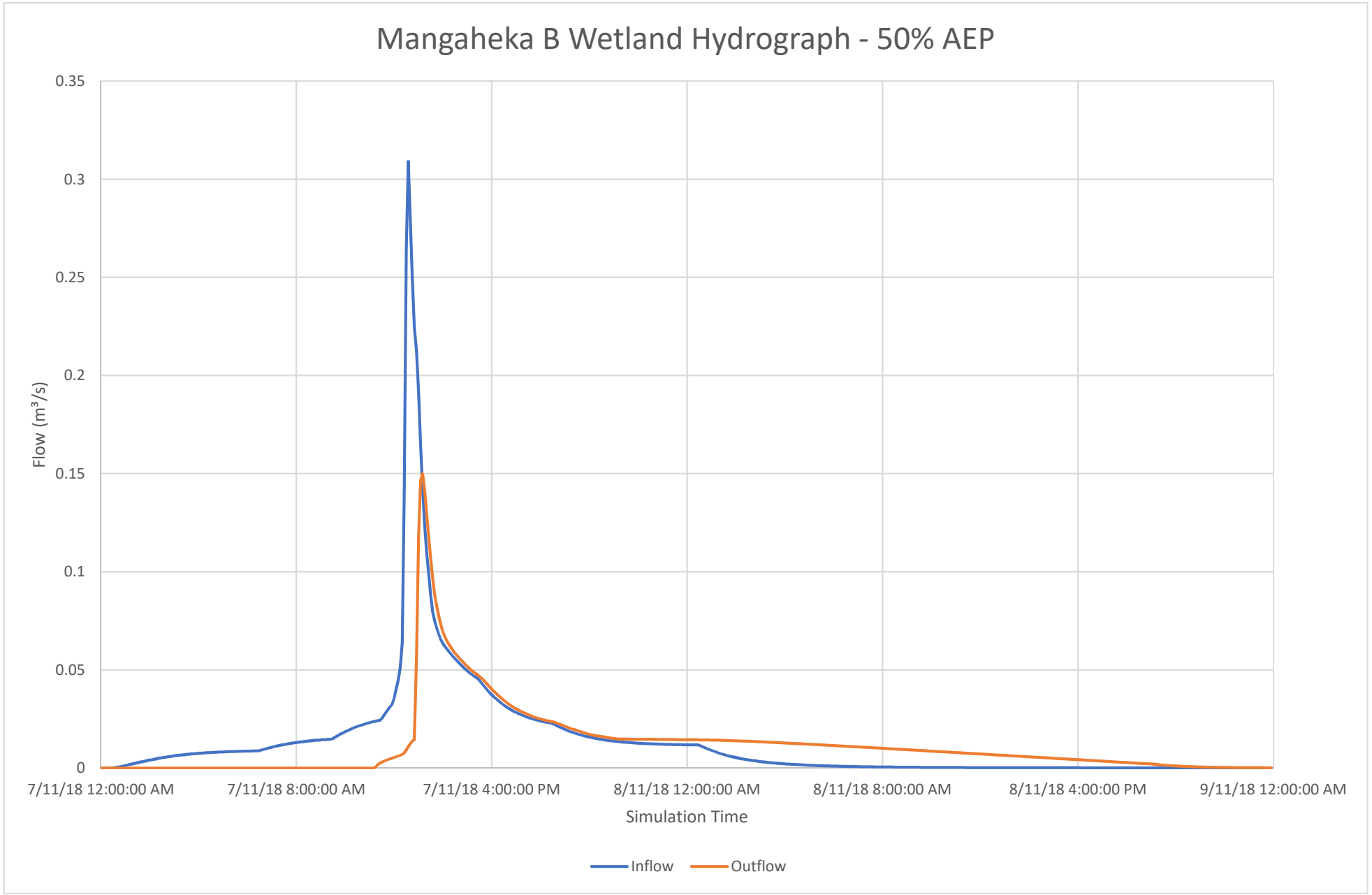

Ohote B Wetland Hydrograph - 50% AEP
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Flow (m³/s)
7/11/18 12:00:00 AM
7/11/18 8:00:00 AM
7/11/18 4:00:00 PM
8/11/18 12:00:00 AM
8/11/18 8:00:00 AM
8/11/18 4:00:00 PM
9/11/18 12:00:00 AM
Simulation Time
Inflow
Outflow

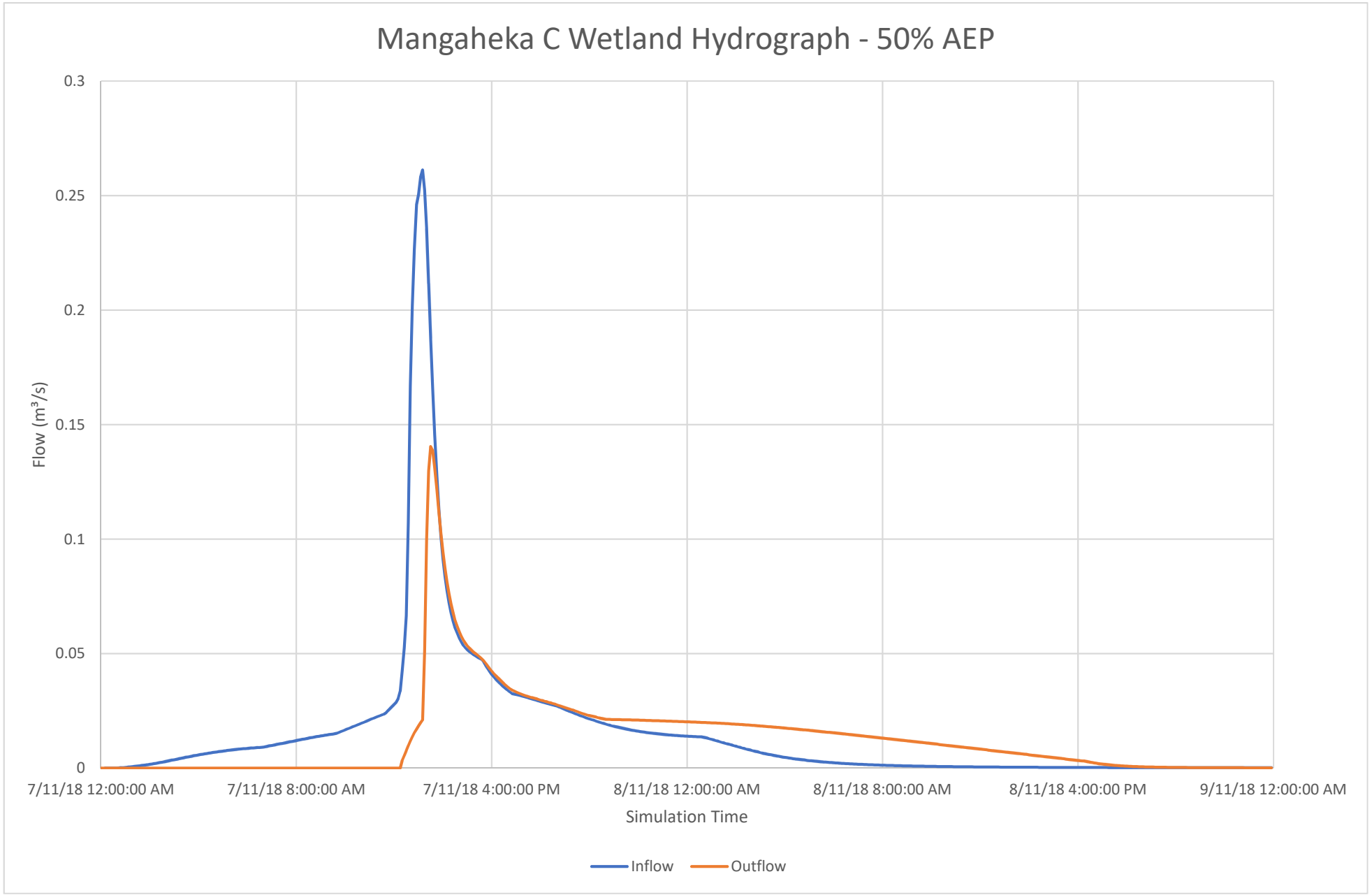

Ohote D Wetland Hydrograph - 50% AEP
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Flow (m³/s)
7/11/18 12:00:00 AM
7/11/18 8:00:00 AM
7/11/18 4:00:00 PM
8/11/18 12:00:00 AM
8/11/18 8:00:00 AM
8/11/18 4:00:00 PM
9/11/18 12:00:00 AM
Simulation Time
Inflow
Outflow

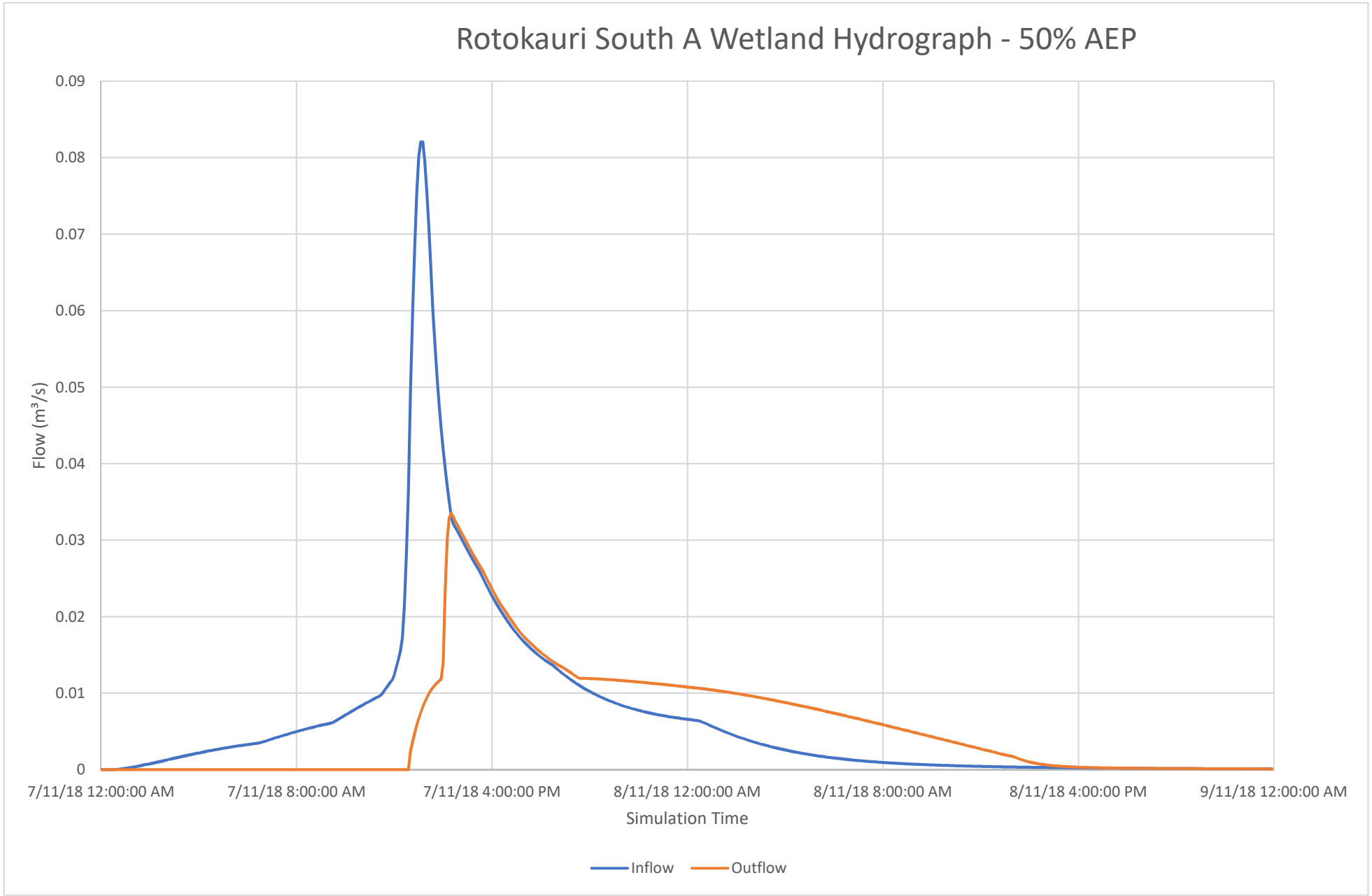

Ohote E Wetland Hydrograph - 50% AEP
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Flow (m³/s)
7/11/18 12:00:00 AM
7/11/18 8:00:00 AM
7/11/18 4:00:00 PM
8/11/18 12:00:00 AM
8/11/18 8:00:00 AM
8/11/18 4:00:00 PM
9/11/18 12:00:00 AM
Simulation Time
Inflow
Outflow

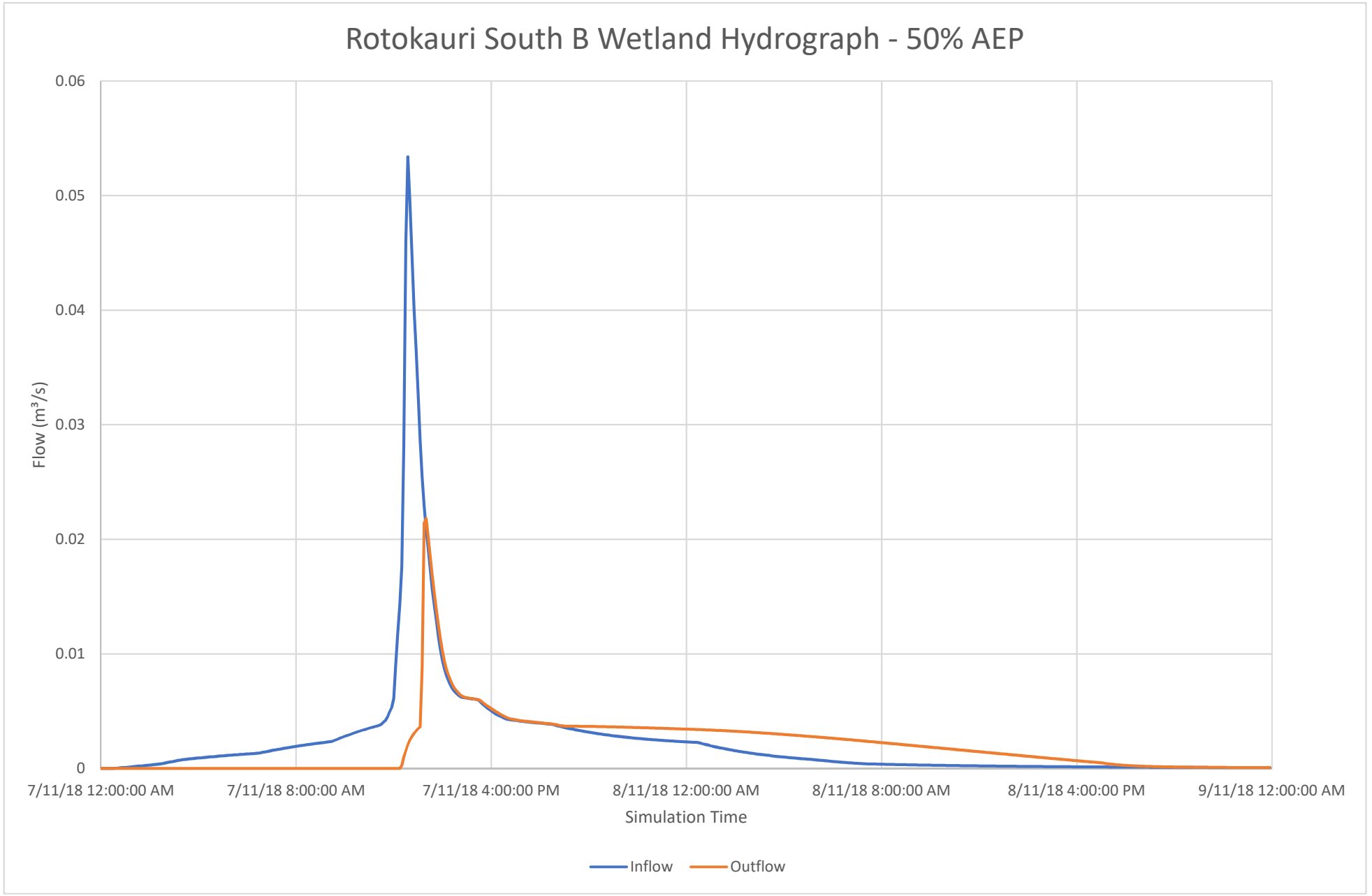

Te Ota Wetland Hydrograph - 50% AEP
1.2
1
0.8
0.6
0.4
0.2
0
Flow (m³/s)
7/11/18 12:00:00 AM
7/11/18 8:00:00 AM
7/11/18 4:00:00 PM
8/11/18 12:00:00 AM
8/11/18 8:00:00 AM
8/11/18 4:00:00 PM
9/11/18 12:00:00 AM
Simulation Time
Inflow
Outflow

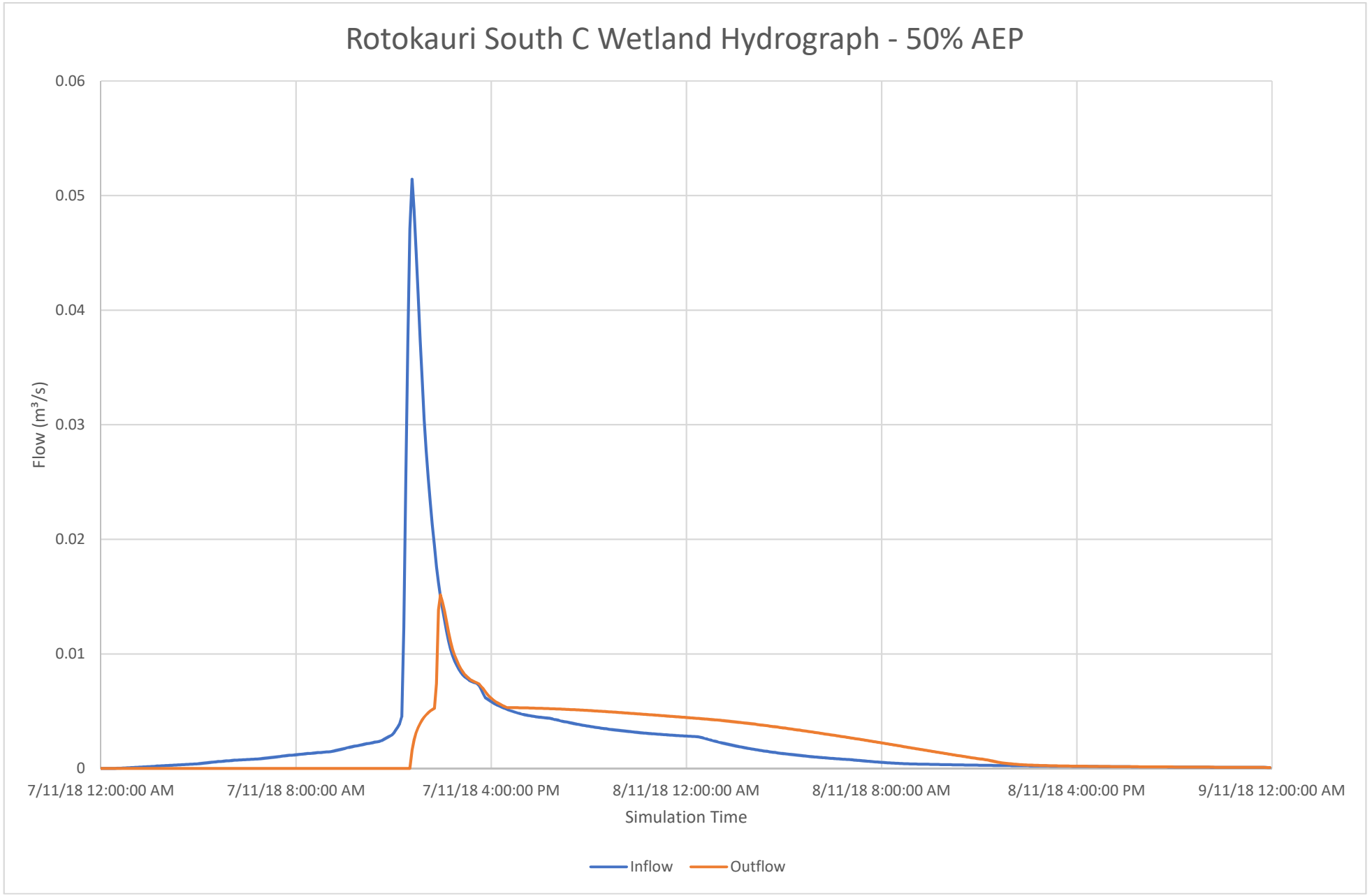

Mangaheka A Wetland Hydrograph - 50% AEP
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Flow (m³/s)
7/11/18 12:00:00 AM
7/11/18 8:00:00 AM
7/11/18 4:00:00 PM
8/11/18 12:00:00 AM
8/11/18 8:00:00 AM
8/11/18 4:00:00 PM
9/11/18 12:00:00 AM
Simulation Time
Inflow
Outflow

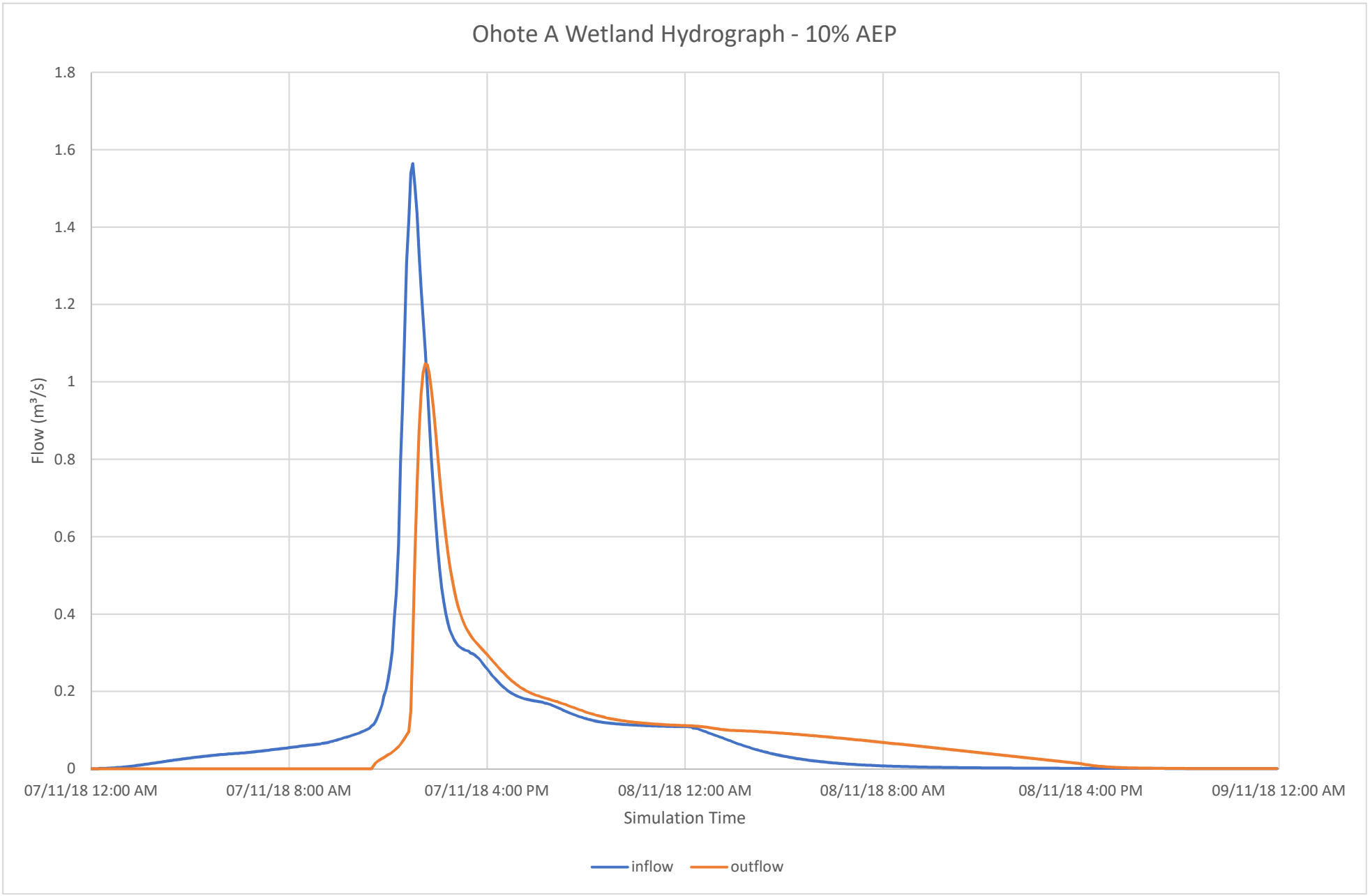

Mangaheka B Wetland Hydrograph - 50% AEP
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Flow (m³/s)
7/11/18 12:00:00 AM
7/11/18 8:00:00 AM
7/11/18 4:00:00 PM
8/11/18 12:00:00 AM
8/11/18 8:00:00 AM
8/11/18 4:00:00 PM
9/11/18 12:00:00 AM
Simulation Time
Inflow
Outflow

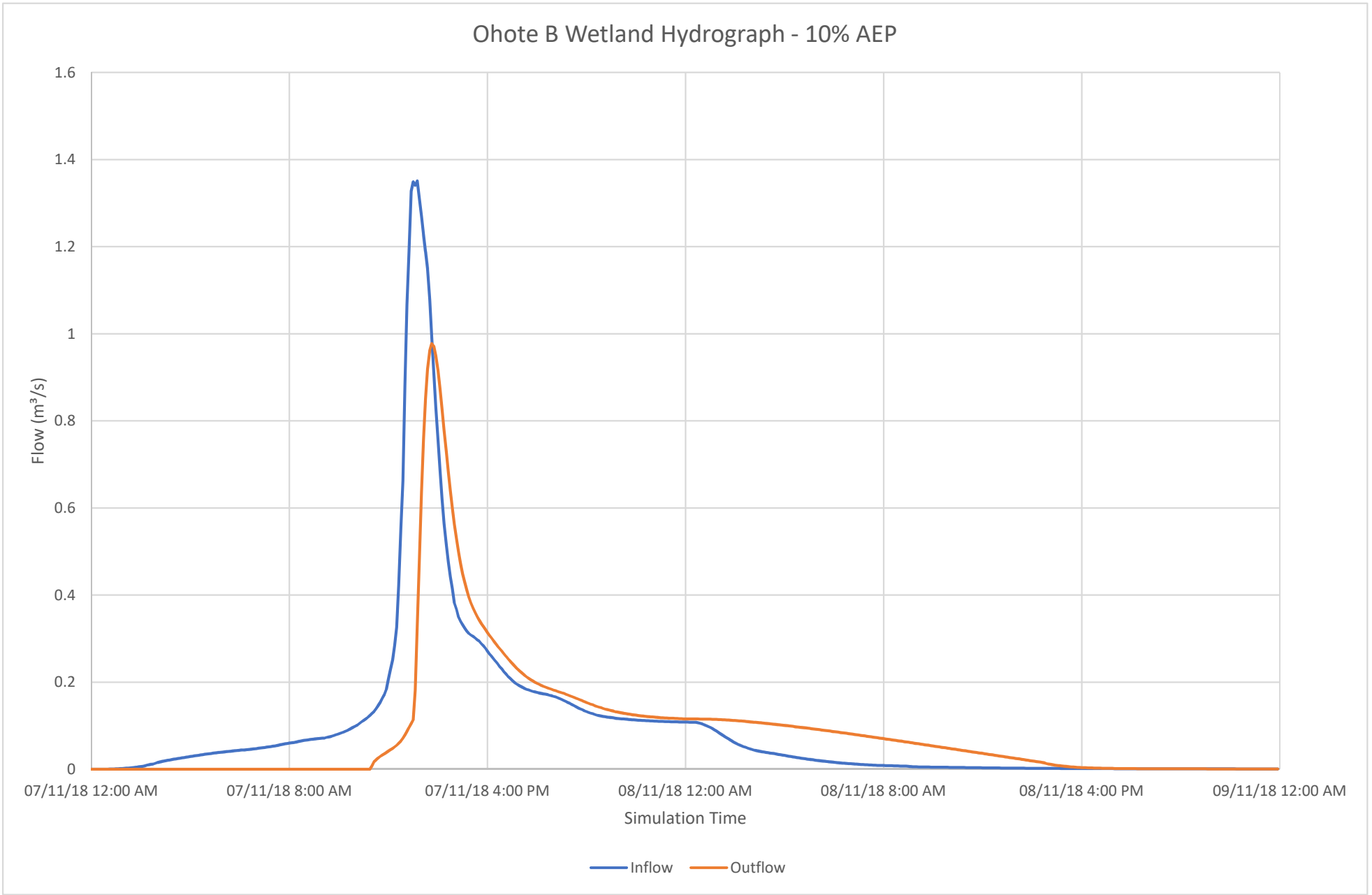

Mangaheka C Wetland Hydrograph - 50% AEP
0.3
0.25
0.2
0.15
0.1
0.05
0
Flow (m³/s)
7/11/18 12:00:00 AM
7/11/18 8:00:00 AM
7/11/18 4:00:00 PM
8/11/18 12:00:00 AM
8/11/18 8:00:00 AM
8/11/18 4:00:00 PM
9/11/18 12:00:00 AM
Simulation Time
Inflow
Outflow

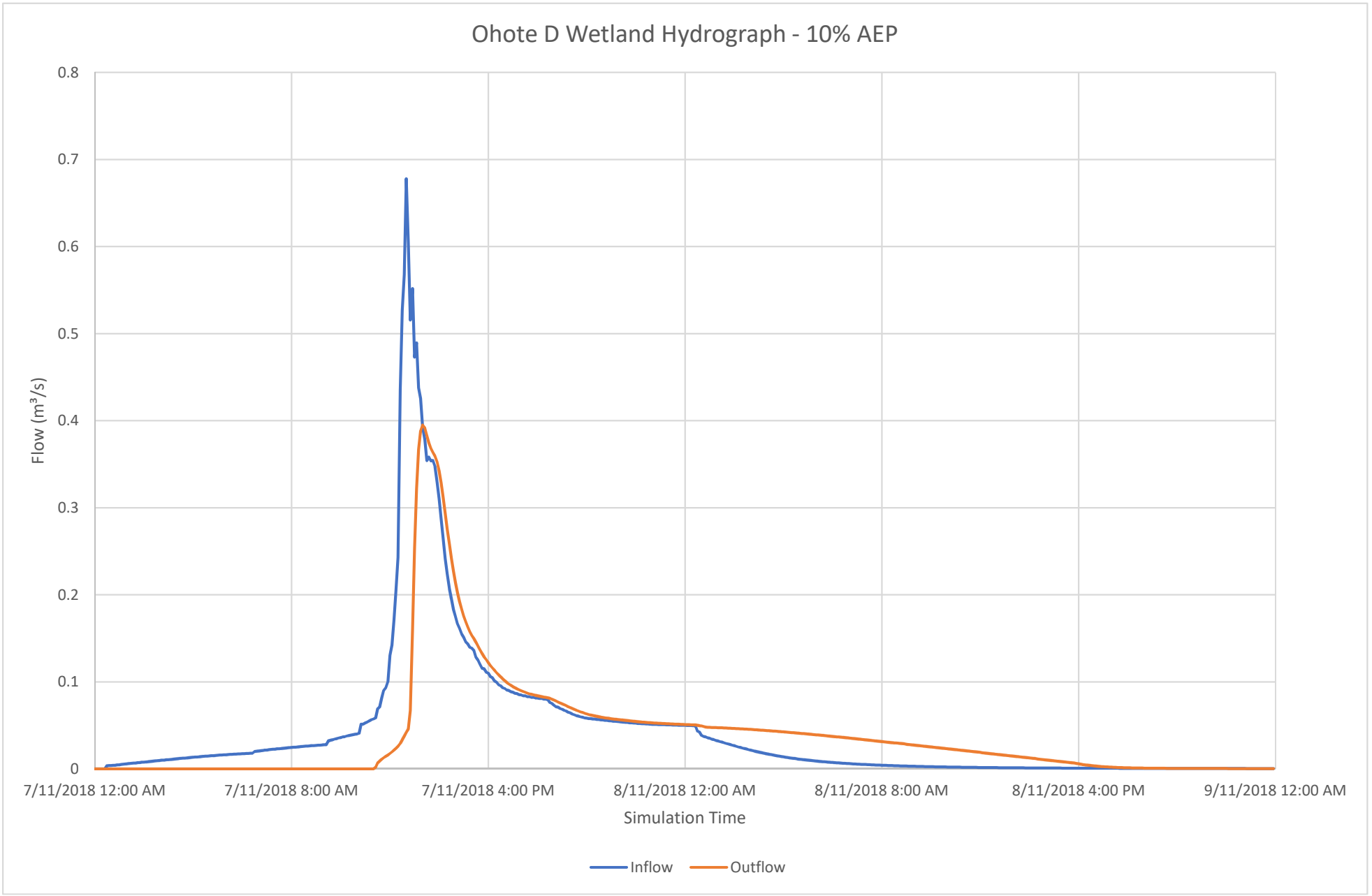

Rotokauri South A Wetland Hydrograph - 50% AEP
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Flow (m³/s)
7/11/18 12:00:00 AM
7/11/18 8:00:00 AM
7/11/18 4:00:00 PM
8/11/18 12:00:00 AM
8/11/18 8:00:00 AM
8/11/18 4:00:00 PM
9/11/18 12:00:00 AM
Simulation Time
Inflow
Outflow

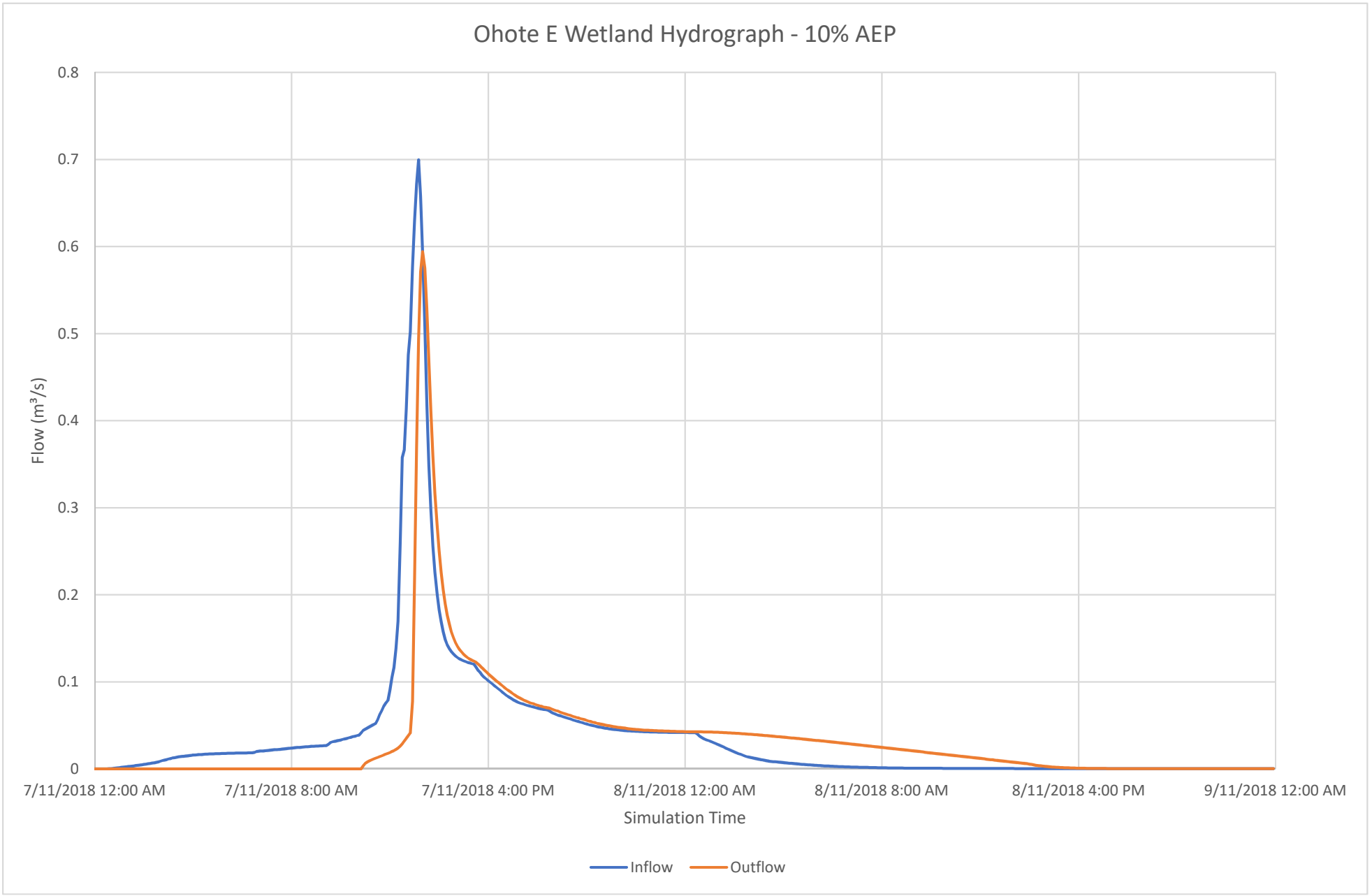

Rotokauri South B Wetland Hydrograph - 50% AEP
0.06
0.05
0.04
0.03
0.02
0.01
0
Flow (m³/s)
7/11/18 12:00:00 AM
7/11/18 8:00:00 AM
7/11/18 4:00:00 PM
8/11/18 12:00:00 AM
8/11/18 8:00:00 AM
8/11/18 4:00:00 PM
9/11/18 12:00:00 AM
Simulation Time
Inflow
Outflow

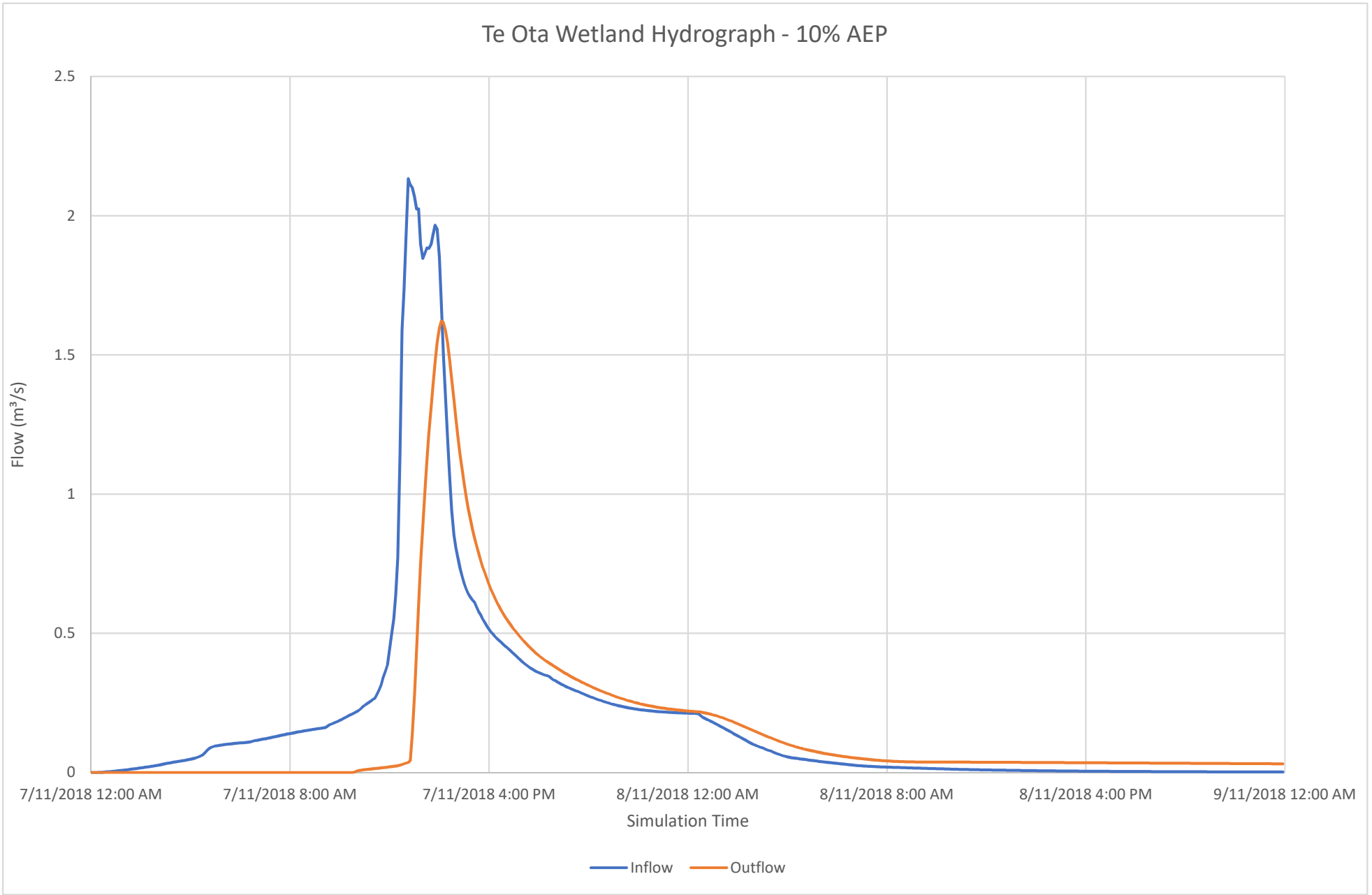

Rotokauri South C Wetland Hydrograph - 50% AEP
0.06
0.05
0.04
0.03
0.02
0.01
0
Flow (m³/s)
7/11/18 12:00:00 AM
7/11/18 8:00:00 AM
7/11/18 4:00:00 PM
8/11/18 12:00:00 AM
8/11/18 8:00:00 AM
8/11/18 4:00:00 PM
9/11/18 12:00:00 AM
Simulation Time
Inflow
Outflow

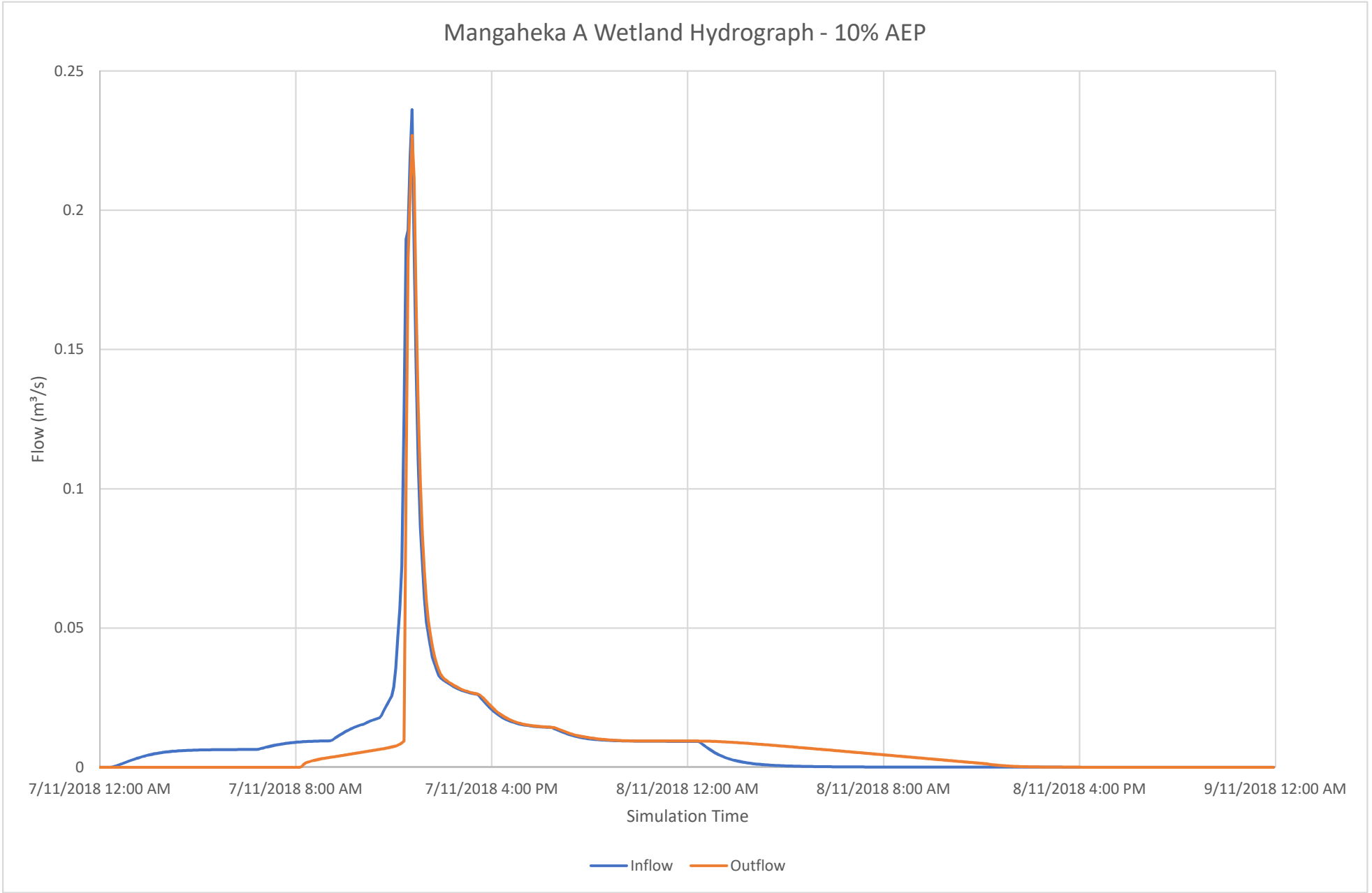

Ohote A Wetland Hydrograph - 10% AEP
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Flow (m³/s)
07/11/18 12:00 AM
07/11/18 8:00 AM
07/11/18 4:00 PM
08/11/18 12:00 AM
08/11/18 8:00 AM
08/11/18 4:00 PM
09/11/18 12:00 AM
Simulation Time
inflow
outflow

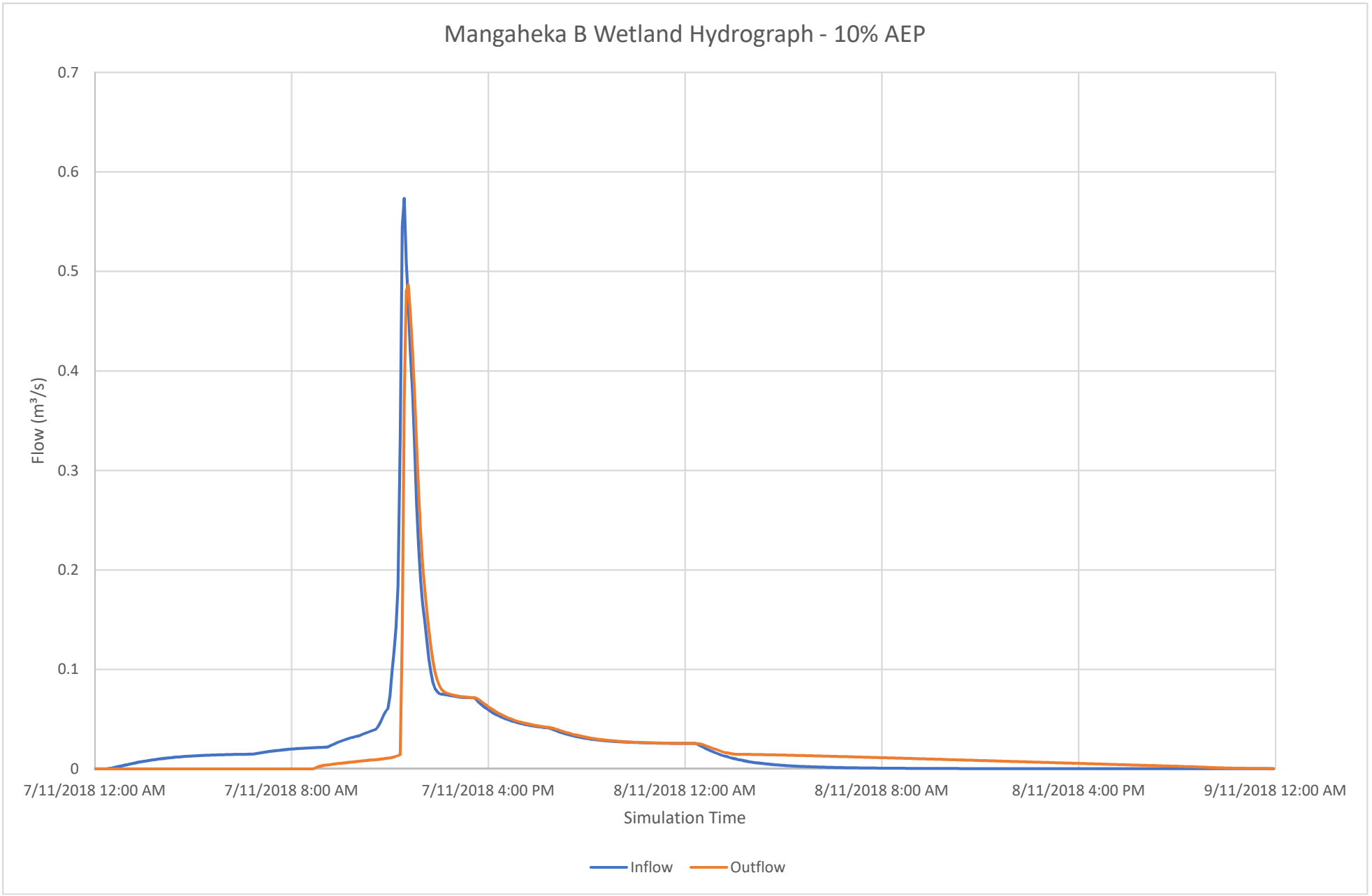

Ohote B Wetland Hydrograph - 10% AEP
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Flow (m³/s)
07/11/18 12:00 AM
07/11/18 8:00 AM
07/11/18 4:00 PM
08/11/18 12:00 AM
08/11/18 8:00 AM
08/11/18 4:00 PM
09/11/18 12:00 AM
Simulation Time
Inflow
Outflow

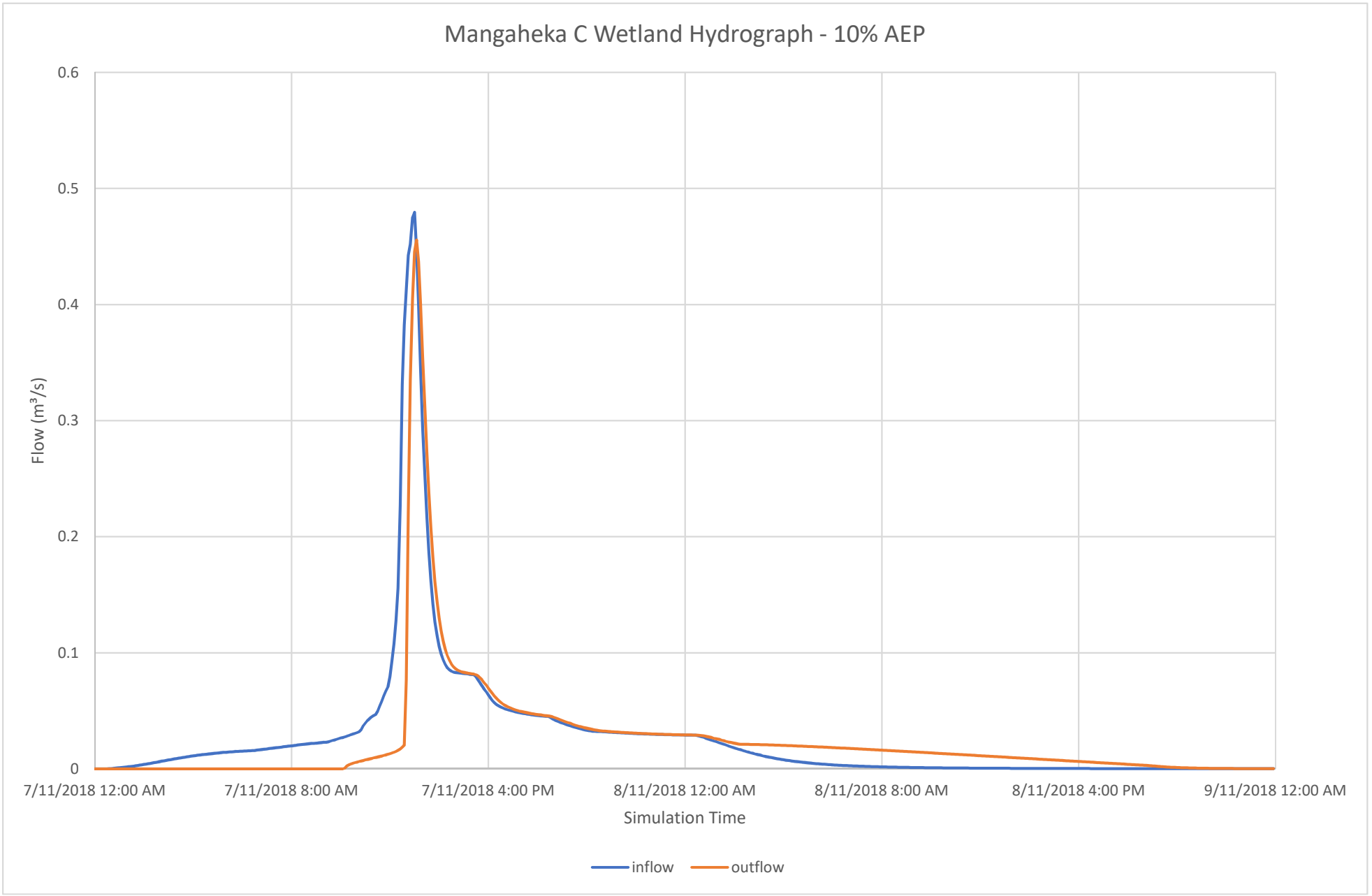

Ohote D Wetland Hydrograph - 10% AEP
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Flow (m³/s)
7/11/2018 12:00 AM
7/11/2018 8:00 AM
7/11/2018 4:00 PM
8/11/2018 12:00 AM
8/11/2018 8:00 AM
8/11/2018 4:00 PM
9/11/2018 12:00 AM
Simulation Time
Inflow
Outflow

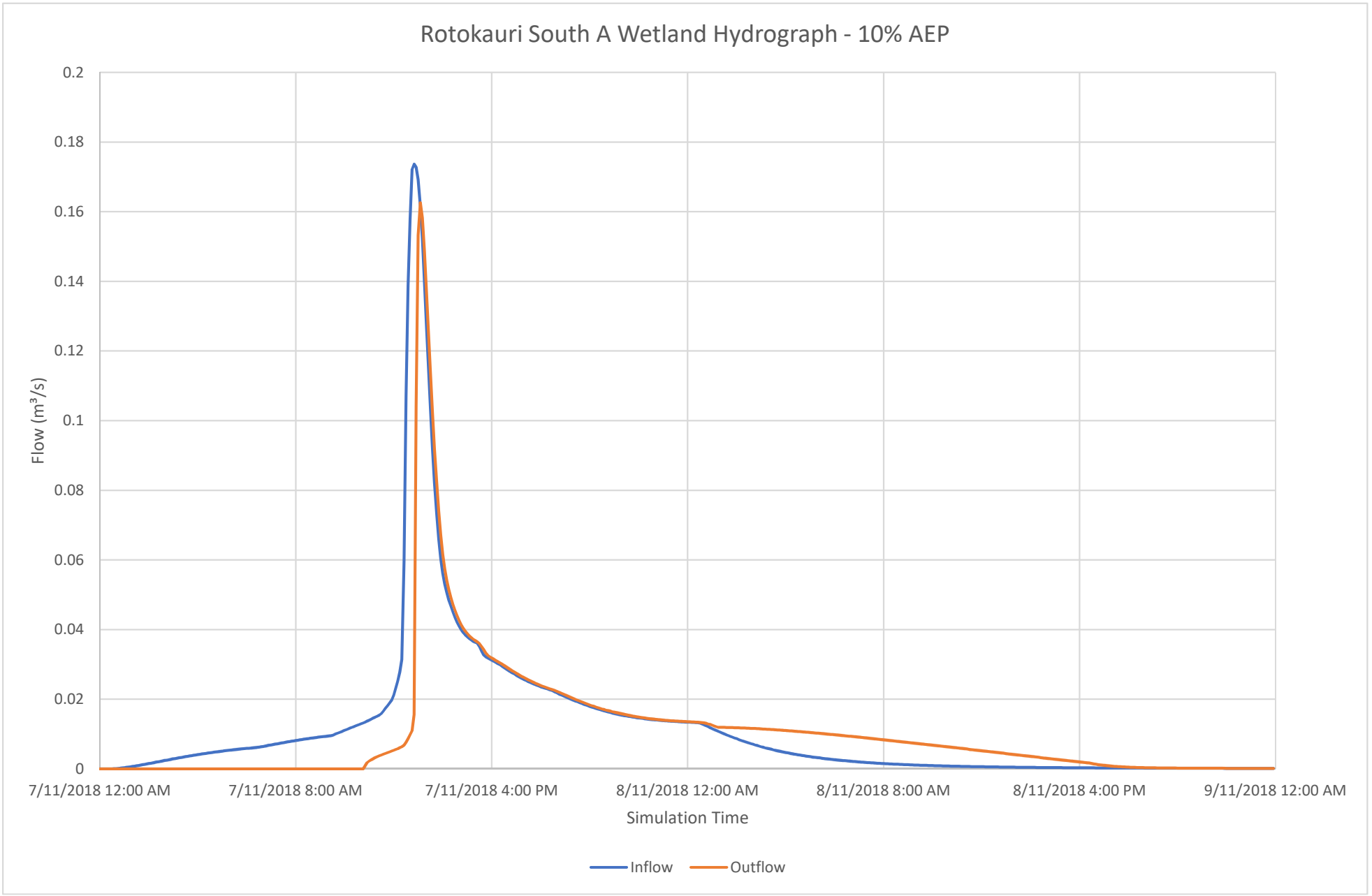

Ohote E Wetland Hydrograph - 10% AEP
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Flow (m³/s)
7/11/2018 12:00 AM
7/11/2018 8:00 AM
7/11/2018 4:00 PM
8/11/2018 12:00 AM
8/11/2018 8:00 AM
8/11/2018 4:00 PM
9/11/2018 12:00 AM
Simulation Time
Inflow
Outflow

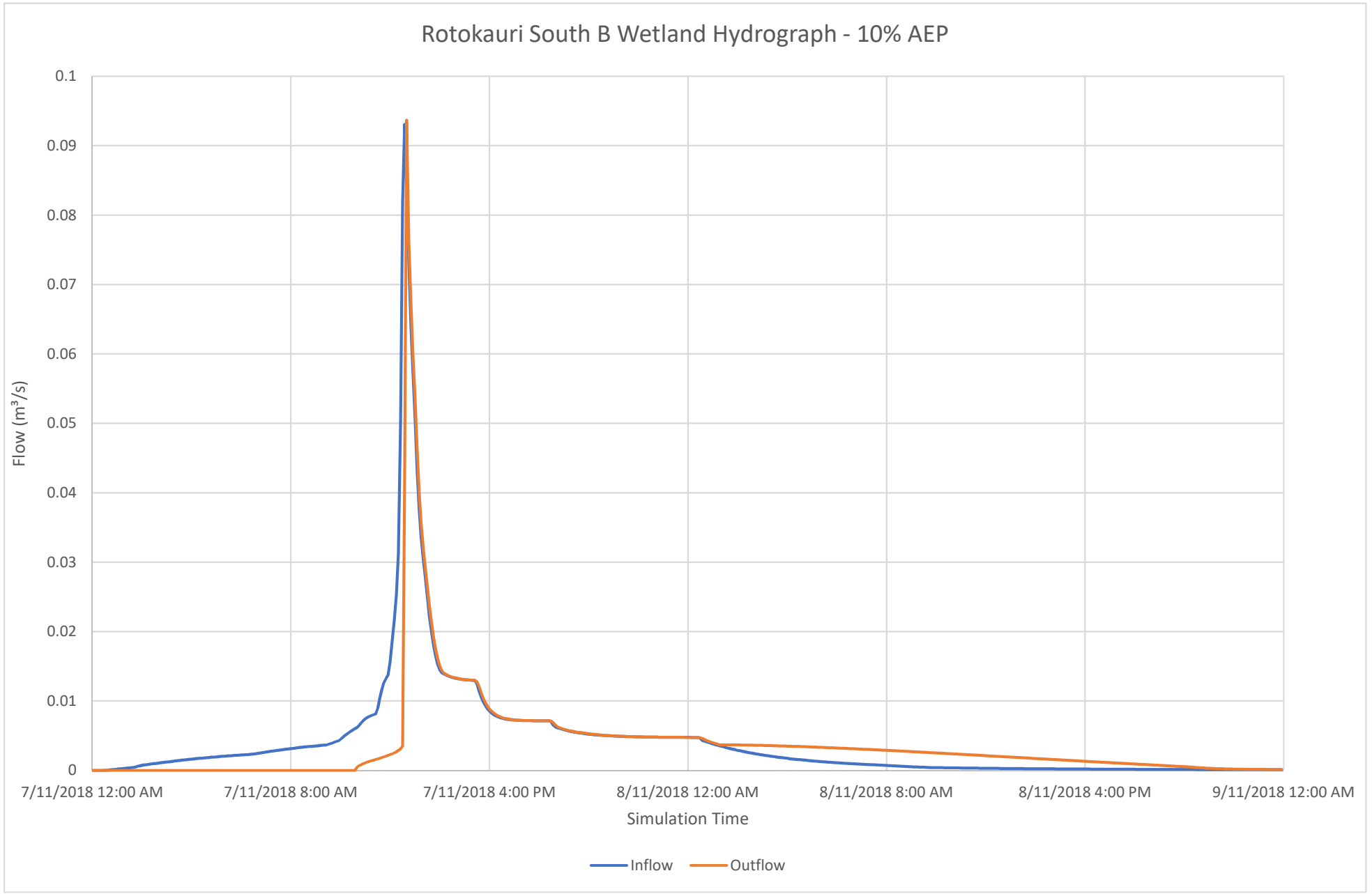

Te Ota Wetland Hydrograph - 10% AEP
2.5
2
1.5
1
0.5
0
Flow (m³/s)
7/11/2018 12:00 AM
7/11/2018 8:00 AM
7/11/2018 4:00 PM
8/11/2018 12:00 AM
8/11/2018 8:00 AM
8/11/2018 4:00 PM
9/11/2018 12:00 AM
Simulation Time
Inflow
Outflow

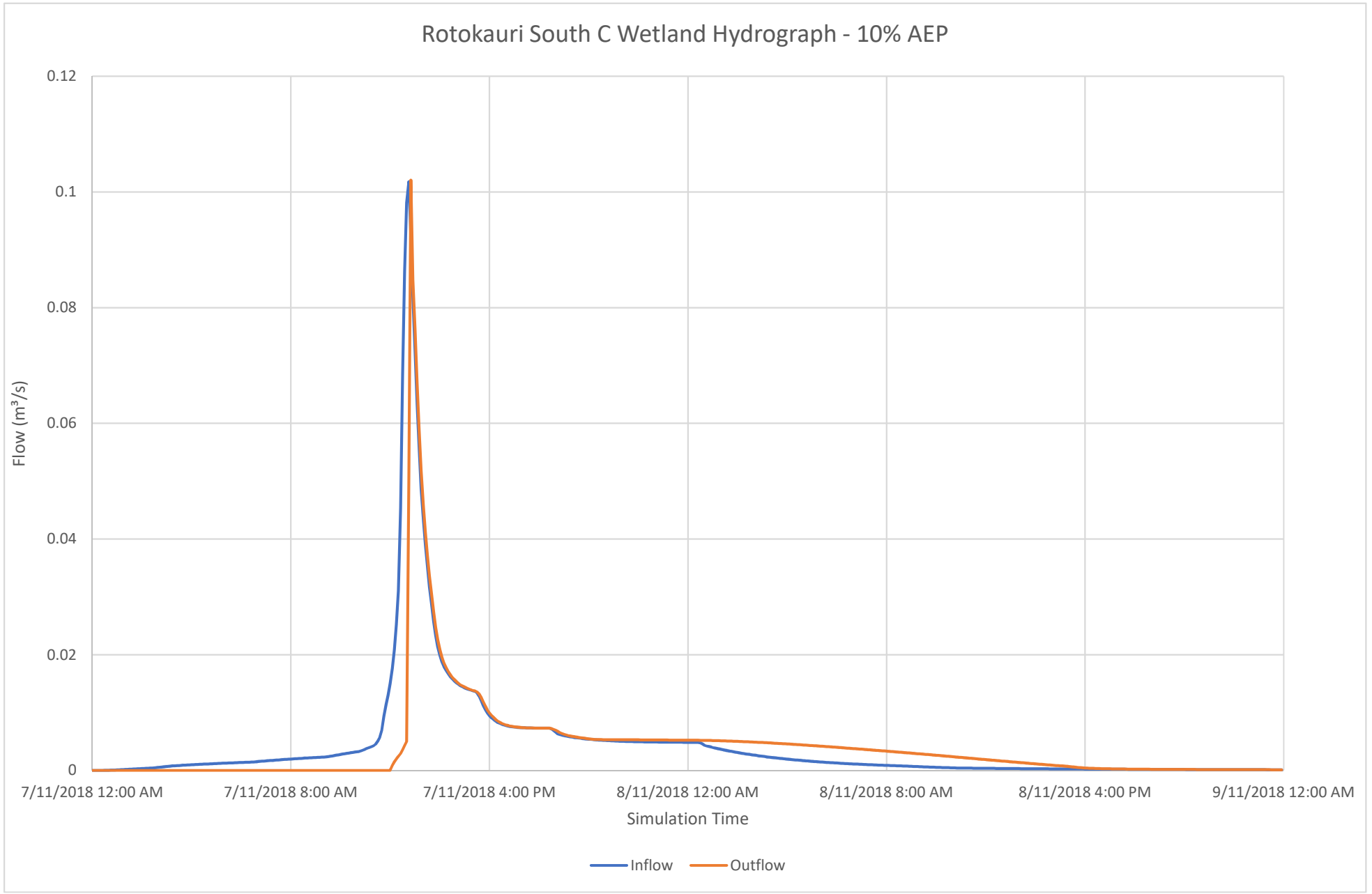

Mangaheka A Wetland Hydrograph - 10% AEP
0.25
0.2
0.15
0.1
0.05
0
Flow (m³/s)
7/11/2018 12:00 AM
7/11/2018 8:00 AM
7/11/2018 4:00 PM
8/11/2018 12:00 AM
8/11/2018 8:00 AM
8/11/2018 4:00 PM
9/11/2018 12:00 AM
Simulation Time
Inflow
Outflow

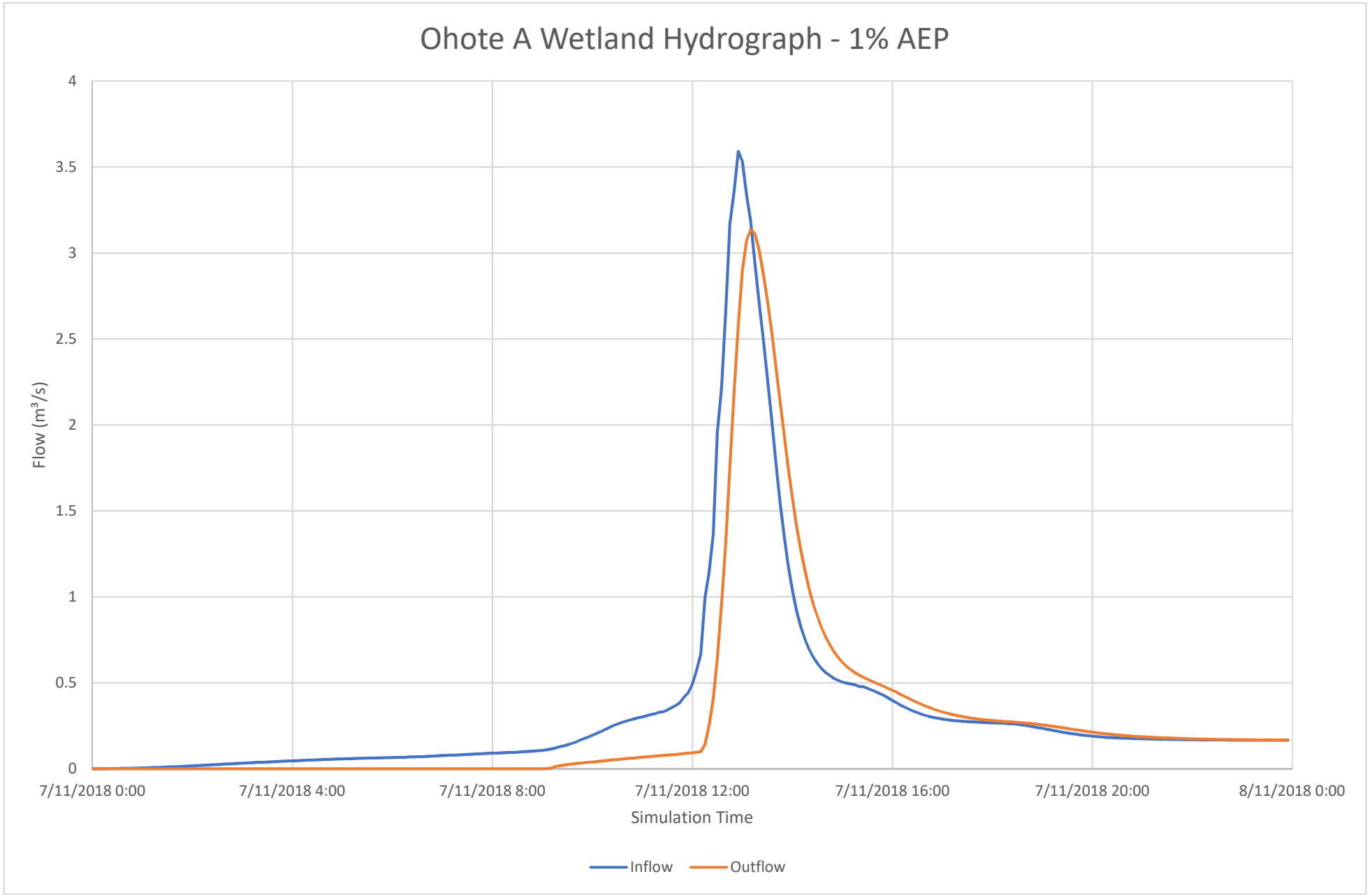

Mangaheka B Wetland Hydrograph - 10% AEP
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Flow (m³/s)
7/11/2018 12:00 AM
7/11/2018 8:00 AM
7/11/2018 4:00 PM
8/11/2018 12:00 AM
8/11/2018 8:00 AM
8/11/2018 4:00 PM
9/11/2018 12:00 AM
Simulation Time
Inflow
Outflow

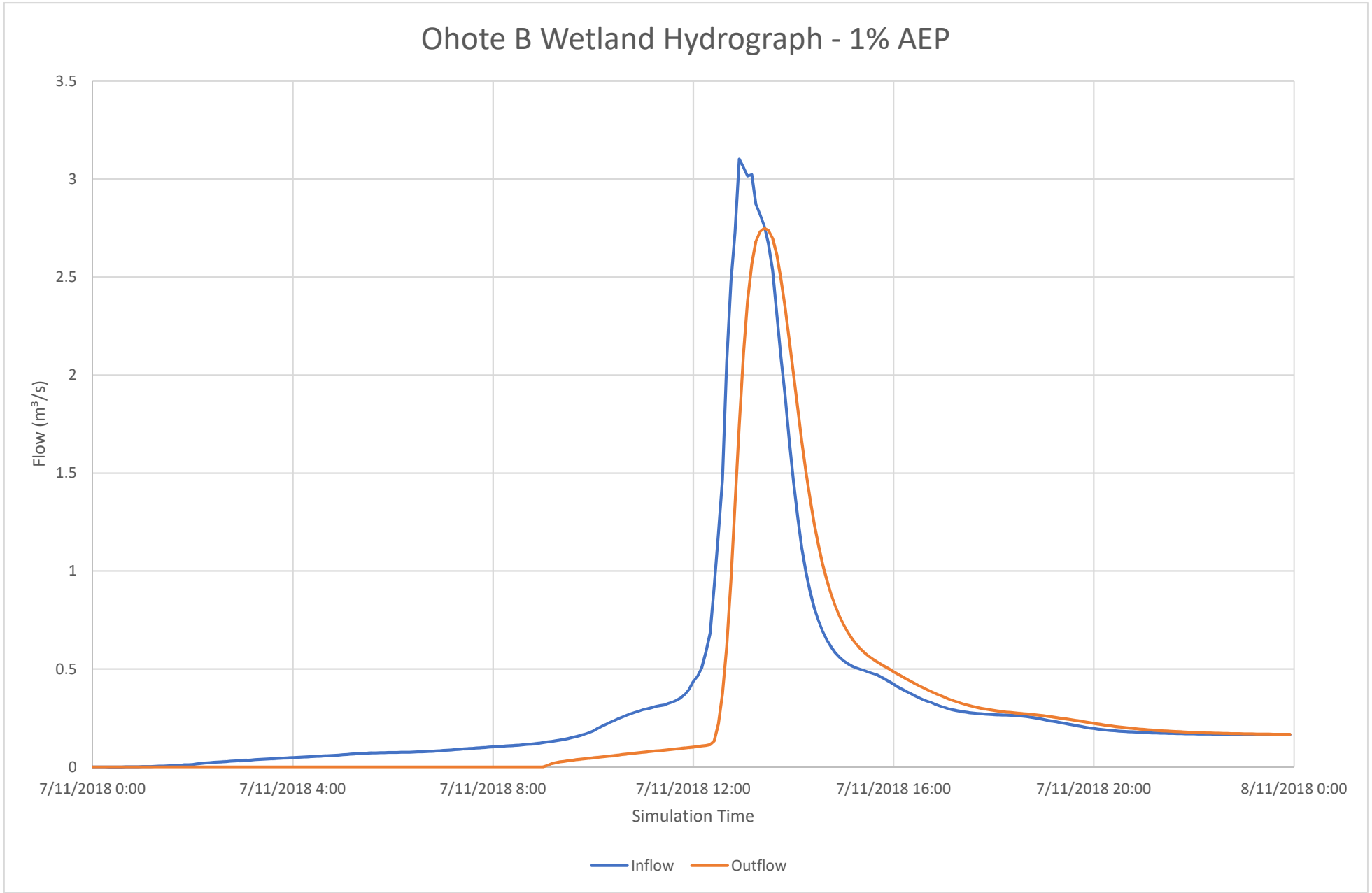

Mangaheka C Wetland Hydrograph - 10% AEP
0.6
0.5
0.4
0.3
0.2
0.1
0
Flow (m³/s)
7/11/2018 12:00 AM
7/11/2018 8:00 AM
7/11/2018 4:00 PM
8/11/2018 12:00 AM
8/11/2018 8:00 AM
8/11/2018 4:00 PM
9/11/2018 12:00 AM
Simulation Time
inflow
outflow

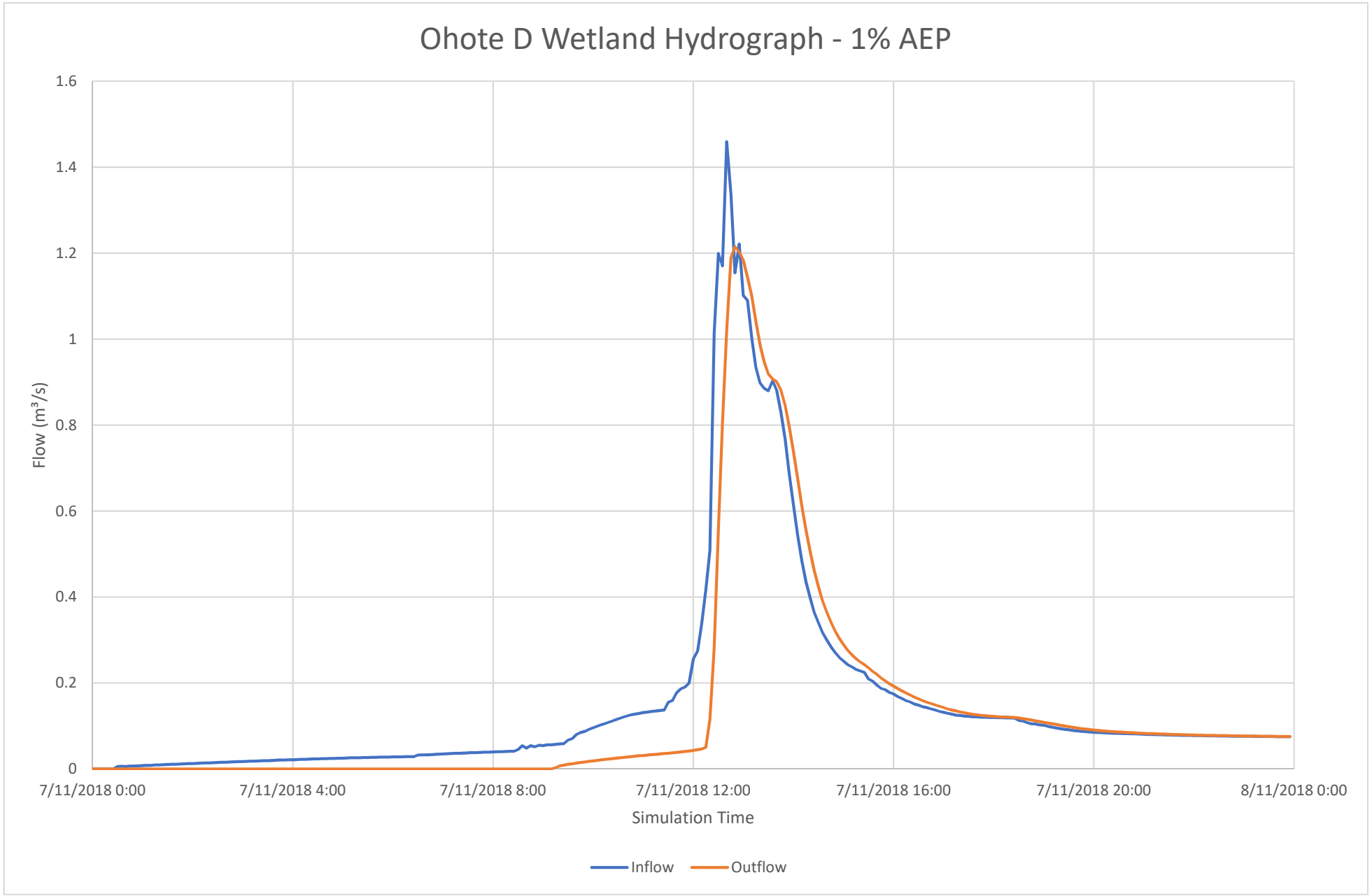

Rotokauri South A Wetland Hydrograph - 10% AEP
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Flow (m³/s)
7/11/2018 12:00 AM
7/11/2018 8:00 AM
7/11/2018 4:00 PM
8/11/2018 12:00 AM
8/11/2018 8:00 AM
8/11/2018 4:00 PM
9/11/2018 12:00 AM
Simulation Time
Inflow
Outflow

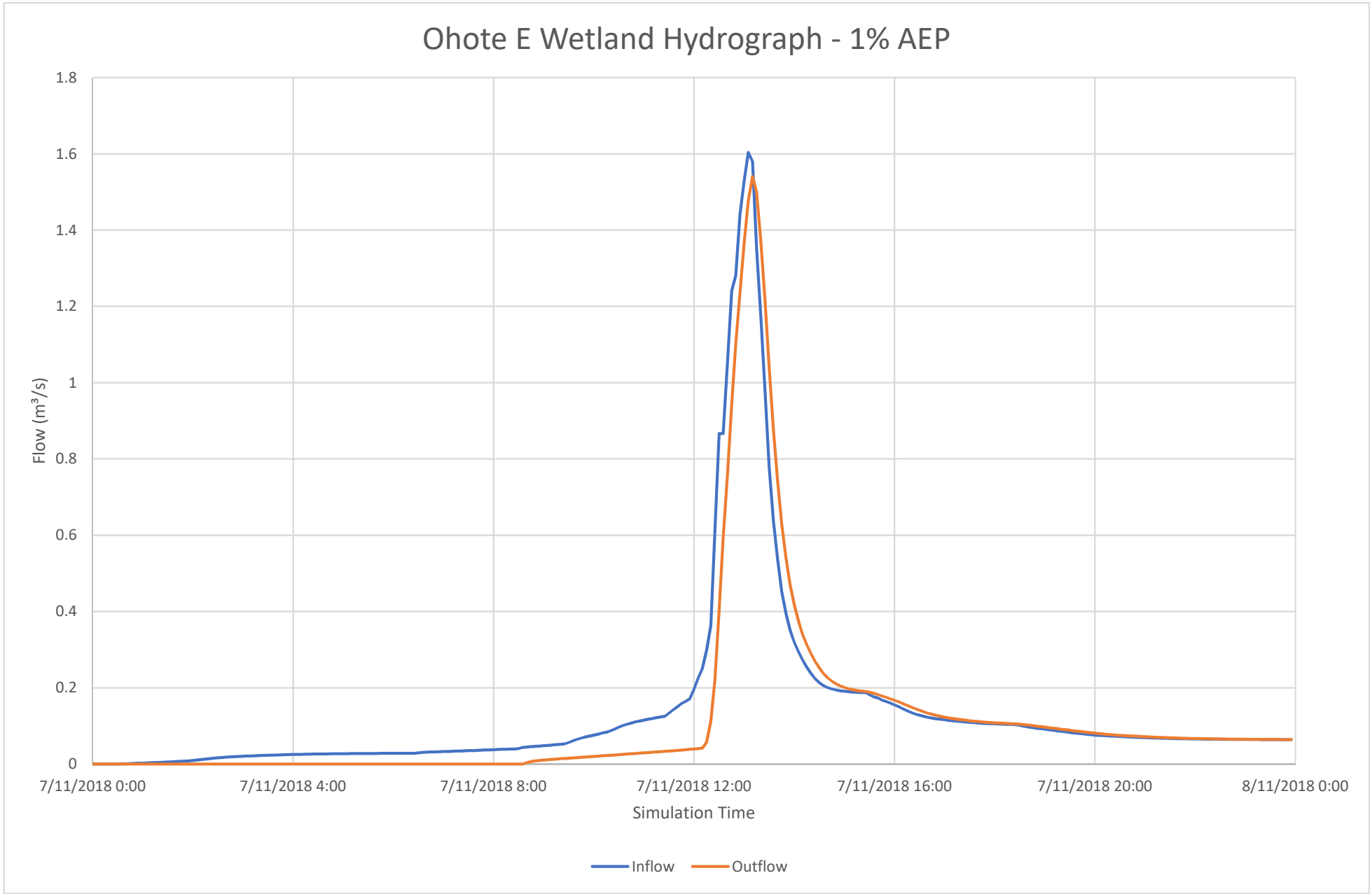

Rotokauri South B Wetland Hydrograph - 10% AEP
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Flow (m³/s)
7/11/2018 12:00 AM
7/11/2018 8:00 AM
7/11/2018 4:00 PM
8/11/2018 12:00 AM
8/11/2018 8:00 AM
8/11/2018 4:00 PM
9/11/2018 12:00 AM
Simulation Time
Inflow
Outflow

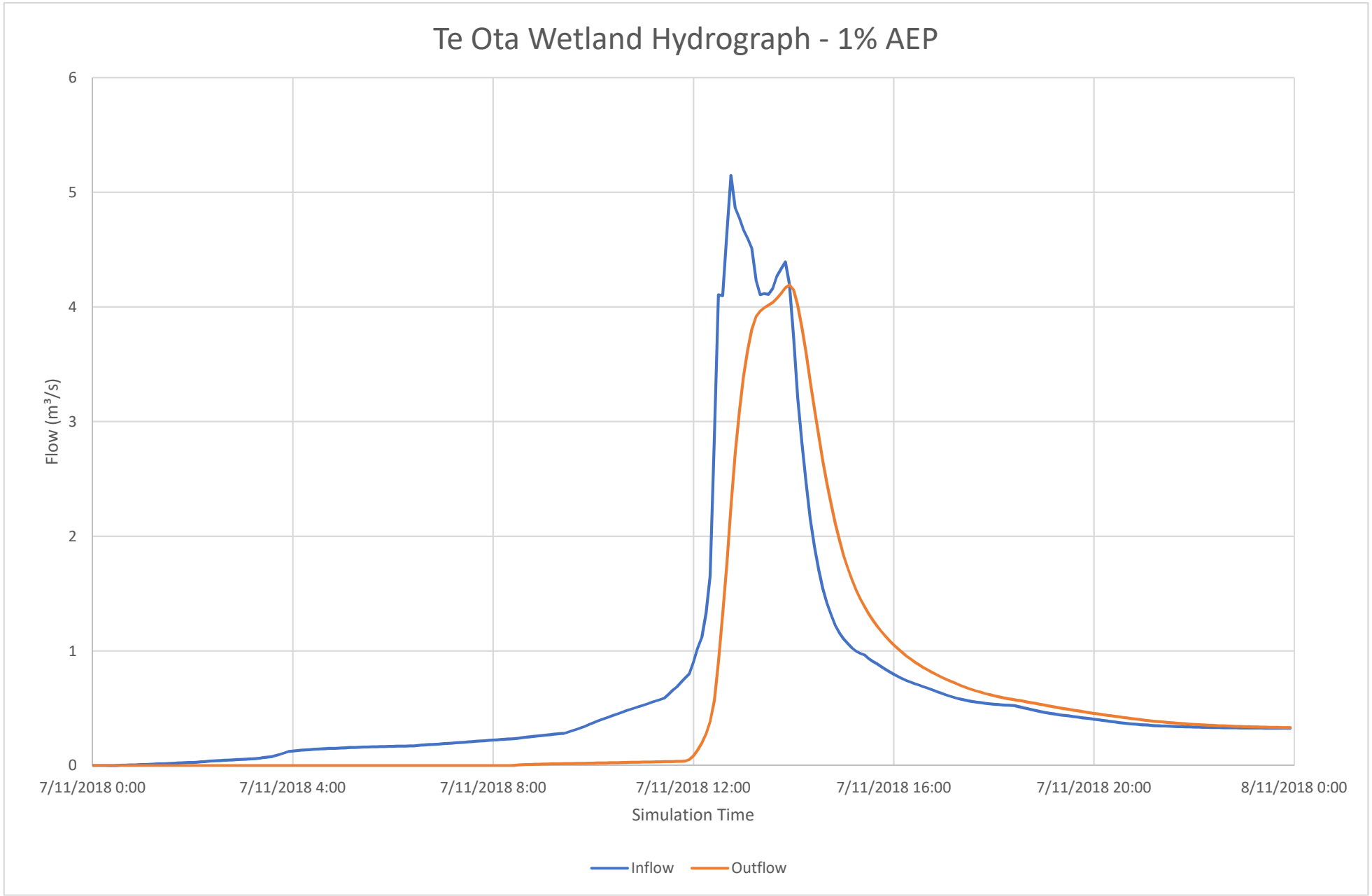

Rotokauri South C Wetland Hydrograph - 10% AEP
0.12
0.1
0.08
0.06
0.04
0.02
0
Flow (m³/s)
7/11/2018 12:00 AM
7/11/2018 8:00 AM
7/11/2018 4:00 PM
8/11/2018 12:00 AM
8/11/2018 8:00 AM
8/11/2018 4:00 PM
9/11/2018 12:00 AM
Simulation Time
Inflow
Outflow

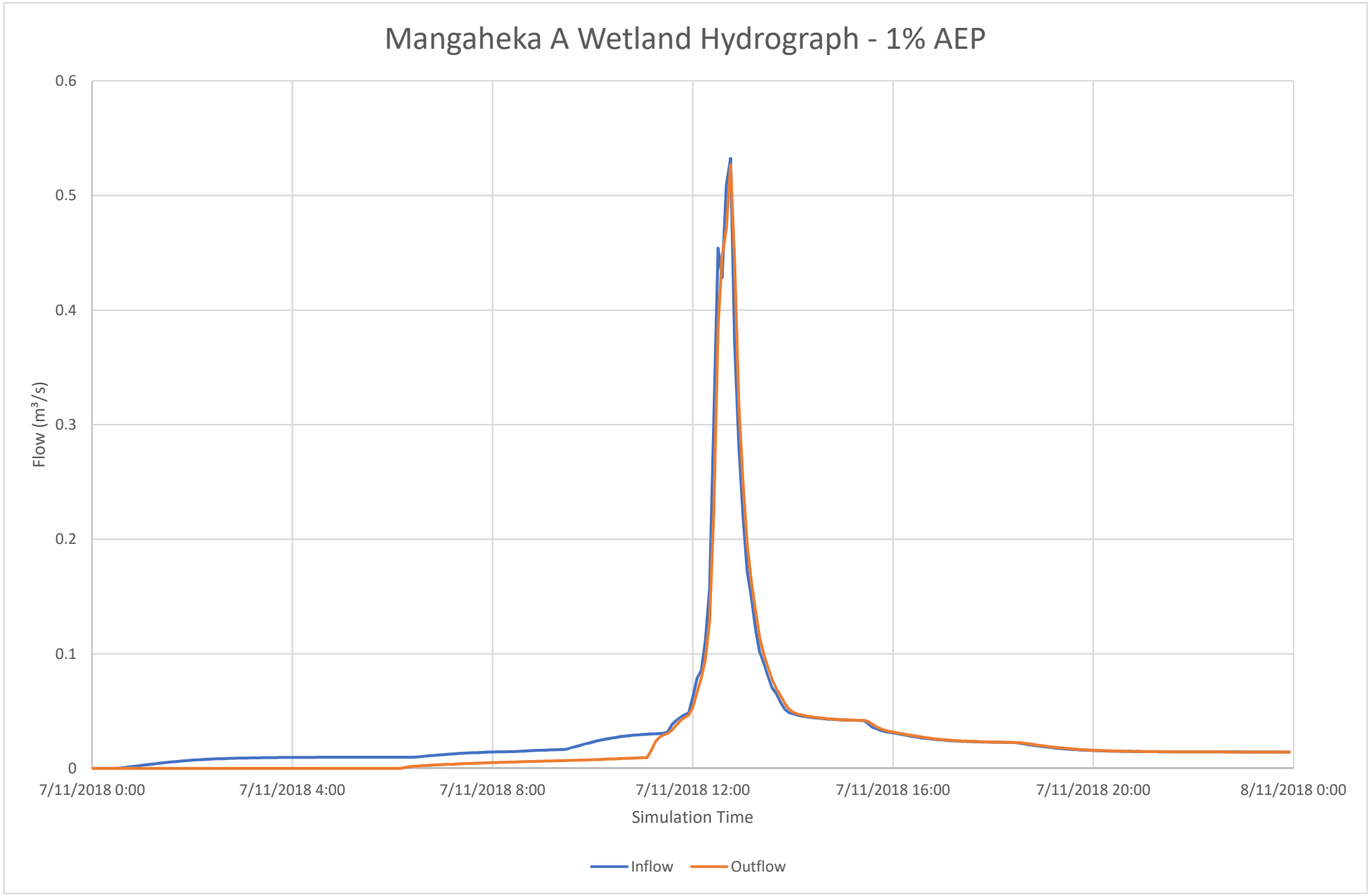

Ohote A Wetland Hydrograph - 1% AEP
Flow (m³/s)
4
3.5
3
2.5
2
1.5
1
0.5
0
7/11/2018 0:00
7/11/2018 4:00
7/11/2018 8:00
7/11/2018 12:00
7/11/2018 16:00
7/11/2018 20:00
8/11/2018 0:00
Simulation Time
Inflow
Outflow

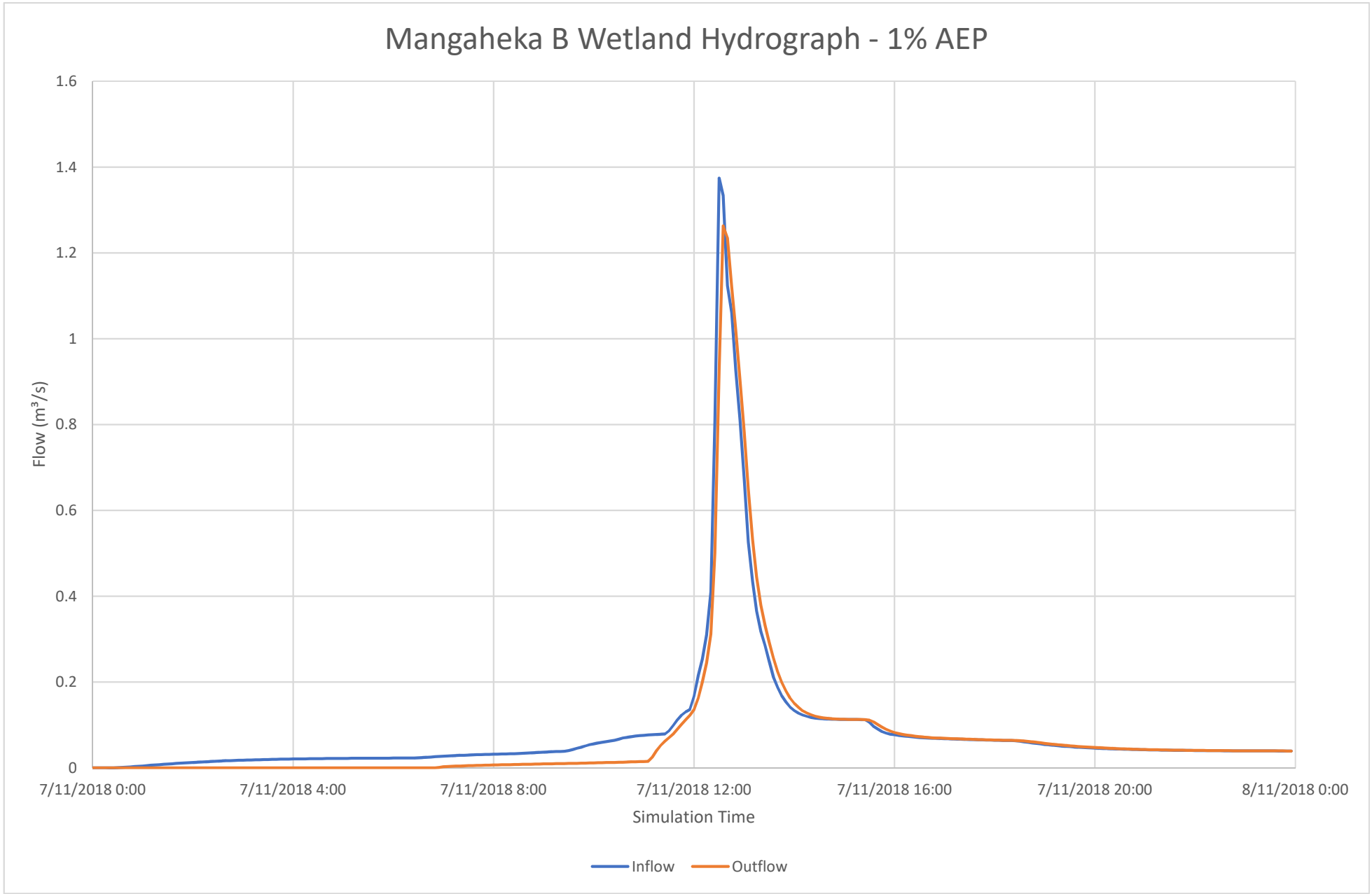

Ohote B Wetland Hydrograph - 1% AEP
3.5
3
2.5
2
1.5
1
0.5
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 4:00
7/11/2018 8:00
7/11/2018 12:00
7/11/2018 16:00
7/11/2018 20:00
8/11/2018 0:00
Simulation Time
Inflow
Outflow

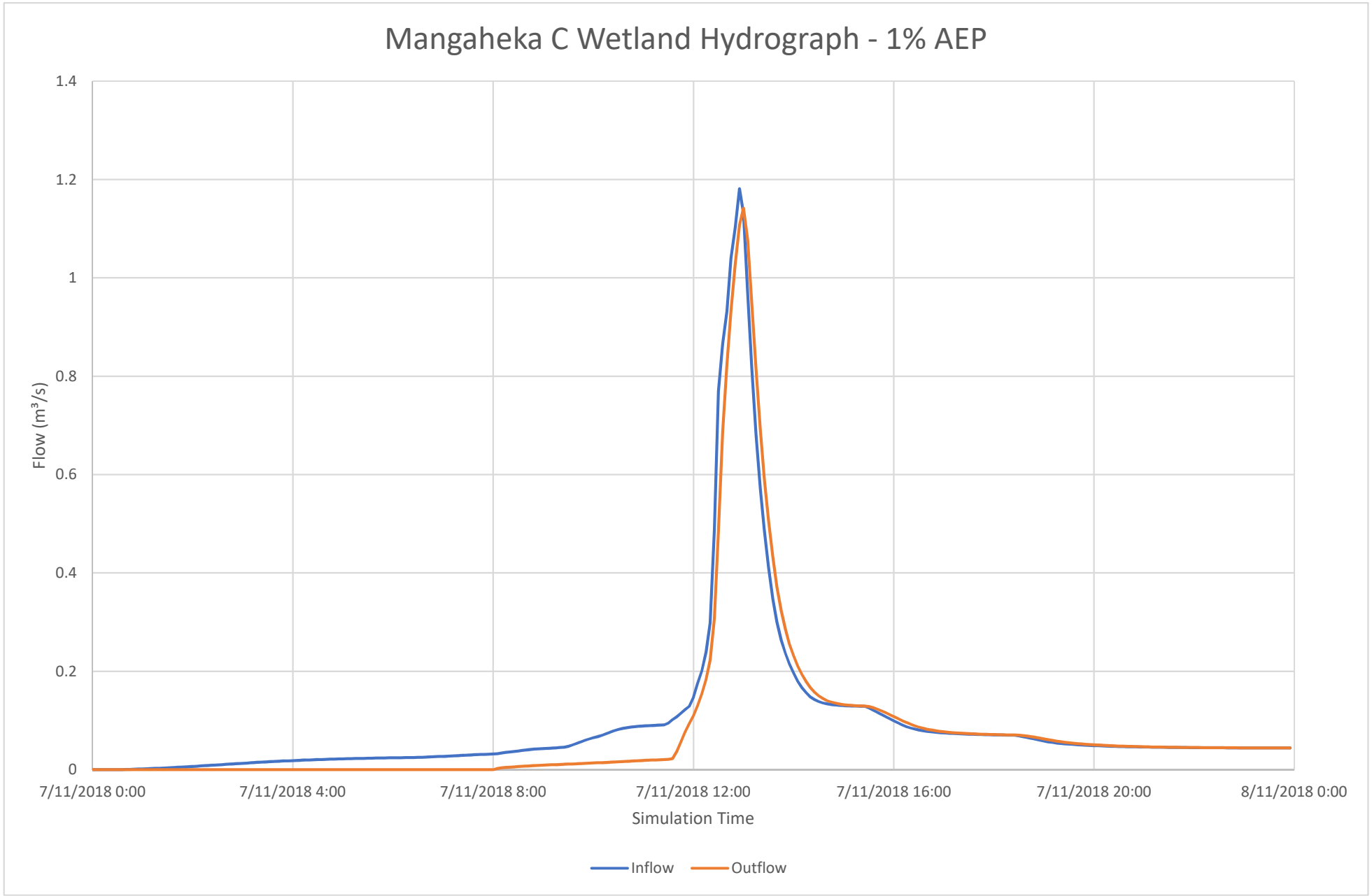

Ohote D Wetland Hydrograph - 1% AEP
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 4:00
7/11/2018 8:00
7/11/2018 12:00
7/11/2018 16:00
7/11/2018 20:00
8/11/2018 0:00
Simulation Time
Inflow
Outflow

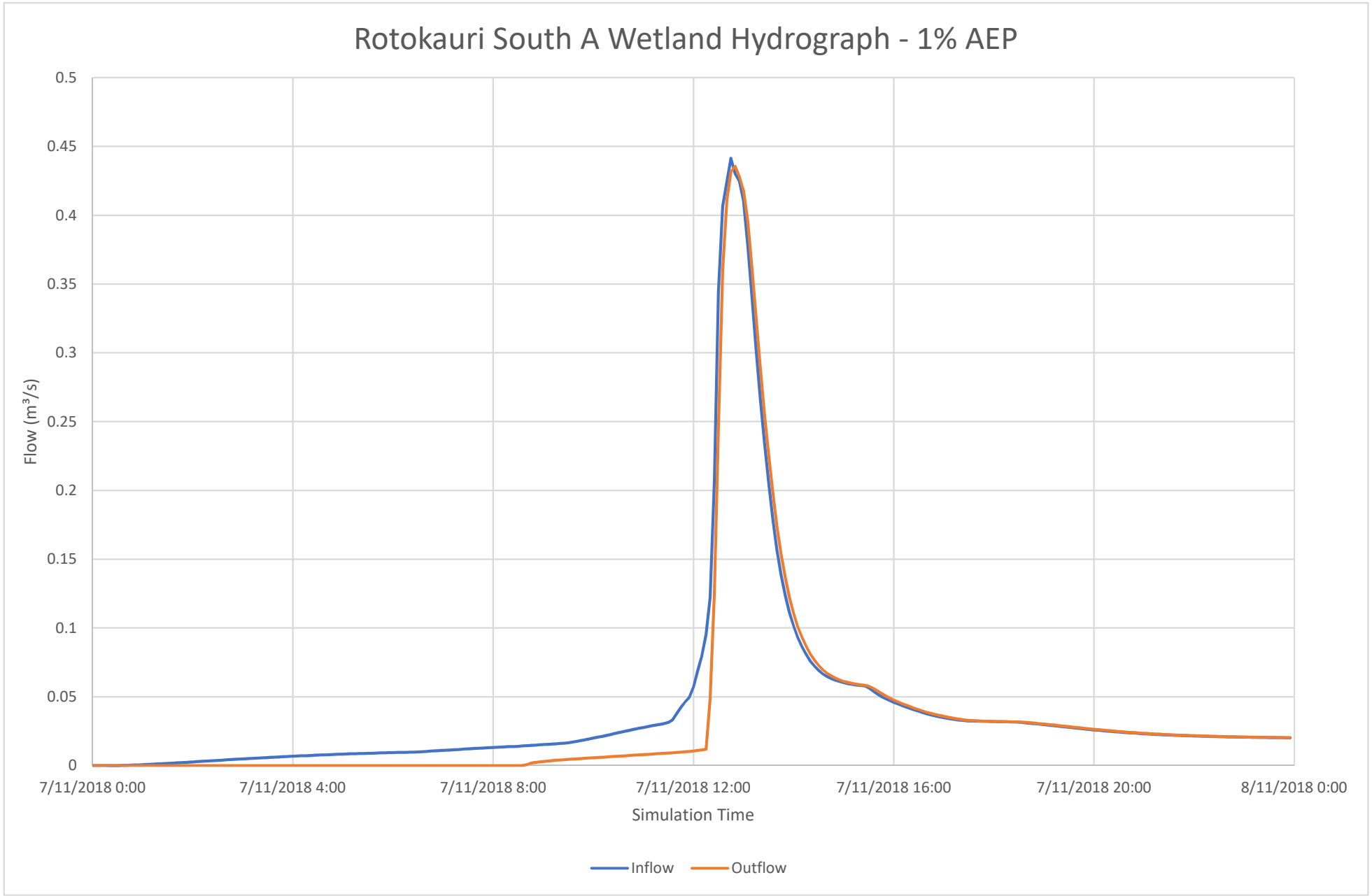

Ohote E Wetland Hydrograph - 1% AEP
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 4:00
7/11/2018 8:00
7/11/2018 12:00
7/11/2018 16:00
7/11/2018 20:00
8/11/2018 0:00
Simulation Time
Inflow
Outflow

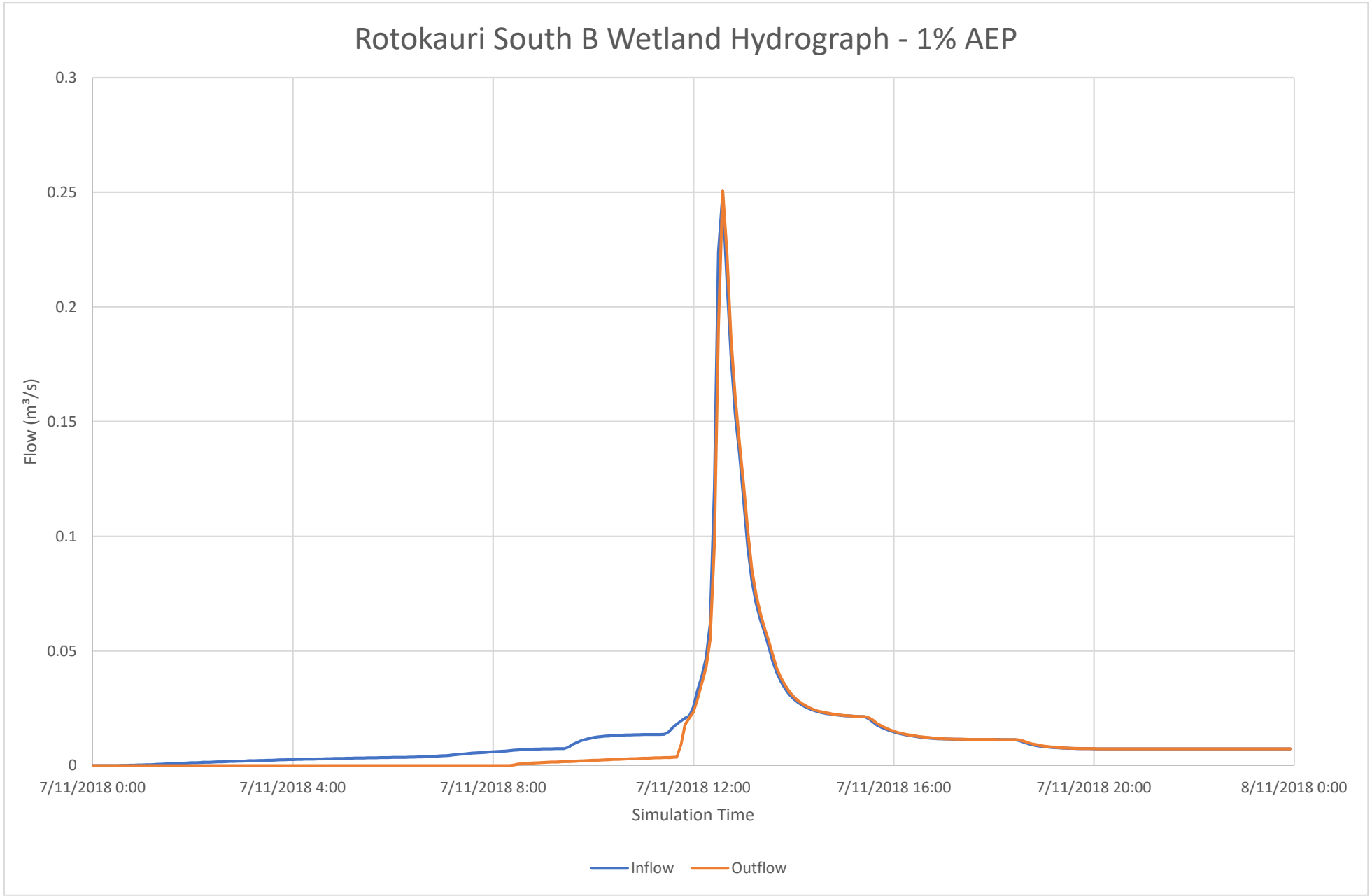

Te Ota Wetland Hydrograph - 1% AEP
6
5
4
3
2
1
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 4:00
7/11/2018 8:00
7/11/2018 12:00
7/11/2018 16:00
7/11/2018 20:00
8/11/2018 0:00
Simulation Time
Inflow
Outflow

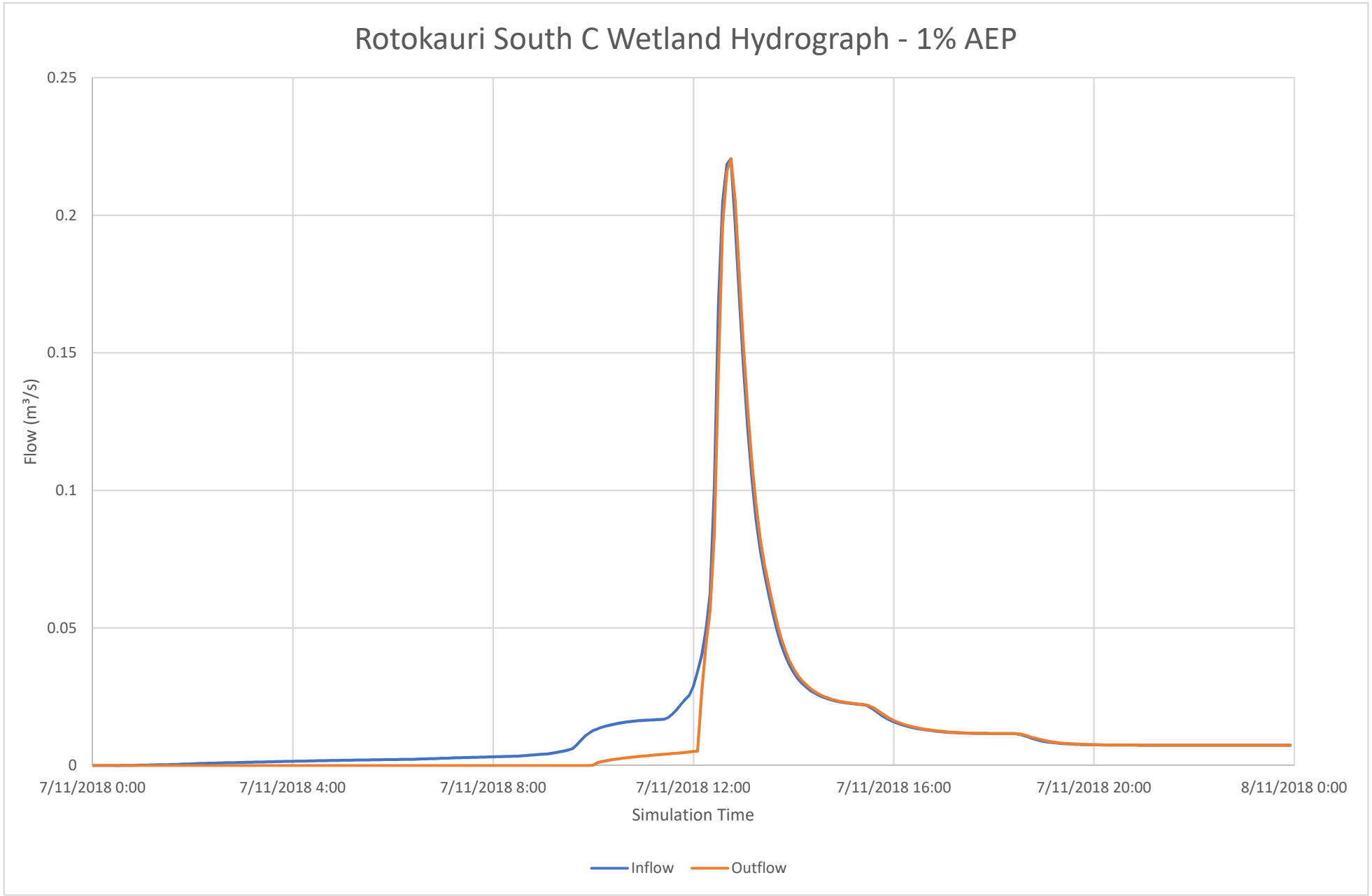

Mangaheka A Wetland Hydrograph - 1% AEP
0.6
0.5
0.4
0.3
0.2
0.1
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 4:00
7/11/2018 8:00
7/11/2018 12:00
7/11/2018 16:00
7/11/2018 20:00
8/11/2018 0:00
Simulation Time
Inflow
Outflow


Mangaheka B Wetland Hydrograph - 1% AEP
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 4:00
7/11/2018 8:00
7/11/2018 12:00
7/11/2018 16:00
7/11/2018 20:00
8/11/2018 0:00
Simulation Time
Inflow
Outflow


Mangaheka C Wetland Hydrograph - 1% AEP
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 4:00
7/11/2018 8:00
7/11/2018 12:00
7/11/2018 16:00
7/11/2018 20:00
8/11/2018 0:00
Simulation Time
Inflow
Outflow


Rotokauri South A Wetland Hydrograph - 1% AEP
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 4:00
7/11/2018 8:00
7/11/2018 12:00
7/11/2018 16:00
7/11/2018 20:00
8/11/2018 0:00
Simulation Time
Inflow
Outflow


Rotokauri South B Wetland Hydrograph - 1% AEP
0.3
0.25
0.2
0.15
0.1
0.05
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 4:00
7/11/2018 8:00
7/11/2018 12:00
7/11/2018 16:00
7/11/2018 20:00
8/11/2018 0:00
Simulation Time
Inflow
Outflow


Rotokauri South C Wetland Hydrograph - 1% AEP
0.25
0.2
0.15
0.1
0.05
0
Flow (m³/s)
7/11/2018 0:00
7/11/2018 4:00
7/11/2018 8:00
7/11/2018 12:00
7/11/2018 16:00
7/11/2018 20:00
8/11/2018 0:00
Simulation Time
Inflow
Outflow

APPENDIX G –SWALE HYDRAULIC RESULTS

1% AEP_{cc} Hydraulic Results

Ohote A Catchment

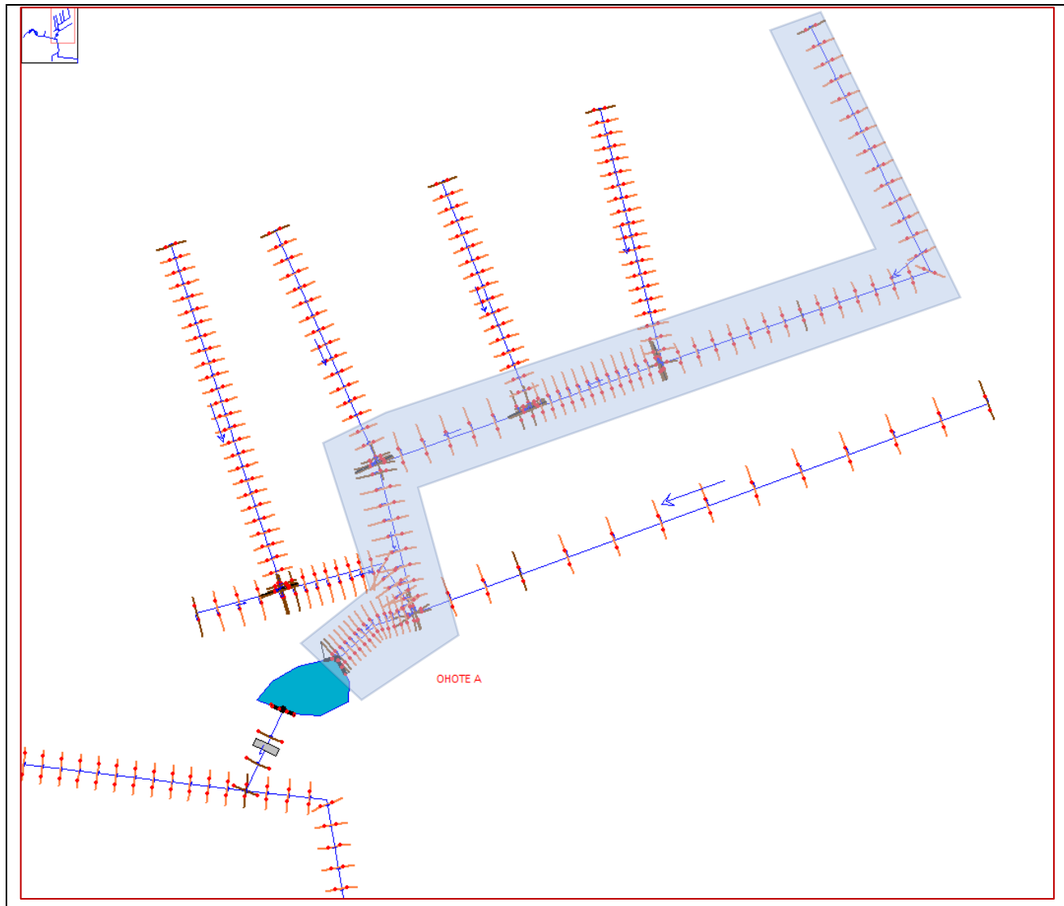


Figure 1 – Schematic Arrangement of Swale Network of Ohote A Wetland Contributing Area (Qualifying Development)

Critical hydraulic section shaded as per above.

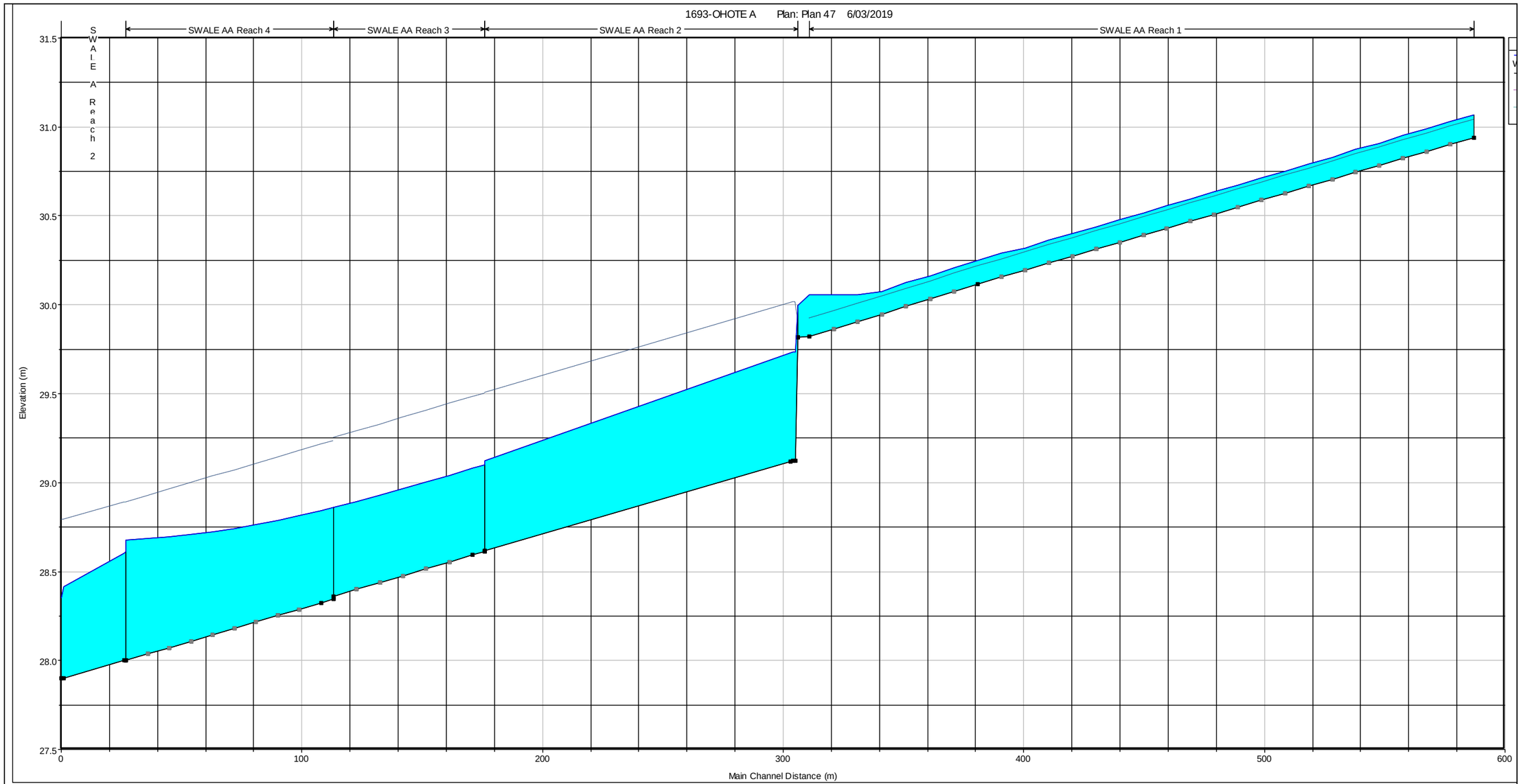


Figure 2 – Water Depth along Critical hydraulic section.

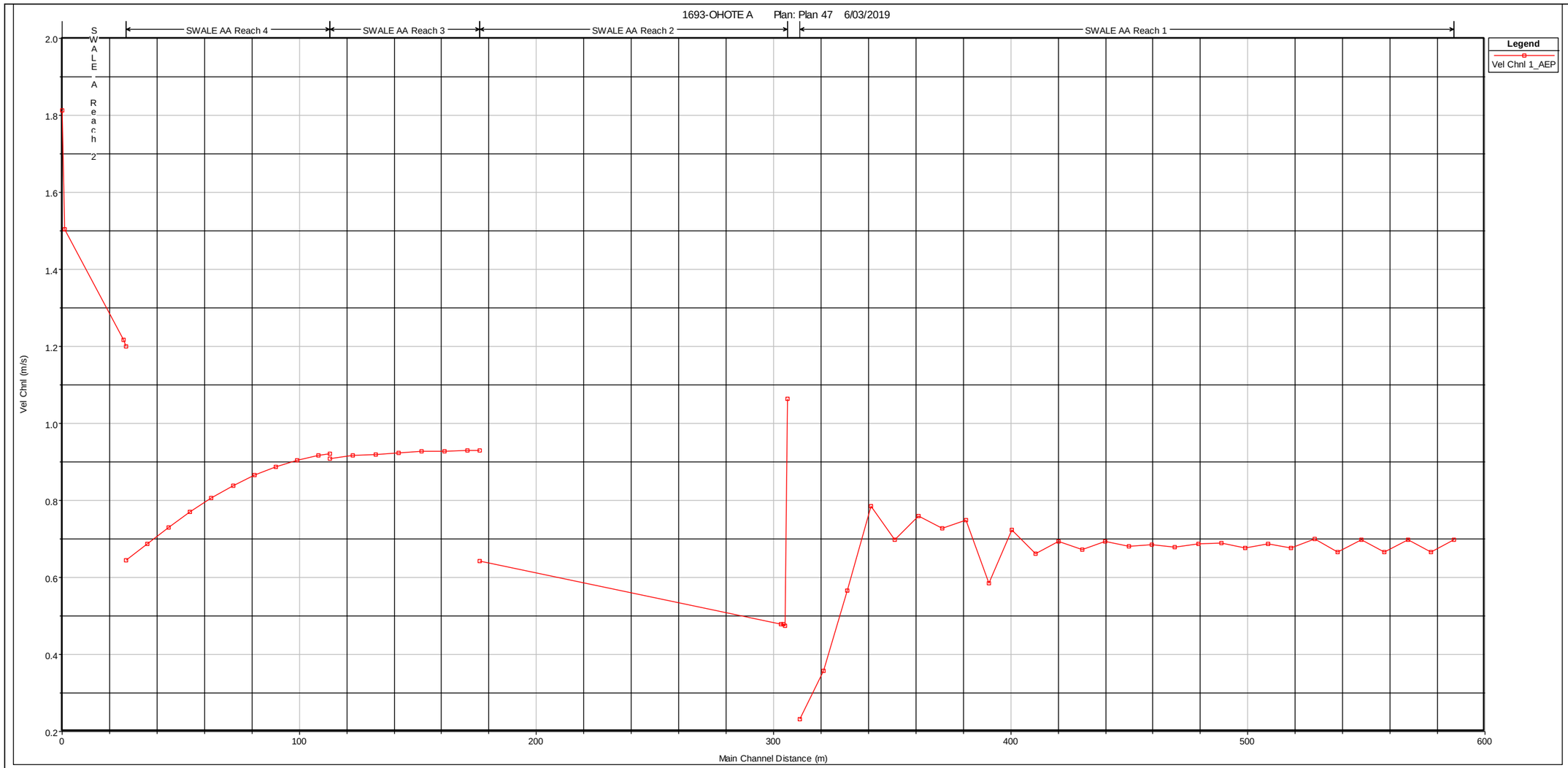


Figure 3 – Velocity Profile along Critical hydraulic section.

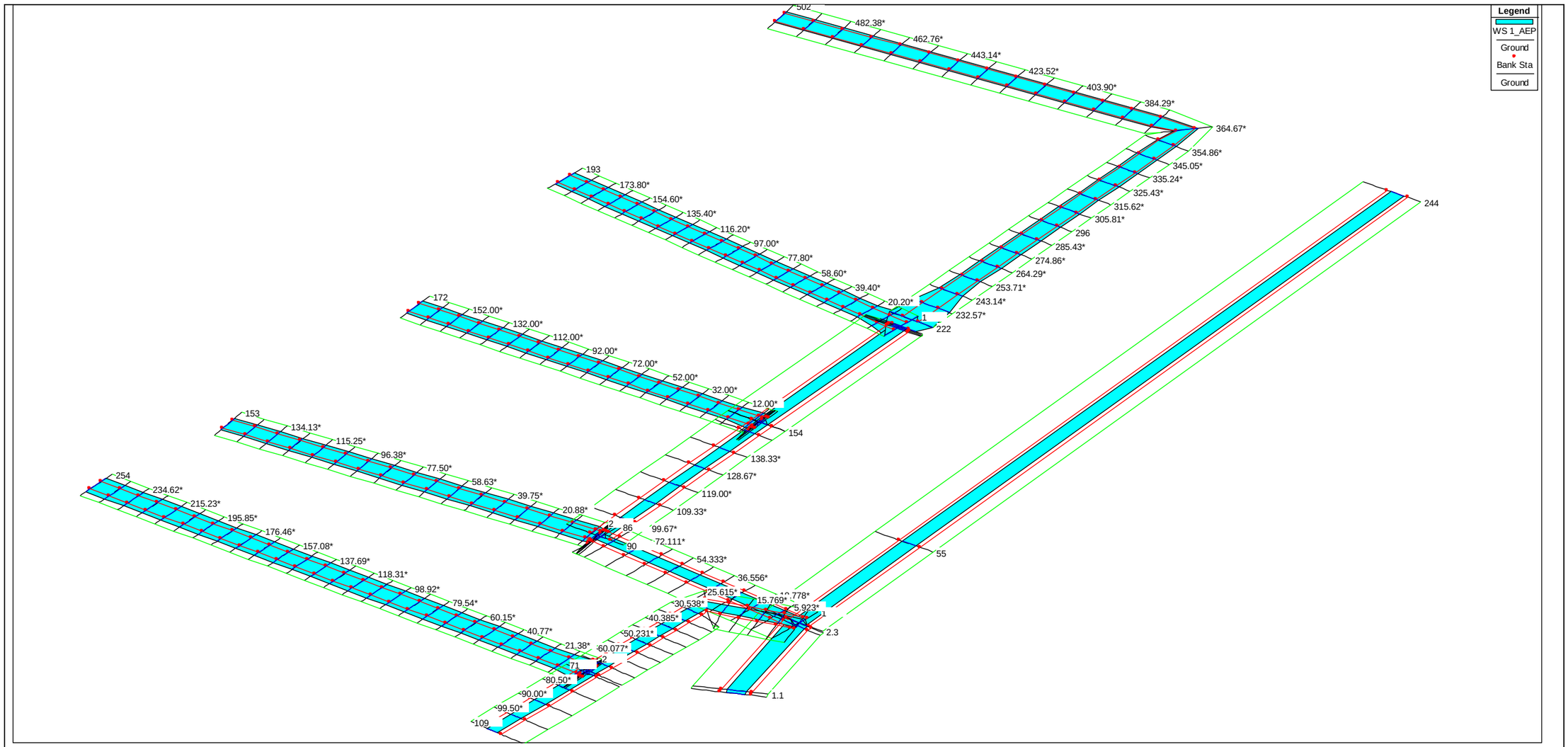


Figure 4 – 3D Water Depth Plot Ohote Swale and Channel Network

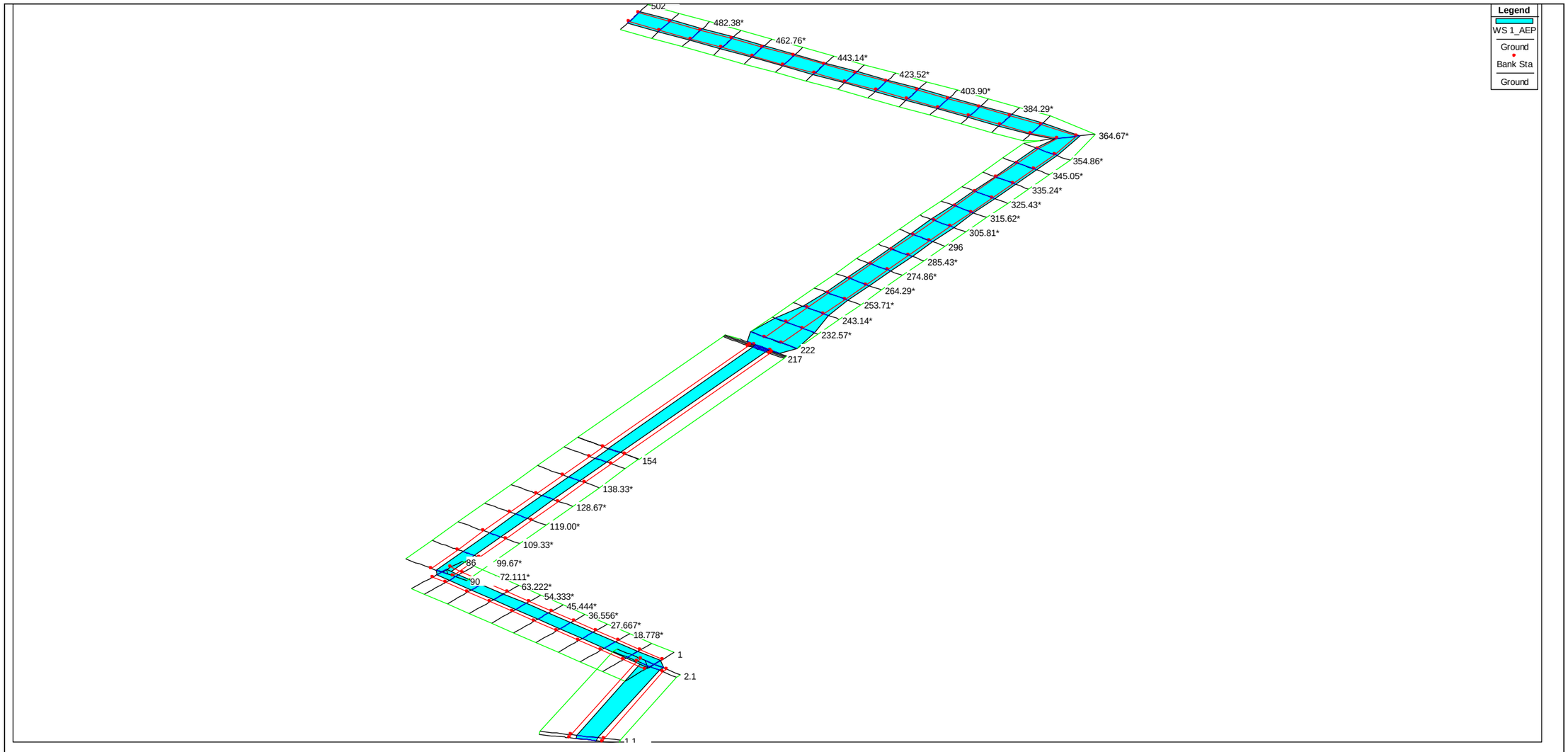


Figure 5 – 3D Water Depth Plot along critical hydraulic section.

Te Otamanui Catchment

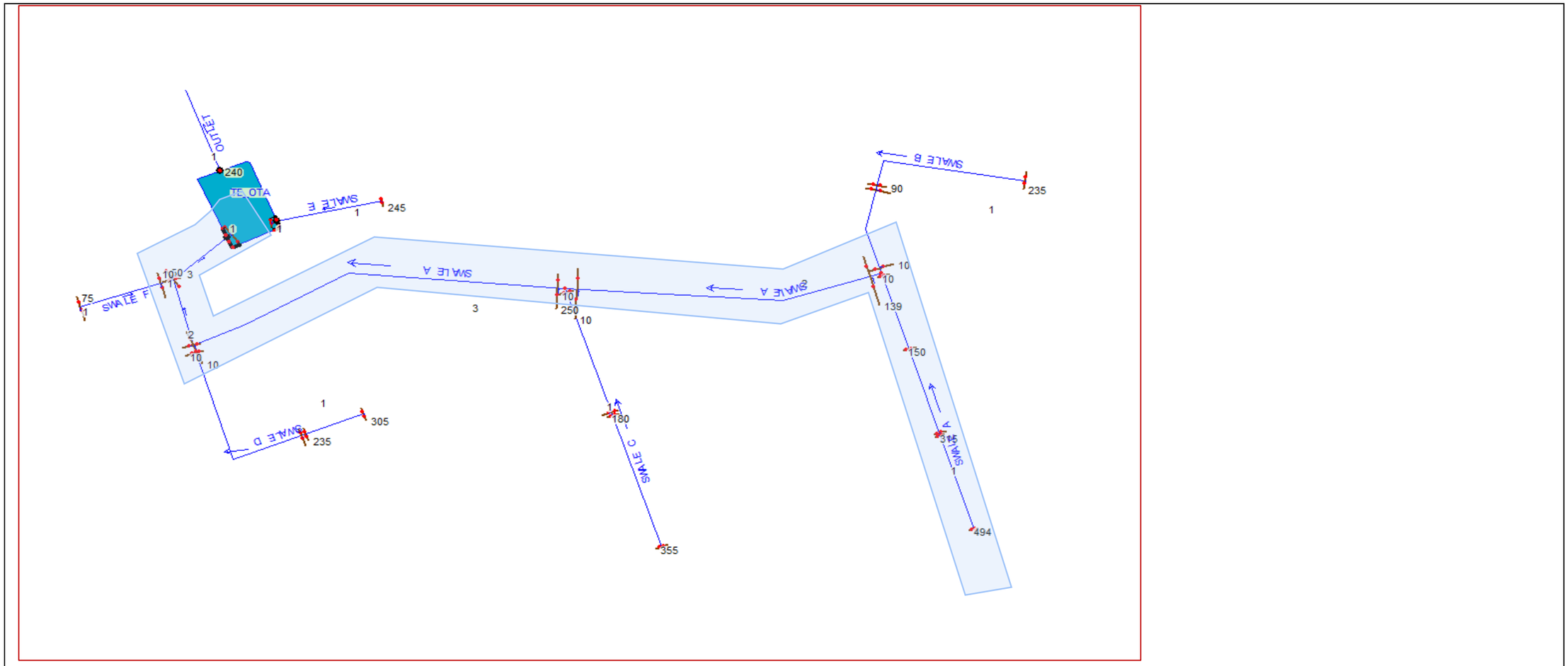


Figure 1 – Schematic Arrangement of Swale Network of Ohote A Wetland Contributing Area (Qualifying Development)

Critical hydraulic section shaded as per above.

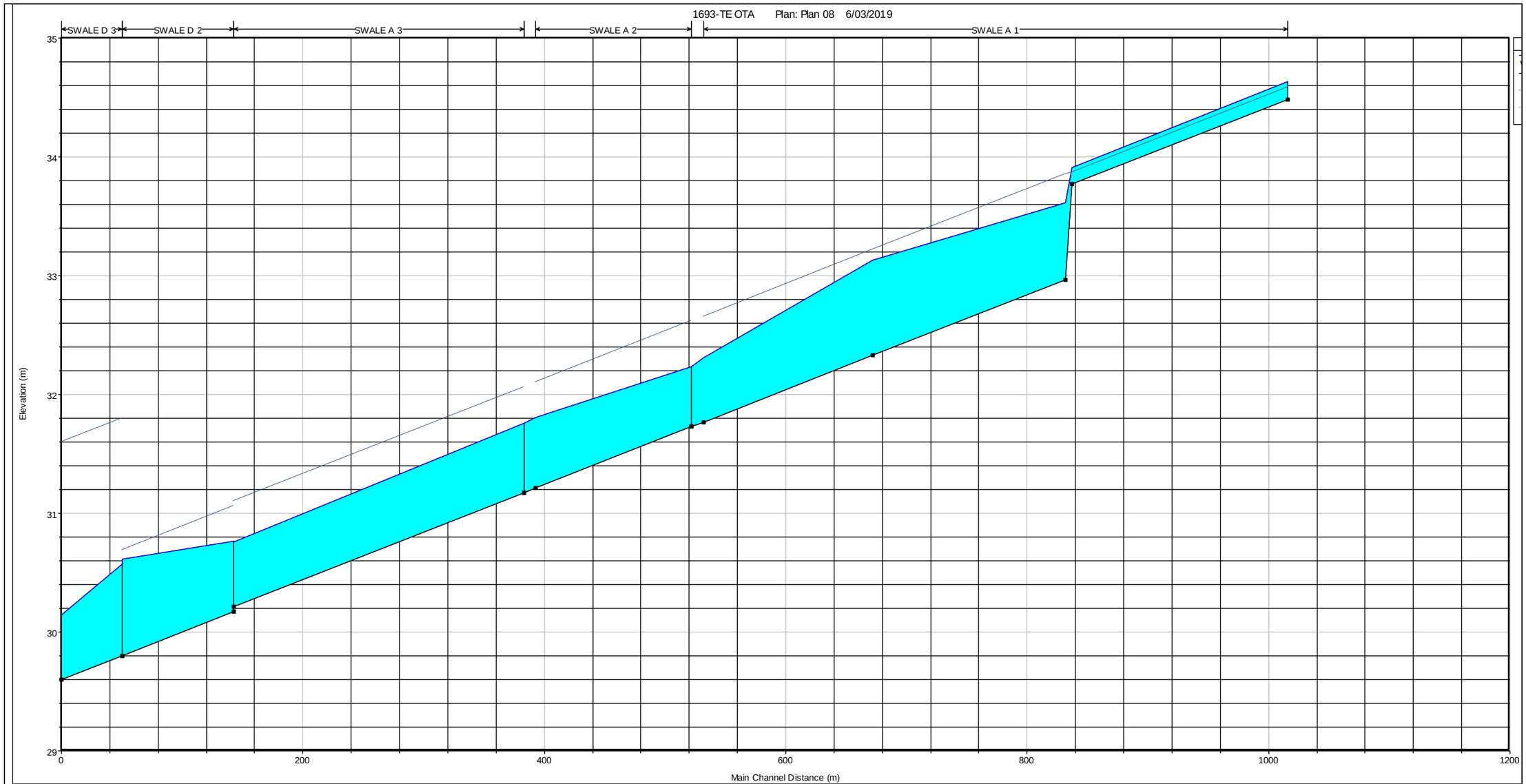


Figure 2 – Water Depth along Critical hydraulic section.

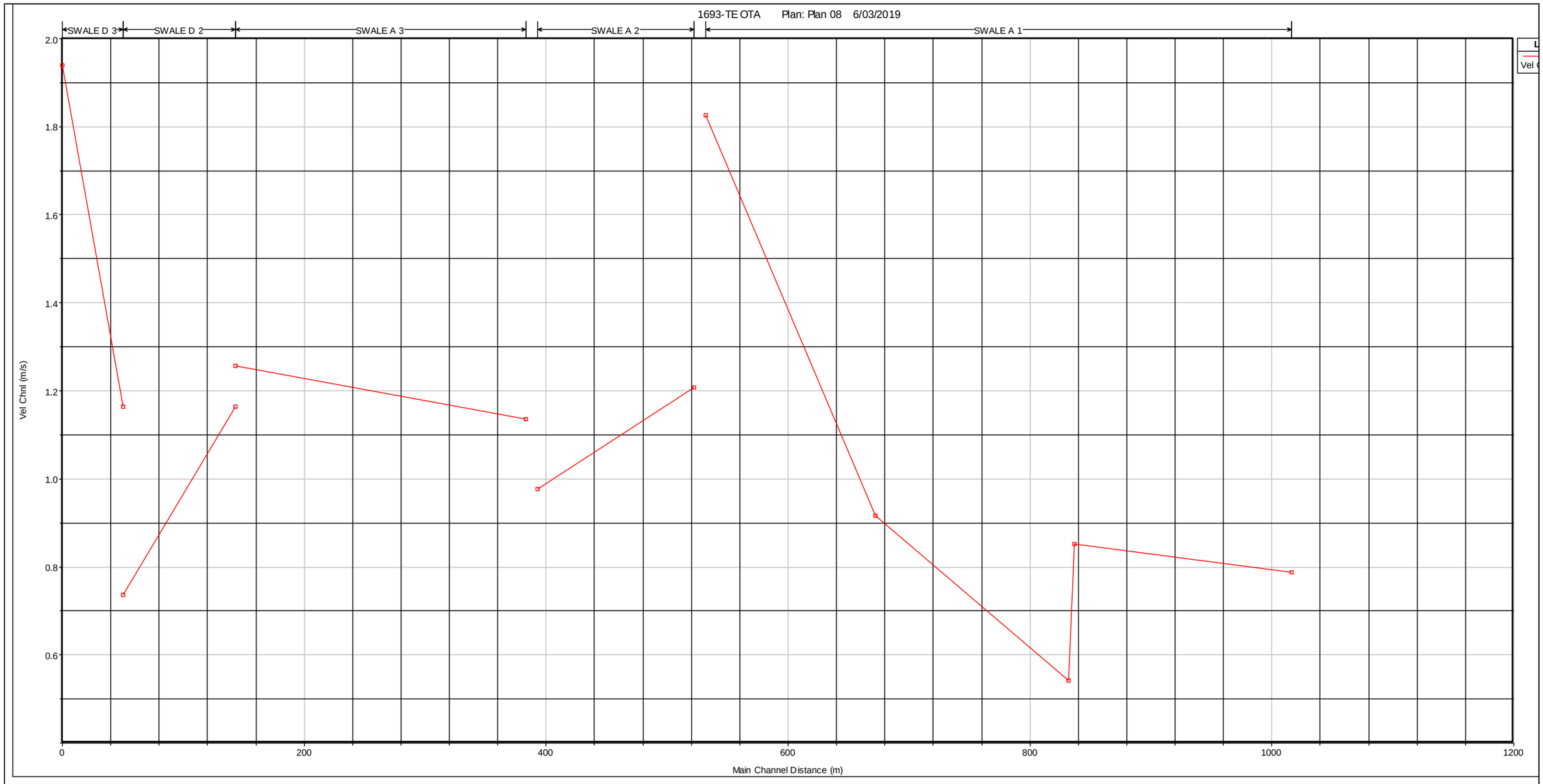


Figure 3 – Velocity Profile along Critical hydraulic section.

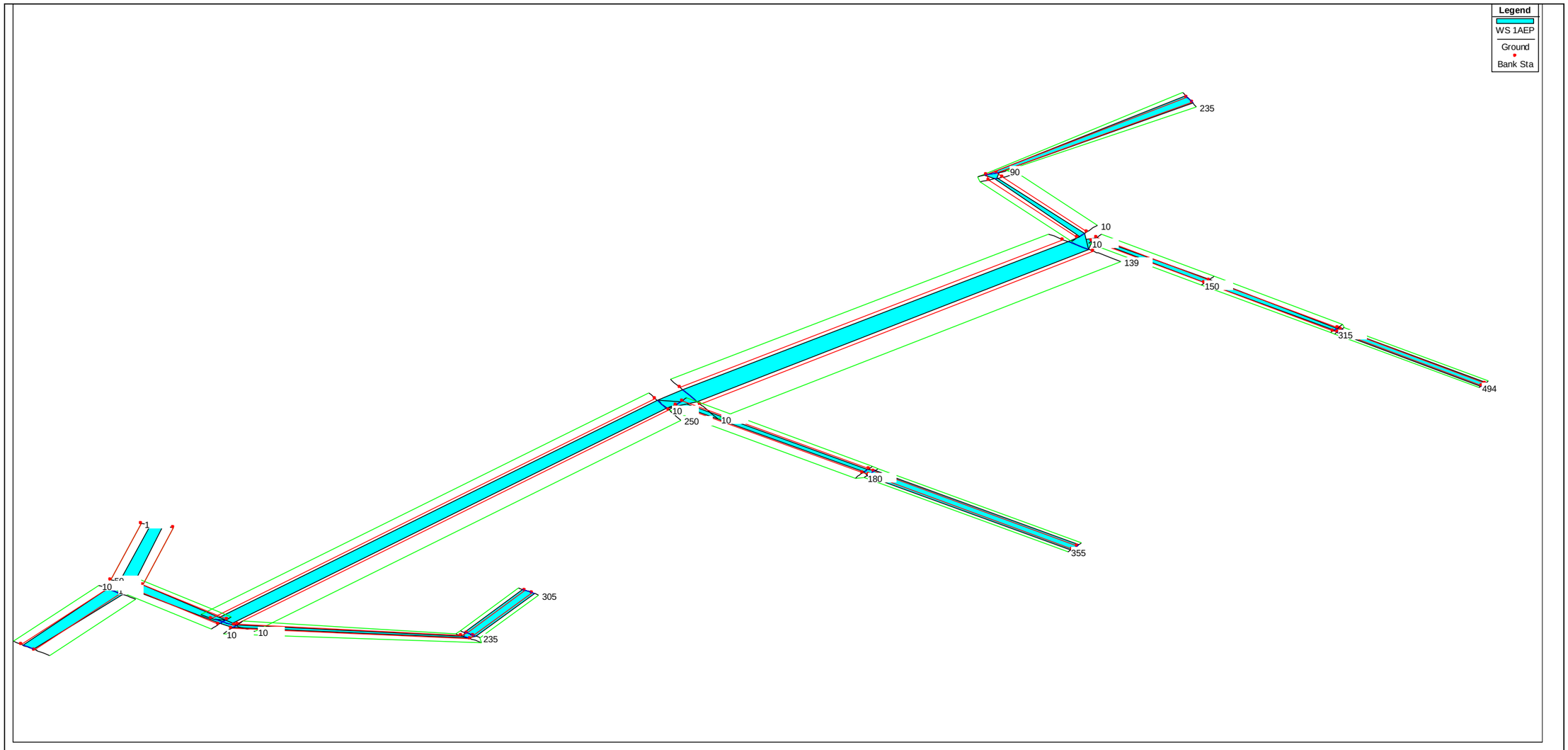


Figure 4 – 3D Water Depth Plot Te Otamanui Swale and Channel Network

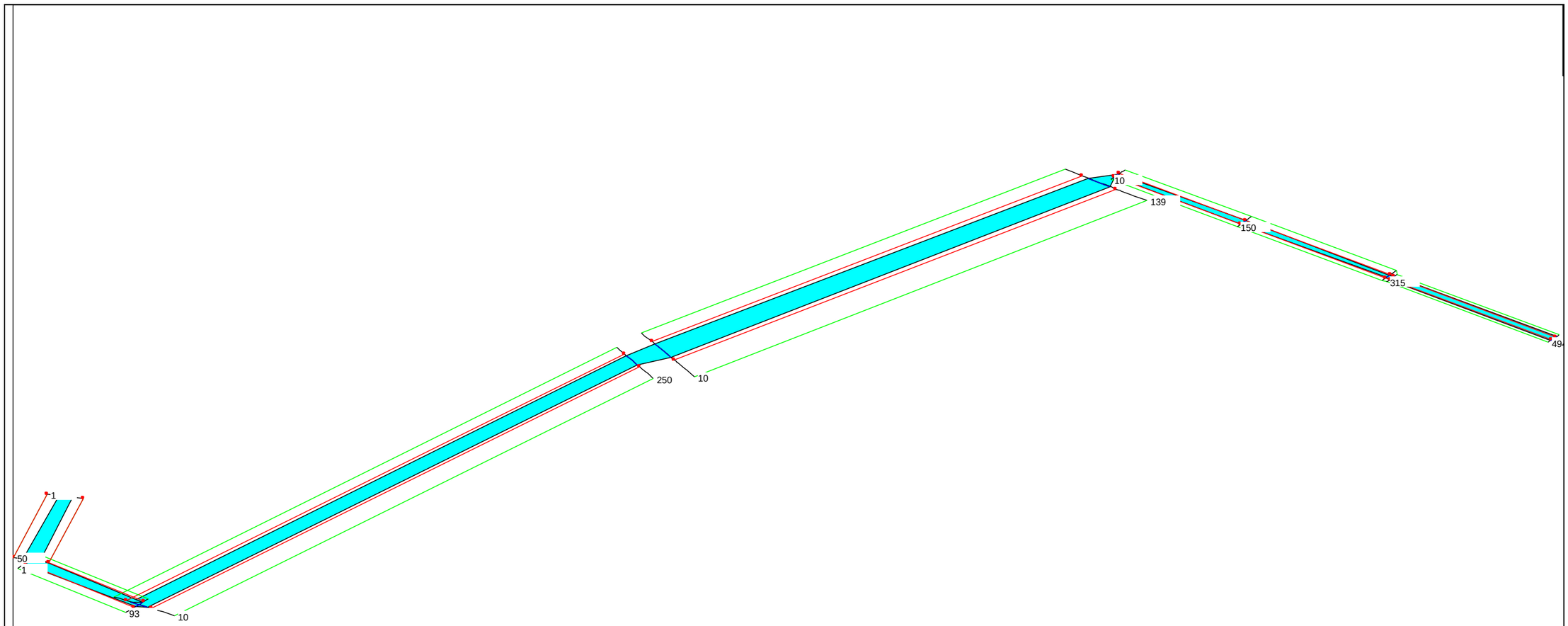


Figure 5 – 3D Water Depth Plot along critical hydraulic section.

APPENDIX H –OHOTE STREAM MODEL FIGURE



N

Legend

- Rotokauri North PPC Area
- WRC/HCC TA Boundary
- Ohote Stream Approximate Centre Line

Modeled Sections

- Sensitive
- Not Sensitive

Data License:
Data by Hamilton City Council and Land Information New Zealand is licensed under CC BY 4.0 NZ.

Map Projection:
NZGD2000 / Mount Eden 2000 (EPSG: 2105)

Drawn By:	FW	Date: 14/02/2019	Signed:
Checked By:		Date:	Signed:
Approved By:		Date:	Signed:
Plot Date:	14/02/2019		

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All dimensions to be checked; Do not scale from drawing.

Project:
Rotokauri North
Private Plan Change (PPC)
Greenseed Consultants Ltd

Title:
Sensitivity Analysis
Ohote Stream

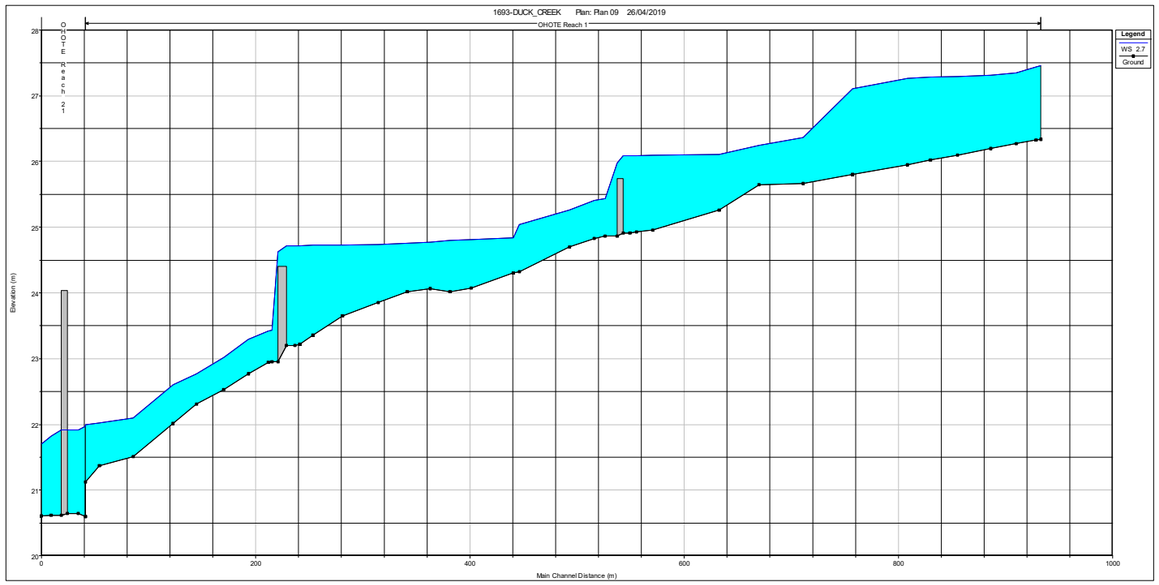
McKENZIE&Co CONSULTANTS LTD

Issue Status:	For Information
Project Number:	1693
Drawing Number:	340
Revision:	A
A3 Scale:	1:3500

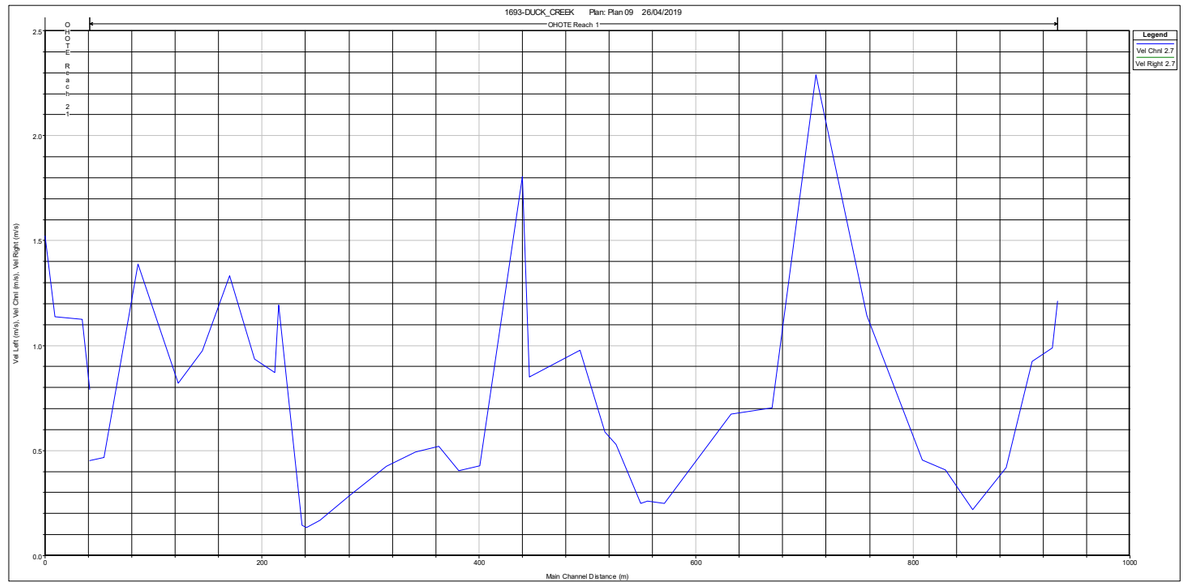
APPENDIX I – EXISTING OHOTE STREAM HYDRAULICS

BASE CASE (2.7 m³/s)

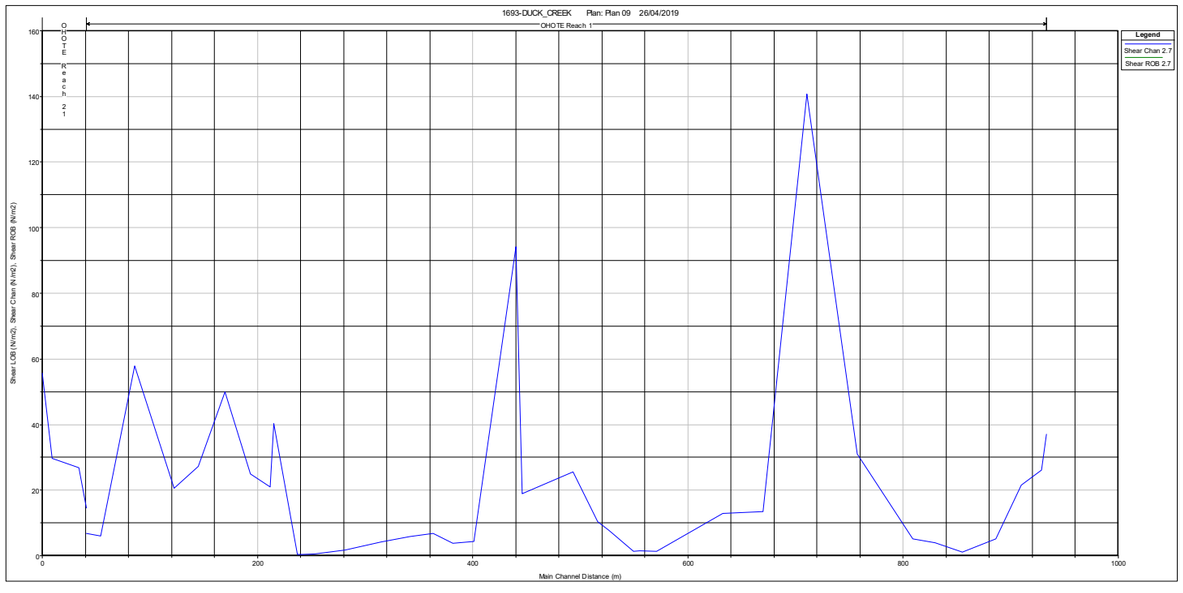
WATER SURFACE PROFILE



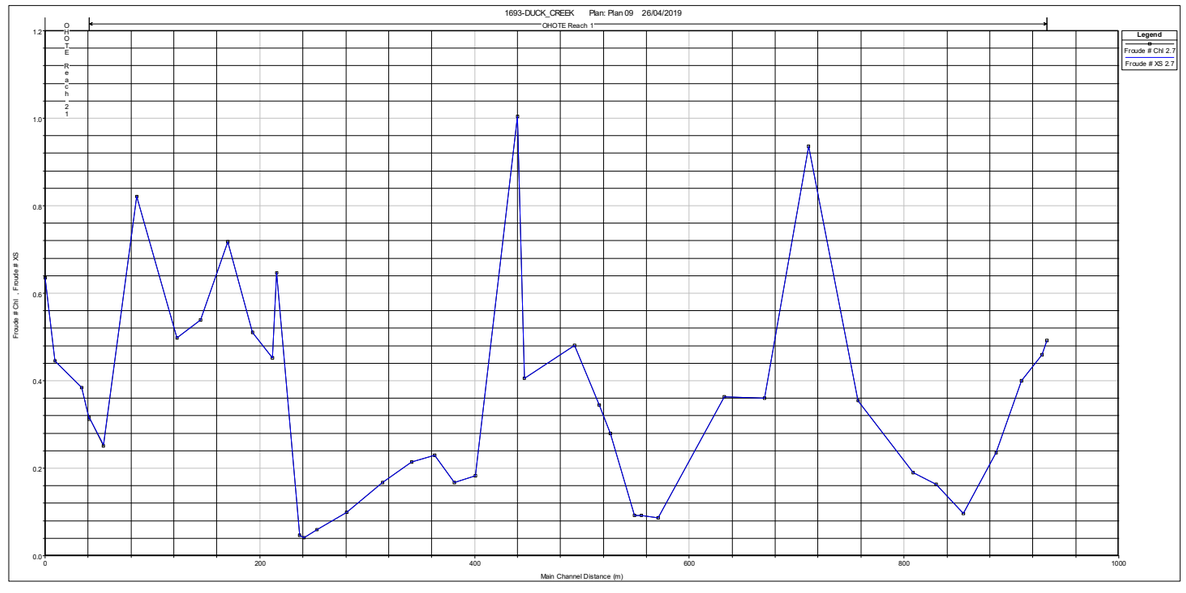
VELOCITY PROFILE



SHEAR STRESS PROFILE

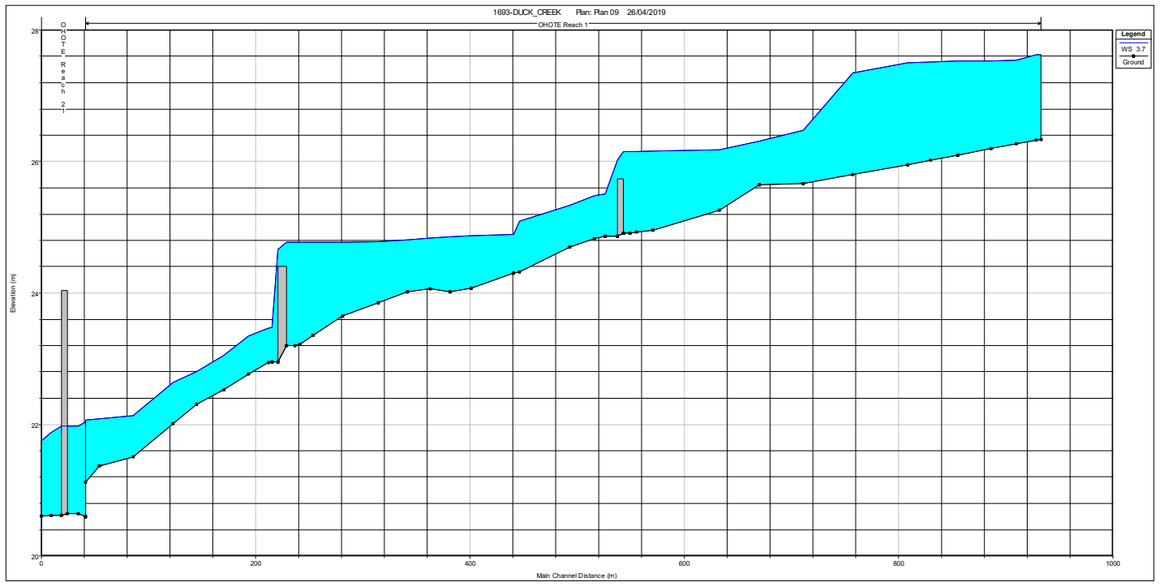


FROUDE NUMBER PROFILE

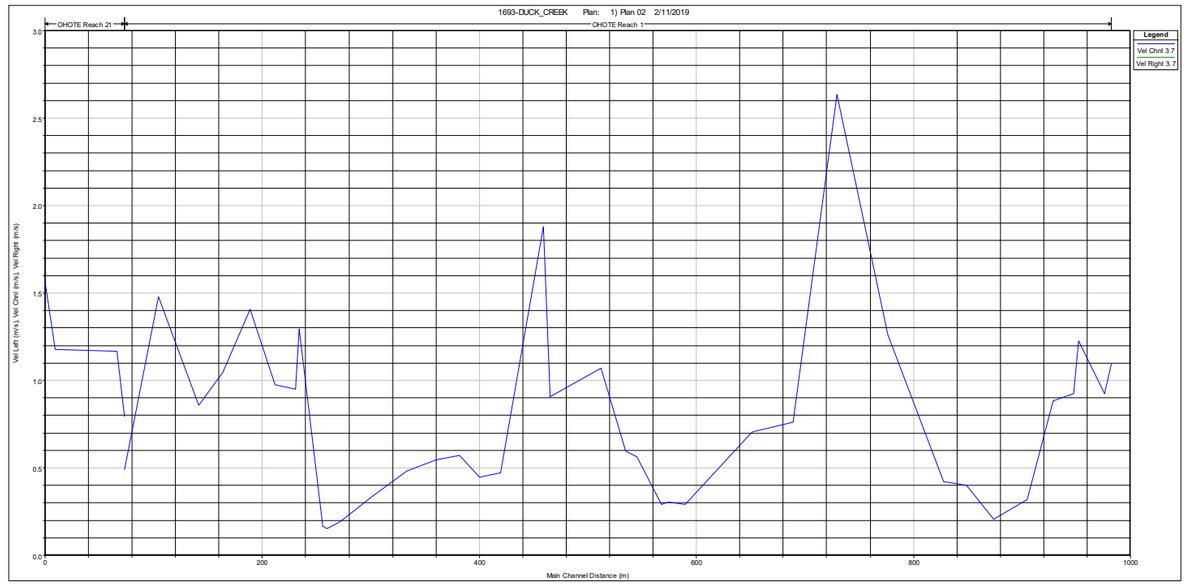


INTERMEDIATE CASE (3.7 m³/s)

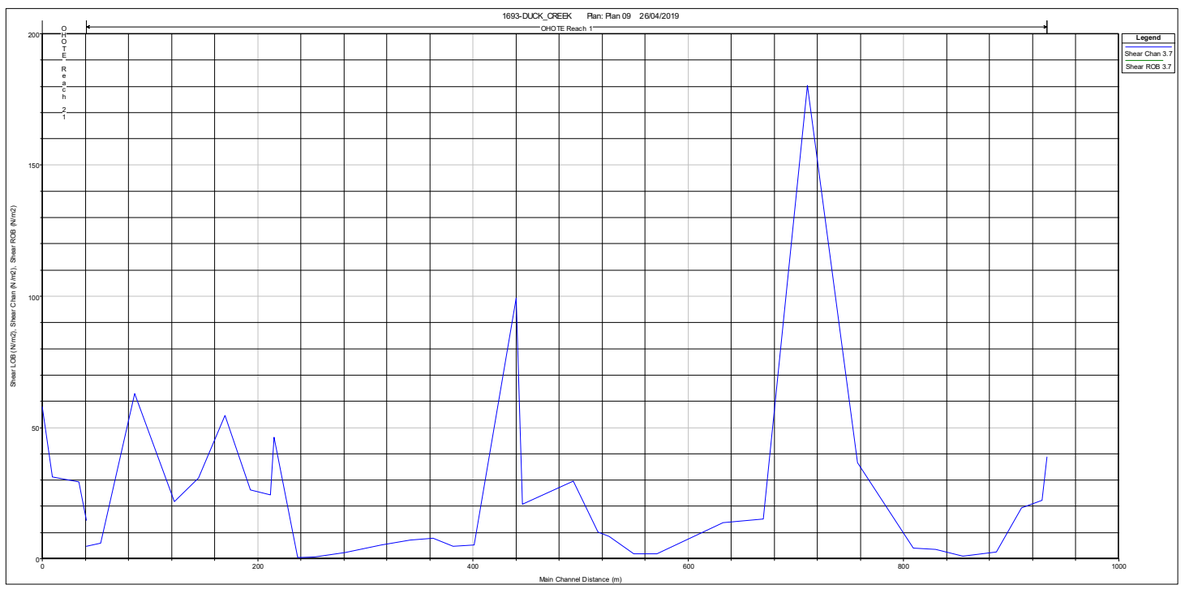
WATER SURFACE PROFILE



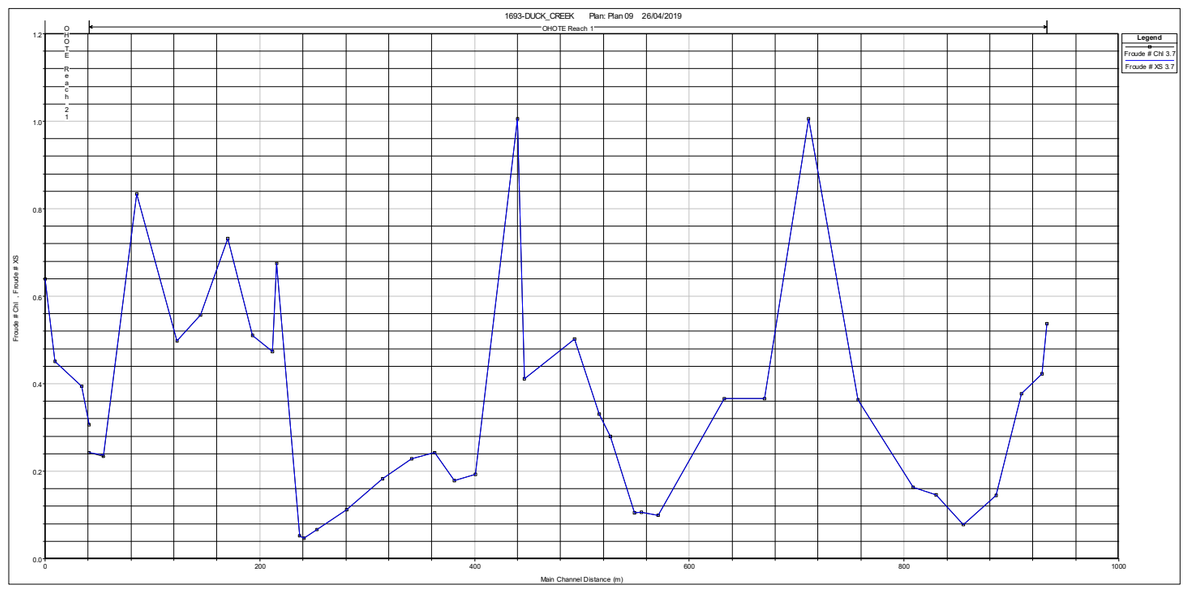
VELOCITY PROFILE



SHEAR STRESS PROFILE

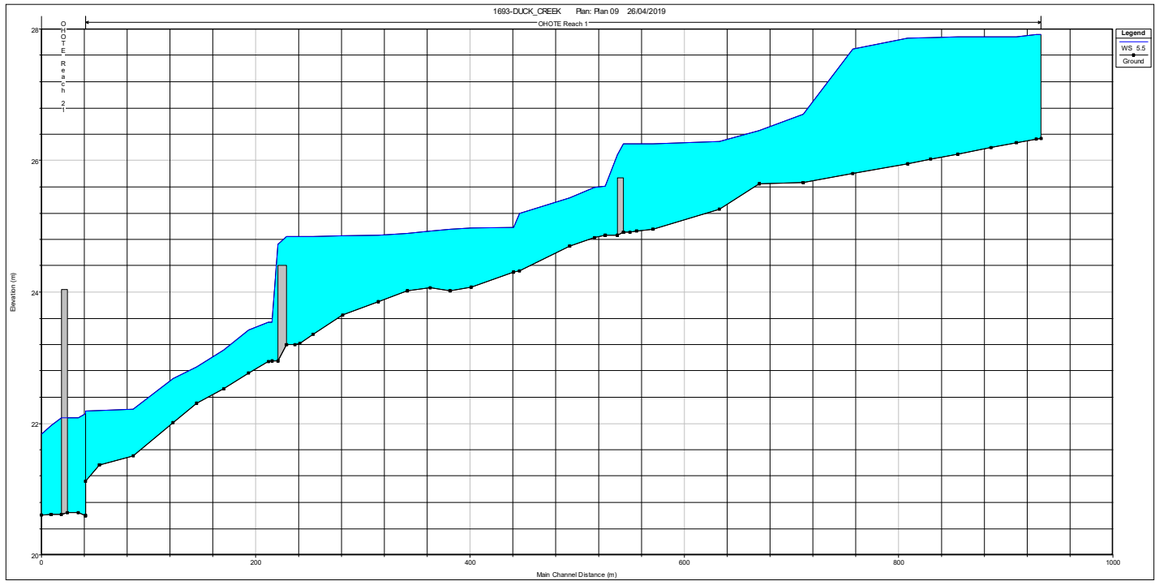


FROUDE NUMBER PROFILE

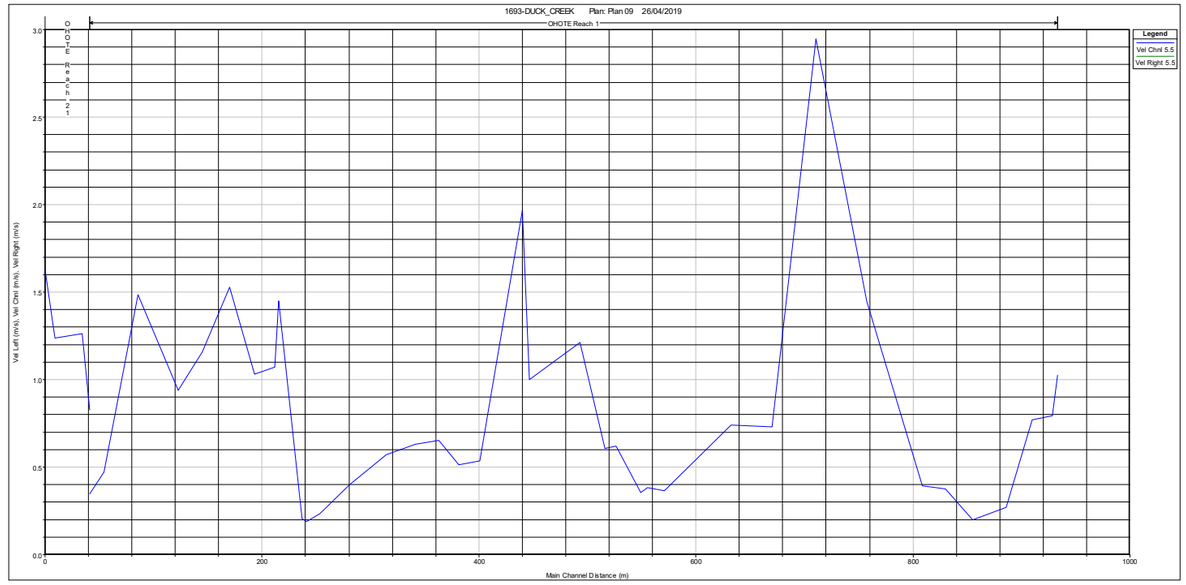


UPPER CASE (5.5 m³/s)

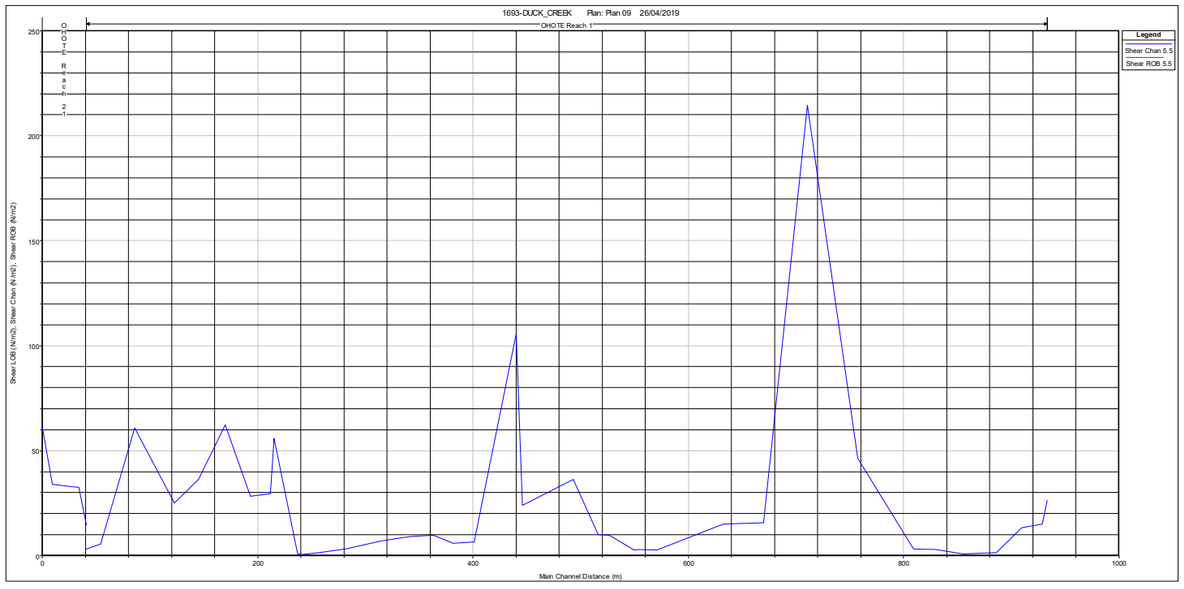
WATER SURFACE PROFILE



VELOCITY PROFILE



SHEAR STRESS PROFILE



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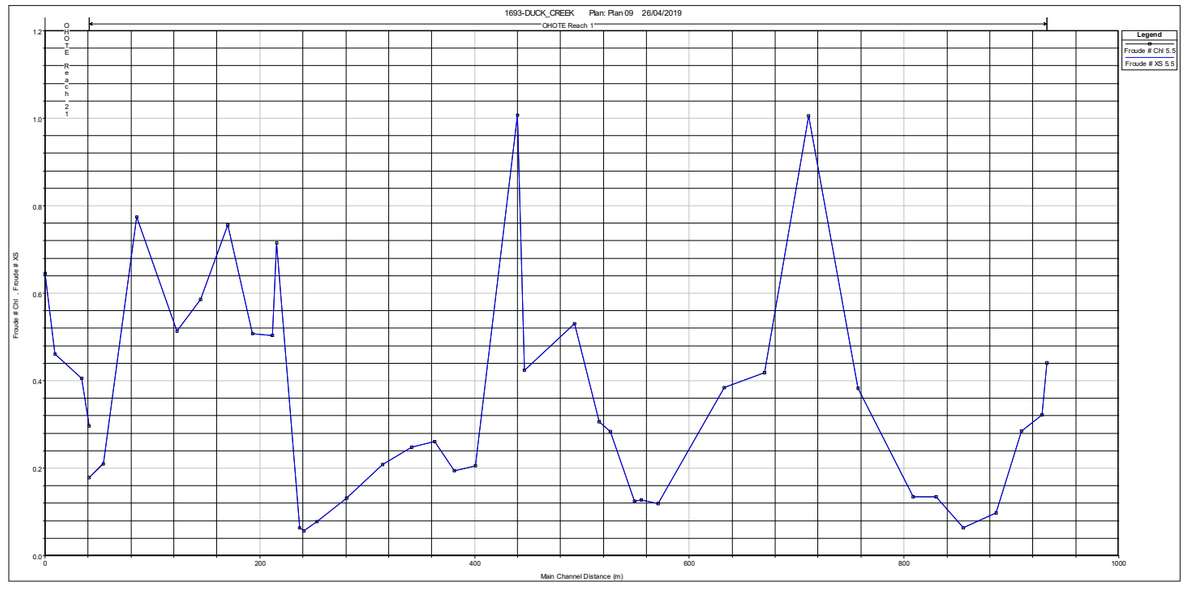
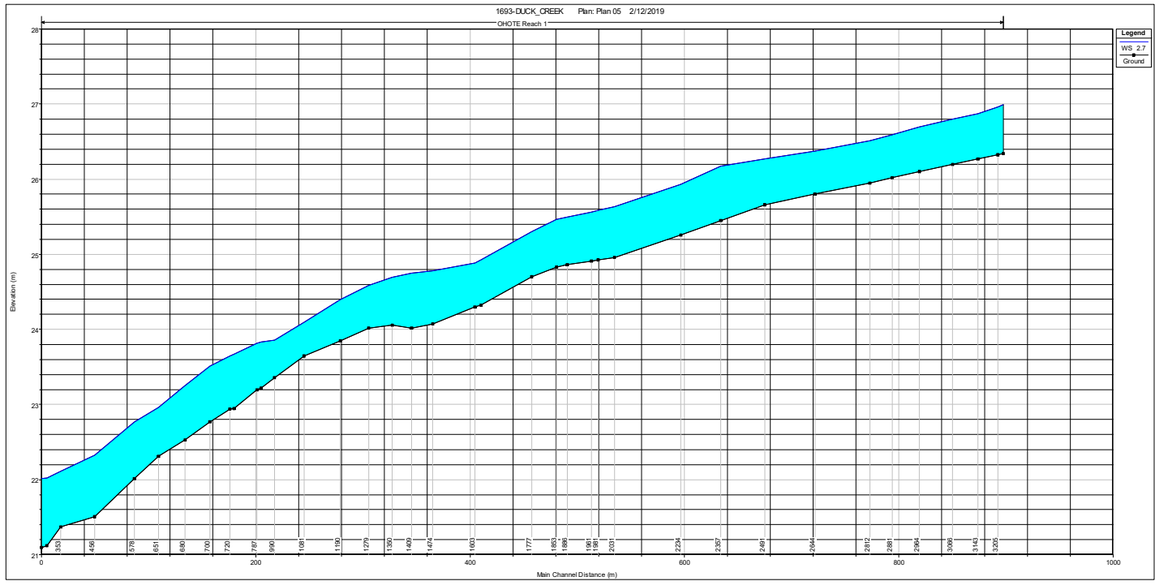


APPENDIX J – DOWNSTREAM WORKS OHOTE STREAM HYDRAULICS

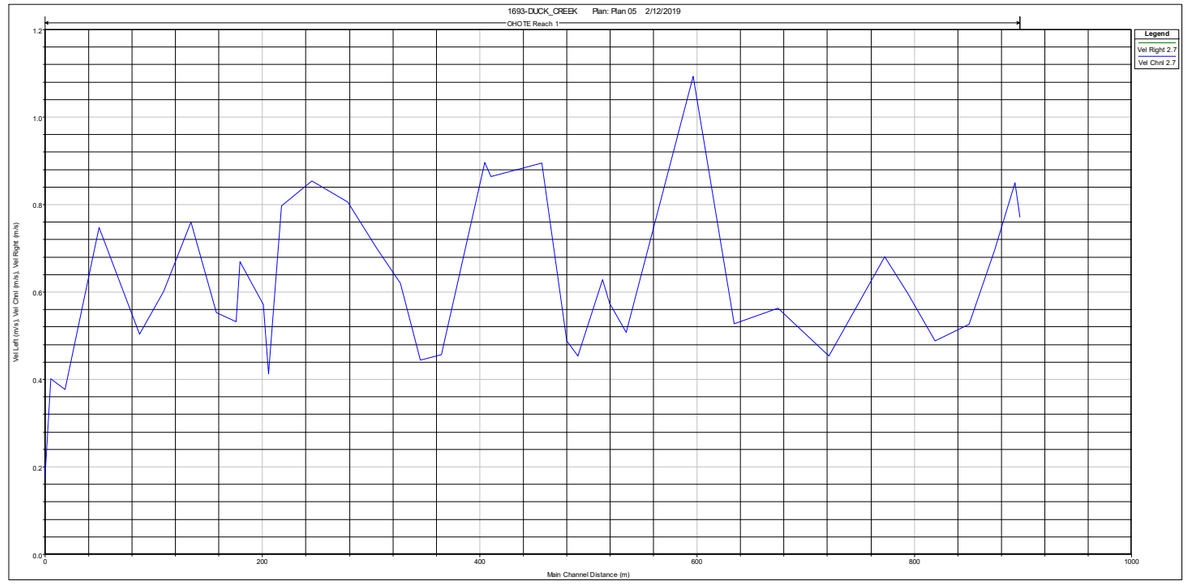
mckenzieandco.co.nz
09 320 5707
P.O. Box 259309, Botany, Auckland 2163

BASE CASE (2.7 m³/s)

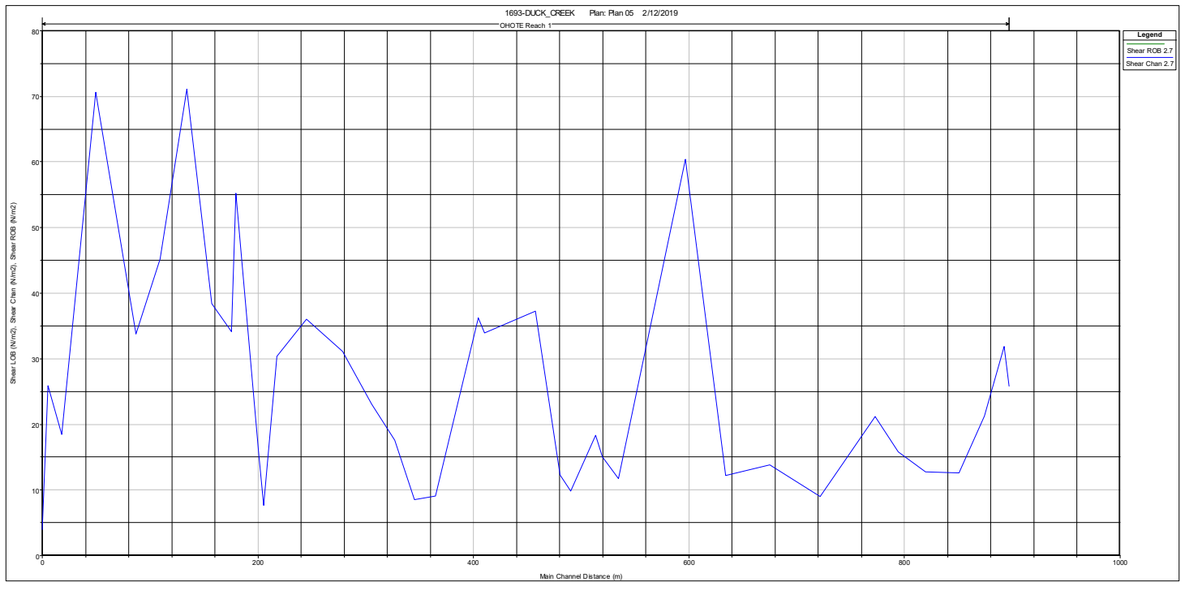
WATER SURFACE PROFILE



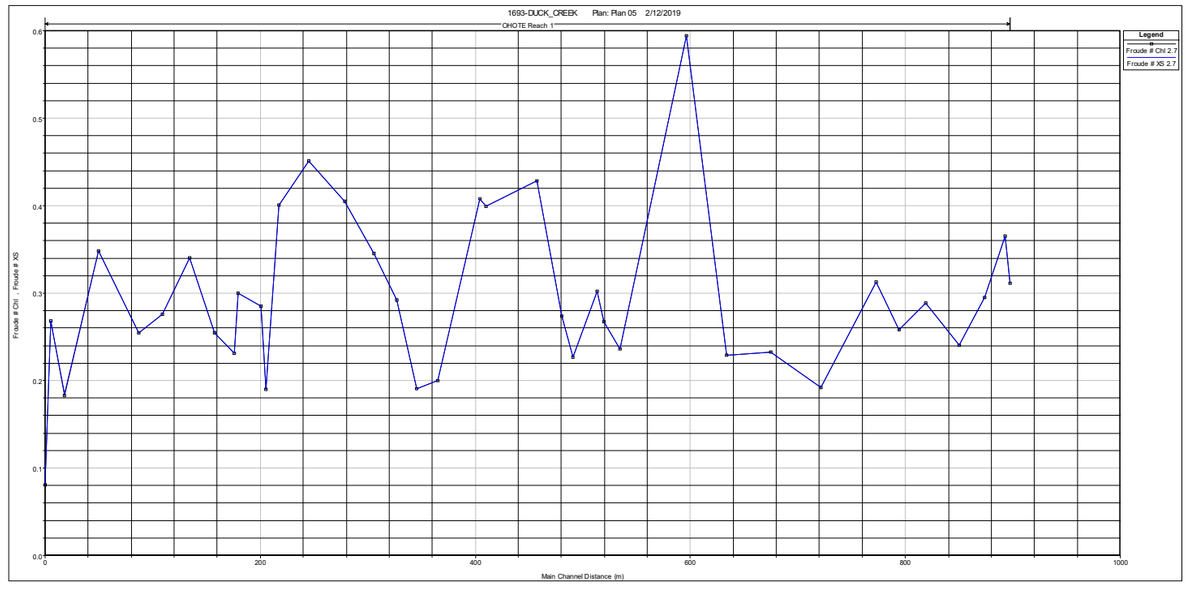
VELOCITY PROFILE



SHEAR STRESS PROFILE

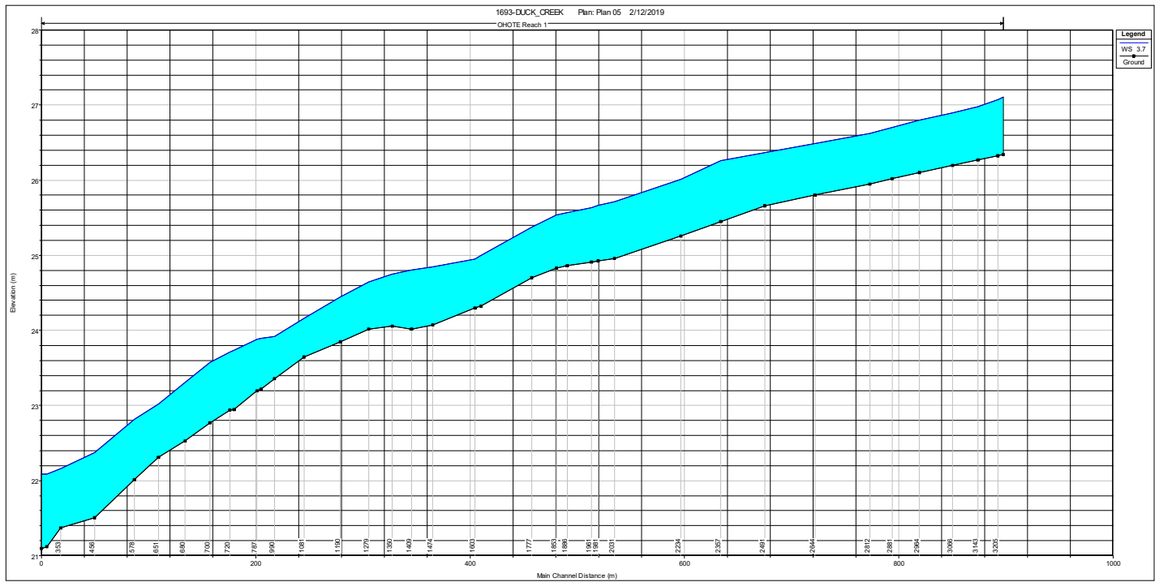


FROUDE NUMBER PROFILE

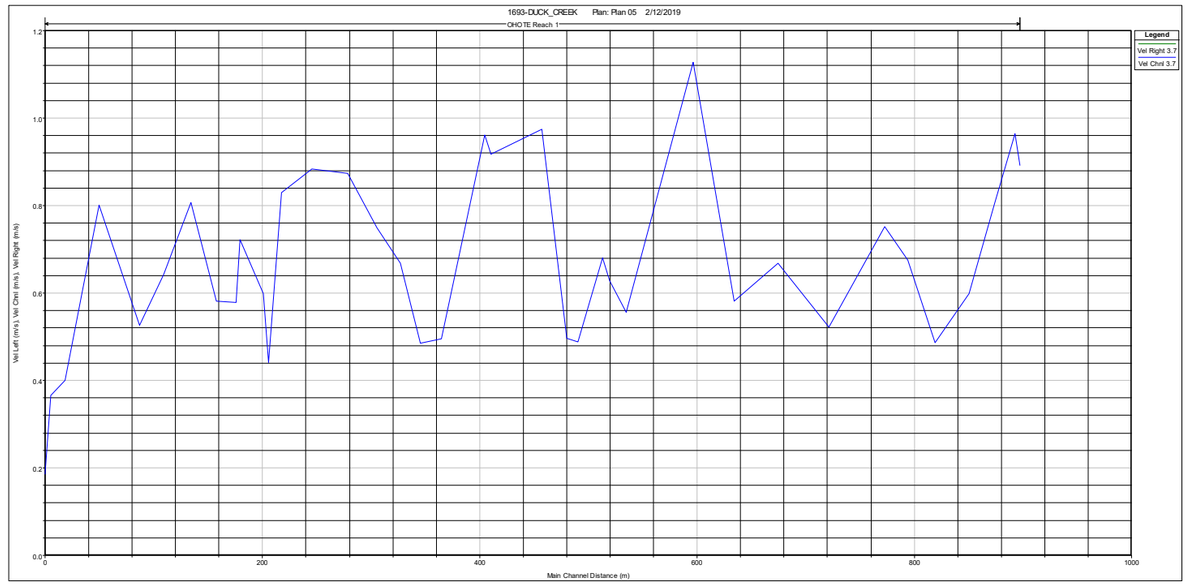


INTERMEDIATE CASE (3.7 m³/s)

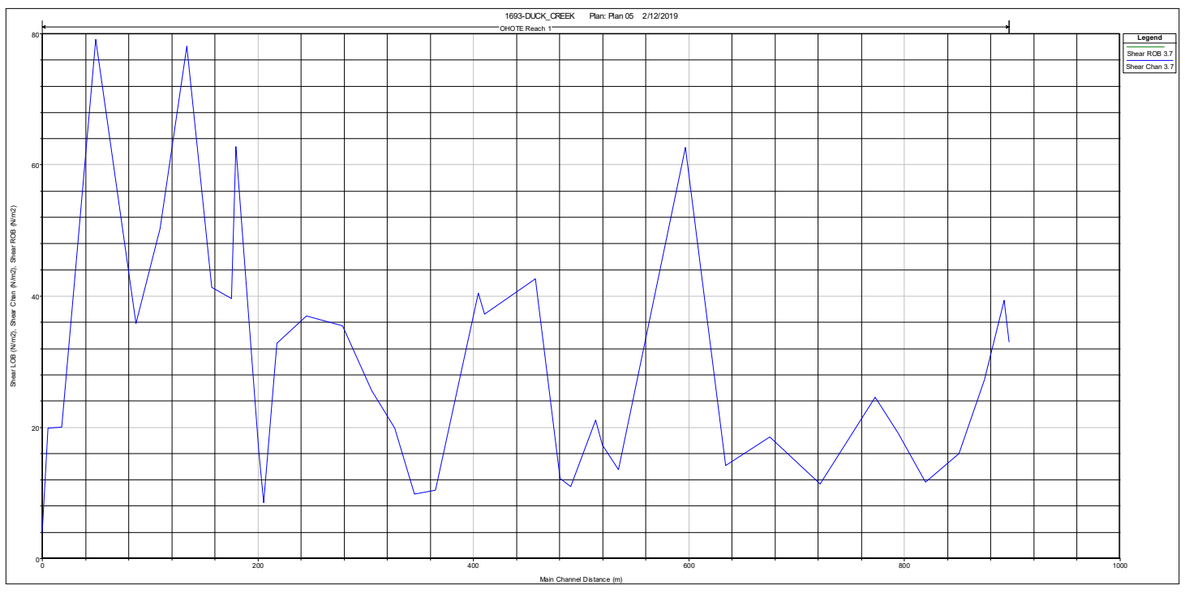
WATER SURFACE PROFILE



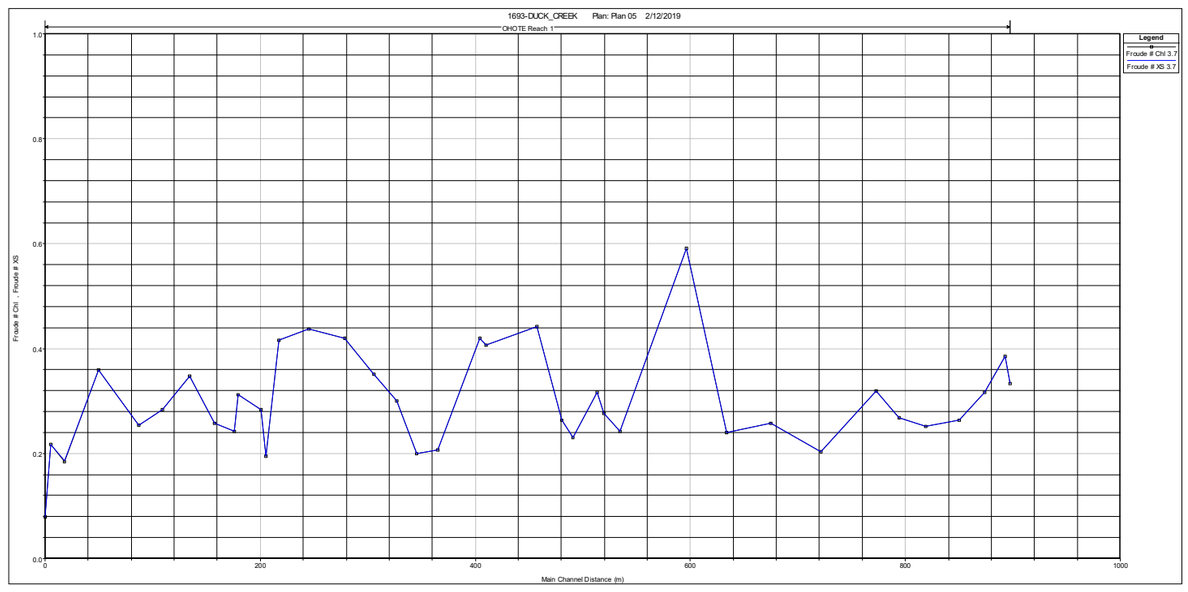
VELOCITY PROFILE



SHEAR STRESS PROFILE

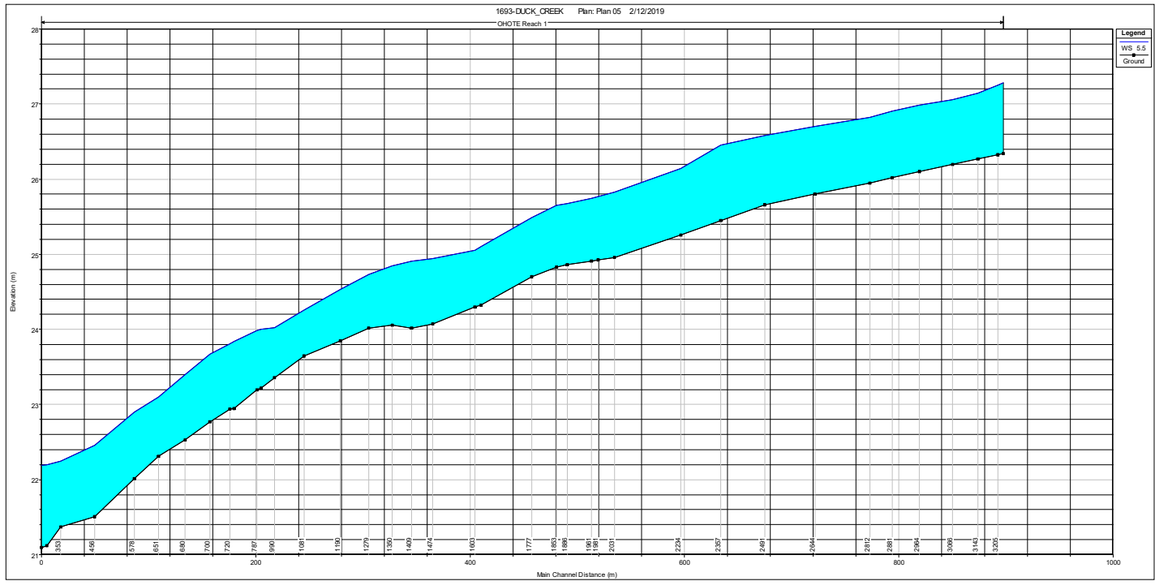


FROUDE NUMBER PROFILE



UPPER CASE (5.5 m³/s)

WATER SURFACE PROFILE



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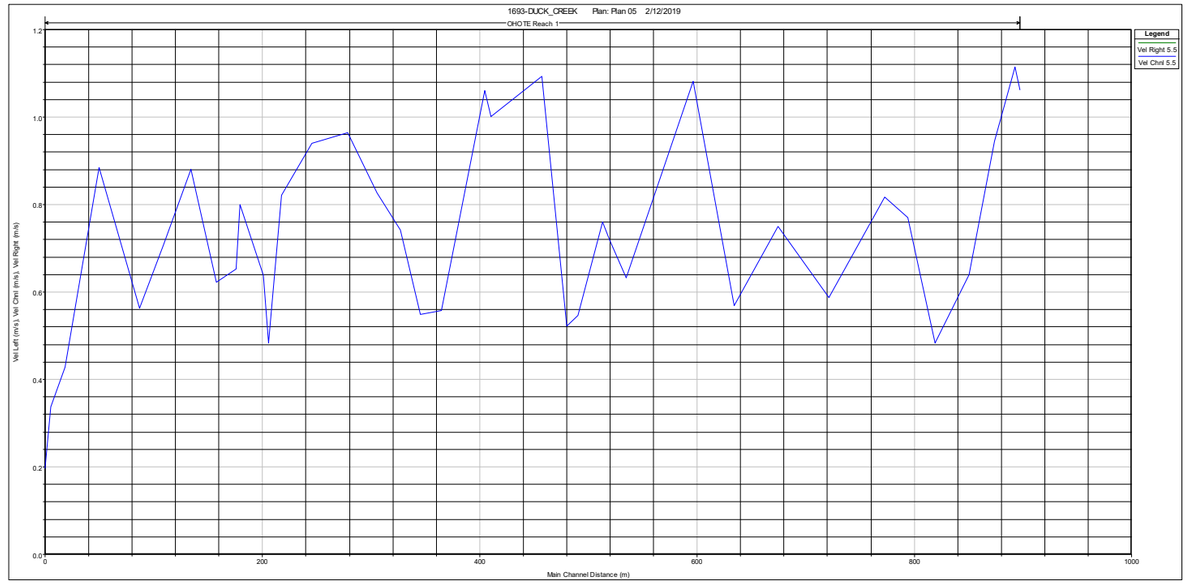

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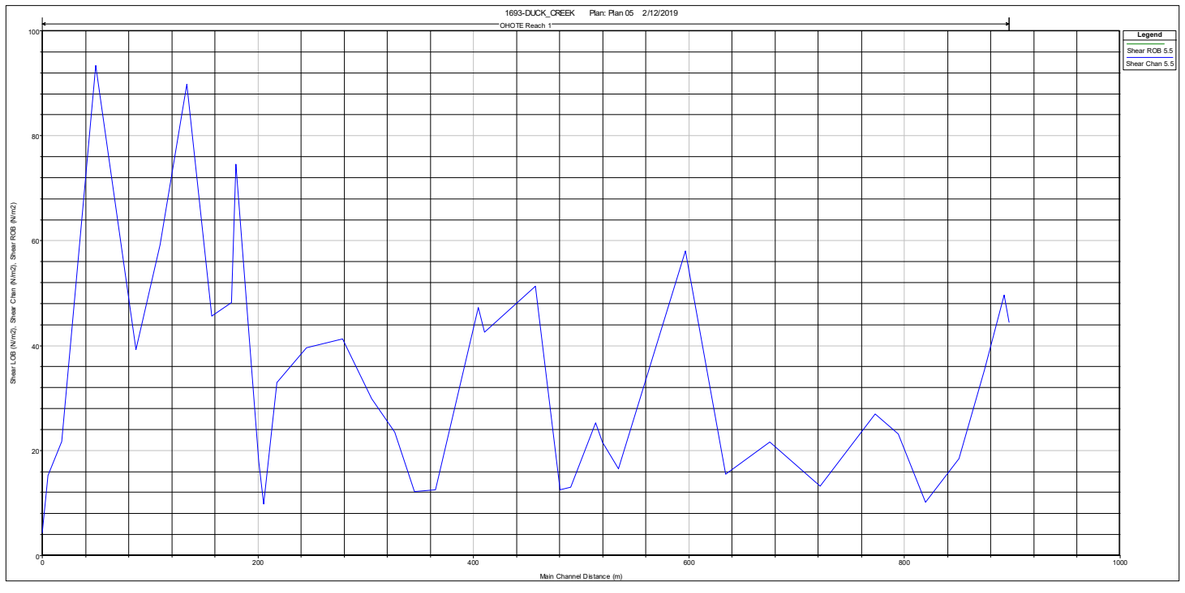

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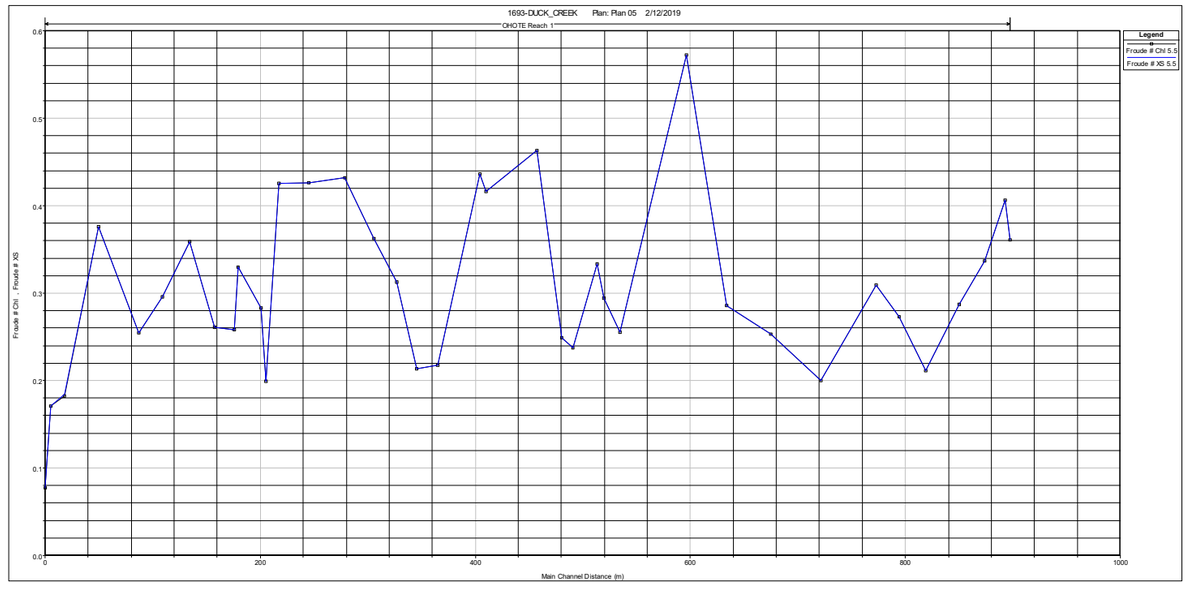
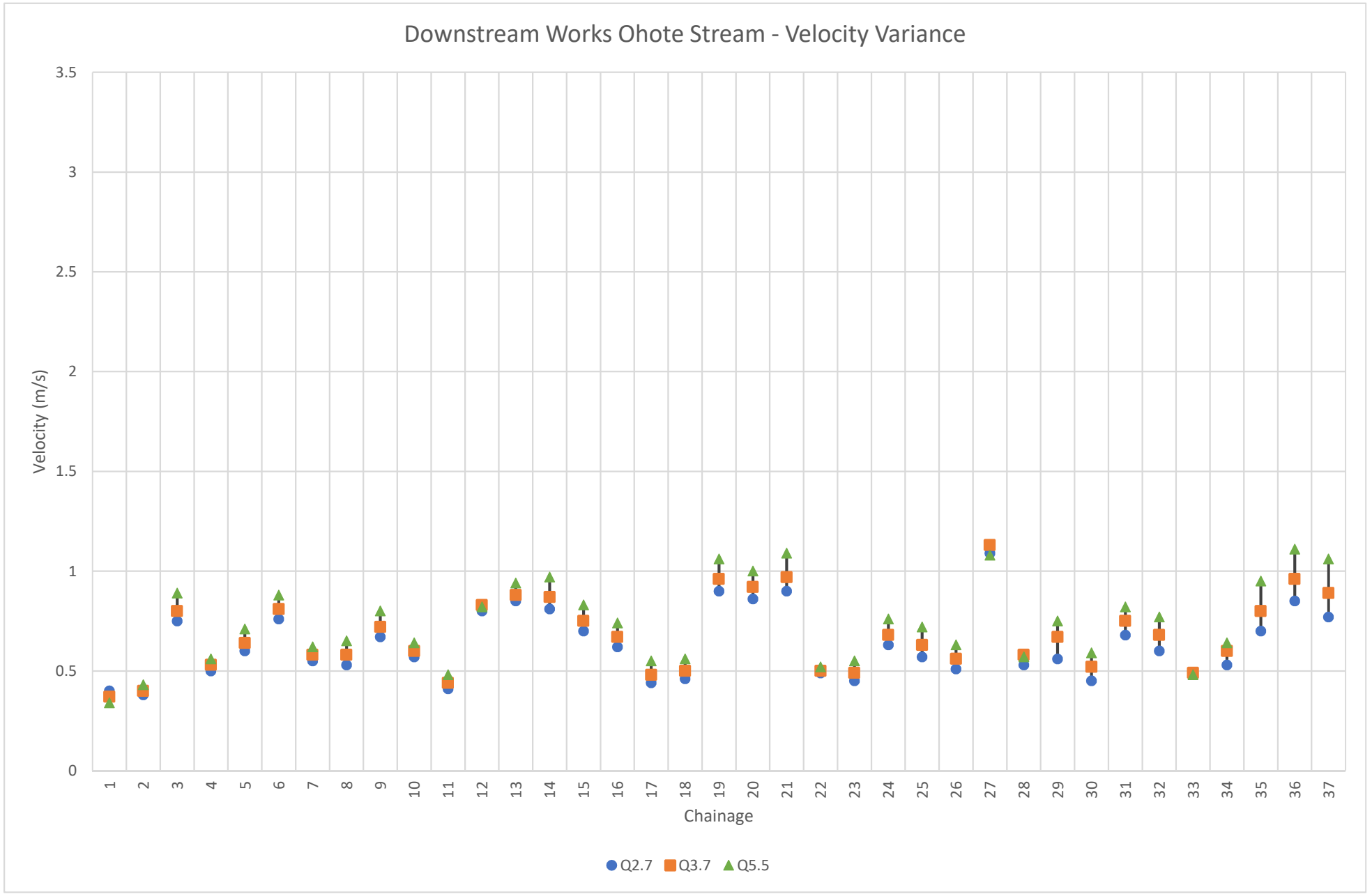
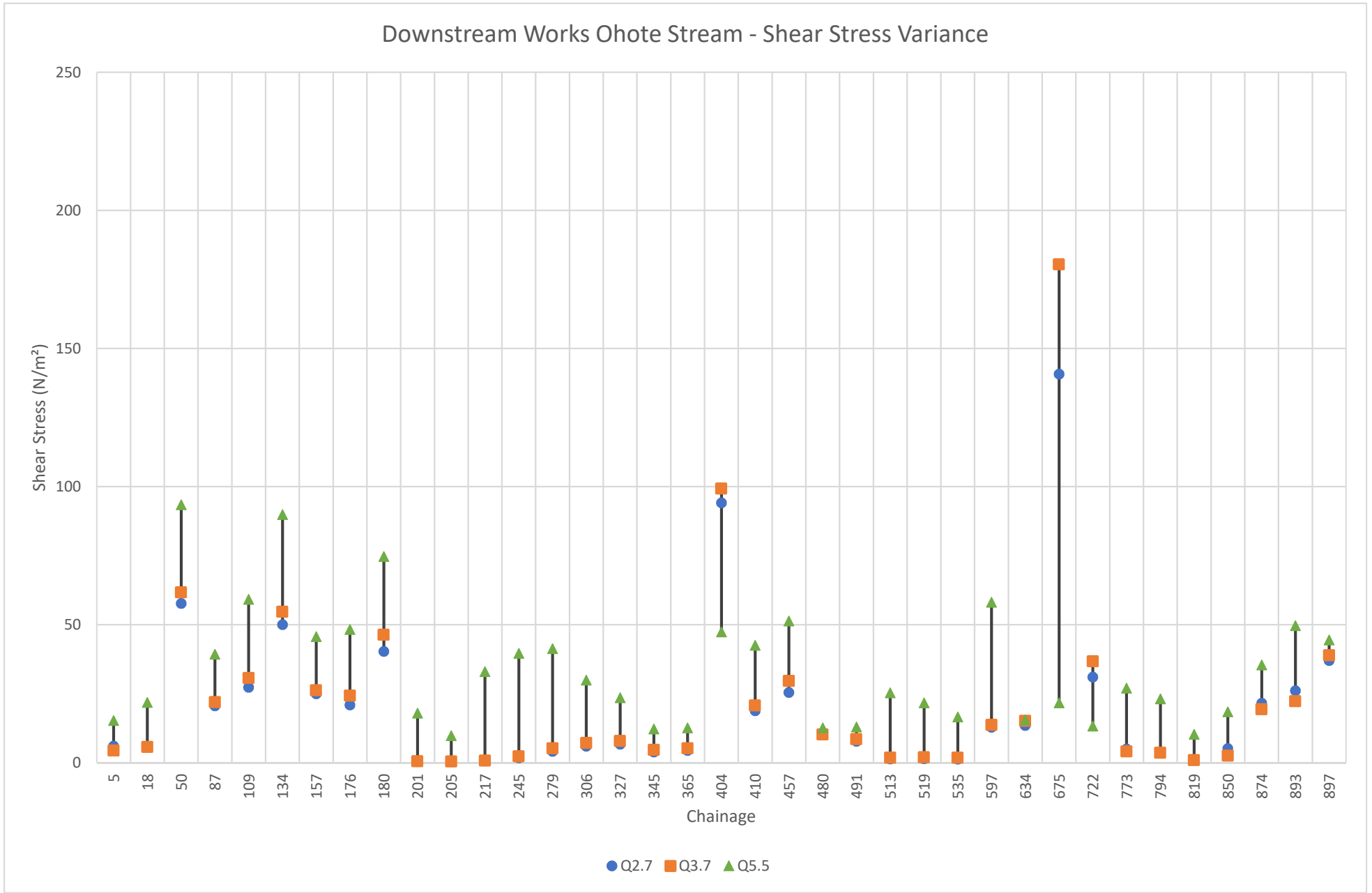
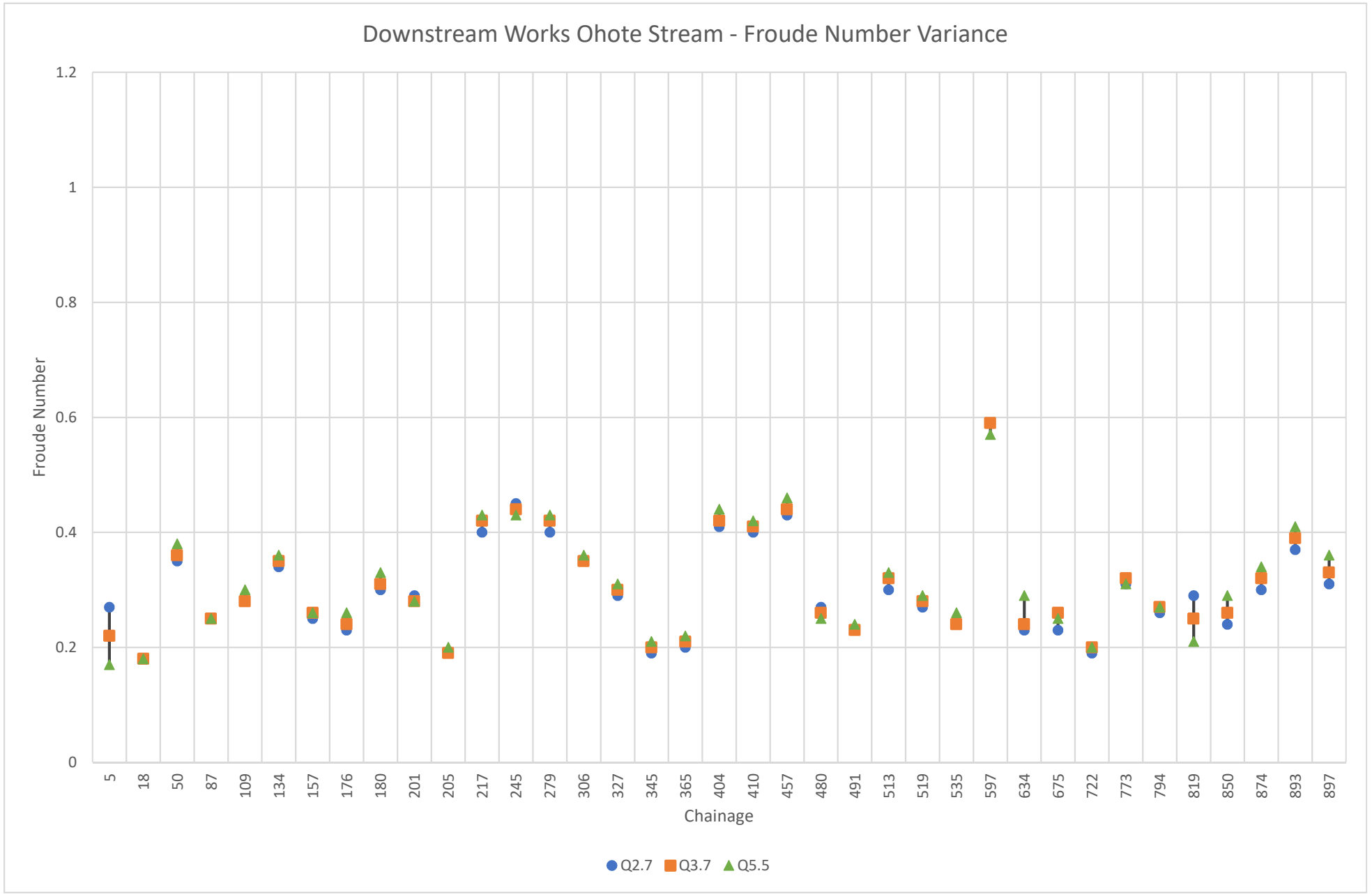



Downstream Works Ohote Stream - Velocity Variance
Velocity (m/s)
3.5
3
2.5
2
1.5
1
0.5
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
Chainage
Q2.7
Q3.7
Q5.5


Downstream Works Ohote Stream - Shear Stress Variance
Shear Stress (N/m²)
250
200
150
100
50
0
5
18
50
87
109
134
157
176
180
201
205
217
245
279
306
327
345
365
404
410
457
480
491
513
519
535
597
634
675
722
773
794
819
850
874
893
897
Chainage
Q2.7
Q3.7
Q5.5


Downstream Works Ohote Stream - Froude Number Variance
Froude Number
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0.8
0.6
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0.2
0
5
18
50
87
109
134
157
176
180
201
205
217
245
279
306
327
345
365
404
410
457
480
491
513
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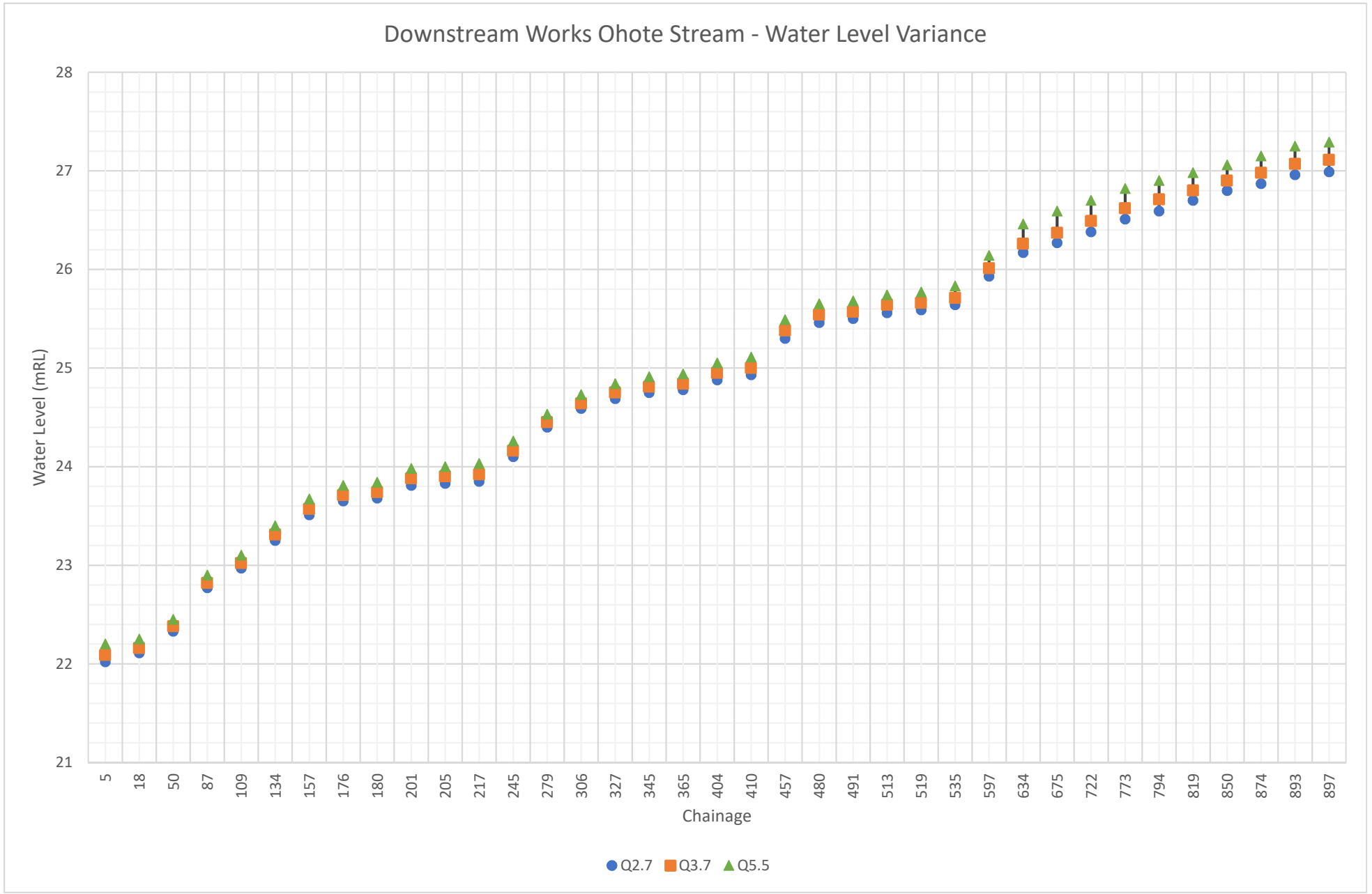
Q2.7
Q3.7
Q5.5


Downstream Works Ohote Stream - Water Level Variance
Water Level (mRL)
28
27
26
25
24
23
22
21
5
18
50
87
109
134
157
176
180
201
205
217
245
279
306
327
345
365
404
410
457
480
491
513
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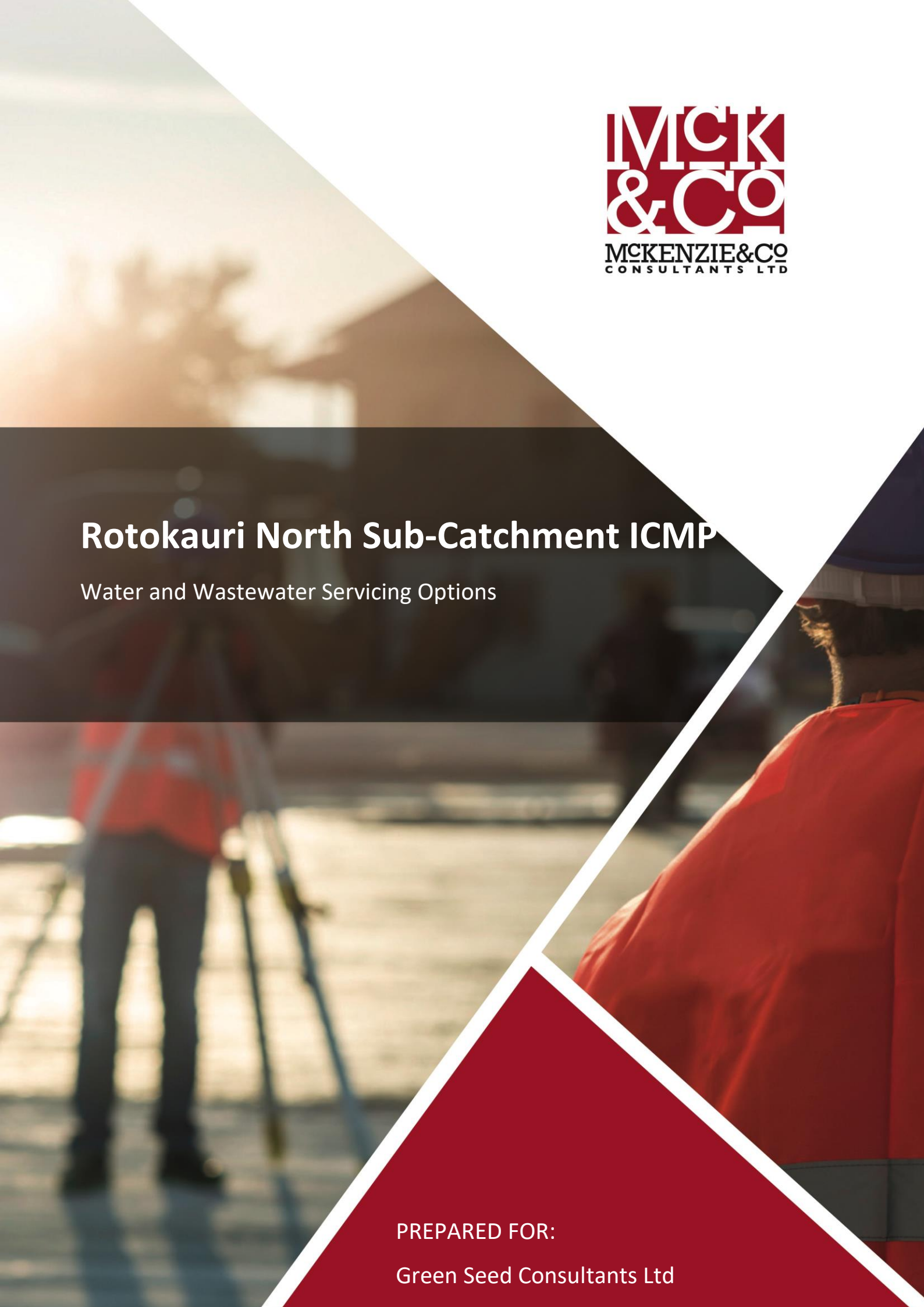
Chainage
Q2.7
Q3.7
Q5.5



Rotokauri North Sub-Catchment ICMP

Water and Wastewater Servicing Options

PREPARED FOR:

Green Seed Consultants Ltd

DOCUMENT CONTROL RECORD

PROJECT: Rotokauri North Sub Catchment ICMP

CLIENT: Green Seed Consultants Ltd

PROJECT LOCATION: Burbush Rd and Te Kowhai Rd, Rotokauri North

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Revision	Date	Originator	Checker	Approver	Description
Draft	10/18	BJR	AH	AH	Client Review
A	12/18	BJR	AH	AH	Draft PPC
B	02/19	BJR	AH	AH	Draft ICMP Version
C	04/19	BJR	AH	AH	ICMP Version

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APPENDICES

Appendix A – Gravity Network Plans

Appendix B – LPS Network Plan

Appendix C – Water Network Plans

1.0 INTRODUCTION

McKenzie & Co. Consultants have been engaged by Green Seed Consultants Ltd (GSCL) to prepare a water and wastewater servicing report for the Rotokauri North Sub-Catchment Integrated Catchment Management Plan (ICMP), which has also been prepared alongside a Private Plan Change (PPC) to rezone 133 ha (within the ICMP area) for medium density housing and a neighbourhood centre.

The full extent of modelling (including that in this report) covers the extent of land identified in Figure 1, based on existing topographical catchments. However, the ICMP covers approximately 203 hectares as shown in Figure 1 below, and is only based on land falling inside the HCC Territorial Authority Boundary.

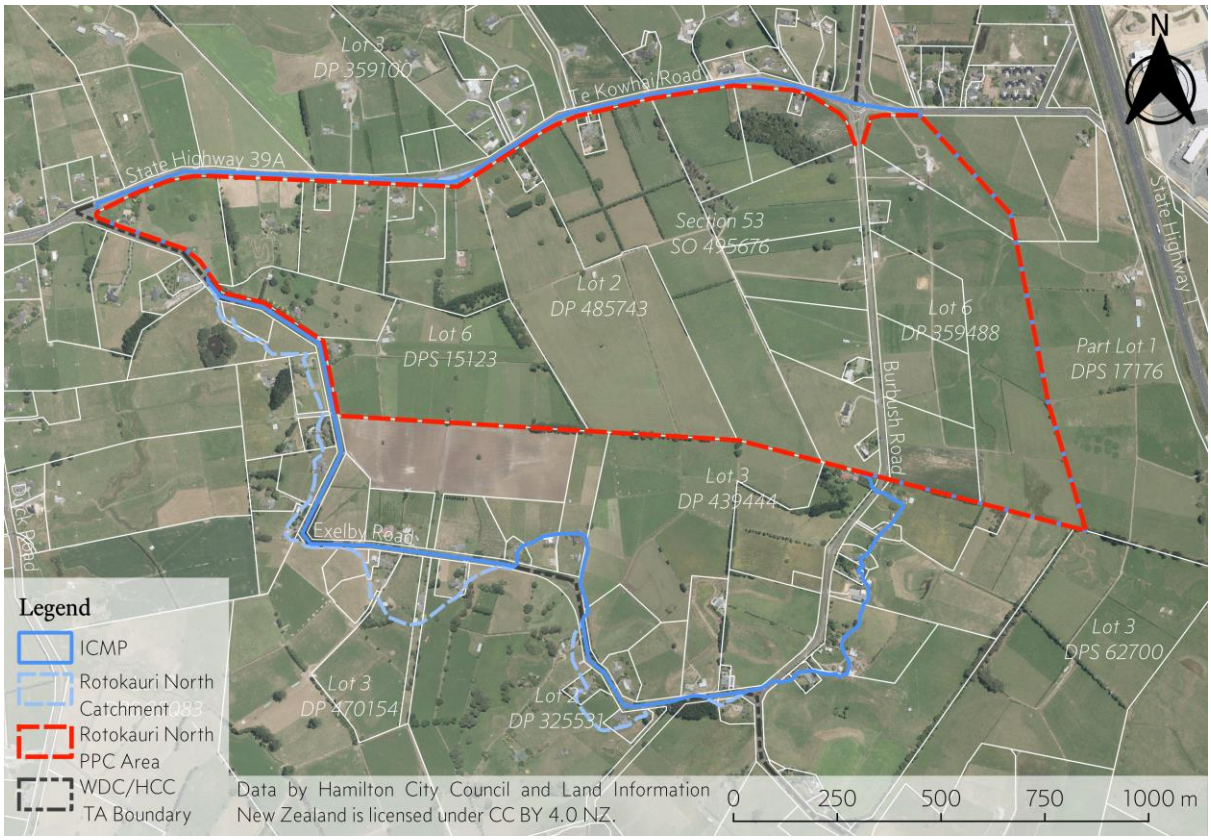

Figure 1 ICMP Area and Rotokauri North Catchment

This report outlines the comparison of wastewater servicing options for the development, and comments on potable water supply. The design within this report is to a conceptual level to allow GSCL to discussion further with Hamilton City Council (HCC).

2.0 SITE DESCRIPTION

The site is located at the edge of Hamilton City's urban limit toward the northwest corner of the city. The site is bounded to the north by State Highway 39 (Te Kowhai Road), and generally on the west and south by Exelby Road. The Waikato Expressway lies to the east and Burbush Road passes through (North – South) the middle of the site.

The site is comprised of farmland pastures, with a small number of farmhouses/residential dwellings, and farm utility buildings present.

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The landform is generally very flat with around 2 m fall across the site. Burbush Road is elevated some 10 m above the site to the south. The total elevation range across the ICMP catchment is from RL 27m to RL 47m.

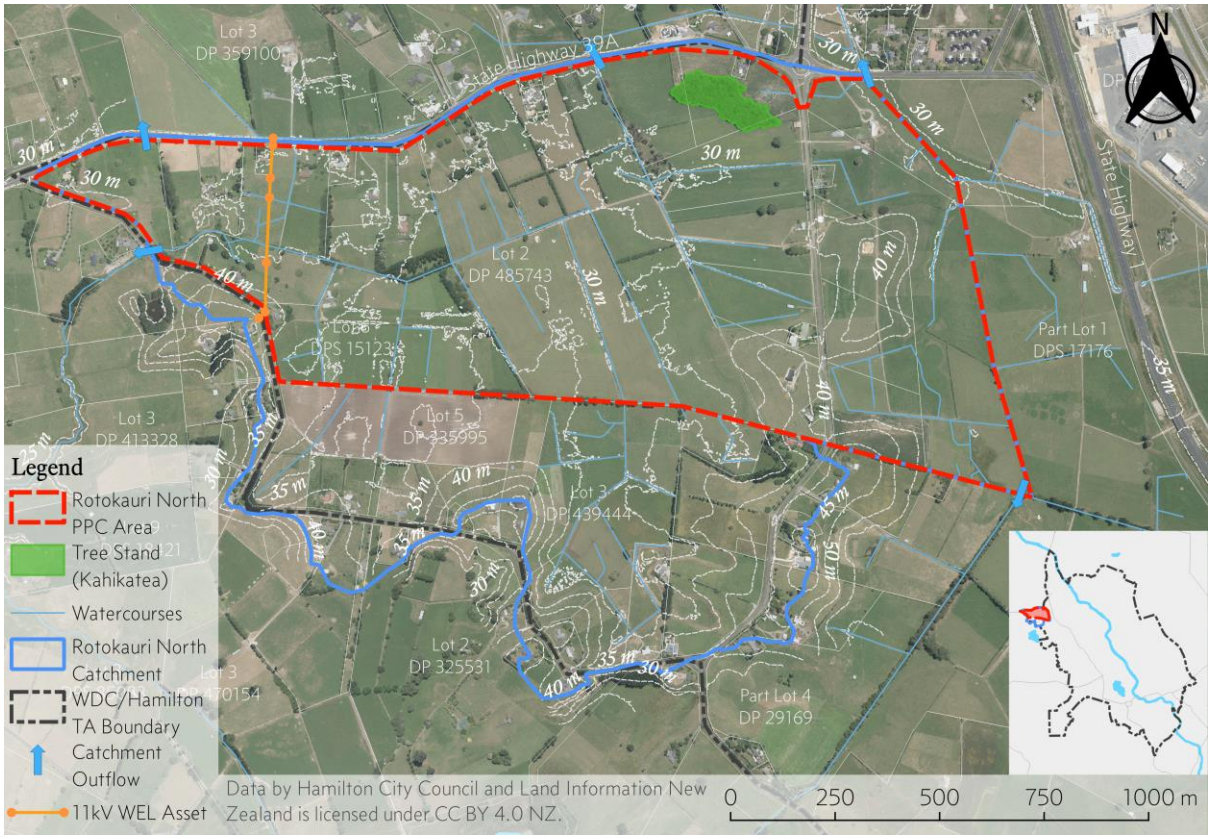

Figure 2 Rotokauri North Topography

3.0 WATER AND WASTEWATER DESIGN CRITERIA

Water and wastewater networks have been designed with regard to the Regional Infrastructure Technical Standards (RITS) (Waikato Local Authority, 2018). The following parameters and design considerations were constant for all concept designs:

Water

Referring to Section 6 of RITS.

Design Parameters

- Domestic demand = 260 L/ person/day;
- Peak flow rate factor = 5.0 m/s;
- Minimum residual pressure = 200 kPa (20m);
- Minimum flow at point of supply = 250 L/min;
- Minimum fire service level shall be FW2 for residential areas, and FW3 for all other areas.

Design Considerations

- Maximum valve spacing of 250m, with shutdown areas limited to 40 dwellings;
- Minimum pipe covers as per RITS Table 6-5;

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- Residential connections limited to pipelines ≤ 250mm diameter; and
- Reticulation to be located within berm, bulk/trunk main location to be agreed with HCC as part of detailed design.

Wastewater

Referring to Section 5 of RITS.

Design Parameters

- Population Equivalent = 2.7 per lot;
- Average daily flow = 200 litres per population equivalent per day;
- Infiltration allowance = 2,250 litres per hectare serviced per day;
- Surface water ingress = 16,500 litres per hectare serviced per day.

Design considerations

- Reticulation located within the road reserve;
- Minimum gradients adopted for all pipe sizes due to limited topographic change across development;
- Minimum depth of gravity pipelines to be 1.2m to allow for road crossings and lot servicing; and
- WWPS design indicative only.

4.0 WATER SUPPLY CONCEPT

Water supply modelling for the ultimate development was undertaken by Mott Macdonald (2017) (Plessis, 2019). The modelling considered a number of scenarios for development buildout, including options for providing initial supply.

In summary:

The HCC water supply network outside of the development area was predicted to have sufficient capacity to service the development. This was based on implementing network upgrades as per the HCC Water Supply Master Plan (Hamilton City Council, 2018a, 2018b; Mott MacDonald Ltd., 2016).

The trunk water supply network within the Rotokauri area, as per Figure 3 and Figure 4, was predicted to have sufficient capacity and pressure, with the exception of a low-pressure area along Lee Road. The previous Master Plan Modelling for the Rotokauri area predicted this low-pressure area, which was caused by topography constraints along Lee Road. The Rotokauri North network was developed to minimise the pressure impacts to this area.

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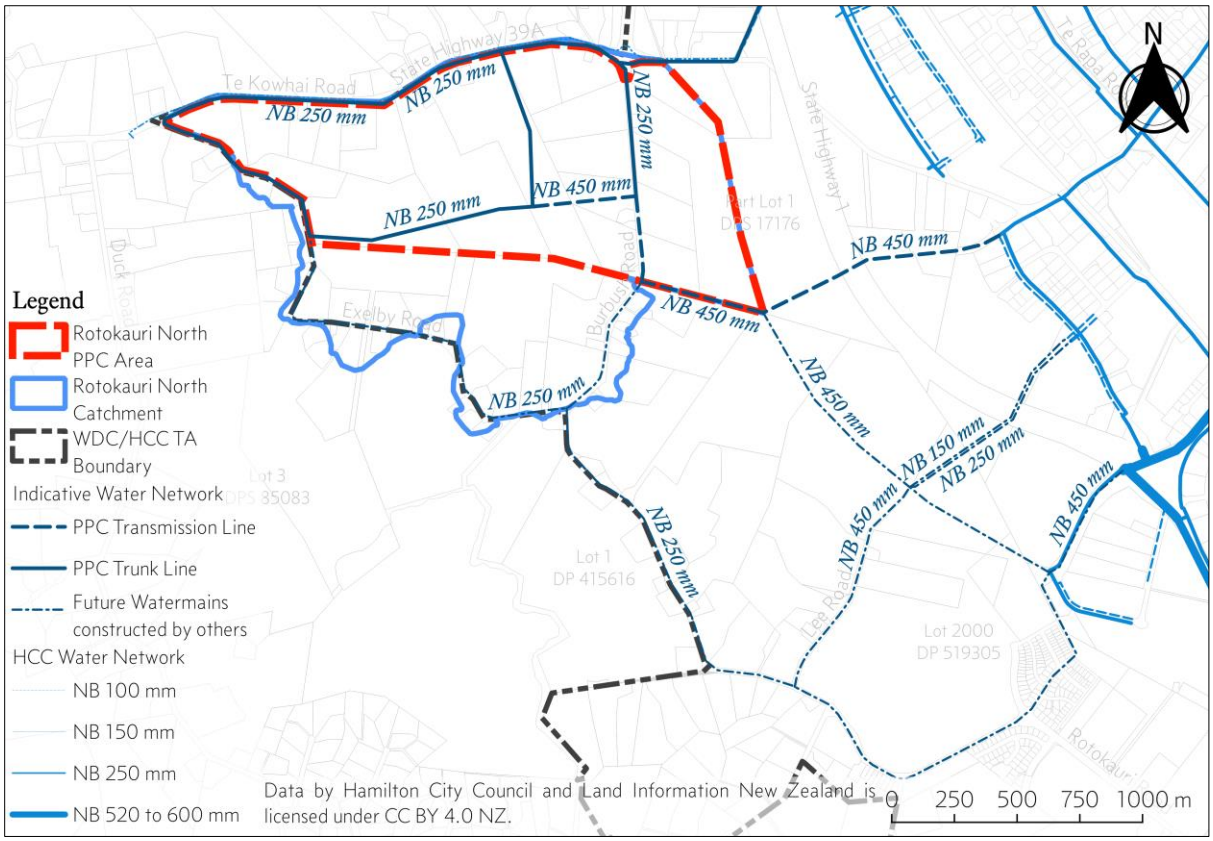

Figure 3 Indicative Rotokauri Water Network

Construction of the ultimate network is expected to progress with development through the catchment.

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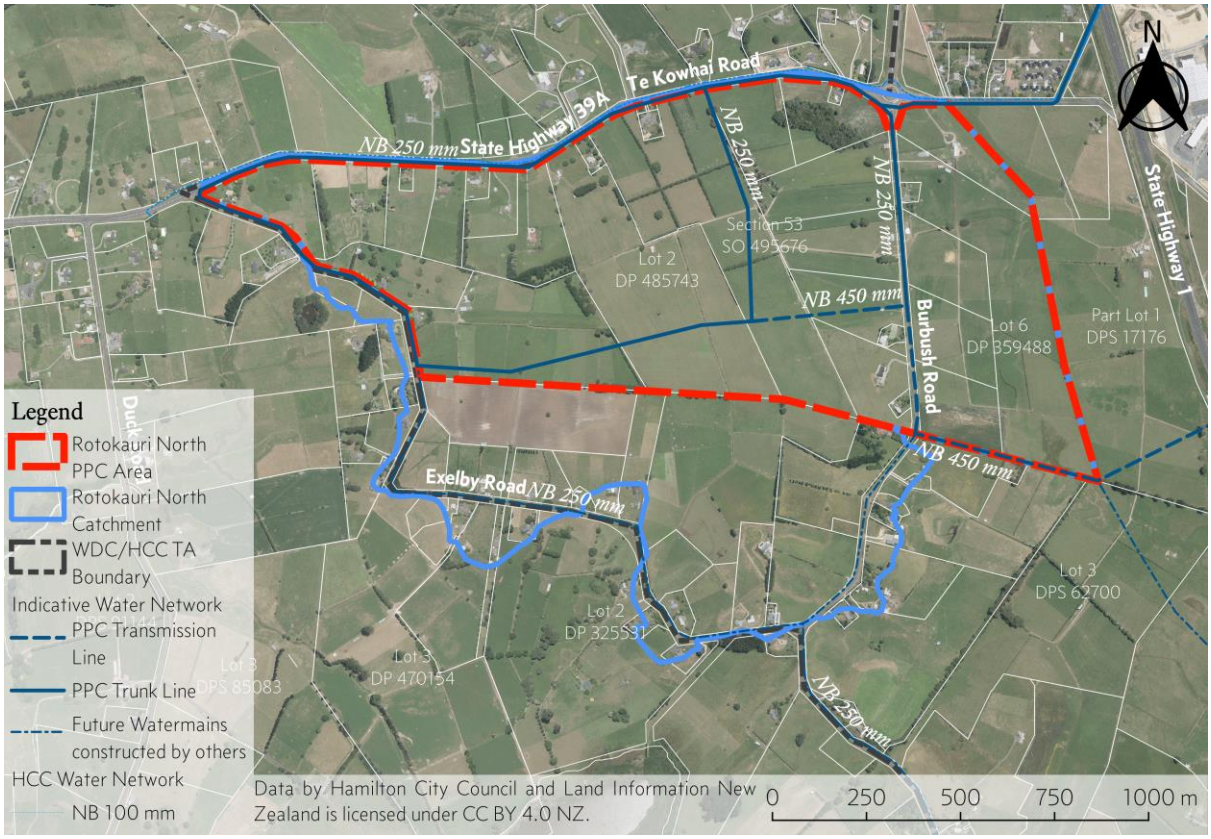

Figure 4: Indicative Water Network for Rotokauri North ICMP

Hydraulic modelling results from Mott Macdonald have been presented in Figure 5 below. These interim results show the minimum pressures across the Rotokauri network with full development of the ICMP area.

As noted previously, the lowest estimated pressure, 15.05m, occurs at Lee Road. Where the ultimate Rotokauri network cannot provide minimum service pressure of 20m, HCC reserves the right to consider alternative service requirements, or changes to levels of service for this specific area.

Additional modelling iterations are currently being carried out by Mott MacDonnell to reflect network changes and connections that have been constructed recently for developments within the Rotokauri South area.

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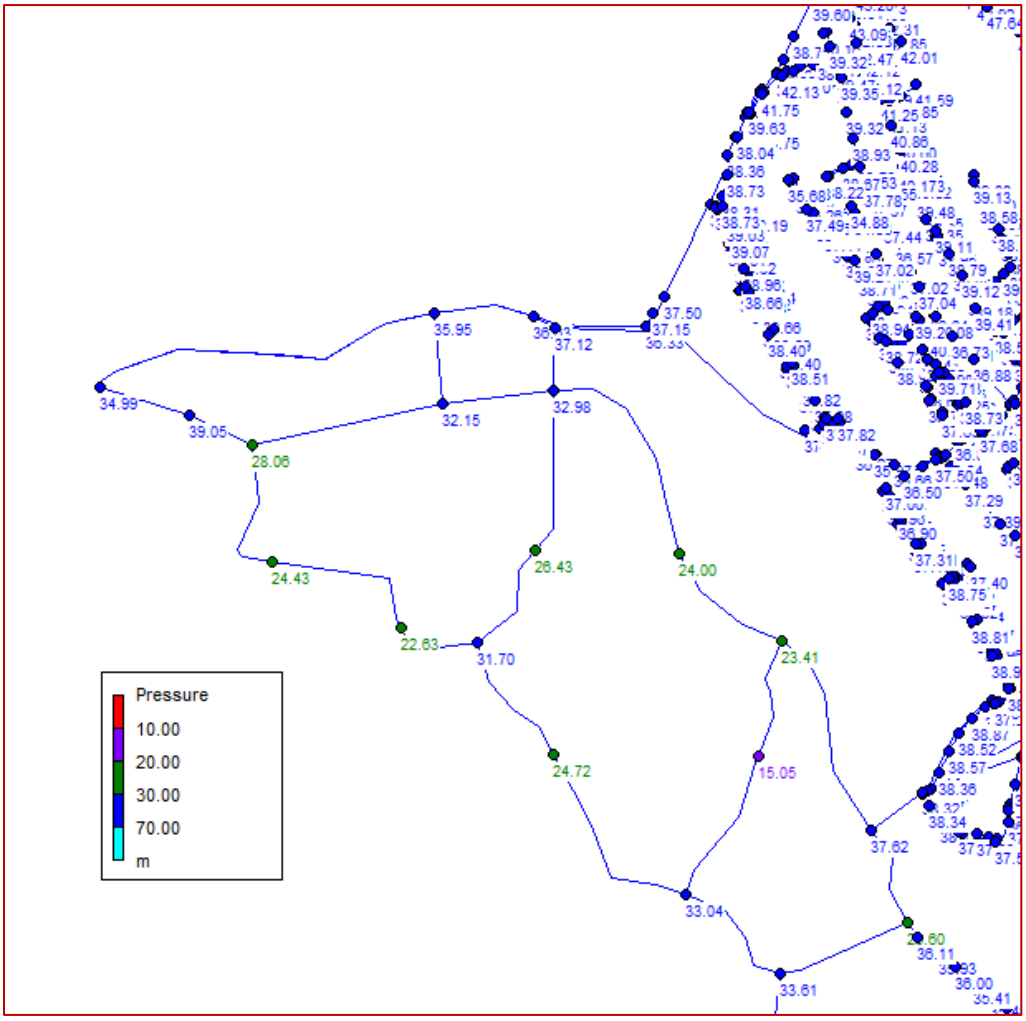

Figure 5 Minimum Network Pressures @ Full Development (Source: Mott MacDonald)

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5.0 WASTEWATER PREVIOUS MODELLING

The additional wastewater flows from the development were modelled previously by AECOM (summarised in CKL, 2018) to assess the downstream impacts. The modelling confirmed that the downstream system has sufficient capacity to manage the additional flows.

It was expected that Development Contributions would be used for any future upgrades to Pukete Wastewater Treatment Plant, in line with the HCC Wastewater Master Plan.

6.0 WASTEWATER GRAVITY CONCEPT

A wastewater network based on servicing all lots using gravity connections was conceptually designed for the Rotokauri North ICMP area. Two variants of the network were investigated, based on a catchment west of Burbush Road draining to either a single, or two or more, new wastewater pumping stations (WWPS).

All WWPS would discharge to the proposed gravity wastewater catchment east of Burbush Road. The catchment east of Burbush Road would connect to the existing DN1050 wastewater network manhole (WWK09003) immediately west of State Highway 1 – the Far Western Interceptor.

Capacity allowance was made for the full extent of two southern catchments external to the PPC area but which fall within the ICMP area as the topography from these catchments falls towards the PPC area – see Figure 6. These two catchments form part of the Ohote Stream stormwater catchment, and have been documented within the stormwater reports previously (Rudsits, 2018). As a precaution, the modelling also covers that part of these catchments that fall outside the HCC TA boundary and the ICMP area and are zoned rural.

6.1 Gravity Design

The network was designed based on minimum gradients and pipe sizing as per RITS (Waikato Local Authority, 2018). Catchment flows were based on the catchments bounded by approximate road corridors. Lot level catchment flows were not developed as these were considered to be at higher level of detail than that required for concept design appropriate for an ICMP.

Catchment flows were estimated as per Section 5.2 of RITS (Waikato Local Authority, 2018). Pipe diameters were increased so as to manage the contributing catchment flows in accordance with hydraulic performance criteria outlined in Section 5.2.4 of RITS.

External Catchments

The design flows from external catchments to the PPC (within the Rotokauri North ICMP catchment), were assessed based on natural catchment boundaries and their resultant areas. The catchment boundary for the catchments generally followed Exelby Road – see Figure 6. Design flows were based on catchment area as measured, and residential density of 45 persons per hectare, as per RITS Table 5-3 (Waikato Local Authority, 2018, p. 419). The external catchment areas O-G and O-H were assumed to connect to the wastewater network at the same

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general locations that stormwater would discharge from the catchments into the PPC area. Refer to Figure 6.

Table 1 summarises the catchment parameters used to model catchments within the ICMP area that are upstream of the PPC area.

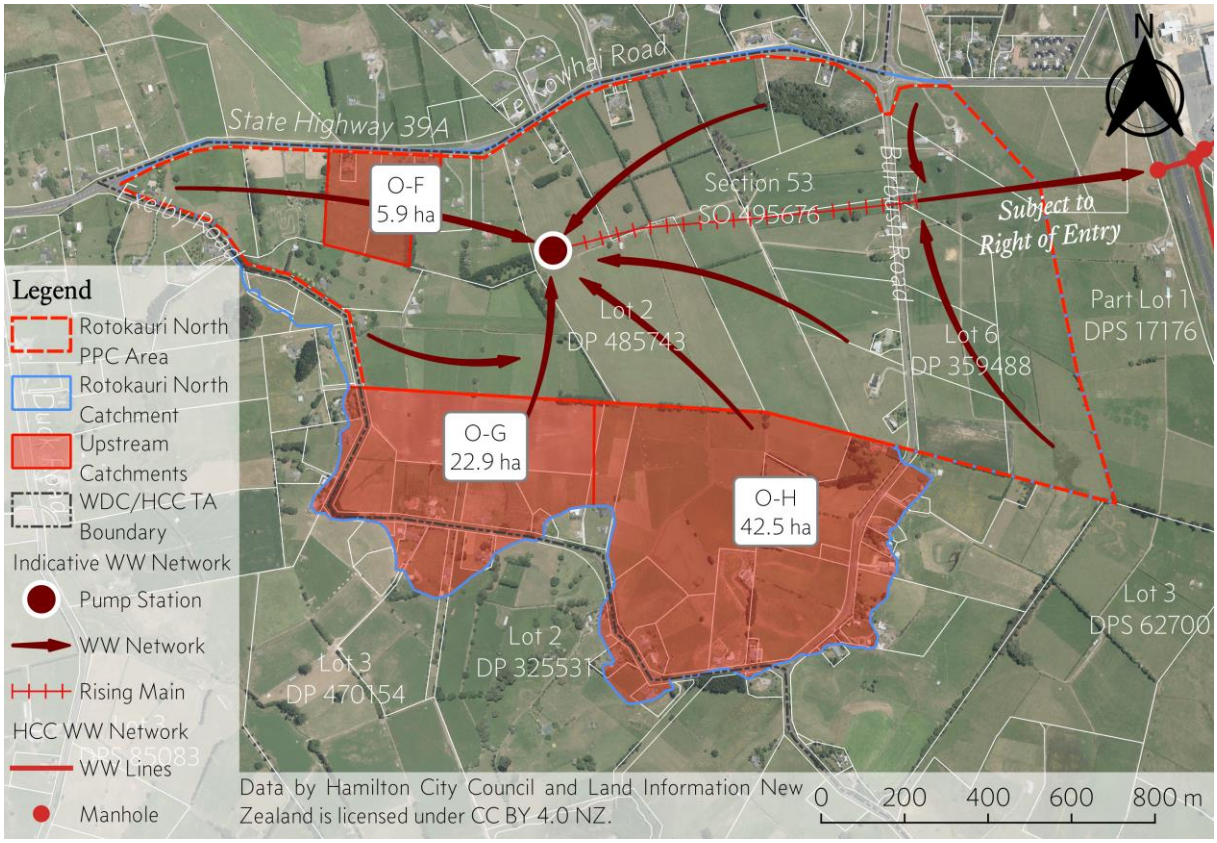

Figure 6 Indicative Wastewater Network with Single Pump Station

Table 1 Upstream Ohote Catchment Details

Design Criteria	O-F	O-G	O-H
Area (ha)	5.9	22.9	42.5
Density (People/ha)	45		
Equivalent Population (People)	266	1031	1913
Peaking Factor	4.0	3.0	2.8
Infiltration Allowance (l/s)	0.2	0.6	1.1
Surface Water Ingress (l/s)	1.1	4.4	8.1
Average Daily Flow (ADF) (l/s)	0.8	3.0	5.5
Peak Daily Flow (PDF) (l/s)	2.6	7.8	13.5

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Design Criteria	O-F	O-G	O-H
Peak Wet Weather Flow (PWWF) (l/s)	3.7	12.1	21.6

Gravity Servicing Variant 1

This concept design variant was based on providing a single trunk wastewater pumping station to service the area west of Burbush Road. The gravity network and pumping station would be sufficiently deep to allow for all of the lots to be serviced by gravity, without intermediate pumping stations – see Figure 6.

The trunk pumping station would be sized to manage the external catchment flows (O-F, O-G, O-H).

This variant would comprise the elements and quantities as per Table 2.

Table 2 Gravity Servicing Variant 1 Concept Design Layout Estimated Quantities

Element Depth of Installation (m)	DN150 Pipe (m)	DN225 Pipe (m)	DN300 Pipe (m)	DN375 Pipe (m)	Manholes (Each)
0-2 m	10,950	100	0	0	160
2-3 m	3,700	300	0	0	50
3-4m	650	300	0	0	20
4-5m	500	150	500	50	20
5-6m	0	250	300	250	10
6-7m	0	50	50	50	10
SUBTOTAL	15,800	1,150	850	350	270
TOTAL	**18,150**				**270**

Gravity Servicing Variant 2

This concept design variant was based on providing two wastewater pumping stations to service the area west of Burbush Road. This variant allowed for smaller pumping stations based on the natural catchment shape. Further, the western most pumping station would be sized to manage external catchment flows from catchments O-F and O-G, and the eastern pumping station would be sized to manage external catchment flow from catchment O-H – see Figure 7.

The concept gravity sewer network would comprise the elements and quantities as per Table 3.

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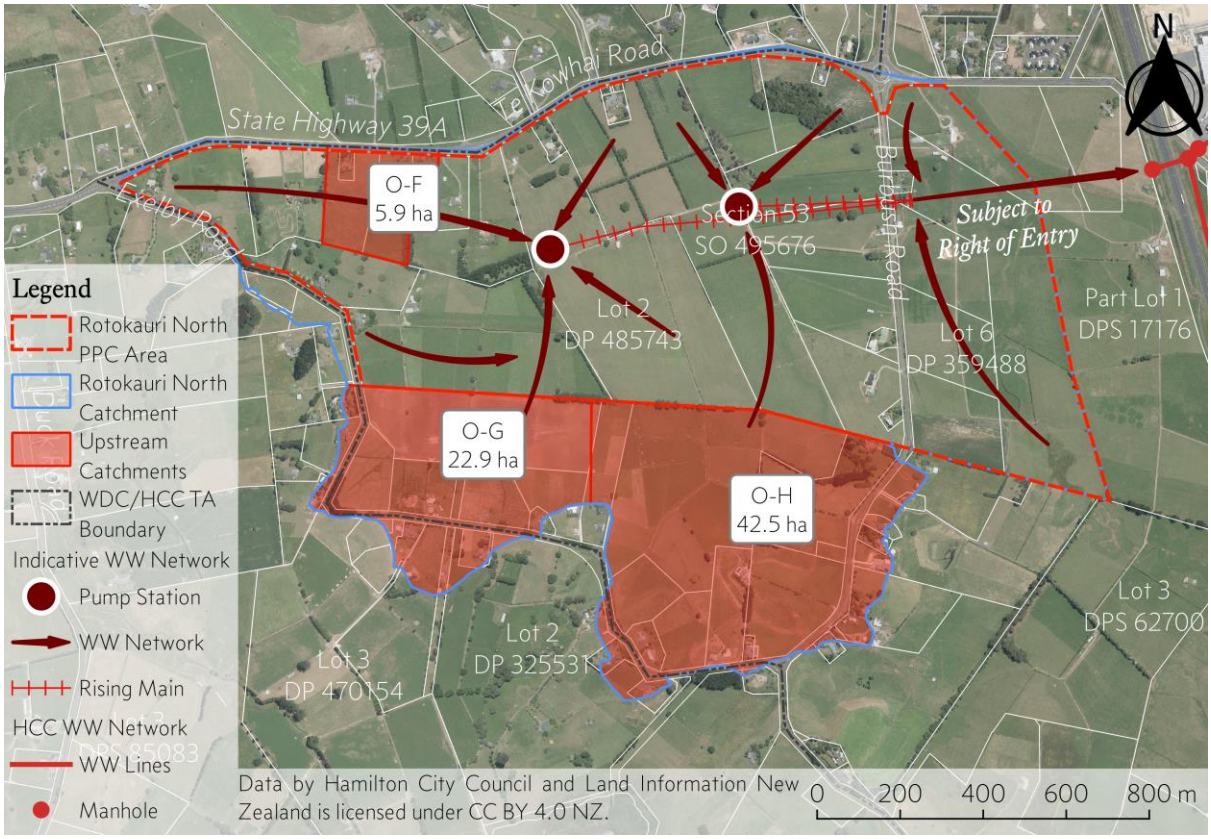

Figure 7 Gravity Servicing Variant 2 Wastewater Trunk Network

Table 3 Gravity Servicing Variant 2 Concept Design Layout Estimated Quantities

Element Depth of Installation (m)	DN150 Pipe (m)	DN225 Pipe (m)	DN300 Pipe (m)	DN375 Pipe (m)	Manholes (Each)
0-2 m	10,950	100	0	0	160
2-3 m	3,700	300	0	0	50
3-4m	1,100	650	0	0	30
4-5m	0	0	900	200	20
SUBTOTAL	15,750	1,050	900	200	260
TOTAL	**17,900**				**260**

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6.2 Pumping Stations

The location of the pumping stations was based on the natural catchment shape, as well as allowing for the external catchment flows. Final location for each pumping station would be dependent on the development Master Plan and associated Scheme Plan(s).

Gravity Servicing Variant 1 Pumping Station

Concept design of the wastewater pumping station was based on the overall contributing catchments, plus the external catchments O-F, O-G and O-H.

The design flows were:

- Average Dry Weather Flow = 30.2 l/s
- Peak Dry Weather Flow = 57.7 l/s
- Peak Wet Weather Flow = 91.5 l/s

The pump design flow adopted was 100.6 l/s, based on Peak Wet Weather Flow plus 10% contingency. Approximate operating depth assumed to be 1.5m below the level of incoming sewer, being an approximate depth of 8.5m (or 18.5 mRL).

The rising main was sized as DN 400 HDPE SDR13.6 (PN12.5, ID = 341 mm) which achieved a velocity of 1.1 m/s.

The concept rising main length was ~1,000 m, generally expected to follow a road corridor to the eastern gravity catchment. The rising main discharge point was based on discharge invert level of 30 mRL, giving a static head of 11.5 m.

Using the Colebrook White model, with the above parameters, the pump design duty point was 100.6 l/s @ 16.4m head. An indicative pump size was based on Xylect online selection programme for Xylem/Flygt. The initial pump selected was the NP3202 640 376mm pump with a 31-kW motor operating at 98.7 l/s @ 15.6m head and 73.7% total efficiency.

A detailed assessment of pump manufacturers and models should be undertaken at detailed design to assess final pump configuration.

The ultimate emergency storage tank required for Rotokauri North has been estimated to be 1,080 m^3 based on 9 hours storage of average dry weather flow (Waikato Local Authority, 2018 sec. 5.2.10.1).

The opportunity for dual rising mains to manage septicity and lower initial flows should be investigated in the future where gravity reticulation and wastewater pumping stations are the preferred servicing option.

Gravity Servicing Variant 2 Wastewater Pumping Stations

Concept design of the wastewater pumping stations was based on the overall contributing catchments, plus the external catchments O-F, O-G and O-H. The pumping stations were referenced to the natural catchments that they are within – Ohote and Te Otamanui.

Sizing methodology as per Variant 1 was utilised, with results tabulated below.

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Table 4 Variant 2 Wastewater Pumping Station Details

Item	Ohote	Te Otamanui
Design Flows (l/s) • Average Dry • Peak Dry • Peak Wet	 • 16.5 • 33.6 • 51.2	 • 13.8 • 31.6 • 47.9
Design Pump Rate	56.3	52.6
Rising Main Diameter	DN280	DN280
Rising Main Velocity (m/s)	1.26	1.18
Static Head (m)	11.5	11.5
Design Pump Duty	56.3 L/s @ 20.9m	52.6 L/s @ 16.6m
Example Pump Model	Flygt NP 3171 MT 3-431 22kW	Flygt NP 3153 MT 3-431 (261mm) 12.5kW
Pump Operating Duty	57.9 L/s @ 22.1m	53.5 L/s @ 17.2m
Pump Efficiency at Operating Duty (%)	68.3	71.7
Emergency Storage (m^3)	588	492

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7.0 WASTEWATER LOW PRESSURE SEWER CONCEPT

A low-pressure sewer (LPS) network has been designed for the ultimate development as a possible alternative to typical gravity servicing concept. The LPS network allows for reticulation to be installed shallower than gravity with the following benefits:

- Reduced inflow and infiltration from sealed system;
- Avoid ground water management during construction
- Avoid deep trenching and impacts on other services
- Future maintenance and emergency responses can be undertaken without need for significant trenching;
- Lower capital costs through reduced pipe size.

7.1 Design Methodology

The network was designed using the zone approach based on indicative future staging zones, with the pipe size modelling undertaken using e-One Design Assistant (eOne, 2018).

The zones were defined based on masterplan areas for the lots. Zones areas were based on net area of lots and excluded road reserve areas, as they were not considered to contribute to any design flows. RITS refers to gross contributing land area to be used for estimation of design flows. However, using gross area was considered to overestimate the inflow and infiltration that would occur for LPS network, hence the use of net area. The exception to this was the external catchments O-F, O-G and O-H for which design flows as per Section 6.1 was used. The external catchments were modelled as Lift Pump Stations within the e-One Design Assistant, with peak flow rates of 110% PWWF. The increased PWWF was conservatively used to account for any future variances in flow, as per RITS recommendations.

The concept design allowed for a total of 206 zones, with total estimate of 2,890 pump units. The pump units were estimates only; and the final number would be determined through detailed design.

Pressure sewer pump suppliers have a range of models with different flow/head curves depending on pump type (centrifugal, progressive cavity, etc.). A maximum flow rate from pressure sewer units was modelled as 1.0 l/s, covering the majority of flow/head curve requirements anticipated for the ICMP area.

Daily flow of 630 l/d for each pressure sewer unit was based on the following:

- Infiltration allowance = Lot size (400 m²) @ 2,250 l/ha/d = 90 l/d
- Population equivalent = 2.7 EP @ 200 l/EP/d = 540 l/d

Figure 8 shows the concept network layout, including anticipated nominal pipe diameters.

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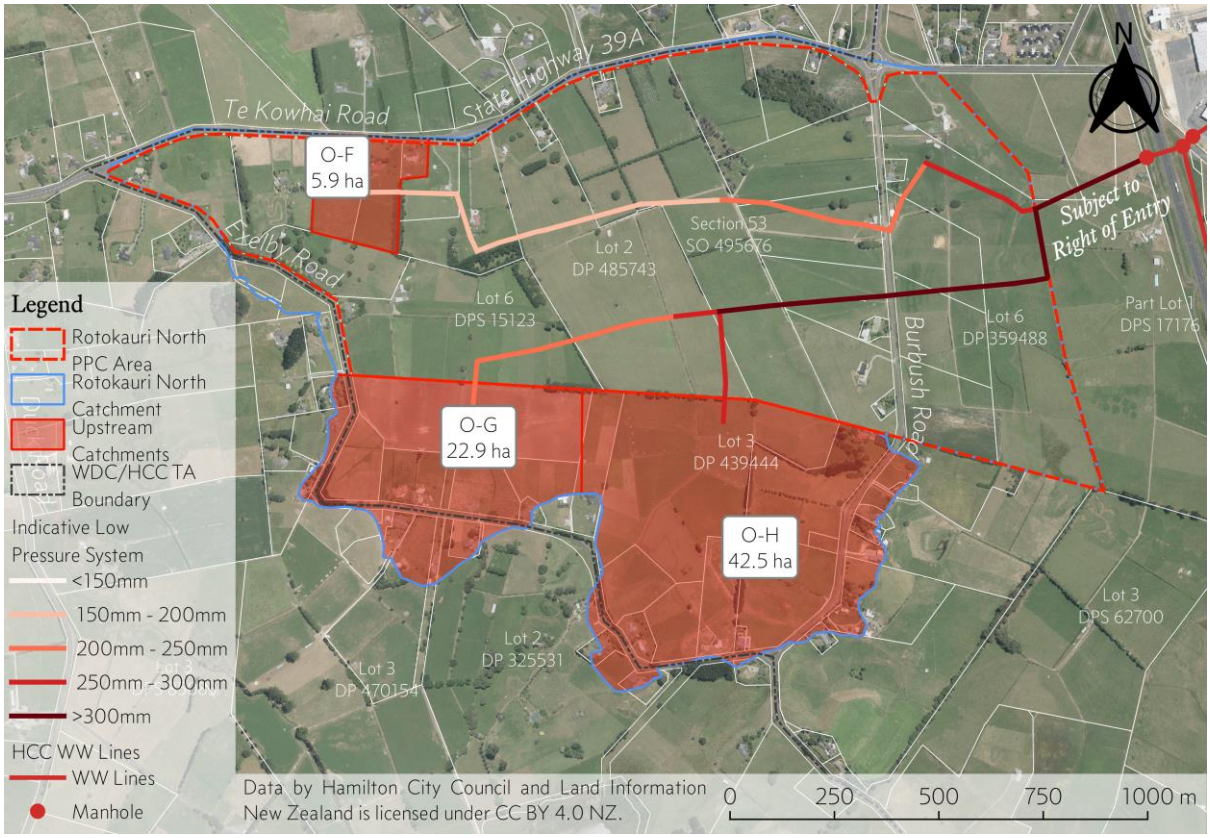

Figure 8 Indicative Low-Pressure Trunk Sewer Layout

The indicative LPS network has been estimated to comprise the following pipe diameters and lengths.

Table 5 Indicative Low-Pressure Sewer Concept Design Quantities

Pipe Diameter (DN)	Total Length (m)
90	850
110	5,250
125	10,550
140	3,550
160	300
180	250
200	400
225	300
250	450
280	850

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Pipe Diameter (DN)	Total Length (m)
315	700
355	300
400	1,300
TOTAL	**25,050**

Note that diameters are nominal, as per HDPE pipe sizing. Internal diameters with e-One Design Assistant (eOne, 2018) have been based on PN16, SDR 11 pipe.

Key hydraulic performance results are as follows:

- Largest total dynamic head = 16.6m (Zone 118);
- Largest accumulated friction loss = 8.1m (Zone 179);
- Maximum velocity = 1.6 m/s (Zone 201, DN400); and
- Maximum accumulated residence time = 8.8 hours (Zone 176).

7.2 Sensitivity Analysis

Sensitivity analysis was undertaken on lot sizing and pump rate assumptions.

Sensitivity scenario 1 was based on the residential lot size decreasing from an average of 320m² to 260m² to assess how higher density affects the concept network. There were no changes to assumptions for other land uses (high density, commercial, education, etc.). The e-One Design Assistant (2018) updated the required pipe diameters across the network for the increased number of connections.

A second sensitivity scenario was completed with the pump rate reduced from 1.0 l/s to 0.58 l/s, to model the e-One (2018) progressive cavity pump. The pipe diameters were amended using e-One Design Assistant (2018) across the concept network for the lower pump rate.

A third sensitivity analysis considered both the increased residential density from scenario 1, with the lower pump rate as per e-One progressive cavity pumps (eOne, 2018).

Sensitivity scenario results are presented in Table 6 and Table 7 below. The results present the changes in comparison to the concept network as per Section 5.0, for pipe network and hydraulic performance.

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Table 6 Network Comparison

Pipe Diameter (DN)	Concept Design	Scenario 1 – Increased Density	Scenario 2 – Pump Rate Sensitivity	Scenario 3 – Density + Pump Rate
Total Pump Units	2,890	3,220	2,890	3,220
	Pipe Length (m)			
63	0	0	900	300
75	0	0	5,250	3,900
90	850	300	10,650	11,400
110	5,250	3,900	3,550	4,250
125	10,550	11,400	300	500
140	3,550	4,250	250	350
160	300	500	900	250
180	250	350	750	400
200	400	50	350	550
225	300	400	500	100
250	450	750	500	850
280	850	700	600	900
315	700	600	200	0
355	300	600	0	0
400	1,300	1,300	300	1,300
TOTAL	25,050	25,100	25,000	25,050

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Table 7 Hydraulic Performance Comparison

Pipe Diameter (DN)	Concept Design	Scenario 1 – Increased Density	Scenario 2 – Pump Rate Sensitivity	Scenario 3 – Density + Pump Rate
Largest Dynamic Head	16.6m (Zone 118)	16.5m (Zone 118)	17.2m (Zone 118)	16.5m (Zone 118)
Largest Accumulated Friction Loss	8.1m (Zone 179)	8.4m (Zone 82)	9.9m (Zone 179)	9.5m (Zone 179)
Maximum Velocity (m/s)	1.2 (Zone 201 DN400)	1. 7 (Zone 201 DN400)	1.1 (Zone 201 DN400)	1.2 (Zone 201 DN400)
Maximum Accumulated Residence Time (hrs)	8.8 (Zone 176)	7. 9 (Zone 176)	5.0 (Zone 176)	4.5 (Zone 176)

Sensitivity Scenario Commentary

The use of e-One progressive cavity pumps (eOne, 2018) has a higher dynamic head requirement, however they offer advantages such as:

- Lower residence time, leading to lower septicity and odour risks; and
- Ability to utilise smaller pipe diameters across the network, providing both capital cost advantage and residence time advantage.

Increasing the residential density through smaller lot sizes reduces the quantity of smaller pipe diameters, but reduces dynamic head requirement through the increased number of pump units.

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8.0 HYBRID OPTION

The proposed topography east of Burbush Road allows for gravity servicing connecting to the existing trunk wastewater main adjacent to SH1. Servicing this catchment using gravity and providing LPS for the catchment to the west as a hybrid solution was also considered feasible.

It is recommended that this hybrid option be considered further in future design subject to development staging and negotiating access for infrastructure with properties between the development and SH1.

9.0 REDUCED INFLOW AND INFILTRATION (I/I)

An LPS would be expected to have less inflow and considerably less infiltration. Design of gravity wastewater systems allows for I/I through the development of design flows and subsequent infrastructure sizing. LPS does not need to allow for these flow components when sizing infrastructure.

As such, the LPS would transport a reduced volume of wastewater to the Pukete Wastewater Treatment Plant. This has the consequential effect of a lower treatment costs for the same number of lots when compared with gravity servicing.

The cost implications have not been quantified due to design only being at a conceptual level. Once a higher level of design has been completed, additional costs and savings will be able to be quantified.

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10.0 CONCLUSION

The HCC water supply network outside the development has sufficient capacity, when programmed upgrades are completed. The trunk network within the Rotokauri North ICMP area can be sized to suit the requirements of the development upon completion of additional modelling.

The ultimate ICMP area can be serviced by conventional gravity system with one or more pumping stations. Alternatively, there is the possibility that a low-pressure sewer system would also be feasible to service Rotokauri North, if agreed by HCC.

Typically, for both servicing methods, installation of trunk infrastructure sized for the ultimate development would need to be undertaken.

Overall, the ICMP area can be serviced for water and wastewater. However, there are options for wastewater servicing which could be explored with HCC.

It is recommended that cost estimates be prepared for wastewater servicing methods to allow for a whole of life comparison to be utilised in further discussion with HCC to confirm the preferred wastewater disposal method.

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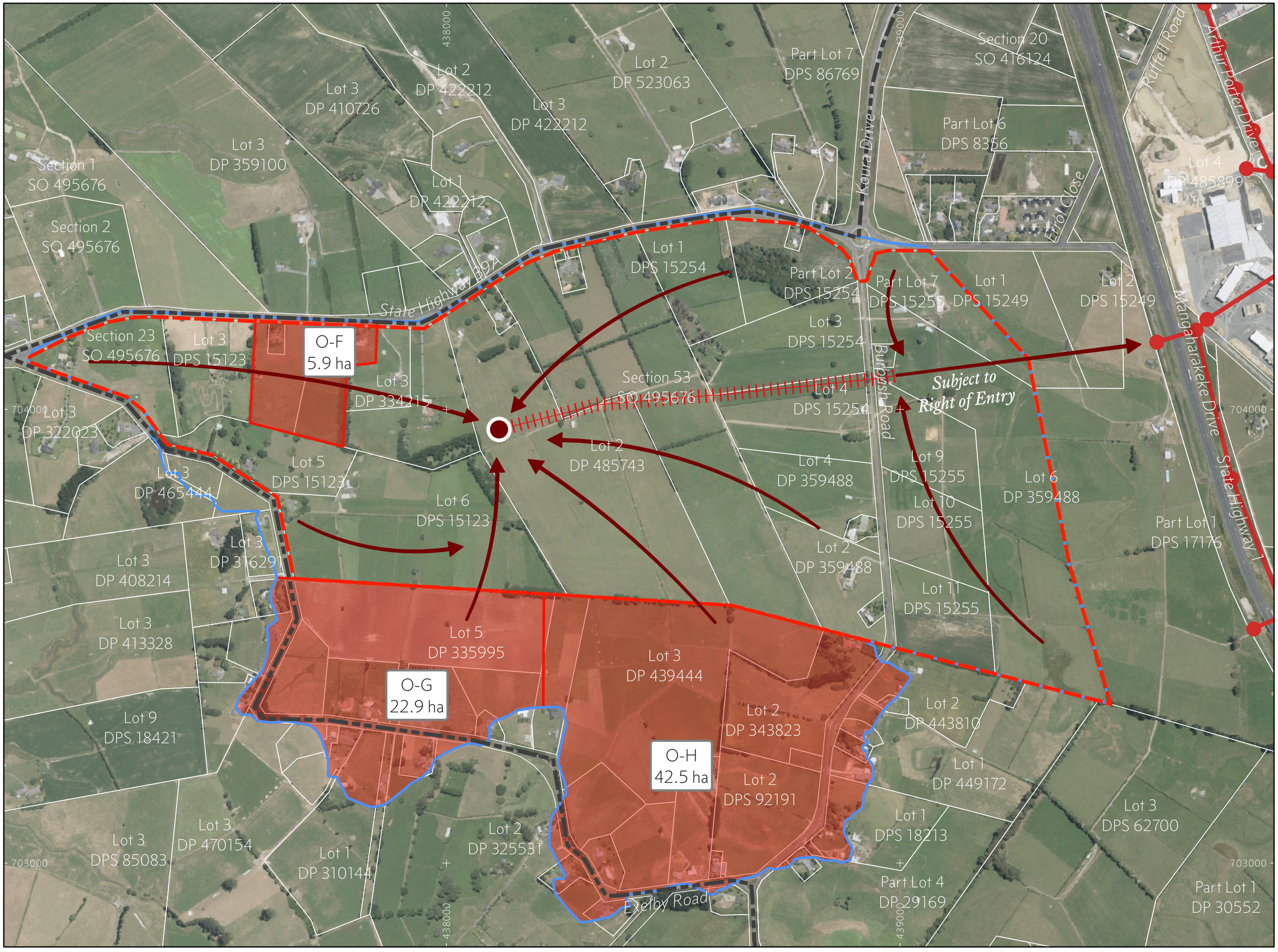
APPENDIX A – GRAVITY NETWORK PLANS



N

Legend

- Rotokauri North PPC Area
- Rotokauri North Catchment
- Upstream Catchments
- WDC/HCC TA Boundary

Indicative WW Network

- Pump Station
- WW Network
- Rising Main

HCC WW Network

- WW Lines
- Manhole

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Map Projection:
NZGD2000 / Mount Eden 2000 (EPSG: 2105)

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Plot Date:	26/04/2019		

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Project:
Rotokauri North
Private Plan Change (PPC)
Green Seed Consultants Limited

Title:
Gravity Wastewater Network
Concept Design of Ultimate Network
With One Pump Station

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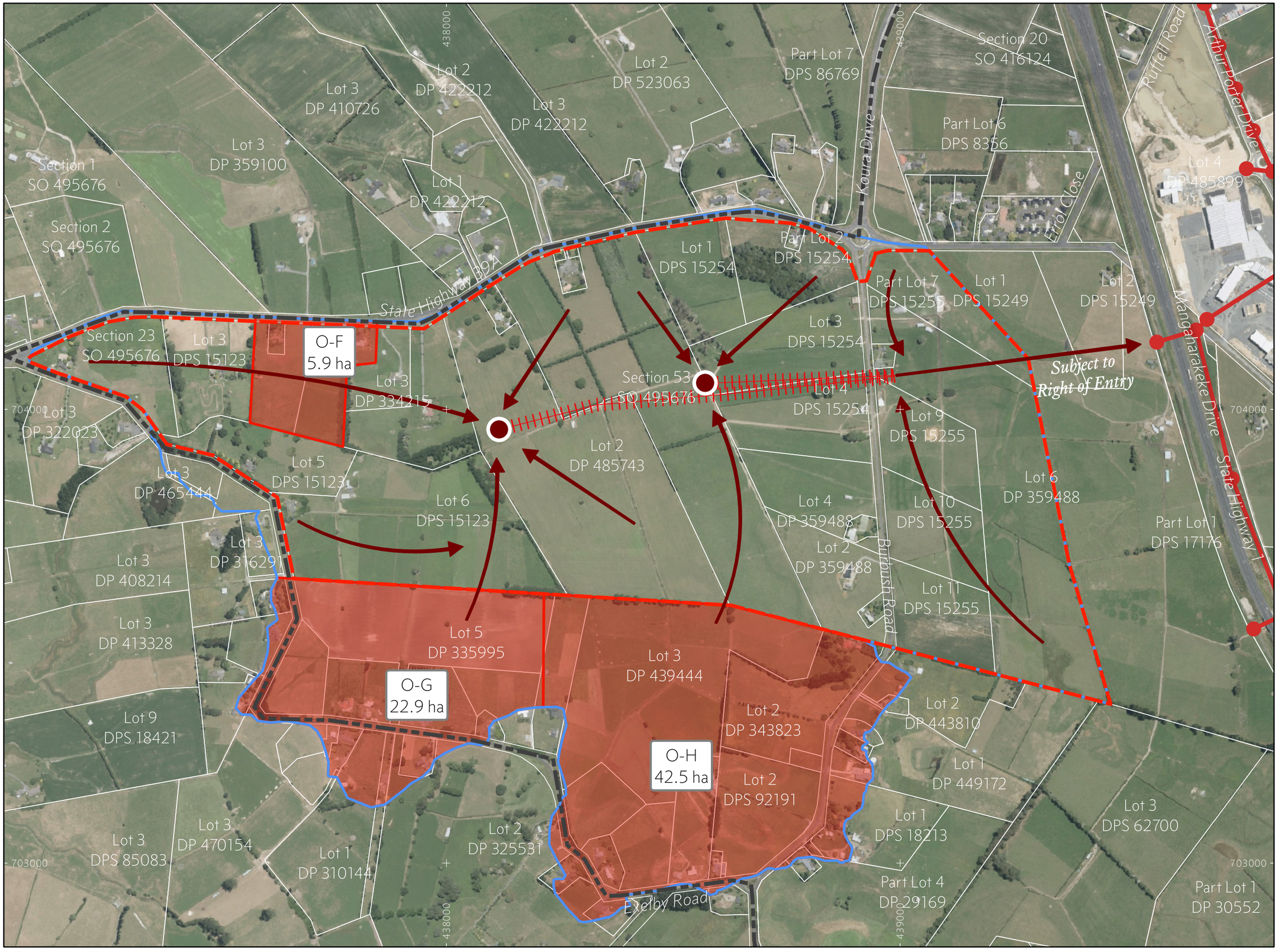
Issue Status:	For Information
Project Number:	1693-0
Drawing Number:	570
Revision:	C
A3 Scale:	1:8000



N

Legend

- Rotokauri North PPC Area
- Rotokauri North Catchment
- Upstream Catchments
- WDC/HCC TA Boundary

Indicative WW Network

- Pump Station
- WW Network
- Rising Main

HCC WW Network

- WW Lines
- Manhole

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Private Plan Change (PPC)
Green Seed Consultants Limited

Title:
Gravity Wastewater Network
Concept Design of Ultimate Network
With Two Pump Stations

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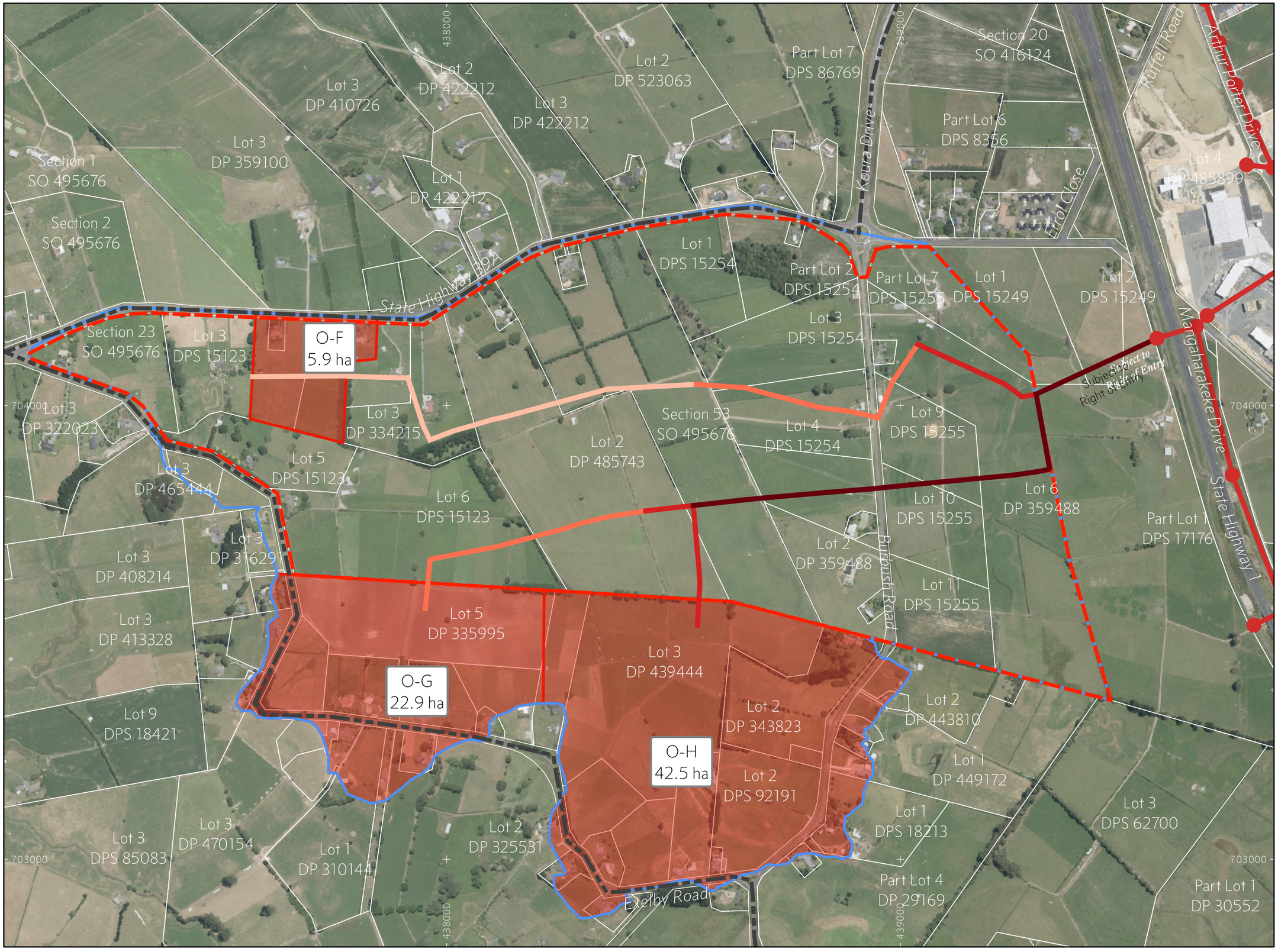
Drawing Number:	571
Revision:	C
A3 Scale:	1:8000

APPENDIX B – LPS NETWORK PLAN



N

Legend

- Rotokauri North PPC Area
- Rotokauri North Catchment
- Upstream Catchments
- WDC/HCC TA Boundary

Indicative Low Pressure System

- <150mm
- 150mm - 200mm
- 200mm - 250mm
- 250mm - 300mm
- >300mm

HCC WW Lines

- WW Lines
- Manhole

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Project:
Rotokauri North
Private Plan Change (PPC)
Green Seed Consultants Limited

Title:
Low Pressure Sewer Network
Concept Design of Trunk Network

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Project Number:	1693-0
Drawing Number:	572
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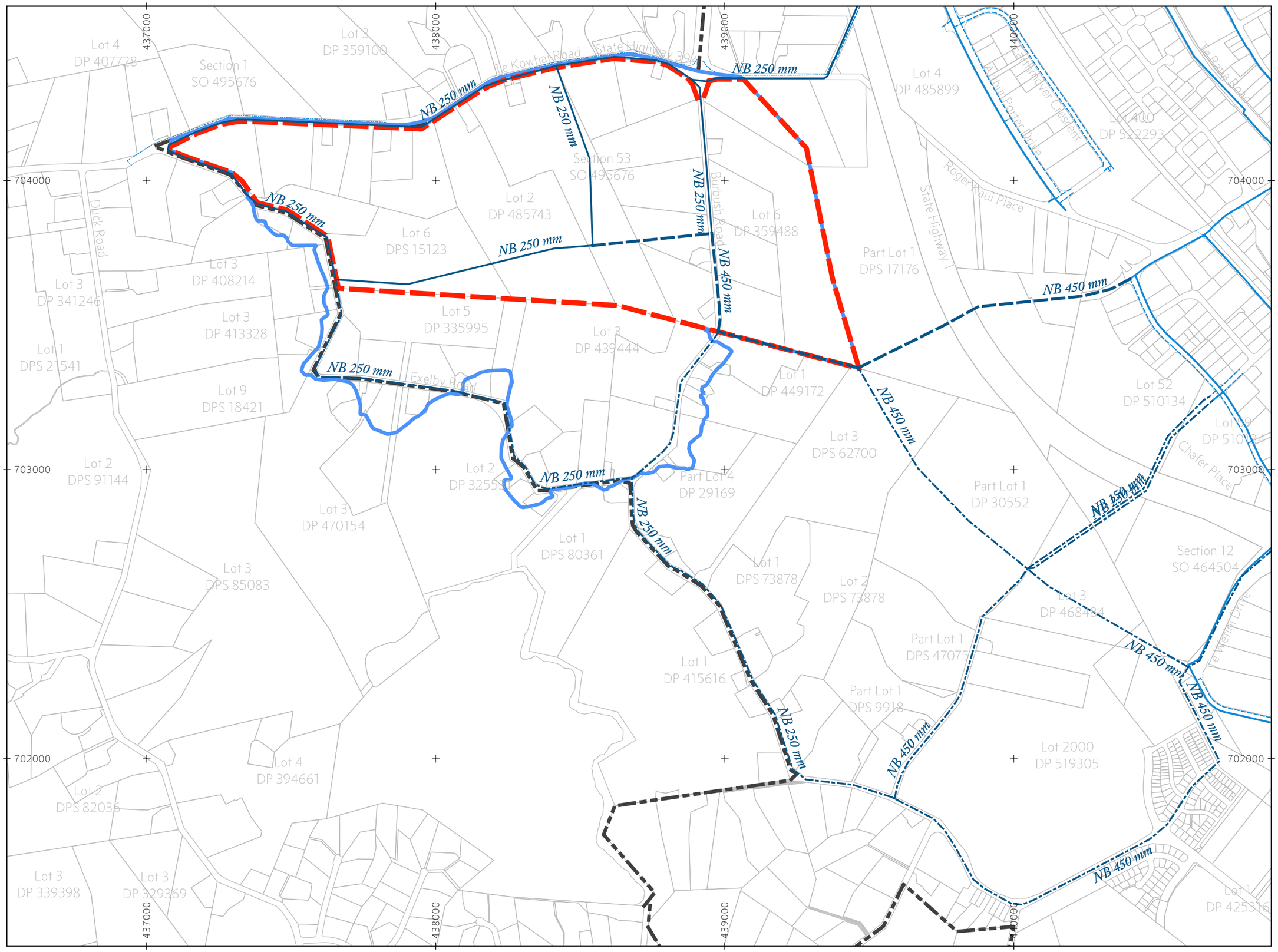
APPENDIX C – WATER NETWORK PLANS



N

Legend

- Rotokauri North PPC Area
- Rotokauri North Catchment
- WDC/HCC TA Boundary

Indicative Water Network

- Future watermains constructed by others
- PPC Area Transmission Line
- PPC Area Trunk Line

HCC Water Network

- NB 100 mm
- NB 150 mm
- NB 225 to 250 mm
- NB 520 to 620 mm

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Map Projection:
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Project:
Rotokauri North
Private Pland Change (PPC)
Green Seed Consultants Limited

Title:
Water Supply Network
ConceptDesign of Ultimate Network

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Drawing Number:	670
Revision:	B
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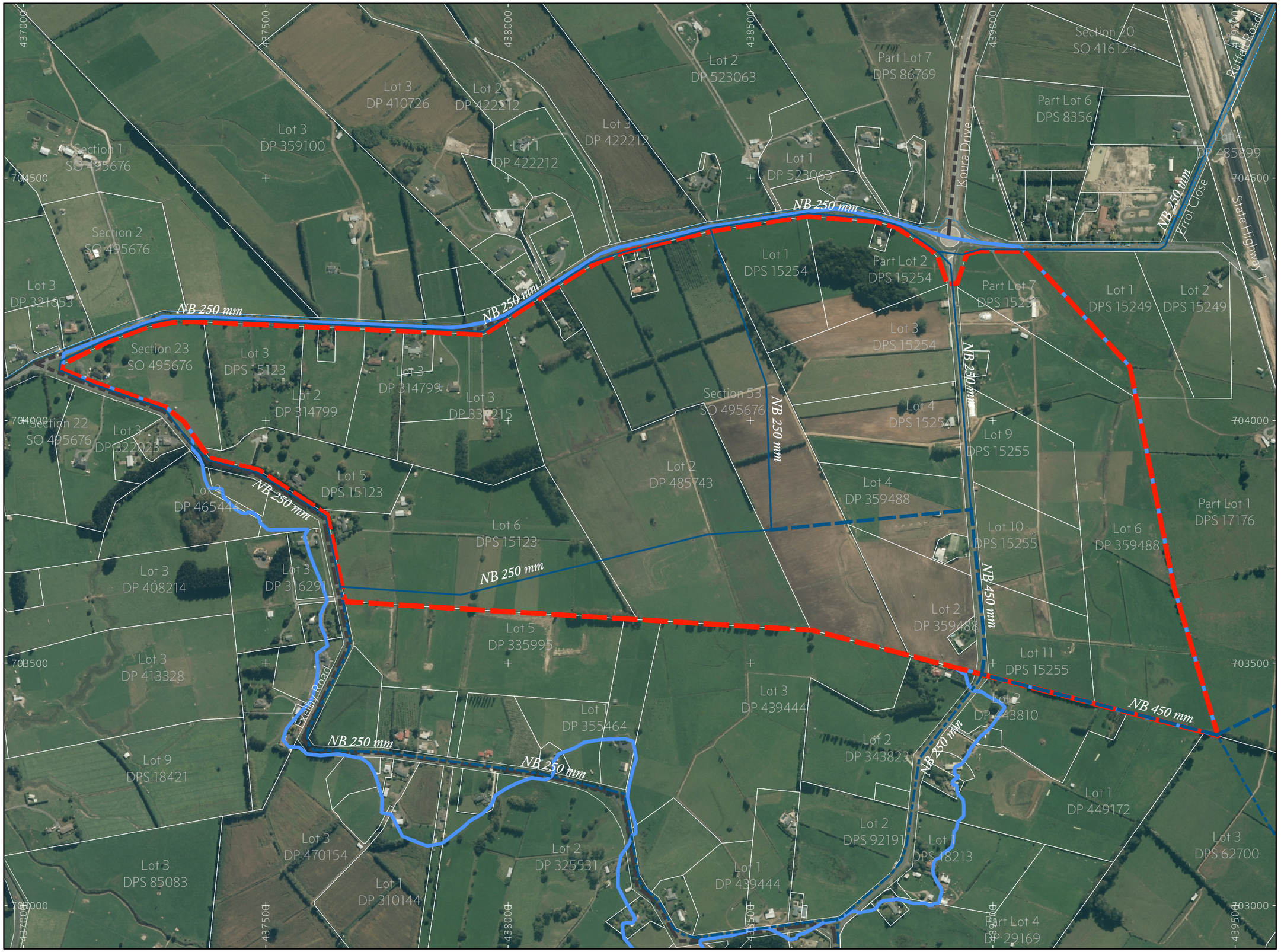

N

Legend

- Rotokauri North PPC Area
- Rotokauri North Catchment
- WDC/HCC TA Boundary

Indicative Water Network

- Future watermains constructed by others
- PPC Area Transmission Line
- PPC Area Trunk Line

HCC Water Network

- NB 100 mm
- NB 150 mm

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Project:
Rotokauri North
Private Pland Change (PPC)
Green Seed Consultants Limited

Title:
Water Supply Network Concept Design for PPC Area

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Drawing Number:	671
Revision:	B
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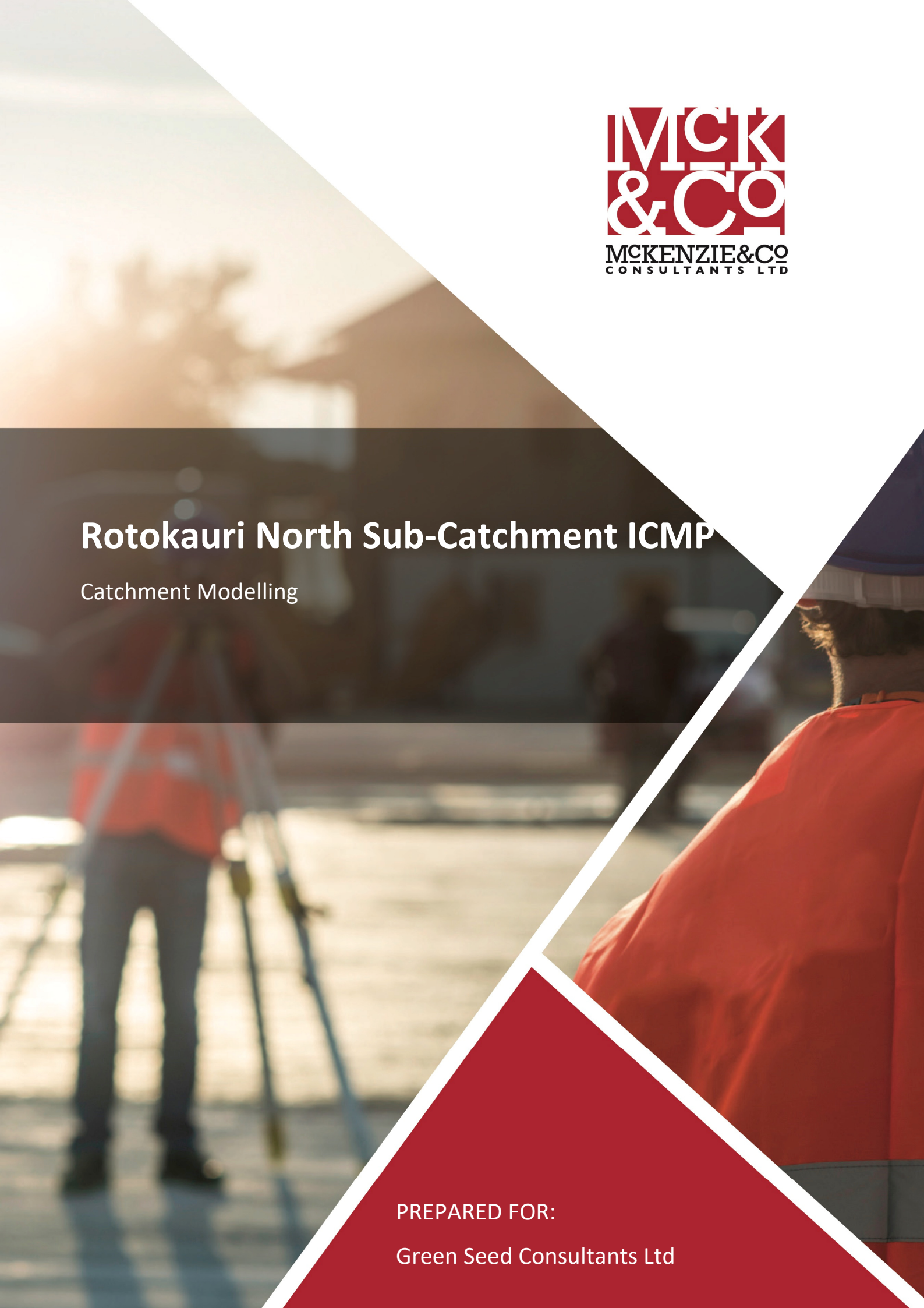

Rotokauri North Sub-Catchment ICMP

Catchment Modelling

PREPARED FOR:

Green Seed Consultants Ltd

DOCUMENT CONTROL RECORD

PROJECT:	Rotokauri North Sub-Catchment ICMP
CLIENT:	Green Seed Consultants Ltd
PROJECT LOCATION:	Burbush Rd and Te Kowhai Rd, Rotokauri North
FILE PATH:	C:\12d\Synergy\data\MCKSQL01\1693 Rotokauri_323\Documents and Communications\Reports\Catchment Modelling Report\1693-Catchment Modelling Report.docx

Revision	Date	Originator	Checker	Approver	Description
Draft	10/18	BJR/BH	AJSH	AJSH	Client Review
1	12/18	BJR	AJSH	AJSH	Draft PPC
2	04/19	BJR/BH	AJSH	AJSH	ICMP Version

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Appendix B – Design Rainfall Hyetographs

Appendix C – 50% AEP Hydrographs

Appendix D – 10% AEP Hydrographs

Appendix E – 1% AEP Hydrographs

Appendix F – Exelby Road Hydrographs

Appendix G – Te Kowhai Road (West) Hydrographs

Appendix H – Te Kowhai Road (East) Hydrographs

Appendix I – Te Kowhai/Burbush Road Hydrographs

Appendix J – Rotokauri South Hydrographs

Appendix K – TP108 Calculation

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1.0 INTRODUCTION

McKenzie & Co Consultants have been engaged by Green Seed Consultants Ltd (GSCL) to prepare a stormwater modelling report to assess pre-development stormwater flows for the Rotokauri North Sub-Catchment Integrated Catchment Management Plan (ICMP). This report has been prepared alongside a Private Plan Change (PPC) to rezone 133 ha (within the ICMP area) for medium density housing and a neighbourhood centre.

The full extent of modelling (including that in this report) covers the extent of land identified in Figure 1, based on existing topographical catchments. However, the ICMP covers approximately 203 hectares as shown in Figure 1 below, and is only based on land falling inside the HCC Territorial Authority Boundary.

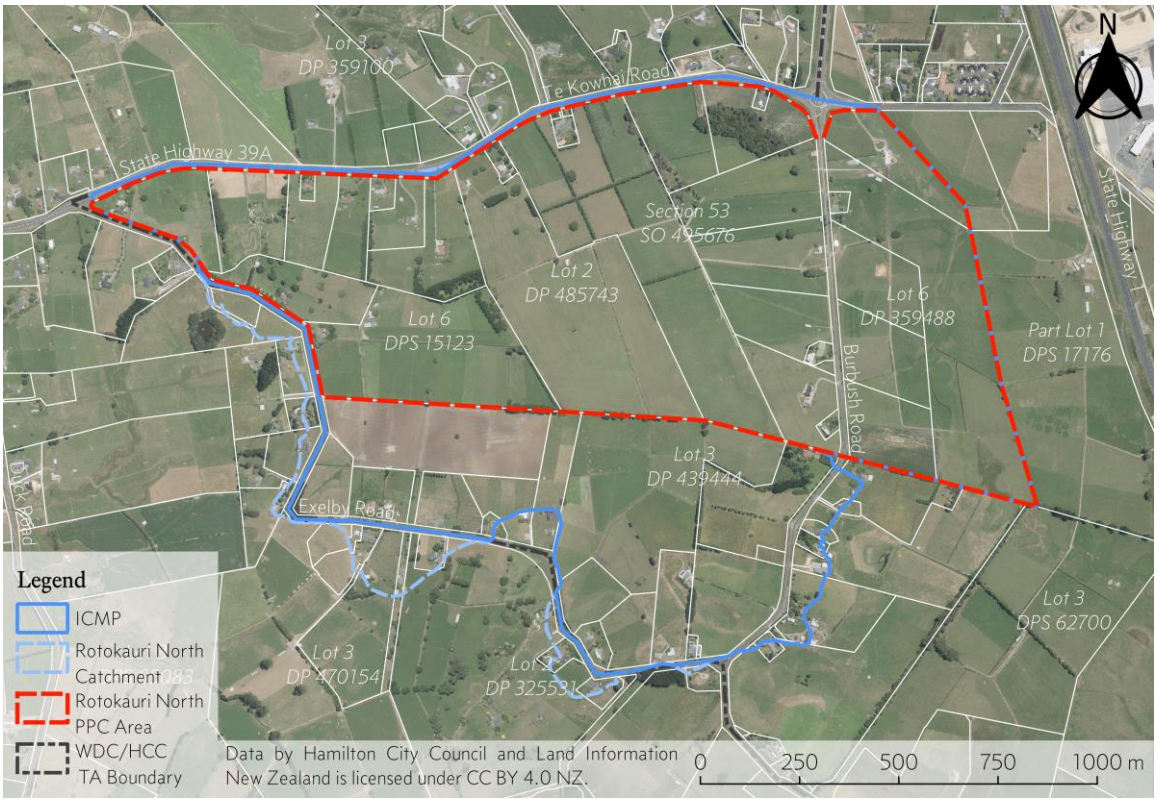

Figure 1: ICMP Area and Rotokauri North Catchment

2.0 SITE DESCRIPTION

The site is located at the edge of Hamilton City's urban limit toward the northwest corner of the city. The site is bounded to the north by State Highway 39 (Te Kowhai Road), and generally on the west and south by Exelby Road. The Waikato Expressway lies to the east and Burbush Road passes through (North – South) the middle of the site – see Figure 2.

The site is comprised of farmland pastures, with a small number of farmhouses/residential dwellings, and farm utility buildings present.

The landform is generally very flat with around 2 m fall across the site. Burbush Road is elevated some 10 m above the site to the south. The total elevation range across the ICMP catchment is from RL 27m to RL 47m.

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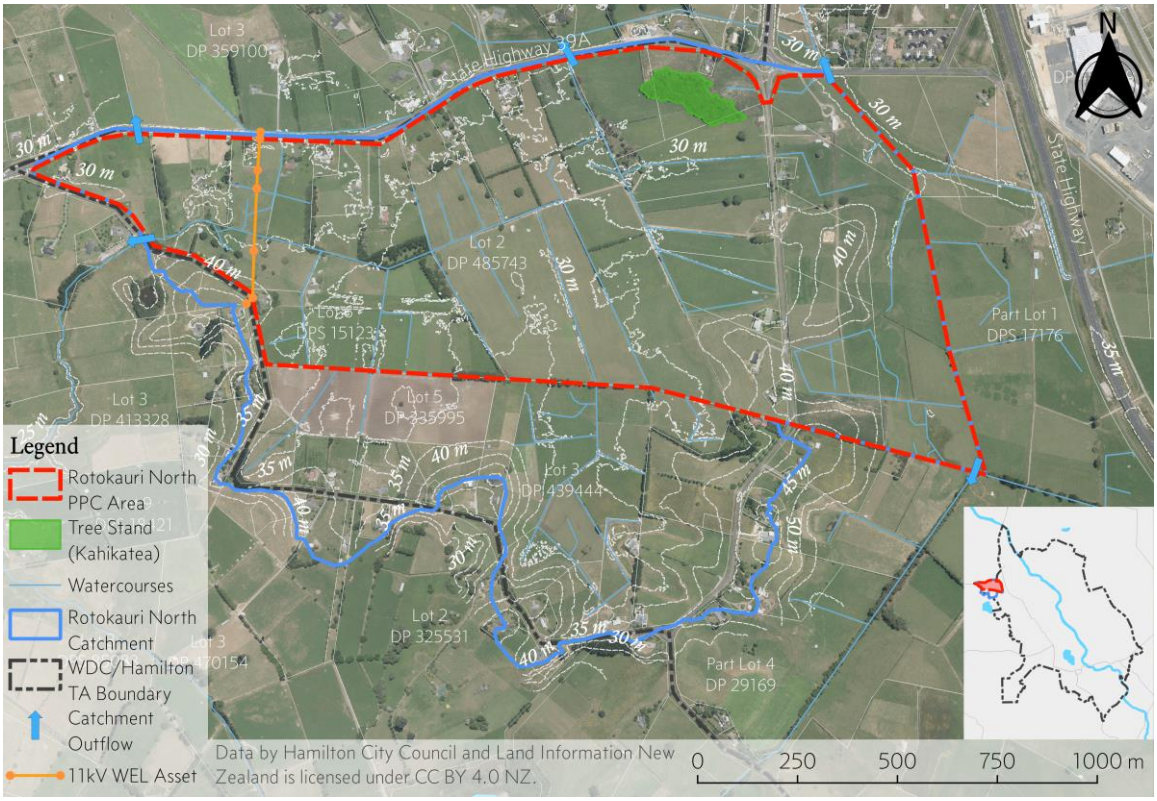

Figure 2: Site Location

3.0 CATCHMENT MODELLING BACKGROUND

The Rotokauri North development area is at the intersection of the Ohote, Te Otamanui, Mangaheka and Rotokauri South catchments. Modelling and reporting on these catchments was undertaken by external consultants for Hamilton City Council (HCC) separate to the work herein.

The majority of stormwater catchment discharge is through the Ohote catchment, which runs predominantly east-west through Rotokauri North. Previous modelling for the Ohote catchment included a restriction on the Exelby Road culvert that limited flows to 0.7m³/s. If the Exelby Road culvert discharge rate previously used is in fact greater than 0.7m³/s, stormwater detention devices constructed upstream to limit the catchment discharge rate to 0.7m³/s will be oversized. For example, preliminary assessment indicates that 85,000 m³ detention will be required for Q = 0.7m³/s; increasing Q to 2.58m³/s reduces detention requirements to approximately 30,000 m³.

There is no apparent physical reason for this limit. Consequently, the actual pre-development flows for the Ohote catchment are unclear.

Three separate models have been produced to determine peak flow at the Exelby Road culvert. 1D models were based on Auckland Council TP108 (Auckland Regional Council, 1999) methodology, HEC-HMS analysis, and 2D modelling using HEC-RAS.

Two-dimensional modelling using HEC-RAS was also undertaken for the portions of Te Otamanui, Mangaheka, and Rotokauri South catchments that fall within the Rotokauri North ICMP and PPC area.

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4.0 ONE DIMENSIONAL MODELLING

To maintain consistency with the Rotokauri South ICMP and the associated stormwater modelling, a TP108 analysis for the predevelopment Ohote catchment (refer to Appendix K – TP108 Calculation) was undertaken such that model results would be comparable with previous AECOM modelling. The analysis inputs were based on values used for the AECOM modelling as noted below.

Catchment size:	136.39 ha from file "MikeModelCatchmentData.gdb.zip" supplied by AECOM on 18/10/18.
Curve Number (CN):	A single weighted average curve number of 73.5 was calculated from the sub-catchment curve numbers in file "MikeModelCatchmentData.gdb.zip" supplied by AECOM on 18/10/18. The curve numbers accounted for impervious areas.
Initial Abstraction, I*a*:	5mm, supplied by AECOM in email on 18/10/18.
Channelisation Factor, C:	1.00 (Note: this was increased from 0.8 value in TP108 to reflect the poor drainage network)
24-hour rainfall depth, P24:	139.68mm, derived from a summation of the depths in the rainfall time series contained in the file "Modelled Rainfall TS.xlsx" supplied by AECOM on 18/10/18.
Catchment slope:	Existing ground surface heights from the LiDAR surface were extracted at 1 m intervals along the alignment of the main channel. The equal area method determined the catchment slope to be 0.17%.

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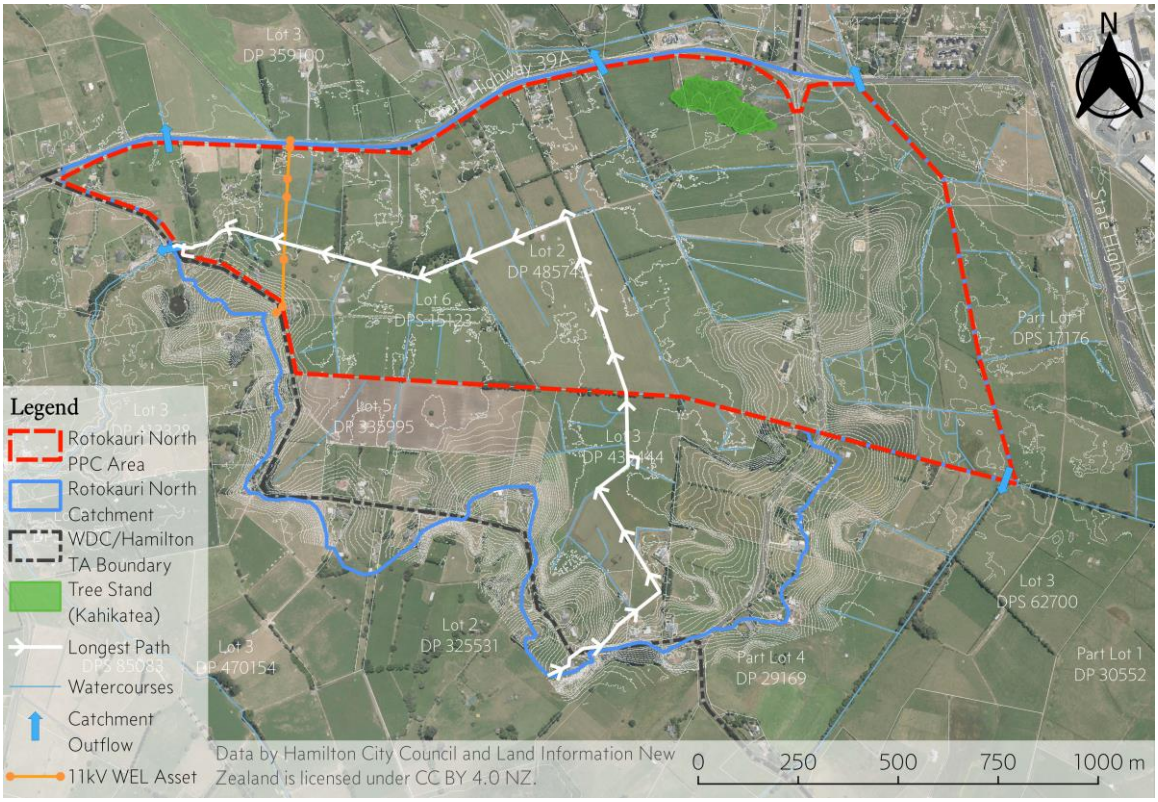

Figure 3: Plan of catchment slope alignment for TP108 calculation

Figure 2 above shows that aside from the ridge running along the west, south and east edges of the catchment, the Rotokauri North ICMP catchment has minimal grade.

An additional HEC-HMS model was built to calculate a predevelopment 1% AEP peak flow immediately upstream of the Exelby Road culvert. The TP108 inputs described above were used in the model with the following additional inputs:

Software used:	HEC-HMS v4.2.1;
Hyetograph time interval:	5 minutes;
Hyetograph data:	from file "MikeModelCatchmentData.gdb.zip" supplied by AECOM on 18/10/18. The data supplied is shown in Appendix B;
Nested storm event duration:	24 hours;
Simulation run period:	24 hours;
Simulation step interval:	1 minute;
Loss method:	SCS Curve Number;
Lag time, t_p:	$t_p = 0.666 * t_c$; and
Peak Rate Factor (PRF):	The default PRF of 484 was used to allow comparison with the PRF used by TP108;

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4.1 Model Limitations

HEC-HMS was used only for one-dimensional (1D) runoff calculations. As an output it provided a rainfall runoff hydrograph. Peak discharge and total runoff volume at given locations are also able to be estimated. No other outputs are provided.

Although HEC-HMS can model baseflow discharge and volume, no baseflow model was used. The model outputs were for surface runoff data only. The methodology assumes that all rain falling within the catchment contributes to surface runoff. HEC-HMS does not directly model any 2D effects, such as storage at ground surface or below surface, grid cell size, shape or relative elevation of adjacent cells, tailwater, etc.

4.2 Boundary Conditions

Precipitation

The precipitation boundary condition was based on a 24-hour duration with rainfall depths proportioned over the event profile as per previous modelling by AECOM.

4.3 1D model Results

The predevelopment 1% AEP peak flow for the two analyses at the upstream side of the Exelby Road culvert were:

- TP108 analysis = 6.3 m^3/s; and
- HEC-HMS analysis = 7.6 m^3/s.

4.4 1D model Discussion

AECOM estimated peak flow for Ohote Catchment to be 0.7m^3/s (revised 2.7 m^3/s in subsequent AECOM sensitivity modelling), using their coupled Mike Urban model (1D/2D). McKenzie & Co. Consultants TP108 and HEC-HMS calculated peak flows were 6.3 m^3/s and 7.6 m^3/s respectively.

McKenzie & Co. consider the TP108 and HEC-HMS analyses to be unsuitable for determining the predevelopment peak flows at Exelby Road for the Ohote catchment as the catchment characteristics (limited topography, poor land drainage network) cannot be replicated adequately. TP108 (Auckland Regional Council, 1999, p. 3) limitation notes also state that the TP108 methodology may not be appropriate for flat catchments with storage capacity, which is reflective of the Ohote Catchment.

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5.0 TWO-DIMENSIONAL MODELLING METHODOLOGY

A new two-dimensional model was developed to assess the flows within the pre-development catchment for the Ohote, Te Otamanui, Mangaheka and Rotokauri catchments, i.e., the Rotokauri North ICMP extents. Development of the new model was limited to the Rotokauri North ICMP catchment.

AECOM previously undertook 2D modelling as part of the Rotokauri South ICMP (AECOM, 2016). The methodology herein was developed to allow for comparison with the AECOM modelling.

5.1 Model Configuration

The model was developed in HEC-RAS as a grid utilising the 2D flow modelling capabilities of the software. The 2D area was selected based on the natural topography of the catchments. Culverts were modelled from field survey data. The drainage network was modelled to match field observations and observed direction of flow. General surface elevation was derived from LiDAR acquired July 2018.

A digital elevation model (DEM) was derived (12d software) from the LiDAR information, with primary drainage channels and streams defined within the topography by manually adjusting the DEM. The manual adjustment was such that the channels and streams matched information from:

- Site surveying (culvert invert levels);
- Field observations (channel widths, position in relation to topography); and
- Corrections due to LIDAR results being affected by vegetation.

Where streams and channels were defined in the DEM, they were based on an assumed base width of 2.0m, as typically observed on site.

The DEM was used as the terrain association within HEC-RAS. Two-dimensional (2D) flow areas were defined for the stream catchments within the Rotokauri North catchment.

Breaklines were added to clearly define the primary drainage channels and streams, with additional breaklines added as required to model local topographic conditions.

The 2D model was configured as follows:

- 5m grid based on DEM;
- 1-2 m variable grid along all breaklines; and
- Manning's *n* = 0.042 for all surfaces, mid-way between established values of 0.035 (pasture, farmland) and 0.05 (flood plains – light brush).

Table 1 below summaries the HEC-RAS surface used for modelling stormwater runoff.

Table 1: 2D Grid Cell Summary

Catchment Reference	Number of Cells	Largest Cell (m^2)	Smallest Cell (m^2)	Average Cell (m^2)
Ohote (Exelby Road Culvert)	75,186	60.6	0.7	18.4

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Catchment Reference	Number of Cells	Largest Cell (m^2)	Smallest Cell (m^2)	Average Cell (m^2)
Te Otamanui (Te Kowhai Road West)	3,315	46.9	1.1	22.4
Te Otamanui (Te Kowhai Road East)	20,005	53.7	0.7	19.7
Mangaheka (Te Kowhai / Burbush)	18,826	55.0	2.2	22.2
Rotokauri South	21,877	60.5	2.1	23.9

5.2 HEC-RAS limitations

As HEC-RAS is primarily suited to river systems, it does not allow for infiltration modelling, nor definition of impervious/pervious areas. The software assumes that all rainfall on the grid will contribute to catchment runoff.

The selection of Manning's *n* (0.042) was such that it would represent the equivalent roughness of the catchment.

Regarding previous catchment modelling by AECOM[1], the global roughness value used was a Manning's *M* of 24.18, equivalent to a Manning's *n* of 0.041. While AECOM have used DHI Mike to model the 2D flow scenario, the global roughness values between the DHI Mike and HEC-RAS models were considered equivalent.

5.3 Boundary Conditions

Precipitation

A boundary condition of all 2D surfaces modelled assumed precipitation across a surface was constant. Precipitation was based on a 24-hour duration, with rainfall depths proportioned over the event profile as per previous modelling by AECOM for the Ohote Catchment – refer to section 4.0 One Dimensional Modelling above. This rainfall data was used rather than the Regional ITS rainfall data so as to allow for consistent comparison of results between different modelling methodologies:

- 50% Average Exceedance Probability (AEP) (1 in 2 year) rainfall event depth = 66.2 mm
- 10% Average Exceedance Probability (AEP) (1 in 10 year) rainfall event depth = 99.1 mm
- 1% Average Exceedance Probability (AEP) (1 in 100 year) rainfall event depth = 139.7 mm

Initial modelling with the rainfall hyetograph as per Figure 3 was undertaken based on assumption that the catchment was fully saturated, high groundwater present and initial abstraction losses

[1] Email from Stepanka Vajlikova (AECOM) to Andrew Hunter (McKenzie & Co.), "RNDA - Modelling Inputs", 25 September 2018.

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equivalent to 0mm. The initial modelling prediction of flow at the Exelby Road Culvert showed a flow rate considerably greater than that predicted by AECOM previously.

Following discussions between McKenzie & Co. Consultants, AECOM and HCC, a revised rainfall hyetograph was developed. The resultant initial abstraction was 5mm to match the previous AECOM modelling.

Following correction for soil types and relevant CN values net rainfall hyetographs were created (as used in the original AECOM model), thereby reflecting reduced runoff from pervious surfaces. The hyetographs were then adjusted such that the first 5mm of rainfall was removed from the time series to model initial abstraction.

The resultant hydrographs showed a moderate correlation[2] with the AECOM modelling, and were used for the results within this report.

Table 2: Design Rainfall Depths[3]

Average Exceedance Probability (AEP) (%)	Design Rainfall Depth (mm) (AECOM)	Design Rainfall Depth (mm) (McKenzie & Co.)
50	66.2	35.5
10	99.1	55.5
1	139.7	78.7

[2] Correlation between AECOM and McKenzie & Co hydrographs for the 1% AEP event was $\rho = 0.8$. The McKenzie & Co hydrograph has a higher initial peak and discharges more rapidly than the AECOM hydrograph. The McKenzie & Co model discharges 90,000 m^3 over 24 hours, approximately 87% of AECOMs model for the same time period.

[3] Design rainfall adopted by McKenzie & Co Consultants was net after initial abstraction of 5mm removed.

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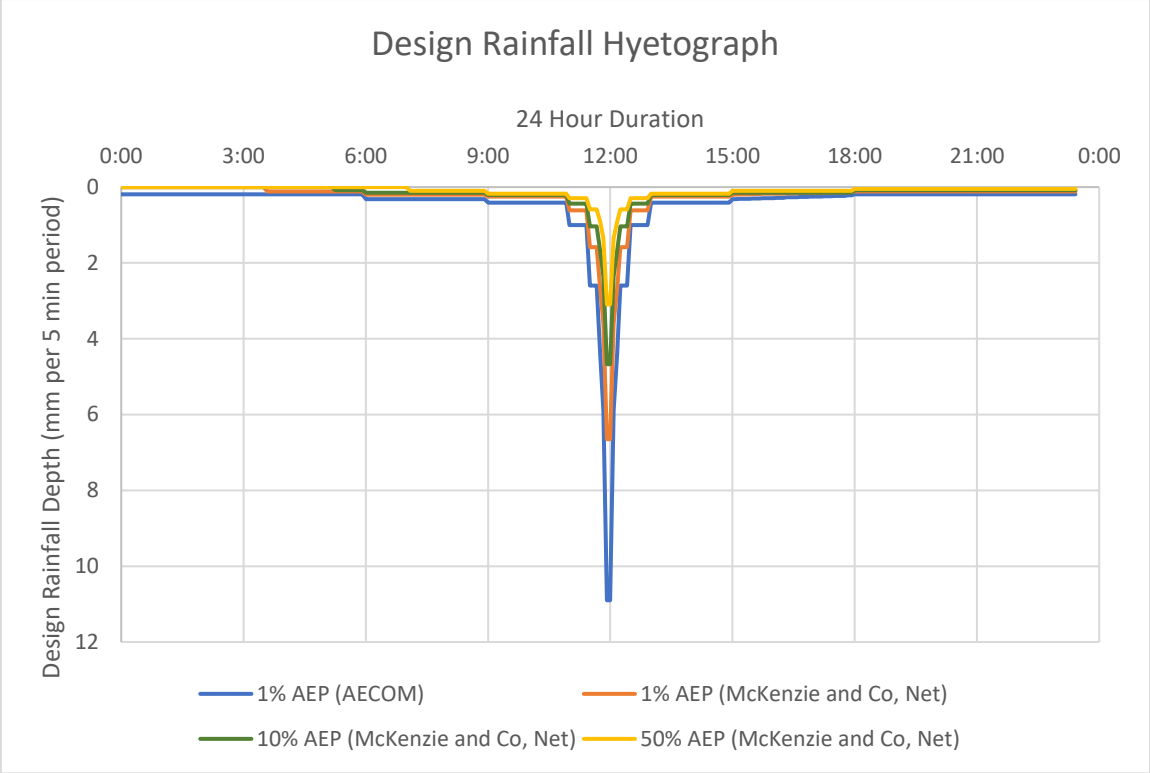

Figure 4: 24 Hour Rainfall Depth Distribution, 1%, 10%, and 50% AEP[4]

Downstream

Normal depth boundary conditions were defined for all 2D surfaces, with a friction line of 0.001 (1 in 1,000). The parameters were defined such that separate water surfaces were computed for all cells along the boundary condition line.

Storage Area / 2D Area Connections

Each catchment, except Rotokauri South, has a culvert underneath existing roads, which controls the outflow. These culvert and road configurations were modelled as Storage Area/2D Area connections within HEC-RAS. Each connection is modelled as a structure (spillway/weir) along the road centreline, with the culvert modelled through the spillway/weir. Culvert details were added as per survey information, with minor adjustments to suit connecting cell values.

For model stability purposes the spillway/weir was modelled using 2D equations rather than the weir equation. Figure *4* below shows the arrangement of the Exelby Road culvert. The spillway profile was based on the DEM along the road, with some local adjustments to suit individual elevations of the adjacent cells.

[4] *ibid* 3

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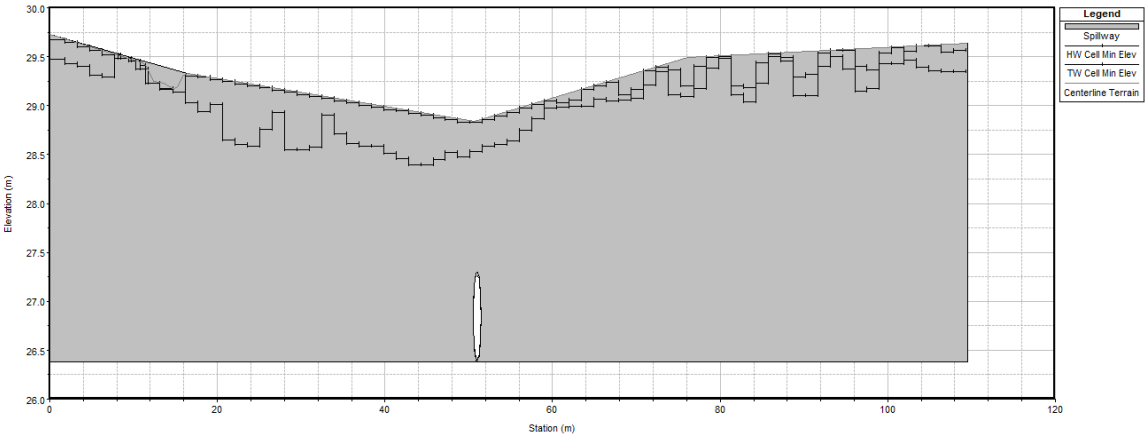

Figure 5: Typical Storage Area/2D Area Connection

Rotokauri South was not modelled with a culvert as there was no suitable hydraulic features with which to model the boundary between the ICMP/PPC area and the downstream catchment area. Results for this catchment were extracted from the boundary condition as outlined above.

Inflow

The Mangaheka catchment included inflow from upstream portion of the Mangaheka catchment to the east of State Highway 1. The DEM did not extend past SH1. As such, the peak predicted flows from Beca's Mangaheka ICMP[5] were used to develop synthetic hydrographs.

An initial model run, excluding the inflow, was used to define the hydrograph shape for the 1% 10% and 50% AEP responses. The 1% and 10% AEP hydrographs were scaled such that the peak flows matched those within Tables 4 and 6 of the Mangaheka IMCP (Adams, 2018). The 50% AEP hydrograph was scaled based on the assumption that peak flow would be 61% of 10% AEP flow, with 61% being difference between net rainfall depths for the two events.

[5] Mangaheka Integrated Catchment Management Plan – Stormwater 1D Modelling Report (Beca, 6 June 2017).

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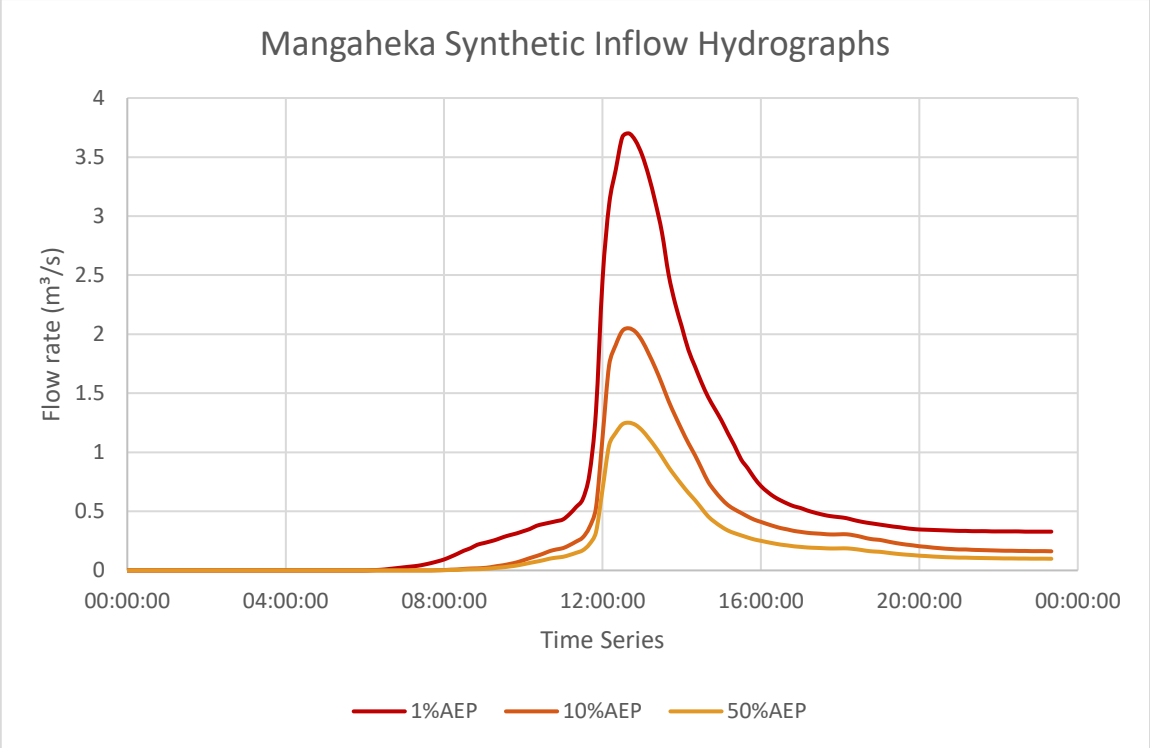

Figure 6: Mangaheka Inflow Hydrographs

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Table 3: Culvert Parameters

Culvert Parameter	Exelby Road Culvert	Te Kowhai Road (West)	Te Kowhai Road (East)	Te Kowhai / Burbush Road
Catchment	Ohote	Te Otamanui	Te Otamanui	Mangaheka
Culvert Diameter as surveyed (mm)	900	300 and 150	900	1200
Culvert Diameter as modelled (mm)	900	300	900	1200
Culvert Upstream Invert (m, RL) as surveyed	26.39	28.81	28.02	27.95
Culvert Upstream Invert (m, RL) as modelled	26.42	28.52	28.2	28.33
Culvert Downstream Invert (m, RL) as surveyed	26.38	28.34	27.96	27.95
Culvert Downstream Invert (m, RL) as modelled	26.38	28.35	27.96	27.90
Culvert Length (m) as surveyed	12.2	41.3	20.7	24.8
Culvert Length (m) as modelled	14.4	33.7	82.9	34.5

Adjustment to the culvert invert levels was necessary so as to match the estimated ground level of the connecting cells within the 2D grid. While the culvert details were surveyed, the 2D grid was based on LiDAR with the difference between the two datasets expected due to accuracy tolerances, etc. The differences within the surveyed and modelled information was not considered to critically affect the predicted results.

While additional topographical survey around the culverts would improve the grid resolution, the requirement for this survey should be considered in context of criticality of the information.

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5.4 Simulation Parameters

The simulation was configured with the following parameters to achieve accuracy and model stability:

- Initial conditions time = 1 hour
- Equation = Diffusion wave
- Maximum iterations for 2D cells = 60
- Volume tolerance for 2D cells = 0.003

Time step divisions were used to shorten the simulation time, while also providing sufficient accuracy to reduce instabilities. Table 4 shows the time steps adopted for the simulation time periods.

Table 4: Simulation Period Time Steps

Simulation Period Start Time	Simulation Period End Time	Time Step Interval (sec)
0:00	11:45	30
11:45	19:00	6
19:00	23:25	30

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6.0 TWO DIMENSIONAL RESULTS

Three rainfall events were modelled:

- 50% AEP
- 10% AEP
- 1% AEP

Results were extracted from the culvert and downstream boundary condition locations to define the pre-development flows within the Rotokauri North ICMP. All rainfall events were based on a 24-hour duration, with total depths as per Section 5.3.

6.1 50% AEP Results

The peak flows through the culverts and boundary condition were as outlined in Table 5 below. These were considered to be representative of the pre-development flows.

Table 5: 50% AEP 2D Results

Location Reference	Catchment	Peak Flow (m^3/s)
Exelby Road	Ohote	1.95
Te Kowhai Road (West)	Te Otamanui	0.11
Te Kowhai Road (East)	Te Otamanui	0.82
Te Kowhai/Burbush Roads	Mangaheka	1.49
Rotokauri South (Boundary Condition)	Rotokauri South	0.46

6.2 10% AEP Results

The peak flows through the culverts and boundary condition were as outlined in Table 6 below. These were considered to be representative of the pre-development flows.

Table 6: 10% AEP 2D Results

Location Reference	Catchment	Peak Flow (m^3/s)
Exelby Road	Ohote	2.41
Te Kowhai Road (West)	Te Otamanui	0.11
Te Kowhai Road (East)	Te Otamanui	1.53
Te Kowhai/Burbush Roads	Mangaheka	2.38
Rotokauri South (Boundary Condition)	Rotokauri South	1.30

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6.3 1% AEP Results

The predicted hydrographs at the culverts and boundary condition were extracted from the model results. For Te Kowhai Road (West)/(East), and Te Kowhai/Burbush Road there was no predicted overtopping of the road (all flow conveyed by the respective culverts). At Exelby Road, the 1% AEP flows were predicted to overtop the culvert, flowing across the road to the downstream system.

Table 7: 1% AEP 2D Results

Location Reference	Catchment	Peak Flow (m^3/s)
Exelby Road	Ohote	3.25
Te Kowhai Road (West)	Te Otamanui	0.12
Te Kowhai Road (East)	Te Otamanui	1.82
Te Kowhai/Burbush Roads	Mangaheka	3.21
Rotokauri South (Boundary Condition)	Rotokauri South	1.77

The hydrographs over the 24-hour simulation period are presented below, with Exelby Road results discussed further in the subsequent section – see Figure 6, Figure 7, Figure 8, Figure 9 and Figure 10.

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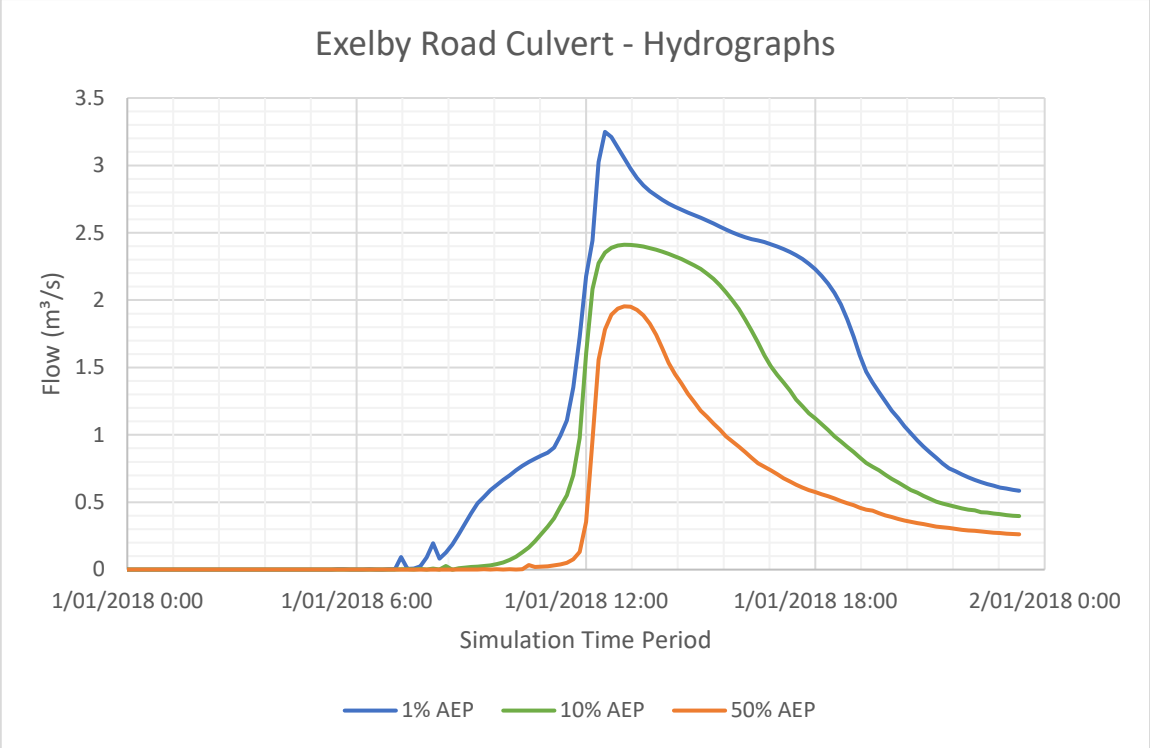

Figure 7: Exelby Road Culvert Flow

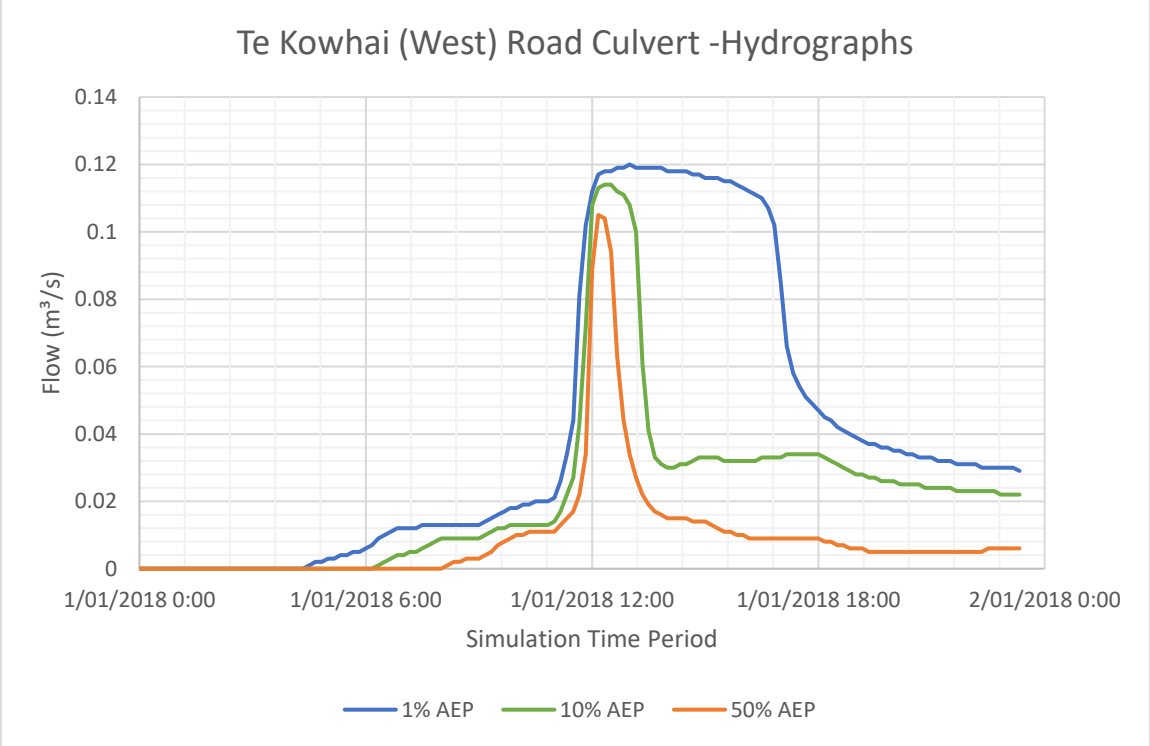

Figure 8: Te Kowhai Road (West) Culvert Flow

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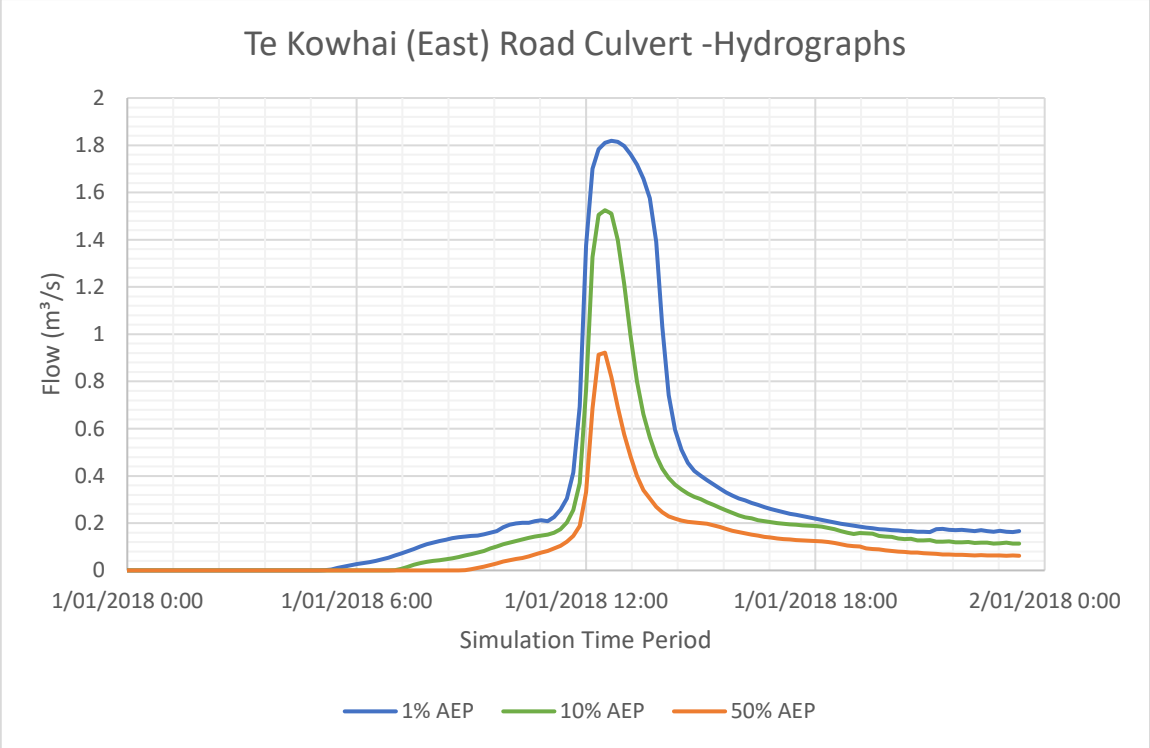

Figure 9: Te Kowhai Road (East) Culvert Flow

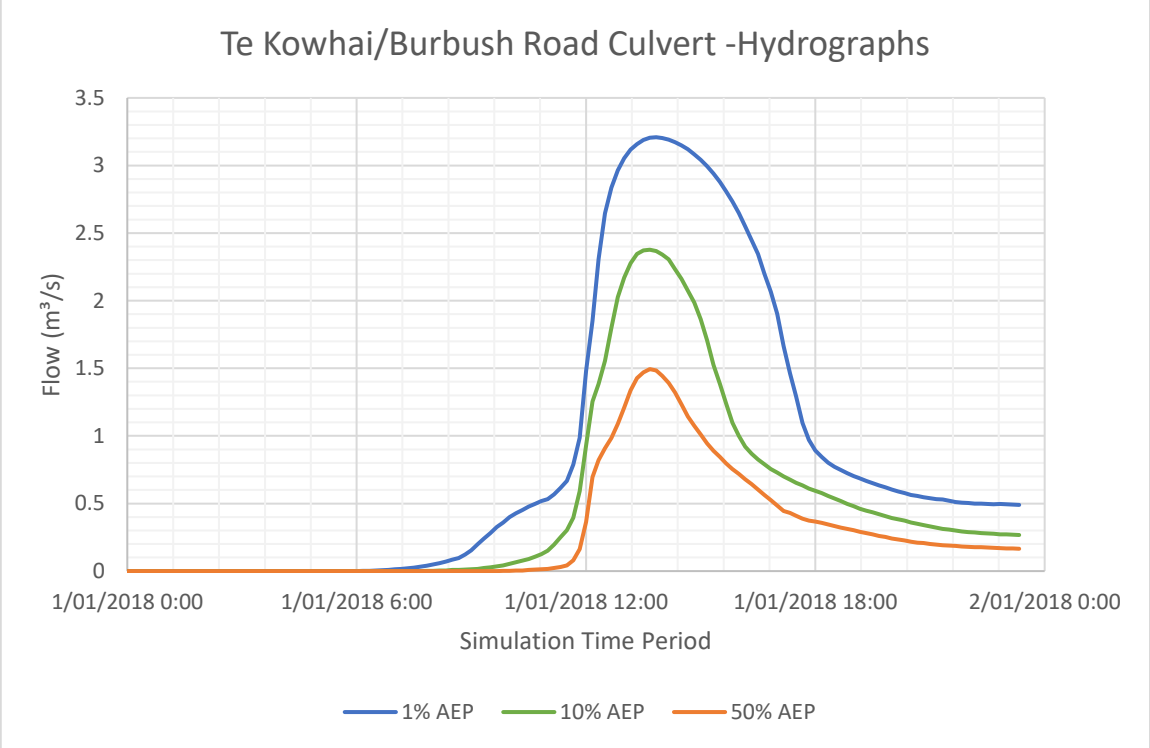

Figure 10: Te Kowhai/Burbush Road Culvert Flow

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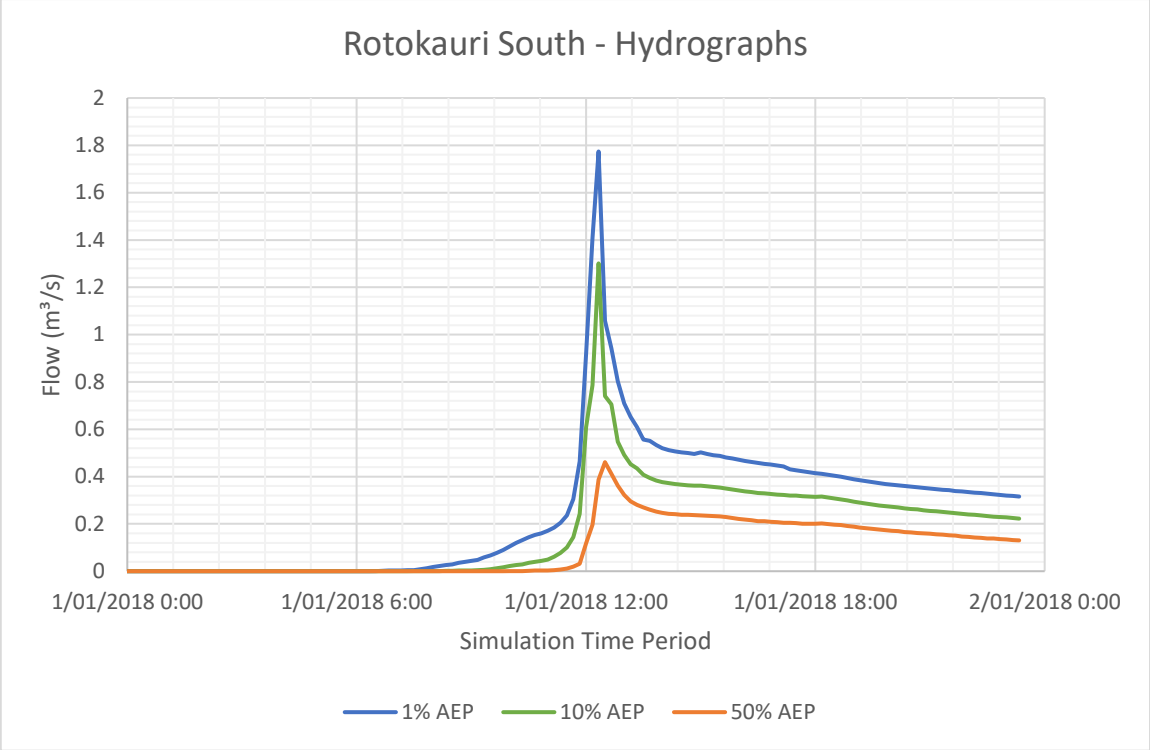

Figure 11: Rotokauri South Boundary Condition Flow

6.4 Exelby Road Discussion

The model predicted that the culvert at Exelby Road would overtop, with excess flow passing over the road and then into the downstream channel area. The flow through the Exelby Road culvert was 2.55 m³/s, and the overflow across the road was 0.70 m³/s. The predicted peak flow presented in Table 7 and Figure 6 above is the summation of these two flows.

The peak culvert flow rate of 2.55 m³/s was comparable with the peak flow from previous AECOM modelling.

6.5 Te Kowhai (West) Discussion

The predicted peak culvert flows for the three design rainfall events were comparable due to the contributing catchment topography. Inspection of the hydrographs show the 1%AEP event has longer duration that the smaller 10% and 50% AEP events.

6.6 Mangaheka Discussion

The predicted peak flows were compared with the results documented by Beca (Adams, 2018) for the Te Kowhai / Burbush Roads culvert, and summarised in the following table.

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Table 8: Te Kowhai/Burbush Peak Flow Comparison

Design Rainfall Event (AEP)	Peak Flow (m^3/s) - Beca Model	Peak Flow (m^3/s) - McKenzie & Co. Model	Difference (m^3/s)	Difference (%)
50%	See below[6]	1.49	-	-
10%	2.53	2.38	0.15	6%
1%	3.48	3.21	0.27	8%

Table 9: Te Kowhai/Burbush Water Level at Culvert (Upstream) Comparison

Design Rainfall Event (AEP)	Peak Flow (mRL - Beca Model	Peak Flow (mRL) - McKenzie & Co. Model	Difference (m)	Difference (%)
50%	See below[7]	29.47	-	-
10%	30.04	29.79	0.25	0.8
1%	30.46	30.19	0.27	0.9

Based on the peak flow results and water level predictions, the two models were considered comparable noting the difference in modelling approaches:

- Beca model based on 1-dimensional analysis; whereas
- McKenzie & Co model is based on 2-dimensional analysis.

Inspection of the 1-dimensional maps within the Beca report (Adams, 2018) and the 2-dimensional results showed a strong correlated in regards to flooding extent.

6.7 Rotokauri South Discussion

Visual inspection of the flooding extent results for the AECOM[8] and McKenzie & Co. model predictions showed a reasonable correlation. The flooding extents as modelled within McKenzie & Co HEC-RAS were considered to be representative of the ED scenario.

The AECOM modelling extent also covered part of the Mangaheka catchment within the Rotokauri North ICMP area. Inspection of the result maps showed a strong correlation between the AECOM and McKenzie & Co. predicted model extents.

[6] Note Beca report did not contain results for 50% AEP design rainfall analysis.

[7] *ibid* 6

[8] Rotokauri Stormwater Modelling – Model Build Report, AECOM Final Revision (23/9/16).

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7.0 TWO-DIMENSIONAL SENSITIVITY MODELLING

Two sensitivity models were developed to check the boundary conditions assumptions and catchment roughness. The sensitivity analysis was based on 1% AEP design rainfall.

7.1 Boundary Conditions Sensitivity

The normal depth boundary condition for all 2D areas were amended from a friction line of 0.001 (1:1000) to a friction line of 0.005 (1:200). This sensitivity model assessed the performance of the downstream conditions having reduced tail water due to a steeper normal depth boundary condition.

The model predicted that there was minimal difference between peak flows, with the exception of the Rotokauri South result, refer to Figure 11 to Figure 15. Therefore, the model predictions were considered to be representative of the catchment flows regardless of downstream boundary conditions.

The Rotokauri South result indicated that increasing the downstream friction line allowed for flow to exit the modelled area at double the rate of the base case. However, the extent of flooding predicted was comparable with the base case due to the relatively short duration of the peak flow.

7.2 Catchment Roughness

Manning's *n* for the catchments was increased from 0.042 to 0.060 (floodplain, light brush and trees) to assess the impact of the peak flows arriving at the culverts. This change was undertaken as a global amendment to all surfaces.

Except for the Ohute catchment, the models predicted minimal change in peak flow. Peak flow from the Ohute catchment reduced by approximately 0.8m^3/s, which is to be expected given increased roughness will tend to hold back stormwater runoff. Refer to Figure 11 to Figure 15 below. Therefore, given the variability in peak flows observed for the Ohute catchment when validating the catchment model (see section 8.0 below) the model predictions were considered to be representative of the catchment flows regardless of roughness values across the catchment surface.

7.3 Sensitivity Results

Model predictions for the two sensitivity scenarios were compared with the base case results, and are documented in Table 10 and Figure 11 to Figure 15 below.

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Table 10: 2D Culvert Sensitivity Scenario Results

Location Reference	Catchment	Base Case Peak Flow (m^3/s)	Downstream Boundary Condition Scenario Peak Flow (m^3/s)	Catchment Roughness Scenario Peak Flow (m^3/s)
Exelby Road	Ohote	3.25	2.99	2.40
Te Kowhai Road (West)	Te Otamanui	0.12	0.12	0.12
Te Kowhai Road (East)	Te Otamanui	1.82	1.81	1.66
Te Kowhai/Burbush Roads	Mangaheka	3.21	3.23	3.09
Rotokauri South (Boundary Condition)	Rotokauri South	1.77	3.34	1.39

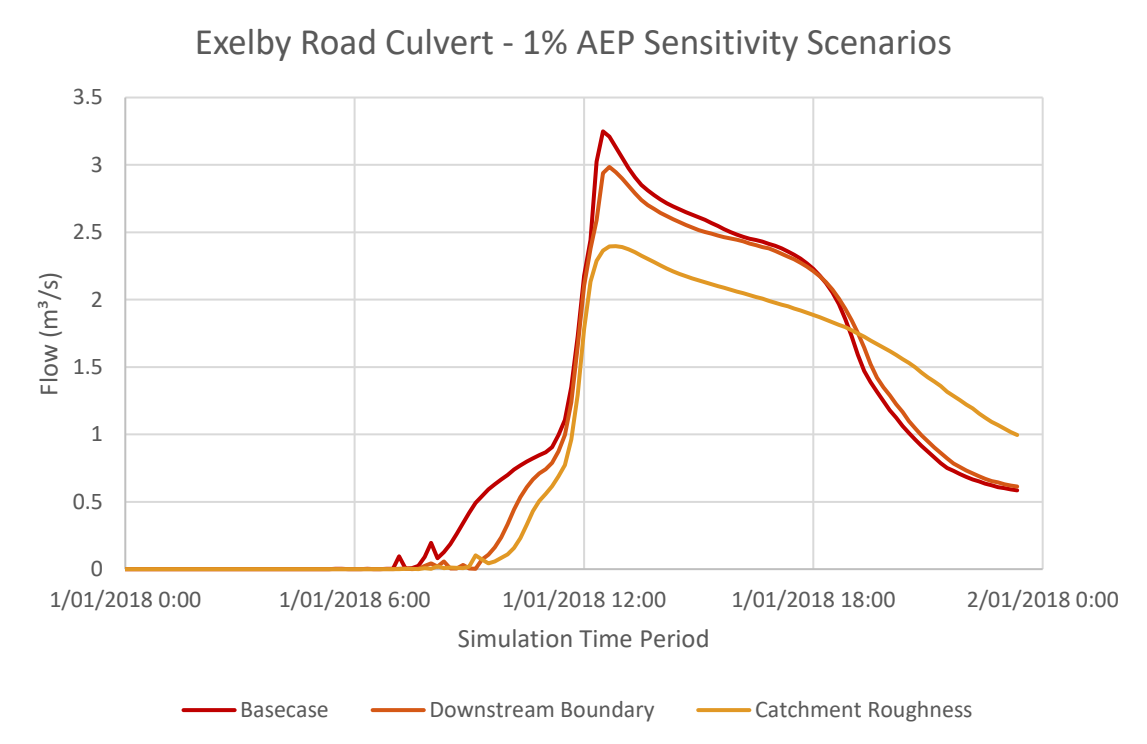

Figure 12: Exelby Road Culvert Flows – Sensitivity Scenarios

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Figure 13: Te Kowhai Road (West) Culvert Flows – Sensitivity Scenarios

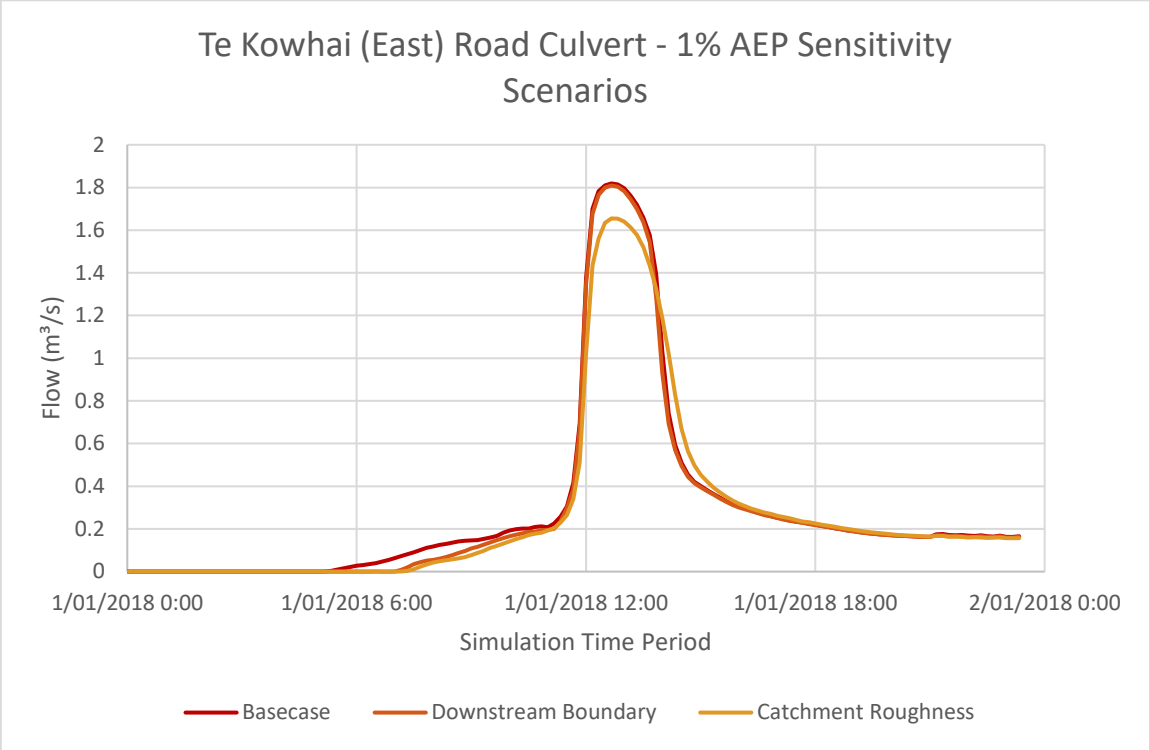

Figure 14: Te Kowhai Road (East) Culvert Flows – Sensitivity Scenarios

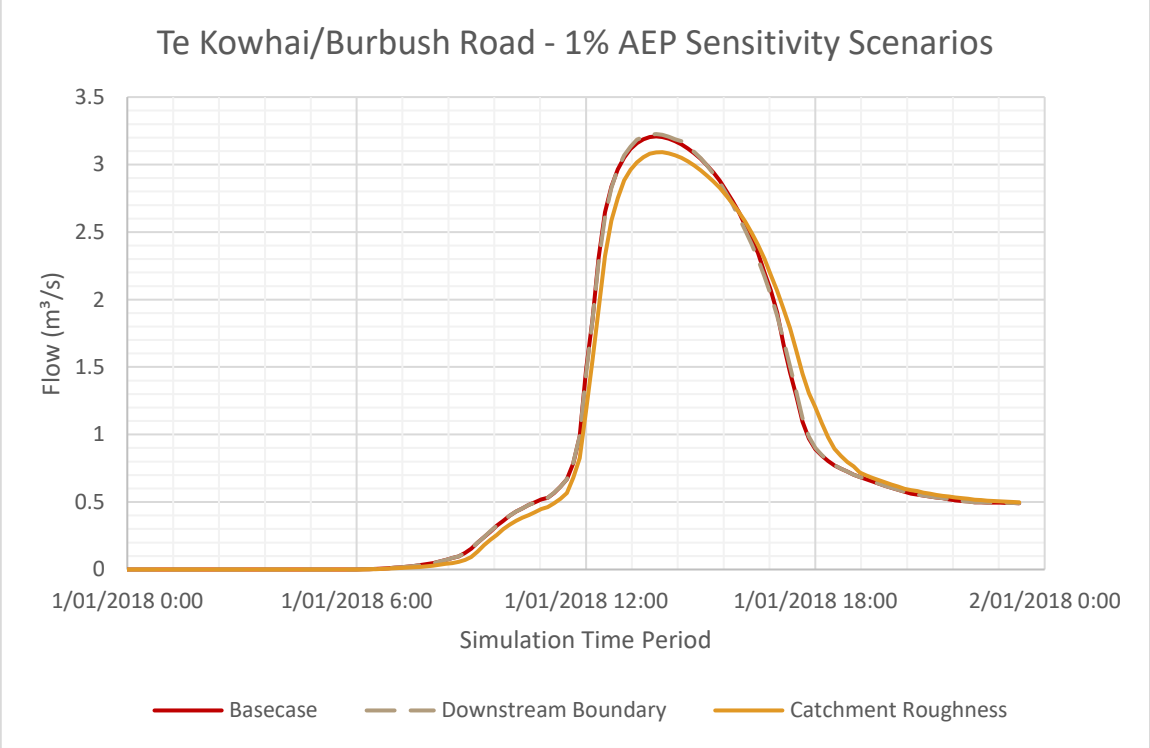

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Figure 15: Te Kowhai/Burbush Roads Culvert Flows – Sensitivity Scenarios

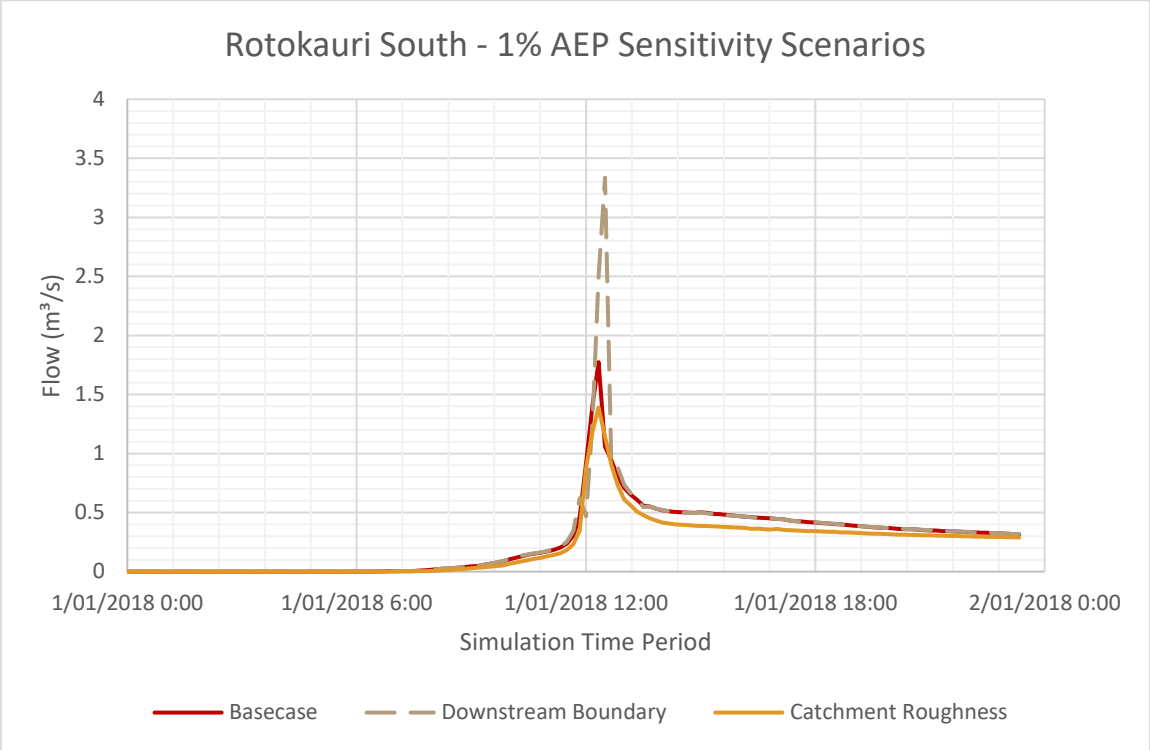

Figure 16: Rotokauri South Boundary Condition Flow – Sensitivity Scenario

8.0 TWO-DIMENSIONAL RESULTS COMPARISON FOR OHOTE

The following modelling scenarios were undertaken to test the validity of HEC-RAS results for the 1% AEP design rainfall event to compare with the previous wider Ohote catchment modelling undertaken by AECOM:

A. Net rainfall and initial abstraction adjusted to match CN = 73.5
   Inspection of the AECOM supplied catchments showed that the average Curve Number (CN) for the MPD catchment was 73.5, with resultant initial abstraction being ~5mm. The net rainfall time series was adjusted such that it was 73.5% of previous time series value (as used in original AECOM model). The time series values that summed to 5mm were removed (set to zero) to model the initial abstraction.
B. Net rainfall and initial abstraction adjusted to match CN = 50.0
   A sensitivity scenario was modelled based on average Curve Number (CN) of 50, with the resultant initial abstraction being 12.7mm calculated as per WRC SRM TR2018/02. The net rainfall time series was adjusted such that it was 50% of previous time series value (as used in original AECOM model). The time series values that summed to 12.7mm were removed (set to zero) to model the initial abstraction.
C. Net rainfall and initial abstraction adjusted to match CN = 61.0
   The rainfall scenario used for base case assessment.
D. As per C. above with Eddy Viscosity Transverse Mixing Coefficient = 3.5. HEC-RAS defaults to a Coefficient of 0. Adopting a value of 3.5 was based on the assumption that values between 2.0-5.0 tend to produce strong transversal mixing over rough surfaces.

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These scenarios were compared with:

- McKenzie & Co. model using AECOM design rainfall without losses or adjustments for Curve Numbers (Pre-Net Rainfall);
- AECOM Maximum Probable Development (MPD) results;
- AECOM Net Rainfall rain on grid results without losses or adjustments for Curve Numbers.

Table 11: Flow Scenario Summary

Scenario	Peak Flow (m^3/s)	Average Flow (m^3/s)
McKenzie & Co. – Pre-Net Rainfall	4.68	1.81
AECOM – MPD	2.28	1.00
AECOM – Net Rainfall, rain on grid	2.70	-
A (CN = 73.5)	3.77	1.32
B (CN = 50)	2.59	0.70
C (CN = 61) (Base case)	3.25	1.01
D (CN = 61 + Eddy Viscosity Coefficient = 3.5)	3.22	1.01

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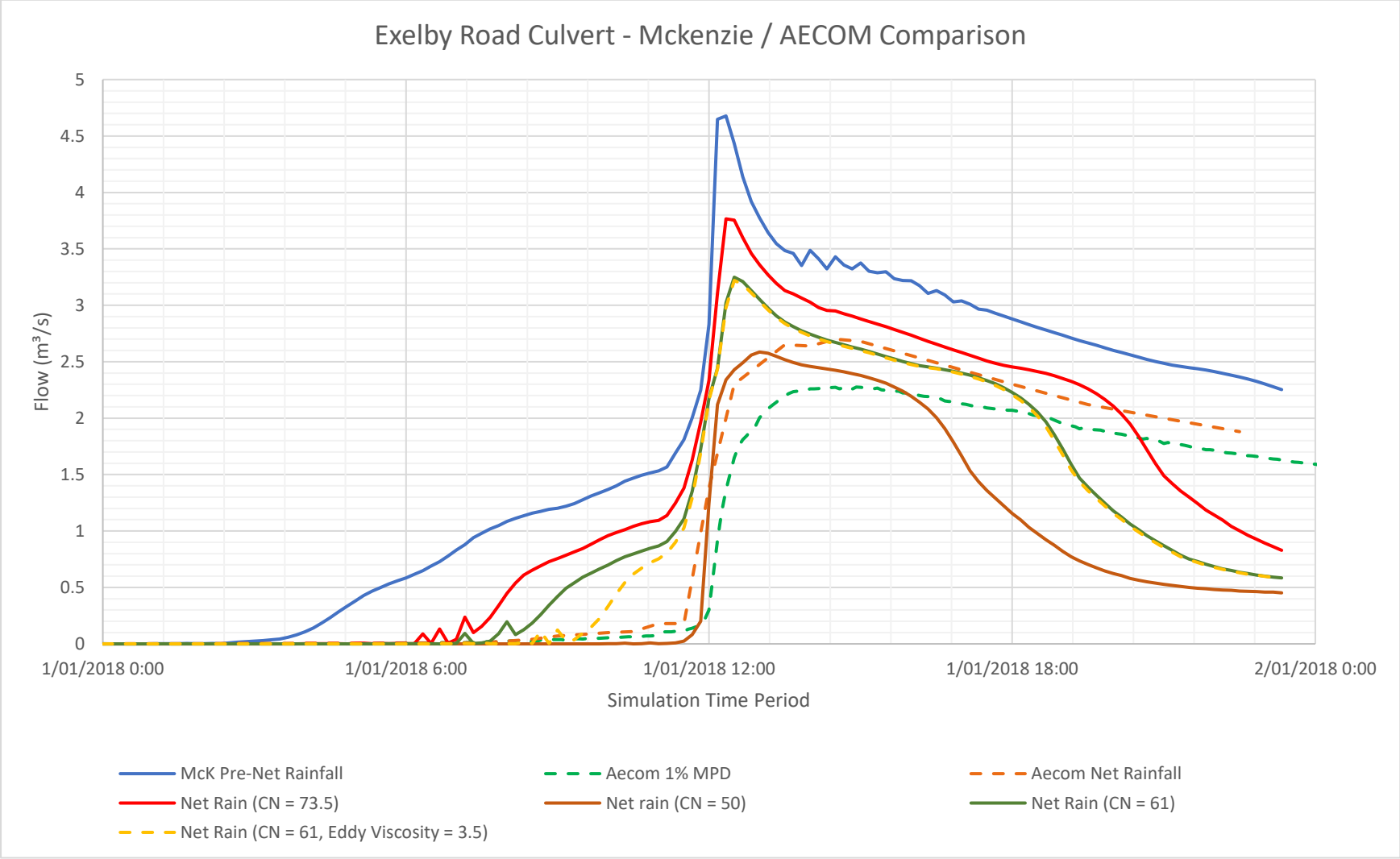

Figure 17: 2D Validation Results for the Ohute Catchment

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8.1 Results Commentary

The McKenzie & Co HEC-RAS model with adjusted terrain and net rainfall scenarios were unable to replicate the hydrographs predicted by AECOM's Mike Urban models. Two scenarios had moderate correlations:

- AECOM 1% AEP and Scenario B Net Rainfall (CN =50). The hydrograph shapes show a slight correlation ($r^2 = 0.7$) with small relative difference in predicted peak flows. However, the Curve Number of 50 and resultant initial abstraction of 12.7mm were not considered representative of the catchment.
- AECOM Net Rainfall and Scenario C Net Rainfall (CN = 61). The hydrograph shapes correlate moderately well ($r^2 = 0.8$) with small relative difference in predicted peak flows. The Curve Number of 61 and resultant initial abstraction of 8.1mm were considered representative of the existing development catchment, particularly for Winter seasonal flow conditions where groundwater has been observed to be very high.

The results of Scenario D showed that the addition of the Eddy Viscosity Transverse Mixing Coefficient did not affect the predicted results at the Exelby Road culvert.

The McKenzie & Co. Pre-Net Rainfall model, Scenarios A and B were not considered representative of the 1% AEP flows. Scenario C was considered representative of a "wet" existing development catchment as has been observed during Winter and Spring conditions.

8.2 Summary and Recommendation

With reference to AECOM[9] correspondence and previous meetings, McKenzie & Co. Consultants agree that differences in predicted peak flows are to be expected when modelling using different software due to implementation differences for the respective numerical engines and adoption and implementation of different loss models. However, visual comparison of the flood extents predicted for each approach shows reasonable correlation between predictions. The key differences between the models are the peak flows, and the duration over which runoff is held within the terrain.

McKenzie & Co. modelling has focused on a lower loss model than that adopted by AECOM to reflect more conservativism in the runoff volume generated. The McKenzie & Co. model has a higher level of terrain information (and modification) to replicate field observations and culvert survey data.

Based on comparison of the sensitivity scenarios, related soil type assumptions and initial abstraction, Scenario C was considered to be representative of the catchment response for 1% AEP design rainfall event.

[9] Chris Hardy (Aecom) to Jackie Colliar (HCC) and Nathanael Savage (HCC), 'Rotokauri north hydrology', 19 November 2018

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9.0 CONCLUSION AND RECOMMENDATION

A one dimensional hydrological/hydraulic model was built using both TP108 and HEC-HMS for the Ohote catchment to assess the Existing Development flows for the 1% AEP rainfall event. The application of TP108 was not considered to accurately represent the flat topography and storage capacity of the catchment, which is a well-known and documented limitation of TP108 (Auckland Regional Council, 1999). Given there is very limited grade/fall within the Ohute catchment, McKenzie & Co. consider TP108 modelling to be unsuited for determination of accurate peak flow estimation of the Ohote catchment.

A two-dimensional hydraulic model was built using HEC-RAS for the Ohote and Te Otamanui catchments for the Rotokauri North physical catchment. The model was built to allow for assessment of the pre-development 1% AEP flows from the catchments.

Four culverts, one at Exelby Road, and three along Te Kowhai Road, were included within the model as they approximate the discharge locations from the ICMP/PPC to the downstream receiving environment. A boundary condition for the ICMP/PPC area within the Rotokauri South catchment was used to model the interface with the larger downstream catchment. The predicted peak flows at the culverts and boundary condition locations for the 1% AEP were:

- Exelby Road = 3.25 m^3/s (refer further below)
- Te Kowhai Road (West) = 0.12 m^3/s
- Te Kowhai Road (East) = 1.82 m^3/s
- Te Kowhai/Burbush Roads = 3.21 m^3/s
- Rotokauri South = 1.77 m^3/s

At Exelby Road the model predicted ponding on the upstream side of the culvert that would ultimately overflow across Exelby Road. The flow through the Exelby Road culvert was estimated to be 2.55 m^3/s, resulting in an overflow across the road was 0.70 m^3/s. The predicted peak flow presented above was the summation of these two flows.

While the peak flow rates do not provide a complete correlation with the AECOM results, the 2D modelling results were considered comparable when with the 1D modelling predictions.

The predicted peak flows from the culverts for the 1% AEP were also assessed for two sensitivity scenarios, changes in downstream boundary conditions (grade change), and catchment roughness. Both sensitivity scenarios suggest reasonable peak flow consistency at the culverts for the model changes assessed.

Due to the differences in modelling software, and input datasets, it is recommended that peak flow out of the Ohute catchment of 0.7m^3/s be adopted in accordance with the Rotokauri ICMP (Hart, 2017). However, given the peak flow variability estimated as part of this preliminary stormwater modelling investigation we recommend that peak flow discharge not be limited to this and that the Rotokauri North ICMP should not preclude the opportunity to refine this figure based on additional topography information and further stormwater runoff model agreement. Ultimately, this work can be undertaken as part of the stormwater discharge consenting process with WRC.

The Exelby Road culvert forms the primary discharge point for the Ohote catchment within the Rotokauri North Sub-Catchment ICMP. As outlined the Rotokauri North Stormwater an Music

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Modelling Report (Rudsits, 2019), significant detention volume will be required to buffer peak flows to 80% ED. There are a number of options for discharge of stormwater at the Exelby Road culvert, which could include the following:

- Retain culvert as is;
- Upgrade culvert to allow for 80% of 1% AEP_{cc} ED flow to pass unattenuated;
- Upgrade culvert to allow for >100% of 1% AEP_{cc} ED flow.
- Potential to lower invert of Exelby Culvert to minimise earthwork volumes.

Preliminary analysis indicates that retention of the existing culvert will require in the order of 85,000 m^3 detention (900mm Culvert, Q = 0.7m^3/s). Increasing the culvert to allow 80% of the 1% AEP_{cc} ED flow to pass unattenuated (1,200mm Culvert, Q = 2.58m^3/s), reduces detention requirements to approximately 30,000 m^3. Increasing the culvert further to allow >100% of 1% AEP_{cc} ED flow to pass unattenuated (1,500mm Culvert, Q = 5.00m^3/s), reduces detention requirements to approximately 23,000 m^3.

As such, we reiterate the previous recommendation that peak flow discharge should not limited through the Rotokauri North ICMP so as to not preclude the opportunity to refine the ultimate boundary conditions at the Exelby Road culvert (maximum discharge rate) as additional topographical information is obtained, further stormwater runoff model agreement is reached, and as detailed design of stormwater detention devices for the Ohute catchment progresses.

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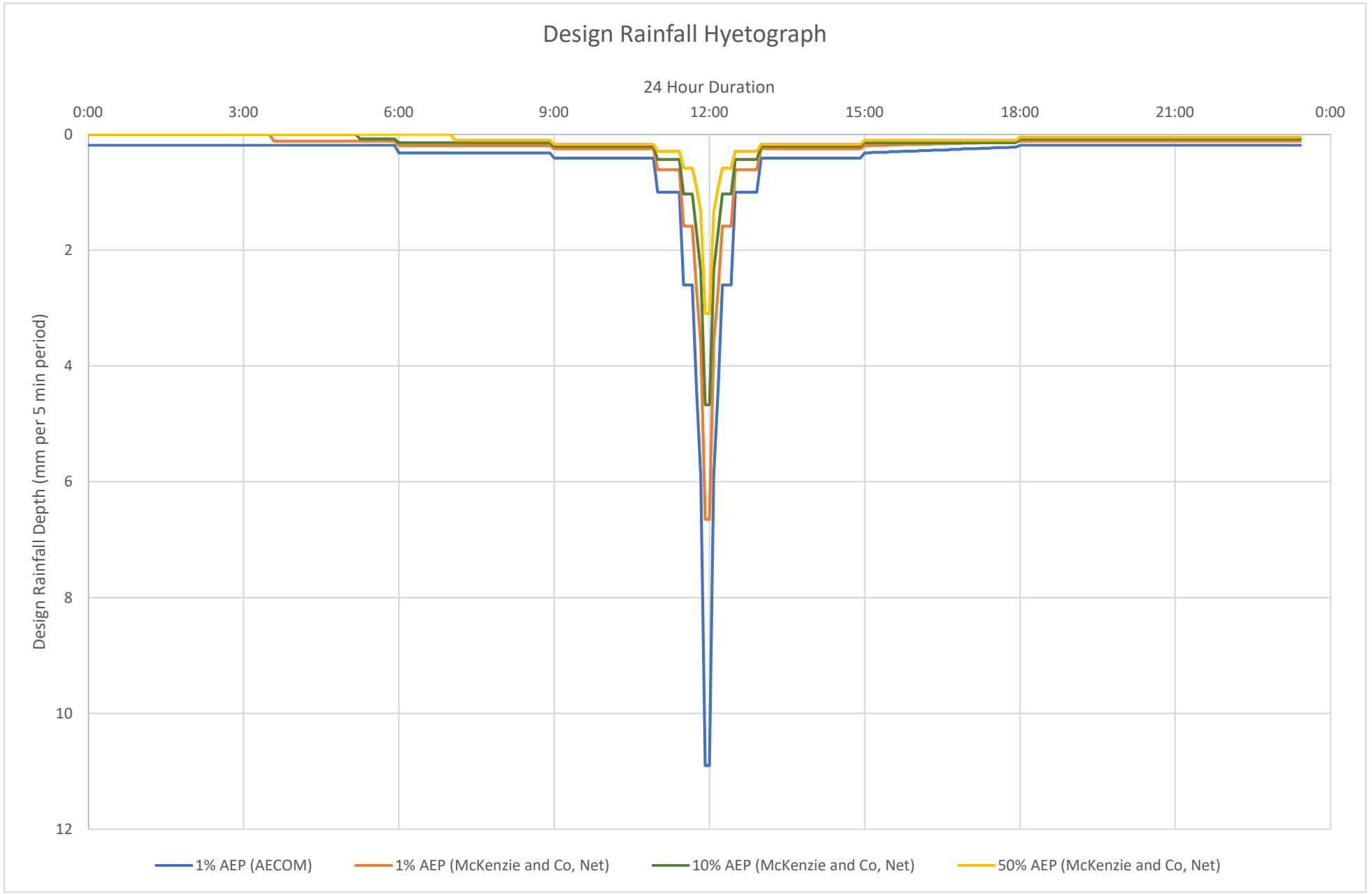
APPENDIX A – HEC-HMS INFORMATION

1693 Rotokauri **5/04/2019**

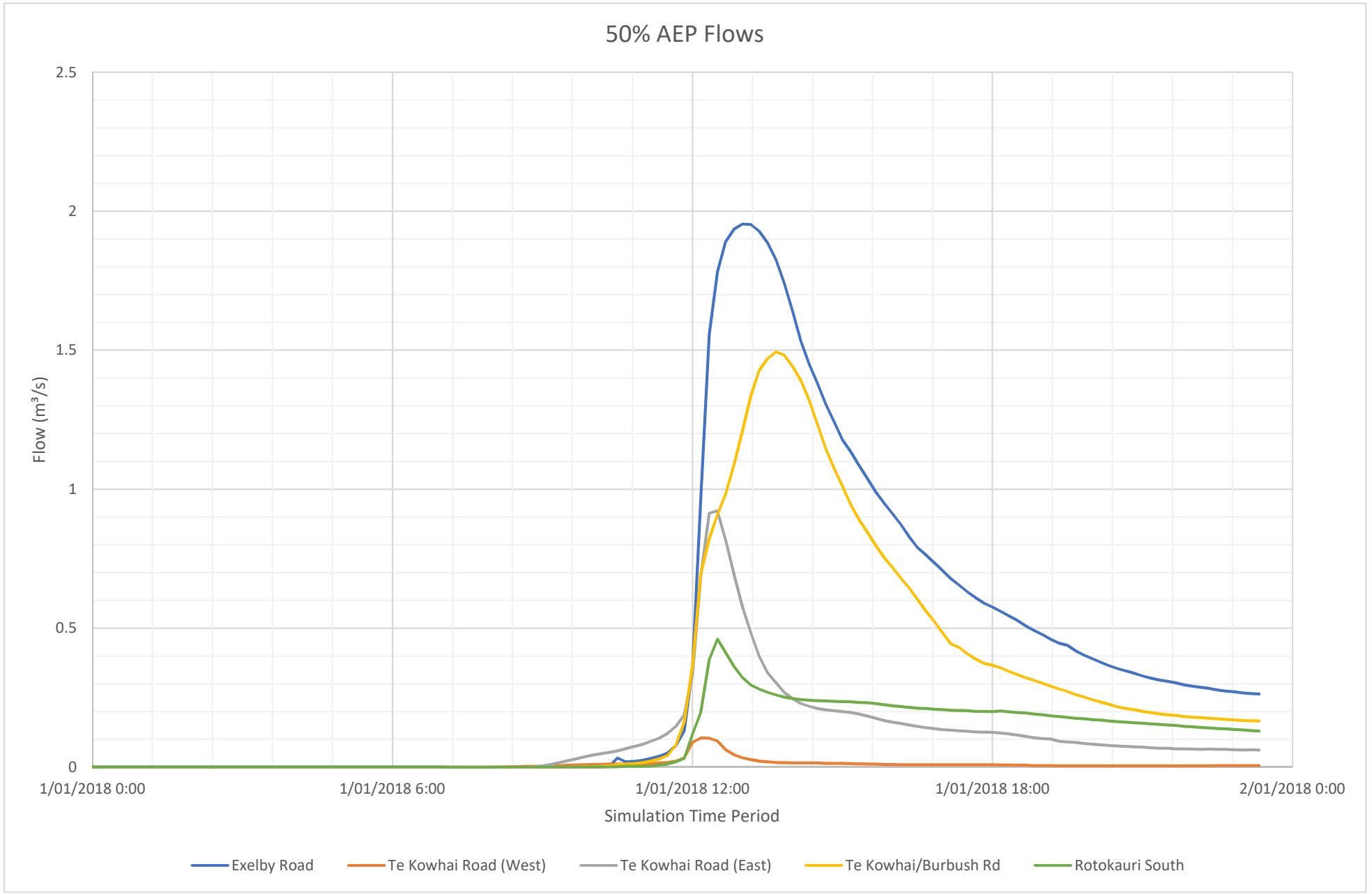
1D HEC-HMS SW model inputs: Ohote catchment predevelopment

Catchment ID	Area (km2)	Area weighted CN	soil storage S (mm)	Ia (mm)	catchment slope Sc (m/m)	catchment length L (km)	channelisation factor C	time of concentration tc (mins)	Catchment lag time (mins)	Peak Rate Factor (PRF)
Ohote	1.3639	73.5	91.60	5.00	0.0017	2.466	1.0	139.26	92.75	484

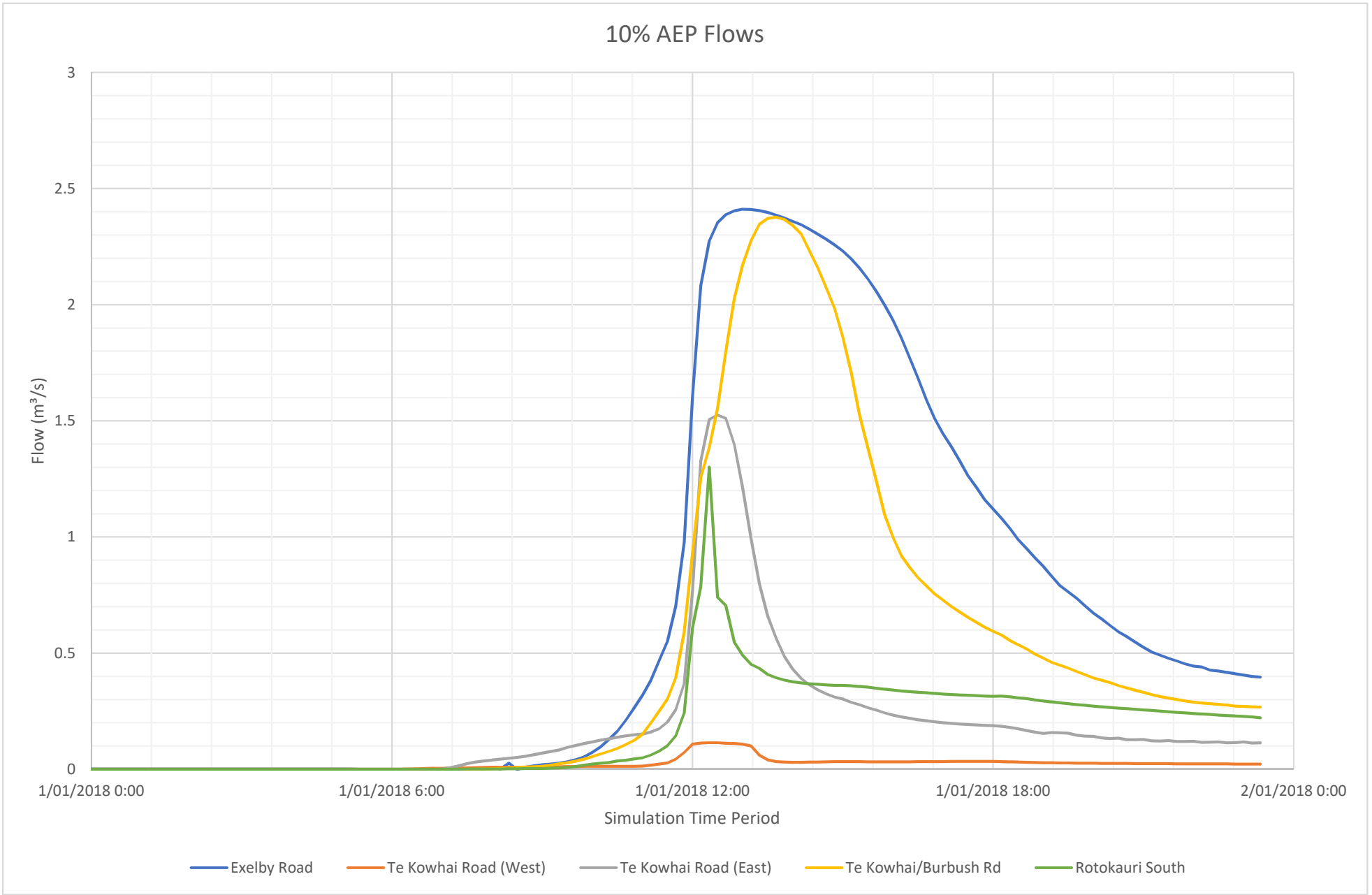
APPENDIX B – DESIGN RAINFALL HYETOGRAPHS


Design Rainfall Hyetograph
24 Hour Duration
0:00
3:00
6:00
9:00
12:00
15:00
18:00
21:00
0:00
0
2
4
6
8
10
12
Design Rainfall Depth (mm per 5 min period)
1% AEP (AECOM)
1% AEP (McKenzie and Co, Net)
10% AEP (McKenzie and Co, Net)
50% AEP (McKenzie and Co, Net)

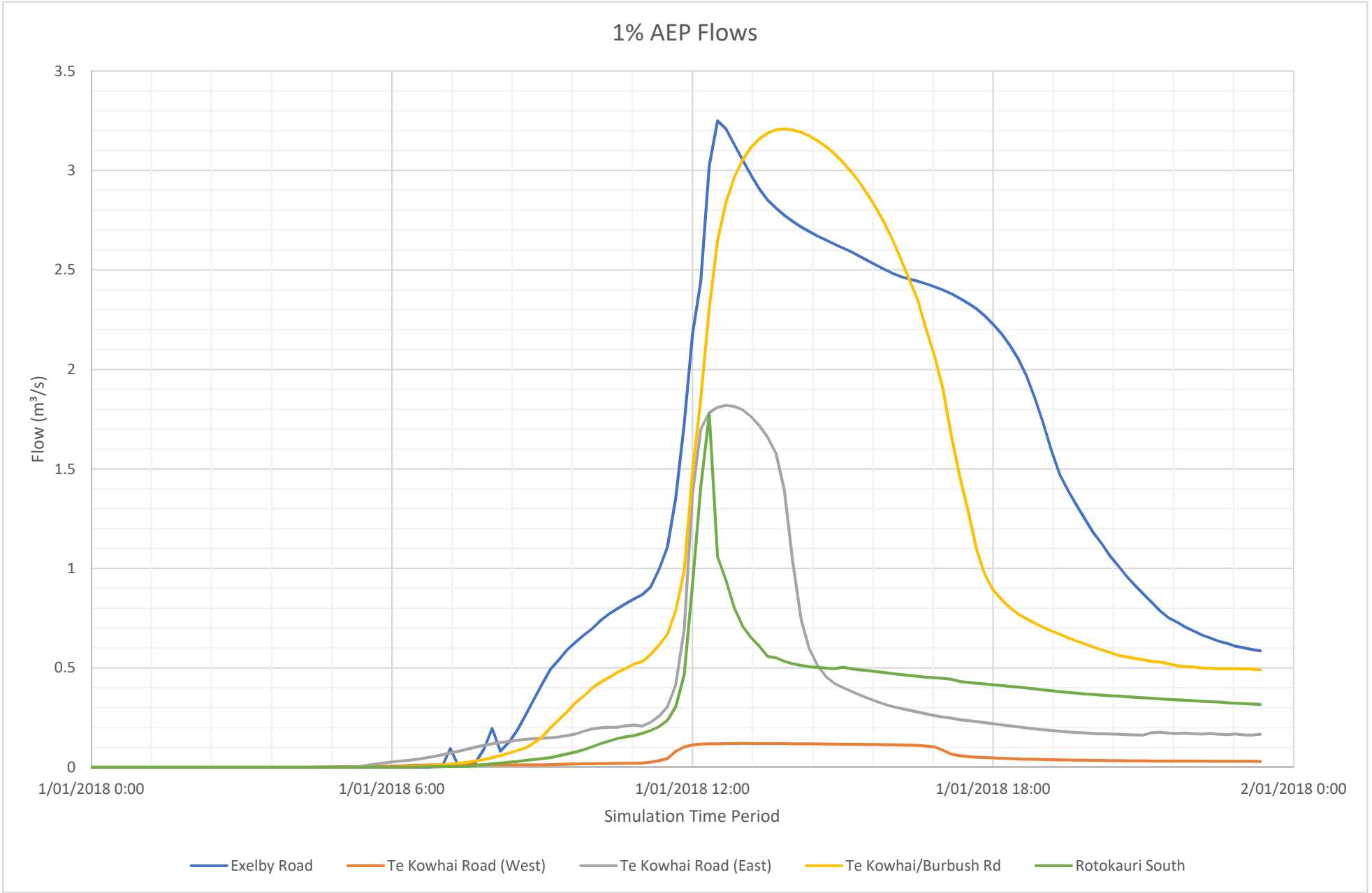
APPENDIX C – 50% AEP HYDROGRAPHS


50% AEP Flows
2.5
2
1.5
1
0.5
0
Flow (m³/s)
1/01/2018 0:00
1/01/2018 6:00
1/01/2018 12:00
1/01/2018 18:00
2/01/2018 0:00
Simulation Time Period
Exelby Road
Te Kowhai Road (West)
Te Kowhai Road (East)
Te Kowhai/Burbush Rd
Rotokauri South

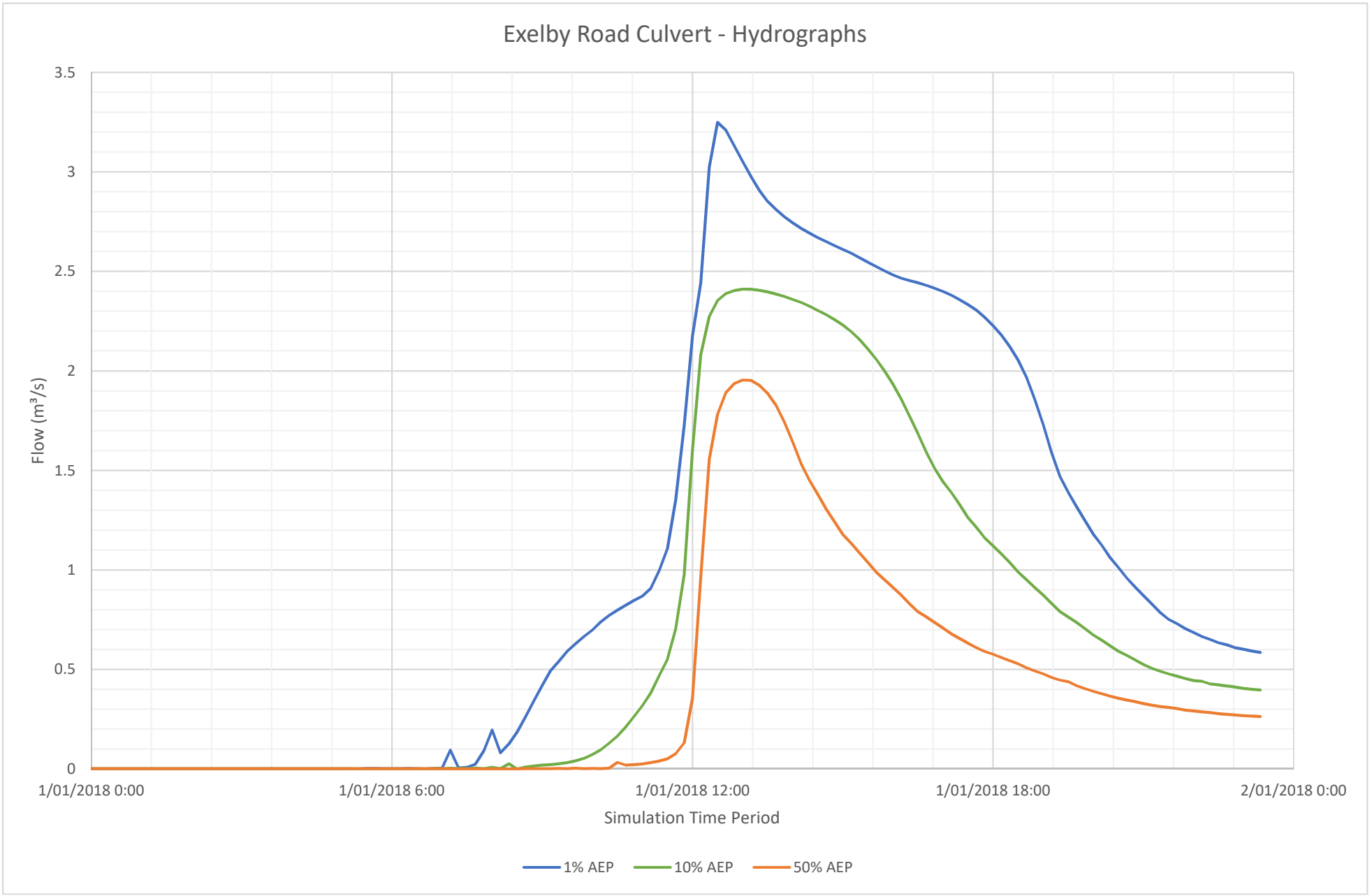
APPENDIX D – 10% AEP HYDROGRAPHS


10% AEP Flows
3
2.5
2
1.5
1
0.5
0
Flow (m³/s)
1/01/2018 0:00
1/01/2018 6:00
1/01/2018 12:00
1/01/2018 18:00
2/01/2018 0:00
Simulation Time Period
Exelby Road
Te Kowhai Road (West)
Te Kowhai Road (East)
Te Kowhai/Burbush Rd
Rotokauri South

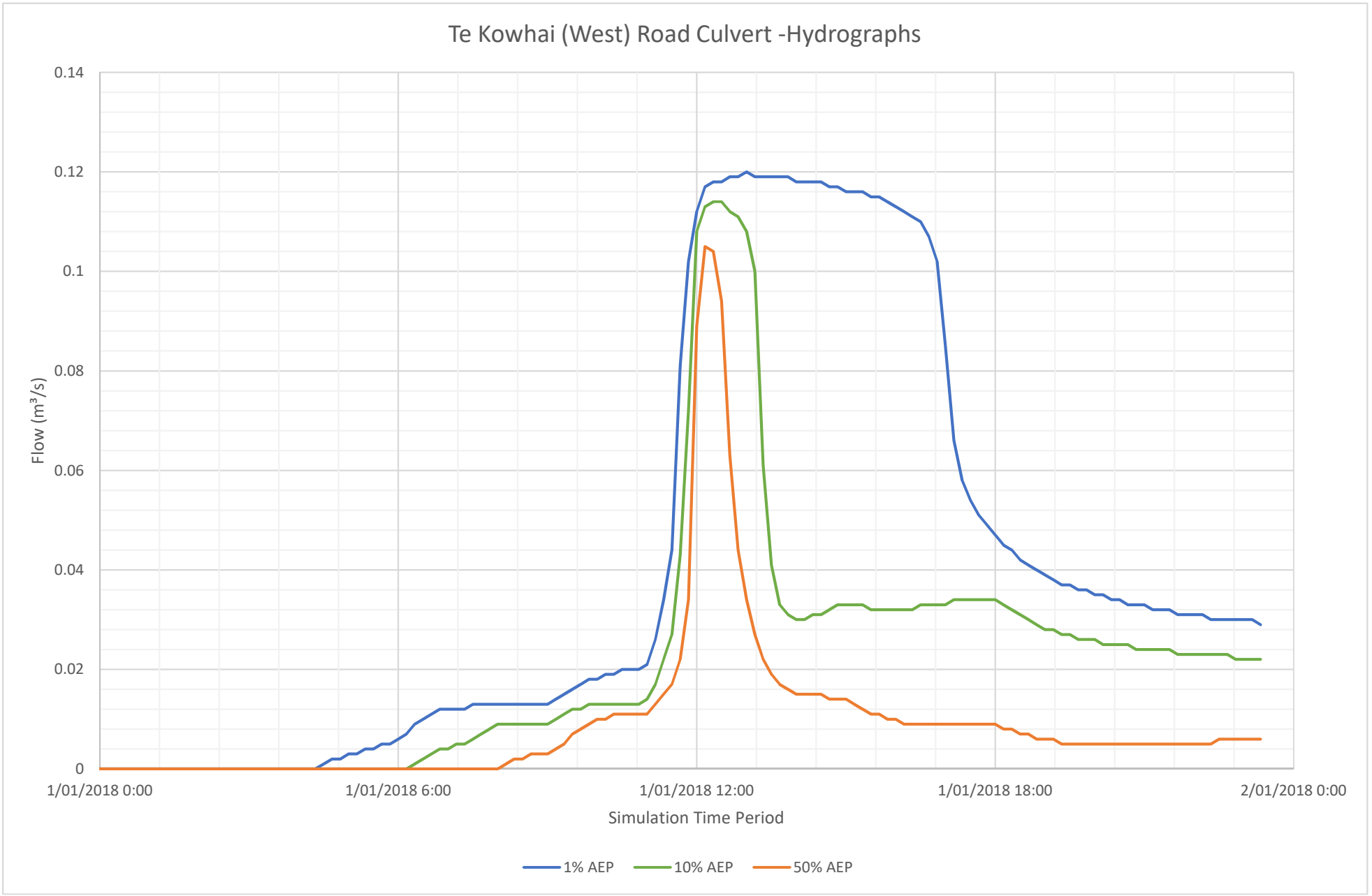
APPENDIX E – 1% AEP HYDROGRAPHS


1% AEP Flows
3.5
3
2.5
2
1.5
1
0.5
0
Flow (m³/s)
1/01/2018 0:00
1/01/2018 6:00
1/01/2018 12:00
1/01/2018 18:00
2/01/2018 0:00
Simulation Time Period
Exelby Road
Te Kowhai Road (West)
Te Kowhai Road (East)
Te Kowhai/Burbush Rd
Rotokauri South

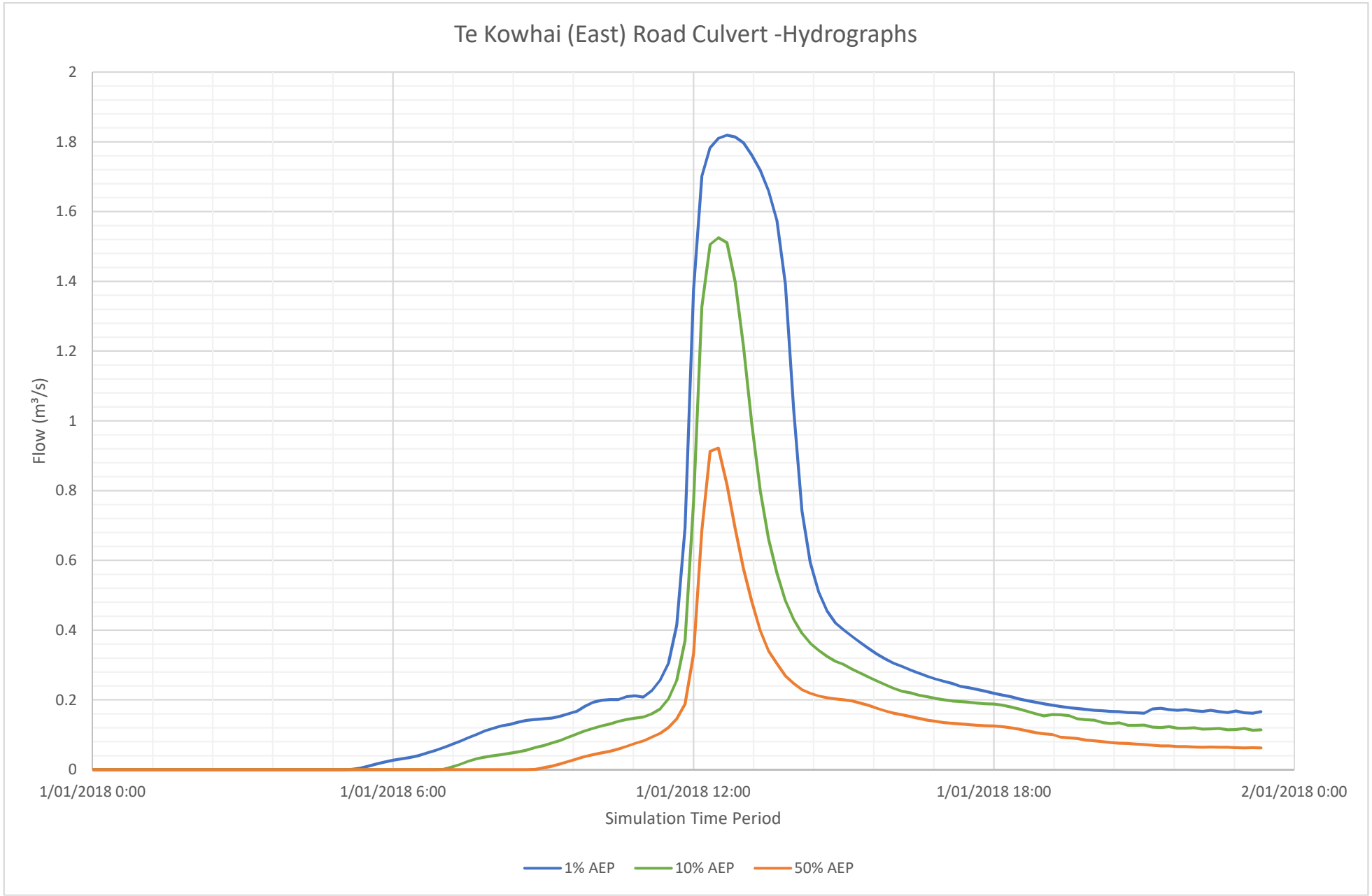
APPENDIX F – EXELBY ROAD HYDROGRAPHS


Exelby Road Culvert - Hydrographs
3.5
3
2.5
2
1.5
1
0.5
0
Flow (m³/s)
1/01/2018 0:00
1/01/2018 6:00
1/01/2018 12:00
1/01/2018 18:00
2/01/2018 0:00
Simulation Time Period
1% AEP
10% AEP
50% AEP

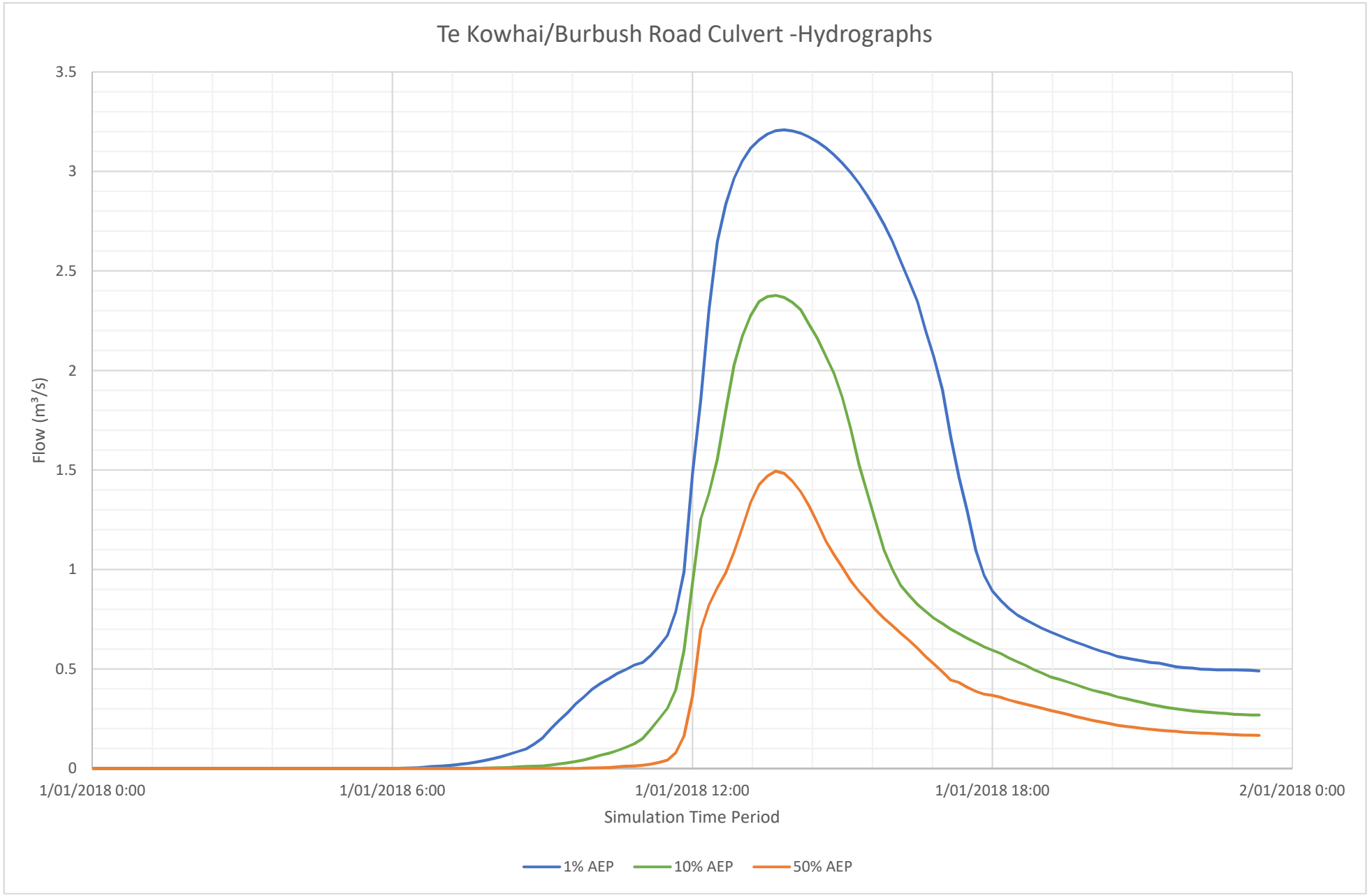
APPENDIX G – TE KOWHAI ROAD (WEST) HYDROGRAPHS


Te Kowhai (West) Road Culvert -Hydrographs
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Flow (m³/s)
1/01/2018 0:00
1/01/2018 6:00
1/01/2018 12:00
1/01/2018 18:00
2/01/2018 0:00
Simulation Time Period
1% AEP
10% AEP
50% AEP

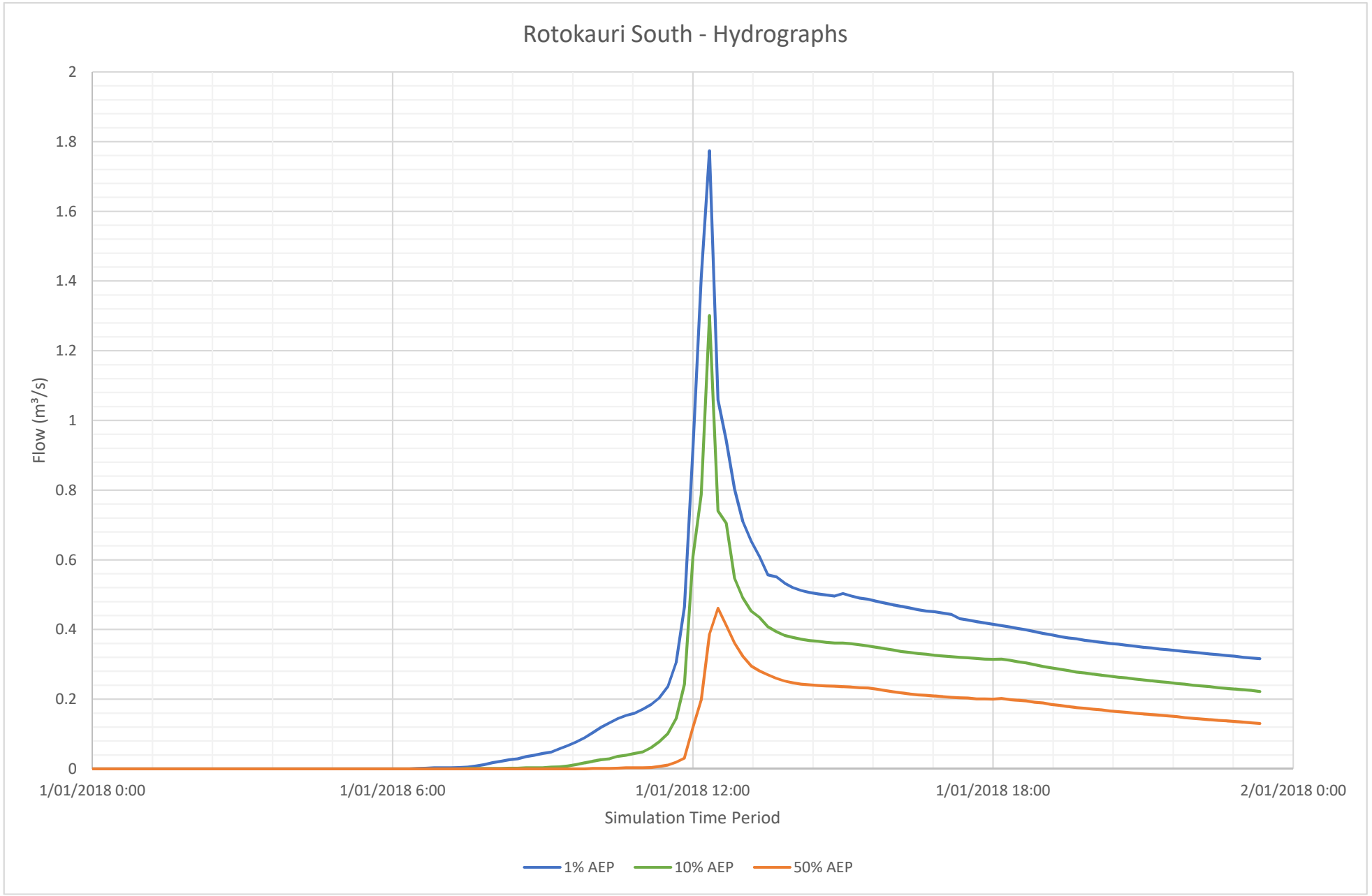
APPENDIX H – TE KOWHAI ROAD (EAST) HYDROGRAPHS

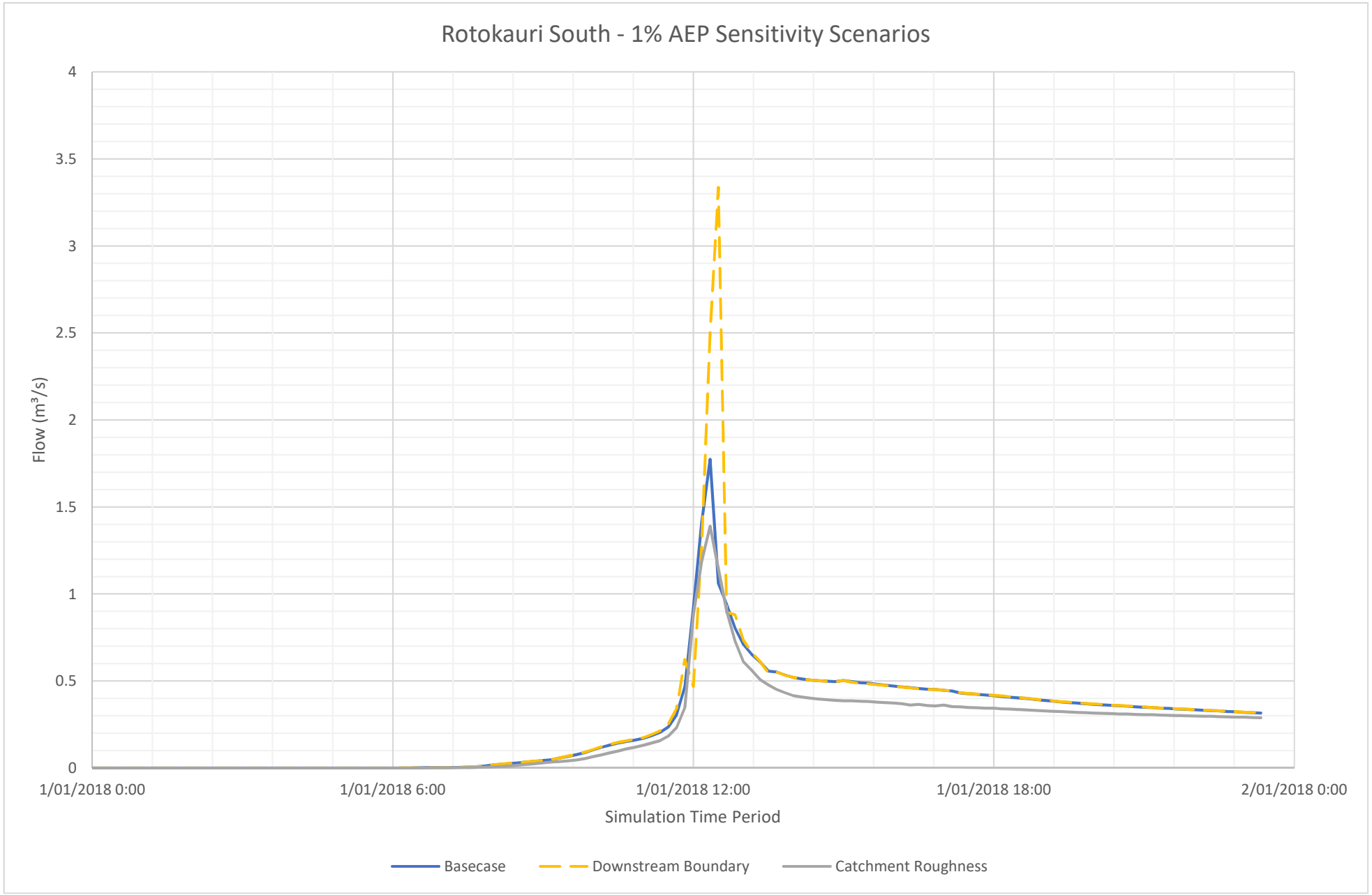

Te Kowhai (East) Road Culvert -Hydrographs
Flow (m³/s)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1/01/2018 0:00
1/01/2018 6:00
1/01/2018 12:00
1/01/2018 18:00
2/01/2018 0:00
Simulation Time Period
1% AEP
10% AEP
50% AEP

APPENDIX I – TE KOWHAI/BURBUSH ROAD HYDROGRAPHS


Te Kowhai/Burbush Road Culvert -Hydrographs
3.5
3
2.5
2
1.5
1
0.5
0
Flow (m³/s)
1/01/2018 0:00
1/01/2018 6:00
1/01/2018 12:00
1/01/2018 18:00
2/01/2018 0:00
Simulation Time Period
1% AEP
10% AEP
50% AEP

APPENDIX J – ROTOKAURI SOUTH HYDROGRAPHS


Rotokauri South - Hydrographs
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Flow (m³/s)
1/01/2018 0:00
1/01/2018 6:00
1/01/2018 12:00
1/01/2018 18:00
2/01/2018 0:00
Simulation Time Period
1% AEP
10% AEP
50% AEP


Rotokauri South - 1% AEP Sensitivity Scenarios
Flow (m³/s)
4
3.5
3
2.5
2
1.5
1
0.5
0
1/01/2018 0:00
1/01/2018 6:00
1/01/2018 12:00
1/01/2018 18:00
2/01/2018 0:00
Simulation Time Period
Basecase
Downstream Boundary
Catchment Roughness

APPENDIX K – TP108 CALCULATION

McKENZIE&CO CONSULTANTS LTD

TP108 calculation
Catchment: Ohote
Project: 1693
Location: Rotokauri North

TP 108 calculation—100 year ARI

Catchment area (A) (km²):	**1.3639**	From MikeModelCatchmentData.gdb.zip supplied by AECOM on 18/10/18
Impervious Area	0.0000	
Percentage of catchment (impervious)	0.0%	
Percentage of catchment (pervious)	100%	
Effective curve number:	**73.5**	supplied by AECOM email dated 18/10/18
Effective Initial abstraction (Ia, mm):	**5.00**	supplied by AECOM email dated 18/10/18
Effective storage (S, mm):	**91.6**	From TP108: S=((1000/CN)-10)×25.4
ARI (yr):	100	
24 hour rainfall depth (P_{24}) (mm):	139.680	From MikeModelCatchmentData.gdb.zip supplied by AECOM on 18/10/18

Time of concentration

Channelisation factor, C	1.00
Catchment length (km)	2.466

Catchment slope (Equal area method)

Point location	Elevation (m)	h (m)	Distance (x) m	Δx (m)	$\bar{h}$ (m)	Δ Area (A) = $\bar{h}$ × Δx (m²)
Pt A	28.314	0.000	0.0	0	0.000	—
	28.28	-0.034	1	1	-0.017	-0.017
	28.26	-0.054	2	1	-0.044	-0.044
	28.244	-0.070	3	1	-0.062	-0.062
	28.228	-0.086	4	1	-0.078	-0.078
	28.218	-0.096	5	1	-0.091	-0.091
	28.233	-0.081	6	1	-0.088	-0.088
	28.283	-0.031	7	1	-0.056	-0.056
	28.344	0.030	8	1	0.000	0.000
	28.397	0.083	9	1	0.056	0.056
	28.441	0.127	10	1	0.105	0.105
	28.445	0.131	11	1	0.129	0.129
	28.364	0.050	12	1	0.091	0.091
	28.216	-0.098	13	1	-0.024	-0.024
	28.039	-0.275	14	1	-0.186	-0.186
	27.852	-0.462	15	1	-0.368	-0.368
	27.665	-0.649	16	1	-0.556	-0.556
	27.486	-0.828	17	1	-0.739	-0.739
	27.362	-0.952	18	1	-0.890	-0.890
	27.351	-0.963	19	1	-0.958	-0.958
	27.402	-0.912	20	1	-0.938	-0.938
	27.455	-0.859	21	1	-0.886	-0.886
	27.475	-0.839	22	1	-0.849	-0.849
intermediate rows not shown for brevity						
	52.431	24.117	2454	1	24.095	24.095
	52.474	24.160	2455	1	24.139	24.139
	52.516	24.202	2456	1	24.181	24.181
	52.575	24.261	2457	1	24.232	24.232
	52.681	24.367	2458	1	24.314	24.314
	52.765	24.451	2459	1	24.409	24.409
	52.809	24.495	2460	1	24.473	24.473
	52.815	24.501	2461	1	24.498	24.498
	52.811	24.497	2462	1	24.499	24.499
	52.796	24.482	2463	1	24.490	24.490
	52.779	24.465	2464	1	24.474	24.474
	52.765	24.451	2465	1	24.458	24.458
	52.752	24.438	2466	1	24.445	24.445
Sum				2466.0		5158.859

Catchment slope (m/m)	**0.00170**	Equal-area slope of the above time of concentration line. Calculated by: $S_C = \frac{2A}{L^2}$
Time of concentration (hrs)	**2.321**	From Section 4.2 of TP108, time of concentration calculated as: $t_C = 0.14CL^{0.66}\left(\frac{CN}{200-CN}\right)^{-0.55} S_c^{-0.30}$
TP108 coefficient—C*:	0.41	From TP108: c*=(P_{24}-2×Ia)/(P_{24}-2×Ia+2×S)
Specific flow rate—q*:	0.033	From Figure 5.1 of TP108 (BLUE ARROW).
Peak flow rate (q_p) (m³/s):	**6.29**	From TP108: q_p=q*×A×P24
Runoff depth (Q_{24}) (mm):	80	From TP108: Q_{24}=((P_{24}-Ia)²)/((P_{24}-Ia)+S)
Runoff volume (V_{24}) (m³):	109341	From TP108: V_{24}=1000×Q_{24}×A

ATTACHMENT 10 - Rotokauri North ICMP: Desktop Review of Hydrogeological Conditions influencing Stormwater Design prepared by Beca dated 17 July 2018

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PO Box 6345, Auckland 1141, New Zealand
T: +64 9 300 9000 // **F:** +64 9 300 9300
E: info@beca.com // **www.beca.com**

Hamilton City Council
Private Bag 3010
Hamilton 3240
New Zealand

17 July 2018

Attention: Nathanael Savage

Dear Nathanael

Rotokauri North ICMP: Desktop Review of Hydrogeological Conditions Influencing Stormwater Design

Draft for review

1 Introduction

Hamilton City Council (HCC) proposes to develop the Rotokauri North Development Area (RNDA) in accordance with the Rotokauri Structure Plan. Beca has been engaged by HCC to undertake a desk top review of the current state of knowledge of the hydrogeological conditions at RNDA.

A key outcome of this review is an initial assessment of potential implications for stormwater design to inform the Rotokauri North Integrated Catchment Management Plan (herein referred to as the Rotokauri ICMP). The conceptual stormwater design options are set out in the report “Stormwater Catchment Management Plan” (prepared by CKL, herein referred to as CKL (2017)).

This letter report presents the findings of the desktop assessment and identifies what additional investigation or analysis would be needed to confirm option viability or provide a higher level of certainty to support design.

2 Stormwater Design Options

A conveyance system is required to take runoff within the Rotokauri North catchment to the Waipa Stream, with smaller out flows towards SH 39 to the North, Te Kowhai Rd drain outlet to the North East, and Rotokauri South outlet to the South East. Various options for conveyance and attenuation of stormwater have been considered with the objective of maximizing discharge to the downstream catchment, whilst providing sufficient upstream attenuation and storage for a 100 year ARI. Options that preserve and promote ecological and landscape character are preferred.

The preferred concept option has been identified as a central drain / green corridor (Figure 1). The typical depth of the channel is intended to be 2 m. It is proposed in the center of the corridor, a relatively small main channel (26-30 m wide) will support permanent base-flows in a run-riffle-pool type arrangement, with the wider corridor (53-76 m wide) profiled to accommodate larger events, similar to that outlined for the overarching Rotokauri ICMP.

Where storage basins are required they are likely to be largely accommodated within the corridor footprint; however, offline storage in adjacent reserves could still be required.

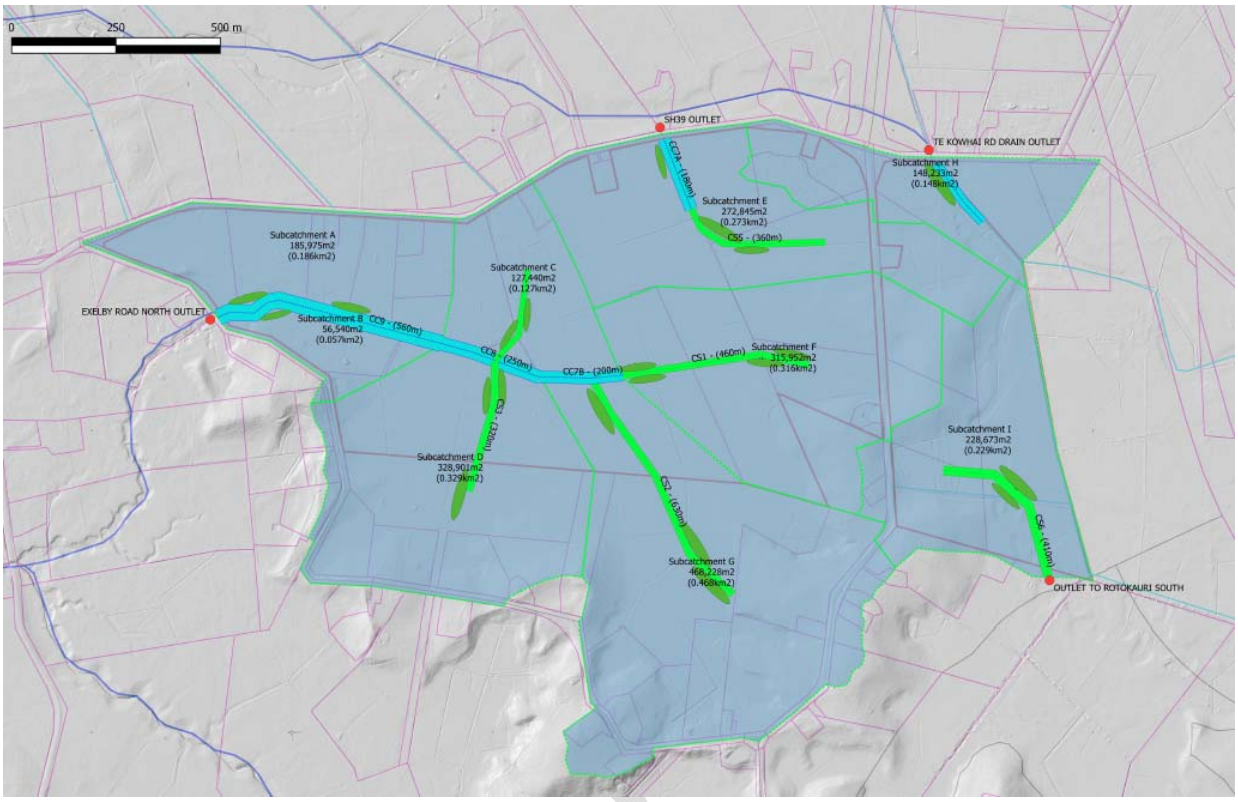

Figure 1: Rotokauri north development area concept stormwater layout (CKL, 2017)

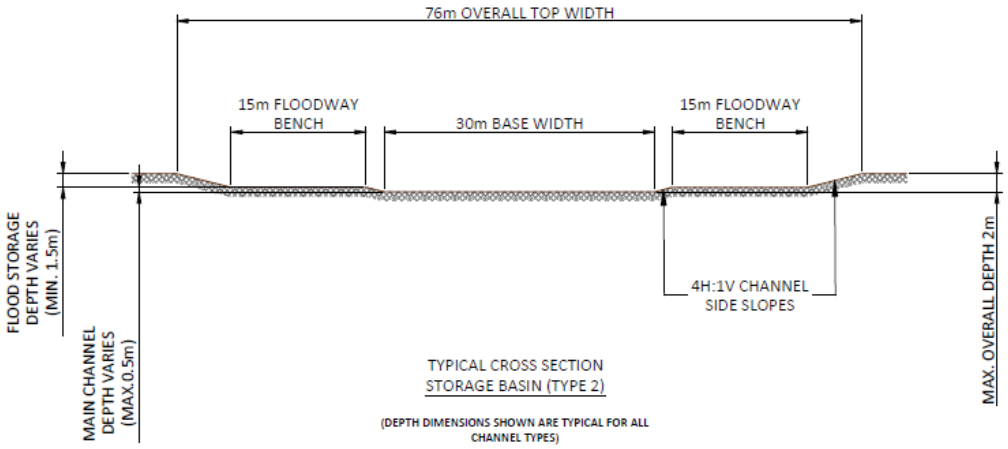

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Figure 2: Typical details of Storage channels (CKL, 2017). The center of the corridor, a relatively small main channel will support permanent base-flows in a run-riffle-pool type arrangement, with the wider corridor profiled to accommodate larger events

3 Hydrogeological Setting

3.1 Geology

The published geological map identifies that the site is liekly to be underlain by Hinuera Formation (Figure 3, which in turn is underlain by Walton Subgroup.

The Hinuera Formation soils were deposited in a fluvial environment and so it is expected that individual layers will vary in thickness and extent.

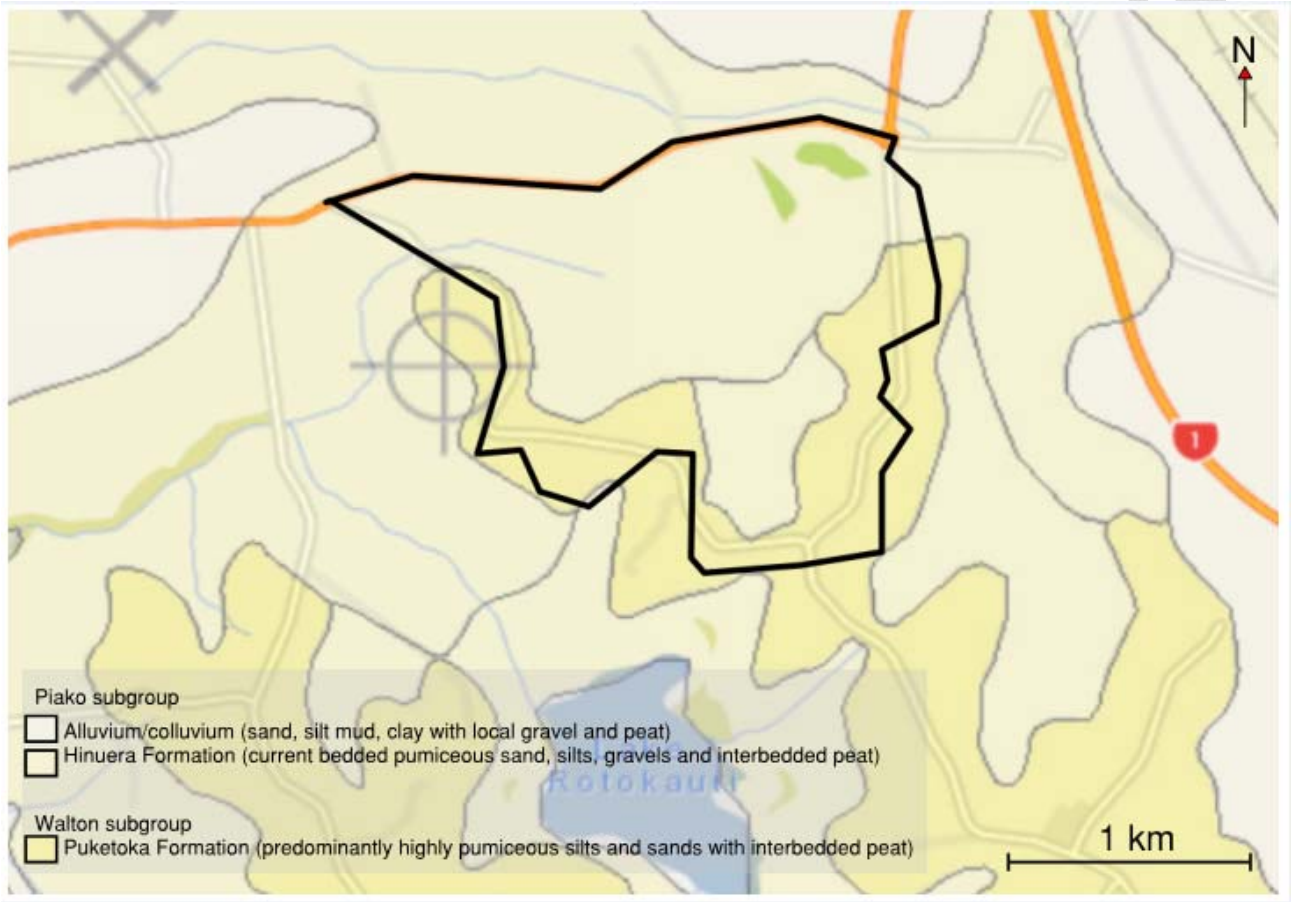

Figure 3: Geological map indicating the site is underlain by Hinuera Formation overlaying Walton Subgroup.

Review of limited, available site investigation data confirms that the profile across the site is comprised of soils (sands, silts and gravels) of the Piako Sub-group (Hinuera Formation). Feasibility level investigations undertaken by HD Geotechnical have been shallow (< 2.4 m depth); however, the upper part of the soil profile is consistent with that identified in the wider Rotokauri Structure Plan area (Table 1). On this basis the near surface Piako Subgroup soils are liekly to range from 0.5 m to 3 m thickness across the RNDA.

The underlying Walton Sub-group outcrops, through the Piako formation forming the low lying hills along the southern boundary of the RNDA.

No peat has been identified in prior investigations at the site, however it was identified (be it inconsistent, both spatially and in thickness) during investigations for the Rotokauri ICMP; therefore, there is some possibility of peat being encountered within the RNDA.

3.2 Hydrogeological Properties of Soils

High level hydrogeological properties of the soils have been determined from initial ground investigations at site, publically available borehole investigation data, relevant Environment Waikato bore data, and experience for similar projects in the area, notably investigations from the neighbouring Rotokauri ICMP (that included long term groundwater level monitoring, in-situ permeability testing and grain size analyses).

Layer descriptions (and their corresponding expected hydrogeological properties) are presented in Table 1 below. The depth and soil properties are largely based on deep investigation drilling undertaken in Rotokauri, however, initial site investigation data from RNDA (HD Geotechnical, 2018) indicates hydraulic conductivities that are likely in the range of $1x10^{-6}$ to $4x10^{-7}$ and hence are broadly consistent.

Layer 1 is likely to have an overall low hydraulic conductivity, controlled by the fines component of the soils and are likely to be strongly anisotropic (that is, the layering in the alluvial soils means that flow occurs more rapidly in a horizontal direction than in a vertical direction, albeit slowly in both cases).

Site specific investigations for Rotokauri indicated that it was possible to further distinguish a coarser, more permeable unit with depth (layer 2). Investigations undertaken for the RNDA to date are not of sufficient depth to confirm if such a layer is present across the site. If present, layer 2 is likely to have a coarser grain size and will likely be more permeable.

Table 1: High-level assessment of liekly hydrogeological properties of the RNDA

Unit	Layer	Description	Depth to top of layer (m bgl)	Thickness (m)	Hydraulic Conductivity (m/s)	K_v/K_h ratio
Piako Subgroup	1	Sandy silty CLAY/sandy SILT	0	0.1 – 10 (typical=1.5)	10^{-6} to 10^{-8} (Low)	0.1
	2	Fine to coarse SAND/ silty fine SAND/ gravelly SAND/SILT	1 – 10	0.5 - 21.5+ (typical=8.7)	1×10^{-5} (mod-high)	1

3.3 Groundwater Levels

The RNDA consists of three sub-catchments which are understood to drain to three separate outlet locations (CKL, 2017). The surface water catchments are constrained by ridgelines formed from low lying Walton Subgroup hills that are located along the southern boundary (coincident with Exelby Road) and running north-south (along Burbush Road). The majority of surface water runoff occurs within these two ridgelines and is expected to drain west towards the Exelby Road North culvert which is at an elevation of ~29 m.

A broadly similar pattern is expected in the groundwater though there is limited site specific investigation to confirm.

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Te Rapa bypass investigation (Te Rapa bypass, 2005) undertaken within the RNDA compiled mostly of hand auger data indicted groundwater levels were 1-1.5 meters below ground level (m bgl). The measurements were taken in July 2005, immediately after drilling.

An initial site investigation (for high level assessment of geotechnical feasibility) was recently undertaken by HD Geotechnical. As part of this investigation shallow, temporary piezometers were installed to depths of 0.6 m to 1.3 m bgl and data loggers were deployed for one week to record the short term groundwater response to rainfall.

These piezometers indicate that groundwater levels ranged from 0.1 m bgl (i.e. near ground surface level) and 1.1 m bgl. Groundwater levels (in individual piezometers) varied by typically 0.3 m but up to 0.5 m over the period of monitoring in response to rainfall. Using the water table method (where recharge can be assumed based on specific yield and the observed change in groundwater level) the rainfall recharge over this limited period is estimated to be close to 100 % indicating a very direct connection to rainfall.

4 Key Hydrogeological and Geotechnical Constraints for Stormwater Design

4.1 Stormwater Options

A central drain / green corridor has been identified as the preferred option. The corridor is nominally 50 m to 70 m wide with a maximum depth of 2 m. Where storage basins are required they are likely to be largely accommodated within the corridor footprint (to the scale shown in Figure 1).

A preferred option has been identified; however we understand some further design development is likely hence the following sub-sections have considered catchment-wide constraints.

With the preferred stormwater conveyance channel option in mind, and the existing publically available data it is possible to draw some high-level assessment of potential constraints and opportunities relating to stormwater management. A typical cross section summarising this information is seen in figure 4.

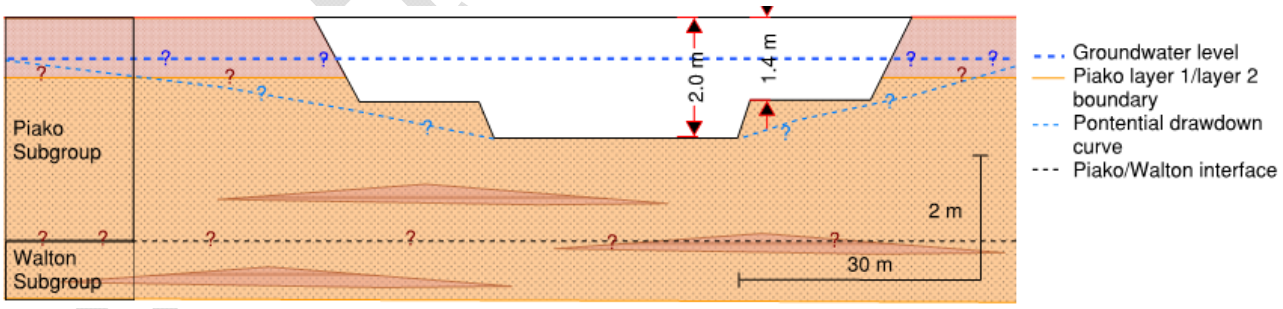

Figure 4: Simplified sketch (not to scale) indicating a typical Conveyance Channel, geological profile, groundwater level and potential drawdown.

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4.2 Hydrogeological Constraints

4.2.1 Depth to groundwater

Initial (short duration) results from the high level feasibility investigations indicate a winter groundwater level that is a maximum of 1.1 m bgl, but in locations as high as 0.1 m bgl with a direct response to rainfall. Levels could be higher after large rain events such that the water table is likely to be encountered at or close to ground surface in some locations. This may locally constrain the maximum achievable unlined channel (or basin) depth. If an unlined basin or channel extends below the groundwater table in places, part of the storage will be taken up by groundwater which may drain from a wider area up-gradient.

Where excavations are in soil of low permeability, excavations are unlikely to encounter significant inflows. However should more permeable layers be encountered, groundwater inflows, in addition to being a construction nuisance, could reduce the storage capacity of the channel / basin.

Conversely, should the summer groundwater levels drop below the base of the channels it could be difficult to maintain a wetted base.

Uncertainties:

- What are the current groundwater levels at the specific location of the proposed channels?
- Are the shallowest groundwater levels (indicated by the 2018 investigations) perched (i.e. would they discharge on excavation through them)?
- What is the seasonal variation of groundwater levels across the site?

4.2.2 Drawdown of the groundwater table

Where excavations are required below the groundwater table, drawdown (as shown on Figure 3) could occur with the potential for:

- Groundwater drawdown induced consolidation settlement. This is a risk in areas where excavation of the waterway will encounter sandy materials that are located below the ground water level. In this situation the channel could drain groundwater from further away causing settlement of the overlying compressible soils. The risk of settlement to neighbouring structures requires further consideration as the need to limit drawdown may be a constraint on the maximum depth of cut.
- Loss of channel or storage basin capacity. If the channel is unlined, some of the volume would be taken up by groundwater; if it is lined then upward groundwater pressures would need to be considered in design.
- Groundwater drawdown could affect surface water bodies, however, our desktop study has not identified any significant natural surface waterbodies.

In general, a shallow drain could be expected to have less groundwater impact in terms of drawdown (as well as lesser geotechnical issues) however initial indications are that the excavations will be below the groundwater level. Key to understanding the potential risk of consolidation will be understanding the summer low groundwater levels.

Where the excavation is fully within silty soils, the extent of drawdown and associated effects are likely to be more localised, however drawdown in the more permeable sand layers may extend somewhat further.

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Uncertainties:

- How far is any drawdown likely to extend from the basins/ channel in the long term?

4.2.3 Infiltration Rates

Generally within the Hamilton area, soakage (with storage) is expected to be utilised for on-site management of stormwater where soils are indicated to be of high permeability.

There is limited hydraulic conductivity or infiltration data available for the site (in terms of either existing rainfall recharge at the surface or site specific testing of vertical infiltration rates) however given the shallow depth to groundwater, relatively low permeability and strong rainfall response indicated by short term testing and expected low overall vertical permeability of the upper soils, there is likely to be limited potential for larger scale infiltration of stormwater.

Even where more permeable layers are present at the surface they may be underlain by lower permeability layers which will constrain the rate of any larger scale vertical infiltration. However, where these layers are encountered in basin or channel excavations above the groundwater table some losses of stormwater to the ground through the base and sides, are likely to occur. Whilst this could be of some benefit for stormwater management it could also result in groundwater mounding and associated effects discussed in later sections.

Uncertainties:

- Could water conveyed or stored in channels and basins infiltrate the ground?
- How consistent is the soil profile across the site?

4.2.4 Other design considerations

a. Lining of Channels and Basins

As noted above some gains to or losses from the channels could occur. Based on limited monitoring to date the water table is expected to be above the base of the channels/ basins, hence water is expected to discharge from the ground into the waterway(s). It may be necessary to line sections of channels / basins where groundwater infiltration is sufficiently high that it reduces storage capacity or impacts on channel or basin slope stability.

b. Groundwater seepage/infiltration leading to mounding

There is a risk that where stormwater is able to infiltrate through the base or sides of a channel or basin, it could lead to elevated groundwater levels (localised mounding) that reach or exceed the ground surface and result in surface flooding. This would be particularly significant for newly developed low-lying land or overland flow paths. It may be necessary to restrict groundwater infiltration in areas with shallow depths to water and limited freeboard.

4.3 Geotechnical Constraints

4.3.1 Stability of cuts

A shallow depth to groundwater (and the potential for seepage to reduce the stability of batter slopes) may require lower slope angles which would increase the area of the channel or basin. This is likely to be most

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significant where deep excavations are planned that are located below the groundwater level and in the more permeable layers.

In these areas there may be constraints on cut slope angle, and/ or maximum depth of excavation.

4.3.2 Lateral Spreading

Lateral spreading occurs when earthquake shaking induces soil to lose cohesion and move, resulting in the soil mass acting like a fluid. Three key elements are all required for liquefaction, and thus lateral spreading, to occur:

1. Loose non-plastic soil (typically sands and silts)
2. Saturated soil
3. Sufficient ground shaking

While a geotechnical evaluation is required to understand the liquefaction potential of the site (and this not within the scope of our work) the soil types that are present at the site are considered potentially susceptible to liquefaction (MBIE, 2017) e.g. quaternary aged soils that are below the groundwater table or are saturated.

Where a wetted base occurs in a swale or basin (either due to ponded or stored water in the base, or, due to being excavated close to or below the groundwater level) the side slopes may be susceptible to lateral spreading, as the underlying material will be saturated and likely to liquefy during an earthquake. This will require specific consideration during further design phases.

5 Recommendations

5.1 Additional Site Investigation

The existing publically available data, and high level site investigations undertaken by HD Geotechnical, provide a high-level overview of the ground and groundwater conditions at the site and the uncertainties/ issues that might need to be addressed. It highlights some unknowns that are likely to influence the selection and design of the preferred stormwater option.

Preliminary site specific investigations are now required, with the intention to get a better representation of the geological conditions, groundwater levels and permeabilities at the site. This will allow for a higher level of certainty in this assessment.

We suggest that additional investigations be staged, with an initial first group of investigations aimed at confirming ground and groundwater conditions to support option selection. Should further design development than alter the locations of specific features, further site specific investigations may be required as part of design optimisation.

Indicative timings and a rough order of costs for the initial confirmatory investigations are provided for programme / budgeting purposes.

This first group of investigations is aimed at answering the following questions:

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- What are the current groundwater levels at the site, and what are the seasonal ranges in water level.
- Are the shallow groundwater levels recorded locally perched? If so, does it matter if they are drained or should / could these areas be avoided?
- What are the permeabilities of the soils

Indicative locations for the confirmatory site investigations are shown below (Figure 5).

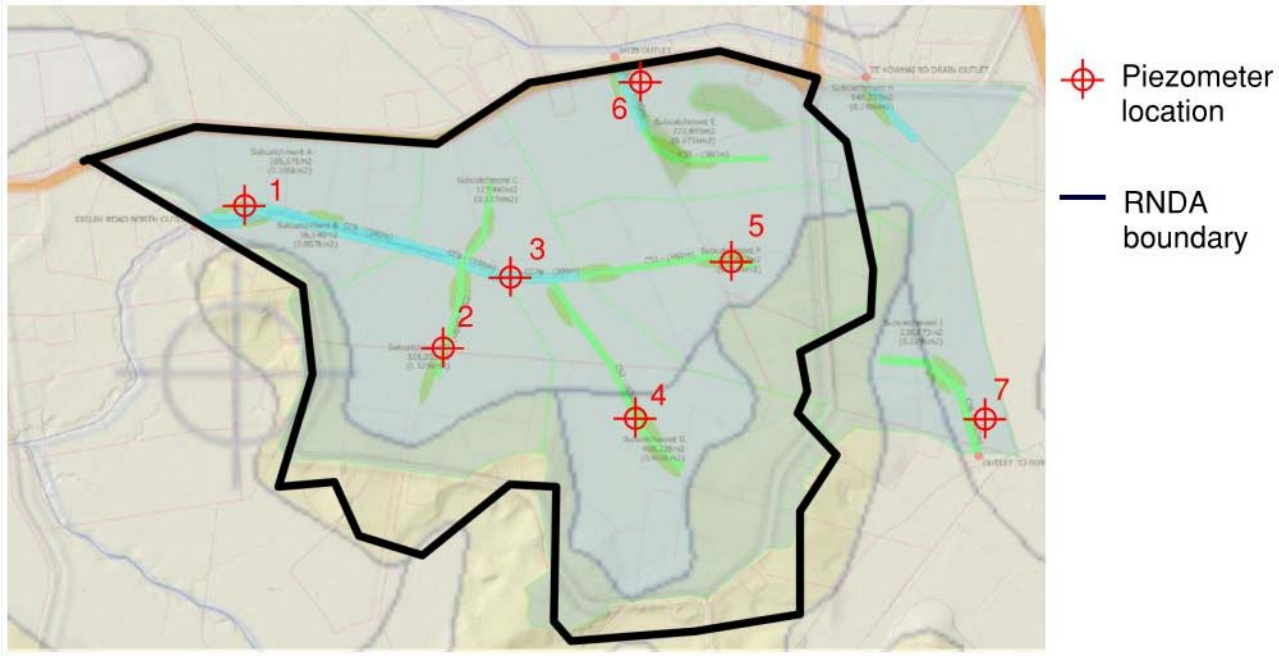

Figure 5: Indicative (approximate) locations showing ideal piezometer locations relative to the concept catchment plan. Note: the locations shown have not taken into account any real-world / logistical restrictions that maybe encountered on site.

a. Investigation drilling and installation of piezometers

Boreholes should be completed as piezometers screened at or just below proposed excavation depth and would comprise a minimum of 1 piezometer at each of the locations shown above in order to assess local variability (particularly where the wetland / basin areas are large). It would also be prudent at a selection of locations to install a deeper piezometer immediately adjacent to confirm if the shallow water table identified in the recent investigations is perched. Each site is likely to take 1 – 2 days to drill and complete at an estimated contractor cost of $2,500 per day (not including any geological logging).

Piezometers installed at these locations would ideally be monitored for one year. This will give confidence in the annual groundwater variation and better constrain groundwater levels.

It is recommended that data loggers be installed to record the more detailed variations in groundwater level that will allow better correlation with changes in environmental conditions.

Data loggers could take up to 3 weeks to be shipped (depending on local availability) and we suggest disbursements of $11,000 ex GST for their purchase (assumes 10 No. data loggers) and around $2,500 for

installation. This cost allows for all shallow piezometers and two deeper piezometers across the catchment to be monitored continuously with manual monitoring in the remaining deep piezometer.

Once installed the data loggers could be downloaded every 1 to 3 months (at a rough cost of $2,100 per download). Groundwater level data will be available after the first download, with a good feel for winter groundwater levels available by mid to late September 2018. We suggest a first download 2 weeks after installation to check all loggers are operating correctly.

b. In-situ permeability testing in piezometers

Permeability testing will be important to inform the need for lining, and for calculation of inflows and the extent of drawdown or mounding during construction and in the long term. In-situ permeability testing will provide an indication of the horizontal permeability at the site.

We suggest allowance for say 3 days of field work to undertake tests in new piezometers ($4,200). It is likely that such work could be undertaken at the same time as investigations in 5.1.1a (above) to limit cost duplication.

c. Vertical infiltration testing

Should the developer wish to progress with soakage, site specific infiltration testing will be required to confirm the likely capacity of the site. Noting the findings above (that soakage may not be practical) we have not proposed any testing at this time.

d. Grain size distribution analysis

To support the permeability analysis, it is recommended that grain size distribution analysis be completed at key locations to assist in refining the permeability of the soils at the site.

We suggest 12 samples (allowance for 1 to 2 per piezometer site) at a cost of ~$10,000+ GST.

e. Factual reporting of the above

Indicative costs for coordinating the investigation, geological logging and factual reporting are likely to be of the order of $30,000.

5.2 Numerical analysis

Previous assessments at Rotokauri have included 2D and 3D groundwater modelling in order to better understand the potential magnitude and extent of groundwater effects. It is recommended that the existing 3D groundwater model for the Rotokauri area be updated to consider RNDA, including results of additional investigations and the effects of the selected stormwater option.

The model can be used to:

- Better understand the overall groundwater catchment
- Assess the magnitude and extent of any drawdown resulting from excavation (for use in consolidation settlement calculations)
- Assess the magnitude of groundwater inflows during construction and in the long term

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- Assess the potential for losses through the base and sides of unlined channels / basins and the extent of groundwater mounding.

The model can be developed without the final design solution in mind, and hence could be used to test the effects of different options such that it can also contribute to optioneering and design optimisation.

The existing Rotokauri groundwater model can be updated to include the Rotokauri North Development Area. Depending on the site specific investigations, the model may require re-calibrating. In this case we suggest allowance of $40,000 (for the analysis and reporting) and a period of six weeks to complete. However, it is possible the model will be suffice as is, in which case time and effort could be reduced.

Whilst the model can be developed without the final concept in mind, model construction will be most efficient if undertaken once the bulk of any new site investigations have been completed (in order to avoid rework). We therefore recommend that this work be commenced once the confirmatory investigations have been completed.

6 Summary and Conclusion

We understand an optimised Stormwater catchment solution is likely to comprise a central channel associated with a green corridor some 30 m to 70 m wide and up to 2 m deep. Short term groundwater monitoring indicate levels across the site varies between near ground level to some 1.1 m bgl, and so it is anticipated that there will be excavation below the groundwater table in some areas.

Where there are sensitive surface features or settlement sensitive structures, there may be constraints on the depth and extent of excavations in order to reduce the potential for adverse effects. In other areas while there may not be environmental constraints, design or construction issues could include the management of construction inflows (for constructability and slope stability considerations), the need for lining etc. These constraints are consistent with observations and recommendations for Rotokauri.

Additional site investigations are recommended at the specific locations of large or deep excavations to better inform design. Such work should include the updating of the existing Rotokauri 3D groundwater model which can be used for both environmental assessment and design optimisation.

Indicative costs and timeframes have been provided for the additional investigations however we would be pleased to provide a more detailed scope and fee and cost estimate for the suggested additional work as the programme proceeds, and look forward to the opportunity to discuss this with you and the wider team in more detail so that key elements can be prioritised.

Yours sincerely

Roy Nutsford
Hydrogeologist

on behalf of

Beca Limited

Phone Number: +64 9 300 9000
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ATTACHMENT 11 - Rotokauri North Development Area:
Technical review of stream classifications prepared by Tonkin & Taylor
dated 7 December 2018

Tonkin+Taylor

Job No: 1008263
7 December 2018

Hamilton City Council
Private Bag 3010
Hamilton 3240

Attention: Nathanael Savage

Dear Nathanael

Rotokauri North Development Area: Technical review of stream classifications

This report presents our independent assessment of the classification of the watercourses present on the Proposed Rotokauri North Development area located off Te Kowhai Rd, Hamilton. The report has been prepared for Hamilton City Council (HCC) as our client[1] with the intention that it will be made available to Green Seed Consultants Limited (GSCL) to assist with the preparation of a sub-catchment ICMP.

1 Introduction

We understand that GSCL is proposing to develop an area of land to the south of Te Kowhai Road, Hamilton as a Special Housing Area (SHA). The location of the site is shown on Figure 1 (Appendix A).

We understand that GSCL and HCC are seeking clarity on watercourse classifications under the Waikato Regional Plan (WRP) in order to progress stormwater and watercourse management options for the site. The purpose of this letter is to provide an assessment of site watercourse classification with respect to WRP definitions. The report does not assess the ecological values of site watercourses.

2 Methods

The methodology for this assessment has comprised:

- A site visit and walkover inspection of the watercourses at the site by a Principal T+T ecologist accompanied by Nathanael Savage of HCC and Mark Tollemache of Tollemache Consultants Ltd (GSCL's consultant planners). The walkover inspection covered two main tributary systems on site, an unnamed tributary of the Te Otamanui Stream and an unnamed tributary of the Ohote Stream. The site visit was undertaken on the morning of Wednesday 24 October 2018. Weather conditions were fine at the time of the site visit and there had been no rainfall recorded at the Ruakura rain gauge in the preceding 10 days (data from NIWA's CLiFlo website). The nearest rainfall event to the site visit was 11 days earlier with 14 and 10.8 mm recorded on 12 and 13 October 2018 respectively.

[1] The report has been prepared in accordance with our Instruction for Service agreement with HCC dated 17 September 2018 (PSP 18104).

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- A review of relevant data including available GIS maps on T+T files[2], the historic aerial photographs available on the Retrolens website and the preliminary hydrogeological report for the site[3].
- Consideration of the status of site watercourses based on the above and with respect to watercourse definitions in the WRP (see Appendix B).

3 Stream classification assessment

This section outlines our assessment of the status of the watercourses on site. We have provided brief overview information for site context, presented the key definitions relevant to the site and then addressed watercourse classifications separately for the unnamed tributaries of the Te Otamanui and Ohote Streams.

3.1 General site context

The Rotokauri ICMP ecology report provides good background on historic land use, topography and geology of the general area[2]. The site has rolling hills around the southern and eastern edges but is largely flat. The unnamed tributaries of the Ohote Stream on site largely fall within an area of historic fen wetland and this broadly coincides with organic soils (Figures 26 and 23 respectively in Kessels Ecology, 2016). We have provided Landcare Research's historical wetland layer on Figure 1, which is an indicative extent of likely wetland habitat prior to human modification.

The unnamed tributaries of the Te Otamanui stream drain allophanic soils the tributaries and drains are largely located outside of the approximate extent of historic fen wetland (refer Figure 1).

We encountered the owner of 350 Exelby Road (Michael Vickers) during the site walkover. He commented that his family had been farming in the area for the past 60 years and could remember his father and neighbours constructing several of the tributary drainage channels within the site. Apart from the main channel he could not recall there being any notable natural channels. Prior to the drains being dug they had significant ponding issues.

3.2 Key WRP definitions

WRP watercourse definitions relevant to stream classification in general are provided in Appendix B. The definitions for ephemeral streams, perennial streams, modified watercourse and artificial watercourse are most relevant to the site and this assessment. We note that based on WRP definitions "farm drain" is a type of artificial watercourse. We also note that wetlands have been historically present in the subject catchments but there is no guidance in the WRP on how to deal with modification to wetlands (i.e. if the drainage of wetlands with channels results in a modified or artificial watercourse). On the whole the drainage channels have been constructed for the purpose of draining the historic wetlands.

We understand from the preliminary hydrogeological report for the site that groundwater levels are generally near the ground surface and respond directly to rainfall. The site walkover for this assessment was in spring but followed a period of dry weather. There was a variable depth of water present in site watercourses, and for upper catchment zero order tributaries (watercourses not appearing on the 1:50,000 map series) this appeared to change with channel depth. Our view is that observed water levels in site watercourses at the time of the walkover reflected a combination of channel depth and groundwater levels.

[2] Figures supporting the Rotokauri ICMP Ecological Assessment, Kessels Ecology (2016). Consultancy project undertaken by Kessels Ecology for Hamilton City Council.
[3] Beca, 2018. RNDA ICMP: Desktop Review of Hydrogeological Conditions Influencing Stormwater Design rev2. Letter from Roy Nutsford to Nathanael Savage Dated 8 September 2018.

Most of the watercourses on site would likely flow (or hold water) for at least three months of the year between March and September. However, it is highly likely that the bulk of the zero order watercourses (most of the watercourses on site) dry out for a period during summer and are therefore ephemeral in nature. However, we assume that the ephemeral and perennial stream definitions follow the definition of a river (see Appendix B) and apply to streams and modified watercourses but not artificial watercourses. Most of the watercourses on site are more consistent with the definition of artificial watercourse (see later), so the ephemeral / perennial definitions may be irrelevant.

None of the watercourses on site are completely unmodified. The most relevant watercourse definitions to this assessment are therefore "modified watercourse" vs "artificial watercourse". The key difference between the two definitions is the presence of "natural portions" or "channels". According to the definitions a modified watercourse has a "natural channel" at its headwaters whereas an artificial watercourse has "no natural portions" from its confluence with a river or stream to its headwaters. We address watercourse classifications for the unnamed tributary of Te Otamanui Stream and the unnamed tributary of the Ohote Stream in the following sections.

3.3 Unnamed tributary of Te Otamanui Stream

The unnamed tributary of Te Otamanui Stream comprises a network of managed channels within an agricultural setting and all of the watercourses on site are straightened. The watercourse network is shown on Figure 1, including the labels we have provided for each of the tributaries as referred to below. We have reviewed the historic aerial photography available on the Retrolens website to assist in determining which of the watercourses on site are artificial vs modified. Photographs date back to 1952 and are provided in Appendix C.

The aerial photograph from 1952 shows a straightened channel network is present, although with slightly different alignments to the present situation. At this time some channel locations appear to be consistent with the current network while others have since been filled or constructed. The main stem (TM) and tributaries T4, T5 and T6 appear to be present. A wetland area appears to be present in the uppermost headwaters but there is no obvious surface stream linking to the main stem. Photographs from 1963 show a similar drainage pattern but with the wetland area reduced in size, and subsequently completely gone by 1974. A similar pattern is shown in 1979. Tributaries T1, T2 and T3 appear to have been constructed post 1979.

In its current state the entire network is arguably "artificial watercourse" given there are no natural portions or channels from headwaters to the confluence with a river or stream. However, it is highly likely there would have been a stream drainage feature from this area prior development of the land for agriculture. Only the main stem is likely to be in the vicinity of any original watercourse alignment with any certainty and our view is that the lower portion of this would be appropriately classified as "modified watercourse". This upstream extent of the section of "modified watercourse" is arbitrary other than it is the likely upstream extent of perennial flow. The remainder of the watercourses within the Te Otamanui Stream catchment within the site in our view are artificial. Our assessment of watercourse classifications is summarised in Table 3.1 and presented on Figure 1.

Table 3.1: Classification of the unnamed tributaries of Te Otamanui Stream against WRP definitions

Stream reach	Watercourse classification	Reasoning
TM (lower)	Modified watercourse	Likely to be in the vicinity of an original stream feature.
T1	Artificial watercourse	No natural portions or channel sections. Likely constructed post 1979.

Stream reach	Watercourse classification	Reasoning
T2	Artificial watercourse	No natural portions or channel sections. Likely constructed post 1979.
T3	Artificial watercourse	No natural portions or channel sections. Likely constructed post 1979.
T4	Artificial watercourse	No natural portions or channel sections.
T5	Artificial watercourse	No natural portions or channel sections.
T6	Artificial watercourse	No natural portions or channel sections.

3.4 Unnamed tributary of Ohote Stream

The unnamed tributary of Ohote Stream also comprises a network of managed channels within an agricultural setting. All of the watercourses are straightened other than a 200 m long reach of the main stem at the downstream end of the site, although this also appears to have a modified channel (deepened). The watercourse network is shown on Figure 1.

Aerial photographs for the site date back to 1952. Similar to the unnamed tributary of the Te Otamanui Stream, the aerial photograph from 1952 shows a straightened channel network is present with the most channels in the current alignment. An extensive wetland area is present in the uppermost headwaters in the vicinity of tributaries O5 and O6 (refer Figure 1). By 1963 the headwater wetland feature has been cleared and drains have been installed in the current alignment. Some changes to the minor channel network appear to have occurred, particularly with channels that appear to cross catchment boundaries.

In our view the lower reach of the main stem would be appropriately classified as “modified watercourse”. This is on the basis that the most downstream section follows the natural topography and that a stream would have been present historically in the vicinity of the main channel. The upstream extent of the section of “modified watercourse” is arbitrary other than it is the likely upstream extent of perennial flow. The remainder of the watercourses on site in our view are artificial and constructed for land drainage purposes. Our assessment of watercourse classifications is summarised in Table 3.2 and presented on Figure 1.

Table 3.2: Classification of the unnamed tributaries of Ohote Stream against WRP definitions

Stream reach	Our view on stream classification	Reasoning
OM (lower)	Modified watercourse	Alignment follows natural topography in lower reach with straightened reach likely in the vicinity of an original stream feature.
OM (upper)	Artificial watercourse	No natural portions or channel sections.
O1	Artificial watercourse	No natural portions or channel sections.
O2	Artificial watercourse	No natural portions or channel sections.
O3	Artificial watercourse	No natural portions or channel sections.
O4	Artificial watercourse	No natural portions or channel sections.
O5	Artificial watercourse	No natural portions or channel sections.
O6	Artificial watercourse	No natural portions or channel sections.

4 Conclusion

We have made an assessment of watercourse status for the Rotokauri North Development site on the basis of a desktop review, a site walkover and in regard to the definitions in the WRP. In our view

the majority of the watercourses on site are consistent with the WRP definition for an “artificial watercourse”. In our view the appropriate classification for the lower reaches of the unnamed tributaries of Te Otamanui and Ohote Streams on site is “modified watercourse” as shown on Figure 1.

5 Applicability

This report has been prepared for the exclusive use of our client Hamilton City Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:	Authorised for Tonkin & Taylor Ltd by:
.....	.....
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Principal Freshwater Ecologist	Project Director

Technical review completed by Justine Quinn, Senior Freshwater Ecologist

DCM
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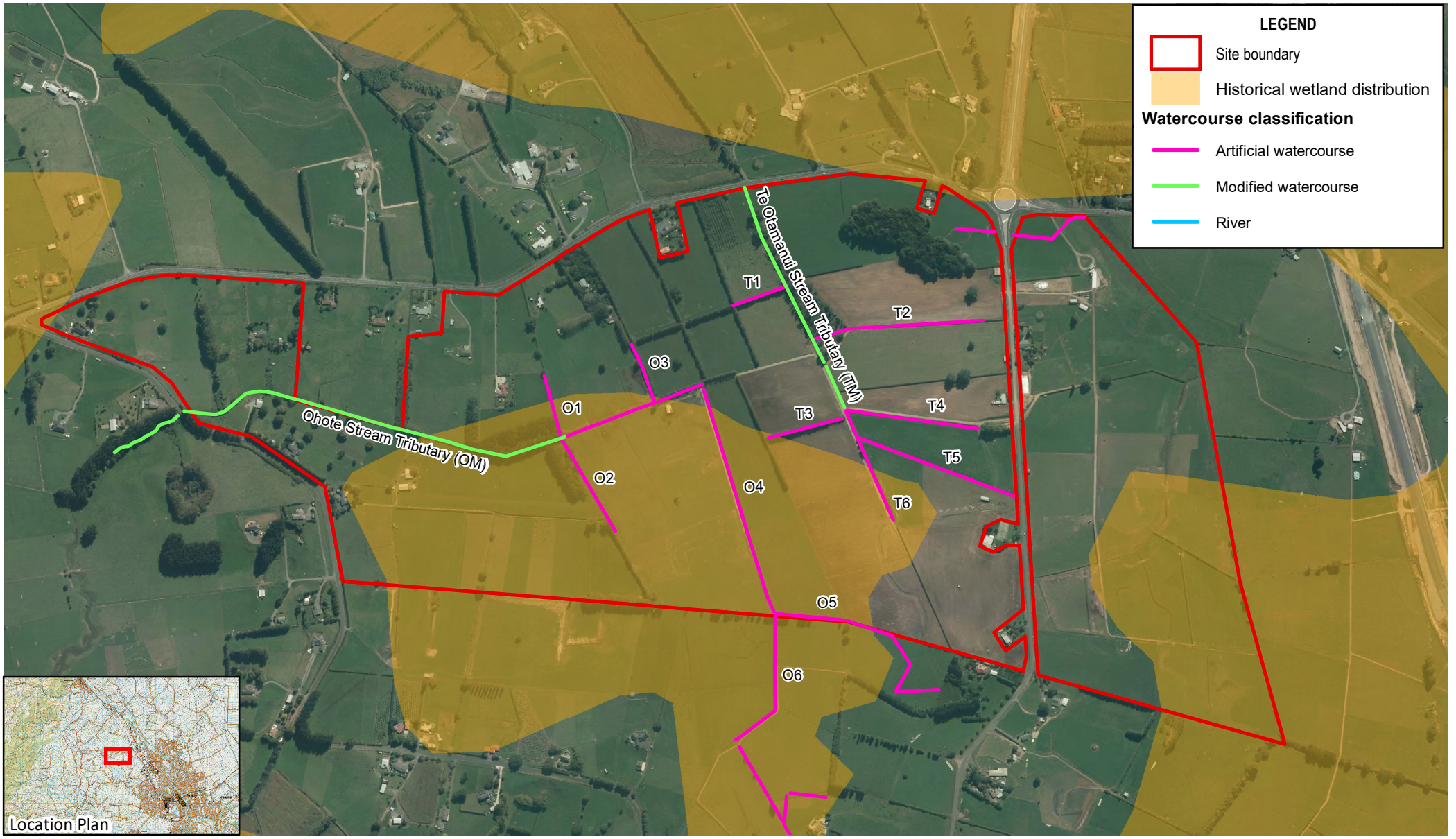
Appendix A: Figure

- **Figure 1: Rotokauri North Streams Watercourse Classification**



Notes: Aerial photography obtained from Waikato Regional Council (WRAPS 2012), Creative Commons BY 4.0
Coordinate Datum: New Zealand Transverse Mercator (NZTM)
Historical wetland distribution data obtained from Ministry for the Environment, Creative Commons 3.0

0 0.08 0.16 0.24 0.32 (km)

A4 SCALE 1:10,000

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DRAWN	ADPU	Oct.18
CHECKED	DCM	Dec.18
APPROVED	PRC	Dec.18

ARCFILE
Rotokauri north stream_ADPU.mxd

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HAMILTON CITY COUNCIL
Rotokauri North Streams
Watercourse Classification

FIGURE No. Figure 1.

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Appendix B: Waikato Regional Plan Definitions

Waikato Regional Plan – Glossary of Terms

Term	Definition
Ephemeral streams	Streams that flow continuously for at least three months between March and September but do not flow all year.
Perennial streams	A stream that flows all year round assuming average annual rainfall.
River	A continually or intermittently flowing body of fresh water, and includes a stream and modified watercourse; but does not include any artificial watercourse (including an irrigation canal, water supply race, canal for the supply of water for electricity power generation, and farm drainage canal).
Modified watercourse	An artificial or modified channel that may or may not be on the original watercourse alignment and which has a natural channel at its headwaters.
Artificial watercourse	A watercourse that contains no natural portions from its confluence with a river or stream to its headwaters and includes irrigation canals, water supply races, canals for the supply of water for electricity power generation and farm drainage canals.
Farm drainage canal	An artificial watercourse on a farm that contains no natural portions from its confluence with a river or stream to its headwaters, and includes a farm drain or a farm canal.

Appendix C: Historic Aerial Photographs



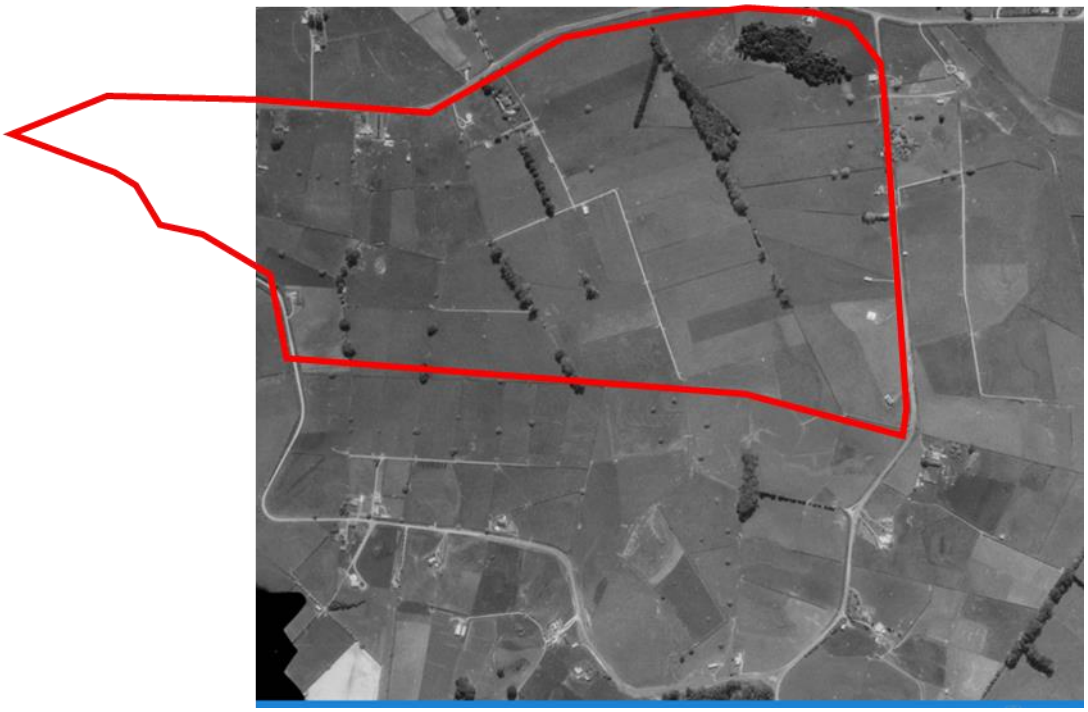
Aerial photograph SN525 / 2, dated 26 September 1952. Sourced from Retrolens and licensed by LINZ



Aerial photograph 3280 / 16, dated 13 February 1963. Sourced from Retrolens and licensed by LINZ



Aerial photograph SN3730 / 7, dated 13 September 1974. Sourced from Retrolens and licensed by LINZ



Aerial photograph SN5479 / 17, dated 27 September 1979. Sourced from Retrolens and licensed by LINZ

ATTACHMENT 12 - Receiving Environment and Rapid Erosion Assessment Rotokauri North Sub-catchment prepared by Morphum Environmental Ltd, November 2018 DRAFT

MORPHUM ENVIRONMENTAL LTD

Engineers & Consultants

Receiving Environment and Rapid Erosion Assessment

Rotokauri North Sub-Catchment

Draft

Prepared for Hamilton City Council by Morphum Environmental Ltd
September 2018



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Engineers & Consultants

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Client Name: Hamilton City Council

Project Name: Rotokauri North Assessment

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Executive Summary

Morphum Environmental Ltd (Morphum) was engaged by Hamilton City Council (HCC) to undertake a watercourse assessment of the Rotokauri North sub-catchment and its receiving environments of the Te Otamanui Tributary and Ohote Stream, as outlined in Figure 1. The watercourses were assessed using two sets of HCC guidance 'modules'; the Receiving Environment Module (REM) and the Rapid Geomorphic Erosion Assessment (RGEA), developed by Morphum for HCC. All interpretation of data should be used in conjunction with these documents. Overall, 10 km of watercourse was assessed in July and August 2018, including 107 stormwater inlet and outlet structures.

The aim of this watercourse assessment was to collect baseline information on the channel morphology, riparian vegetation, ecological condition and erosion susceptibility within the sub-catchment and its receiving environments. This information is intended to be used to assist in determining the potential effects for increased volumes and flows from the Rotokauri North sub-catchment and the proposed diversion from part of the Mangaheka catchment to the Te Otamanui tributary.

This report summaries these findings and proposes erosion mitigation projects with associated approximate costs. The report also highlights enhancement opportunities within the sub-catchment and the receiving environments to improve the amenity, conveyance and ecological values of these watercourses, along with recommended options for managing the effects of existing and future issues and pressures.

The Rotokauri North sub-catchment is a relatively small catchment (~180 hectares), situated at the Northern extent of the larger Rotokauri catchment (~788 hectares). The Rotokauri North Development Area (RNDA) encompasses a total area of 163 hectares. The proposed development includes a new special housing area, with a public school and major roads. The development of this area will see a shift in land use from a predominately rural landscape to a suburban setting. An overview of the RNDA and scoped watercourses for this assessment report is provided in Figure 1.

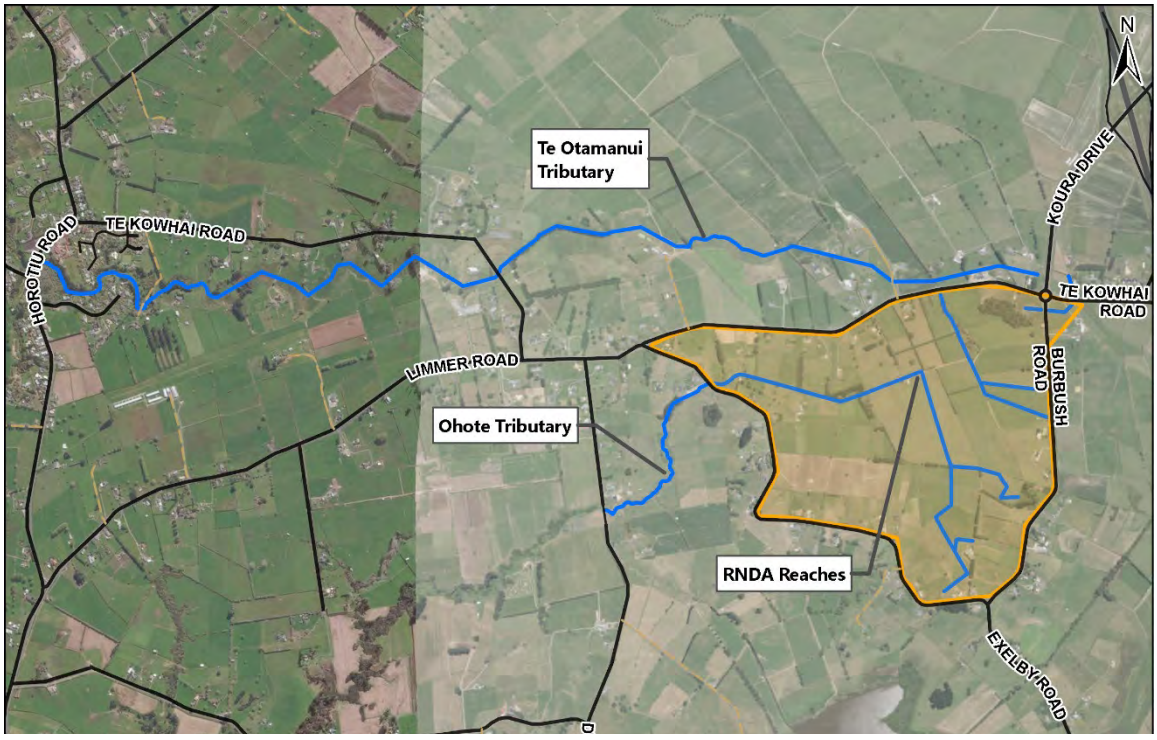

Figure 1: Overview of the Rotokauri North Development Area

The sub-catchment has four receiving environments; Mangaheka to the North, Ohote and Te Otamanui to the West, and Lake Rotokauri to the South. The watercourses within the Rotokauri North Development Area (RNDA) drain to each of these receiving environments.

The majority of the watercourses within the surveyed extent are located within agricultural pastoral land, with small areas of rural residential land use. These agricultural streams have little to no native woody riparian vegetation and direct stock access to the stream channel is common with damage from stock, such as pugging of banks, evident along many reaches. Modifications of the watercourses such as straightening, deepening and diversion of flows were recorded throughout the surveyed extent. In addition, an extensive farm drainage network exists in the Rotokauri North sub-catchment, assessment of which was not within the scope of this watercourse assessment. It is noted that HCC have engaged independent consultation on the classification of watercourses within the RNDA. Where this classification differs from that outlined in Appendix 2, we would advocate that HCC are best placed to define the interpretation to be carried forward. This will require communication with WRC so that they can provide their position on this issue.

Surveys for black mudfish were conducted at 4 sites, while sediment and water quality were conducted at five sites within the surveyed extent. No black mudfish were recorded at the sample sites. Water quality results indicate poor water quality, with five measured parameters – including nitrogen and phosphorus exceeding Australian and New Zealand Environment and Conservation Council (ANZECC) trigger values. Sediment quality was indicative of agricultural land use, with high concentrations of arsenic at one site, but relatively low concentrations of heavy metals such as zinc and lead across the sampled sites. Guidelines proposed in the National Policy Statement for Freshwater Management (NPS-FM), ANZECC and supporting Waikato Regional Council (WRC) documents suggest that the watercourses in the Rotokauri North Sub-Catchment and the receiving environments are degraded, and therefore should be enhanced through development where possible.

Existing erosion and bank instability issues in the Rotokauri North sub-catchment and its receiving environments are primarily driven by a lack of riparian vegetation, straightened channels with steep banks, and stock damage. The RGEA methodology identified nine 'unstable' reaches and two 'moderately unstable' reaches. A total of six erosion hotspots were observed in the sub-catchment, all located in the receiving environments of the RNDA.

The proposed management approach presented in this report aims to anticipate and plan for the increase in conveyance demands on stream systems. The management approach identifies key issues, objectives to address these issues, and options and actions to mitigate the actual and potential adverse effects associated with these issues. The broad management objectives outlined in this report align with the outcomes sought by the Stormwater Master Plan (HCC, 2016), the Rotokauri ICMP (2017), the Waikato vision and strategy document (2011), the NPS-FM (2016) and the Proposed Waikato Regional Plan Change (2018).

Fourteen erosion mitigation projects have been identified along the receiving watercourses of Rotokauri North sub-catchment and the receiving environments. Erosion remediation within the RNDA has not been included as part of this assessment, as it is anticipated that the developer will address any existing issues as part of the planned development. The erosion mitigation projects are comprised of four broad types; grade control, bank batter, erosion planting and toe protection. These engineered approaches aim to remediate existing erosion issues and mitigate further increases in erosion due to increased runoff within the catchment.

The mitigation projects identified in this assessment arise from existing issues that have the potential to be exacerbated by changes in the contributing catchment. It should not be inferred that the costs of these projects would be borne entirely by upstream greenfield growth areas. A further process of

assessing the contributing catchment, and existing and proposed on-site mitigation is necessary to consider a fair and reasonable allocation of costs between existing contributors and growth areas.

The total estimated cost, including contingency, of the physical works for the proposed erosion mitigation projects is approximately $2.5 Million. Unit costs rates are applied to represent high-level estimates of physical works only.

Five enhancement opportunity projects have been proposed within the Rotokauri North sub-catchment and the receiving watercourses. These projects highlight opportunities for the developer and Hamilton City Council to increase the amenity and ecological value of the watercourses, and improving resilience to land use changes in the future. The total estimated cost of the enhancement projects is approximately $1.2 Million.

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1.0 Introduction

1.1 Overview

The purpose of this watercourse assessment report is to collect baseline data on the ecological and physical attributes of the watercourses in the Rotokauri North sub-catchment and receiving environments, outlined in Figure 1. A specific objective of this watercourse assessment was to identify existing erosion issues and assess the potential effects of increased volumes and flows from the Rotokauri North sub-catchment and the proposed diversion from part of the Mangaheka catchment to the Te Otamanui tributary. In addition, the report recommends erosion mitigation projects and enhancement opportunities for managing existing and potential future erosion issues.

The watercourses that were assessed can be broken into three categories; reaches within the Rotokauri North Development Area (RNDA), reaches along the Ohote Stream tributary and reaches along the Te Otamanui Stream tributary, the latter two of which are downstream of the development area.

Assessing the watercourses within the greenfields development area (RNDA) has identified watercourses, indigenous vegetation and habitats that are recommended to be safeguarded and enhanced. Assessment of the Ohote Stream and Te Otamanui Stream tributaries has identified reaches that may be susceptible to the effects of urban development within the upstream greenfields catchment area.

1.2 Scope

Morphum Environmental Ltd (Morphum) was engaged by Hamilton City Council (HCC) to undertake a watercourse assessment of the Rotokauri North sub-catchment and its receiving environments.

The scope of works within the Rotokauri North sub-catchment and its receiving environments includes the following:

Field assessment of 10 km of open watercourse in accordance with ICMP Receiving Environment Module (HCC, 2011)

- Field assessment of 10 km of open watercourse using the updated HCC Rapid Geomorphic Erosion Assessment Methodology (HCC, 2018)
- Black Mudfish surveys at four sites[1]
- Sediment and water quality at five sites
- Macroinvertebrate sampling at five sites
- High-level identification of habitable and non-habitable buildings at risk of flooding from increased flows
- The development of a programme of works to manage existing issues and mitigate future erosion issues (concept level with high level costing)
- Selection and development of enhancement opportunities and potential management options and actions.

A literature review of available information and datasets in the catchment was outside the scope of this report. However, a comprehensive review has previously been conducted as part of the Rotokauri Integrated Catchment Management Plan (ICMP) (HCC, 2017). The outputs from the literature review

[1] Initial scope included black mudfish sampling at five sites. The variation in the number of sites reflects the absence of suitable habitats in the survey area.

include a number of technical investigations and assessments being undertaken to support the ICMP. These are outlined in Table 1.

Table 1: ICMP technical investigations and assessment documents

Document Author and Title	TRIM Reference
AECOM, 2016. Rotokauri ICMP - Major Drainage: Options Report	D-2230265
AECOM, 2016. Rotokauri ICMP - Major Drainage: Preferred Option & Stormwater Management Solution Report	D-2230077
AECOM, 2016. Rotokauri ICMP – Three Waters Infrastructure: Integration Report	D-2238224
CH2M Beca, 2016. Rotokauri: Hydrogeological Interpretive Report to Support ICMP	D-2230274
CH2M Beca, 2015. Rotokauri - Additional Hydrogeological Investigations (Factual Report	D-2006869
Kessels Ecology, 2016. Rotokauri ICMP – Ecological Assessment and Inputs	D-2230270
Opus, 2015. Pukete Reservoir Bulk Water Main – Conceptual Design Report	D-1969497
Morphum Environmental Ltd, 2016. Rotokauri Erosion Susceptibility Assessment	D-2230277
Morphum Environmental Ltd, 2016. Rotokauri ICMP - Water Quality Treatment Concept Development Report	D-2200277
Mott MacDonald, 2015. Rotokauri Water Supply Capacity Assessment	D-2172097
Streamlined Environmental Ltd, 2015. Rotokauri ICMP - Broad Scale Water Quality Assessment	D-1998549

The extent of the watercourse assessment was defined by Morphum Environmental and agreed with the Hamilton City Council prior to the assessment survey being conducted. It should be noted that an extensive farm drainage network exists in the Rotokauri North sub-catchment, which was not part of this assessment scope. In some instances, these additional watercourses were recorded, but not assessed. The extent of the watercourse assessed is summarised in the catchment overview map in Figure 1.

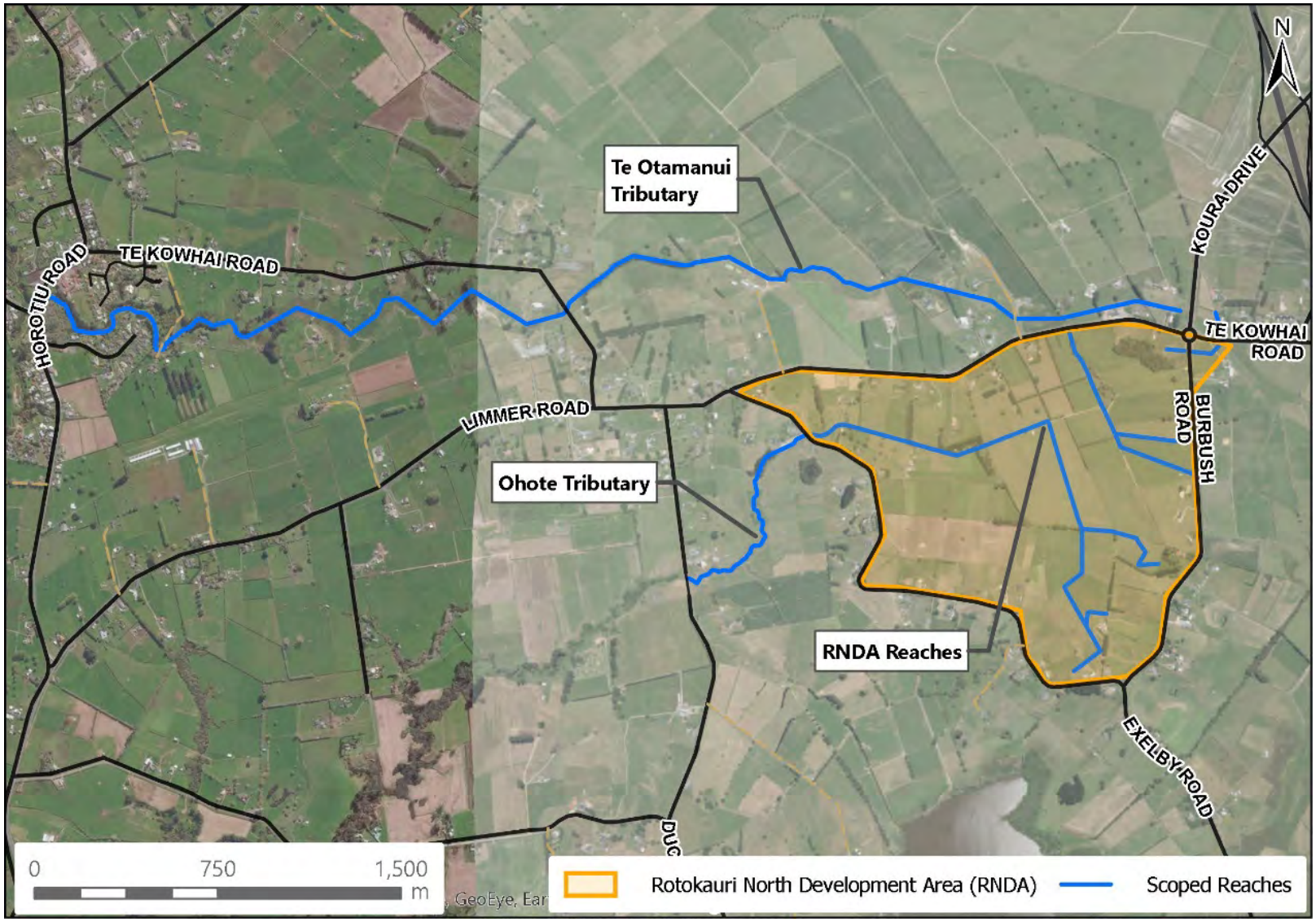


Figure 2: Watercourses scoped for assessment

1.3 Reach Naming Convention

The document provides references to each stream reach using a tributary code. The boundaries of each stream reach or 'ecoline' are defined by factors such as riparian cover, topography and channel morphology, as described in the Receiving Environment Module (REM). The numbering convention of the tributary codes is based on the number of tributaries entering the main stem of the network. For example:

- TEO_MAIN_1 is the 1st downstream reach of the main channel in the Te Otamanui Tributary
- OHO_TRIB1_5 is the 5th reach of the first tributary (heading upstream) of the Ohote Stream

The tributary codes are displayed against each reach as depicted in Figure 2 and on maps provided as Appendices.

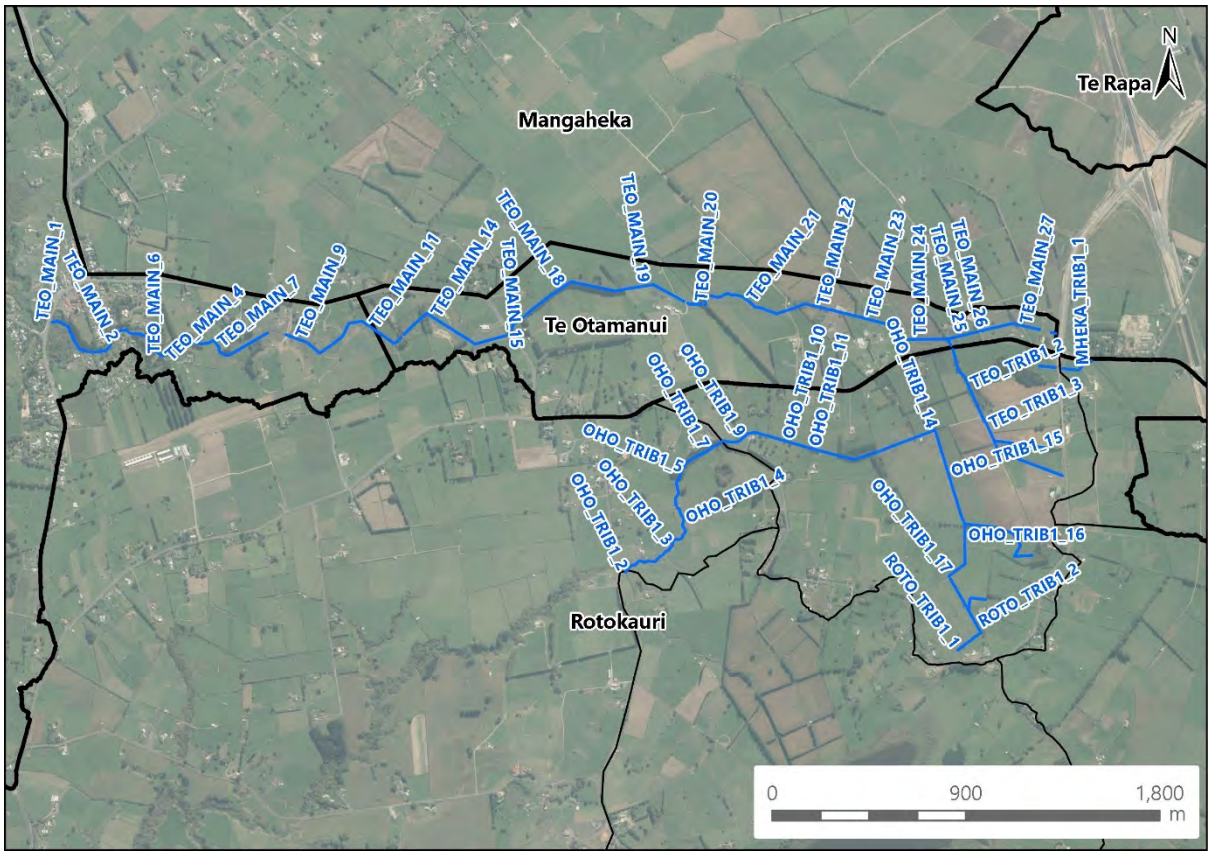


Figure 3: Reach naming convention

2.0 Catchment Overview

2.1 Catchment Location and Drainage

The Rotokauri North sub-catchment is a small, predominantly pasture and arable greenfields catchment, of approximately 180 hectares, at the northern extent of the wider 788 hectares Rotokauri catchment. The Rotokauri North sub-catchment incorporates the Rotokauri North Development Area (RNDA) and is located in the north-western area of Hamilton City. The Rotokauri South Development Area, also part of the Rotokauri ICMP, (RSDA) consists of three main sub-catchments; Waiwhakareke, Central Development Area and the Lake Rotokauri Development Area which were not assessed as part of this investigation.

The RNDA has four drainage points; the Exelby Road northern culvert, the Te Kowhai Road culvert, the Burbush Road Culvert and Exelby Road southern culvert.

- Exelby Road northern culvert primarily drains from east to west via a culvert under Exelby Road, where it continues to a confluence with the Ohote Stream at Duck Road. The Ohote Stream receives flows from the wider Rotokauri Catchment.
- Te Kowhai Road culvert flows north, under Te Kowhai Road, into a tributary of the Te Otamanui stream within the Te Otamanui Catchment.
- Burbush Road culvert drains north out of the north eastern extent of the RNDA and into the Mangaheka drain at the head of the of the Mangaheka catchment.
- Exelby Road southern culvert flows south under Exelby Road and into Lake Rotokauri however, this is a much smaller outlet and may primarily be active during high flows.

2.2 Land Use

2.2.1 Historic Land Use

The Te Reo name 'Rotokauri' translates to mean 'Lake of Kauri Trees', with the Lake gaining its name following the discovery of ancient buried kauri logs that were found in the bed of the lake. The historic landscape was typified by two predominant land types; rolling hills and ranges densely forested with kauri (*Agathis australis*), totara (*Podocarpus totara*), tawa (*Beilschmiedia tawa*), matai (*Prumnopitys taxifolia*) and miro (*Prumnopitys ferruginea*) whereas, the forests of the peat swamps and plains in areas such as the RNDA, were dominated by kahikatea (*Dacrycarpus dacrydioides*), titoki (*Alectryon excelsus*), raupo (*Typha* Spp.) and harakeke (*Phormium tenax*).

Within the RNDA area, a majority of the landscape was part of a large fen wetland; a type of wetland that is usually fed by mineral-rich surface water or groundwater. Fen wetlands are typically dominated by grasses, sedges and sphagnum mosses and appear on slopes, flats or depressions where surface water and ground water accumulate. Historical fen wetlands have typically been drained in the Waikato to accommodate agricultural land use, through the development of farm drains that disrupt and re-direct natural flow regimes.

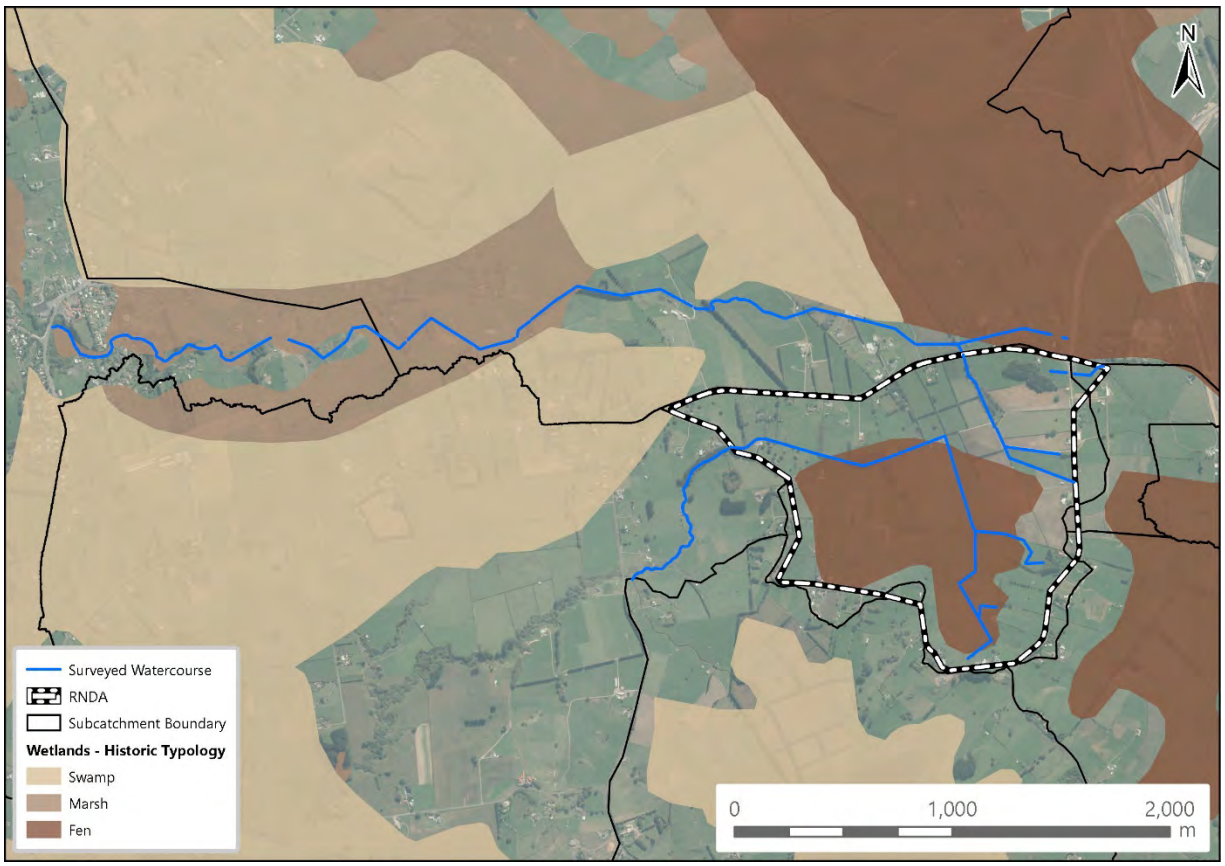


Figure 4: Historic Fen wetland within RNDA and receiving environments of Ohote Stream and Te Otamanui Tributary

2.2.2 Current Land Use

The Rotokauri North sub-catchment land use is currently entirely rural, 97.4% of land classified as high producing exotic grassland, 1.6% classified as exotic forest and the remaining 1.0% classified as indigenous forest as per the Land Cover Database (version 4.1) as depicted in Figure 4. The grasslands are used for a mixture of dairy grazing, recreation grazing and some arable cropping.

2.2.3 Future Land Use

The sub-catchment is zoned as 'future urban' under the HCC Operative Plan with land use currently being primarily 'high producing exotic grassland' (New Zealand Land Cover Database v4, 2017). The Rotokauri Structure Plan proposes a mixture of residential and open space zoning (Figure 4). Developing rural land to residential will increase the impervious areas within the sub-catchment and alter the run-off characteristics during storm events. As part of the Rotokauri ICMP, a network of multi-functional 'Green Corridors' have been planned throughout the Rotokauri structure plan area to manage stormwater flows, whilst also adding landscape and amenity values to the future urban areas.

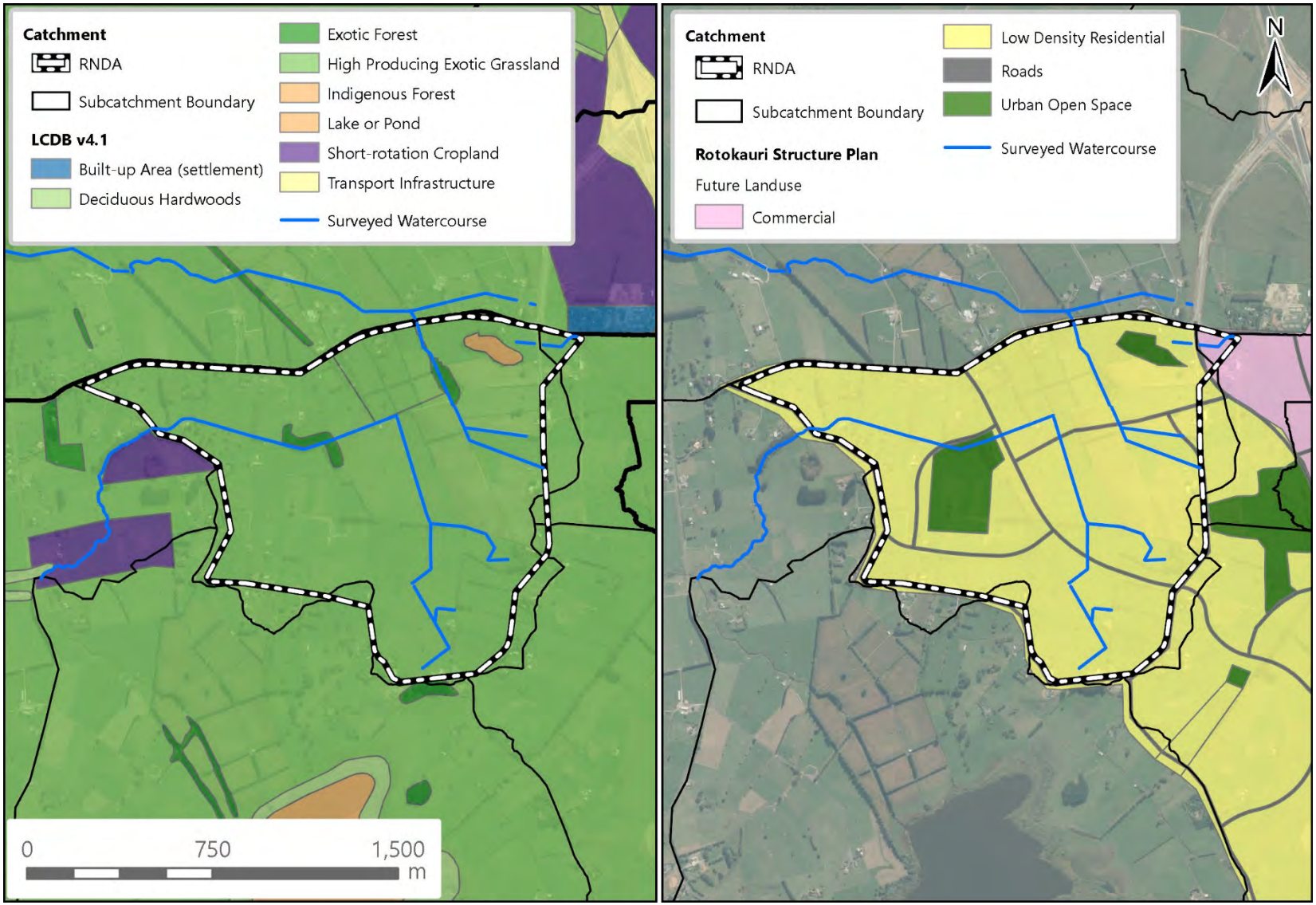


Figure 5: Present and proposed future land use in the RNDA (New Zealand Land Cover Database, 2017; Proposed District Plan – Structure Plan, 2016)

2.3 Catchment Topography

Topography varies from rolling hills along the south eastern boundary to exceptionally flat for a majority of the catchment (Figure 5). The extremely shallow gradient within the RNDA results in shallow watercourse grade and large bodies of standing water during the winter months.

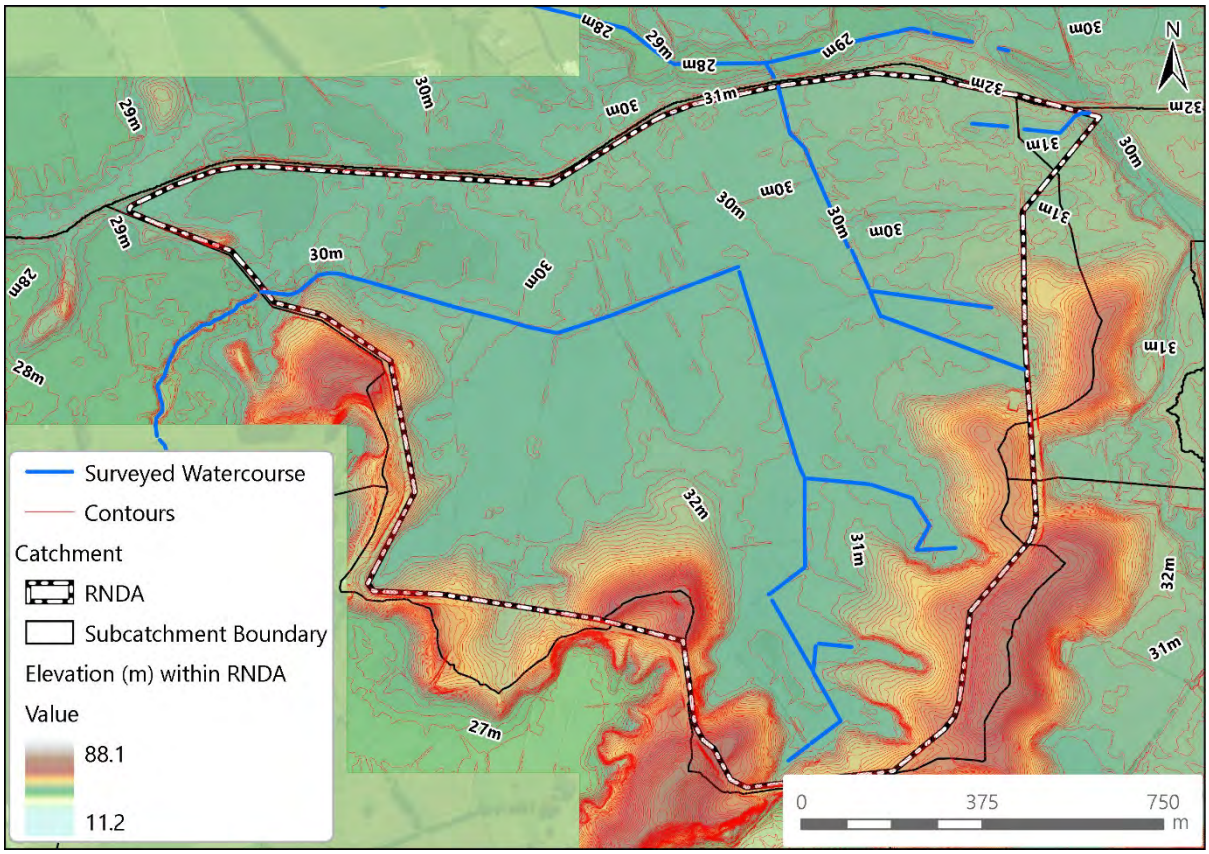


Figure 6: Rotokauri North sub-catchment topography based on 2008 LiDAR

2.4 Catchment Geology

Landcare Research's existing soil database (smap) classifies the dominant soil type within the RNDA as Allophanic and Organic (Figure 5). Allophanic soils are dominated by allophane minerals, sand and silt and are very porous with low density structure and weak cohesive strength. Erosion rates are generally low when soils are vegetated and not on steep slopes. Within the Te Otamanui catchment, the watercourse follows a vein of top soils depicted as recent soils. These recent soils are weakly developed soils that are common along alluvial floodplains as well as unstable steep slopes.

The allophanic soils here are part of the Te Rapa series, described as 'peaty sand', and the Horotui series which is predominately silty sand. The recent soils within the Te Otamanui catchment are also part of the Horotui series. The organic soils form in the partly decomposed remains of the historic fen wetland plants that has now formed as peat. Organic soils have little bearing strength and are prone to shrinkage when dried. The organic soils within the RNDA are part of the Kaipaki series and are usually described as 'loamy peat'. The Brown soil types present in the catchment are part of the Rotokauri series and are identified as 'clay loam' while the Gley soils are part of the Te Kowhai series and are a 'silt and clay loam'.

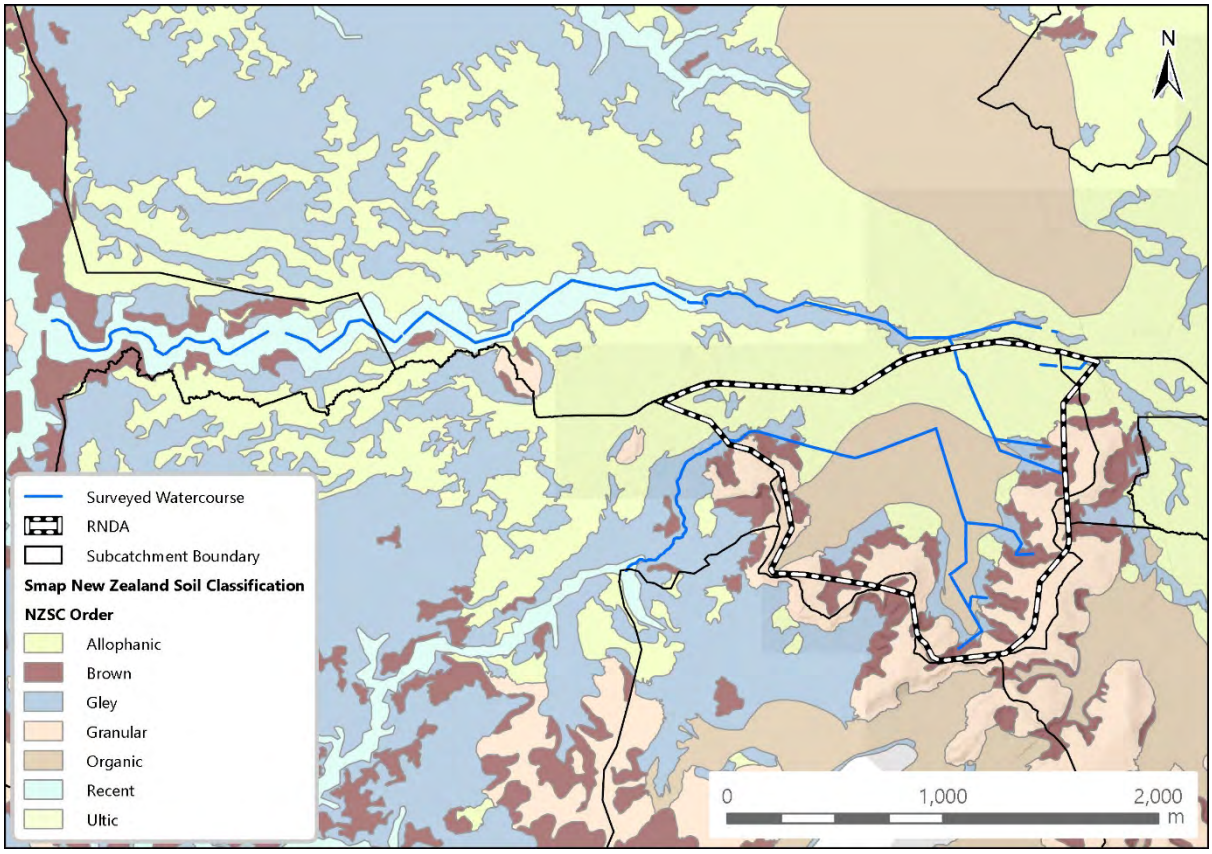


Figure 7: Soil series of the RNDA sub-catchment and receiving environments (source, smap - Landcare Research)

3.0 Methodology

The watercourses in the Rotokauri North sub-catchment and the receiving environments were assessed using two sets of method guidance 'modules'; the Receiving Environment Module (REM) and the Rapid Geomorphic Erosion Assessment (RGEA). The methodology used in this report aims to standardise data collection, modelling, data presentation, and reporting for all future HCC watercourse assessments.

3.1 Receiving Environment Assessment Methodology

The ICMP-REM was developed by Morphum Environmental for Hamilton City Council (HCC, 2015). All interpretation of the data from this report should be used in conjunction with the ICMP REM document. The Waikato Regional Council Plan (WRCP) classifications were used to define watercourse types (Table 2) and watercourse classification (Table 3).

Table 2: WRCP watercourse types

Watercourse type	Definition
River	A stream or modified watercourse that does not include any artificial watercourse
Modified watercourse	An artificial or modified channel that may or may not be on the original watercourse and which has a natural channel at its headwaters.
Farm drainage canal	An artificial watercourse on a farm that contains no natural portions from its confluence with a river or stream to its headwaters and includes a farm drain or a farm canal.

Table 3: WRCP watercourse classification

Watercourse classification	Definition
Perennial	A stream that flows all year round assuming average annual rainfall
Ephemeral	A stream that flows continuously for at least three months between March and September but does not flow all year

3.2 Limitations

The following limitations of the REM methodology should be considered in the interpretation of the data from this report.

Watercourse Classification

The watercourse assessment provides a field estimate of stream classification only and this classification is not specifically intended for Resource Consent purposes. Although specific and detailed assessment is required prior to consent approval for any works within a subject reach, the details contained in this document can be used to guide associated investigations for a resource consent application. Failure to identify a stream reach during this Watercourse Assessment process does not indicate that a stream is not present or that any such stream is ephemeral. The assessment has been based on the regional plan definitions and these definitions are open to considerable interpretation. We would note that this is evidenced by the T&T assessment dated 1 November 2018 which, defines the artificial vs modified

boundary of the subject watercourse, but states the arbitrary nature of their definition also. Furthermore, T&T also acknowledge the presence of the historical wetland and the lack of guidance within the WRP on how to interpret watercourse classification in modified wetlands.

Temporal variations

Watercourse assessments undertaken, as per this methodology, must be considered within the seasonal context. Variables such as water depth and velocity are dependent on the level of base flow, and antecedent conditions such as stormwater inflows prior to the assessment. Factors that are more variable over diurnal time scales, such as temperature, are not recorded as part of this assessment as time series data is required for meaningful and representative results.

Assessment methodology

It is acknowledged that the ICMP REM is largely a 'rapid' assessment of engineering assets, as well as, biological and geomorphologic stream state. Parameters are also typically averaged over the extent of each reach and there will be some variability along this length.

3.3 Rapid Geomorphic Erosion Assessment Methodology

The RGEA provides rapid baseline information on the bank and bed stability of a watercourse. It was developed by Morphum Environmental for Hamilton City Council (HCC, 2018) as a relatively simple assessment to rapidly identify reaches that may require stabilisation interventions. The RGEA records the dominant processes occurring along the subject reaches using twelve criteria that are directed at determining trends of recent channel adjustment, as processes migrate through a channel network with time. As this assessment is essentially a snapshot in time, assessment is usually carried out during summer months, when water levels are lower and more of the lower bank is exposed. The methodology utilises criteria of channel form to infer dominant channel processes and the magnitude of channel instabilities through the following twelve criteria:

1. Bed substrate material
2. Bank material and cohesion
3. Bank height
4. Bank angle
5. Presence of knickpoints/headwall cutting
6. Degree of constriction (relative decrease in top of lower bank width from upstream)
7. Erosion Scars (percentage of reach)
8. Erosion scars resulting from lateral flow sources
9. Established riparian woody vegetative cover
10. Stream bank erosion processes
11. Stage of incised channel evolution
12. Stream curvature

For each assessment reach, the dominant processes are recorded using a geospatial polyline feature class that evaluates the twelve criteria outlined above, to provide a channel stability ranking. Scoring in each criterion is such that a higher value indicates greater potential for erosion and instability. Each criterion has a maximum value of 4 to reduce subjective interpretation and to ensure the relative importance of each criterion is assessed equally. Scores from the twelve criteria are added to give a channel stability ranking (Table 4).

Table 4: Channel stability scores	
Ranking	**Stability Scores**
Highly stable	0 – 10
Moderately stable	11 – 16
Stable	17 – 22
Unstable	23 – 28
Moderately Unstable	29 – 34
Highly Unstable	35 – 44

3.4 New Zealand Black Mudfish Survey

The black mudfish (*Neochanna diversus*) is an endemic freshwater species. Previous surveys show black mudfish populations are present in the Waikato region (Hicks and Barrier, 1996; Ling, 2001). The preferential habitat of black mudfish includes wetlands and small swampy streams, much like the watercourses in the Rotokauri North sub-catchment.

The Department of Conservation methodology for monitoring New Zealand mudfish (Ling *et al.,* 2013) was used to develop a survey design for the Rotokauri North sub-catchment. Four sites in the sub-catchment were selected for sampling (Appendix 2). The selection of these sites was based on their potential to provide suitable habitat for resident mudfish populations. The four sites were also representative of the main habitat types present in the sub-catchment.

At each site, 30 non-baited gee minnow traps were set approximately 5 metres apart along a 150-metre transect. A combination of standard metal traps and collapsible net traps were used, all of which were set overnight and retrieved the following day. Traps were set at sites RNDA1 and OHOTE on 6 August and retrieved on 7 August, while the RNDA2 and TEOT1 sites had traps set on 7 August and retrieved on 8 August.

Upon retrieval of the traps, the number, size class and species of captured fish were recorded. Mudfish size classes were defined as per Ling *et al.,* (2013) (Table 5).

Table 5: Black mudfish size classes	
Age Group	**Size Class (mm total length)** (Ling *et al.,* 2013)
Fry	5 – 30
Juveniles	30 – 50
Adults	> 50

3.5 Macroinvertebrate Community Index (MCI) sampling

Benthic macroinvertebrates are commonly used as bioindicators of ecosystem health in New Zealand. Macroinvertebrate taxa groups have been shown to respond differently to natural and anthropogenic stressors (Stark and Maxted, 2007). As such, the presence or absence of specific taxa can provide insights into the ecological condition of a local site.

Standardised protocols for sampling soft-bottom streams, as outlined in the Regional Guidelines for Ecological Assessments of Freshwater Environments (Environment Waikato, 2005) and described by Stark (2001) and, were used to collect macroinvertebrate samples at five sites within the Rotokauri North sub-catchment.

As per the REM methodology, the presence/absence of taxa, their relative abundance, and the percentage of EPT taxa were identified for each of the five sites. The overall ecological value was compared to MCI threshold scores as per Stark (2001) (Table 6).

The dominant habitat types sampled for macroinvertebrates were in-stream woody debris, macrophytes and undercut banks. The first four samples were collected at the same sample reaches as the black mudfish sites; RNDA1, RNDA2, OHOTE, and TEOT1. An additional site, TEOT2 situated at the downstream reach of the Te Otamanui Tributary was also included. At each of these five sites, water and sediment quality samples were also collected. These sample sites are briefly described in Table 7. Refer to Appendix 1 for the location of these sites.

Table 6: Interpretation of Macroinvertebrate Community Index Scores

Ecological health ranking	**MCI Quality Thresholds (**Stark *et al.,* 2001, 2007)
Excellent	> 119
Good	100 – 119
Fair	80 – 99
Poor	< 80

Table 7: Site descriptions of ecological survey sites

Site Code	Descriptions	
RNDA1 (TEO_TRIB1_3)	Incised, straightened channel surrounded by dairy farm land. No significant riparian shading or in-stream woody debris. Floating duckweed mats present in stream channel.	
RNDA2 (OHO_TRIB2_3)	Shallow, stagnant watercourse surrounded by harvested maize cropland. Riparian vegetation dominated by rank grasses.	
OHOTE (OHO_TRIB1_1)	Wetland-like characteristics. Channel dominated by floating sweetgrass.	

TEOT1 (TEO_MAIN_26)	Incised, straightened channel. Macrophyte cover and overhanging rank grasses.	
TEOT2 (TEO_MAIN_1)	Wide and relatively deep downstream reach of Te Otamanui. Overhanging vegetation and canopy cover.	

4.0 Summary of Findings

The Rotokauri North sub-catchment has four receiving environments; Mangaheka to the North, Ohote and Te Otamanui to the West, and Lake Rotokauri to the South. The watercourses within the Rotokauri North Development Area (RNDA) drain to each of these receiving environments.

The Rotokauri North sub-catchment and the receiving environments are comprised of meandering single thread rivers, modified watercourses and farm drainage canals as per the Waikato Regional Plan (WRP) (Appendix 2). The stream network within the RNDA is comprised of both perennial and ephemeral watercourses.

The physical attributes assessed for watercourses within the Rotokauri North sub-catchment are summarised in Table 8.

Table 8: Summary of physical variables across the extent of watercourse surveyed

Total Length of Surveyed Watercourse (km)	10.03					
Catchment Area (Ha)	180.32					
Catchment Imperviousness	3.92%					
Receiving Environments	Ohote Stream, Te Otamanui Stream, Lake Rotokauri, Mangaheka Stream					
Dominant Substrate Type	Silt Sand					
WRP Stream Classification	**Perennial**				**Ephemeral**	
Length of stream (km)	9.054				0.982	
% of total stream length	90.2				9.8	
WRP Watercourse Type	**River**		**Modified watercourse**		**Farm drainage canal**	
Total stream length (km)	0.772		7.809		1.454	
% of total stream length	7.7		77.8		14.5	
Vegetation	**0 – 10 %**	**10-30%**	**30-50%**	**50-70%**	**70-90%**	**>90%**
Average Overhead Cover (% of total stream length)	37.7	27.8	21.3	9.8	3.3	0
Pfankuch Upper Bank stability assessment	**Excellent**		**Good**	**Fair**		**Poor**
Overall Stability Index (% of total stream length)	0		69	31		0
Erosion scarring	**Percentage of reaches with >60% erosion scarring**			**Total No. Erosion hotspots**		
	36			6		

4.1 WRC Watercourse Types

The three watercourse types present in the Rotokauri North sub-catchment and the receiving environments are meandering single thread rivers, modified watercourses and farm drainage canals. The findings are based on the assessment by the ecologists and geomorphologist involved in the field investigations and conclude that these points are defined as per Appendix 2. As there is no guidance in

the WRP on how to deal with modification to wetlands or how to classify channels that drain wetlands, a precautionary approach has been taken to classify these channels as modified. Additionally, the channels that drain the historic wetland within the RNDA do not clearly fall under the WRP definitions of an artificial or a modified watercourse.

It is noted that HCC have engaged independent consultation on the classification of watercourses within the RNDA. Where this classification differs from that outlined in Appendix 2, we would advocate that HCC are best placed to define the interpretation to be carried forward. This will require communication with WRC so that they can provide their position on this issue. Each of the three watercourse types is briefly described below.

4.1.1 Meandering single thread river

Meandering single thread rivers are natural streams which have retained natural geomorphic features and a meandering channel shape. These reaches have not been modified by anthropogenic activities such as straightening, deepening or widening of the stream channel and bed. This watercourse type was relatively rare within the receiving channels where intense historic and, present land use activities have extensively modified the physical and ecological attributes of these watercourses.

4.1.2 Modified watercourses

Modified watercourses are natural streams which have been modified by anthropogenic activities such as straightening, deepening or widening of the stream channel and bed, primarily through 'drain cleaning' activity which results in an overly steep bank and removal of bed material. Modified watercourses were the most common type of watercourse encountered as part of this assessment.

4.1.3 Farm drainage canals

Farm drainage canals are artificial watercourses on a farm that contain no natural portions from their confluence with a stream or river to their headwaters. An extensive network of farm drainage canals is present within the Rotokauri North sub-catchment. These reaches are straightened, and often deepened channels used to lower the water table and provide additional arable land.

4.2 Reach Summaries

The watercourses in the sub-catchment and the receiving environments are soft-bottom streams and silt/sand are the dominate benthic substrate types. The flat topography of the area is reflected by the slow-flowing streams in the catchment. The numerous farm drains and standing bodies of water (ponds) observed in this assessment indicate a high water-table throughout the sub-catchment and the receiving environments.

Generally, the watercourses show evidence of channel modification such as straightening, widening and deepening. Adjacent land use is dominated by agricultural, pastoral activities. Sparse vegetation consisting of gorse, barberry and poplar dominated these reaches. In the downstream reaches of the Te Otamanui (TEO_MAIN_1 to TEO_MAIN_6) mixed vegetation provides moderate shading to the stream channel.

Erosion scarring of stream banks is largely attributed to anthropogenic activities such as 'drain cleaning', stock access and damage and lack of riparian vegetation. Bank benching, bank instability and fine sediment deposition can be largely attributed to stock damage rather than erosion from high stormwater flows. In the downstream reaches of the Te Otamanui, there is some evidence of fluvial erosion caused by larger flows through constricted channels.

A total of seven debris jams were identified in the Rotokauri North sub-catchment and the receiving environments. The identified debris jams were large fallen trees causing localised changes in water velocity and depth in the stream channel. The identified debris jams did not pose any significant issues to stormwater flows.

The following Tables (Table 9 - Table 12) provide an overview of the channel morphology, riparian condition and erosion in each of the receiving watercourses in the Rotokauri North sub-catchment. For further detail regarding erosion in the Rotokauri North sub-catchment, refer to Section 4.3 of this report.

The reaches within each of the receiving environments have been grouped based on similar characteristics and geographic proximity. Representative photos of each group of reaches are presented in Table 13. Refer to Appendix 3 for stream overhead cover in the sub-catchment.

Table 9: Reach Summaries - Te Otamanui Tributary

Reach	Watercourse type	Watercourse classification	Channel morphology	Riparian condition	Erosion
Downstream reaches (TEO_MAIN_1 to TEO_MAIN_6)	River - Meandering single thread	Perennial	Meandering channel morphology and wide floodplains. Riparian corridors constrained by existing residential dwellings located at the top of the gully banks on TRB. Average wetted width is 1.5 m.	Moderate cover (average 30 – 50% of reach) from riparian vegetation. Riparian corridors constrained by existing residential dwellings located at the top of the gully banks on TRB. Riparian vegetation includes few mature native species such as tree fern, flax and karamu. Dominant vegetation type is exotic weeds; kikuyu, elephant ear and reed sweet grass.	Predominately fluvial erosion on downstream reaches (TEO_MAIN_1 to TEO_MAIN_3). RGEA stability ranking of 'unstable'. Upper reaches (TEO_MAIN_4 to TEO_MAIN_6) are 'moderately stable'.
Mid-reaches (TEO_MAIN_7 to TEO_MAIN_15)	Modified watercourses	Perennial	Agricultural streams with straightened and deepened channels. Floodplain connectivity is 'rare' as modifications contain most flows in the channel. The average wetted width in the channel ranges from 1 - 2.5 m.	Sparse vegetation (< 10%) in this section of the sub-catchment. No canopy cover recorded for 78% of ecolines Pastural land use with stock access noted along the reach.	RGEA stability ranking of 'stable' and 'moderately stable' Two reaches (TEO_MAIN_7 and TEO_MAIN_14) are 'unstable. The incised and steep banks (average 65- 75˚) had evidence of ongoing erosion, with 77% of ecolines showing evidence of recent erosion scarring along 40 - 60% of the lower bank.
Upper reaches (TEO_MAIN_16 to TEO_MAIN_28	Modified watercourses	Perennial	Relatively uniform channel morphology, with straightened channels ranging from 1.1 m – 1.8 m wide Floodplain connectivity recorded as 'rare' to 'occasional' as channels have been modified to contain most flood flows.	Shelter belt of mature deciduous trees on TLB. Natural wetland dominated by Juncus on TRB along lower reaches (TEO_MAIN_16 to TEO_MAIN_18). No riparian vegetation in the upper reaches.	RGEA stability ranking of 'stable' for 53% of ecolines. Stability ranking of 'moderately stable' for 38% of ecolines. TEO_MAIN_21 is 'unstable' due to mass failures on both banks.
Te Otamanui Tributaries (TEO_TRIB1_1 to TEO_TRIB1_4) *Watercourses in the RNDA*	Modified watercourses	Perennial	Watercourses are straightened and intersected by multiple farm track culverts. Sections of stream have stagnant water and emergent macrophytes such as duckweed.	Surrounding land use is a cattle farm. Direct stock access to the watercourse is restricted by electric fences. TEO_TRIB1_1 and TEO_TRIB1_2 have a narrow riparian margin of deciduous trees on the TRB. No other riparian vegetation is present.	RGEA stability ranking of 'stable' for 50% of reaches and 'moderately stable' for 25%. TEO_TRIB1_2 has a ranking of 'unstable'.
Te Otamanui Tributaries (TEO_TRIB2_1 and TEO_TRIB1_5) *Watercourses in the RNDA*	Farm drainage canals	Ephemeral	Straightened and shallow channels with low bank height.	Channels are accessable by stock access and therefore lack definitive channel boundaries. No riparian cover	RGEA stability ranking of 'moderately stable'.

Table 10: Reach summaries - Ohote Stream

Reach	Watercourse type	Watercourse classification	Channel morphology	Riparian condition	Erosion
Wetland reaches (OHO_TRIB1_1 to OHO_TRIB1_7)	Riverine wetland	Perennial	Reaches lack definitive boundaries between stream channel and banks.	Reaches dominated by facultative wetland grasses such as kikuyu, native rushes such as Juncus and mature, individual willow trees.	74% of reaches have a RGEA stability ranking of 'highly stable' OHO_TRIB1_7 is low grade, fully shaded stream with some undercutting and a RGEA stability ranking of 'moderately stable'
Lower-mid reaches (OHO_TRIB1_8 to OHO_TRIB1_9)	Modified watercourses	Perennial	OHO_TRIB1_9 has recently been deepened to increase flow capacity within the channel. Lack of bank stabilisation from these works has resulted in ongoing soil deposition into watercourse.	Modification to riparian and channel morphology due to stock damage. Riparian vegetation includes sparse individual Burberry and other exotic tree species on the TLB.	OHO_TRIB1_8 is 'stable' and OHO_TRIB1_9 is 'unstable'
Mid reaches (OHO_TRIB1_10 to OHO_TRIB1_14) *Watercourses in the RNDA*	Modified watercourses	Perennial	Floodplain connectivity was 'rare' at 80% of the mid-reaches, due to modifications such as straightening and deepening of the channel.	The dominant surrounding land use is low-density residential dwellings and pastoral farms. Downstream reaches (OHO_TRIB1_10 to OHO_TRIB1_12) have relatively high shading from Barberry, tree ferns and pine planting on TRB. OHO_TRIB1_13 to OHO_TRIB1_14 are open, with low cover.	50% of reaches have RGEA stability ranking of 'stable' OHO_TRIB1_11 is 'unstable'
Upper reaches (OHO_TRIB1_15 to OHO_TRIB1_18 & OHO_TRIB2_2) *Watercourses in the RNDA*	Modified watercourses	Perennial	Straightened channels and incised, steep banks. OHO_TRIB2_1 is anoxic, with dense macrophyte cover.	Surrounding land use is cropland – predominately maize. Low riparian vegetation is present along this section of the Ohote Stream, with gorse providing the only shade to the channel. The dominant surrounding land use is maize cropland. Low (<10%) riparian shading on the OHO_TRIB2_1.	Reaches range from 'stable' to 'moderately stable' with no significant issues identified in this section of the sub-catchment.
Headwater Tributary (OHO_TRIB2_2 & OHO_TRIB2_3) *Watercourses in the RNDA*	Farm drainage canals	Ephemeral:	OHO_TRIB2_2 and TRIB2_3 are shallow (~ 0.1 m depth), with dense oxygen weed cover in stream.	No riparian cover was recorded for the ephemeral streams.	RGEA stability ranking of 'moderately stable'

Table 11: Reach summaries - Rotokauri Stream

Reach	Watercourse type	Watercourse classification	Channel morphology	Riparian condition	Erosion
Rotokauri Stream (ROTO_TRIB1_1 to ROTO_TRIB1_4)	Farm drainage canals	Perennial	Natural direction of flow has been altered. Artificial agricultural streams with incised banks, unconsolidated soft sediment deposition in stream channel.	Low (<10%) riparian cover along bank margins. Cattle observed alongside stream banks. Direct stock access is restricted by fences approximately 1 m from top of stream bank.	RGEA stability ranking of 'stable' Some fluvial and mass wasting recorded on both banks of channels.

Table 12: Reach summaries - Mangaheka Stream

Reach	Watercourse type	Watercourse classification	Channel morphology	Riparian condition	Erosion
Mangaheka Stream (MHEKA_TRIB1_1 to MHEKA_TRIB1_2)	Farm drainage canals	Perennial	The downstream reach (MHEKA_TRIB1_1) lacks definitive bank boundaries due to stock modification and have similar characteristics to wetlands.	Severely impacted by stock damage, with evidence of pugging along each reach. No riparian vegetation on either bank. However, an ecologically significant remnant native kahikatea forest patch is present upstream of MHEKA_TRIB1_2.	RGEA stability ranking of 'moderately unstable'

Table 13: Examples of reaches in the Rotokauri North sub-catchment and receiving environments

Meandering single thread river in Te Otamanui	Agricultural reaches modified by stock access	Straightened channel, intersected with farm culverts
		
Wetland reaches in the lower Ohote Stream	**Ephemeral farm drain in the Rotokauri North Development Area**	**Modified watercourse surrounded by cropland**
		

4.3 Erosion

4.3.1 RGEA Stability Ranking

Following the Rapid Geomorphic Erosion Assessment methodology, there were no 'highly unstable' reaches in the Rotokauri North sub-catchment. Most watercourses in the sub-catchment were ranked as 'stable' (Table 14). Refer to Appendix 4 and Appendix 5 in the Appendices for RGEA stability, and upper bank stability in the sub-catchment.

Some sections of the sub-catchment had RGEA stability rankings of 'moderately unstable' and 'unstable' (Table 15). These rankings highlight areas of concern within the sub-catchment which are prone to further erosion and degradation. Mass failure was recorded as the primary erosion process in these 'moderately unstable' and 'unstable' reaches. The high incidence of mass failures can be attributed to the relatively non-cohesive bank soil structure, composed primarily of silt clay loam and the lack of established woody riparian vegetation. Similarly, the dominate bed substrate material in the sub-catchment is clay/silty clay (86%), with a lower proportion of the reaches dominated by gravel (9%) and silt (5%).

The downstream reaches of the Te Otamanui (TEO_MAIN_1 to TEO_MAN_3) were ranked unstable and primarily impacted by fluvial erosion.

These erosion processes are likely exacerbated by surrounding land use activities, including riparian vegetation removal along bank margins, likely as part of pastoral and 'drain cleaning' activities. Riparian vegetation plays an important role in preventing lateral adjustment of watercourses and stabilising stream banks, whilst contributing to channel roughness and helping dissipate erosive forces.

Table 14: RGEA Stability Rating

	Highly Stable	Stable	Moderately Stable	Moderately Unstable	Unstable	Highly Unstable
Te Otamanui	-	17	10	1	7	-
Ohote	5	10	10	-	2	-
Mangaheka	-	-	3	-	-	-
Rotokauri	-	4	-	-	-	-
Total no. of reaches	5	31	13	1	9	-
Total length of watercourse (m)	**683.7**	**4,312.4**	**2,806**	**110.8**	**2,067.9**	**0**
% of watercourse length	6.8	43	28	1	20.6	0

The ten reaches in the Rotokauri North sub-catchment and the receiving environment with RGEA rankings of 'moderately unstable' and 'unstable' are described in Table 15. These low stability reaches are located primarily along the Te Otamanui Tributary (80%), with two unstable reaches identified on the Ohote Stream Tributary.

The Ohote Stream tributary is expected to be the primary receiving environment, downstream of the proposed Rotokauri North Development Area (RNDA). Te Otamanui Tributary is expected to be the secondary receiving environment, with potential additional increased flows from a possible diversion from the Mangaheka Stream.

The changes in land use from a greenfield, pastoral landscape to an urbanised residential land use within the RNDA presents the following pressures on the receiving environments:

- Increased imperviousness and associated changes in hydrograph and impacts on watercourses, including increased potential for channel erosion and reduced base flows
- Reclamation and diversion of watercourses
- Increased channel modification due to development of roads, privates accessways, and associated culvert structures.

Table 15: Summary of low stability reaches

Reach	RGEA Stability Ranking	Description
TEO_MAIN_8	Moderately Unstable	Narrow channel with incised banks, downstream of man-made pond (constructed between 2010 – 2012). Steepened reach with high channel constriction.
TEO_MAIN_1 to TEO_MAIN_3	Unstable	Channel follows a meandering course. Widened channels through bank retreat, located on downstream reaches of the Te Otamanui Tributary.
TEO_MAIN_7	Unstable	Incision and active channel widening of modified watercourse in operational cattle farm.
TEO_MAIN_14	Unstable	Lateral flow erosion scars on both banks. Unstable, excessive undercut banks with leaning riparian sedges in stream channel.
TEO_MAIN_21	Unstable	No riparian vegetation, mass failures on both banks. Lateral flow erosion scars present on TLB. Vertical face present.
TEO_TRIB1_2	Unstable	Fluvial entrainment is the dominant erosion process. Some mass wasting on TRB. Incised channel banks.
OHO_TRIB1_9b	Unstable	Artificial reshaping of the existing banks through 'drain cleaning' activities. Banks steepened and straightened. Deposition of material on bed.
OHO_TRIB1_11	Unstable	Excessive undercutting of banks. Leaning and fallen vegetation from shelter belt present in stream channel.

To mitigate further degradation in the sub-catchment and minimise adverse impacts on the receiving environments, a programme of erosion mitigation projects is presented in Section 5.2.

4.3.2 Erosion Hotspots

Erosion hotspots are identified as discrete locations of severe erosion causing environmental, infrastructure, and health and safety risk. An erosion hotspot is defined as severe erosion located within the channel and or, lower or upper banks, resulting in slumping and exposed soil surfaces and must be:

- Actively eroding,
- Exceed two metres in length or have a total surface area of > 5 m^2

The instability score (3 or 4) classifies erosion hotspots as 'shallow' or 'deep'. The asset risk score (1 to 4) indicates the risk that erosion poses to surrounding infrastructure, with scores of 1 indicating open spaces with negligible impacts and 4 indicating risk to major structures such as roads and services. The

overall risk value is determined from the instability and asset risk scores. If the sum of the two scores is greater than 6, the hotspot is classed as 'high risk', while scores of 4 – 5 are classed as 'medium risk'.

A total of six erosion hotspots were identified in the Rotokauri North sub-catchment, summarised in Table 16. These identified erosion hotspots were all located outside the RNDA (Appendix 5). The erosion hotspots did not pose a significant risk to infrastructure and were classed as medium risk.

At two erosion hotspots located on the Te Otamanui Tributary; TEO_MAIN_19 and TEO_MAIN_1, it was identified that maintenance to assets are required. The asset at TEO_MAIN_19 is a private farm culvert, whilst TEO_MAIN_1 is a Council owned asset draining stormwater flows from Horotiu Road. The recommended maintenance types include redesign and replacement of culverts to facilitate future flows following development of the upstream catchment areas.

The most common contributing factors for erosion hotspots were minimal riparian vegetation, poorly maintained private stormwater assets, and channel modification (i.e. drain cleaning). Of the six erosion hotspots, 33% were assessed as caused by fluvial (flow) processes, 50% were attributed to steep banks and minimal riparian vegetation and the cause of one erosion hotspot on TEO_MAIN_21 (16%) was unknown.

Table 16: Summary of erosion hotspots.

Attribute			
Total Length of Surveyed Watercourse (km)		10.03	
Total Length of Erosion Hotspots (m)		207.6	
Total Number of Erosion Hotspots		6	
	Mean	**Min**	**Max**
Height of erosion (m)	2.5	2	4
Depth of erosion (m)	0.8	0.5	2
Length of erosion (m)	14	3	30
Erosion Type	**Shallow Instability**	**Deep Instability**	
% of erosion hotspots	83.3	16.7	

4.4 Biodiversity

4.4.1 Black Mudfish Survey

The survey did not identify any black mudfish at the four samples sites in the Rotokauri North sub-catchment. The invasive mosquitofish (*Gambusia affinis*) was abundant (> 100 individuals) throughout and captured in traps at all sites except RNDA2. A single native shortfin eel (*Anguilla australis*) was recorded at TEOT1 (Figure 22).



Figure 8: Small shortfin eel and a number of mosquitofish captured in a Gee minnow trap at TEO1

The absence of black mudfish from the surveyed watercourses is most likely due to a lack of suitable habitat for this species throughout the sub-catchment. In addition, the presence of fish barriers (discussed further in Section 4.4.2) is likely to impede the migration of individuals in the watercourse network.

The Rotokauri North sub-catchment mudfish sample sites were highly modified watercourses, with mineralised substrates dominated by silt. Preferential habitat features for black mudfish such as emergent and overhanging vegetation, tree roots, and peat substrates were largely absent in the sub-catchment. Additionally, as Hicks and Barrier (1996) suggest, the invasive mosquitofish can exclude black mudfish from perennial habitats by outcompeting the native species for habitat and food resources.

The OHOTE site had wetland characteristics and good riparian vegetation with dense sedges and small thickets of willows present along the survey transect. However, the mineralised river silt and the dominance of *Glyceria* indicated a high level of disturbance in the system.

It is acknowledged that the detection of black mudfish was limited to a single night at each site. However, the extensive sample area (150 metre), concentrated trapping effort (30 traps at 5 metres spacing), and the inclusion of a range of habitat types in the sub-catchment indicates a comprehensive survey was undertaken. The results suggest that the presence of black mudfish populations in the Rotokauri North sub-catchment is unlikely.

4.4.2 Fish Passage

Barriers to fish passage can severely limit native fish populations by restricting the amount of stream habitat that they can access. Many native species complete their larval life-stage in the marine environment before migrating into freshwater catchments as juveniles, where they continue to develop into adults once they are established in suitable upstream habitats. Artificial and natural barriers in freshwater systems can limit this migration.

All barriers to fish passage were classified into one of three categories (Swimmer, Climber or Anguilliform) according to the locomotory function of the fish that were likely to impede. Barriers to swimmers will affect species that are only capable of swimming (e.g. inanga, common bully), while barriers to climbers will also prevent species such as banded kokopu and redfin bully from migrating

upstream. The most difficult instream barriers will also affect anguilliformes (adult eels), which are capable of traversing short distances across land between waterbodies.

Two artificial barriers to fish passage were identified in the receiving environments of the RNDA. These barriers were;

- Perched private farm culvert (Asset ID: UNK026)
- Series of perched farm culverts and artificial pond (Asset ID: UNK094 – UNK097)

No natural in-stream fish barriers such as cascades, waterfalls or dams were found in the sub-catchment.

One of the most notable fish barriers present within the Rotokauri North sub-catchment is located on a downstream reach of the Ohote Stream (OHO_TRIB_1). The outlet of a private 1000 mm concrete culvert (ID: UNK026) is perched 0.35 m, forming a complete barrier to swimming and climbing species (depending on water levels). The structure impedes fish passage to more than 2 km of upstream reaches of the Ohote Stream.



Figure 9: Fish barrier for swimming fish species located on the culvert outlet (Asset ID: UNK026)

The second fish passage barrier is a series of perched farm culverts upstream of a constructed online pond. The culverts were noted to be poor – average condition due to a lack of maintenance. The culverts form a complete barrier for swimming fish species, and a partial barrier to climbing species.

It should be acknowledged that assessment of potential fish barriers was conducted during winter between July and August. The water depth in the watercourses was elevated, and flooded culverts were noted throughout the sub-catchment. It is possible that additional farm and road culverts are partial or complete barriers for various fish locomotory groups during drier months of the year, these were not identified as part of this study.

4.4.3 Macroinvertebrate Community Index

Macroinvertebrate Community Index (MCI) samples were taken at five sites in the Rotokauri North sub-catchment along 100 metre reaches. The summary of the biodiversity index scores for the five sites are listed in Table 15. Overall, MCI scores in the catchment were indicative of 'poor' to 'fair' ecological health.

The highest MCI score (97.2) was recorded in the agricultural site RNDA1. The pollution-sensitive EPT taxa group was only found at the RNDA1 site, with a single stick caddisfly (Triplectides) recorded in the sample.

The site TEOT1, situated in the mid-reaches of the Te Otamanui Tributary, had a MCI score of 90. Similarly, TEOT2 situated further downstream of the Te Otamanui had a MCI score of 87. These scores indicate 'fair' ecological value. The most common taxa at these sites were midges (Orthoclad), seed shrimps (Ostracoda) and worms (Oligochaetes). These taxa are often abundant in unshaded, nutrient-enriched streams with prolific algal growth.

The remaining two sample sites (OHOTE and RNDA2) had MCI scores ranging from 77 to 79, indicating poor ecological condition. Similar to Te Otamanui Tributary sites, these sites were dominated by taxa groups such as worms and midges which are indicative of moderate to high organic pollution.

MCI guidelines proposed in the NPS-FM suggests that discharges, subdivision use and development in this area should be managed to enhance freshwater values. It should also be noted that base flows were slightly elevated at time of sampling in winter (July - August 2018).

Table 17: Summary of biodiversity index values across sites

Site Code	MCI	No. Taxa	EPT Taxa	MCI Ecological Quality Threshold
RNDA1	97.2	16	1	Fair
RNDA2	77.0	10	0	Poor
OHOTE	79.5	19	0	Poor
TEOT1	90	14	0	Fair
TEOT2	87	19	0	Fair

4.5 Water Quality

As per the project scope, one water quality grab sample was obtained at each of the five sample sites. A summary of the water quality parameters is provided in Table 18 below.

The results indicate that the water quality of the watercourses in the Rotokauri North sub-catchment is poor. Five parameters exceeded the ANZECC trigger values set for lowland rivers and streams (protection of 95% of species) and the 'satisfactory' levels set by Waikato Regional Council for river water quality in the region (WRC, 2012). These exceedances are shown in red, and orange shows exceedances of one set of guidelines in Table 18.

Turbidity exceeded the guideline values at all five sites, and by a magnitude of five at TEOT2 (25 NTU). Turbidity indicates water clarity and studies have shown turbidity levels above 5 NTU have adverse effects on underwater light – and thus on plant and invertebrate production (Davies-Colley, 1991). Loss in water clarity also adversely impacts migration of common native freshwater fish species (Boubee et al., 1997). High sediment loads from the surrounding land use is contributing to high turbidity in the sub-catchment.

Total nitrogen concentrations also exceeded the guideline values at all five sites. The highest concentrations were recorded in RNDA1 (4 g/m^3) and TEOT1 (4.3 g/m^3). Similarly, Total Kieldahl Nitrogen, which indicates the concentrations of biologically available nitrogen, exceeded guideline values at these two sites. The nitrogen concentrations results fall within the 'C' attribute state of the

NPS-FM indicating an adverse effect on some sensitive species. These sites are downstream of cattle farms and stock access to the stream was recorded upstream of both these sites.

Total phosphorus concentrations were also high in RNDA (0.18 g/m^3), TEOT1(0.03 g/m^3) and TEOT2 (0.07 g/m^3). Additionally, the site OHOTE, situated in the downstream reaches of the Ohote Stream (OHO_TRIB_1) also exceeded WRC guideline concentrations. Overall, the high concentrations of nutrients (N and P) are reflective of intensive agricultural land use in the sub-catchment.

It is acknowledged that these results provide only a single 'snapshot' in time of water quality in the sub-catchment.

Table 18: Surface water quality results

Contaminant	Unit	RNDA1	RNDA2	OHOTE	TEOT1	TEOT2	ANZECC Lowland[1]	WRC[3]
pH		6.4	6.2	6.8	6.2	6.6	7.2 – 7.8	6.5 – 9
Suspended Sediment (TSS)	g/m^3	19	6	9	10	15	-	-
Turbidity	NTU	18.3	9.2	8.7	22	25	5.6	5
Total Nitrogen	g/m^3	4	0.9	1.53	4.3	2.9	0.614	0.5
Total Kieldahl Nitrogen (TKN)	g/m^3	1.45	0.43	0.75	1.07	0.84	-	0.88
Total Phosphorus	g/m^3	0.178	0.03	0.063	0.036	0.076	0.033	0.04
Total Iron	g/m^3	5.2	1.33	1.74	4.7	3.9	-	-
Total Nickel	mg/m^3	2.9	3.7	1.6	1.6	0.9	11[2]	-
Total Lead	mg/m^3	0.14	0.11	0.15	<0.11	0.15	-	-
Total Copper	mg/m^3	1.22	5	0.92	0.53	0.68	-	-
Total Zinc	mg/m^3	40	23	15.1	80	13.1	8000	-
PAH's	ug/L	<0.008	<0.008	<0.008	<0.008	<0.008	-	-
E. coli	E. coli/100 mL	99	96	85	70	260	-	550
cBOD	g O^2/m^3	3	<2	<2	<2	<2	-	-

[1]95% protection level for freshwater
[2] Values for protection of species are more appropriately applied to dissolved values than total values
[3] Satisfactory levels from the WRC River water quality levels
- No value or Insufficient Data

Anaerobic conditions were noted throughout the low and mid-reaches of the Te Otamanui Tributary. These reaches were characterised by stagnant water, macrophytes and a thick layer (~0.2 m) of unconsolidated soft sediment in the stream channel. Anaerobic conditions were identified as strong sulphuric odours and bubbling from the dark benthic sediment. Other indicators of poor water quality such as white foam and sheens were also present in the Rotokauri North sub-catchment.

4.6 Sediment Quality

Composite sediment samples were taken along each of the five MCI (100 metre) sample reaches. These samples were analysed for heavy metals including copper, lead, zinc, chromium, arsenic and nickel.

The ANZECC Interim Sediment Quality Guidelines (ISQG) low trigger values are the single-contaminant thresholds where adverse biological effects could occur as an early warning for management intervention. The ISQG high trigger values are indicative of contaminant concentrations where significant biological effects are expected.

Arsenic concentrations exceeded ISQG high trigger values at the Te Otamanui Tributary site TEO1. The site TEOT1 is situated in the mid-reaches of the Te Otamanui Tributary, with surrounding land dominated by pastoral land use. The other tested heavy metals did not exceed ISQG trigger values at the five sites.

Overall, sediment contaminant results are reflective of the predominately intensive agricultural land use in the Rotokauri North catchment. The sediment concentrations of heavy metals such as nickel and zinc are low, reflecting the low urban land use.

As Rotokauri undergoes a land use change from agricultural to urban areas, there is likely to be a shift in the contaminants most of concern. For instance, nutrients such as nitrogen and phosphorus will likely decrease in concentrations overtime, whilst heavy metals such as zinc and copper are likely to increase. Management strategies which aim to improve water quality in the region should consider these land use changes and their associated pressures over time.

Table 19: Summary of sediment contaminants (mg/kg/dry wt)

	Zn	**Cu**	**Pb**	**As**	**Cr**	**Ni**
	(>200 (Low) >410 (high))	*(>65 (Low) >270 (high))*	*(>50 (Low) >220 (high))*	*(>20 (Low) >70 (high))*	*(>80 (Low) > (370 high))*	*(>21 (Low) > (52 high))*
RNDA1	28	5.2	7.1	6	5.1	2.4
RNDA2	24	2.8	3.7	4.8	3.8	3.1
OHOTE	38	1.9	2.9	2.9	2.5	2.3
TEOT1	74	5.9	4.3	71	7.8	3.6
TEOT2	80	5.6	4.5	32	4.2	4.2

Cells highlighted in red exceed ISQG – High limits.

4.7 Infrastructure

Stormwater inlet and outlet structures were assessed in the Rotokauri North sub-catchment, following the methodology outlined in the REM (HCC, 2015). At each inlet and outlet, a number of variables were recorded, including asset ownership, material of structure, erosion issues and structural safety Table 20.

Of the 106 surveyed assets:

- 92% were inlets or outlets with no headwall, wingwall or dissipating structure
- 8 % were inlets or outlets, with headwalls and/or wingwalls
- 43% were inlets or outlets in the Rotokauri North Development Area

Most of the stormwater infrastructure in the Rotokauri North sub-catchment are private farm track culverts. A large proportion (72%) of these assets do not present significant risks of flooding or erosion.

However, 51% of assets had a condition rating of 'average' or lower and require some form of remedial action.

Common issues noted for stormwater infrastructure in the sub-catchment include:

- Aging culvert material (spalling, cracking, displacement, rust of reinforcing)
- Scour at inlets and outlets
- Undercutting below culvert outlets due to erosion
- Erosion to banks around structures caused by stock access
- Excessive macrophytes and debris blocking inlets and outlets

Table 20: Summary of stormwater assets (inlets/outlets) and significant issues and remedial actions

	Assets Surveyed				
Number of assets (inlets/outlets)	107				
Condition Assessment	**Very Good**	**Good**	**Average**	**Poor**	**Very Poor**
Condition of structure	2	46	48	9	2
Erosion Assessment	**None**	**Slight**	**Moderate**	**Severe**	
Extent of erosion	32	45	15	15	

Table 21: Engineering structure safety risk matrix for structures (inlets/outlets)

		Access			
Safety		**Appears Safe**	**Not Safe**	**Not Safe (Drop 1.5m)**	**Uncertain**
Pedestrian Access	Easy	4			
	Moderate	45	1	4	1
	Difficult	47	2	1	2
Erosion severity		**None**	**Slight**	**Moderate**	**Severe**
Asset Ownership	Unknown	-	-	-	-
	Council	6	7	1	2
	Private	26	38	14	13

Two structures in the sub-catchment present risks to infrastructure and stream channel. These are described below:

- The inlet at Te Kowhai Road (UNK031) is in relatively good condition, with some iron bacteria recorded upstream of the culvert and inside of the pipe. However, the 1200 mm Ø pipe appears to be undersized and is causing backwater, scour and erosion on both banks upstream of the culvert (Figure 9).

- The outlet at Horotiu Road (UNK107) is a near-vertical outflow draining from the main road. The discharge of flows from a height of approximately 2 metres into the stream channel below has caused severe erosion at the downstream end of the Te Otamanui stream. It is recommended that this infrastructure is upgraded or replaced with a design which mitigates channel erosion.



Figure 10: Left: Erosion and coir lining on banks upstream of the Te Kowhai Road culvert (UNK031); Right: Erosion downstream of outlet UNK107

4.8 Flood Floor Levels

As part of the watercourse assessment, Morphum conducted initial flagging of both habitable and non-habitable buildings that may potentially be at risk of flooding from increased flows. The assessment was a visual inspection only, using an inclinometer to identify building floor levels that were within 1.75 m elevation of the top of the bank. It is anticipated that this initial assessment will be used in conjunction with the flood assessment to identify areas for further investigation. All houses within the Rotokauri North development area were excluded from this assessment. As a result of the investigation, two houses were identified as being within 1.75 m of the top of the bank and are illustrated in Figure 10. The houses within this area require further investigation into the risk of flooding from development within the upstream catchment, however these are new dwellings, so a resource consent process is considered likely to have assessed flood levels.



Figure 11: Results of Habitable Floor Level Surveying

5.0 Options and Actions

5.1 Management Zones

Four management zones have been identified in the Rotokauri North sub-catchment and the receiving environments based on reaches with similar pressures, issues and opportunities. A brief description of each of the management zones is outlined in Table 22, while a detailed description of each management zone is described in Sections 5.1.1 to 5.1.4.

The common pressures on watercourses identified within the surveyed extent result from historic and existing rural land uses. The most common pressures and their effects within each management zone are outlined in Table 23, while further issues and pressures specific to each management zone are described in Table 24 - Table 27.

In addition to existing land uses, proposed future growth and development also poses potential issues and pressures on watercourses within the catchment. There is, however, an opportunity to remedy and mitigate existing and future pressures through the greenfields development process and manage rural land use issues in areas outside of the RNDA.

The proposed management approach presented in this report aims to anticipate and plan for the increase pressures on watercourses. The management approach identifies key issues, objectives to address these issues, and recommends options and actions to mitigate their actual and potential adverse effects.

A summary of possible objectives to manage these pressures within each management zone in the Rotokauri North sub-catchment and the receiving environments is presented in Table 28. The broad management objectives outlined in this report align with the outcomes sought by (but not limited to) the Stormwater Master Plan (HCC, 2016), Rotokauri ICMP (2017), the Waikato vision and strategy document (2011), the NPS-FM (2016) and the Proposed Waikato Regional Plan Change (2018).

Table 22: Summary of Management Zones

	Management Zone	Description
MZ1	Rotokauri North Development Area	Encompasses 163 hectares of greenfields land marked for the Rotokauri North Special Housing Area
MZ2	Ohote Tributary downstream of Exelby Road and TEO_MAIN_18	Watercourse with wetland-like characteristics, wide floodplains and high ecological potential
MZ3	Lower Te Otamanui Tributary (TEO_MAIN_1 to TEO_MAIN_7)	Meandering watercourses with moderate riparian cover and wide floodplains with erosion issues caused by fluvial processes and stock access
MZ4	Upper Te Otamanui Tributary	Incised and straightened channels, modified for efficient conveyance but degraded ecological value. Surrounding landscape is primarily agricultural with stock access issues

Table 23: Common pressures across management zones in the Rotokauri North sub-catchment and the receiving environments

Common Issues across the management zones	Description of impacts	Suggested Objectives	Impacted management zone
Stock access to waterways	Reduced water quality through faecal contamination. Reduced bank stability. Increased suspended sediments and deposition. Change in morphology and hydrodynamics of the watercourse.	Exclude stock from watercourses. Establish set-backs from the stream and plant riparian vegetation buffers.	Management Zones 1, 2,3 and 4.
Channel erosion	Ecological impacts include; • increased sediment deposition on the channel bed from erosion of upper and lower banks, which can adversely affect macroinvertebrates through change in habitat and loss of interstitial space. • Fish populations are also affected by availability of habitat for spawning and food supply. Channel erosion can impact private/public land and is particularly an issue where it poses a risk to assets such as walkways, roads, fences, buildings and/or channel lining.	Soft engineering approaches which aim to improve conveyance capacity and mitigate future erosion, whilst enhancing the ecological value of these watercourses. This can include the regrading and naturalisation of stream channels to restore natural channel morphology and planting on banks.	Management Zones 1, 2, 3 and 4. The severity and the processes driving erosion in these reaches varies across the management zones. Specific issues are discussed for each management zone in the sections below.
Lack of riparian margin vegetation	The lack of riparian vegetation impacts the biochemical and geomorphic processes in streams including; • Decreased channel shading, resulting in increased macrophyte abundance and increased temperatures • Loss of dissolved oxygen levels • Reduction in non-point source filtration, both in surface flow and groundwater • Reduced stable organic matter input • Loss of fish spawning habitat and habitat for adult stages of macroinvertebrates • Loss of habitat connectivity (both freshwater and terrestrial fauna) • Loss of root reinforcement provided by riparian plants, reducing bank stability	Establishing set-backs and riparian planting as per the guidelines in the Proposed Waikato Regional Plan Change 1 (2018) to support ecological outcomes.	Management Zones 1, 2, 3 and 4.
Degraded water quality	Degraded water quality due agricultural land use and agricultural sourced contaminants such as sediment, nutrients and heavy metals. Impacts include; • High suspended or deposited sediment levels • Low dissolved oxygen • High temperatures • High nutrient levels These water quality conditions adversely impact the aquatic life in these watercourses and have cumulative impacts on the low energy downstream receiving environments	Implementing treatment devices to address stormwater discharges. Ensuring best practice measures are in place during the development phase to reduce sediment inputs into these systems	Management Zones 1,2,3 and 4.

5.1.1 Management Zone 1 – Rotokauri North Development Area

Description

Management Zone 1 is comprised primarily of perennial watercourses however there are small ephemeral watercourses present in the headwaters of these tributaries.

The perennial watercourses are dominated by pastoral land use, with sparse riparian cover and low channel shading. The channels show evidence of straightening, deepening and widening, and have incised, steep gradient banks. At the time of sampling, slow flows were observed in the channels, and emergent macrophytes such as duckweed on the water surface were recorded along some reaches.

The watercourses are drained to the Te Otamanui Tributary through a culvert under Te Kowhai Road and to Ohote Stream through a culvert under Exelby Road. Field assessment of these inlets and outlets indicated that these assets are likely to be undersized for managing existing flows. For example, the Te Kowhai Road culvert (Inlet Asset ID: UNK032) shows evidence of severe erosion caused by flows and backwater pooling upstream of the culvert. This issue is likely to be exacerbated with increased flows and discharge from the proposed development.

These watercourses are all within the development footprint for the proposed Rotokauri North Special Housing Area. As a result, these watercourses will undergo a shift from agricultural streams to urban streams. The specific issues and suggested objectives and actions associated with the RNDA are outlined in Table 24.

The susceptibility of the catchment to erosion and the impacts of associated sediment in the immediate receiving environments (Te Otamanui and Ohote Stream) and further downstream (Waipa River) are long term issues that are likely to increase in severity through the development of the Rotokauri area. The proposed development also has the potential to increase the source of other contaminants such as heavy metals associated with urban runoff. It is therefore critical that increased peak flows and contaminant loads associated with urban development in the RNDA are controlled and managed before reaching the receiving environment in order to minimise impacts. In the short-term, sediment control measures will be required during the land development phase to ensure that contaminants are not being flushed into the receiving environment. Water quality treatment for sediment and contaminants can be met through the implementation of the HCC Regional Infrastructure Technical Specification (RITS) Standard at the development stage. The treatment of greenfield areas to a minimum of RITS standards is required by the WRC Stormwater Discharge Consents. The following management objectives are based on baseline data collected in this report.

Table 24: MZ1 Issues and Objectives

Specific Issues	Suggested Objectives and Actions	Guiding/ Statutory documents
Potential piping, diversions and/or reclamations of watercourses.	Preserve remaining open watercourses within the sub-catchment. Streams and wetlands should only to be piped and culverted in exceptional circumstances where no other practical alternative exists. Any diversion of watercourses should consider the groundwater recharge implications and maintain or improve pre-diversion hydrology and habitat. Existing groundwater seepages should also be considered. In some instances, the surrounding low-gradient topography and location of existing ponds or pugged wetland-like reaches within the catchment may be suitable for the creation of wetlands for the primary purpose of stormwater treatment. Naturalisation or enhancement of stream corridors to improve ecological values and provide amenity value through green spaces.	WRC Plan Section 3.6. Damming and Diverting WRC Plan Section 4.3. River and Lake Bed Disturbances, 4.3.1 Issues Supported by RMA, 1991
Modified hydrographs due to increased impervious surfaces in the RNDA	Advocate for best practice stormwater management controls above the receiving environment Implementation of a water sensitive design including re-use or infiltration practices	Regional Infrastructure Technical Specifications (RITS) WRC Stormwater Discharge Consents
Contaminants such as sediment, heavy metals, pollutants associated with development and urban land use	Stormwater quality treatment upstream of the receiving environment to reduce impacts	The NPS-FM sets two compulsory values (ecosystem health and human health for recreation) Water quality parameters set in; - the Proposed Healthy Waters Wai Ora Plan Change, - ANZECC guideline levels - WRC trigger values Reference in Rotokauri ICMP
Potential undersized road culverts (Inlet Asset ID: UNK032)	Redesign and upgrade of culverts to manage increased discharges at greater velocities, whilst also including erosion mitigation at both the inlet & outlet, including energy dissipating structures where required. Redesign of culverts should also consider best practice guidelines for fish passage. Options for reducing barriers to fish.	New Zealand Fish Passage Guidelines, NIWA Regional Infrastructure Technical Specifications (RITS)

5.1.2 Management Zone 2 – Ohote Tributary downstream of Exelby Road

Description

Management Zone 2 is comprised of peat-like wetland reaches. These reaches have high (~3 metre) upper gully banks and wide floodplains. There is low (10 – 30%) riparian cover along these reaches, and pastoral grasses are the dominant vegetation type. One erosion hotspot was recorded in this management zone.

Some parts of this management zone are fenced off from stock and OHO_TRIB1_7 has newly planted riparian vegetation on the TRB. However, the lower sections show evidence of stock damage along bank margins and in the stream channel.

The channel and floodplains are dominated by extensive floating mats of *Glyceria*. The reaches appear to be heavily modified due to vegetation clearance on the banks and surrounding land use. As a relatively rare habitat type in the area, peat/ boggy wetlands have ecological values that should be protected.

The reach (OHO_TRIB1_7) directly downstream of the Exelby Road culvert is narrow, incised and near (~ 20 m) an existing residential property. The reach is susceptible to further erosion and bank instability issues as a result of increased flows from the development upstream. There is also potential that contaminant aggregation can occur within the wetland reaches if not treated to adequate standards in the upstream development area.

Table 25: MZ2 Issues and Objectives

Specific Issues	Suggested Objectives and Actions	Guiding/ Statutory documents
Increased erosion susceptibility in reach OHO_TRIB1_7 directly downstream of Exelby Road culvert	Redesign of culvert in accordance with RITS Standards. Engineering approaches to provide armouring – e.g. rock rip rap, gabion. Bank regrading to introduce a transition with gradual bank slope, widening stream channel to dissipate flows and riparian planting. Advocating for stormwater retention/detention above the receiving environment	Regional Infrastructure Technical Specifications (RITS)
Potential loss or further deterioration of peat-wetland	Exclusion of stock. Fencing on both banks. Removal of weed and exotics such as willow, parrots feather and *Glyceria*. Planting gully banks and upper stream banks to promote connectivity with wetlands directly downstream of Duck Road. Planting to also promote in-stream conditions such as temperature and provide potential fish spawning habitat on banks	Healthy Rivers Proposed Waikato Regional Plan Change. Rule 1 and Rule 2 farming activities. Rotokauri ICMP (2017) and as highlighted in an objective generic for ICMPS: Maintaining natural hydrology "groundwater level in peat soils are sustained"

5.1.3 Management Zone 3 – Lower Te Otamanui Tributary

Description

Management Zone 3 includes the downstream reaches of the Te Otamanui Tributary, which are dominated by low-density residential land use. The surrounding land use also a public school. The lower reaches have wide floodplains and the top of the high gully banks (~4 metres) are planted with mature pine on the TRB. The floodplains are dominated by exotic weed species such as *Glyceria*. Similarly, further upstream (TEO_MAIN_3 to TEO_MAIN_5), the TRB has moderate riparian cover from mixed native and exotic vegetation.

There are multiple small, informal crossings along the stream channel, as well as a public access way and walking bridge from Horotiu Road to the stream.

Table 26: MZ3 Issues and Objectives

Specific Issues	Suggested Objectives and Actions	Guiding/ Statutory documents
Fluvial erosion caused by constricted channel flows	Engineering approaches to naturalise the stream channel and improve engagement with floodplain.	Stormwater Master Plan, 2016
Pest plant species within the riparian corridor	Weed control and enhancement of existing riparian corridor. Encourage greater diversity of native vegetation which reflect the ecological district and historic vegetation. Planting should also consider the functional requirements of species to provide the required stability and filtration. Improving amenity and aesthetics values, as well as maintaining and enhancing public access	Waikato Pest Management Plan 2014 - 2024 Maintenance of riparian areas and public green spaces can assist towards goals outlined in the Hamilton Plan (2015)
Outfall erosion at Horotiu Road	Redesign in accordance with RITS standards. Consideration for altered hydrology from upstream development.	Regional Infrastructure Technical Specifications (RITS) New Zealand Fish Passage Guidelines, NIWA

5.1.4 Management Zone 4 – Upper Te Otamanui Tributary

Description

Watercourses transect multiple private properties which are dominated by agricultural and cropland activities. The channels are heavily modified, with little to no riparian cover. Stock exclusion is limited to single electric wires along bank margins of some reaches, whilst other reaches have open stock access. Bank slumping and erosion in these channels can be largely attributed to stock damage rather than erosion caused by stormwater flows.

It is understood that a potential diversion from part of the Mangaheka catchment to the Te Otamanui tributary is being investigated by BECA and WSP Opus. It is further understood that only flows generated

from events greater than a 1 in 10-year event are proposed to be diverted. Therefore, dependant on flows, the increased risk on channel and bank erosion is not considered to be significant as these flows are greater than the anticipated channel forming flow for these reaches and are likely to be assimilated within overbank floodplains which exist for a majority of the upper reaches. Further investigation is recommended to determine the actual anticipated changes in flow regime and risks this poses on flooding and erosion based on rainfall scenario modelling.

The Stormwater Master Plan for HCC (2016), outlines management priorities for open watercourses and drains, much like the reaches found in this management zone. These management actions include channel erosion remediation, outfall erosion remediation, improvement of riparian corridors and vegetation, mitigation of fish barriers and improved water quality.

Management objectives such as naturalisation of channels are considered low priority as there are often land constrictions on private land. Nevertheless, there are opportunities for Council, supported by guiding documents such as the Proposed Healthy Waters Waikato Regional Plan Change, to engage with landowners to improve the ecological outcomes in these reaches. The properties surrounding the Te Otamanui Tributary can be categorised as small and low intensity rural properties under 4.1 ha.

Table 27: MZ4 Issues and Objectives

Specific Issues	Suggested Objectives and Actions	Guiding/ Statutory/ Reference documents
Direct stock access, causing erosion and damage to bank margins	Set-backs, fencing to exclude stock, and riparian planting.	Proposed Healthy Waters Waikato Regional Plan Change 1. Schedule C – stock exclusion. Rule 1 and Rule 2 apply to properties surrounding Te Otamanui Tributary
Multiple undersized private culverts	Redesign and upgrade to improve conveyance, particularly with potential increased flows from the upstream development and diversion of the Mangaheka Stream. Redesign of culverts should also consider removing redundant culverts and fish passage friendly infrastructure	Regional Infrastructure Technical Specifications (RITS) New Zealand Fish Passage Guidelines, NIWA
Incised, steep channels with localised areas of severe erosion	Engineering approaches to address existing erosion issues and mitigate further erosion in the channel	Stormwater Master Plan (2016)
Online pond upstream of TEO_MAIN_7	Restoration to natural hydrology and removal of a series of culverts which are barriers to mitigation	Regional Infrastructure Technical Specifications (RITS) New Zealand Fish Passage Guidelines, NIWA Waikato Regional Plan; Section 3.6
Proposed diversion from part of the Mangaheka catchment to the Te Otamanui tributary	Further investigation is required to determine the actual anticipated changes in flow regime and risks on flooding	Potential catchment inflows from Mangaheka stream identified in Rotokauri ICMP (2017)

Table 28: **Summary of Management Zones and Objectives**

Management Zones		Stream Naturalisation	Erosion Remediation and Sediment Control	Stock Exclusion and Fencing	Riparian Vegetation Enhancement	Wetland Enhancement	Pest Plant Control	Water Sensitive Communities	Infrastructure Remediation	Fish Passage Remediation	Artificial Pond Remediation	Conveyance Improvement
MZ1	Rotokauri North Development Area	✓	✓		✓			✓	✓			
MZ2	Ohote Tributary downstream of Exelby Road and TEO_MAIN_18		✓	✓	✓	✓	✓			✓		✓
MZ3	Lower Te Otamanui TEO_MAIN_1 to TEO_MAIN_ 8		✓	✓			✓		✓			
MZ4	Upper Te Otamanui Tributary		✓	✓	✓						✓	✓

5.2 Erosion Mitigation Projects

The conversion of greenfield areas to developed urban areas will result in an increase in impervious surfaces, and associated changes in the hydrograph of receiving watercourses. These changes in the hydrograph often include 'flashy' hydrology with elevated flow depths and velocity, as well as lower base flows.

Mitigation of frequent flow changes is likely to be incorporated in development proposals, however there will be a residual potential that upstream development in the RNDA will increase the erosion and channel instability downstream. Remediation of current instabilities is important to mitigate this further erosion risk in the sub-catchment resulting from the proposed development. Engineering approaches to remediate channel instabilities include reducing channel bank grade, placement of boulders for bank protection, and planting riparian vegetation buffers.

The mitigation projects identified in this assessment arise from existing issues that have the potential to be exacerbated by changes in the contributing catchment. It should not be inferred that the costs of these projects would be borne entirely by upstream greenfield growth areas. A further process of assessing the contributing catchment, and existing and proposed on-site mitigation is necessary to consider a fair and reasonable allocation of costs between existing contributors and growth areas.

Where erosion hotspots, 'moderately unstable' or 'unstable' reaches were identified, engineering approaches to mitigate further erosion are recommended. A summary of these erosion mitigation projects is presented in Table 30. Refer to Appendix 6.

It should be noted that the primary objective of these erosion mitigation projects is to manage existing erosion issues and mitigate residual future erosion effects only. The scope of these erosion mitigation projects does not provide mitigation solutions for agricultural best practices such as stock exclusion to waterways and have therefore not been costed for but have been noted where applicable. The projects do not directly seek but may have co-benefits to improve water quality, ecological enhancement, or amenity values. For enhancement opportunities within the Rotokauri North sub-catchment where erosion mitigation is not the primary driver, refer to Section 5.3.

High-level costs for the proposed erosion mitigation measures within each reach are provided in Table 29. It is recommended that a detailed options analysis and planning assessment is conducted to inform capital works. Table 30 describes the erosion mitigation projects and expected outcomes.

The unit rates and costs applied to erosion mitigation works are derived from quotes and invoices from physical works in the last five years in the Auckland market. The rates are therefore considered conservative. The final costings presented in this report should be considered as indicative only with further refinement required during concept design.

Table 29: Proposed erosion mitigation works costs ($)

Reach/Tributary	Bank Batter Excavation	Coir Matting	Newbury Rock Riffle	Keystone Boulders	Cost Planting	Total Cost	Design and Feasibility (10%)	Resource Consent (3%)	Defects Liability (10%)	Sub-total	Total including 20% Contingency
TEO_MAIN_1	141,457	7,777			63,751	212,985	21,298	6,390	21,298	261,971	314,365
TEO_MAIN_2	34,904	2,728			19,574	57,205	5,721	1,716	5,721	70,363	84,435
TEO_MAIN_3	28,889	2,252			20,089	51,230	5,123	1,537	5,123	63,013	75,615
TEO_MAIN_4	-				13,360	13,360	1,336	401	1,336	16,433	19,720
TEO_MAIN_7	7,348	1,643		67,044	27,170	103,205	10,321	3,096	10,321	126,942	152,331
TEO_MAIN_8	28,957	3,871	44,270	-	23,720	100,818	10,082	3,025	10,082	124,006	148,807
TEO_MAIN_9	-			25,404	-	25,404	2,540	762	2,540	31,247	37,497
TEO_MAIN_11	200,161	5,575		-	15,794	221,531	22,153	6,646	22,153	272,483	326,979
TEO_MAIN_14	52,222	9,014		-	45,618	106,854	10,685	3,206	10,685	131,430	157,716
TEO_MAIN_15	28,026	2,758		13,852	9,815	54,451	5,445	1,634	5,445	66,975	80,370
TEO_MAIN_21	401,441	15,131		-	53,924	470,496	47,050	14,115	47,050	578,710	694,452
TEO_MAIN_24	-			-	25,838	25,838	2,584	775	2,584	31,781	38,137
TEO_MAIN_26	28,503	6,088		89,068	32,146	155,806	15,581	4,674	15,581	191,641	229,969
TEO_TRIB1_1	1,207	2,630	50,418		2,812	57,067	5,707	1,712	5,707	70,192	84,230
OHO_TRIB1_3	1,813	159			17,116	19,089	1,909	573	1,909	23,479	28,175
OHO_TRIB1_7	-	-			10,223	10,223	1,022	307	1,022	12,574	15,088
Total costs ($)	954,929	59,626	94,688	195,368	380,950	1,685,561	168,556	50,567	168,556	2,073,240	
Total overall costs for erosion mitigation works with 20% contingency											**2,487,888**

** Unit rates used to calculate costs are in Appendix 9*

Table 30: Proposed Erosion Mitigation Works in the Rotokauri North Sub-Catchment

Location in the sub-catchment	Issue	Proposed Erosion Mitigation Works	Approximate area or length of proposed works	Expected Outcomes
TEO_MAIN_1 to TEO_MAIN_3	Fluvial erosion resulting in highly incised, steep stream banks. Constricted, narrow channel with wide floodplains.	Bank battering to a 1:3 grade. Weed plant removal and riparian planting with coir matting.	Earthworks removal = 10518 m^3 Floodplain planting = 2892 m^2 Grade control = 53 m^3	Reduce channel incision and bank angle. Increase floodplain connectivity. Riparian planting to reduce upper bank and floodplain erosion and improve cohesive strength of soils.
TEO_MAIN_4	Highly incised, steep stream banks. Mass wasting from banks and undercutting on TLB Bare or minimum groundcover on TLB.	Riparian planting on TLB.	Floodplain planting = 760 m^2	Riparian planting to reduce upper bank and floodplain erosion on TLB.
TEO_MAIN_7	Incised banks with active bank widening. Toe erosion and degradation. Direct stock access, and damage to banks.	Bank battering to a 1:3 grade. Placement of keystone boulders. Riparian planting with coir matting	Earthworks removal area = 164 m^3 Keystone boulders = 45 m^2 Floodplain planting = 760 m^2	The keystone boulders will provide toe protection and bank stabilisation without requiring additional grading of banks. Planting of banks to improve riparian vegetation condition, stock exclusion is recommended.
TEO_MAIN_8	Constructed pond at head of reach has caused steepening of the reach. Active incision, with channel and bed scour, and Knick points.	Bank battering to a 1:3 grade. Newbury Rock Riffle Riparian planting with coir matting	Floodplain planting = 664 m^2 Earthworks removal = 598 m^3	Reduce channel grade, dissipate flows and protect the stream bed from further degradation. Increase habitat complexity
TEO_MAIN_9	Straightened channel with steep banks	Placement of keystone boulders	Keystone boulders = 35 m^2	Toe protection and stream bank stabilisation to reduce further erosion
TEO_MAIN_11	Straightened channel with steep banks Bank erosion exacerbated by stock access	Riparian planting with coir matting	Floodplain planting = 442 m^2	Reduce sediment release and discharge from the channel. Protect the morphology and hydrodynamics of the watercourse and planting of banks to improve riparian vegetation condition. Stock fencing exclusion is recommended.
TEO_MAIN_14	Steep, incised banks. Toe scour.	Bank battering to a 1:3 grade. Riparian planting with coir matting	Earthworks removal = 423 m^3 Floodplain planting = 1276 m^2	Reduce channel incision and bank angle and stabilise bank with riparian buffer planting. Increase floodplain connectivity.
TEO_MAIN_15	Unstable undercutting on both banks, bank and bed scour leading to deepening of stream and incision	Placement of keystone boulders Riparian planting with coir matting	Erosion mitigation planting = 275 m^2 Keystone boulders = 19 m^2	Toe protection to mitigate further toe erosion and widening of the stream bed. Riparian planting to reduce bank slumping.
TEO_MAIN_21	Erosion on low lying TRB primarily exacerbated by stock access. Toe undercutting caused by fluvial processes and bank slumping	Bank battering to a 1:3 grade Riparian planting with coir matting	Earthworks removal = 6918 m^3 Floodplain planting = 1508 m^2	Stability from riparian planting and gradual slope to prevent further bank slumping. Fencing for stock exclusion is recommended.
TEO_MAIN_24	Drain cleaning resulting in loose, exposed soils slumping into stream channel	Riparian planting with coir matting	Floodplain planting = 723 m^2	Planting to provide bank stability for resilience against increased flows and retention of valuable top soils
TEO_MAIN_26	Erosion hotspot on TLB. Bank slumping recorded along the length of reach. Ongoing toe erosion leading to widening of stream channel. No significant risk to existing infrastructure.	Bank batter to a 1:3 grade Riparian planting Placement of keystone boulders	Floodplain planting = 899 m^2 Earthworks removal = 503.7 m^3 Keystone boulders = 123 m^2	Protection against loss of further land from adjacent property. Reduce channel incision and bank angle. Increase floodplain connectivity. Riparian planting to reduce upper bank and floodplain erosion and improve cohesive strength of soils.
TEO_TRIB1_1	Steepened and deepened channel. Increased flow velocity causing scouring along banks and at the confluence	Bank batter to a 1:3 grade Riparian planting with coir matting	Earthworks removal = 40.8 m^3 Floodplain planting = 78 m^2	Dissipate energy from flows to prevent further scouring of banks. Riparian vegetation providing bank stability and soil retention

Location in the sub-catchment	Issue	Proposed Erosion Mitigation Works	Approximate area or length of proposed works	Expected Outcomes
OHO_TRIB1_3	Erosion hotspot on the upper banks and gully banks due to lack of riparian vegetation and stock access	Bank batter to a 1:3 grade Riparian planting with coir matting	Earthworks removal = 91.2 m^3 Floodplain planting = 479 m^2	Riparian planting to reduce upper bank and floodplain erosion and improve cohesive strength of soils.
OHO_TRIB1_7	Erosion on TLB, primarily due to a lack of riparian vegetation and stock access	Riparian planting	Floodplain planting = 286 m^2	Reduce sediment release and discharge from the channel. Protect the morphology and hydrodynamics of the watercourse and increase bank stabilisation with riparian planting.

5.3 Enhancement Opportunities

Five enhancement opportunities were identified in the Rotokauri North sub-catchment and receiving environments. In some instances, these enhancement opportunities are intended to work in tandem with the proposed erosion mitigation works to improve management outcomes. Other enhancement projects highlight opportunities to utilise water sensitive design and best practice green infrastructure design to minimise adverse impacts on watercourses within the RNDA and the receiving environments as discussed in Sections 5.1 and 5.2 above. Enhancement opportunities are intended to increase the amenity and ecological value of the watercourses, whilst improving flow conveyance and improving resistance to further changes to surrounding land use.

The enhancement projects identified in this assessment represent opportunities only. It should not be inferred that these projects are allocated to any particular party to implement. The enhancement information has value in that it can inform a range of parties (e.g. HCC, WDC, WRC, land owners) who may be considering or undertaking other works in the vicinity. Parties will be able use this information to, if they choose, influence project scoping to deliver or maximise environmental benefits, perhaps with no significant additional investment required. Identifying these opportunities also provides an information base for not-for-profit or environmentally focused delivery agencies looking for opportunities to invest in environmental improvement works (e.g. Streamcare groups, WRC, WRA).

All the enhancement opportunities are located within the Waikato District and are not on public land. In order for these enhancement opportunities to be realised, co-operation with landowners will be required and, in some cases, easements developed for maintenance of these areas.

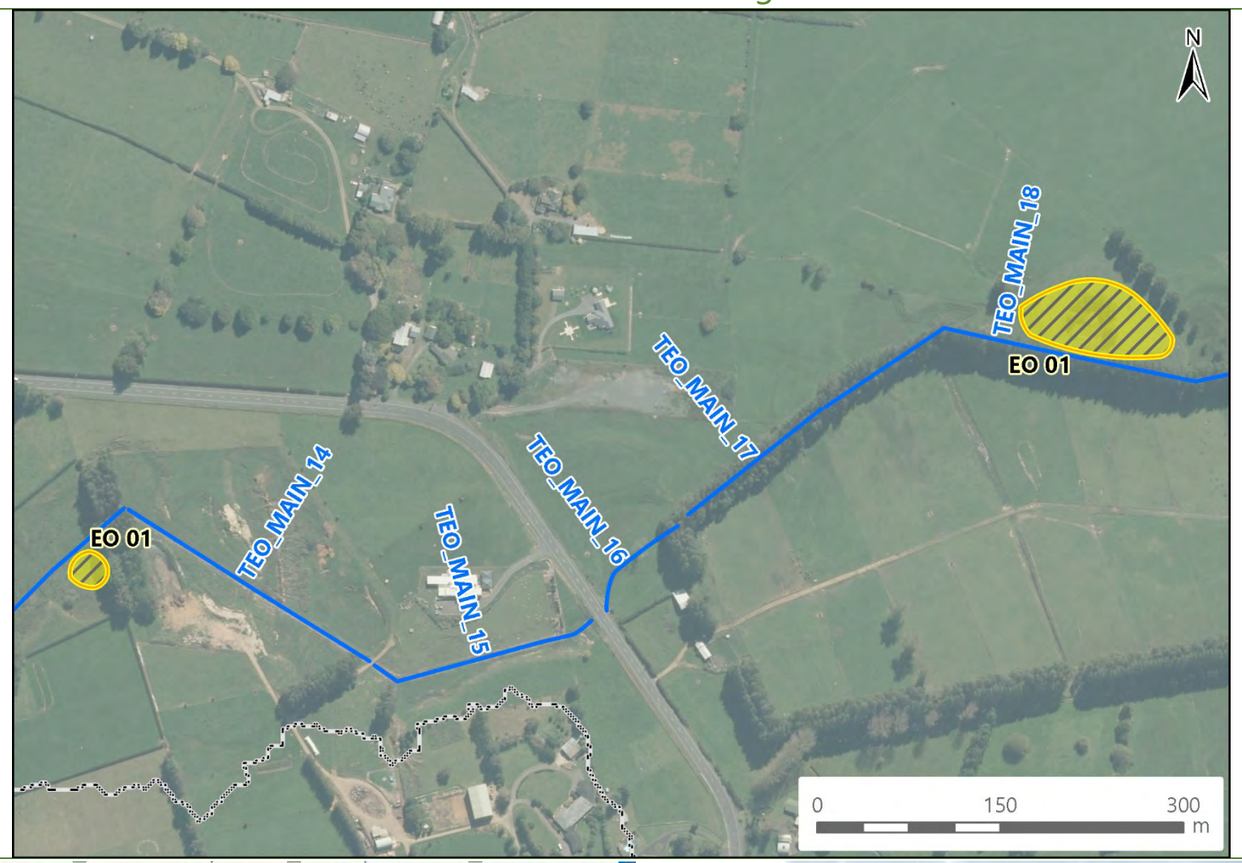
As per the REM methodology, each enhancement opportunity is assigned a high-level prioritisation score based on the potential benefits to the public and local amenity values, ecological values such as biodiversity and habitat improvements, and conveyance. An overview of the projects and their prioritisation is presented in Table 31. Refer to Appendix 7 for the location of these areas.

Table 31: Summary of prioritisation of enhancement opportunities.

Enhancement Opportunity	Management Zone	Description	Amenity	Ecology	Conveyance	Overall Score	Prioritisation Score
EO 1	MZ4	Wetland naturalisation and planting at two existing wetland sites along the mid- Te Otamanui Stream	L	M	M	8	3
EO 2	MZ2	Wetland naturalisation and planting along the lower reaches of the Ohote Tributary	M	H	H	11	1
EO 3	MZ4	Pond naturalisation at head of TEO_MAIN_8	L	M	H	9	2

Enhancement Opportunity	Management Zone	Description	Amenity	Ecology	Conveyance	Overall Score	Prioritisation Score
EO 4	MZ3	Stock exclusion and riparian enhancement along erosion prone reaches	L	H	M	9	2
EO 5	MZ4	Stock exclusion and riparian restoration along Te Otamanui Tributary	L	M	M	8	3

EO1- Wetland naturalisation and enhancement along mid-Te Otamanui Stream



Location: Upper Te Otamanui Tributary

Tributary ID: TEO_MAIN_18 and TEO_MAIN_13 **Ownership:** Private

Priority score: 3

Description: Opportunity for the restoration of wetlands to help regulate stream flows and enhance ecological functions.

Currently modified straightened and incised channels drain pastoral land use along the Te Otamanui. The floodplains maintain some wetlands with species such as Juncus, but the land has been planted with pastoral grasses and heavily modified by stock access.

The source of flow is likely comprised of groundwater seepage and rain fall. These areas can be defined as natural palustrine wetlands.

At TEO_MAIN_18, existing artificial farm pond can be naturalised and connected to the wider wetland area.

Upstream Catchment Area:	Wetland Area:	Wetland Area as Percentage of Upstream Catchment:
284 Hectares	0.64 Hectares	0.2%

Considerations

These areas outside the RNDA will likely remain private. Enhancement and stream management in these receiving environments requires land-owner cooperation. Opportunity for Council and community engagement

Enhancement Types	Stakeholders
Naturalisation	Residents
Fencing/Stock Exclusion	HCC
Conveyance Improvements	Community groups
Aquatic Weed Control	



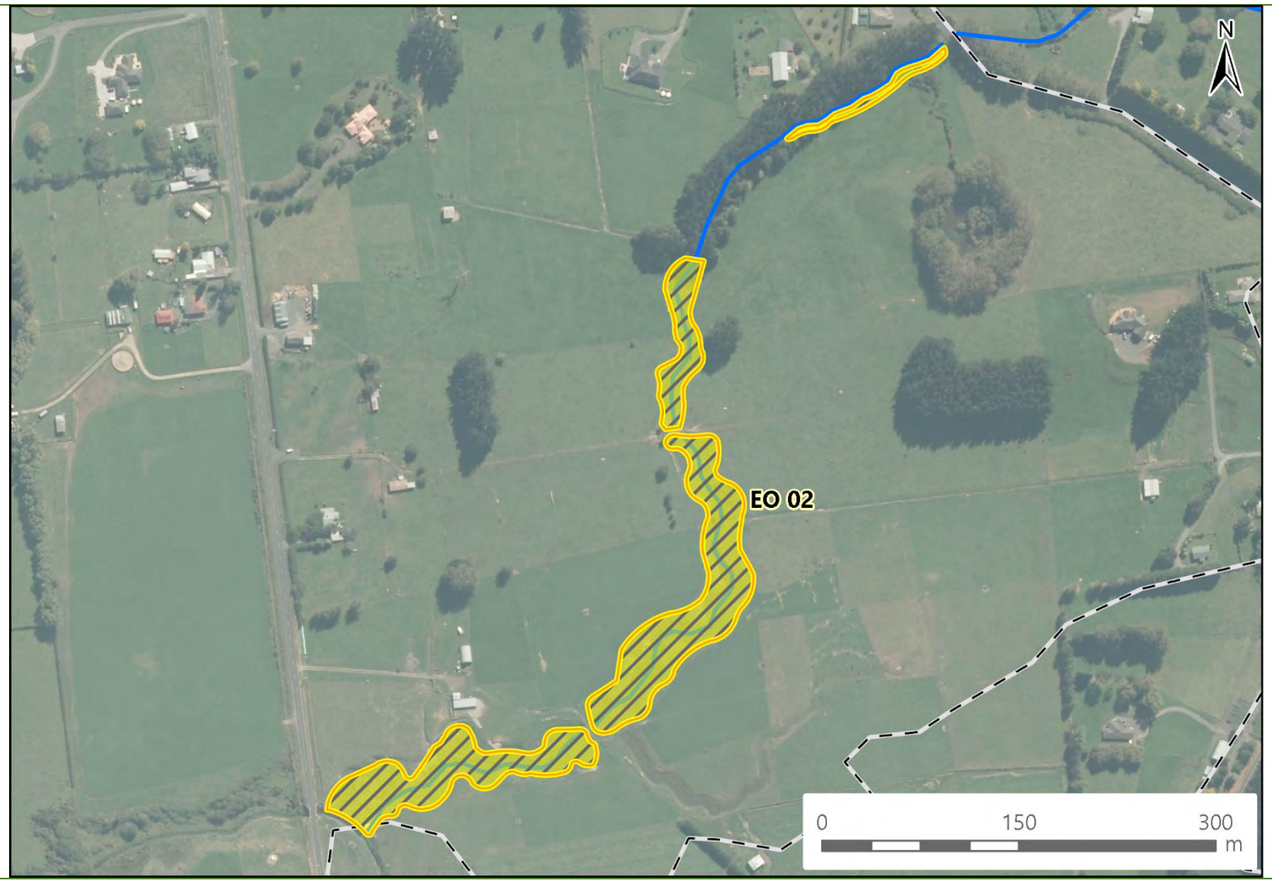
Artificial farm pond on TRB of TEO_MAIN_18 embedded in a natural palustrine wetland





Palustrine wetlands heavily modified by stock damage and planted by pastoral grasses

EO2- Wetland naturalisation and enhancement in lower Ohote Stream reaches



Location: Ohote Stream downstream of Exelby Road

Tributary ID: OHO_TRIB1_1 to OHO_TRIB1_7

Ownership: Private

Priority score: 1

Area: 1.79 Ha

Description:

The downstream reaches of the Ohote Stream are identified as low grade, meandering channels which vary from single thread channel to anastomosing channels during periods above normal flow. In these riverine wetland-like reaches, the floodplains have secondary and tertiary channels that are highly connected. These riverine wetland-like reaches provide valuable water filtering and sediment retention services.

Opportunity to exclude stock, create set-backs of 10 metre riparian buffers and plant the gully banks with native vegetation will improve the ecological value of this watercourse type in the sub-catchment. In addition, removal and re-design of the farm culvert which is a fish barrier to upstream habitat.

Considerations

- Erosion and scour protection
- Weed removal and planting appropriate, eco-sourced vegetation
- Fish passage
- Maintaining conveyance capacity
- Flooding risk to reach directly downstream of the culvert

Enhancement Types	Stakeholders
Naturalisation	Residents
Fencing/Stock Exclusion	HCC
Conveyance Improvements	Community groups
Aquatic Weed Control	

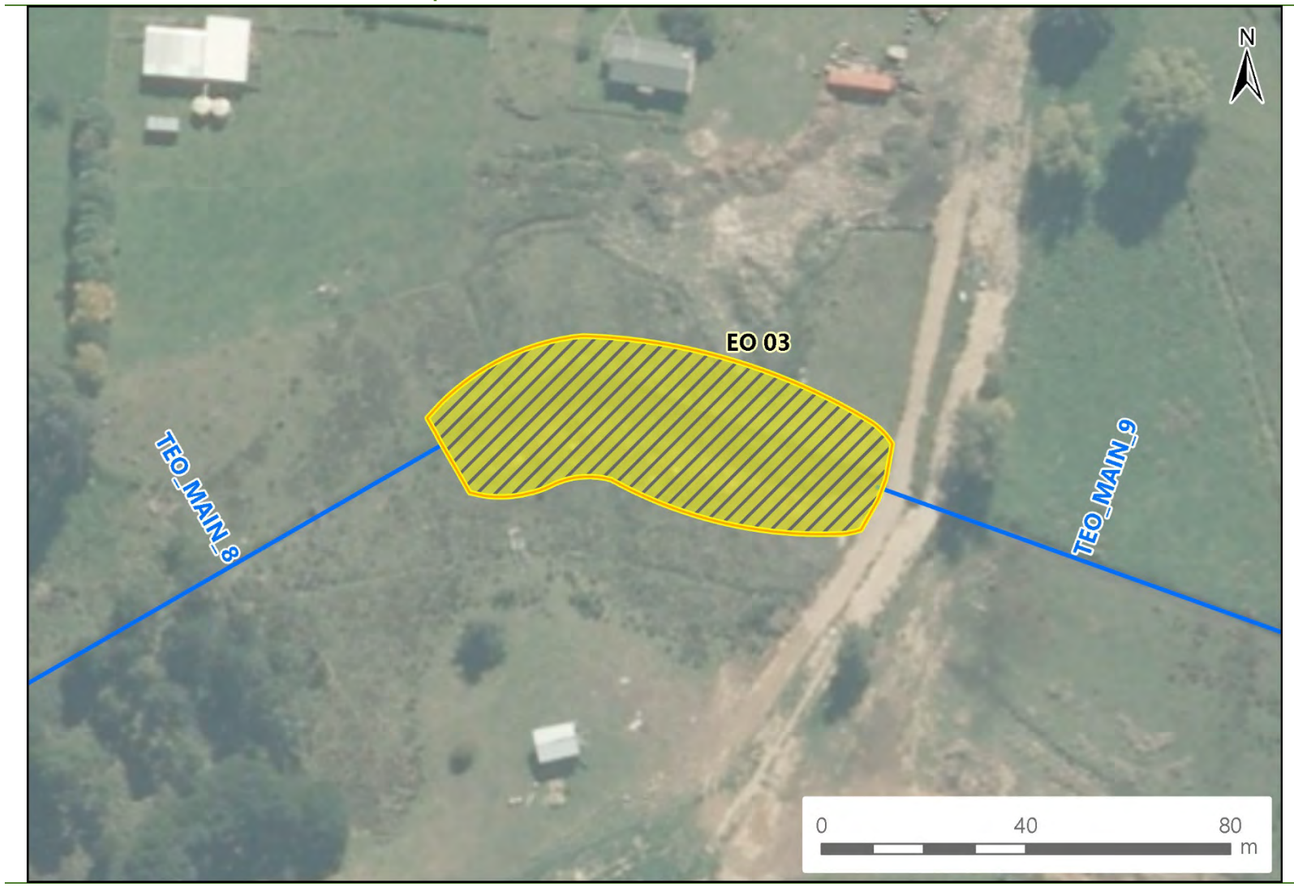






Riverine wetland-like reaches in the downstream reaches of the Ohote Stream

EO3– Pond naturalisation upstream of TEO_MAIN_8



Location: Lower Te Otamanui Tributary

Tributary ID: TEO_MAIN_8

Ownership: Private

Priority Score: 2

Area: 0.24 Ha

Description

Artificial farm pond created through damming on private property. WRC Plan recognises farm damming as a permitted activity where it does not adversely impact neighbouring properties or increase erosion and flooding risk. The aesthetic farm pond has altered local hydrology and ecological processes. The reaches directly downstream of the pond are unstable, and highly prone to erosion.

Opportunity to naturalise the pond, stabilise stream banks, remove fish barriers and enhance the riparian margins with native riparian vegetation.

The pond is on private property and therefore requires co-operation with landowners for stream management and remediation works.

Considerations

- Maintenance required for conveyance efficiency
- Downstream effects of naturalising pond to a stream channel
- Erosion and scour protection
- Remediation of fish barrier
- Earthworks required for re-shaping of channel
- Weed and pest control

Enhancement Types	Stakeholders
Conveyance Improvements	HCC
Fish Barrier	Residents
Erosion Protection	
Weed Control and Planting	



Artificial pond

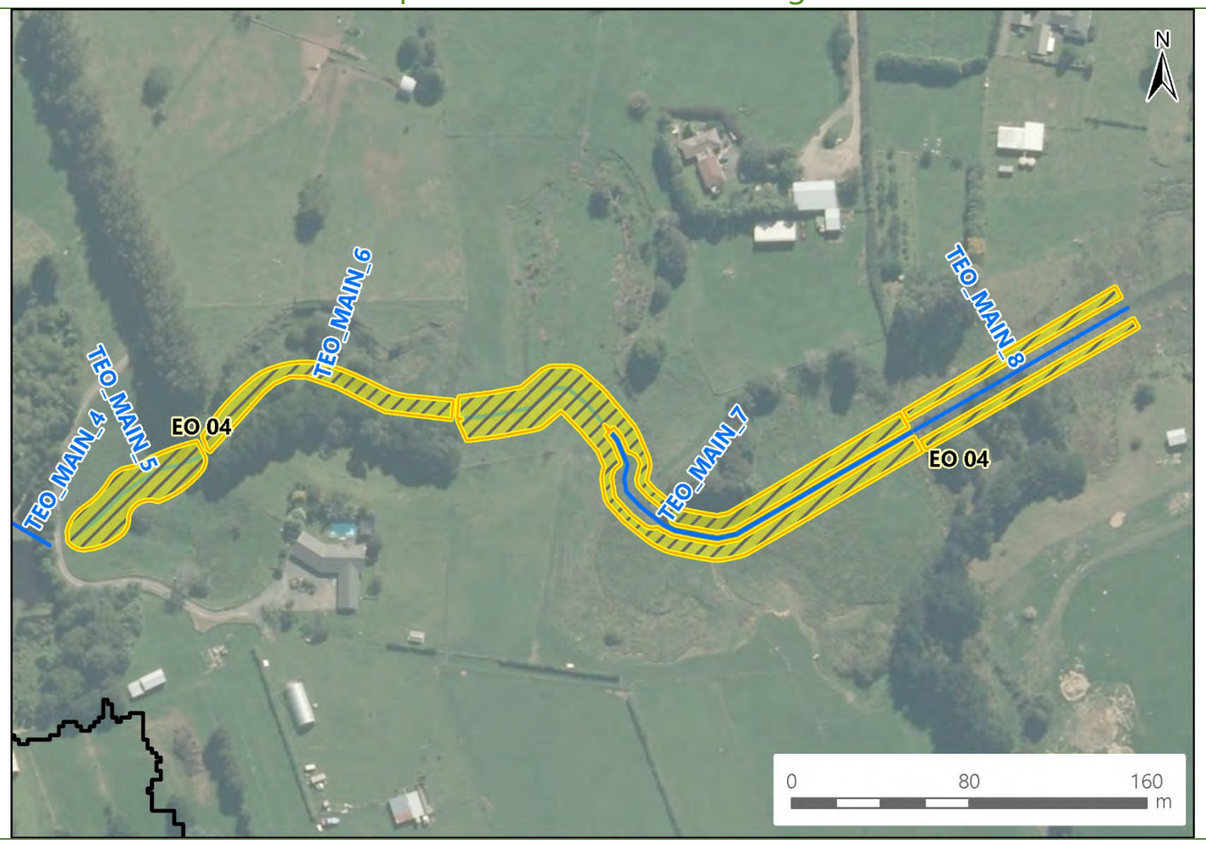


Downstream reach erosion



Culvert requiring remediation upstream of pond

EO4 – Stock exclusion and riparian enhancement along the lower Te Otamanui Tributary



Location: Lower Te Otamanui Tributary

Tributary ID: TEO_MAIN_1 to TEO_MAIN_8

Ownership: Private

Priority Score: 2

Area: 0.74 Ha

Description

This enhancement opportunity augments erosion mitigation works previously outlined in this report. In addition to the minimal works required to address current erosion mitigation issues, there is an opportunity to improve the ecological outcomes by maximising riparian buffer to the recommended 20 metre width.

Opportunity to create wider set-backs with exclusion fencing and native vegetation riparian buffers. The larger-scale management approach mitigates further risk whilst enhancing the stream habitats. Privately owned land. Enhancement and stream management in these receiving environments will therefore require landowner co-operation. There are also opportunities to create community projects which encourage community engagement.

Considerations

- Maximising riparian buffer width to reduce extent of edge habitat
- Maintaining required conveyance capacity through floodplain appropriate species
- Linking any remnant vegetation patches to minimise impacts of fragmentation

Enhancement Types	Stakeholders
Weed Control and Planting	HCC
Erosion Protection	Residents
Fencing/ Stock Exclusion	

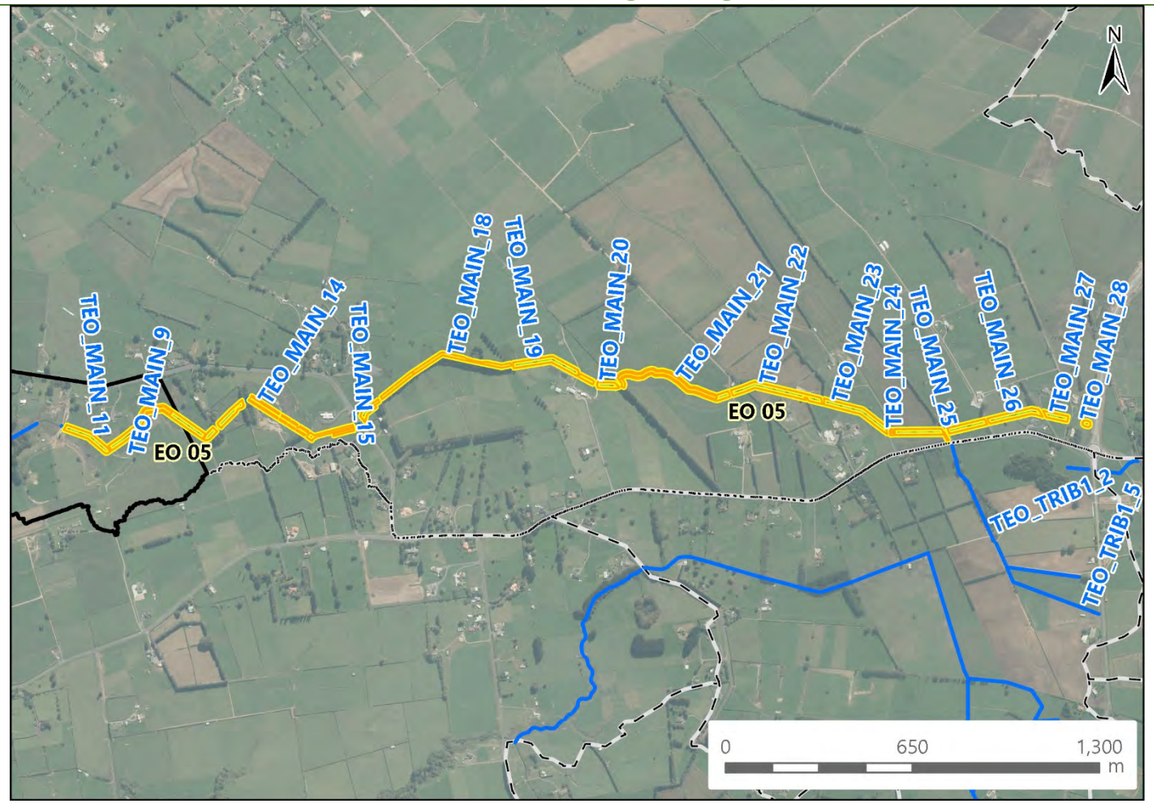






Downstream reaches of the Te Otamanui Stream, creating dominated by low growing exotic plant species

EO5 – Stock exclusion and riparian planting along upper Te Otamanui Tributary



Location: Upper Te Otamanui Tributary

Tributary ID: TEO_MAIN_9 to TEO_MAIN_28

Ownership: Private

Priority Score: 3

Area: 5.94 Ha

Description

This enhancement opportunity augments erosion mitigation works previously outlined in this report. The Te Otamanui Tributary consists of heavily modified reaches with stock damage on stream banks, poor water quality and little to no riparian cover. As an alternative to *ad-hoc* localised erosion mitigation works exclusively in highly prone reaches, there is an opportunity to create set-backs with exclusion fencing and 20 metre riparian buffers along the Te Otamanui Tributary. The larger-scale management approach mitigates further risk whilst enhancing the stream habitats.

Privately owned land. Enhancement and stream management in these receiving environments will therefore require landowner co-operation. There are also opportunities to create community projects which encourage community engagement.

Considerations

- Maximising riparian buffer width to reduce extent of edge habitat
- Maintaining required conveyance capacity through floodplain appropriate species
- Maintenance of channel to mitigate flood risks
- Linking any remnant vegetation patches to minimise impacts of fragmentation
- Long term maintenance requirements

Enhancement Types	Stakeholders
Weed Control and Planting	HCC
Erosion Protection	Residents
Fencing/ Stock Exclusion	







Upper Te Otamanui Tributary reaches with no riparian cover, stock access and high erosion susceptibility

Table 32: Summary of Enhancement Opportunity Costs

Enhancement Opportunity	Enhancement Planting Cost	Exclusion Fencing	Pond Naturalisation	Land Purchase	Total
EO1	$46,191	$5,190.48	-	$7,922	$59,304.04
EO 2	$129,618	$4,803.73	-	$22,229	$156,651.98
EO 3	-	$3,591.12	$126,940	$2,971	$133,502.50
EO 4	$53,654	$8,460.40	-	$9,201	$71,316.26
EO 5	$430,603	$72,762.70	-	$73,850	$577,216.52
Total overall costs for enhancement opportunity works with 20% contingency					**$1,210,372**

** Unit rates used to calculate costs are in Appendix 9*

6.0 Conclusions

In summary, the observations made during the field assessment indicate that the receiving watercourses downstream of the Rotokauri North Development Area are dominated by agricultural pastoral land uses, with small areas of rural residential land use. As a result, these predominately agricultural streams display a varying level of channel stability with stock access and stock damage of both the upper and lower banks evident across the survey extent.

The lack of established native woody riparian vegetation and high incidence of channel modifications have resulted in a system that often displayed unnatural channel geometry, a lack of geomorphic features and vegetation to support a healthy freshwater ecosystem. Of the 61 reaches identified, one was classified as moderately unstable and nine as unstable.

The proposed management approach presented in this report aims to anticipate and plan for the increase in conveyance demands on stream systems. The management approach identifies key issues, objectives to address these issues, and recommends options and actions to mitigate their actual and potential adverse effects.

The broad management objectives outlined in this report align with the outcomes sought by the Stormwater Master Plan (HCC, 2016), Rotokauri ICMP (2017), the NPS-FM (2016) and the Proposed Waikato Regional Plan Change (2018). The erosion mitigation projects highlight areas of concern and provide remediation options to address localised issues. The enhancement opportunities aim to address broader issues within the survey extent to enhance the ecological, conveyance and amenity values.

The fourteen erosion mitigation projects have been developed at a high level consists of four types; grade control, bank batter, erosion planting and toe protection. These engineered approaches aim to remediate existing erosion issues and mitigate further risk within the receiving watercourses.

The total estimated cost including contingency of the physical works for the proposed erosion mitigation projects is approximately $2.5 Million. Unit costs rates are applied to represent high-level estimates of physical works only.

Six enhancement opportunity projects have been proposed within the Rotokauri North sub-catchment and the receiving watercourses. These projects highlight enhancement opportunities for the developer, private land owners and Hamilton City Council to increase the amenity and ecological value of the watercourses, whilst improving flow conveyance and improving resistance to further changes to surrounding land use. The total estimated cost of the enhancement projects is approximately $1.2 Million.

Erosion remediation within the RNDA has not been included as part of this assessment, as it is anticipated that the developer will address any existing issues as part of the planned development. Enhancement opportunities have been identified within the development area and it is recommend that, where possible, the developer reduces diversion or piping of existing watercourses and instead, incorporates enhancement of existing features into any urban landscape design plans.

It is anticipated that the baseline data, summary of findings and recommendations proposed in this report will go towards supporting decision making in the development process.

7.0 References

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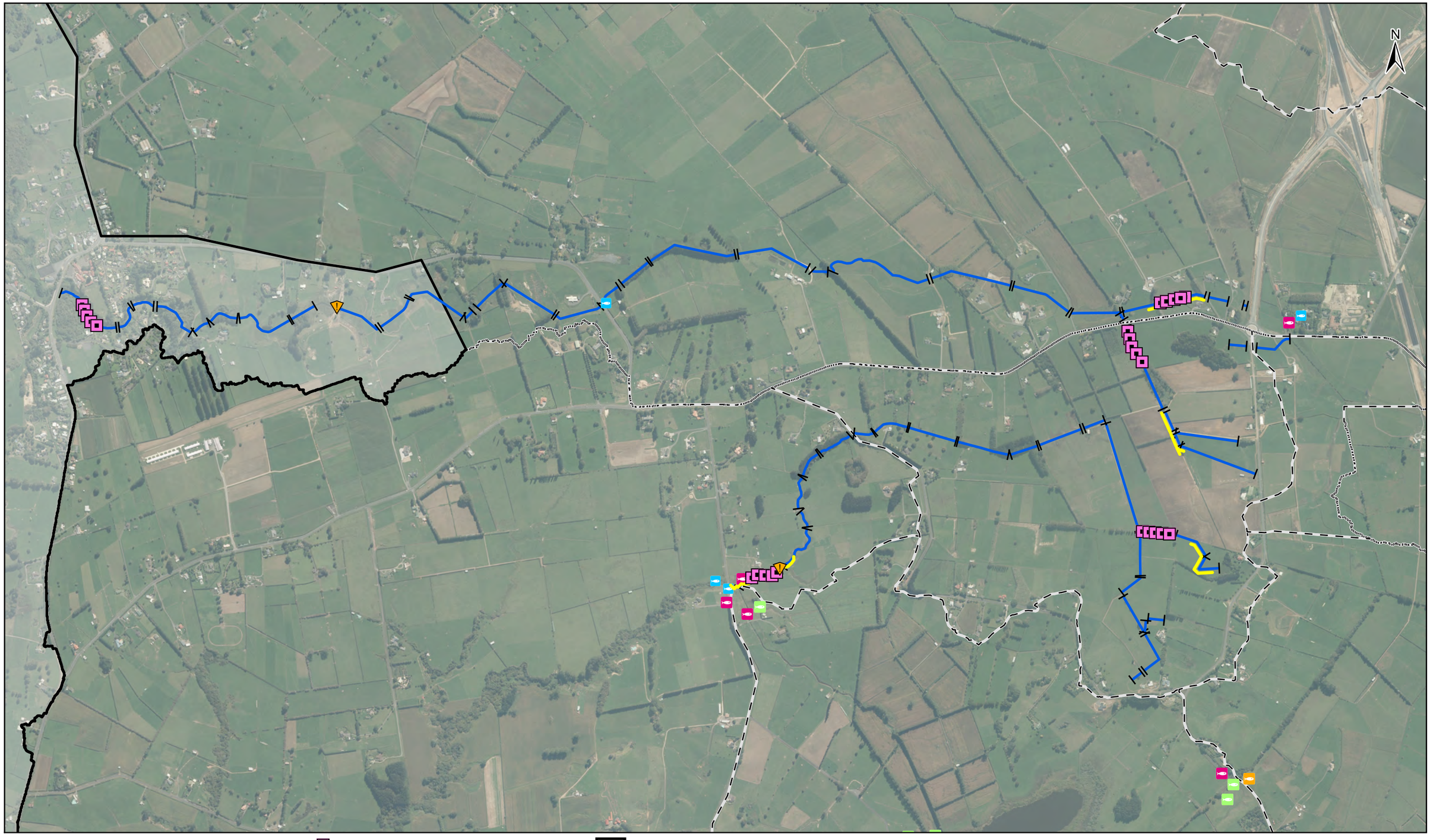
Appendix 1 Fish Survey and Fish Barriers

ROTOKAURI NORTH - FISH SURVEY & FISH BARRIER



W:\Morphum_GIS\Projects\Councils\Hamilton City Council\P01733 Rotokauri North Assessment\ArcPro\P01733 Rotokauri North REM\P01733 Rotokauri North REM.aprx Layout: 01 Fish Survey and Fish Barrier

NZFFDB

- Anguilliform
- Climber
- Swimmer
- Exotic

Eng. Barrier to:

- Climbers

- Water and Sediment Sample Points
- Black Mudfish Survey Locations
- Ecoline
- ICMP Catchment Boundary
- ICMP Subcatchments

Client HAMILTON CITY COUNCIL

Project **ROTOKAURI NORTH REA**

0 500 1,000 m

Project no. P01733

Date 14 Nov 2018

Drawn SM

Approved CC

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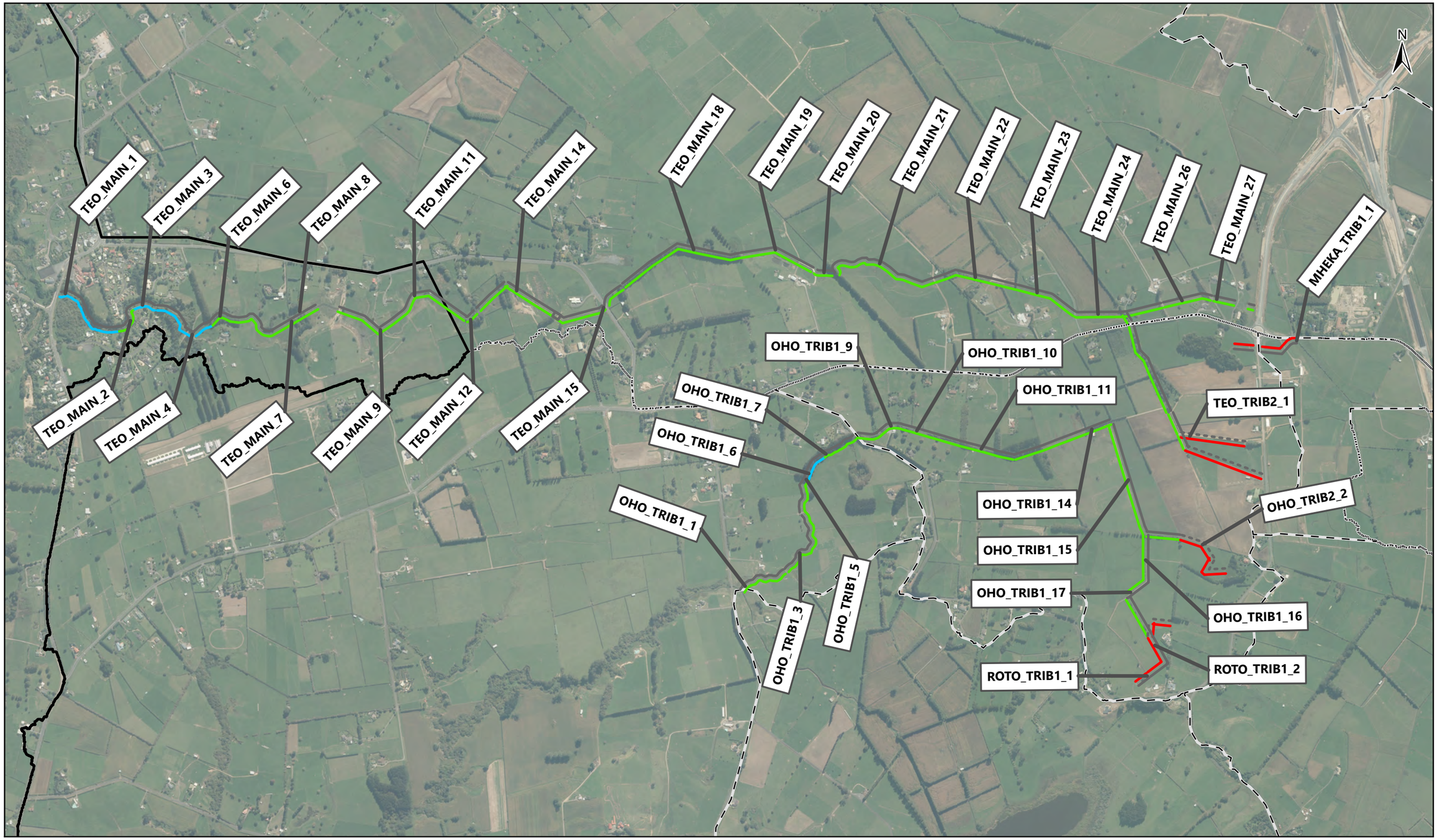
Appendix 2 Stream Watercourse Classification

ROTOKAURI NORTH - STREAM WATERCOURSE CLASSIFICATION

MORPHUM ENVIRONMENTAL LTD



WRC Classification

- Farm drainage canal
- Modified watercourse
- River

WRC Type

- Ephemeral
- Perennial

- ICMP Catchment Boundary
- ICMP Subcatchments

Client HAMILTON CITY COUNCIL

Project **ROTOKAURI NORTH REA**

0 500 1,000 m

Project no. P01733

Date 14 Nov 2018

Drawn SM

Approved CC

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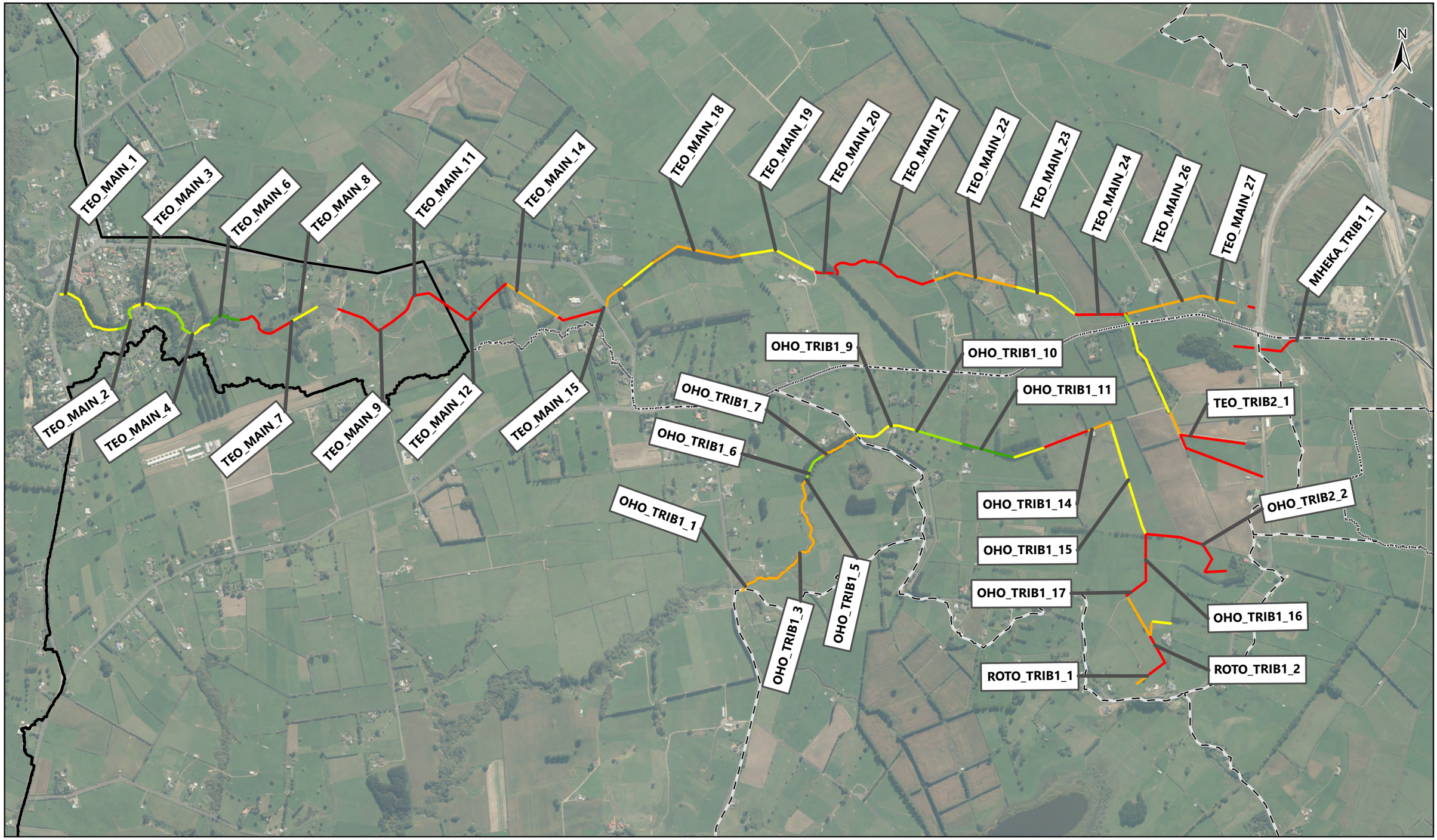
Appendix 3 Stream Overhead Cover

ROTOKAURI NORTH - STREAM OVERHEAD COVER

MORPHUM ENVIRONMENTAL LTD



Overhead Cover %

- <10%
- 10-30%
- 30-50%
- 50-70%
- 70-90%
- >90%

- ICMP Catchment Boundary
- ICMP Subcatchments

Client HAMILTON CITY COUNCIL

Project **ROTOKAURI NORTH REA**

0 500 1,000 m

Project no. P01733

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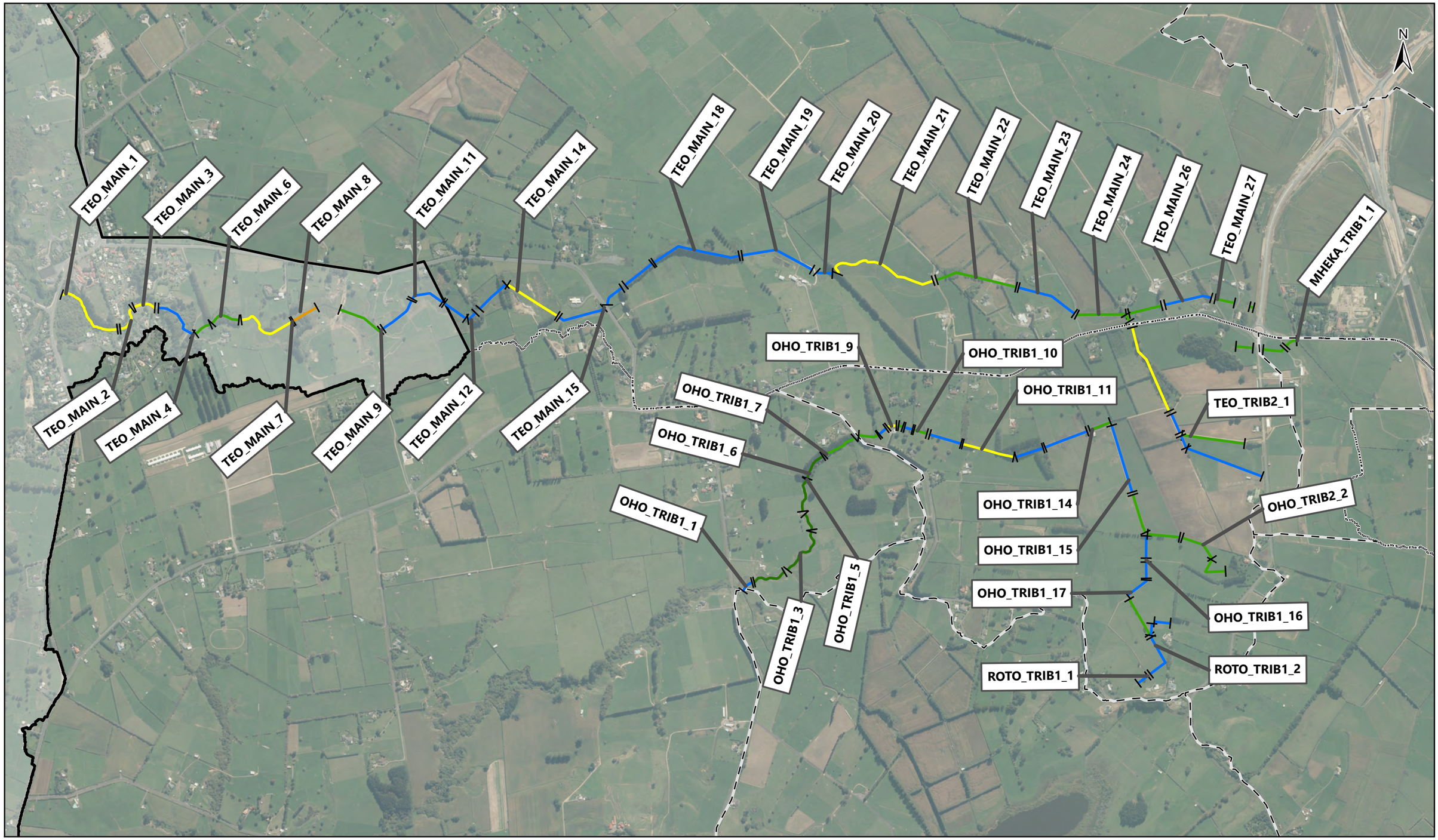
Appendix 4 Stream Erosion Susceptibility

ROTOKAURI NORTH - STREAM EROSION SUSCEPTIBILITY



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Erosion Susceptibility

- Highly Stable
- Moderately Stable
- Stable
- Unstable
- Moderately Unstable

- ICMP Catchment Boundary
- ICMP Subcatchments

Client HAMILTON CITY COUNCIL

Project **ROTOKAURI NORTH REA**

0 500 1,000 m

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Date 14 Nov 2018

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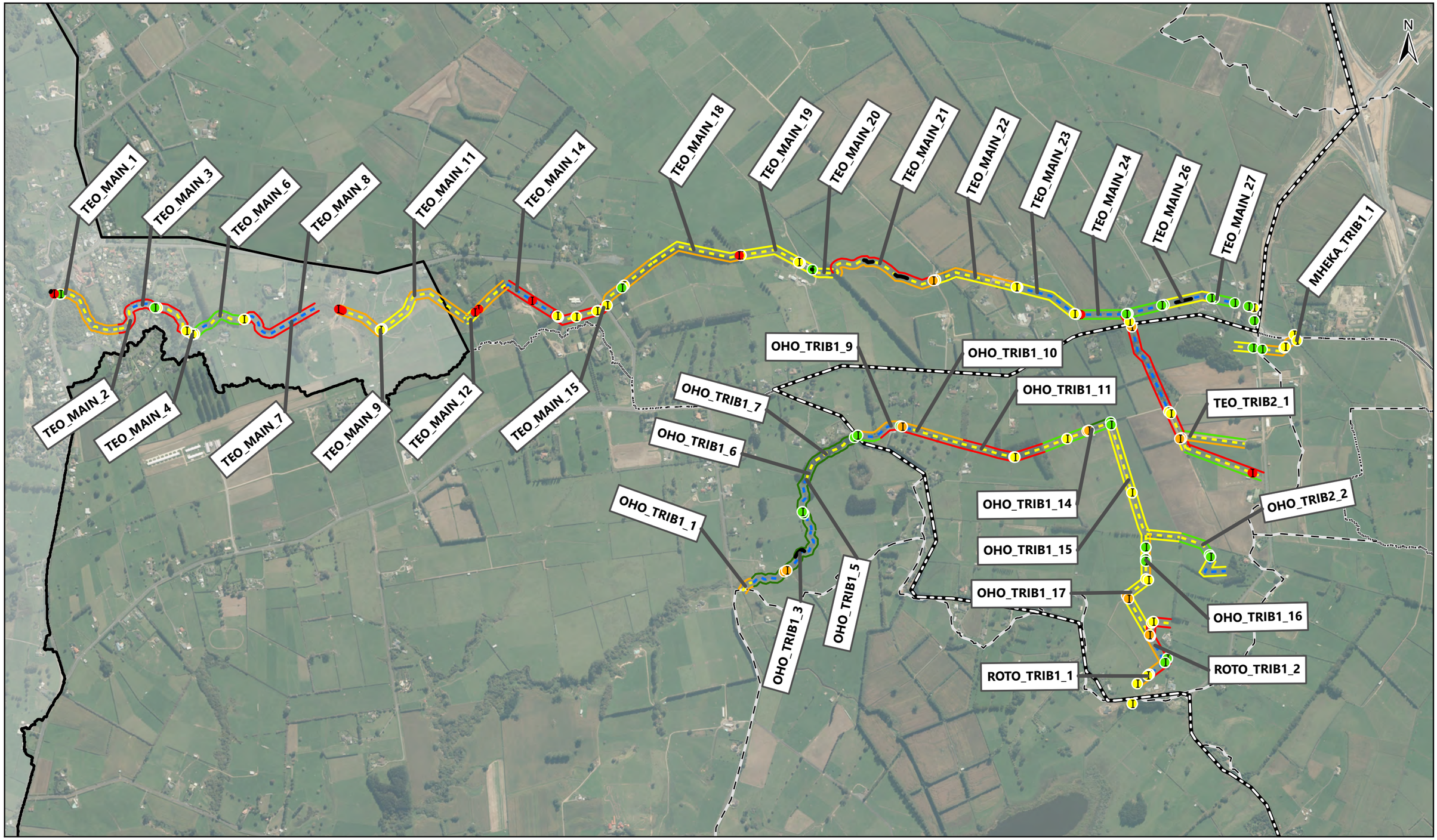
Appendix 5 Stream Erosion & Upper Bank Stability

ROTOKAURI NORTH - STREAM EROSION & UPPER BANK STABILITY



Current Erosion Bank %

- None
- <20%
- 20-40%
- 40-60%
- >60%

Upper Bank Stability Score

- Excellent
- Good
- Fair
- Poor

Erosion Hotspot

Overall Risk Value

- Medium

Infrastructure Erosion

- None
- Slight
- Moderate
- Severe

- ICMP Catchment Boundary
- ICMP Subcatchments

Client HAMILTON CITY COUNCIL

Project **ROTOKAURI NORTH REA**

0 500 1,000 m

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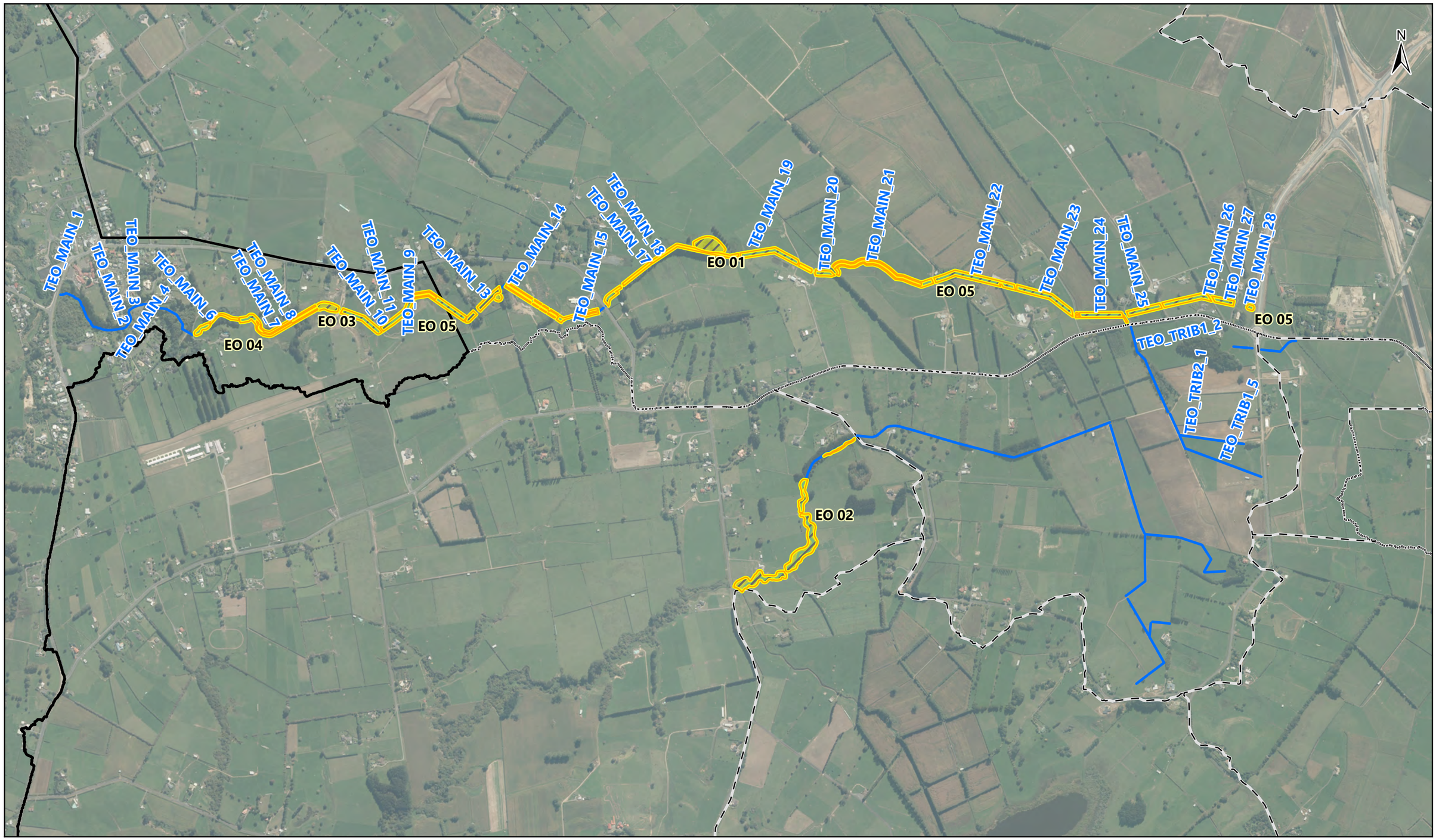
Appendix 6 Stream Enhancement

ROTOKAURI NORTH - STREAM ENCHANCEMENT



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Enhancement Opportunities

Ecoline

ICMP Catchment Boundary

ICMP Subcatchments

Client HAMILTON CITY COUNCIL

Project **ROTOKAURI NORTH REA**

0 500 1,000 m

Project no. P01733

Date 12 Sep 2018

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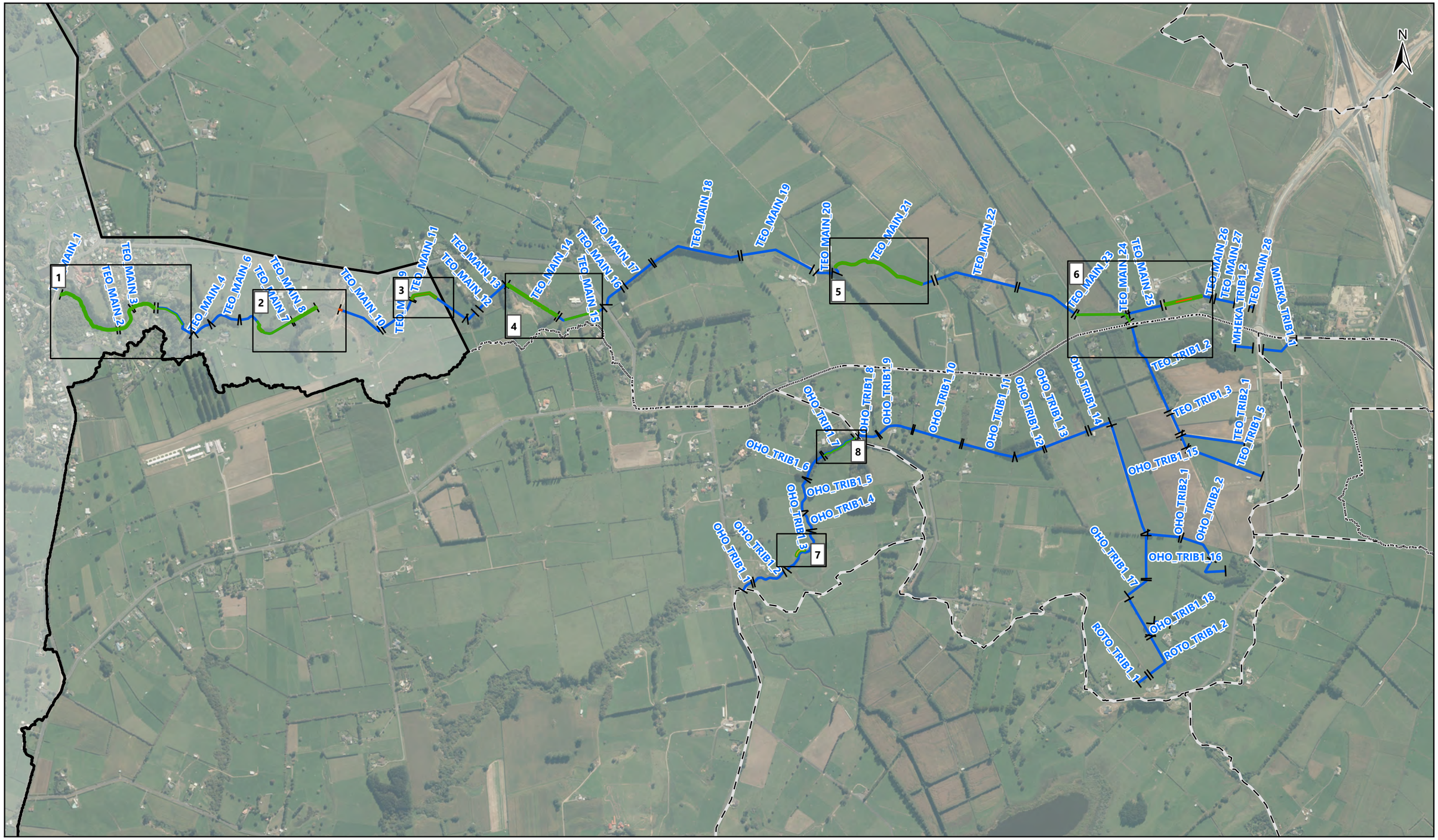
Appendix 7 Erosion Remediation Projects

ROTOKAURI NORTH - EROSION REMEDIATION PROJECTS: OVERVIEW



Erosion Mitigation Works

- Toe Protection
- Bank Batter
- Erosion Planting
- Grade Control

- Ecoline
- ICMP Catchment Boundary
- ICMP Subcatchments

Client HAMILTON CITY COUNCIL

Project **ROTOKAURI NORTH REA**

0 500 1,000 m

Project no. P01733

Date 12 Sep 2018

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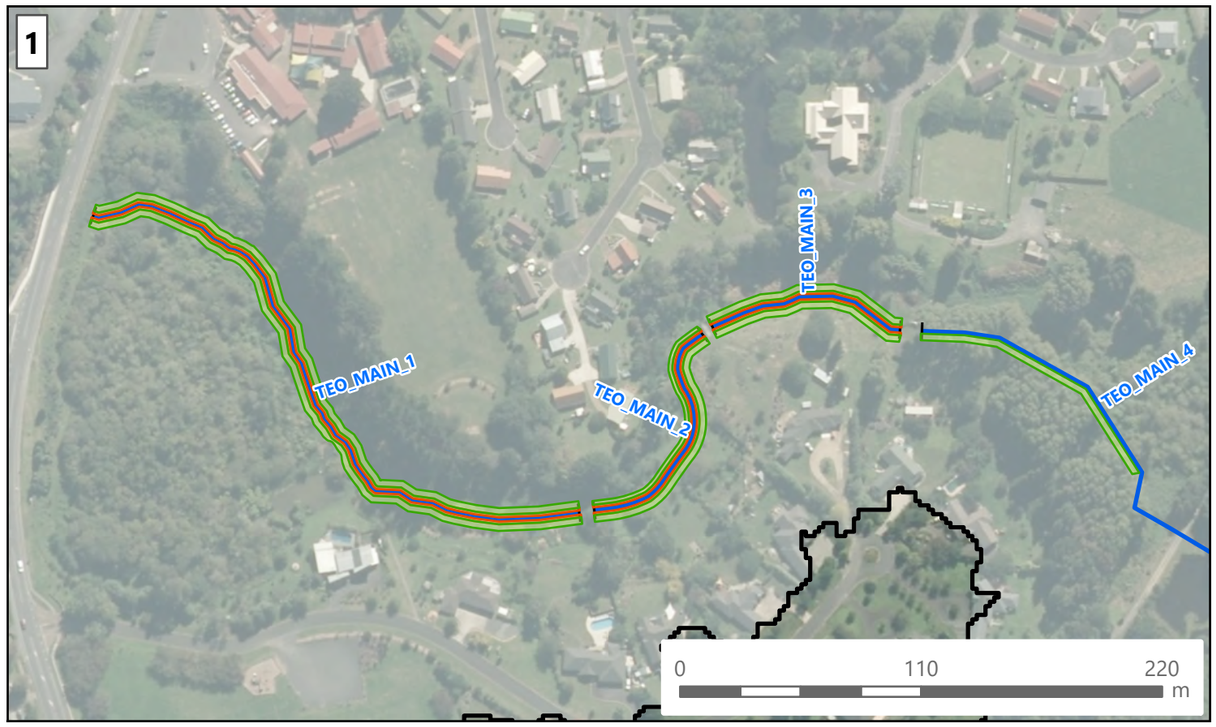
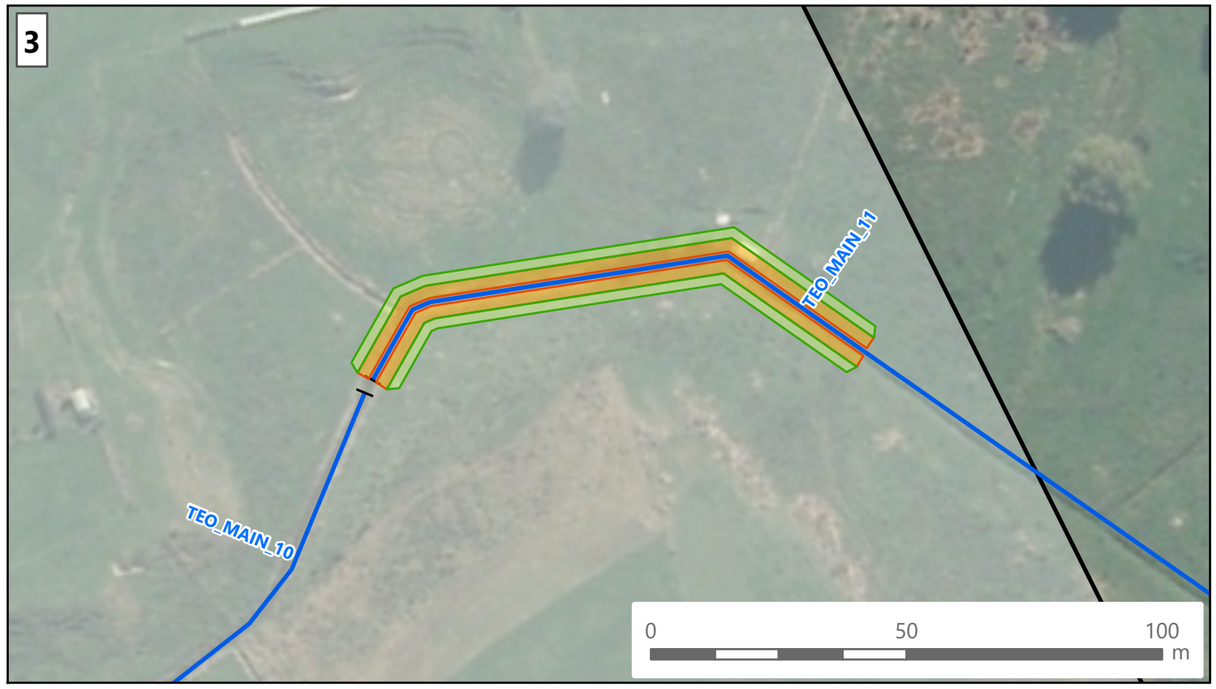
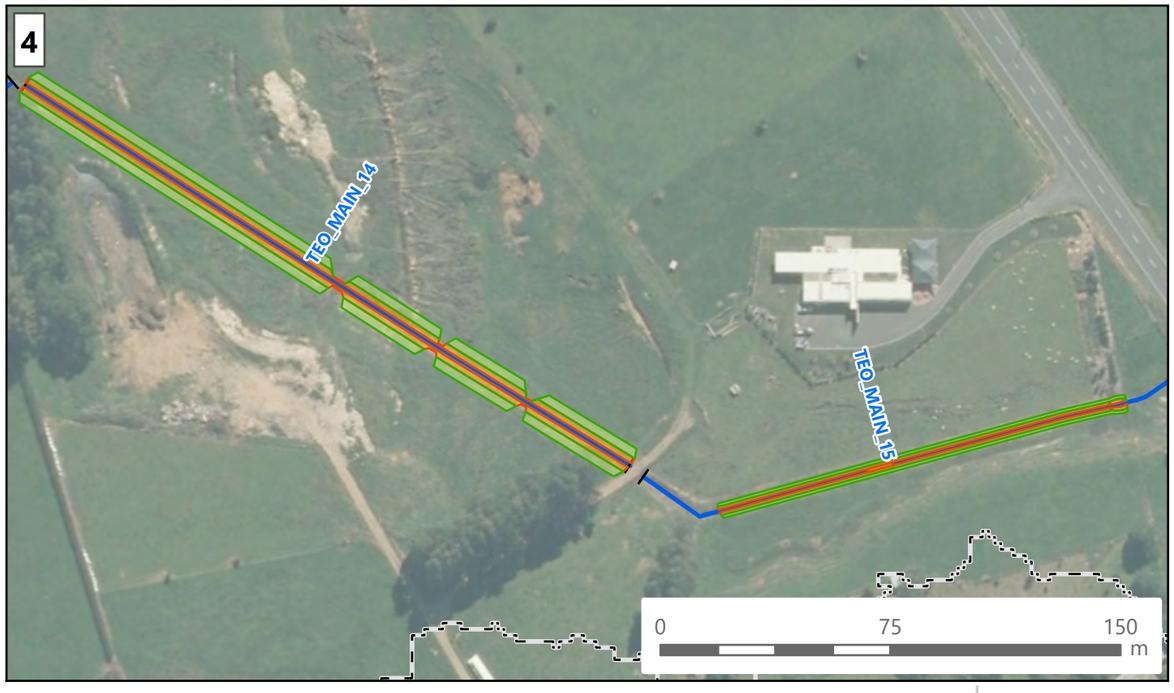
ROTOKAURI NORTH - EROSION REMEDIATION PROJECTS









Erosion Mitigation Works

- Toe Protection
- Bank Batter
- Erosion Planting
- Grade Control

- Ecoline
- ICMP Catchment Boundary
- ICMP Subcatchments

Client HAMILTON CITY COUNCIL

Project **ROTOKAURI NORTH REA**

Project no. P01733

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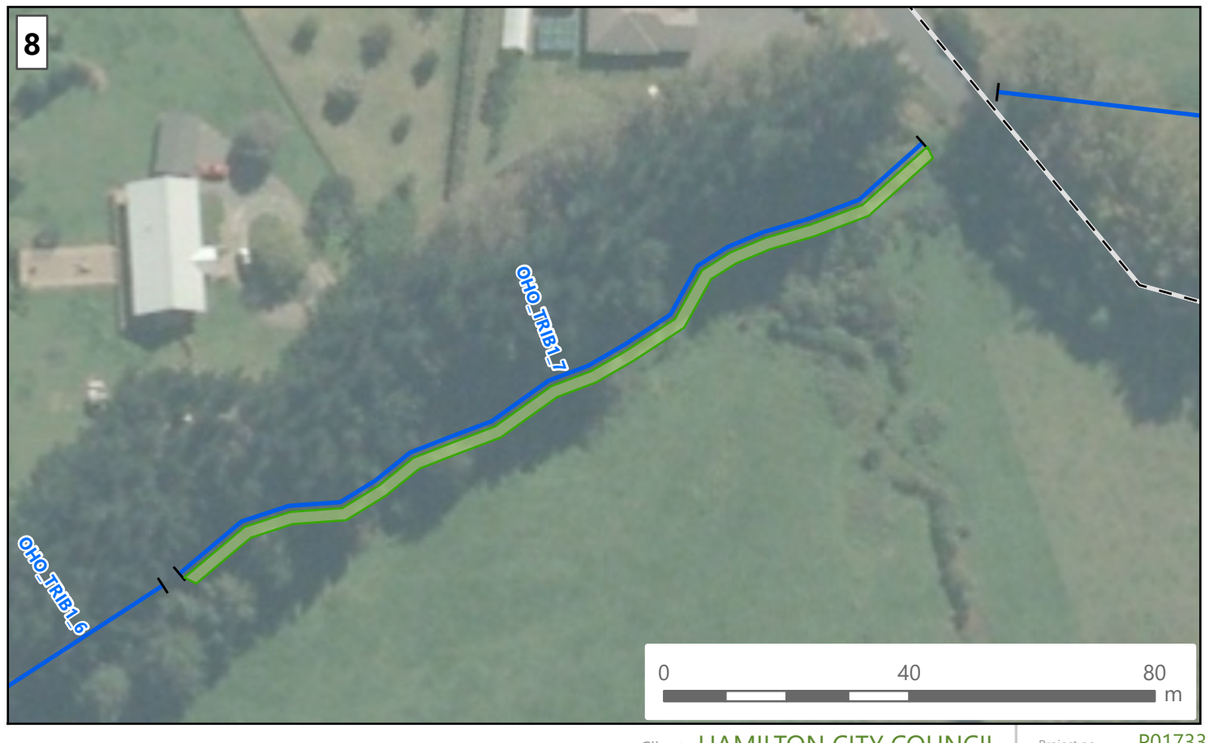
ROTOKAURI NORTH - EROSION REMEDIATION PROJECTS









Erosion Mitigation Works

- Toe Protection
- Bank Batter
- Erosion Planting
- Grade Control

- Ecoline
- ICMP Catchment Boundary
- ICMP Subcatchments

Client HAMILTON CITY COUNCIL

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Appendix 8 Management Zones

ROTOKAURI NORTH - MANAGAMENT ZONES

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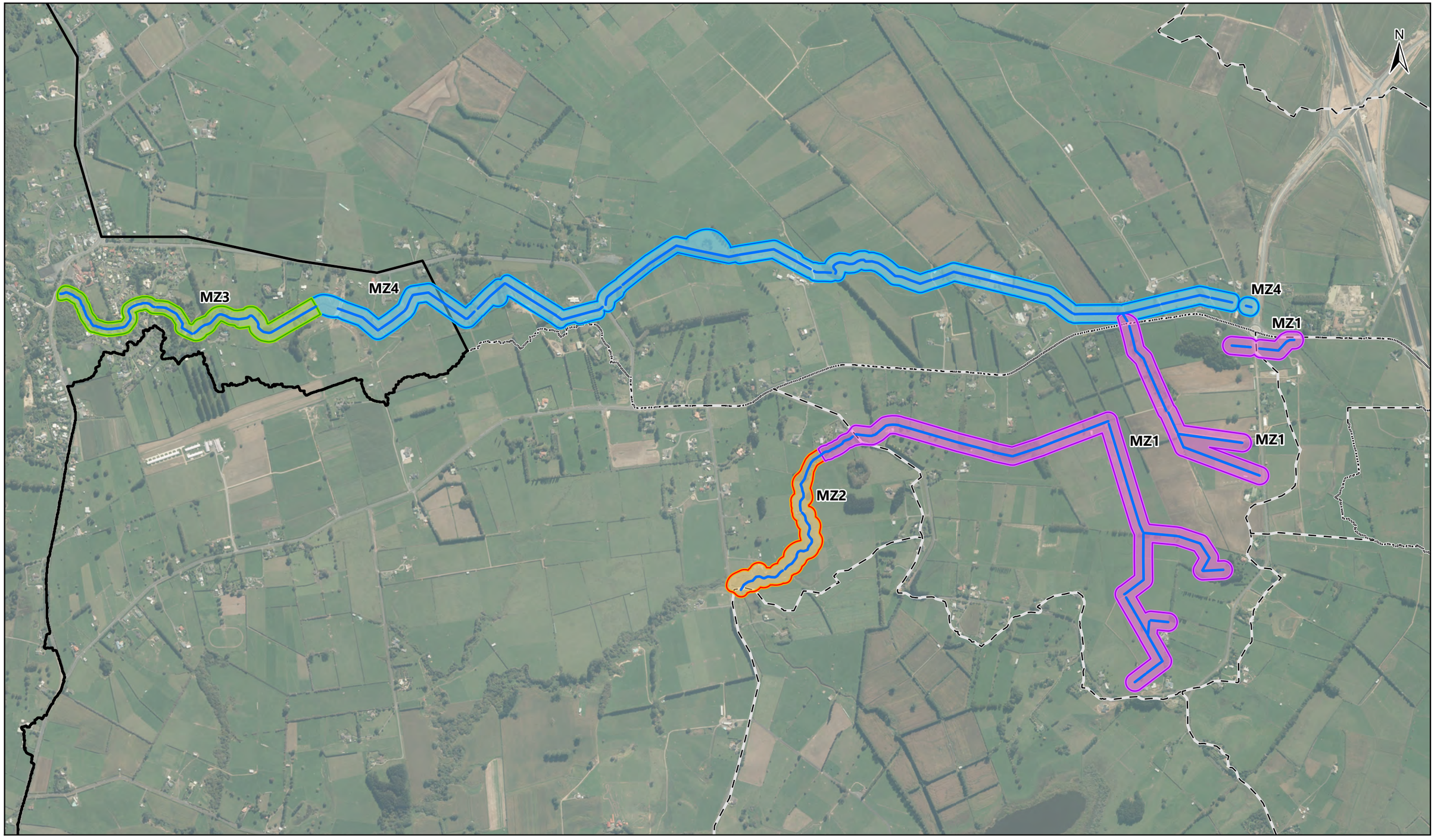

W:\Morphum_GIS\Projects\Councils\Hamilton City Council\P01733 Rotokauri North Assessment\ArcPro\P01733 Rotokauri North REM\P01733 Rotokauri North REM.aprx Layout: 08 Management Zones

Management Zones
- MZ1
- MZ2
- MZ3
- MZ4

- Ecoline
- ICMP Catchment Boundary
- ICMP Subcatchments

Client HAMILTON CITY COUNCIL

Project **ROTOKAURI NORTH REA**

0 500 1,000 m

Project no. P01733

Date 12 Sep 2018

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Appendix 9 Cost & Unit Rates for Mitigation Options

Mitigation	Unit	Cost	Assumptions and exclusions
Planting of Banks and Floodplains	m^2	$35	Includes boom spray of glyphosate single application; Planting at up to 4 plants per m2. *Carex, Juncus*, toetoe, flax and cabbage tree; Plant grade PB3s; Assumes team of 6 planting 350 plants each per day; Cost includes vegetation removal, planting, weeding and maintenance for 5 years.
Newbury Rock Riffles as Grade Control	m^2	$950	Import and place rock riffles. Weirs to be 400-500 mm boulders, riffles to be D_{50}=300 mm well graded angular rip rap in combination with 5-50mm railway ballast, approximately 20m^3 of rip rap per riffle. 50mm bedding layer of GAP30 installed over existing ground surface. Crushed aggregate D_{50}=50 mm to be installed to fill gaps around rip rap.
Bank batter	m^3	$70	$50/m^3$ for excavation; $20/m^3$ for haulage away from site and disposal to clean fill; Does not include setting up diversions/erosion and sediment control; Assumes 45° banks from toe of existing bank, does not include the excavation required to install the rip rap. The rip rap volume may need to be excavated also for installation of the rip rap. This could be avoided by placing the rip rap directly on the cut bank. Rip rap may not be required at all sites of bank batter but has been used here to allow for the cost of stabilisation. Determination of the best stabilisation material will be decided during concept design or detailed design.
Keystone Boulders	m^3	$1,500	600 mm boulders placed within a 400 mm deep trench
Fencing	m	$7.50	7 wire fencing with 5 m posting.
Grazing Land Purchase	m^2	$1.24	Based on 10% of average land sale cost in Waikato Region as reported by REINZ 2018; 10% assumes land lease rather than sale; http://www.interest.co.nz/rural/resources/farm-sales.
Pond Restoration	-	$126,940	Planting cost: $ 50, 000.00 Outlet Installation includes outfall wingwall and rip rap $ 2,500.00 Scruffy Dome with man hole. Scruffy dome is ~ 10m of pipe $ 20,000.00 Embankment stabilising, assumes 0.5m3/1m2 at $40/ m^3. Total: $ 14,620.00 Scour protection includes rip rap at inlet: $ 2,500.00 Sediment removal includes $ 5,000 to drain and prepare for removal. Removal of 0.5m depth at $40/$m^3$. Total: $ 37,320.00

ATTACHMENT 13 - Integrated Traffic Management Report
prepared by Commute Transportation Specialists
dated April 2019

Rotokauri North
Proposed Plan Change

Integrated Transportation Assessment Report

30 April 2019




commute
TRANSPORTATION CONSULTANTS

Project:	Proposed Plan Change, Rotokauri North
Report title:	Integrated Transportation Assessment Report
Document reference:	J001028 Rotokauri 30042019
Date:	30 April 2019

Report Status	Prepared By	Reviewed By	Approved By
Final Report	Nilu Seneviratne	Leo Hills	Leo Hills

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1 INTRODUCTION

Commute Transportation Specialists has prepared an Integrated Transport Assessment ("ITA") for a proposed Private Plan Change ("PPC") to rezone approximately 140 ha of land, located within the existing Rotokauri Structure Plan area, at the north western edge of Hamilton. The PPC area is currently zoned as 'Future Urban' in the Hamilton City District Plan ("HCDP") and the proposal intends to rezone this land to predominantly 'Medium Density Residential' zoning to allow for the development of up to 2000 residential dwellings.

A local neighbourhood centre is also being proposed within the site.

A hierarchy of roads are proposed to support the development and will have connections onto Exelby Road, SH39 and Burbush Road respectively.

It is noted that the subject site is located within the existing Rotokauri Structure Plan boundary. As such, the proposed PPC area including associated roading provisions assessed within this report will be complimentary to the development planned within the Structure Plan and is to be known as 'Rotokauri North' and will be subject to a new/updated Structure Plan specific to the Rotokauri North area.

A number of documents have been prepared for this PPC and will be referenced throughout this report (and provided as attachments to this report as relevant). These include the following:

- Memorandum prepared by TDG (dated October 2017);
- Rotokauri North – SH39 Access review prepared by Commute Transportation (dated 24th August 2018); and
- Preliminary transportation review prepared by TDG (dated November 2017).

Key transportation considerations for this proposal are:

- the accessibility of the site to the various modes of transport; and
- the ability of the surrounding road network to safely and efficiently support the proposed development; and
- the alignment of the potential residential development with that planned for the PPC area and with the remainder of the Rotokauri Structure Plan area.

These and other transportation issues will be addressed in this report.

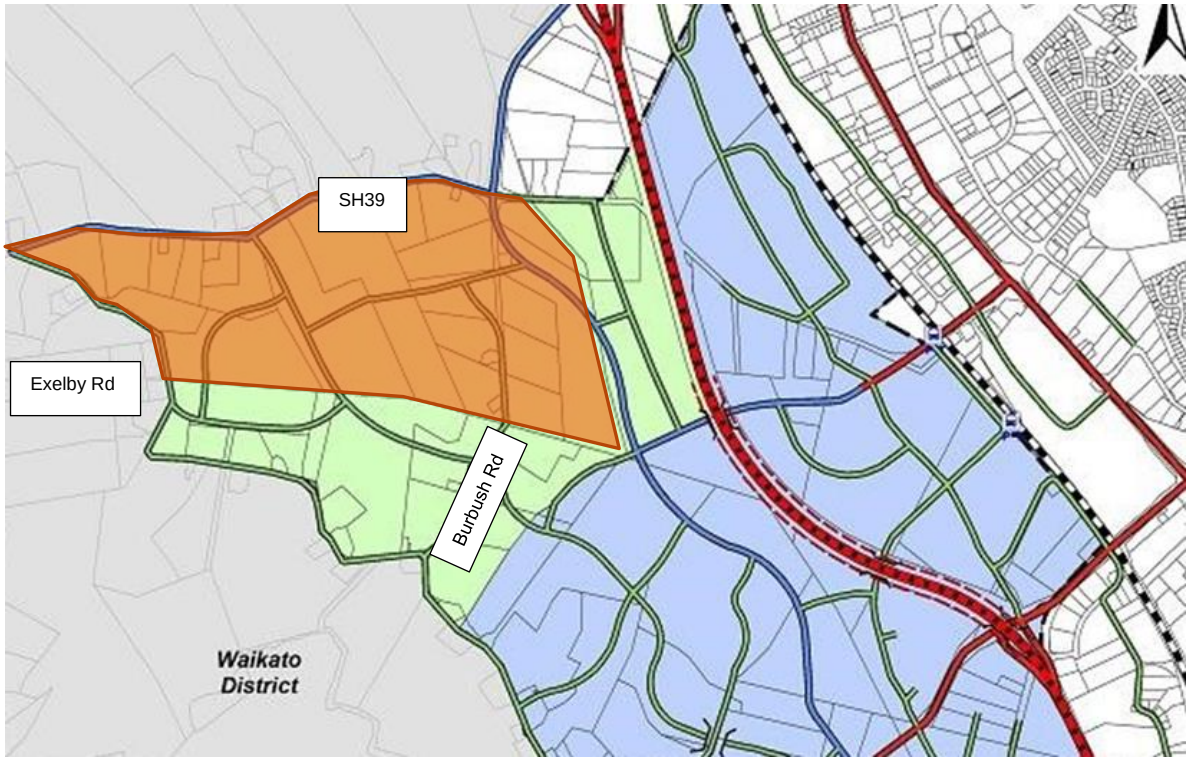
2 EXISTING ENVIRONMENT

2.1 SITE LOCATION

The site is zoned as Future Urban Zone ("FUZ") under the HCDP and is currently occupied by a small number of residential dwellings and agriculture related activities.

Figure 2-1 shows the location of the site in relation to the Rotokauri Structure Plan.

Figure 2-1:Site location (Hamilton City Council's ("HCC") Partly Operative District Plan)



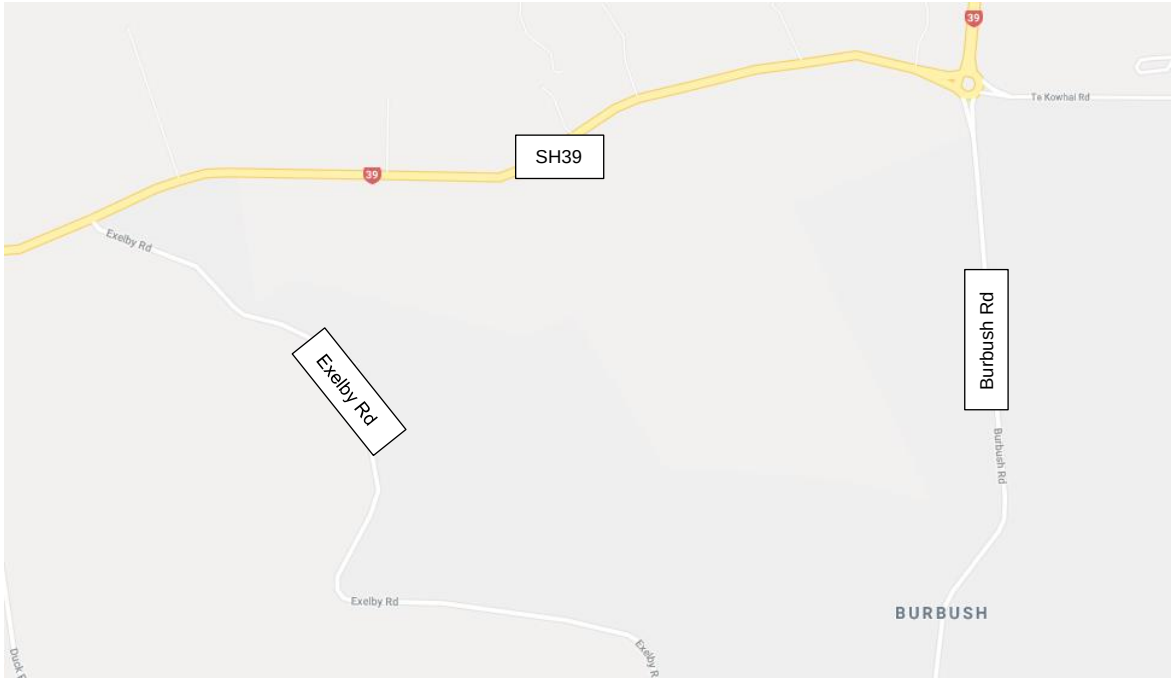
As can be seen above, the PPC area is identified as part of stage 2 of the Rotokauri Structure Plan.

2.2 ROADING NETWORK

2.2.1 GENERAL

Figure 2-2 shows the existing road network near the vicinity of the site.

Figure 2-2: Existing road network



2.3 STATE HIGHWAY 39

State Highway 39 (also known as Te Kowhai Road "SH39") runs east-west along the north boundary of the site. The posted speed limit on SH39 in the area is 80km/hr.

Near the north-eastern corner of the site, SH39 forms a large single-lane roundabout with Te Kowhai Road / Burbush Road and then continues northwards on Koura Drive to a full grade-separated interchange with State Highway 1 (the Waikato Expressway "SH1").

SH39 is a two-way, two-lane road with a typical seal width of approximately 11 m and is marked with a centre line and edge lines and is considered to be in excellent condition. This section of SH39 was upgraded in 2014 as part of a project to re-route SH39 as a more direct link to SH1.

Photograph 1: SH39 in the vicinity of the site



2.4 EXELBY ROAD

Exelby Road runs generally north-west/south-east between SH39 and Rotokauri Road and forms the western boundary of the subject site. Rotokauri Road completes the link to the Baverstock and Nawton suburbs. It is currently a local rural road and has a typical seal width of approximately 5.7 m in the vicinity of the site, with a road corridor width of 20 m. Between SH39 and Burbush Road, Exelby Road does not have any painted markings. The topography and horizontal alignment of Exelby Road results in limited forward visibility at many curves.

Photograph 2: Exelby Road in the vicinity of the site



2.5 BURBUSH ROAD

Burbush Road runs approximately north-east/south-west between SH39 and Exelby Road and forms the eastern boundary of the subject site. It is currently a local rural road and has a typical seal width of approximately 5.7 m in the vicinity of the site, within a road corridor of 20 m. Burbush Road is marked with a centre line from SH39 to Exelby Road.

Photograph 3 shows the current layout of Burbush Road in the vicinity of the site.

Photograph 3: Burbush Road in the vicinity of the site



2.6 ACCESSIBILITY

2.6.1 PRIVATE VEHICLES

The site is well located with regard to vehicle connections to and from the wider Hamilton and Auckland regions. SH39 runs along the northern boundary of the site and provides a

connection to the Waikato expressway northbound and southbound ramps via the SH1 Koura Drive interchange. The SH1 Koura Drive Interchange is located approximately 1 – 3 km north from the site via the Te Kowhai Road/ Burbush Road roundabout. SH1 is a nationally significant route that connects Hamilton to the south and Auckland to the north.

2.6.2 PUBLIC TRANSPORT

There are no local bus services operating near the vicinity of the PPC area. The nearest bus stops are located on Rotokauri Road (some 1.9 km southeast of the site) and serve the Frankton service (Route 8) connecting between Rotokauri Road and the Hamilton town centre.

As the area develops, and stages of the minor arterial road are completed, consideration by Council should be given to either extending the existing Frankton service along the planned minor arterial road and within the site, or providing a new service connecting Rotokauri North to the town centre and wider area.

2.6.3 WALKING

The area surrounding the site is still fairly rural in nature with no dedicated pedestrian provisions along Exelby Road or Burbush Road. However, a shared path is provided at each approach to the Te Kowhai Road/ Burbush Road roundabout as shown in Photograph 4 below.

Photograph 4: Existing shared path near Te Kowhai Road/ Burbush Road roundabout



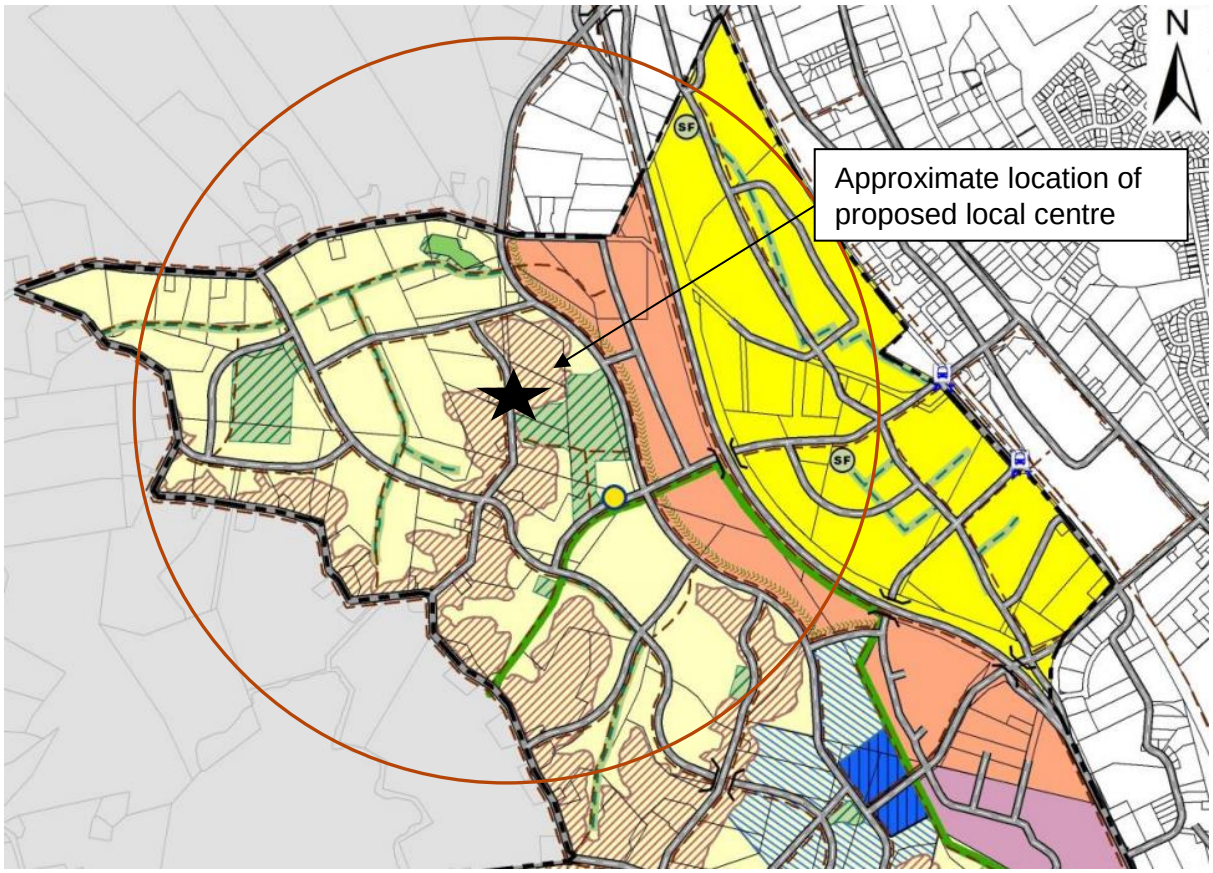
The Austroads Guide to Traffic Engineering Practice Part 13 – Pedestrians indicates that the practical walking distance for non-recreational walking trips is in the order of 1.5km. Using the practical walking distance of 1.5km and the 15th percentile walking speed of a typical fit,

healthy adult of 1.3m/s, gives a journey time of some 20 minutes. This is in line with New Zealand data in the Pedestrian Planning and Design Guide, which states that for walking trips, half are more than 10 minutes and 18% are more than 20 minutes.

The primary catchment area for pedestrians has therefore been based on a 20-minute walking time from the proposed site centres.

As noted, the site is currently rural in nature therefore, there are no existing facilities located near the site within the typical walking catchment area (1.5 km radius). As the area develops in accordance with that planned in the operative Rotokauri Structure Plan and the proposed Rotokauri North Structure Plan the amenity near the vicinity of the will likely be enhanced as shown in Figure 2-3 below.

Figure 2-3: Walking catchment of site (existing operative Rotokauri Structure Plan)



As shown above, a community focal point is planned, southeast of the site, and is located within the walking catchment area. It is noted that the proposal also intends to provide a small neighbourhood centre within the Rotokauri North Structure Plan area, this is also located within the walking catchment area. There are also a number of employment and industrial activity planned by the Rotokauri Structure Plan within the walking catchment area.

In addition, Hamilton City Council have identified as a future Council project, a bridge/ underpass, to connect those parts of the Rotokauri Structure Plan located west and east of the Waikato expressway respectively. Once constructed in the future, this will improve access to the wider facilities such as the Base shopping mall.

2.6.4 CYCLING

There are currently no dedicated cycle facilities on Exelby Road, Burbush Road or SH39. This excludes some localised off-road shared path provided at the approaches to the Te Kowhai Road/ Burbush Road roundabout.

2.7 TRAFFIC VOLUMES

Daily traffic volumes have been extracted from the TDG Preliminary transportation review (dated 2017) and NZTA state highway traffic count database for Exelby Road, Burbush Road, SH39 (Te Kowhai Road). The peak hour volume has been estimated to be 10% of the daily volume; this is outlined in Table 2-1 below.

Table 2-1: Existing Traffic Volumes

Road	ADT	AM
Exelby Road	550 vpd	55 vph
Burbush Road	590 vpd	59 vph
SH39 Te Kowhai Road (between Limmer Road and Duck Road)	5813 vpd	581 vph

2.8 ROAD SAFETY RECORD

A search of the road safety record using the NZTA Crash analysis system (CAS) has been made to identify all crashes reported near the vicinity of the site during the five-year period from 2013 to 2017 including all available crashes in 2018. The study area includes the following road sections:

- SH39 (between Exelby Road and SH1);
- Burbush Road (between SH39 and Exelby Road);
- Exelby Road (between SH39 and Burbush Road); and
- Other several local roads including Te Kowhai Road (east of SH39) and Errol Cl.

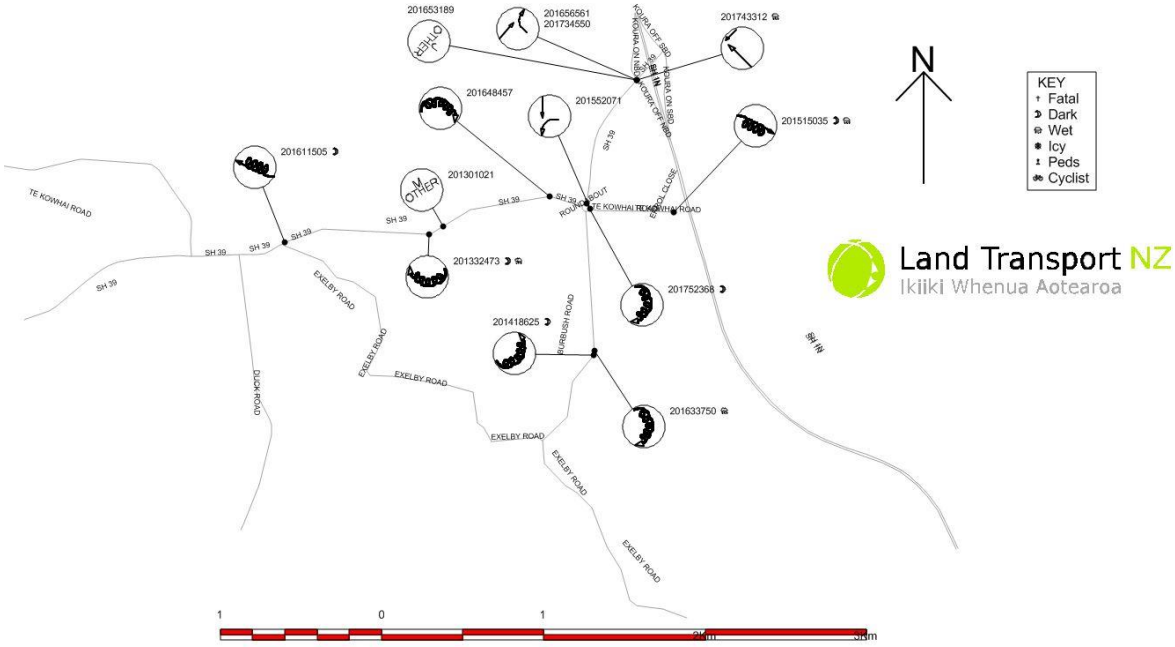
In total, 13 crashes were recorded within the search area over the five-year period. Of these, there was two serious crashes and two minor injury crashes. The remaining crashes had no reported injuries. The following summarises the crashes;

- Two loss of control crashes were reported on Burbush Road. Both crashes involved a vehicle (or motorcycle) losing control when turning left/ right along Burbush Road. One minor injury was reported.
- Four crashes were recorded along SH39 (Te Kowhai Road) including three loss of control crashes. Of the three loss of control crashes reported, two occurred on involved a vehicle losing control when turning right (too far left/ right). The third loss of control crash involved the vehicle going off the road resulting in one serious injury (attempted suicide). The remaining crash resulted in two serious injuries and involved a vehicle eastbound on SH39 hitting another vehicle manoeuvring (manoeuvring vehicle failed to give-way at driveway).
- Four crashes were reported at the intersection between SH39/ Koura road off-ramp (NBD). Of these, two crashes involved a vehicle hitting a vehicle merging from the right (merging vehicle failed to give-way). The remaining two crashes involved a car hitting a van crossing/ turning at the intersection. No injuries were reported.

- Two crashes were recorded at the Te Kowhai Road/ SH39 intersection including one loss of control crash and one merging crash. No injuries were reported.
- one crash was recorded on Te Kowhai Road, some 100 m east of the intersection with Errol Close and involved a vehicle eastbound on Te Kowhai Road losing control (alcohol and lost control under braking were listed as contributing factors).

The CAS diagram is provided in Figure 2-4 below.

Figure 2-4: CAS diagram



As can be seen, a number of loss of control crashes have been reported within the study area. One crash (serious injury) was reported on SH39 involving a vehicle leaving a driveway. In this case, the driver manoeuvring from the property failed to give-way to through traffic. A number of crashes were also recorded at the SH39/ Koura off ramp (NBD), however the majority of these involved vehicles turning/ merging and were all non-injury. As such, provided the new intersections on SH39 and internal intersections are designed appropriately and comply with Austroads sight distance requirements, it is considered that the PPC and potential residential development (including the restriction on private access to SH39) will not exacerbate the existing road safety record.

It is noted that the surrounding road network is currently rural in nature. Following the development of the Rotokauri North Structure Plan, the area will be urbanised. As such, the speed limits are likely to decrease, and the priority control at each intersection will be upgraded accordingly.

3 EXISTING ROTOKAURI STRUCTURE PLAN

The land is identified by Council for Future Urban development and has a current structure plan known as the Rotokauri Structure Plan.

The RCDP describes the area as:

> *"The Rotokauri growth cell is an area of approximately 1000 Ha on the north west fringe of Hamilton. It was brought into the city during the 1980s to provide for long-term*

development and city growth. At present it is primarily in agricultural use, with the majority of the area zoned for future urban development within the District Plan."

The operative Rotokauri Structure Plan outlines the future zoning and transport network for land located within the structure plan boundary to cater for future urban growth. The HCDP identifies that the development of the Rotokauri Structure Plan has been guided by the following vision:

"The sustainable expansion of the City into Rotokauri, through a coherent integrated and people focused mixed use development based on best practice urban design principles"

Figure 2-9 of the Rotokauri Structure Plan also included a transportation network plan, identifying arterial, key collector and collector roads as shown in Figure 3-1 below.

Figure 3-1: Rotokauri Structure Plan – Staging and Transport Network

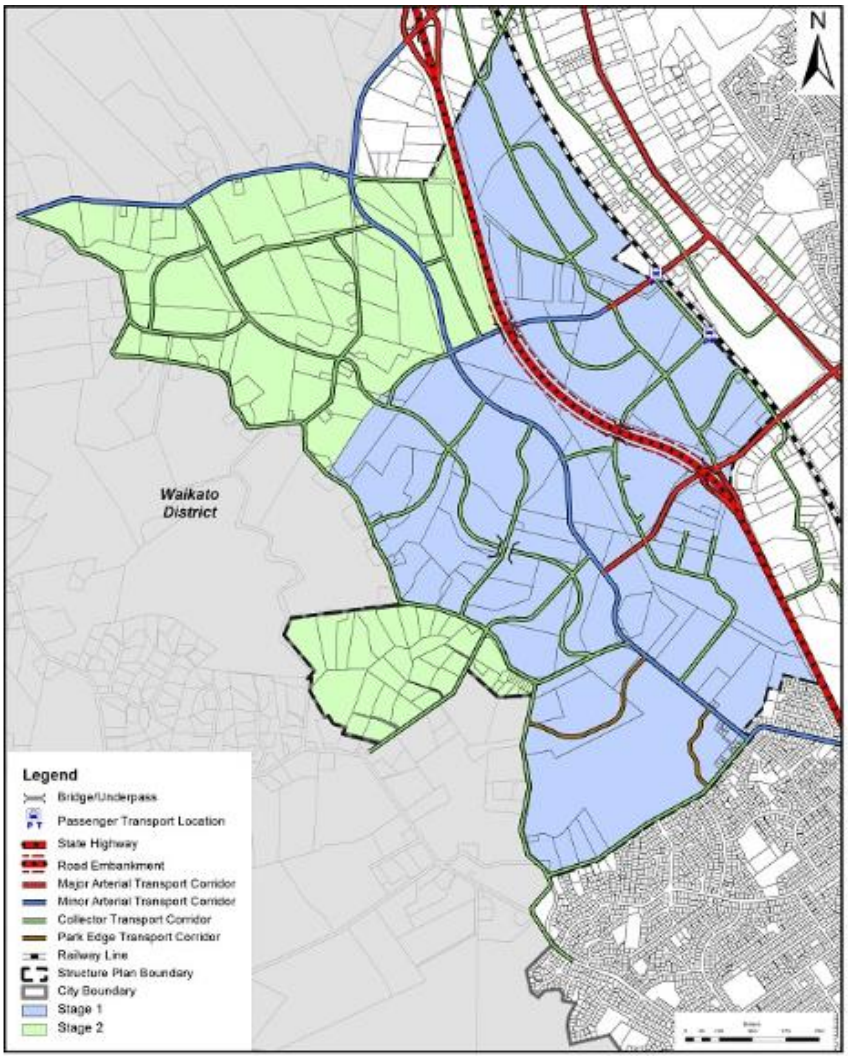
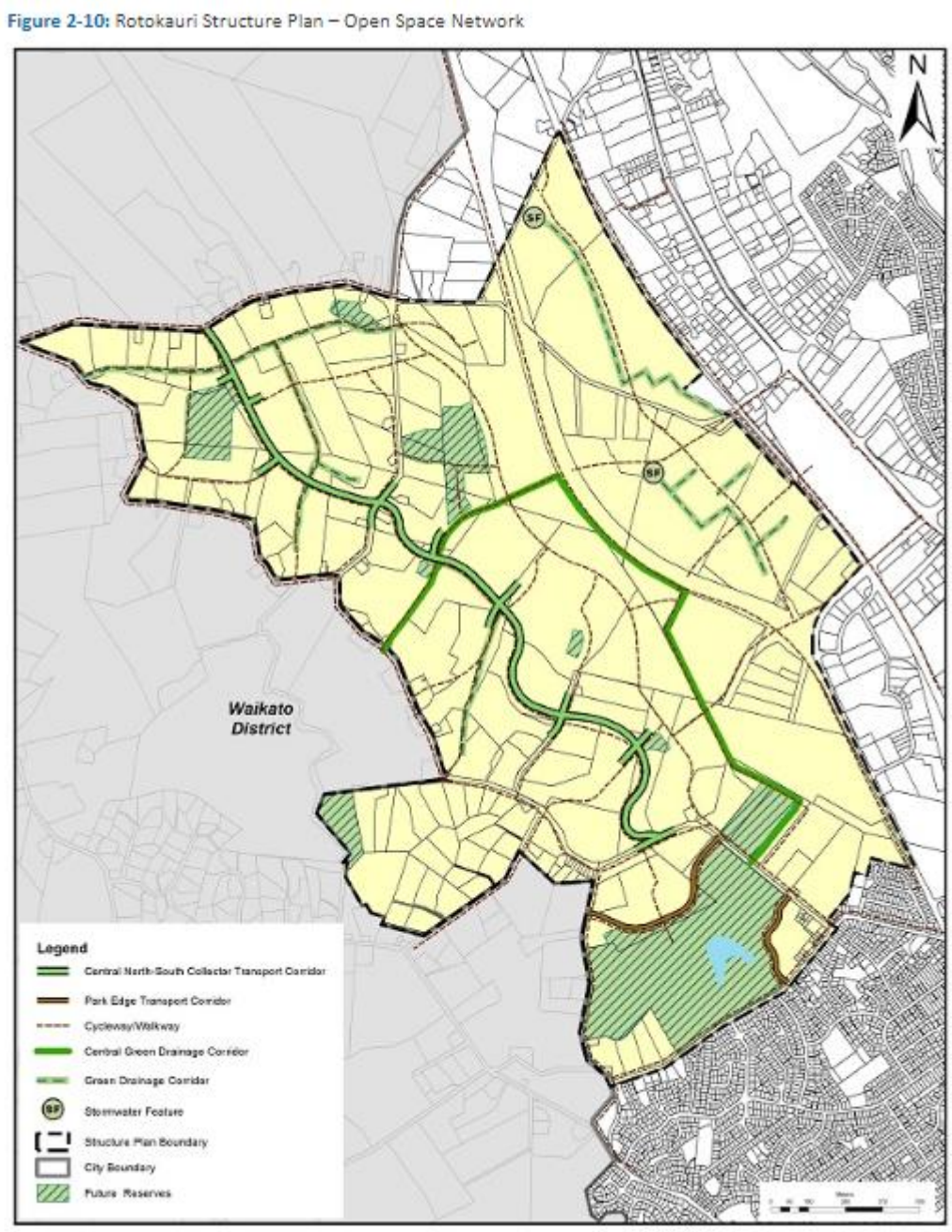


Figure 2-10 of the Rotokauri Structure Plan also includes the main pedestrian and cycle facilities planned as shown in Figure 3-2 below.

Figure 3-2: Rotokauri Structure Plan - Open Space Network



The Rotokauri Structure Plan outlines the release of land for development in two stages, with the PPC located within the stage 2 area. The Rotokauri Structure Plan indicates that the release of land beyond stage 1A (such as the PPC):

> *"will be contingent upon the availability of network capacity which may arise as a result of traffic generation being less than anticipated in the traffic growth assessments, or from completion of new infrastructure".*

This report outlines the availability of network capacity and any upgrades to the main network required to give effect to the release of the Rotokauri North area as a separate stage/PPC.

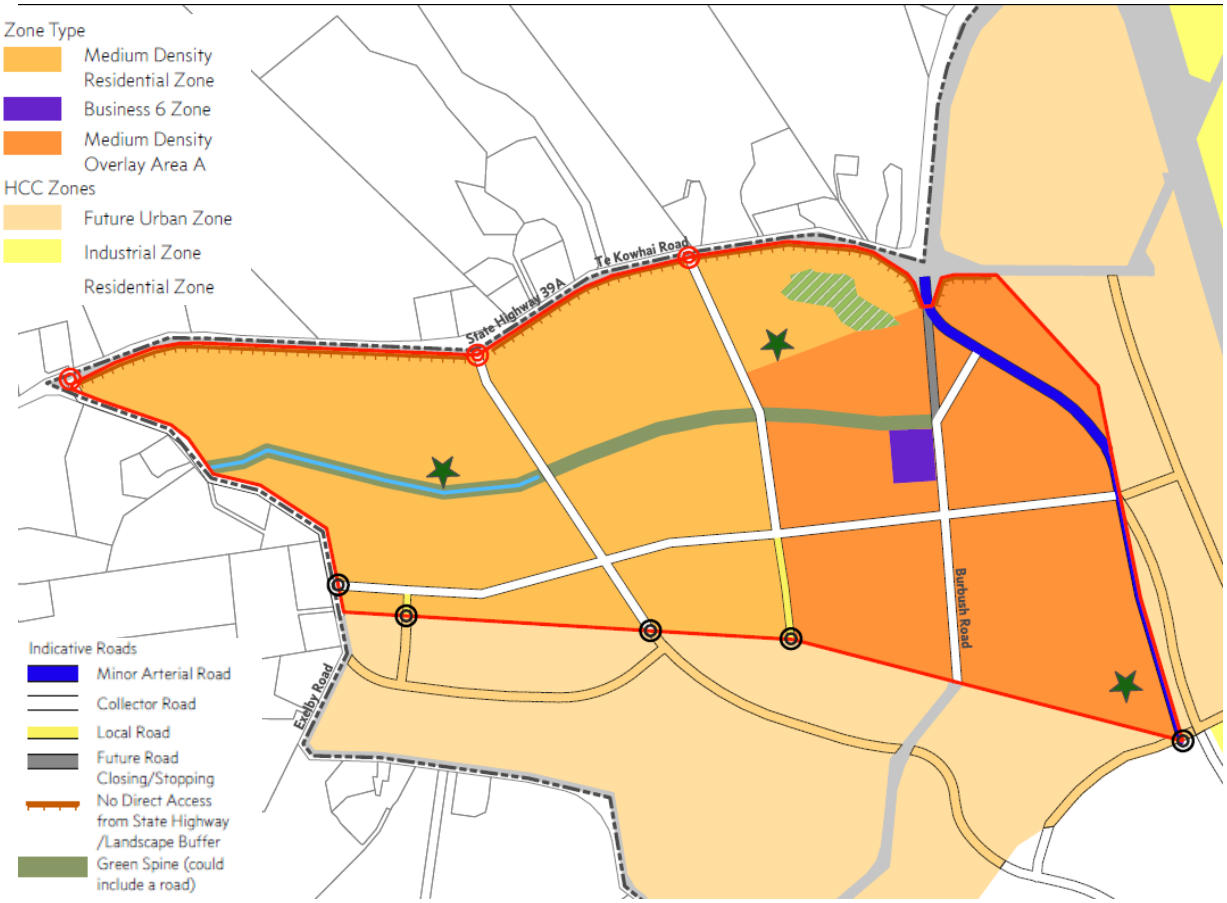
4 PROPOSED DEVELOPMENT

The proposal intends to rezone approximately 140 ha of land located in Rotokauri North. The site is currently zoned as 'Future Urban' in the HCDP and the proposal intends to rezone the land to predominantly 'Medium Density Residential' zoning to allow for the development of approximately 2000 residential dwellings. Of note, a neighbourhood centre is also proposed in the centre of the development.

The site is located at the north western end of the Rotokauri Structure Plan boundary.

Figure 4-1 shows the proposed zoning including the location of a local neighbourhood centre (circled in red).

Figure 4-1: Proposed zoning of Rotokauri North



5 PROPOSED ROAD NETWORK

A hierarchy of road types are proposed and have been designed with the intention of creating a clearly understood movement pattern as well as some variety and character throughout the Rotokauri North area and to maintain key connections with the Rotokauri Structure Plan.

Figure 4-1 above shows the proposed road hierarchy and roading connections.

Following attendance at a Council workshop (August 2018), during which consideration of site constraints and opportunities were discussed, a new structure plan has been developed and is shown in Figure 4-1 above.

5.1 ROTOKAURI NORTH STRUCTURE PLAN: TRANSPORTATION NETWORK

The Rotokauri North Structure Plan anticipates that the proposed road network will have a total of eight key road connections to the existing road network (circled in orange in above), including:

- Two new connections onto SH39;
- One connection on Exelby Road;
- One connection onto Burbush Road.

A minor arterial road is proposed as part of the development and will connect to the Te Kowhai Road/ Burbush Road roundabout at the northern end. As a result of establishing the new minor arterial road, Burbush Road could be realigned at the northern end and is planned to connect to the minor arterial road, rather than the Te Kowhai Road/ Burbush Road roundabout (as existing). The alignment also locates this minor arterial entirely within the PPC area to allow its delivery with this stage rather than it being split between this stage and a future stage (unknown delivery date).

It is noted that both Exelby Road (carriageway and eastern berm) and Burbush Road will be upgraded to collector roads as part of the development. Further key connecting points to the rest of the Rotokauri Structure Plan area will be maintained.

5.1.1 KEY DIFFERENCES – IMPACT ON SH39

The proposal introduces several minor changes to the road network when compared to that planned as part of the Rotokauri Structure Plan. These are outlined in Table 5-1 below (and locations illustrated in Figure 5-1 below). It is noted that, similar to the proposed layout, one east-west link is planned within the Rotokauri Structure Plan.

Figure 5-1: Planned road network for the operative Rotokauri Structure Plan

Figure 2-9: Rotokauri Structure Plan – Staging and Transport Network

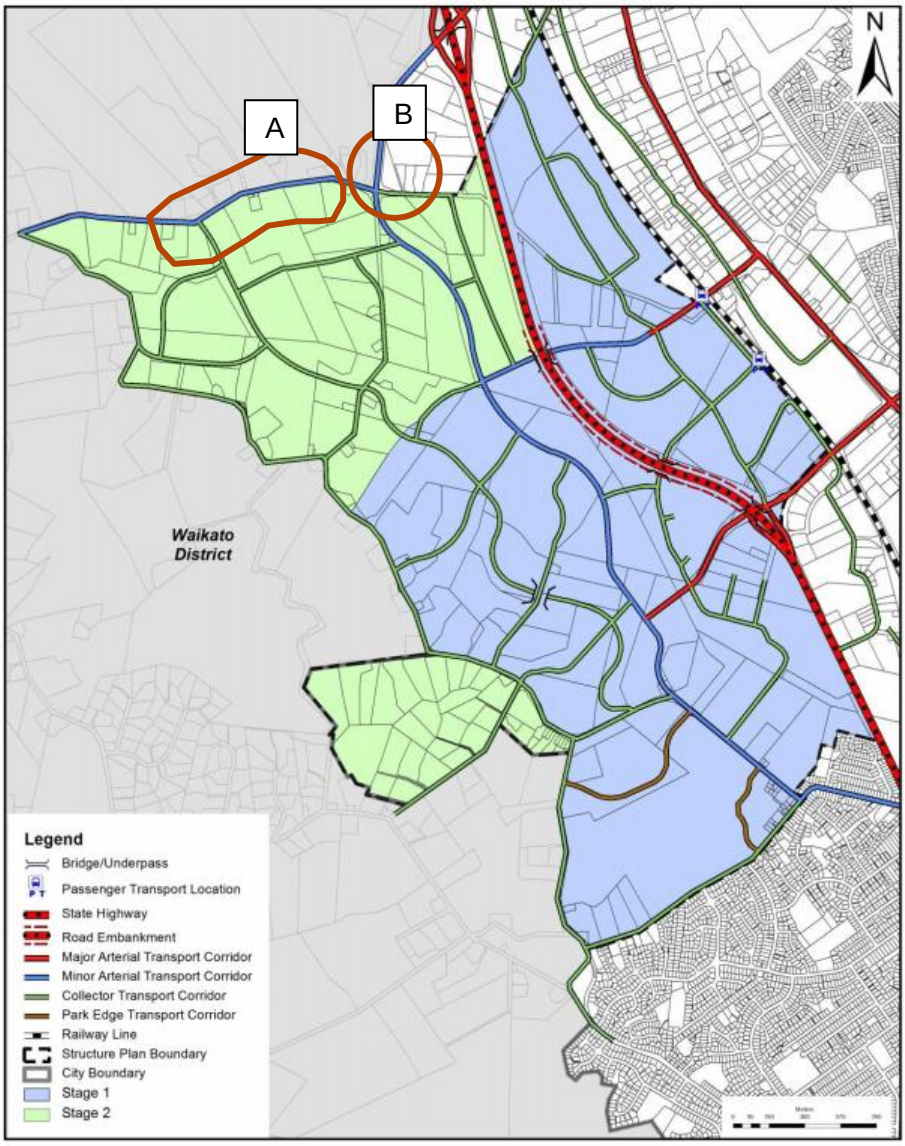


Table 5-1: Comparison of road network planned as part of the operative Rotokauri Structure plan and the proposed Rotokauri North Structure Plan respectively

	Road name	Operative	Proposed	Comment
A	New connections onto SH39	The Rotokauri Structure Plan indicates one new road connection onto SH39	The proposal intends to provide two new road connections onto SH39	Provided these new road connection intersections are designed to comply with Section 9 below and the Austroads Guide requirements, it is considered that by providing an additional link onto the state highway network, this will reduce congestion at the existing and planned intersections once the

				structure plan area is fully developed.
B	Burbush Road	With a new minor arterial road, Burbush Road is planned to connect to the minor arterial road via a new collector or local road.	The proposal identifies the opportunity to realign Burbush Road such that it connects directly to the new minor arterial road. Road stopping is matter to be addressed through the Local Government Act 2002	Provided the intersection between Burbush Road and the new minor arterial road is designed in a safe manner and complies with Austroads guide requirements, it is considered that this alteration is not considered to adversely affect the future road network in any way. It is noted that, consideration must be given to providing dedicating turning bays on the minor arterial road onto Burbush Road to avoid vehicles turning into Burbush Road obstructing through traffic.

Notwithstanding the changes outlined in Table 5-1 above, the proposed road network typically aligns with the planned road network outlined in the Rotokauri Structure Plan.

Through refinement of the area the internal roading layout has changed from that contained in the Rotokauri Structure Plan, however the general principles remain the same with a network of collector roads linking to the arterial network to the north (SH39) and east (new arterial road). The location of the road links to the land to the south of the proposal are generally in the same location as shown in the Rotokauri Structure Plan with the additional of a new collector road link near the middle of the site which directly links to the additional connection to SH39 as noted in item B (Table 5-1) above.

5.2 ROAD CROSS-SECTIONS

Figure 3.6.2(c) -(g) of the Rotokauri Structure Plan sets out the recommended cross-sections for various types of roads.

The following sections outline the proposed cross-section for each road within the PPC area and its alignment with the Rotokauri Structure Plan cross-sections.

5.2.1 MINOR ARTERIAL ROAD

For a minor arterial road, the Rotokauri Structure Plan outlines the following requirements:

- 2 x 3.5 wide traffic lane separated by a 4 m wide solid medium/ return bay;
- 1.8 m wide cycle lane (both sides);
- 2.5 m parallel parking along one side of the carriageway. Adjacent to this side of the carriageway, the following should be provided:
  - 2 m wide front berm;
  - 1.8 m wide footpath;
  - 2 m wide back berm.
- 9.4 m wide recessed 60-degree angle parking (one-side) Adjacent to this side of the carriageway, the following should be provided:

- 1.7 m wide front berm;
- 3 m wide shared path;
- 3 m back berm.

Two cross-sections are proposed for the minor arterial road including one without and with a swale respectively. The cross-section proposed without a swale includes the following:

With swale

- 2 x 3.5 m wide traffic lane separated by a 3.5 m wide solid median;
- 1.2 m wide shoulder (both sides);
- 2.75 m wide berm/ parking bay (both sides);
- 3.0 m wide shared use path (both sides); and
- 1.8 m wide back berm (both sides).

Where the road reserve includes a swale (along one side of the road only) a 1.0 m wide berm separating the parking/ berm and shared use path is provided typically similar to that shown above. The key difference being a swale and 1.0 m wide berm (along one side) separating the parking/ berm and shared use path is provided.

The cross-sections proposed for the minor arterial road are shown in Figure 5-2 and Figure 5-3 below.

Figure 5-2: Minor arterial road cross-section (without swale)

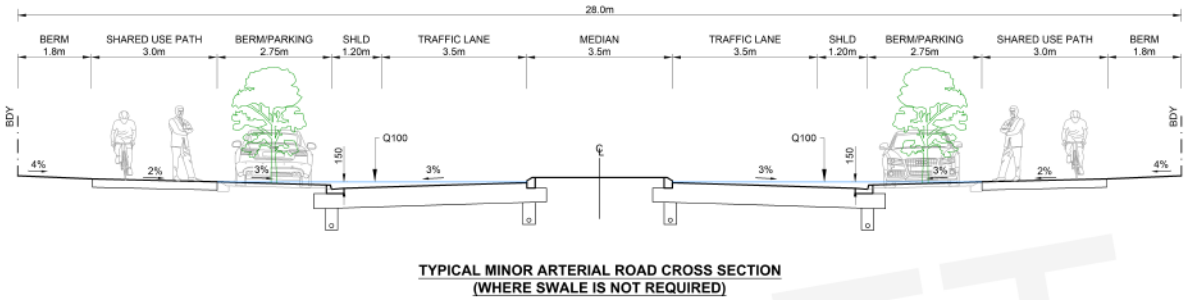
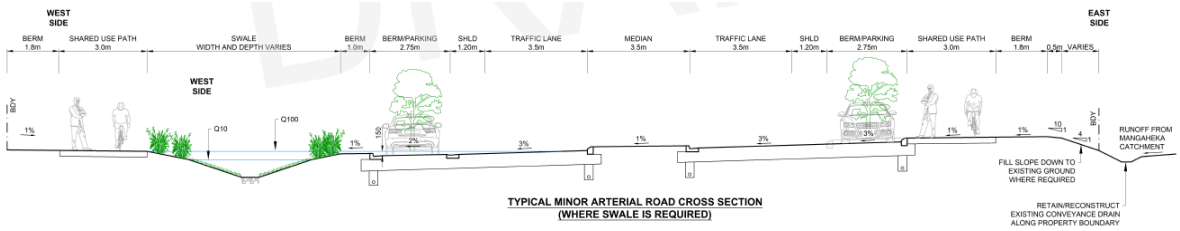


Figure 5-3:Minor arterial road cross-section (with swale)



The key differences between the proposed cross-sections and that outlined in the Rotokauri Structure plan are as follows:

- The width of the centreline median has been reduced to 3.5 m (initially 4.0 m);
- Cycle and pedestrian provisions have been amalgamated as a shared path rather than providing separate facilities;
- Parallel on-street parking is proposed along both sides of the road rather than a mix of parallel and angled parking (structure plan).

While not yet finalised, it is recommended that the speed limit along the minor arterial road be 60 km/hr.

Based on the above, the typical cross-section of the minor arterial road generally aligns with that planned and is considered acceptable. Furthermore, the cross sections in both the operative Rotokauri Structure Plan and the proposed Rotokauri North Structure Plan area are indicative only, and full design to an acceptable standard is captured by existing HCCDP provisions which requires a Restricted Discretionary Activity resource consent for creation of a new road.

5.2.2 COLLECTOR ROAD

Figure 3.6.2(e) of the Rotokauri Structure Plan outlines the following requirements for a collector road:

- 2 x 3.5 wide traffic lane separated by a 3 m wide flush medium;
- 6.2 m wide front berm (both sides);
- 1.8 m wide footpath (both sides);
- 2 m wide back berm (both sides).

A number of collector roads are proposed within the site. Section 15-5 (f) of the HCDP indicates that a "*collector road performs both a movement and property access function and are expected to move goods and people between local destinations or to higher order transport corridors for further travel. Property access is provided with few restrictions. Depending on the land use environment heavy freight and through traffic may be limited on these corridors. Intra-city passenger transport services are likely to use these routes".*

Similarly, two cross-sections are proposed within the PPC area including one with and without a swale respectively, as follows:

- 2 x 3.0 m wide traffic lane (both directions);
- 0.6m wide shoulder (both sides);
- 1.5 m wide on-road cycle lane (both sides);
- 2.5 m wide berm/ parking bay (both sides);
- 1.8 m wide footpath (both sides); and
- 1.0 back berm (both sides).

Where the road reserve includes a swale (along one side of the road only) a 1.0 m wide berm separating the parking/ berm and footpath is provided typically similar to that shown above. The key difference being a 1.0 m wide berm separating the parking/ berm and shared use path is provided.

Compared with the Structure Plan layout, the proposal intends to provide narrower lanes (3.0 m) and include on-road cycle facilities with 0.6 m wide separation from the traffic lanes. In this regard, the narrower lanes are considered acceptable. In addition, on-street parallel parking spaces are proposed along the collector road (currently not planned as part of the Rotokauri Structure plan). The on-street parking is located adjacent to the cycle lane; it is therefore recommended to provide the 0.6 m wide separation (buffer) between the parking and cycle lane to avoid collisions between drivers opening car doors and cyclists (rather than between the cycle and traffic lane).

While the proposed cross-sections for a collector road vary in some respects to that outlined in the Rotokauri Structure Plan, given that the road will cater for all modes of transport, the proposed layout is an improvement to the previous layout and is therefore considered acceptable.

While not yet finalised, it is recommended that the speed limit along the collector road be 50 km/hr.

The cross-sections proposed for a collector road is shown in Figure 5-4 and Figure 5-5 below.

Figure 5-4: Collector road - proposed cross-section

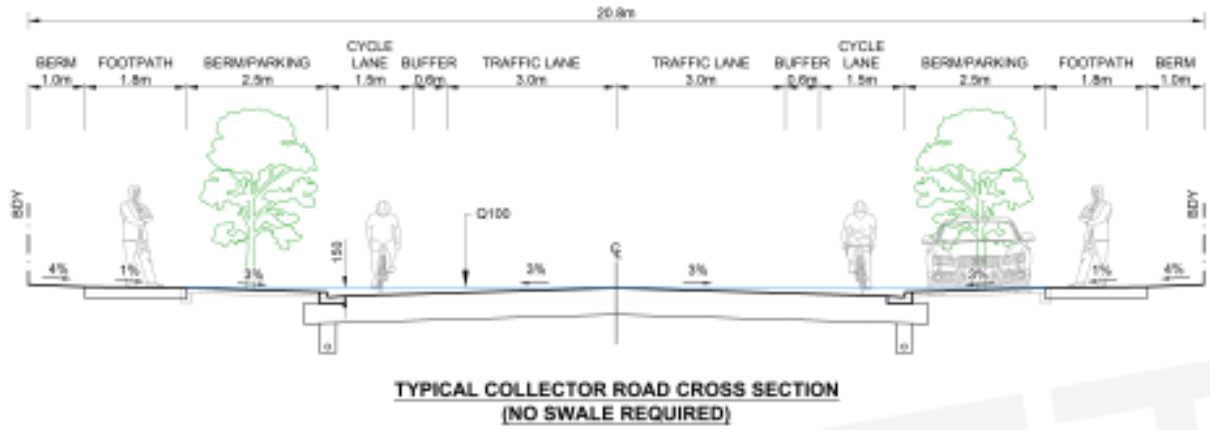
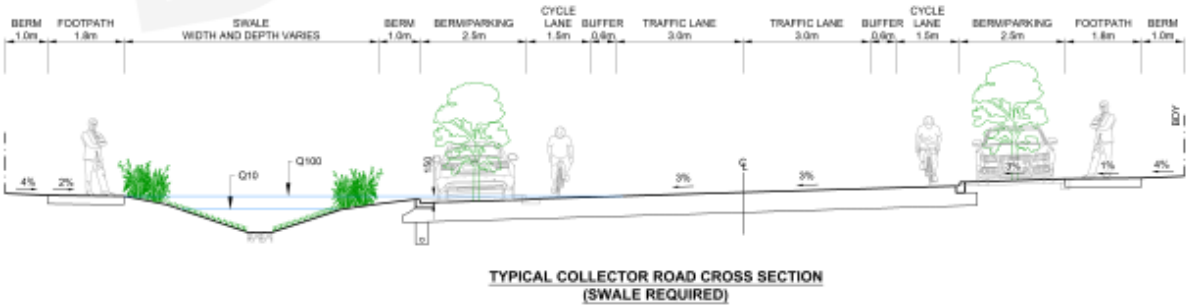


Figure 5-5: Collector road - proposed cross-section (swale)



Overall, the layout proposed for a collector road (on-site) typically aligns with that originally planned and is considered acceptable. Furthermore, the cross sections in both the operative Rotokauri Structure Plan and the proposed Rotokauri North Structure Plan area are indicative only, and full design to an acceptable standard is captured by existing HCCDP provisions which require a Restricted Discretionary Activity resource consent for creation of a new road.

5.2.3 LOCAL ROAD

Figure 3.6.2(f) of the Rotokauri Structure Plan outlines the following requirements for a local road:

- 2 x 3 m wide traffic lane (no separation);
- 6.0 m wide front berm (one-side). Adjacent to this, the following should be provided:
  - 3 m wide footpath;
  - 3 m wide back berm.
- 2 m wide front berm (one side). Adjacent to his, the following should be provided:
  - Drainage reserve (to include some 2.0 m wide footpath).

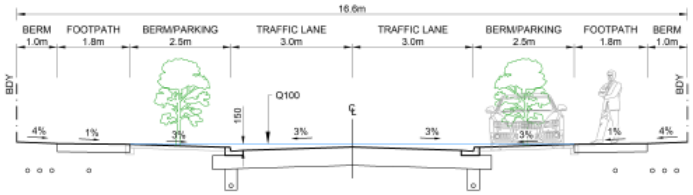
A number of local road types are proposed to provide access to the dwellings. The HCDP outlines the function of a local road is for *property access*. Three cross-sections are proposed within the PPC area and vary in relation to providing on-street parking (one or both sides) or providing a swale.

The typical local road layout includes the following:

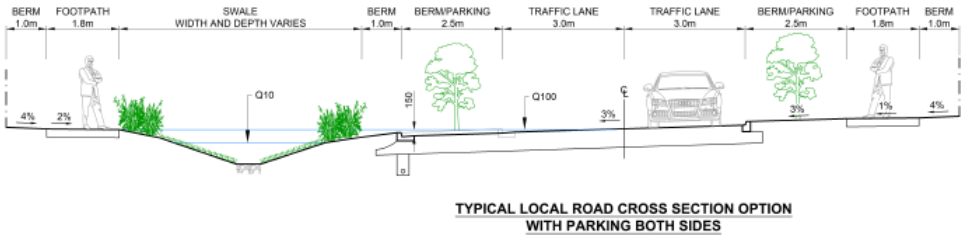
- 3.0 m wide lane (both directions);
- 2.5 m wide berm/ parking bay (both sides);
- 1.8 m wide footpath (both sides); and
- 1.0 m wide back berm.

The second cross-section incudes the above features with the addition of a swale. The key difference being that the second layout includes a swale along one side of the road (no adjacent parking lane) and the third layout comprises parking on both sides and a swale. Figure 5-5 shows the layout of all three cross-sections.

Figure 5-6: Local road - proposed cross-section







As such, excluding the additional provision of on-street parking along one or both sides of the road (not currently planned for), the proposed cross-sections typically align with that outlined in the Rotokauri Structure Plan for a local road. Further, while no dedicated cycling facilities are provided along local roads, it is recommended that these are designed to a low volume speed limit (40 km/hr) by way of speed humps to encourage lower speeds.

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Provided the above recommendations are included in the proposal, including speed management provisions, the above cross-sections are considered acceptable. Furthermore, the cross sections in both the operative Rotokauri Structure Plan and the proposed Rotokauri North Structure Plan area are indicative only, and full design to an acceptable standard is captured by existing HCCDP provisions which require a Restricted Discretionary Activity resource consent for creation of a new road.

5.2.4 REAR LANES

Laneways to access lots from the rear known as “rear lanes” has also been introduced through the PPC. Rear lanes are critical to accessing lots which may front Arterial or Collector Roads, providing an alternative to individual accesses from these higher order roads, and form a key component in maintaining pedestrian and cyclist safety along these routes also. However, it is emphasised that rear lanes are not the same thing as traditional access lot servicing rear lots. These are lanes proposed to serve front lots via a rear access. Three types of rear lanes form part of the PPC packages, the dimensions of these are:

- 7m width for a two-way rear lane;
- 4m width for a one-way lane **where** parking spaces accessed directly off the lane and/or any reverse vehicle manoeuvring into the lane are aligned between 0 degrees (parallel parking) to 45 degrees (angled parking) to the lane; and
- 7m width for a one-way lane **where** parking spaces are accessed directly off the lane and/or any reverse vehicle manoeuvring into the lane are aligned between 46 degree (angled parking) and 90 degree (perpendicular parking).

In this regard, the final detail of vehicle tracking in lanes is a matter to be determined at resource consent stage, based on the final form and length etc of each individual lane. However, subject to the length of the rear lane, in general the widths proposed on a straight block/grid pattern development (as that proposed and anticipated by the PPC) should be suitable.

5.3 PROPOSED INTERSECTION LAYOUTS

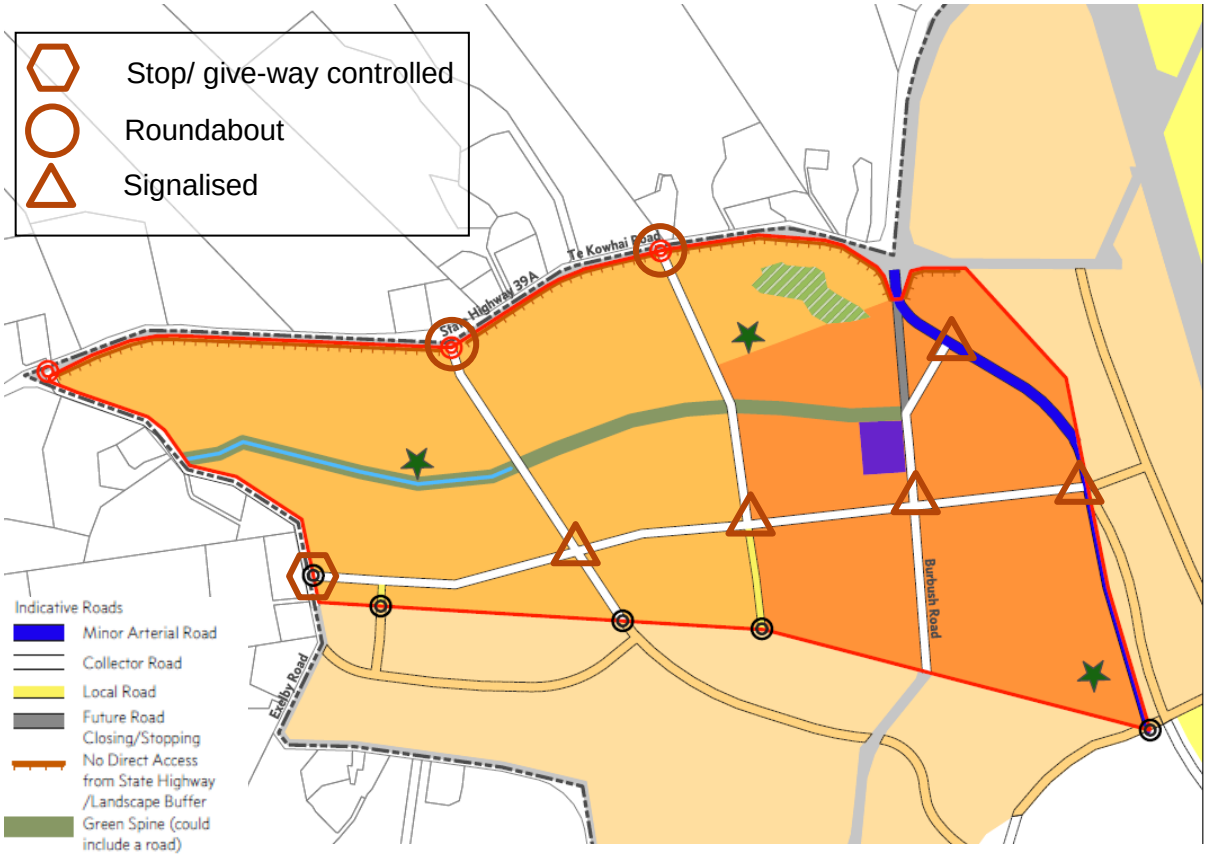
The proposed internal road network is expected to comprise a variety of intersection forms form give-way to signalised intersections. The intersection controls recommended through the site are as follows:

- Arterial / Collector intersections should be roundabout controlled or signalised (unless demand does not warrant);
- Collector/ collector cross-road intersections should be signalised or roundabout (unless demand does not warrant);
- all local road/ local road intersections should be give-way controlled;
- all local road/ collector road intersections should be give-controlled; and
- all collector road/ SH39 intersections should be roundabout controlled (modelling indicates single lane), however Exelby Road unlikely to warrant anything other than standard intersection.

Of note, the above recommendations are only indicative (especially the roundabout vs traffic signals) and are subject to demand analysis at sub-stages (resource consents) of traffic volumes / cyclists and pedestrians at the time of detailed design stage.

Figure 5-7 shows the proposed layout and recommended intersection controls throughout the site.

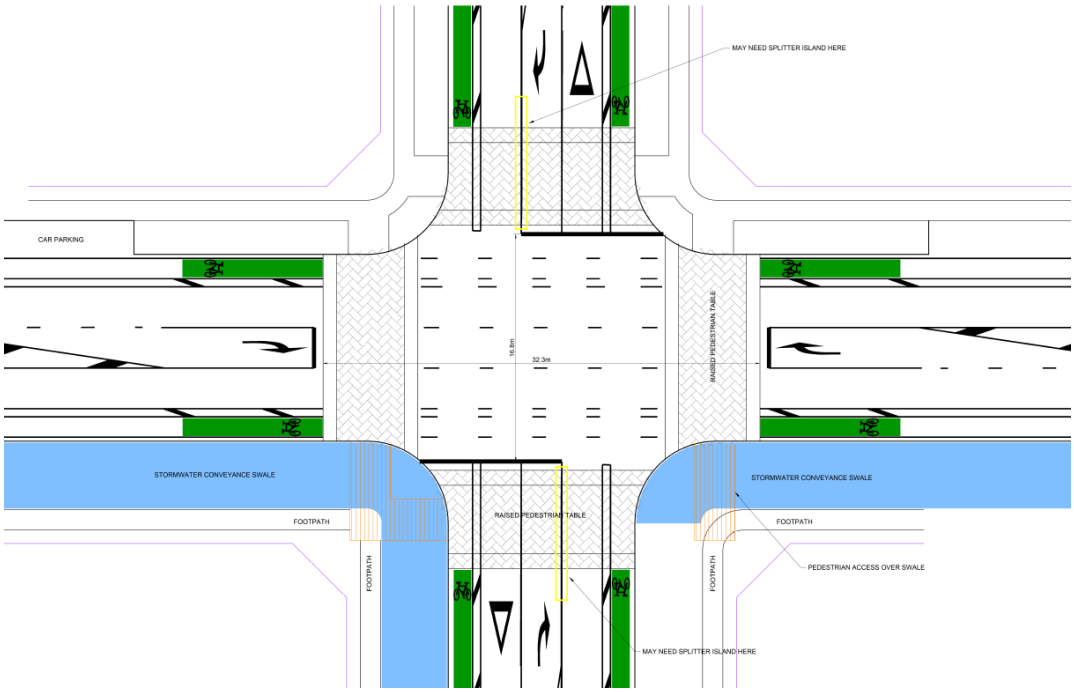
Figure 5-7: Recommended intersection forms through the site



5.3.1 COLLECTOR/COLLECTOR ROAD INTERSECTIONS

A signalised intersection layout (indicative) has been designed for all cross-road (collector road/ collector road) intersections within the site. Figure 5-7 above, shows the recommended location of all signalised intersections and Figure 5-8 shows the proposed collector road cross-section intersection layout.

Figure 5-8: Proposed collector road/ collector road intersection layout



As shown above, each approach includes the following a single through movement/ left turn lane (combined), a dedicated right turn (short lane), on-road cycle lanes (either side) and pedestrian crossings.

5.4 CYCLING PROVISION

A comprehensive cycling network will serve the site. The proposed cycling provisions are to be provided along the new minor arterial road and collector roads and will include the following:

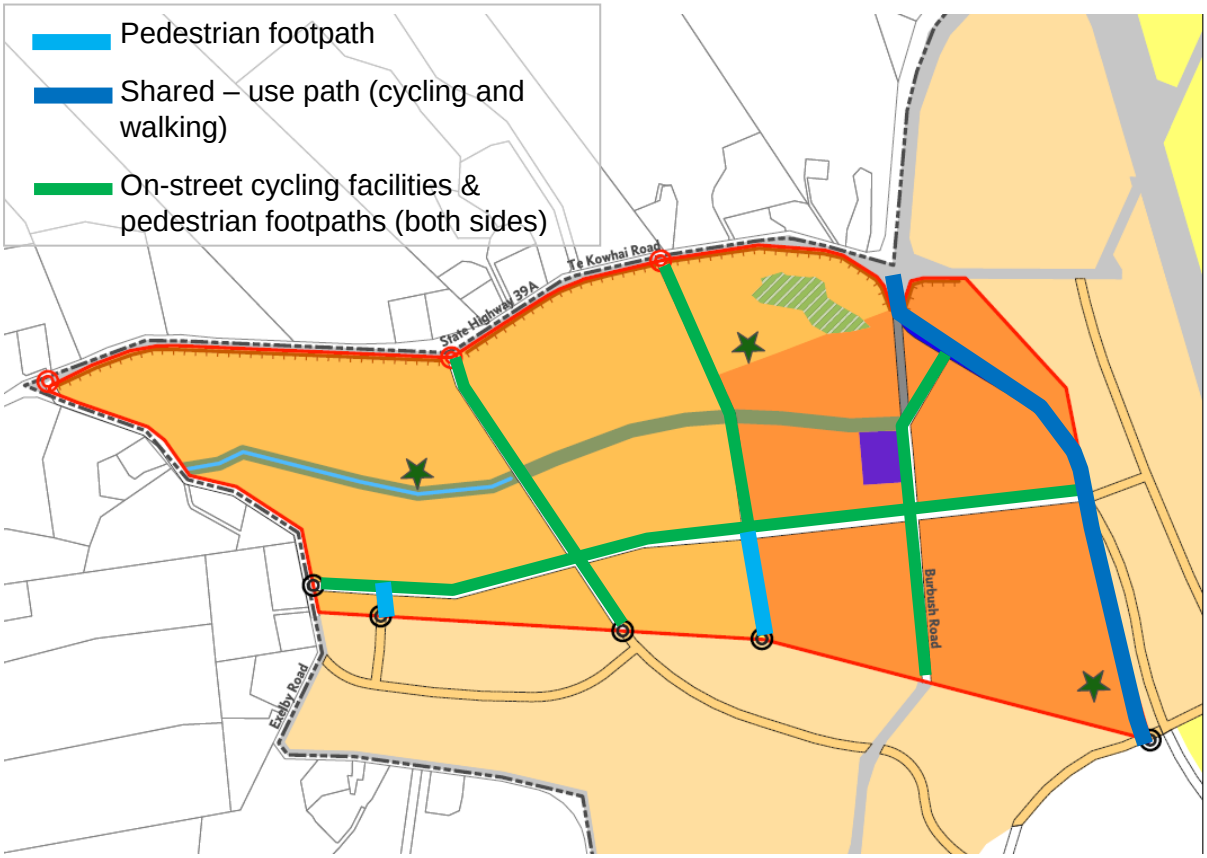
- Minor arterial road: 3.0 m wide shared paths (both sides); and
- Collector roads: 1.5 m wide on-road cycle lanes along both sides of the road and will have a 0.6 m wide separation from the traffic lane.

As noted, a local neighbourhood centre will also be provided and is typically expected to cater for the surrounding residential dwellings. In this regard, it is recommended to provide a low speed environment in the form of traffic calming near the local centre.

Given that the local roads are not expected to provide any dedicated cycling facilities, it is recommended to encourage a low speed environment along these roads by means of traffic calming such as speed tables / road narrowing, ideally at 80 m spacings.

Figure 5-9 shows the proposed cycling and pedestrian network within the PPC area.

Figure 5-9: Proposed cycling provision



6 TRIP GENERATION

6.1 GENERAL

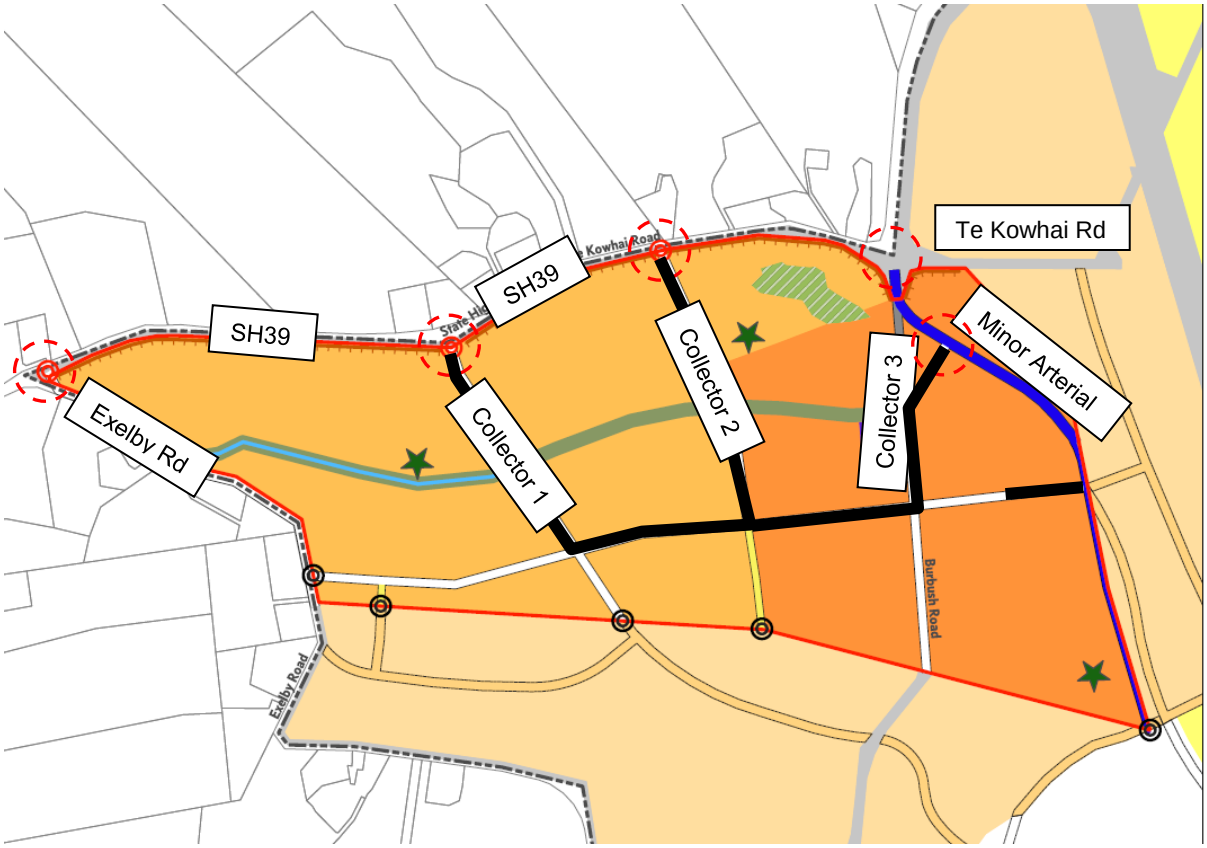
Traffic modelling has been undertaken using the Tracks model (current version) for Hamilton to determine the volumes proposed along the existing roads near the PPC area, as a result of the development associated with the PPC area, for the future years 2021 and 2041. For the purpose of this assessment, the following items were considered in the model:

- the full extent of the development (2000 dwellings) is considered to be established by the year 2021 (worst case);
- the PPC area predominantly comprises of 'Residential' zoning; and
- the major road links proposed within the PPC area have been included in the modelling (as shown in Figure 6-1 below).

Five intersections have been considered within this assessment and are highlighted in Figure 6-1 above. This includes:

1. Exelby Road/ SH39 intersection;
2. Collector 1/ SH39 intersection;
3. Collector 2/ SH39 intersection;
4. SH39/ minor arterial road/ Te Kowhai Road roundabout intersection; and
5. Collector 3/ Minor arterial road intersection.

Figure 6-1: Key roads adopted (within the PPC area) for modelling purposes (outlined in black)



Attachment A provides the volumes proposed along roads within and near the site.

6.2 INTERSECTION PERFORMANCE

6.2.1 GENERAL

The performance of the intersections has been modelled using SIDRA Intersection 6.0 (Sidra), an industry standard tool for assessing the performance characteristics of intersections and road networks.

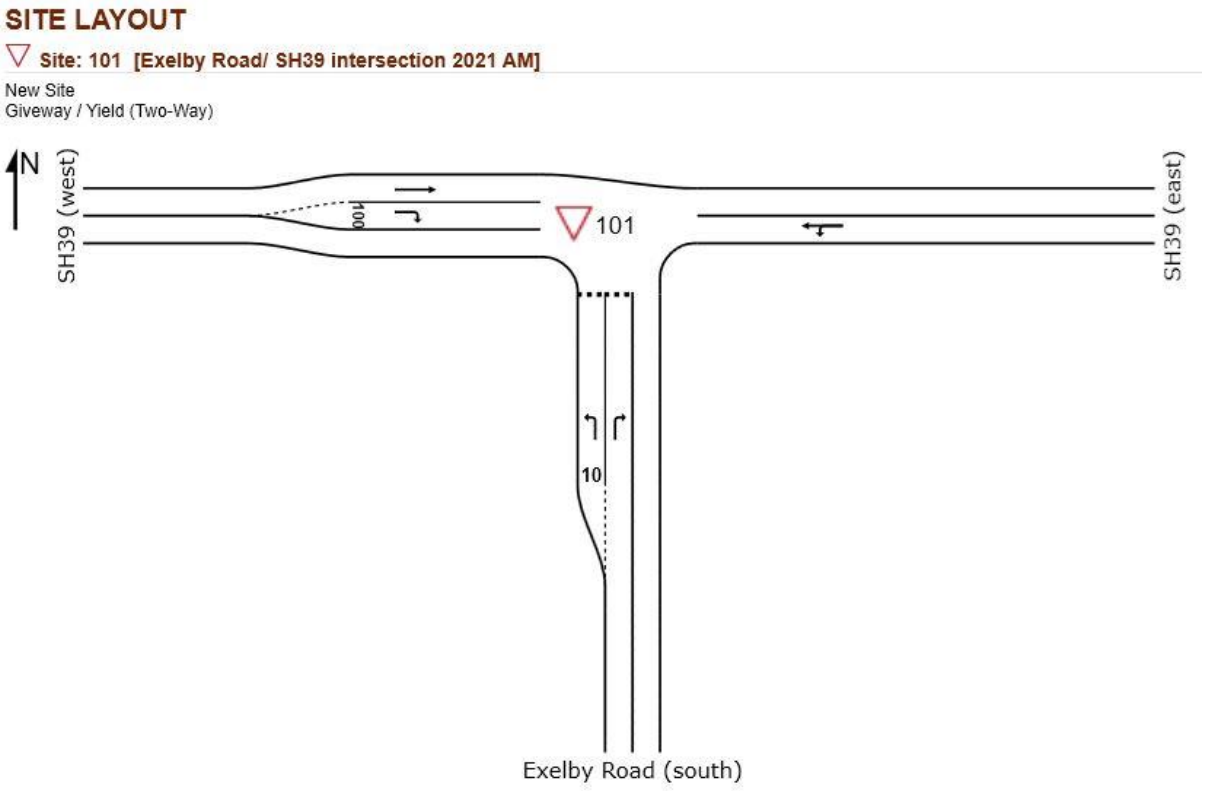
The results presented in this report include the Degree of Saturation, which is a measure of available capacity and the Level of Service ("LOS"), which is a generalised function of delay. For priority (sign) controlled intersections, a degree of saturation of less than 0.8 is considered to be acceptable. LOS A and B are very good and inactive of free flow conditions; C is good; D is acceptable; and E and F are indicative of congestion and unstable conditions. For a signalised intersection, a degree of saturation less than 0.9 is considered acceptable.

The following sections outline the performance of each intersection for the future years 2021 and 2041 and any upgrades required at these intersections.

6.2.2 EXELBY ROAD/ SH39 INTERSECTION (EXISTING)

The Exelby Road/ SH39 intersection (existing) is currently give-way controlled with priority afforded to vehicles along SH39. The intersection provides a right turn bay on SH39 to facilitate vehicles turning right into Exelby Road. Figure 6-2 shows the typical layout of this intersection.

Figure 6-2: Exelby Road/ SH39 intersection



The performance of the intersection for the future year 2021 and 2041 is outlined in Table 6-1 and Table 6-2 below.

Table 6-1: Performance at Exelby Road/ SH39 intersection 2021 – AM(PM)

Leg	Movement	Degree of Saturation (v/c)	Average Delay (s)	LOS	95th %ile Queue (m)
Exelby Road (south)	LT RT	0.084 (0.127) 0.002 (0.002)	6.5 (6.9) 10.7 (11.3)	A (A) B (A)	2.5 (3.8) 0.1 (0.1)
SH39 (east)	LT TH	0.130 (0.169) 0.130 (0.169)	5.6 (5.6) 0.0 (0.0)	A (A) A (B)	0.0 (0.0) 0.0 (0.0)
SH39 (west)	TH RT	0.157 (0.165) 0.102 (0.071)	0.0 (0.0) 6.5 (6.8)	A (A) A (C)	0.0 (0.0) 3.4 (2.3)

Table 6-2: Performance at Exelby Road/ SH39 intersection 2041 – AM(PM)

Leg	Movement	Degree of Saturation (v/c)	Average Delay (s)	LOS	95th %ile Queue (m)
Exelby Road (south)	LT TH	0.055 (0.020) 0.003 (0.004)	7.2 (7.7) 14.0 (18.4)	A (A) B (C)	1.5 (0.5) 0.1 (0.79)
SH39 (east)	TH RT	0.212 (0.270) 0.212 (0.270)	5.6 (5.6) 0.0 (0.0)	A (A) A (A)	0.0 (0.0) 0.0 (0.0)
SH39 (west)	LT RT	0.240 (0.277) 0.019 (0.040)	0.0 (0.0) 7.1 (7.7)	A (A) A (A)	0.0 (0.0) 0.6 (0.51)

As noted, this intersection is priority controlled and no upgrades are proposed as part of the PPC. As shown above, the intersection performs at an acceptable level of service (LOS A – C) during the morning and evening peak hours in 2021 and 2041. The maximum average delay occurs at the right turn movement from Exelby Road is expected to experience the

maximum average delay (11.3 seconds during the evening peak), with a queue length of less than one vehicle. In 2041, the average delay at this movement increases to 18.4 seconds (evening peak). The maximum degree of saturation occurs at the western approach (SH39)

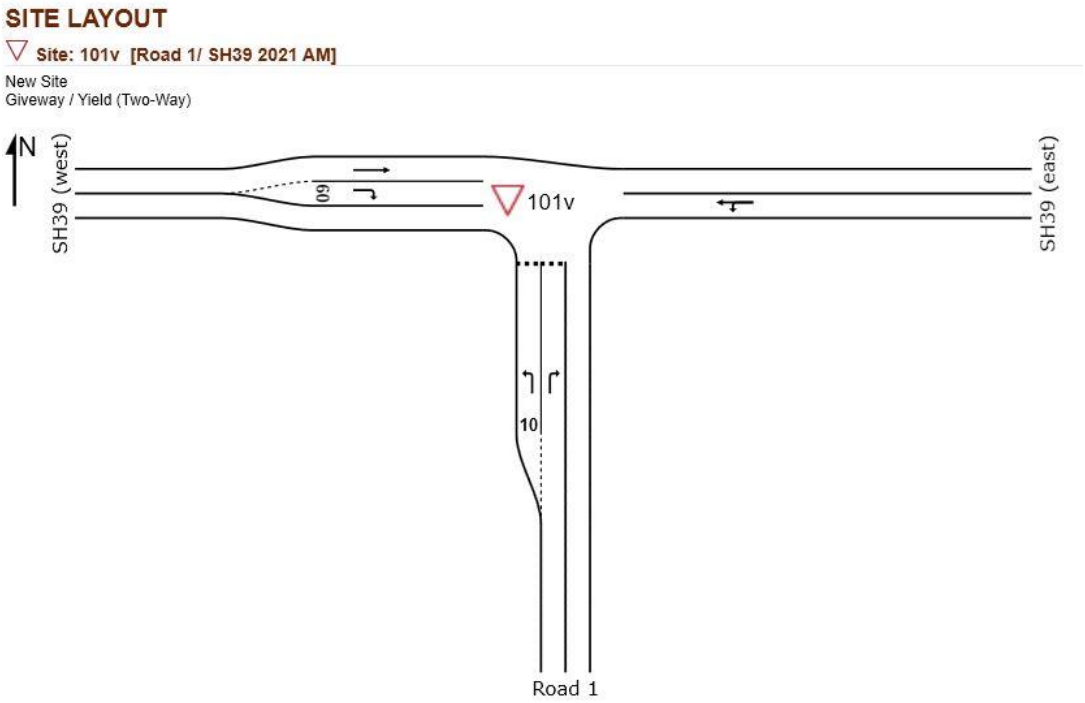
As such, the existing layout of the Exelby Road / SH39 intersection is anticipated to cater for the volumes proposed for the future year 2021 and 2041, including the traffic associated with the PPC. Therefore, no upgrades are required as part of the PPC. It is noted that, a collector road linking from the PPC area to Exelby Road has not been included in the model. It is therefore recommended that an assessment be made at subsequent stages of the development, following the construction of this road connecting to Exelby Road, to determine whether the impact of this road will result in significant increases at the Exelby Road/ SH39 intersection. In relation to the entire road network proposed, several other connections to SH39 are provided therefore it is unlikely that residents will utilise this road when travelling to and from the area west of the PPC area.

6.2.3 COLLECTOR 1/ SH39 INTERSECTION (PROPOSED)

This is a new intersection to be formed as part of the PPC. The layout of this intersection is yet to be confirmed however will likely involve a roundabout control (when required) or give-way.

A give-way controlled layout has initially been tested with priority afforded to traffic along SH39. Figure 6-3 shows the potential layout of the intersection (give-way controlled), although it is noted that final form of mitigation is subject to approval and liaison with NZTA at consenting stage.

Figure 6-3: Potential layout of Collector 1/ SH39 intersection



The performance of the intersection for the future year 2021 and 2041 is outlined in Table 6-3 and Table 6-4 below.

Table 6-3: Performance at Collector 1/ SH39 intersection 2021 – AM(PM)

Leg	Movement	Degree of Saturation (v/c)	Average Delay (s)	LOS	95th %ile Queue (m)
Collector 1 (south)	LT RT	0.019 (0.007) 0.414 (0.175)	6.3 (6.6) 12.1 (13.0)	A (A) B (B)	0.5 (0.2) 16.7 (4.7)
SH39 (east)	LT TH	0.148 (0.307) 0. 148 (0.307)	5.6 (5.6) 0.0 (0.0)	A (A) A (A)	0.0 (0.0) 0.0 (0.0)
SH39 (west)	TH RT	0.150 (0.155) 0.008 (0.021	0.0 (0.0) 6.5 (8.0)	A (A) A (A)	0.0 (0.0) 0.2 (0.6)

Table 6-4: Performance at Collector 1/ SH39 intersection 2041 – AM(PM)

Leg	Movement	Degree of Saturation (v/c)	Average Delay (s)	LOS	95th %ile Queue (m)
Collector 1 (south)	LT TH	0.018 (0.007) 0.659 (0.368)	7.0 (7.6) 23.7 (27.6)	A (A) C (D)	0.5 (0.2) 29.5 (10.1)
SH39 (east)	TH RT	0.235 (0.406) 0.235 (0.406)	5.6 (5.6) 0.0 (0.1)	A (A) A (A)	0.0 (0.0) 0.0 (0.0)
SH39 (west)	LT RT	0.236 (0.268) 0.008 (0.024)	0.0 (0.0) 7.2 (9.6)	A (A) A (A)	0.0 (0.0) 0.2 (0.7)

As shown above, the lanes are expected to perform at an acceptable level of service (LOS A- C). The right turn on Collector 1 performs at LOS B during the morning and evening peak for the year 2021; the performance of this movement is summarised as follows:

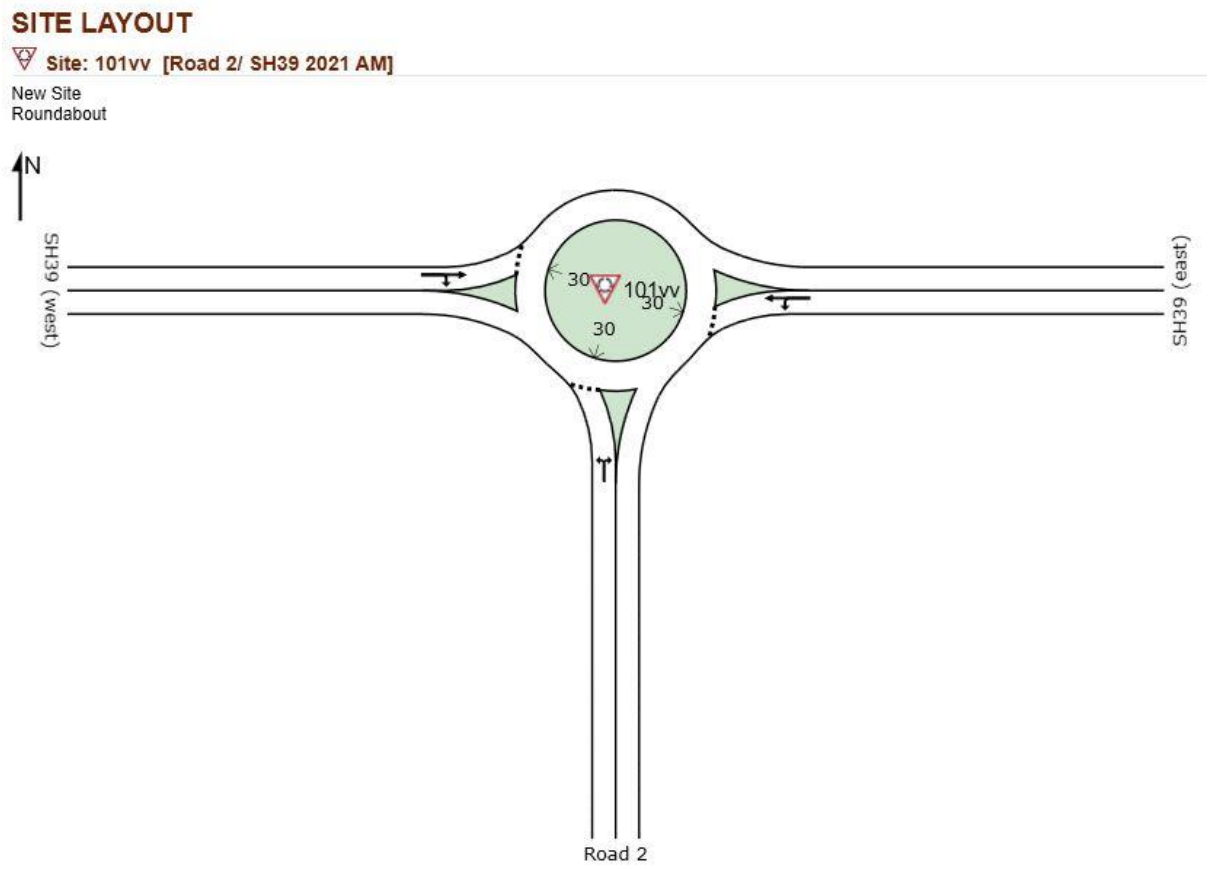
- In 2041, this movement reduces to LOS C (morning peak) and LOS D (evening peak);
- The degree of saturation for this movement is well below 0.8 in 2021 (0.414) and rises to a maximum of 0.659 in 2041 (still below 0.8); and
- A maximum average delay is 13.0 seconds and occurs during the evening peak (2021). This increases to 27.6 seconds in 2041.

Based on the above, the proposed priority intersection layout is considered adequate to accommodate the predicted traffic volumes at this intersection for the future years 2021 and 2041. It is noted that, the performance of this intersection should be reassessed at each subsequent resource consent stages to determine if a roundabout control is warranted.

6.2.4 COLLECTOR 2/ SH39 INTERSECTION

This is a new intersection to be formed as part of the PPC. The modelling indicates that, with the level of volumes proposed for the year 2021 at this intersection, a roundabout control intersection is required, as this link is expected to feed the majority of volumes to and from the site (compared with Collector 1/ SH39 intersection). As such, a single lane roundabout control is recommended as shown in Figure 6-4 below, although it is noted that final form of mitigation is subject to approval and liaison with NZTA at consenting stage.

Figure 6-4: Potential layout of Collector 1/ SH39 intersection



The performance of the intersection for the future year 2021 and 2041 is outlined in Table 6-1 and Table 6-2 below.

Table 6-5: Performance at Collector 2/ SH39 intersection 2021 – AM(PM)

Leg	Movement	Degree of Saturation (v/c)	Average Delay (s)	LOS	95th %ile Queue (m)
Collector 2 (south)	LT RT	0.474 (0.206) 0.474 (0.206)	5.3 (7.1) 11.1 (12.9)	A (A) B (B)	27.7 (9.9) 27.7 (9.9)
SH39 (east)	LT TH	0.218 (0.712) 0. 218 (0.712)	3.5 (3.9) 3.6 (4.0)	A (A) A (A)	13.0 (79.6) 13.0 (79.6)
SH39 (west)	TH RT	0.617 (0.296) 0.617 (0.296	10.5 (4.5) 16.3 (10.3)	B (A) B (B)	49.1 (16.5) 49.1 (16.5)

Table 6-6: Performance at Collector 2/ SH39 intersection 2041 – AM(PM)

Leg	Movement	Degree of Saturation (v/c)	Average Delay (s)	LOS	95th %ile Queue (m)
Collector 2 (south)	LT TH	0.444 (0.215) 0.444 (0.215)	6.5 (8.9) 12.3 (14.6)	A (A) B (B)	24.1 (10.9) 24.1 (10.9)
SH39 (east)	TH RT	0.316 (0.749) 0.316 (0.749)	3.6 (4.1) 3.6 (4.1)	A (A) A (A)	21.1 (9.31) 21.1 (93.1)
SH39 (west)	LT RT	0.700 (0.444) 0.700 (0.444)	10.2 (4.5) 15.9 (10.2)	B (A) B (B)	67.3 (30.1) 67.3 (30.1)

As shown above, the lanes are expected to perform at a LOS A or B in both 2021 and 2041. For 2021, the maximum degree of saturation occurs at the western approach and is 0.617 during the morning peak hour and 0.296 (evening peak). For this approach, the degree of saturation increases (slightly) to 0.700 (morning peak) and 0.444 (evening peak), however is still well below the threshold before an upgrade is required (0.9). The right turn at the western approach is expected to experience a maximum average delay of 16.3 seconds (2021) and 95%tile back of queue of 49.1 m (6-7 vehicles). In 2041, the delay at this approach increases to 15.9 seconds (2041) with a queue length of 67.3m (9-10 vehicles).

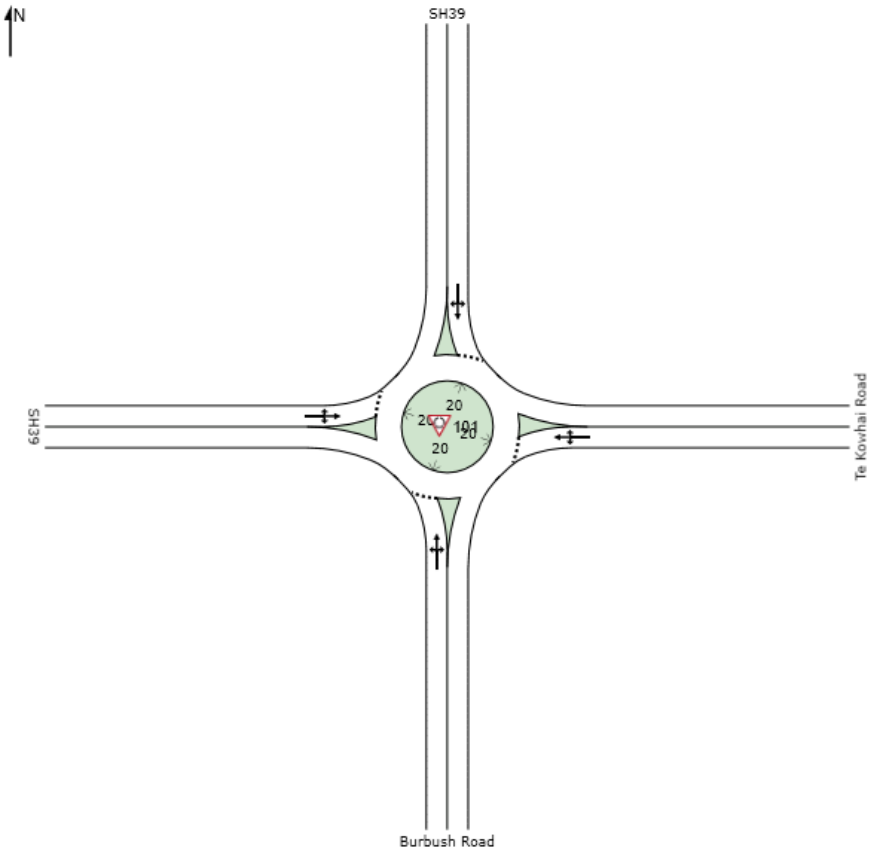
It is also noted that, compared with 2021, the performance of the southern approach (Collector 2 road) reduces in 2041; this is a result of other external roading connections being formed therefore reducing the level of volumes at this intersection.

Overall, the proposed layout is considered adequate to cater for the proposed volumes at this intersection.

6.2.5 TE KOWHAI ROAD/ SH39/ MINOR ARTERIAL (EXISTING) INTERSECTION

The Te Kowhai Road/ SH39 intersection is existing and currently has a connection to Burbush Road to the south. As part of the PPC, Burbush Road is to be realigned to connect to the minor arterial road, and the proposed minor arterial road will form the new southern leg at this intersection (effectively replacing Burbush Road). Figure 6-5 shows the existing layout of the intersection.

Figure 6-5: Te Kowhai Road/ SH39 intersection (existing layout)



The performance of the intersection for the future year 2021 is outlined in Table 6-7 below.

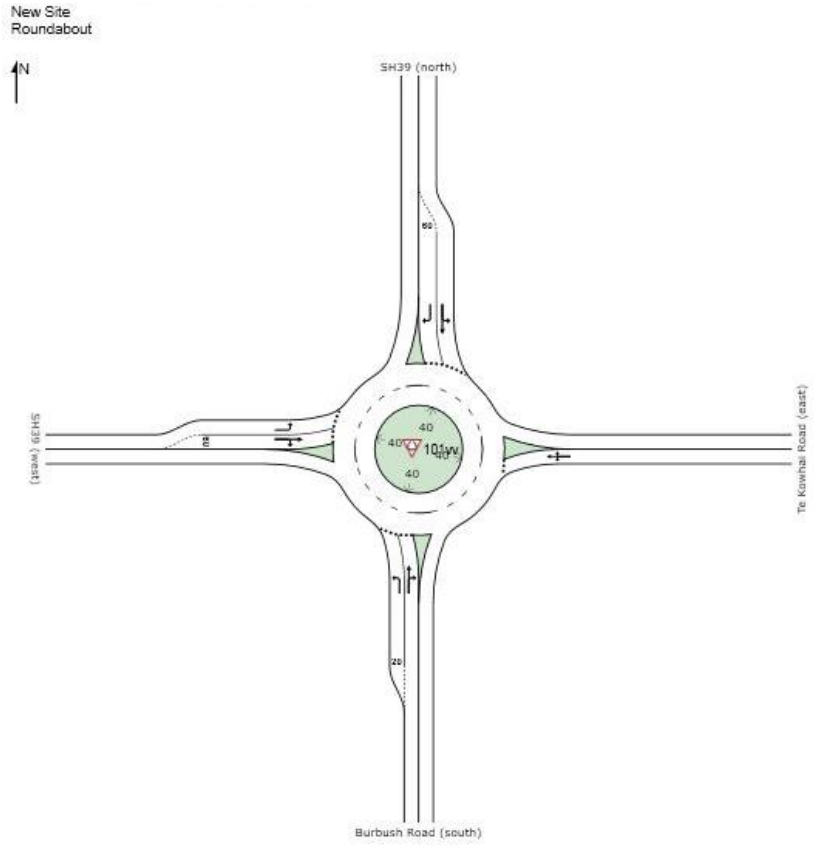
Table 6-7: Performance at Te Kowhai Road/ SH39/ Minor arterial road intersection 2021 – AM(PM)

Leg	Movement	Degree of Saturation (v/c)	Average Delay (s)	LOS	95th %ile Queue (m)
Burbush Road (south)	LT TH RT	0.386 (0.672) 0.386 (0. 672) 0. 386 (0. 672)	5.9 (33.6) 6.0 (33.7) 11.6 (39.3)	A (C) A (C) B (D)	20.3 (55.1) 20.3 (55.1) 20.3 (55.1)
Te Kowhai Road (east)	LT TH RT	0.033 (0.593) 0. 033 (0. 593) 0. 033 (0. 593)	6.2 (91.2) 6.2 (91.2) 11.9 (96.9)	A (F) A (F) B (F)	1.4 (25.0) 1.4 (25.0) 1.4 (25.0)
SH39 (north)	LT TH RT	0.386 (1.063) 0. 386 (1.063) 0. 386 (1.063)	4.2 (65.8) 4.1 (65.7) 9.4 (70.9)	A (E) A (E) A (F)	22.7 (1397) 22.7 (1397) 22.7 (1397)
SH39 (west)	LT TH RT	1.031 (0.436) 1.031 (0.436) 1.031 (0.436)	64.3 (5.3) 64.7 (5.7) 70.0 (11.0)	E (A) E (A) E (B)	434.1 (27.2) 434.1 (27.2) 434.1 (27.2)

As shown above, with the current intersection layout, the volumes proposed for the year 2021 are expected to exacerbate the performance of the intersection with Te Kowhai Road expected to operate at a LOS F (during the evening peak) and a maximum degree saturation of 1.031 (over capacity) occurring at the western approach (SH39). As such, some form of mitigation is required at this intersection prior to full buildout. It is noted that final form of mitigation is subject to approval and liaison with NZTA (and also noting that the existing roundabout is subject to a designation in the HCDP).

Figure 6-6 outlines the recommended (upgraded) layout, which is essentially converted the existing single lane roundabout to a double lane roundabout.

Figure 6-6:Upgraded layout of the Te Kowhai Road/ SH39/ Minor arterial road intersection



Based on the above layout, the performance of the intersection for the future year 2021 and 2041 is outlined in Table 6-8 and Table 6-9 below.

Table 6-8: Performance at Minor Arterial Road/ Te Kowhai Road/ SH39 intersection 2021 – AM(PM)

Leg	Movement	Degree of Saturation (v/c)	Average Delay (s)	LOS	95th %ile Queue (m)
Minor Arterial Road (south)	LT TH RT	0.042 (0.038) 0.304 (0.354) 0.304 (0.354)	5.4 (15.7) 4.5 (14.1) 11.1 (20.7)	A (B) A (B) B (C)	1.4 (1.7) 13.4 (20.3) 13.4 (20.3)
Te Kowhai Road (east)	LT TH RT	0.003 (0.093) 0.003 (0.093) 0.003 (0.093)	4.9 (11.3) 4.8 (11.2) 11.4 (17.7)	A (B) A (B) B (B)	1.0 (3.4) 1.0 (3.4) 1.0 (3.4)
SH39 (north)	LT TH RT	0.183 (0.420) 0.183 (0. 420) 0.194 (0. 660)	3.4 (3.4) 3.1 (3.1) 9.6 (9.7)	A (A) A (A) A (A)	6.1 (20.0) 6.1 (20.0) 7.1 (48.2)
SH39 (west)	LT TH RT	0.848 (0.361) 0.052 (0.038) 0.052 (0.038)	12.2 (4.4) 5.6 (4.5) 12.2 (11.1)	B (A) A (A) B (B)	116.3 (19.4) 1.9 (1.4) 1.9 (1.4)

Table 6-9: Performance at Minor Arterial Road/ Te Kowhai Road/ SH39 intersection 2041 – AM(PM)

Leg	Movement	Degree of Saturation (v/c)	Average Delay (s)	LOS	95th %ile Queue (m)
Minor Arterial Road (south)	LT TH RT	0.144 (0.526) 0.464 (0.661) 0.464 (0.661)	6.3 (15.4) 5.3 (17.0) 11.9 (23.6)	A (B) A (B) B (C)	5.5 (33.1) 25.2 (58.9) 25.2 (58.9)
Te Kowhai Road (east)	LT TH RT	0.054 (0.100) 0.054 (0.100) 0.054 (0.100)	6.4 (9.2) 6.3 (9.1) 12.9 (15.7)	A (A) A (A) B (B)	1.8 (3.5) 1.8 (3.5) 1.8 (3.5)
SH39 (north)	LT TH RT	0.342 (0.507) 0.342 (0.507) 0.313 (0.622)	4.6 (4.2) 4.3 (3.9) 10.6 (10.4)	A (A) A (A) B (B)	15.1 (26.8) 15.1 (26.8) 14.0 (40.3)
SH39 (west)	LT TH RT	0.805 (0.528) 0.375 (0.213) 0.375 (0.213)	13.5 (6.4) 7.3 (6.5) 13.9 (13.1)	B (A) A (A) B (B)	96.2 (34.8) 17.6 (9.2) 17.6 (9.2)

Based on the upgraded layout, the lanes are expected to perform at a LOS A or B in both 2021 and 2041, with the exception of the right turn lane from the southern approach (Minor Arterial Road) reducing to a LOS C in 2041. The maximum degree of saturation for this movement is 0.661 (evening peak) therefore is well below the limit.

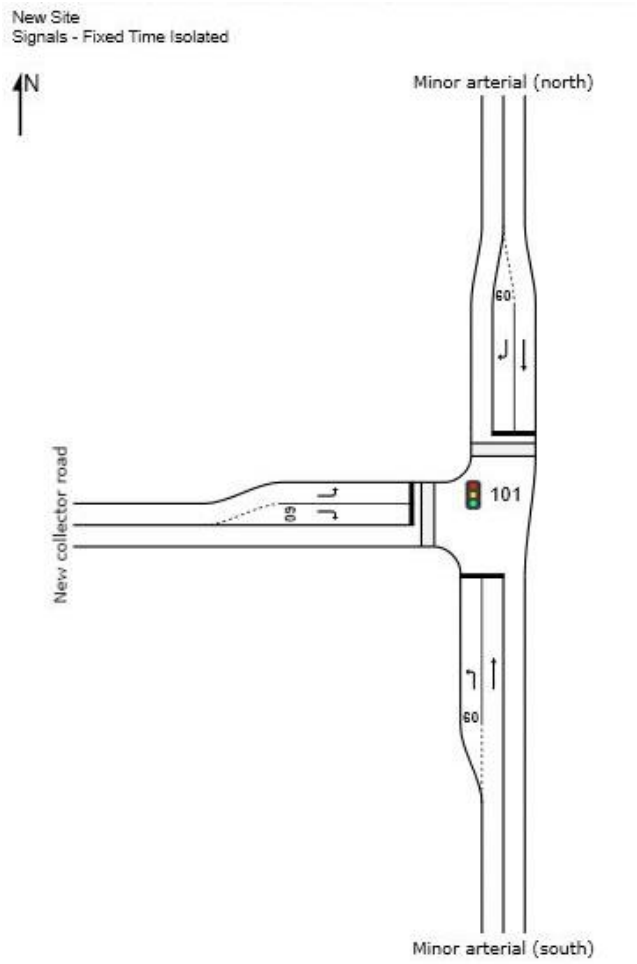
In 2021, the maximum average delay is 12.2 seconds and occurs at the left/ right turn lanes from SH39 (western approach); this increases to 13.9 seconds in 2041 (morning peak). The maximum 95%tile queue is 116.3m (2021) and 96.2m (2041) and occurs at the left turn approach on SH39 (west) during the morning peak hour.

Overall, the recommended layout is considered adequate to cater for the proposed volumes for the future year 2021 and 2041. Based on the above assessment, the existing layout of the intersection warrants an upgrade by the year 2021. As such, an assessment of the intersection should be made at each sub-stage to determine the exact timing of the upgrade.

6.2.6 COLLECTOR 3/ MINOR ARTERIAL INTERSECTION (PROPOSED)

This is a new intersection, to be formed as part of the PPC, and is proposed to be a signal-controlled intersection. Figure 6-7 shows the recommended layout of the intersection.

Figure 6-7: Collector 3 (new road)/ Minor Arterial Road intersection



The performance of the intersection for the future year 2021 and 2041 is outlined in Table 6-10 and Table 6-11 below.

Table 6-10: Performance at Collector 3 (new road)/ Minor Arterial Road intersection 2021 – AM(PM)

Leg	Movement	Degree of Saturation (v/c)	Average Delay (s)	LOS	95th %ile Queue (m)
Minor Arterial Road (south)	LT RT	0.217 (0.069) 0.602 (0.334)	10.6 (11.8) 15.4 (17.8)	B (B) B (B)	15.9 (4.6) 38.5 (13.1)
Minor Arterial Road (north)	TH RT	0.078 (0.418) 0. 399 (0.339)	4.6 (6.4) 23.6 (20.5)	A (A) C (C)	5.5 (36.9) 15.1 (17.4)
Collector 3 - new road (west)	LT RT	0.458 (0.396) 0.196 (0.325)	23.9 (22.6) 22.9 (22.3)	C (C) C (C)	17.5 (17.0) 7.1 (13.7)

Table 6-11: Performance at Collector 3 (new road)/ Minor Arterial Road intersection 2041 – AM(PM)

Leg	Movement	Degree of Saturation (v/c)	Average Delay (s)	LOS	95th %ile Queue (m)
Minor Arterial Road (south)	LT TH	0.114 (0.649) 0.843 (0.871)	9.5 (15.9) 33.1 (31.4)	A (B) C (C)	10.5 (96.8) 65.5 (119.0)

Minor Arterial Road (north)	TH RT	0.499 (0.285) 0.784 (0.897)	14.8 (5.3) 37.6 (41.6)	B (A) D (D)	61.5 (32.6) 44.5 (109.3)
Collector 3 - new road (west)	LT RT	0.499 (0.863) 0.891 (0.655)	20.4 (40.4) 36.1 (33.0)	C (D) D (C)	58.5 (65.7) 156.7 (42.5)

As shown above, the lanes are expected to perform at a LOS A, B or C in 2021 with several movements declining to LOS D in 2041. This includes the right turn movement from SH39 (east) and left turn movement from SH39 (west). The maximum degree of saturation from these movements is 0.891 (right turn movement), occurring during the morning peak hour only, therefore is still below capacity with an average delay of 36.1 seconds. The 95%tile back of queue for this movement is 15.7 m (21-22 vehicles) and is considered acceptable.

Overall, the proposed layout is considered adequate to cater for the proposed volumes at this intersection.

6.2.7 PROPOSED INTERSECTIONS ALONG SH39

As outlined in section 6 above, two new intersections are proposed along SH39 including:

- Collector 2/ SH39 intersection (roundabout); and
- Collector 1/ SH39 intersection. This intersection will initially be developed as a give way-controlled intersection however, this is subject to demand and will be assessed at resource consent for sub-stages to determine if a roundabout control is warranted.

A concept plan has been developed, outlining the indicative boundary of the two intersections in relation to the existing road reserve and is shown in Figure 6-8 and Figure 6-9 below.

Figure 6-8: Collector 1/ SH39 intersection (give-way) – indicative layout



Figure 6-9: Collector 2/ SH39 intersection (roundabout) – indicative layout



As shown above, both intersection layouts are expected to be accommodated within the existing road reserve with any additional land being acquired from the PPC area only. As such, no land is expected to be required from the neighbouring properties.

6.2.8 BURBUSH ROAD (SOUTH)

Based on the TRACKS model, the maximum peak hour traffic volumes expected along Burbush Road, south of the PPC area, is to be in the order of 700 – 900[1] veh/ hr (two-way) equating to some 9000 veh/ day. This is a significant increase in traffic volumes when compared with the existing volumes along Burbush Road (approximately 600 vehicles per day).

It is important to note that the area surrounding Burbush Road is zoned as 'Future Urban' in the HCCDP indicating that this area will be urbanised. With reference to the HCCDP Road Hierarchy maps, the entire length of Burbush Road is proposed to be upgraded to a collector Road. As such, the future function of this road is considered appropriate to cater for the future volumes.

Burbush Road currently provides a single lane in each direction with centre line markings only. As part of this application, Burbush Road will be upgraded to a collector road (within

[1] Volumes extracted from the 2041 TRACKS model

the PPC area) with the remaining length of Burbush Road remaining as existing (until such time as development to the south occurs).

In this regard, Figure 3-1 of Austroads[2] outlines the level of service of a road based on the average passenger car speed and flow rate. Based on this, with the proposed volumes (maximum of 540 vehicles per lane), Burbush Road is still expected to operate within capacity (LOS B). Further, no apparent crash trends have been identified along Burbush Road (south of the PPC area) as outlined in section 2.8 above.

While Burbush Road to the south of the PPC area is expected to accommodate the anticipated traffic movements, monitoring of the operation to the south of the PPC area is recommended to assess whether the safety or efficiency of this section is compromised in the interim period.

6.3 MITIGATION MEASURES

Based on the above analysis, several mitigation measures are recommended to maintain the safety and efficiency of the surrounding road network. The exact timing of upgrades should be determined at resource consent for each sub-stage, these include:

- The two new connections onto SH39 should be developed during the early stages of the development to disperse traffic within the site and therefore along SH39. Of these, one connection (Collector 2/ SH39 intersection) should be roundabout controlled and the other connection priority controlled respectively;
- Upgrade of the Te Kowhai Road/ SH39/ Minor Arterial Road intersection before full buildout (timing of upgrade to be determined at each sub-stage);
- The following key intersections should be assessed at each sub-stage to determine whether further upgrades are required:
    - Exelby Road/ SH39 intersection;
    - Collector 1/ SH39 intersection;
    - Collector 2/ SH39 intersection; and
    - Te Kowhai Road/ SH39/ Minor Arterial Road intersection.
- Provision of public transport utilising the Collector and arterial roading network is considered critical in an overall integrated and multi-model development. This is only likely to be economical after at least 1000 dwellings are occupied and is dependent on Council; and
- Monitor the operation of Burbush Road, to the south of the PPC area, in the interim period (pre-upgrade and urbanisation) to assess whether the safety or efficiency of this section is compromised.

It is also noted that, similar to that planned within the Rotokauri Structure Plan layout, one east-west link is proposed within the PPC area. Based on the above modelling, this is considered acceptable.

[2] Guide to Traffic Management Part 3: Traffic Studies and Analysis

7 PARKING

7.1 DISTRICT PLAN REQUIREMENTS

From a review of the HCDP, (Table 15-2a) the following minimum parking requirements are considered applicable to the site outlined in Table 7-1 below.

Table 7-1: Unitary Plan parking requirements

Activity	Parking space requirement
Single dwellings and duplex dwelling	2 per household or dwelling
Ancillary residential units and apartment buildings	1 per residential unit

As shown above, a minimum of two spaces should be provided for each dwelling to comply with the HCDP parking requirements. Stacked spaces would be acceptable to reduce the width of vehicle crossings. Where apartment buildings or ancillary residential units are provided within the site, a minimum of 1 car park space should be provided to comply with the HCDP requirements.

The details of parking provisions will be provided in later assessments; however, parking should be provided in accordance with the HCDP requirements (with the recommended amendments above).

Duplex units and/or terraced housing, particularly where associated with affordable housing, are however likely to only have one car park per unit, and it is considered appropriate that provisions be made for this reduction from the standard residential requirements. It is noted that the only deviation from the existing HCDP rules is with respect to a duplex dwelling, as a terraced type product falls under the HCCDP definition of an “apartment building.

In general, a reduction in car parking for duplex dwellings, is likely to encourage other forms of transport (other than private car) however it is recognized that before public transport becomes wide-spread in the area this is likely to result in additional demand for on-street parking. As such in streets with a higher number of these duplex units should have additional provision for on-street parking (e.g. closer to 1 space per 3 units rather than the more typical minimum rate of 1 space per 4 units). Council have the ability under the HCCDP rules to address this type of matter already (as construction of a road is a restricted discretionary activity and the design, layout and wider traffic effects all form part of the matters for discretion). Therefore, no specific new assessment criteria or rule is deemed necessary to address this matter.

Further, it is noted that local roads are proposed to provide on-street parking along one or both sides of the road (not provided for in the Rotokauri Structure Plan cross-sections).

It is considered that a stacked parking space (for example an open space in front of a garage) should be permitted as the second parking space. This provides an efficient and safe way (given both uses will be from the same dwelling) of achieving the second parking space.

7.1.1 CYCLE PARKING

Table 15-2a of the HCDP outlines the requirements for visitor cycle spaces. For a dwelling or duplex building, the HCDP does not require any visitor cycle parking. In this regard, any

requirement for visitor parking associated with any multiple unit development or development of the local neighbourhood centre will be addressed at resource consent stage.

7.1.2 ACCESSIBLE PARKING

Table 15-2d of the HCDP outlines the requirements for accessible parking spaces, for all zones, based on the number of car parking spaces being provided. The following rates apply:

- Minimum of 1 accessible space(s) for every 1-20 car park spaces provided;
- Minimum of 2 accessible space(s) for 21-50 car park spaces provided; and
- One additional accessible space for every additional 50 car parks above 50 car park space

In this regard, each residential property is expected to provide 1-2 car park spaces therefore does not require any accessible spaces. Consideration should be given to providing accessible spaces near the local neighbourhood centre during individual resource consent stages.

7.1.3 LOADING

As per Table 15-2a of the HCDP, no loading spaces are required for residential properties. Consideration should be given to providing loading spaces for the local neighbourhood centre during individual resource consent stages.

8 INTERSECTION LOCATIONS / ACCESS

8.1 GUIDELINES

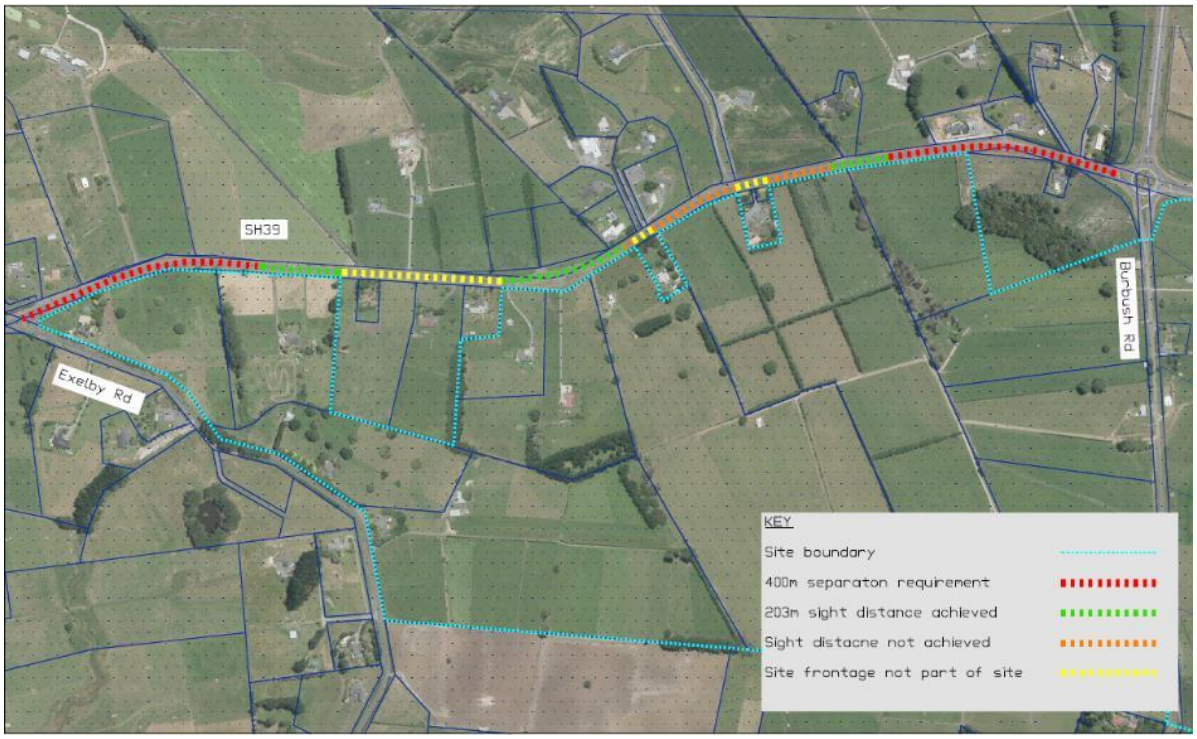
Measurements have been undertaken both in terms of speeds and visibility on SH39. In terms of SH39 the NZTA Planning Policy Manual (Appendix 5B Accessway standards and guidelines) (“PPM”) and Austroads 4A: Unsignalized and signalised intersection are considered appropriate.

In terms of sight distance, the PPM requires a total of 203m for a posted speed limit of 80km/hr (90km/hr operating speed) while Austroads requires 214m Safe Intersection Sight Distance (SISD) for an operating speed of 90km/hr.

In terms of intersection spacing, the PPM notes a desirable spacings between accessways and between intersections and accessways on national state highways carrying over 10,000 vpd of 400m for a Stage Highway with an 80km/hr operating speed.

With these requirements together with limitations in current site boundaries, the following Figure 8-1 (and Appendix A) has been developed showing the constraints on SH39 in relation to intersection locations

Figure 8-1: SH39 constraints

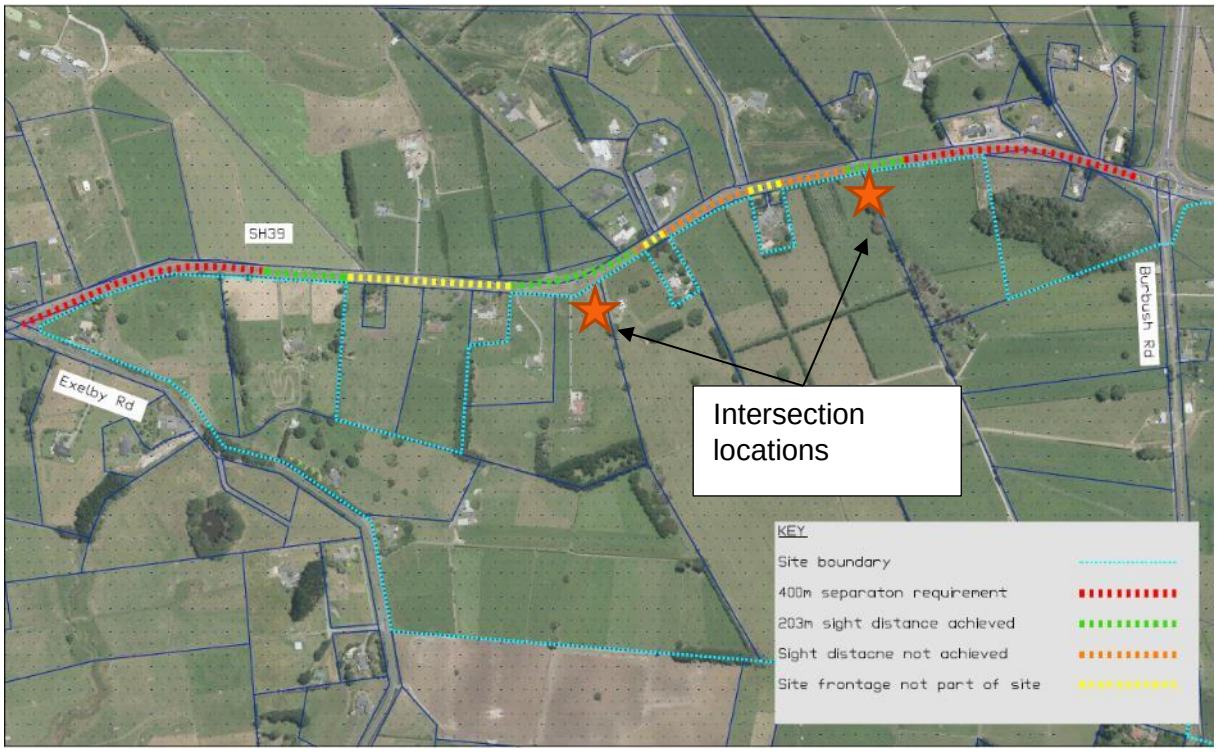


The diagram shows:

- Locations where any proposed intersection would be too close to existing intersection (RED);
- Locations where sight distance is achieved (GREEN);
- Locations where sight distance is not achieved (ORANGE); and
- Locations where locations on SH39 which are not part of the subject site (YELLOW).

The same figure is shown in Figure 8-2 below together with the locations proposed masterplan intersection locations.

Figure 8-2: SH39 constraints



Both locations are considered to be in locations that achieve appropriate separation and sight distance.

9 INTERNAL INTERSECTIONS

The exact formation of individual internal intersections should be considered as part of each detailed development application.

9.1 PROPOSED PROVISIONS

The following transport related rules have been included in the PPC text:

Vehicle Crossings and Internal Vehicle Access

- *new rules to supersede equivalent in Chapter 25/Appendix 15*
- *Minimum widths between vehicle crossings = 2m*
- *Minimum distance for a vehicle crossing from a local road intersection = 10m*

Testing of the current rules, (along with experience with the Auranga development which is another project being undertaken by the applicant for a medium density living development), that modification of the City-wide rules/Appendix 15 rules is required to ensure alignment between transport provisions and the densities possible with the Zone and structure plan provisions.

The local road intersection vehicle crossings locations modification can be managed via designing roads to achieve a lower speed environment (i.e. target of 30km per hour along local roads) to improve the operating characteristics of the road. As the construction of new roads requires resource consent in the first instance (as a restricted discretionary activity) the council has adequate discretion to ensure that the lower speed environment can be achieved.

The modification to widths between crossings is a clarification only as the District Plan is unclear (provides two confliction options). Vehicle crossings will also largely be determined at subdivision design stage so as to not conflict with street furniture/lighting/planting parking bays etc.

Design and Access Widths

- *new rules to supersede equivalent in Chapter 25/Appendix 15*
- *provision for a combined vehicle crossing width of 6m*
- *provision for rear lane standards (equivalent to Rule 23.7.8.*

The current vehicle crossing widths do not take into account pairing opportunities, and these are important in supporting smaller lot sizes with narrower road frontages.

Rear lane standards are repeated so as to avoid any confusion over their intended land use or subdivision status.

Design and Access Widths

> *Insert vehicle access restrictions (no direct access onto SH39, minor arterial road and collector road with a dedicated cycleway/3m shared path).*

Direct vehicle access to SH39 from individual lots is not considered to be appropriate under any circumstances because of the traffic safety and road function implications. Provisions seek to prevent this outcome, which is a matter reflected in the structure plan. Further, a shared use path is proposed along the minor arterial road only therefore no access should be proposed along this road.

The other restrictions address potential safety and amenity conflicts between private vehicles and cyclists (and promote use of rear lanes which in turn supports higher density development) on collector roads. As such, it is appropriate that the rule restrict vehicle accesses over the shared paths or cycle lanes associated with a collector road.

Parking

Insert new standard for parking = 1 carpark per duplex or terraced housing unit.

Justification for this reduction is provided in section 7.1. above.

10 INTEGRATION WITH FUTURE TRANSPORT NETWORK

10.1 GENERAL

The following section provides a review of established policy and plans in relation to the proposed development. The documents reviewed comprise:

- Operative Chapter 25 of the HCDP.
- The Waikato Plan 2017;
- Waikato Regional Land Transport Plan;
- Waikato Regional Public Transport Plan; and
- Regional walking and cycling strategy.

10.2 CHAPTER 25 OF HCDC

Section 25.14 of the HCDP outlines the city-wide objectives, policies and rules relevant to the transport network with the primary objective being "*an integrated multi-modal transport network that meets national, regional and local transport needs and is:*

- *Responsive;*
- *Efficient;*
- *Affordable;*
- *Safe;*
- *Accessible;*
- *Sustainable; and*
- *Integrated with land-use"*

The plan intends to achieve this vision with the following policies:

- The transportation network and related infrastructure is planned, designed, constructed and managed in a manner that:
    - is consistent with and supports the land-use spatial framework for the City (Figure 2.1a in Chapter 2)'
    - Promotes vibrant business centres;
    - Contributes to safe and efficient multi-modal transport corridors serving the Central City, business centres and other key destinations;
    - Contributes to a transportation network;
    - Recognises the need for effective long-term solutions that are affordable and practicable.

The proposal intends to provide a multi-modal road network along the proposed collector and minor arterial road including a 3 m shared path or on-road cycle facilities. The proposal also restricts access of all residential properties to local and collector road, therefore no access is proposed along SH39 or the minor arterial road, to improve safety for vehicles entering/ leaving properties and reduce collisions involving through movements. Based on this, the proposal is considered to support the transport related objectives and policies outlined in the HCDP. The proposal also intends to rezone the PPC area to predominantly residential zoning which aligns with the zoning outlined in Figure 2.1a of Chapter 2 of the HCDP.

10.3 THE WAIKATO PLAN

The Waikato Plan ("the plan) is a comprehensive document that identifies and addresses issues that the region faces and seeks to take advantage of opportunities for the Waikato region. The plan identifies five key priorities with 10 key action plans to address these priorities. The five priorities are as follows:

1. Planning for population change;
2. Connecting communities through targeted investment;
3. Partnering with iwi/ Maori;
4. Addressing water allocation and quality; and
5. Advancing regional economic development.

In order to achieve the second priority (connect communities), four key transport related actions have been identified including;

- Key action 4: advocate on behalf of regional transport priorities;
- Key action 5: Integrate Waikato and Auckland Transport networks;
- Key action 6: encourage development of a nationally significant cycling and walking experience; and
- Key action 7: Establish a freight and logistics action group.

As noted, the proposed residential development, will provide for an additional 2000 dwellings, this will enable and support an increase in population within Rotokauri North and northern Hamilton. It will also provide a roading network which integrates with the existing and Hamilton town centre as well as the wider state highway network and include pedestrian features encouraging the use of alternative modes for local journeys. Based on this, the proposal is considered to support the Waikato Plans priorities.

10.4 WAIKATO REGIONAL LAND TRANSPORT PLAN (RLTP)

The 2018 Update to The Waikato Regional Land Transport Plan (2015-2045) ("RLTP") sets out the direction for the region's transport system for the next 30 years. It identifies the land transport objectives and direction for land transport that the region is seeking to achieve to contribute to an effective, efficient and safe land transport system. Four transport objectives are identified in the plan and are summarised below:

- An efficient and resilient land transport system that advances regional economic wellbeing and facilitates freight movement on strategic corridors in the upper North Island;
- A planned transport response that supports future growth areas;
- Land transport in the Waikato region is a Safe System, working towards zero deaths and serious injuries
- A transport system that provides an inclusive range of integrated, quality transport choices for all users to meet their social, economic and cultural needs.

A number of upgrades are planned to the existing land transport infrastructure near the vicinity of the site.

The proposed upgrades to the existing land transport infrastructure surrounding the site will integrate and align with the current road network as well as support the proposed growth in the area, thus contributing to a safe, efficient and effective transport system within Rotokauri North and Hamilton. These upgrades will connect the proposed development with the existing Hamilton town centre community and provide access to multi modal services such as cycling & walking.

As such, the PPC is considered to be supportive of the RLTP objectives.

10.5 WAIKATO REGIONAL PUBLIC TRANSPORT PLAN (RPTP)

The Waikato Regional Public Transport Plan 2018 - 2028 ("RPTP ") outlines the strategic direction for public transport in the Waikato region over the next 10 years. The plan provides a means for councils, transport operators and stakeholders to work together to develop and improve the public transport services and infrastructure in the region, while also enabling public input into the design and operation of the public transport network.

The vision of the RPTP is to "*build a public transport system that enhances the vitality of our communities, strengthens our economy and helps create a healthier environment*".

The following key policy focus areas are outlined in the RPTP to support this goal:

- Plan for a layered network of public transport services made up of Mass transit, Frequent, Connector, Coverage and Targeted public transport services;
- Consider the needs of the transport disadvantaged when providing for public transport services. The following groups of people are considered transport disadvantaged:
    - People with disabilities;

  - People without a driver licence or access to a vehicle
  - Children or elderly
  - People with low income and/or living in 'high deprivation' neighbourhoods People living in isolated communities with no easy transport access to essential services.
- Ensure public transport services at least meet the standard service levels set out in table 3.1 for each layer where there is appropriate demand and available funding.

There are currently very limited public transport services available near Rotokauri North area. However, as the remainder of the structure plan area is developed, it is likely that extensions to existing bus services, or new bus services, will be introduced to connect the site with the Hamilton town centre. Establishment of these services by Council would provide the development with improved access to public transport services and has the potential to reduce traffic flows between these areas.

Table 23 of the RLTP indicates that there are plans to extend the existing Frankton service into the Rotokauri development.

In this regard, it is expected that as the public transport services outlined in this ITA are implemented, the proposed development is considered to align well with the objectives of the RPTP.

10.6 ACCESS HAMILTON

Access Hamilton is a high-level integrated transport strategy that has been developed to assist the Hamilton City Council, to achieve its strategic objectives for the city's development and transport infrastructure planning, over the next 30 years. The strategic vision of the plan is to:

- Deliver an affordable, integrated, safe, responsive and sustainable transport system;
- Support economic, social, environmental and cultural well-being;
- Manage incremental change in transport and land-use systems by applying a hierarchy of interventions;
- Position infrastructure and land development to meet the city's long-term needs.

The proposed development intends to provide an integrated transport system integrating all users (including private vehicles, cyclists and pedestrians). Further, as noted a number of upgrades are planned to the existing land transport infrastructure near the vicinity of the site.

The proposed upgrades to the existing land transport infrastructure surrounding the site will integrate and align with the current road network as well as support the proposed growth in the area, thus contributing to a safe, efficient and effective transport system within Rotokauri North and Hamilton.

As such, the PPC is considered to be supportive of the Access Hamilton objectives.

10.7 REGIONAL WALKING AND CYCLING STRATEGY

The 2009 - 2015 Regional Walking and Cycling Strategy outlines the strategy for walking and cycling within the Waikato region in accordance with the RLTP. The vision of the strategy is that: "*Walking and cycling are safe, integrated and accessible activities in the Waikato region"*. The strategy intends to achieve this vision with the following three policies and actions:

- Support the construction and maintenance of accessible walking and cycling infrastructure throughout the regions for all user types;
- Promote travel demand management and travel behaviour change initiatives that assist walking and cycling in relieving urban congestion and improving journey time reliability; and
- Recognise the role that walking and cycling can play in the economic development of the region.

The proposed development intends to provide on-road cycle paths and pedestrian footpaths along all collector roads within the development as well as a shared use path along the main minor arterial road. This will provide an easily accessible path for the use of other modes of transport to and from the site and has the potential to reduce the number of vehicles on the road network. Therefore, the proposal is considered to align well with the walking and cycling strategy.

11 CONSTRUCTION TRAFFIC

The proposed development will result in the demolition of the existing facilities followed by the excavation and construction work associated with the new buildings.

Throughout all other construction periods (e.g. fit out, building construction) truck volumes are expected to be typical of a standard construction site and low in comparison with the ultimate traffic generation of the site.

As is typical with a development of this scale, it is proposed that provision be made in the conditions of consent for a Construction Traffic Management Plan to be developed for the works anticipated. It is considered that this Construction Traffic Management Plan should include:

- Construction dates and hours of operation including any specific non-working hours for traffic congestion/noise etc, aligned with normally accepted construction hours in the Hamilton City Region;
- Truck route diagrams both internal to the site and external to the local road network.
- Temporary traffic management signage/details for both pedestrians and vehicles, to manage the interaction of these road users with heavy construction traffic; and
- Details of site access/egress over the entire construction period and any limitations on truck movements. All egress points should be positioned to achieve appropriate site distances.

Based on experience of constructing similar projects and bearing in mind capacity within the existing road network, with the appropriate Construction Traffic Management Plan in place and the above measures implemented, it is considered that construction activities will be managed to ensure an appropriately low level of traffic effects.

Of note, the construction activities are temporary and with appropriate measures in place are able to be managed. Therefore, construction effects can be maintained to a less than minor level.

12 CONSULTATION

The following consultation (attended by Commute) has been undertaken with the Hamilton City Council and NZTA on transport matters relating to the Rotokauri north development. It is the applicants understanding that HCC and NZTA have jointly engaged Mr Alastair Black of Grey Matter to review and provide advice/feedback on behalf of both parties.

- Workshop with Mr Alastair Black of Grey Matter Ltd on 30th July 2018.
- Memo from Commute Consultants dated 24th September 2018, which was emailed to NZTA, Grey Matter and HCC on SH39 access (no feedback received).
- Meeting with Mr Alastair Black and Ms Paula Rolfe (Hamilton City Council) on 26th February 2019 to discuss HCC review of draft ITA dated December 2018.

Several matters were brought to attention during the consultation with NZTA and HCC and as a result of draft feedback from Grey matter and the meeting on 26th February 2018. These matters have been incorporated into this report.

13 IMPLEMENTATION PLAN

Table 13-1 summarises the proposed Rotokauri North Implementation Plan. It sets out local and wider area works that will need to be addressed as part of development of this site.

Table 13-1: Implementation plan

Upgrades/ proposed road provision	Upgrade	Comments	Funder
1 x New collector road/ SH39 intersection	Roundabout controlled intersection (single lane)	Roundabout required for initial development (first sub-stage). This is subject to construction occurring near the northern portion of the site.	Developer
1 x New collector road/ SH39 intersection	Priority control intersection/ roundabout (single lane)	Initial connection developed as priority control intersection. Potential for upgrade to roundabout control as required (assessed at each sub-stage)	Developer
Burbush Road	Upgrade Burbush Road to a collector road	Will be required as part of initial development (using this road)	Developer
	Monitor the operation of Burbush Road, to the south of the PPC area, in the interim period (pre-upgrade and urbanisation) to assess whether the safety or efficiency of this section is compromised	Will be required, in the interim period, pre-upgrade and urbanisation of Burberry Road (south of the PPC area).	Developer
Te Kowhai Road/ SH39 intersection	Upgrade as per the layout in Figure 6-6 (two-lane roundabout)	Will be required prior to full buildout. Intersection to be assessed at each sub-stage) to determine timing of upgrade	Developer
Exelby Road	Upgrade Exelby Road to a collector road	Will be required as part of initial development (using this road)	Developer
Development	Local and Collector roads	As required	Developer
As required	Provision of Public Transport	Provision of a PT network to serve the area recommended	Council

		to occur after 1000 dwellings have been constructed	

The timing of each of each upgrade/ proposed works is subject to demand and will be determined at resource consent for each sub-stage. It is noted that as part of the existing HCCDP, any road construction is subject to resource consent, and the effects on the wider traffic network (including any upgrades required) falls within the scope of matters than can (and will be) considered. No new framework is required by this PPC to determine the timing of each intersection upgrade.

14 CONCLUSION

The descriptions, analyses and assessments provided in this report have shown that:

- The existing road network will partly provide for accessibility of the site by various transport modes: walking, cycling, bus and private vehicle;
- the extent of development proposed can be accommodated by the surrounding road network while maintaining acceptable levels of safety and performance; and
- the proposed development is consistent with and encourages key regional and district transport policies.

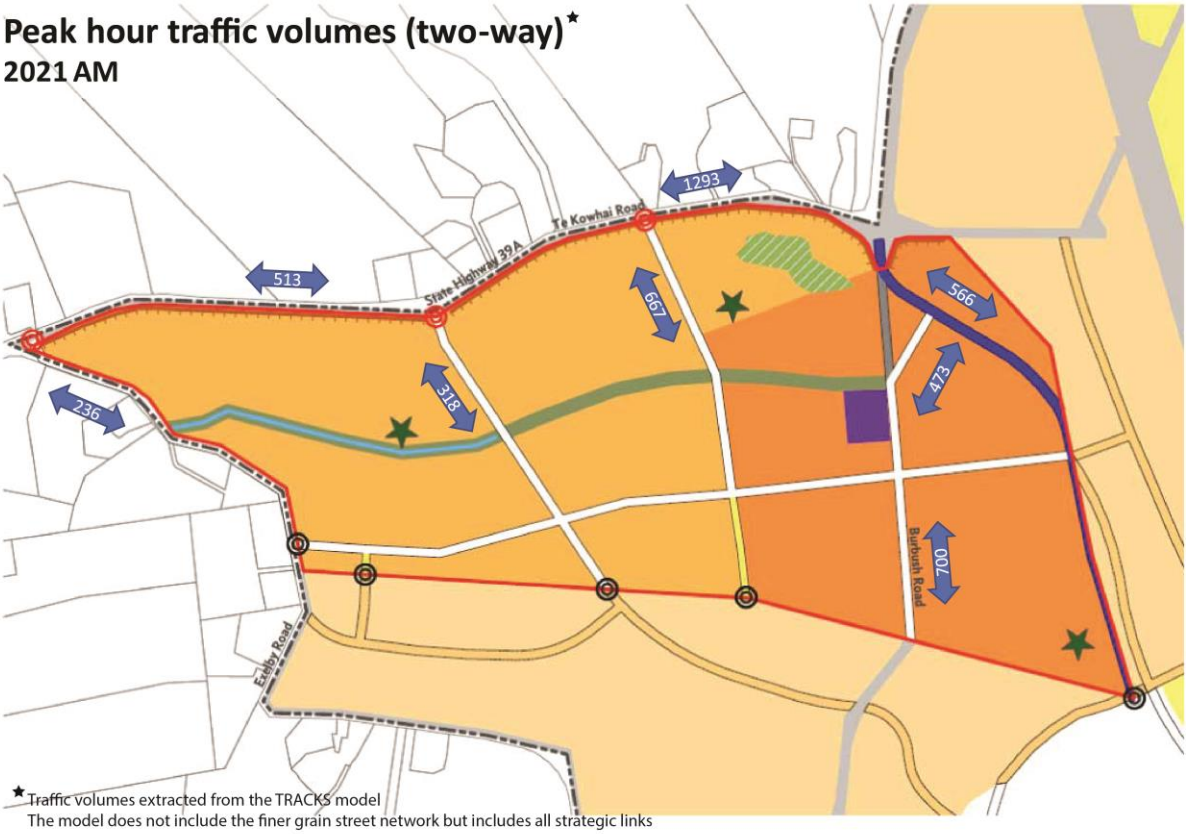
It is recommended that the transport network upgrades described in section 13 of this assessment be provided to enable the proposal to be appropriately supported by the road network. These can be addressed through the relevant resource consent applications.

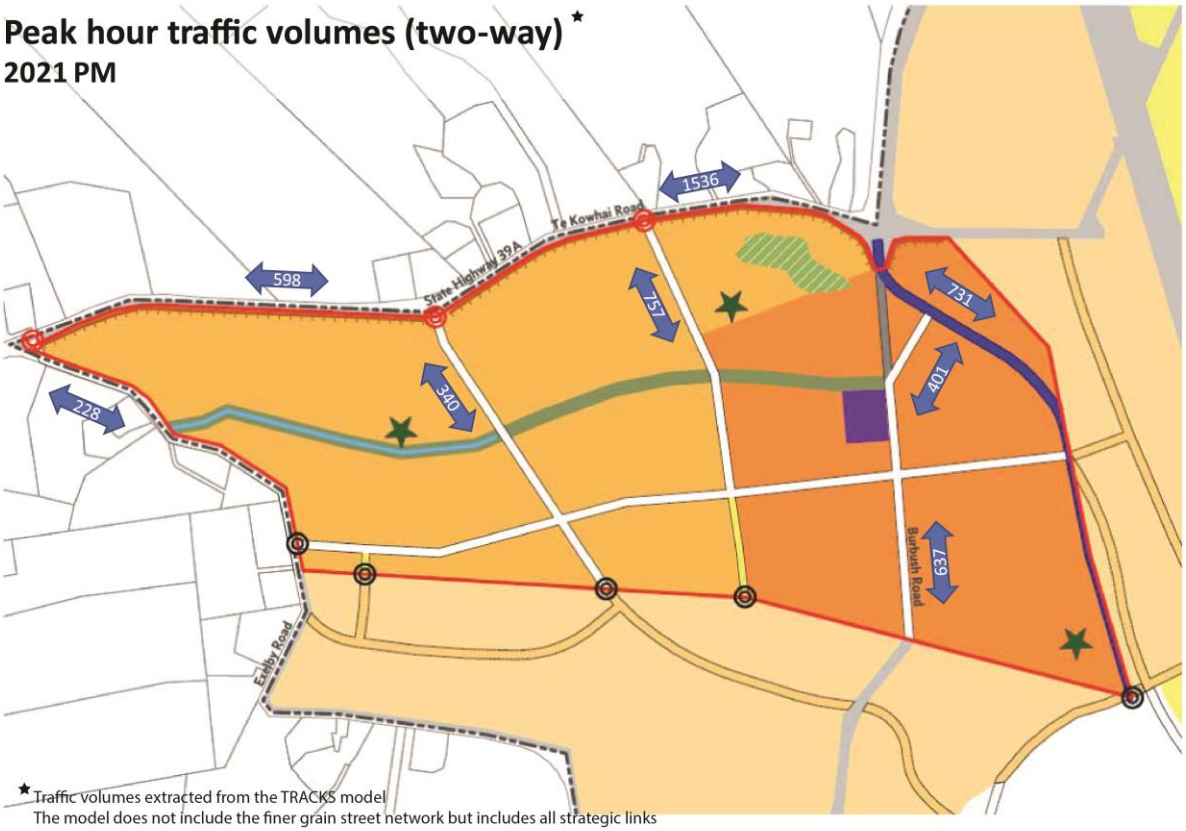
The full extent of development enabled by the proposal will be appropriately supported by the existing road network and upgrades to existing road network (as detailed above) to maintain appropriate levels of safety and efficiency on the surrounding road network.

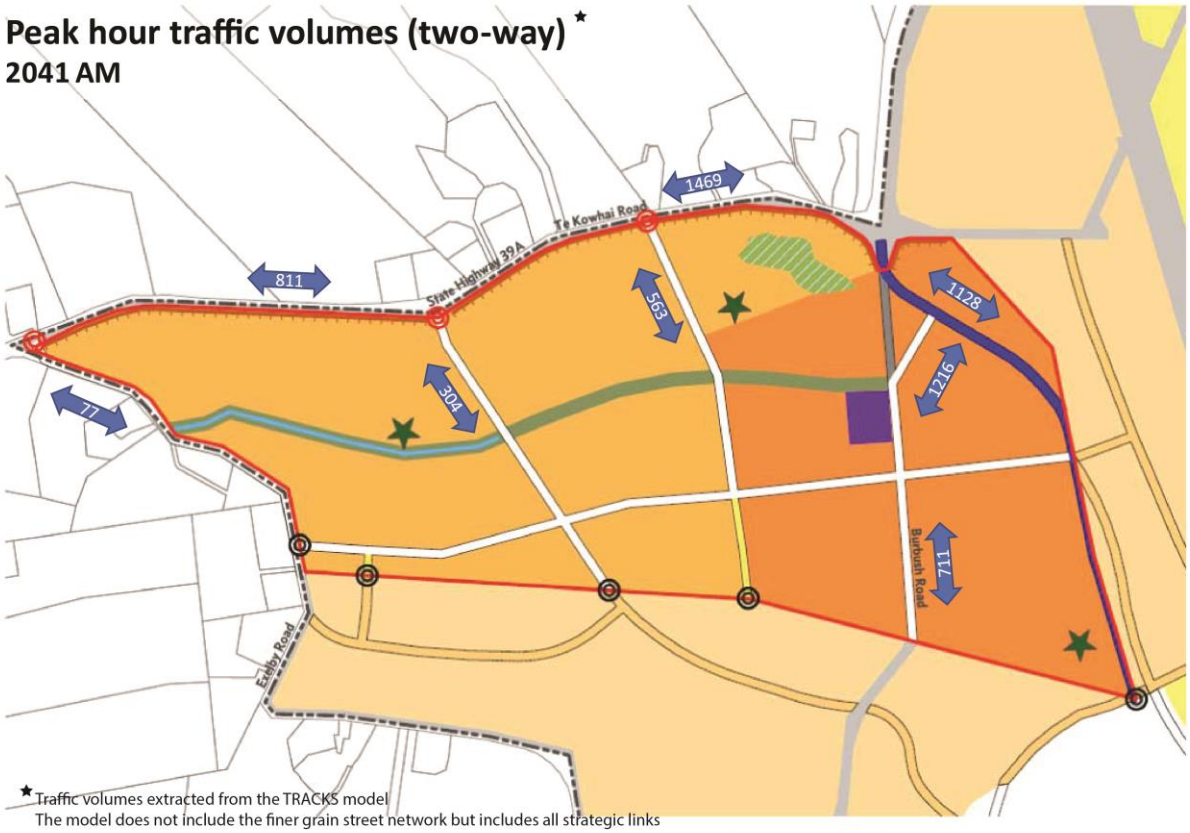
Accordingly, it is concluded that there is no traffic engineering or transportation planning reason to preclude acceptance of this proposal.

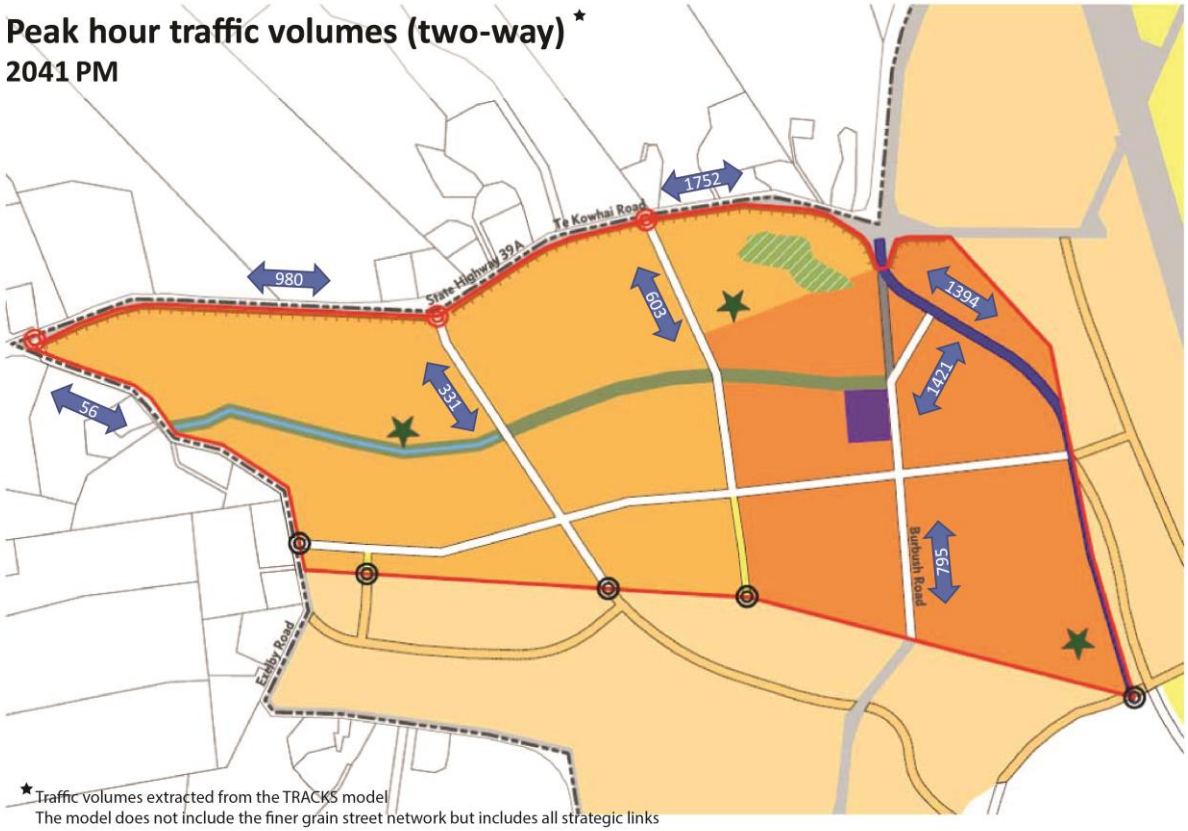
Commute Transportation Consultants

ATTACHMENT A – TRACKS PROPOSED VOLUMES (2021 & 2041)






Peak hour traffic volumes (two-way) ★
2041 AM
1469
Te Kowhai Road
811
State Highway 39A
563
1128
304
1216
77
Burbush Road
711
Exiby Road
★ Traffic volumes extracted from the TRACKS model
The model does not include the finer grain street network but includes all strategic links


Peak hour traffic volumes (two-way) ★
2041 PM
1752
Te Kowhai Road
980
State Highway 39A
603
1394
331
1421
56
Burbush Road
795
Exiby Road
★ Traffic volumes extracted from the TRACKS model
The model does not include the finer grain street network but includes all strategic links

ATTACHMENT 14 - Economic Report by Property Economics dated 30 October 2018

30 October 2018

Green Seed Consultants Limited

c/- Michael Gao

MADE

55 Shortland Street

AUCKLAND

Dear Michael,

RE: Rotokauri North Plan Change Retail Economic Overview

Property Economics has been engaged by Michael Gao of MADE, on behalf of Green Seed Consultants Limited, to provide a high-level retail economic overview for a proposed small-scale mixed-use commercial development with the purpose of serving as a local neighbourhood convenience centre in the proposed Rotokauri North Special Housing Area in Hamilton.

This overview has a specific focus on outlining the key retail / commercial elements of the proposed neighbourhood centre and considers any wider retail impacts this development may have on the surrounding centre network (existing and planned).

Given the size, scale, composition and localised nature of the proposed neighbourhood centre, any economic effects that may occur are likely to be largely isolated to the localised area and the surrounding centres. For the purpose of this analysis the centres that will be considered are The Base and surrounding retail centres and the proposed Rotokauri Suburban Centre, a planned commercial development yet to be actioned proposed within the southern Rotokauri growth area.

Proposed Development

Based on the information provided to Property Economics, Green Seed Consultants Limited intend to develop a 133ha Special Housing Area in north Rotokauri in two stages.

The component of the development relevant to this overview is the proposed neighbourhood centre with the intent of servicing part of the day-to-day retail and commercial convenience needs of the immediate neighbourhood.

Appendix 1 & 2 show the location of the proposed neighbourhood centre in the context of the wider Rotokauri North Concept Masterplan and broader zone framework.

Neighbourhood Centre Policy Plan Context

The relevant Hamilton City Council Operative District Plan Business Zone provisions regarding Neighbourhood Centres is set out below.

> ***Objective 6.2.3***
> *A distribution of locally based centres that provide services and health-care services capable of meeting the day-to-day needs of their immediate neighbourhoods.*
>
> ***Policies***
>
> - ***6.2.3a** - Activities within neighbourhood centres principally serve their immediate neighbourhood.*
> - ***6.2.3b** - The scale and nature of activities within neighbourhood centres shall not generate significant adverse amenity effects on surrounding residential areas and transport networks.*
> - ***6.2.3c** - Residential activities above ground floor commercial uses are encouraged as part of mixed-use development.*

The purpose of Neighbourhood centres in the Operative Plan is to provide a limited range of everyday goods and services and essentially serve a walk-in population. It is essential that the range and scale of activities is compatible with neighbouring residential activity and local amenity values. Limited opportunity must exist for expansion of these centres.

The proposed Rotokauri North neighbourhood centre is specifically designed at a scale to fulfil this role for the future Rotokauri North community and it is in light of these policies that Property Economics will assess the neighbourhood centre in the proposed Rotokauri North development.

Operative District Plan Policy Context

At a broad level Hamilton City's Operative District Plan establishes new policy setting (planning) and strategic direction for the city that seeks to consolidate commercial activity into existing (and planned) centres to deliver an efficient and convenient network of centres throughout the city. In areas of planned high growth such as Rotokauri this will include the development of new centres to efficiently service the requirements of that 'new' community.

This approach seeks to safeguard economic benefits attributable to this consolidation and recognises the significant private and public-sector investment in the city's commercial network. These economic benefits include:

- Certainty of investment
- Agglomeration gains (economic and social)
- Transportation efficiencies
- Infrastructure efficiencies

- Improved community wellbeing and social amenity

This provides basis to the discussion around the proposed development and its effects on the local area and surrounding centres.

Retail Expenditure and Sustainable GFA

A forecast of retail expenditure and sustainable GFA for Rotokauri North has been based on the 'at capacity' / fully developed market for Rotokauri North of 2,000 households. For the purposes of this assessment it has been assumed this would occur by 2038. There is also potential for the proposed centre to service some convenience demand from the future industrial development anticipated in the wider Rotokauri Structure Plan west of the expressway. Convenience demand associated with these activities would primarily be spread across the Rotokauri Suburban Centre, the proposed neighbourhood centre and convenience activity enabled within the Industrial zone (mainly food & beverage likely). This is additional to the analysis in this overview.

For the purpose of this analysis, retail expenditure and floorspace analysis has focused solely on the sectors of convenience retailing. This sector represents a subset of the total retail market. Convenience retailing can be generally defined as stores used for quick stop and frequently required shopping, used primarily due to their close proximity and easy accessibility for the customer.

These stores are not exclusive to any one retail category with examples of such stores including, dairies, bakeries, fruit & vegetable stores, cafes and restaurants. At a broad level, convenience retail spend (excluding supermarkets as a supermarket is not proposed in the centre) is estimated to represent around 19% of all retail expenditure and this proportion has been adopted for the purpose of this analysis. In order to provide a more detailed understanding of convenience and commercial / professional service store types this encompasses a more comprehensive list of convenience store types is provided in Appendix 3.

At capacity Rotokauri North is projected to generate an annual level of convenience-based retail expenditure of around $12m which is sufficient to sustain approximately 1,800sqm GFA of convenience retail activity.

However, not all convenience retail expenditure generated by Rotokauri North will be internalised or remain in Rotokauri North, particularly with other centres such as the proposed Rotokauri Suburban Centre within close proximity once developed. Other centres are likely to draw customers from the Rotokauri North area.

As a result, an estimated 50% of the estimated generated retail spend is considered appropriate to internalise locally which reduces the sustainable retail demand to around 900sqm GFA. However, retail stores only comprise around 50% of a local neighbourhood centre's tenancy composition with convenience commercial service activity demand also requiring consideration in the proposed centre's provision. Factoring in convenience commercial service demand elevates the total centre sustainable GFA requirements for convenience retail and commercial service activities in the Rotokauri North centre to 1,800sqm GFA.

In respect of land requirements for an efficiently developed centre, applying a GFA to land ratio of around 45% would be appropriate. This means around 4,000sqm of developable and usable land is required to accommodate the Rotokauri North convenience retail and commercial service activities. This excludes land required for any playgrounds, urban parks, community or recreational facilities that sometimes form part of neighbourhood centres. Land demand for these activities would be additional to the determined 4,000sqm.

Trade Competition Effects vs Distribution Effects

In terms of assessing potential retail economic effects under the RMA there is first a need to differentiate between trade competition effects and flow-on retail distribution effects. By themselves, trade competition effects are not justification for declining a retail consent application under the RMA, unless they are of a level that generates significant adverse flow-on retail distribution effects on the existing centre network of the area. It is within this broader context that the relative merits of this private plan change, in terms of retail impacts, needs be considered under the RMA.

Retail distribution effects are generated by, and are the result of, consequential trade competition effects. These effects can range across the spectrum (positive and negative) depending on the level of effects generated, which are heavily dependent on the scale, type and location of the proposed activity, among other attributes. Where the patterns of support and commercial activity within an existing centre would not change dramatically within a locality as a consequence of a proposed activity, then the retail distribution effects are not considered to be significant.

Put another way, retail distribution effects would occur where a new business (or cluster of businesses) affects an existing centre to such a degree that it would erode a centre's viability, causing a decline in its function and amenity, and disenabling the people and communities who rely upon those existing (declining) centres for their social and economic wellbeing.

It is Property Economics' understanding that the planned neighbourhood centre will be a commercial development of around 2000sqm-3000sqm GFA with a primary role and function of providing convenience-based retail and commercial services to the emerging residential market surrounding the centre.

The nearest competitors to the proposed neighbourhood centre are The Base / Te Awa Centre to the east, and of particular interest, the planned larger scale Rotokauri Suburban Centre proposed to be developed in Rotokauri South. It is Property Economics' understanding that this centre is proposed to be a significantly larger commercial development to serve all Rotokauri with a retail and commercial service function akin to a town centre.

The Base / Te Awa Shopping Centre is a significant regional centre that services not only Hamilton but the wider Waikato Region. It encompasses over 84,000 sqm GFA and contains over 100 specialty stores with seven major tenancies / anchor stores.

The Rotokauri suburban centre is a planned commercial centre, proposed to be the main retail / commercial centre for this north western growth area of Hamilton and to serve both residential and industrial areas. The centre will offer a much broader range of retail and commercial services than the proposed neighbourhood centre and also is likely to contain a number of community and recreational facilities that will not be included in the proposed centre.

Given the proposed scale of the Rotokauri North neighbourhood centre, projected market growth and role and function of the surrounding centres, the market can comfortably accommodate both a suburban and neighbourhood centre in the future, much like most other communities in Hamilton. Importantly the development of the proposed Rotokauri North neighbourhood centre does not undermine the potential for the Rotokauri suburban centre to be developed or jeopardise its planned role and function.

Being a small, convenience-based centre, the proposed Rotokauri North neighbourhood centre's competitiveness is largely driven by its proximity to its local market. In this sense the proposed centre is unlikely to pose a significant threat to these other centres to the point where retail distribution effects would begin to become evident. The proposed centre would be simply too small to undermine those larger centres and there is no plausible potential that the proposed provision could undermine or jeopardise the retail and commercial provisions in The Base / Te Awa and the planned Rotokauri suburban centre to a level where their function or viability is threatened.

Taking into consideration the scale, type, location and market growth components of the proposed neighbourhood centre, and its proximity to centre competition, the development is not considered of a scale that could generate significant adverse retail distribution effects on surrounding centres. Its proposed activities are appropriate and fit with the role and function of a modern neighbourhood centre. Any effects generated by the proposed development are considered likely to be trade competition effects, and nor do the retail stores themselves have the propensity to generate significant adverse retail distribution effects on the market. Any trade diversion effects will be negligible in my opinion, trade competition based and quickly offset by projected market growth.

Summary

Rotokauri has been identified by the Hamilton City Council as an area to accommodate significant residential growth in the future. Around 1000ha of development is planed with land zoned industrial and residential, the land zoned residential totals approximately 485ha and the land zoned industrial totals approximately 270ha.

The future population of the area is expected to grow to between 16,000 and 20,000 people once developed, and it is currently planned that the future Rotokauri Suburban Centre will act as the primary commercial centre to the area, serving the general residential population of Rotokauri and the neighbouring industrial estate.

Furthermore, the Rotokauri North Special Housing Area would be best served in terms of efficiency if it had its own small neighbourhood centre that did not conflict with the main

Rotokauri suburban centre, i.e. complement rather than undermine. The development is isolated on the north side of the area and as a matter of convenience an additional small commercial development is likely to be beneficial to satisfy the demand that is likely to arise from this subdivision as it grows for a convenient 'top-up' location.

In light of previous considerations and given the scale of the proposed development, Property Economics consider a full retail impact assessment unnecessary in this instance. With current proposed market growth, strong prospective demand (based on fully developed yield), little conflict with existing developments in terms of the RMA, Property Economics supports the subject private plan change's neighbourhood centre from a retail economic perspective.

Yours faithfully,



Tim Heath
Managing Director

APPENDIX 1: ROTOKAURI NORTH SHA MASTERPLAN CONCEPT

Rotokauri North Special Housing Area

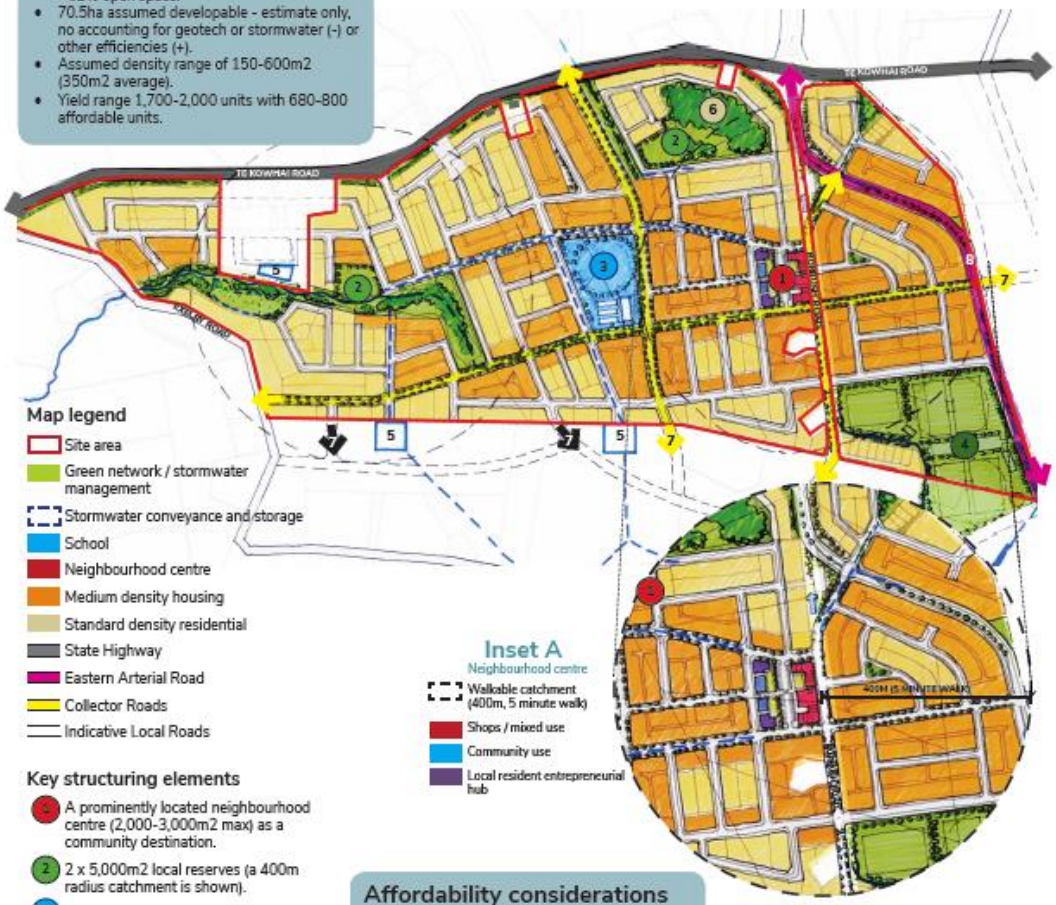
August 2018
Green Seed Consultants Ltd

ROTOKAURI NORTH SHA UPDATED MASTERPLAN CONCEPT (Figure 4)

Figure 4: Rotokauri North SHA Updated Masterplan Concept
Source: Design Urban Pty Ltd

Masterplan concept summary

- Concept delivers approximately 53% developable land at this stage:
  - 6% stormwater
  - 29% roads
  - 12% open space.
- 70.5ha assumed developable - estimate only, no accounting for geotech or stormwater (-) or other efficiencies (+).
- Assumed density range of 150-600m2 (350m2 average).
- Yield range 1,700-2,000 units with 680-800 affordable units.



Map legend

- Site area
- Green network / stormwater management
- Stormwater conveyance and storage
- School
- Neighbourhood centre
- Medium density housing
- Standard density residential
- State Highway
- Eastern Arterial Road
- Collector Roads
- Indicative Local Roads

Inset A
Neighbourhood centre

- Walkable catchment (400m, 5 minute walk)
- Shops / mixed use
- Community use
- Local resident entrepreneurial hub

Key structuring elements

1. A prominently located neighbourhood centre (2,000-3,000m2 max) as a community destination.
2. 2 x 5,000m2 local reserves (a 400m radius catchment is shown).
3. A possible primary school.
4. An opportunity for a 14ha district sports park (10ha on Green Seed site).
5. Indicative potential stormwater storage pond locations on neighbouring sites with conveyance through the Green Seed site via swales to central storage and conveyance stream.
6. Retention of an existing area of significant bush.
7. Consistency with existing Rotokauri Structure Plan including links to other sites in locations shown.
8. A key arterial road on the eastern edge of the site delivering strategic network.

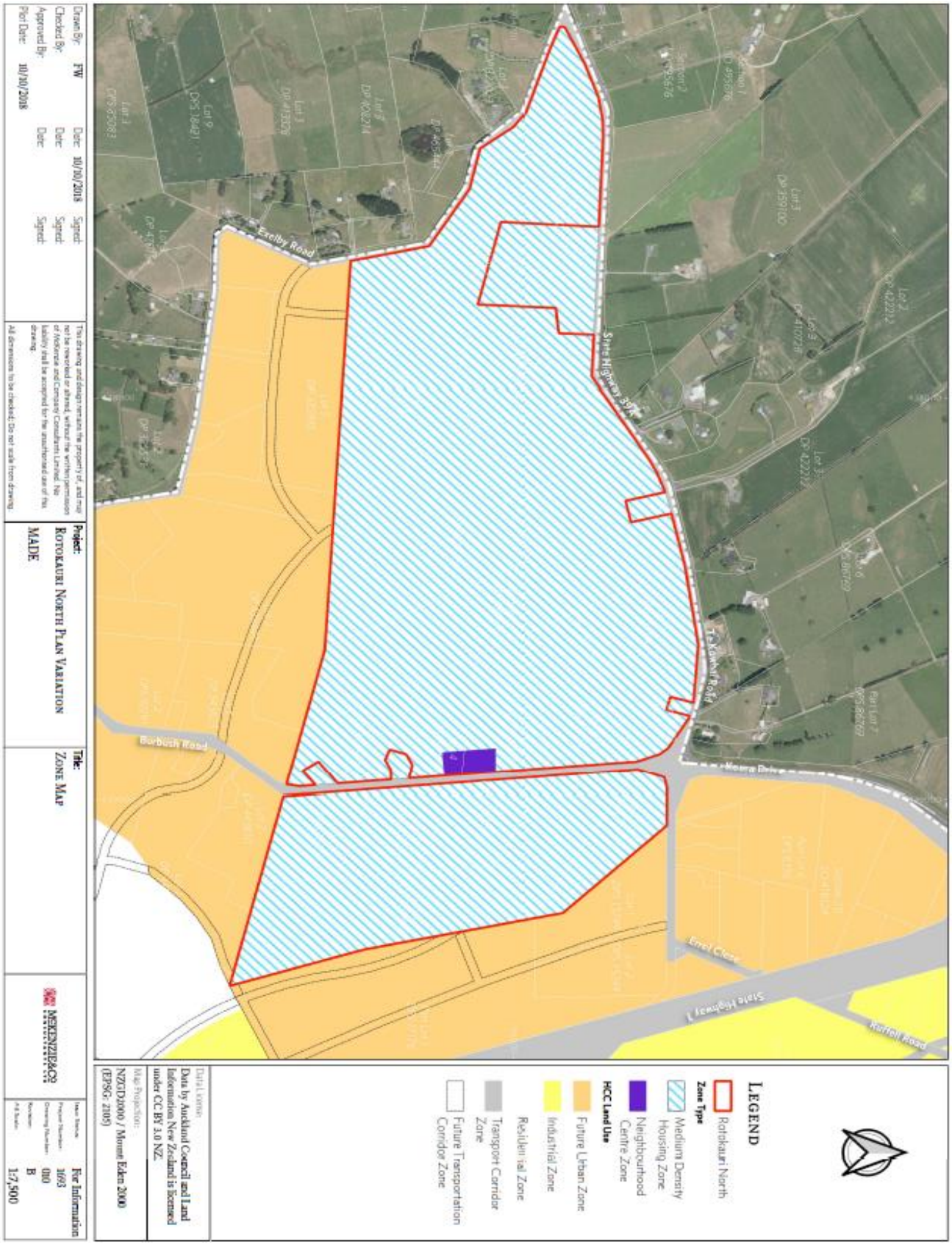
Affordability considerations

- Committment to at least 40% affordability:
  - 3 bedrooms or less
  - on sections 350m2 or less
  - GFA less than 140m2.



Inset B
Indicative affordable housing

APPENDIX 2: ROTOKAURI NORTH SHA ZONE MAP



APPENDIX 3: CONVENIENCE STORE TYPE EXAMPLES

Note this is not intended to represent an exhaustive list.

- Superette / Dairy
- Fish shop
- Butcher
- Bakery
- Post Shop / Stationery
- Fruit & Vege Shop
- Delicatessen
- Cake Shop
- Ice Cream Parlour
- Liquor / Wine Shop
- Takeaways (Fish & Chips, Pizza, Chinese, Thai, Turkish, Indian, etc.)
- Cafés & Restaurants
- Video store
- Chemist
- Newsagent
- Pub / Bar
- Florist
- Camera / Photography Shop
- Gift Shops
- Optometrist
- Locksmith
- Hairdresser
- Drycleaners
- Doctors
- Accountants
- Physiotherapists
- Medical practitioners
- Dentists
- Gym
- Lawyers

ATTACHMENT 15 - Urban Design Assessment by Ian Munro dated April 2019

urban design assessment

ROTOKAURI NORTH

STRUCTURE PLAN AND PRIVATE PLAN CHANGE REQUEST

for

GREEN SEED CONSULTANT LTD

by

IAN MUNRO

april 2019

executive summary

This report documents an independent urban design analysis of an application for a private plan change ("**PPC**") to rezone approximately 140ha of Future Urban ("**FUZ**") zoned land to Medium Density Residential Zone ("**MDRZ**") and Business 6 Zone ("**B6Z**") made by Green Seed Consultant Ltd ("**GSCL**") on an area of land known as Rotokauri North, within the Hamilton City Council's Rotokauri Structure Plan area. The application has been made to Hamilton City Council ("**Council**") under the Resource Management Act 1991 ("**RMA**"). The key conclusions of this report are that:

a. The PPC has been prepared following best-practice urban design principles and has benefited from a master plan-based design process. The master plan, although proposed to remain non-statutory, has demonstrated that the land can be subdivided logically and in a way that will support a high-quality neighbourhood, and also remain compatible with the Council's Rotokauri Structure Plan.

b. The PPC would provide for approximately 1,700 – 2,000 houses on sites typically ranging between 150m2 up to 400m2 (as a result of either subdivision which accords with a land use activity (e.g. of a duplex) or vacant fee simple subdivision). To support the needs of this neighbourhood, the PPC provides for a neighbourhood centre (B6Z) to help meet daily convenience needs in a way that will respect the wider centres hierarchy and support existing centres. Opportunity for a new primary school has also been identified, although the Ministry of Education ("**MoE**") would follow a separate process to make any decisions in that regard and it is not proposed to zone or 'lock in' a future school through the PPC.

c. Provision has also been made for recreation reserves, the protection of an existing area of notable bush, the needs of New Zealand Transport Agency ("**NZTA**"), and creation of a logical transport network that satisfies the Council's strategic network imperatives for arterial and collector roads.

d. The PPC has been based on the provision of affordable housing and a variety of housing typologies. To this end the Council's existing MDRZ development controls have been reviewed and augmented so as to maximise the efficiency at which high-quality housing can be provided. This includes provision for an 'acceptable solution' approach to duplex housing. This model is considered to be industry-leading and is particularly supported.

e. Changes proposed to the 'standard' MDRZ zone rules also seek to require higher standard of urban design quality, and well-laid out subdivisions that are walkable and safe. This includes attempts to minimise cul-de-sac roads and rear lots, and govern the maximum dimensions of urban blocks so as to not undermine pedestrian convenience and legibility.

On the basis of the above, the PPC is considered to result in few adverse urban design effects, many positive urban design effects, and is an effective and efficient means to enable the land's development. The PPC could therefore be accepted on urban design grounds.

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1. introduction

1.1 This report documents an independent urban design analysis of an application for a private plan change ("**PPC**") to rezone approximately 140ha of Future Urban ("**FUZ**") zoned land to Medium Density Residential Zone ("**MDRZ**") and Business 6 Zone ("**B6Z**") made by Green Seed Consultant Ltd ("**GSCL**") on an area of land known as Rotokauri North, within the Hamilton City Council's Rotokauri Structure Plan area. The application has been made to Hamilton City Council ("**Council**") under the Resource Management Act 1991 ("**RMA**").

1.2 This report should be read in conjunction with the separate bundle of Figures titled "Rorokauri North: Urban Design Figures".

1.3 For full details of the proposal, the PPC request documents prepared by Tollemache Consultants Ltd are referred to.

2. scope and involvement

2.1 I have been engaged by GSCL as its urban design consultant. GSCL is a subsidiary entity of Ma Development Enterprises Ltd ("**MADE**"). Since 2014 I have been MADE's design leader, coordinating the design and built form outcomes of its developments across Auckland.

2.2 I visited the site in 2017 and have coordinated the design process since then in response to a brief set by GSCL. My brief was to ensure the land was efficiently planned in a manner that achieved best-practice urban design principles and would be an attractive and desirable destination for people to live in. Ensuring the provision for affordable housing was also a key part of my brief, based in part on the decision of the Council to recommend the Rotokauri North area as a Special Housing Area ("**SHA**") under the Housing Accords and Special Housing Areas Act 2013 ("**HASHAA**").

2.3 In fulfilling my brief I have worked closely with the following particular consultants:

a. Mark Tollemache and Renee Fraser-Smith, Tollemache Consultants Ltd (planners);

b. Steve Thorne, Design Urban Pty Ltd (master planner);

c. Leo Hills, Commute Consulting Ltd (traffic engineer);

d. Andrew Hunter, McKenzie & Co (engineer);

e. Rob Pryor, LA4 (landscape architect); and

f. Amy Hendry, Four Walls Architects Ltd (architect).

2.4 The process followed to arrive at the current proposal has been as follows:

a. initial site visit;

b. high-level pre-application with Council staff in 2017;

c. analysis of Rotokauri Structure Plan, Hamilton City District Plan ("**HCDP**"), VISTA;

d. formal site analysis;

e. second site visit December 2017;

f. design workshop 1, December 2017, which identified the first concept master plan and included input from Council staff;

g. technical analysis of first concept master plan;

h. design workshop 2, August 2018, which identified the second concept master plan, and possible planning rules for the zone, and including input from Council staff;

i. technical analysis of second concept master plan;

j. development of preferred urban design rules;

k. refinement of the concept master plan and urban design rules;

l. finalisation of proposed structure plan and plan provisions; and

m. preparation and finalisation of this report.

3. urban design framework

3.1 Urban design has become a popular movement in New Zealand since the 1990s. In that time a substantial amount of literature and projects have occurred purporting to reflect 'urban design thinking'. The rise of urban design has also overlapped with the simultaneous rise of 'environmentally sustainable cities' and a general focus on better, more 'integrated planning'. These are mutually compatible but nonetheless independent things. This has overall created ambiguity regarding what urban design is inherently intending to do.

3.2 In consideration of a wide range of international and national urban design documents and in summary the essence of urban design can be regarded as

configuring development so as to enhance the quality, safety and comfort of public spaces, including the way that public spaces and development on adjoining private spaces integrate with one another.

3.3 GSCL briefed me to ensure that its Rotokauri North project was able to achieve best-practice urban design outcomes. Successful urban design has been linked across a number of well-substantiated studies[1] as being able to help urban development:

a. create safer and more sociable neighbourhoods for people to enjoy;

b. contribute to public health outcomes primarily by promoting more active lifestyles and pedestrian behaviour and ensuring more consistent solar access to sites and buildings;

c. provide greater visual interest, amenity values, and built character within neighbourhoods;

d. result in neighbourhoods that are more resilient to environmental and social changes;

e. achieve better integration and prominence of public spaces, enabling greater utility to be extracted from those public assets; and

f. deliver greater variation in land use mix, density, and housing choice.

3.4 To ensure that Rotokauri North achieved all of the above, the design process has been guided by best-practice urban design principles at all times. These have been sourced from the following sources:

a. Council VISTA;

b. New Zealand Urban Design Protocol;

c. People+Places+Spaces: A Design Guide for Urban New Zealand; and

d. HCDP.

3.5 The above documents discuss an extensive number of concepts and potential issues. However, across them a number of spatial outcomes or priorities are consistently expressed that are relevant to Rotokauri North.

3.6 In summary, the following overarching design principles have guided the PPC proposal:

a. require a well-connected and walkable block and street network that recognises the road hierarchy and the needs of strategic through movement;

[1] For a representative synthesis, refer to Ministry for the Environment, 2005, *The Value of Urban Design*, Wellington.

b. require development to activate and front public spaces, and have private space to the rear, and avoid lot frontages becoming dominated by vehicle access and parking functions;

c. maximise housing choice and variety, including affordable housing;

d. maximise the efficiency of development in a way that contributes to a high-quality built environment and new neighbourhood character;

e. prominently integrate public open spaces and storm water facilities into the neighbourhood and have them contribute to its character;

f. integrate logically into and otherwise be consistent with the Rotokauri Structure Plan;

g. maximise solar access to lots and ensure a good standard of on-site amenity is achieved; and

h. ensure the daily needs of residents are met as conveniently as is possible.

4. site analysis

4.1 The site is approximately 140ha and has been described in the planning report accompanying the PPC by Tollemache Consultants Ltd. Particular characteristics relevant to an urban design assessment are that:

a. The site is at the north-western edge of Hamilton City; Te Kowhai Road (State Highway 39 ("**SH39**")), immediately north of the site, marks the boundary with Waikato District. Vehicle access to this edge will be necessarily limited. SH39 intersects with State Highway 1 ("**SH1**") at Te Kowhai Road roundabout near the site's north-eastern corner. This gives the site excellent visibility and accessibility, but limited direct access.

b. The site is very flat (although some minor hills rise in the site's southern area) and is in rural (predominantly pasture) / rural-residential use. The land is currently quite 'wet', with ponding readily visible after rain events. It is not possible to develop the land without providing storm water storage and conveyance facilities; due to the low-lying nature of the land and high water-table, these facilities will likely need to use horizontal width rather than vertical depth to meet storage needs, and hence may come to occupy a substantial part of the site area.

c. An existing stream, being a tributary of the Ohote catchment, runs east-west through the western part of the site, and passes under Exelby Road by way of a small culvert. A second stream, being a tributary of Te Otamanui catchment, runs north across SH39.

d. Exelby Road marks the western boundary of the site (and Hamilton City). Burbush Road is the third existing road at this time. It runs through the site in a north-south alignment and then turns south-east towards the southern boundary of the site, as it curves to follow the rising slope. It intersects with Exelby Road beyond the site boundary.

e. South-west of the SH1 / SH39 intersection and roundabout is an area of notable native forest – Significant Natural Area ("**SNA**") in the HCDP. This remnant is the last remaining example of what likely prevailed prior to domestication of the land and it is of local significance. Provision for its ongoing protection (as is achieved through its current SNA zoning) and, if possible, enhancement will be necessary.

f. The site otherwise lend itself to a variety of internal block and road layout options, with the undulating topography and need to accommodate storm water the key design constraint.

g. The relevant planning guidance is from the Council's Rotokauri Structure Plan (notified 2007 as Plan Variation 18, operative since 2011). The Structure Plan identified the land as suitable for residential activities. Land to the east of the site is identified for employment activity and this is likely, in the medium term, to provide employment opportunities to residents in Rotokauri North. The Structure Plan also identifies indicative open spaces and a high-level road network; that layout is not immediately understandable other than with reference to existing landform contours and shapes; this may not be an appropriate or efficient real-world approach to take but is at the level of a Structure Plan not inappropriate.

h. In the wider environment, Hamilton City to the south includes the balance of the Rotokauri Structure Plan area and Lake Rotokauri. In the southern part of the area is live-zoned land being developed and including a commercial centre intended to be the 'principal' centre serving the Structure Plan land.

i. To the east is the existing Hamilton City urban area. It includes extensive residential land as well as a north-south employment and commercial spine following SH1, railway, and arterial road corridors that run through Hamilton. Associated with these and relatively accessible from the site is Te Rapa / The Base, a regionally significant commercial centre and employment hub.

j. It is unknown whether, over the longer term, a railway station may eventuate to serve what has been an ongoing speculation over an Auckland – Hamilton passenger line. Were this to occur, it is likely that the site would enjoy reasonably good access to this.

4.2 Overall and based on the above, the site forms part of a logical urban growth opportunity that will in time connect living, working, recreation and transportation. In urban design terms there are no reasons to suggest the suitability for urban

development and general residential use identified in the Council's Rotokauri Structure Plan is inaccurate, and no reasons that would warrant deferral of a PPC to up-zone the land at this time.

5. rotokauri structure plan

5.1 The Rotokauri Structure Plan (**Figure 5.1**) was prepared in 2007. It covers a land area of approximately 1,000ha and the PPC site accounts for approximately 14% of this. Parts of it have already been through a re-zoning process (Plan Variation 18) and are in the process of being developed.

5.2 Relevant to the site, the Structure Plan:

a. Anticipates (standard) residential activity and identifies a ridgeline protection area associated with the natural hill system that runs across the Structure Plan area.

b. The ridgeline protection area is envisaged, based on documentation accompanying the Structure Plan (**Figure 5.2**), to be based on a model of retaining ridges and as much natural topography as possible by incorporating these into large rear garden spaces, placing dwelling downslope and near road frontages. It is not clear whether private boundary fences around properties were contemplated or whether the ridges would remain clear of fencing and be treated akin to a 'commons'.

c. Anticipates a surface-based stormwater management train draining land from the south into the site, connecting with a west-flowing facility that departs the site via the existing Exelby Road culvert (**Figure 5.3**).

d. Anticipates at least one district-scale recreational open space of several hectares, but provides for two such large spaces. These are connected to the key road network (likely to maximise legibility and accessibility).

e. Provides for a small community focal point south of the site adjacent to an extension of Arthur Pointer Drive Road that connects to Hamilton's urban area to the east, and a single primary Rotokauri commercial centre further south at Wairere Drive.

f. Relies on SH39 and Exelby Road as the urban boundary.

g. Provides for a sinuous network of arterial and collector roads in both north-south and east-west directions (**Figure 5.4**).

h. Provides for a relatively broad mixture of residential, commercial, employment, community, and recreational activities within the Structure Plan area. Higher amenity 'employment' zoned land is proposed to sit in a north-south ribbon between residential land (west) and industrial land (east).

i. The existing area of SNA at the SH1 / SH39 intersection is to be protected.

j. Not shown, but understood to be expected at the time of development, are small-scale neighbourhood reserves and parks. It is understood that the Council's key expectation here is that such a park should not be more than a 5-minute walk; this would amount to a need for two or three such parks within the site.

k. The site is proposed to be part of "Stage 2" of the Structure Plan, in terms of land up-zoning.

l. Burbush Road is signalled to be realigned, making way for a new north-south spine road (east) connecting eventually from SH1 / SH39 south to the Rotokauri Centre.

m. It is not clear whether the green (storm water) corridors are or are not intended to be aligned with road corridors, however cycle-pedestrian routes are indicated as occurring along the roads and the green corridors.

n. In terms of the future road network, it is understood that these are to be provided for and negotiated with the Council at the tie of development; no designations for their routes or functions exist.

o. In terms of the future road network, the Structure Plan identified four points where key roads would cross the site boundary with neighbouring land (south and east) that is not subject to the PPC.

5.3 Overall, the Rotokauri Structure Plan sets in place a relatively detailed planning strategy for the site. Although it is understood there is some flexibility in the final alignment and placement of the key elements shown, the Structure Plan provides a useful starting point to consider how to enable development on the PPC site.

6. concept master plans

6.1 Master plans are a technique at helping 'bridge the gap' between high-level structure planning and detailed subdivision design. I prefer using them whenever a site is large enough to require multiple blocks and roads, and where a variety of options may be available. Typically, this can be 10ha – 15ha+. Master plans are not as accurate as subdivision scheme plans but are drawn to scale and use realistic or intended dimensions and sizes. Their key benefit is how they are able to help test what real-world outcomes may or may not be possible, and why. They are focused on streets, blocks and land use types, but frequently also indicate individual lots or buildings.

6.2 For Rotokauri North, it is not proposed to make the concept master plan a statutory part of the HCDP. This is largely because as the design process shifts

into the next and more detailed level of subdivision planning (assuming the PPC is accepted) it is inevitable that some parts of it will change and refine over the life of the development. Nonetheless, the master plan is relied on by GSCL to make planning and investment decisions, and will form the basis of the site's subdivision.

6.3 Based on information relating to storm water and drainage needs, a concept master plan ("**concept 1 master plan**") was prepared through a 3-day workshop held in Hamilton in December 2017. This has been included as **Figure 6.1**. Its key characteristics were:

1. retention of an existing area of SNA near the Burbush Road and Te Kowhai Road intersection, and provision for two playing fields (an alternative 'plug in / plug out' providing five playing fields was also prepared;

2. provision of the key roads shown on the Rotokauri Structure Plan with some realignment, particularly to a north-south 'spine' road;

3. provision for storm water storage and conveyance areas based on projected needs, integrated where practicable with public road frontage (**Figure 6.2**);

4. retention of a hill / ridge feature identified on the Rotokauri Structure Plan following guidelines prepared on behalf of the Council prepared at the time of the Structure Plan:

    a. Tests undertaken at the workshop to understand the significance of the features identified that they may not warrant protection;

    b. A key issue was that retention of the hills markedly reduced opportunity for streets and blocks in these parts of the Structure Plan area and this was not regarded as inefficient; and

    c. Cross sections prepared through the key feature within the PPC site identified that when developed it would be likely that the top of the hill would be mostly or entirely screened by the dwellings below the ridge (see **Figure 6.3**).

5. provision of north-south orientated street blocks where possible and practicable to optimise solar access;

6. provision of a small neighbourhood centre based on the key road network, with a north-south alignment, and access to the storm water 'green network';

7. provision of a potential primary school, located so as to have centrality within the site, access to the storm water 'green network', playing fields and the neighbourhood centre; and

8. provision for higher-density, rear-lane based housing along the key north-south road so as to make it safer for pedestrians and cyclists and to remove the safety conflict of reversing vehicles generally;

6.4 The concept 1 master plan delivered an indicative yield of 1,450 – 1,800 houses based on the following parameters:

1. 45% of the site (60ha) was available for development based on approximately 30% of the site for a well-connected road network and park-edge roads (roads that fronted public open spaces or waterways); 20% for storm water related facilities; and 5% for recreational open spaces.

2. Provision being made for an approximately 3ha primary school and approximately 1ha of neighbourhood centre.

3. Lot sizes ranging from 200m2 to 800m2, with an average or typical lot size of around 350m2. Detached houses, duplex units and terraced housing units (*which fall under the definition of an "apartment" in the District Plan)* were considered likely to be supported by the local market and form almost all houses within the development. Occasional apartment living was provided for but not assumed to appeal to a large number of likely residents.

4. Incorporation of rear-lanes along key roads and where higher density housing was sought (to avoid vehicle crossings, driveways and garages visually dominating streets and otherwise creating hazards for pedestrians and cyclists).

6.5 The concept 1 master plan identified a number of technical challenges to be addressed, including:

1. the requirements for managing on-site storm water treatment and / or conveyance;

2. what 'affordable housing' may mean and following on from that, to what extent it could or could not be provided;

3. market testing of different housing types and densities;

4. the significance of a hill / ridge system across the Rotokauri Structure Plan area that extended into the Rotokauri North site;

5. transportation needs and the likely width of roads; and

6. the need for and provision of recreational open spaces within Rotokauri North.

6.6 Following on from the December 2017 workshop, and after completion of further technical investigations it was identified that the concept 1 master plan would not likely deliver a yield that was commercially feasible based on the costs

associated with the development, the challenges or providing 10% or more affordable housing, and the generally low proportion of the site likely to be available for development. It was also identified that the alteration to roading locations outside of the Rotokauri North site would raise practical issues in respect to the scope of the PPC request and the potential effects on third party landowners in the remainder of the Stage 2 Rotokauri Structure Plan area. Based on the work undertaken in the concept 1 master plan regarding the ridgeline protection area, LA4 Ltd undertook a landscape review to confirm the significance of the hills. LA4 Ltd concluded that the hills were not a significant or important part of the landscape and that it was not necessary to protect them as envisaged in the original Structure Plan.

6.7 A second 3-day design workshop was held in Hamilton in August 2018, based on re-visiting the concept 1 master plan with updated technical information, as well as a more specific consideration of the form of a PPC request, the extent of the recommended SHA, possible planning rules and requirements. This resulted in a concept 2 master plan (included as **Figure 6.4**), and then a more refined concept 3 master plan (**Figure 6.5**). Its key characteristics are:

1. retention of the concept 1 plan's general alignment for the north-south spine road, and greater east-west connectivity for storm water conveyance and for better access to planned employment land east of the site;

2. realignment of Burbush Road so as to provide a collector / arterial road shown on the Rotokauri Structure Plan within the site;

3. a revised neighbourhood centre placement in the eastern part of the site so as to relate well to Burbush Road and also future employment land in the east. This was aligned with east-west collector routes that will likely be used to cater to employee daily work trips as well as the key north-south spine from SH1;

4. a more centrally located potential primary school site serving the area;

5. provision of potential playing fields (intended to serve a District-catchment rather than just the residents of Rotokauri North) so as to be as accessible as possible to the wider Hamilton City;

6. realignment of the intersection of Te Kowhai Road and Exelby Road to make it safer;

7. provision of two local park reserves to meet the needs of residents within Rotokauri North;

8. provision of an access-restricted and landscape-buffer edge to Te Kowhai Road/SH39;

9. a greater emphasis on higher densities in the eastern part of the site in recognition of its greater accessibility to employment, the transport network, possible school and possible neighbourhood centre, and lower

density in the west. Following on from this, a higher concentration of affordable housing was identified as being more desirable in that higher density part of the site; and

10. a revised storm water management concept based on the principle of each site within the catchment providing for on-site management / detention. This provides a more equitable means of spreading the burden of urban stormwater across the Structure Plan area (**Figure 6.6**).

6.8 The concept 3 master plan delivered an indicative yield of 1,700 – 2,000 houses based on the following parameters:

1. 53% of the site (70ha) was available for development based on approximately 30% of the site for a well-connected road network and park-edge roads (roads that fronted public open spaces or waterways); 7% for storm water related facilities; and 11% for recreational open spaces.

2. Provision being made for an approximately 3ha primary school and approximately 1ha of neighbourhood centre.

3. Lot sizes ranging from 150m2 to 600m2, with an average or typical lot size of around 350m2. Detached houses, duplex units and terraced housing units (*which fall under the definition of an "apartment" in the District Plan)* were considered likely to be supported by the local market and form almost all houses within the development. Occasional apartment living was provided for but not assumed to appeal to a large number of likely residents. Lot dimensions were indicatively planned at a typical 28m depth, with lot frontages varying from >10m (vehicle access from front), or <10m (rear lane access). A duplex concept based on a 12.5m x 28m (minimum) parent lot was also tested (producing two child fee simple lots with subdivision):

    a. A variety of lot configurations were tested against the HCDP MDRZ rules. This was to confirm what urban design effects different lot sizes (and hence different block dimensions in the master plan) would give rise to. This identified key concerns with the typical height in relation to boundary ("**HiRB**") conrtols and some other rules, notably the service court and building coverage requirements (**Figure 6.7**);

    b. A variety of duplex lots have been tested and lessons learned from other developments reflected on. It was identified that the most desirable duplex design is one that is "offset", with one unit close to the street, and the other unit setback from the street behind the car parking spaces that serve both units. This configuration can achieve an urban design outcome almost indiscernible from a standard family house, and lends itself to 'pepper potting' affordable housing across normal subdivisions (**Figure 6.8**);

4. Incorporation of rear-lanes along key roads and where higher density housing was sought (to avoid vehicle crossings, driveways and garages visually dominating streets and otherwise creating hazards for pedestrians and cyclists) (**Figure 6.9**).

6.9 Subsequent to the second design workshop, ongoing technical work has identified further refinements to the amount of land required to accommodate storm water needs; affordable housing; planning rules; possible primary school needs; and general development efficiencies have been considered. This process resulted in the concept 4 master plan (**Figure 6.10**), and the concept 5 master plan (**Figure 6.11**).

6.10 The key differences between the concept 3 and concept 4 plans are:

1. Refinements of the internal block layout to improve land efficiency; and

2. Enlargement and realignment of the village centre spanning between the two east-west collector roads.

6.11 The key differences between the concept 4 and the concept 5 plans are:

1. Removal of the potential school site reflecting that it might not be acquired by Ministry of Education;

2. Removal of District playing fields, reflecting that these might not be acquired by the Council;

3. Retention of existing Exelby Road intersection with State Highway 39, reflecting that closing or relocating it would require NZTA and existing third-party landowners outside of the Plan Change area;

4. Removal of the northernmost east-west collector and replacement with a dedicated pedestrian / cycle / stormwater management area or 'community spine';

5. Refinement of the eastern arterial road to straddle the site boundary;

6. Provision of additional on-site stormwater space serving both the Ohute (attached to the east-west linear space in the site's west) and Te Otamanui (adjoining the protected bush area in the site's north-east) catchments;

7. Reassignment of higher density housing to the eastern half to align with the proposed additional height overlay area and around the village centre;

8. Realignment of the village centre to adjoin the northern east-west community open space spine; and

9. General minimisation of rear-lane blocks, to improve land efficiency.

6.12 On the basis of the wide range of urban form outcomes that the master plan concepts have identified, all based on varying assumption regarding an eventual storm water solution, a final concept 6 master plan (**Figure 6.12**) has been prepared. Given the need to establish fixed land use zone areas, the concept 6 plan aims to bring together the key elements of the previous concept plans in a manner that could allow any of the concept plans 3, 4, or 5 (or 6) to be established, depending on what final storm water management preferences are reached. An augmentation of the concept 6 master plan has been included as **Figure 6.13**, which shows, indicatively, the preferred locations of a primary school and district playing fields, in the event that either or both did occur.

6.13 The key differences between the concept 5 plan and the concept 6 plan are:

1. Refinement of stormwater management areas;

2. Conversion of the northern east-west collector / green spine route to include sections of road and sections of open space;

3. Simplification of street and block network to improve land efficiency; and

4. Re-introduction of the Exelby Rd / SH39 intersection realignment.

6.14 The concept 6 master plan has been used to reverse-engineer the proposed zone plan for Rotokauri North, presented in the next section of this report. By being based on a well-tested master plan, I consider that the zone plan and Structure Plan can be confidently relied on as representing an achievable starting point for subdivision.

6.15 The master plan tests have shown that, in a variety of different ways, the land can be efficiently and successfully developed. It is not proposed to include a master plan concept within the District Plan, even as an assessment matter or reference, because of the number of variables that affect what will be developed. These include uncertainty regarding the location of any public primary school, whether or not the Council seeks district playing fields on the site, and of course the major storm water management decisions to be made (primarily in terms of the maximum flow rate at the Exelby Road culvert). However, what the various master plans have shown is that subject to a number of 'fixed' elements, it will be possible to manage that diversity of outcomes without losing the ability to 'lock in' critical outcomes.

6.16 Nonetheless, the proposed structure plan includes additional detail to help compensate for the absence of a specific master plan concept and ensure that an urban form outcome consistent with what has been shown across the various concept master plans through the subdivision process.

7. proposed structure plan

7.1 The proposed zone / Structure Plan for Rotokauri North (**Figure 7.1**) has been derived from the concept 6 master plan and reflects its key components well, including:

a. the key collector and eastern arterial roads;

b. specified access points to and direct property access restrictions and a building setback requirement along SH39;

c. specified access points to FUZ land south of the PPC site;

d. green corridors / storm water facilities, and indicative open spaces;

e. existing roads identified for potential closure (part of Burbush Road);

f. protection of the existing SNA;

g. MDRZ across the site and identification of an additional height opportunity in the eastern part of the PPC site; and

h. identification of a neighbourhood centre in the B6Z.

7.2 Not shown on the proposed zone plan and refined structure plan are the local road and street network, precise locations and shapes of local reserves, the detail design and integration of storm water / green corridors with streets, and the detail of any wetland or enhanced stream area in the western part of the site. These matters would be managed through the subsequent subdivision and land use consent processes, the Rotokauri North Integrated Catchment Management Plan ("**ICMP**") and the proposed zone rules. Also not included in the proposed zone plan is the potential primary school. MoE practice is to undertake its own site evaluation and selection processes, and then use RMA designation processes to provide for any future school(s) 'over the top of' any underlying land use zone; predetermining school sites and shapes via 'school' zones at the time of a plan change is not a favoured method within the industry.

7.3 The proposal includes a number of sites that sit outside of GSCL's control but which are proposed to be included in the re-zoning. This is from the point of view of ensuring a comprehensive and integrated planning outcome eventuates, and also simply because it makes good sense to include those small 'orphan' sites. These sites are (**Figure 7.2**):

a. Lots 1 – 3 DP 314799;

b. Lots 1 & 3 DP 359488;

c. Lots 1 & 2 DPS 69074;

d. Lot 1 DPS 72047;

e. Lot 1 DPS 46587; and

f. Lot 1 DPS 4129.

7.4 The predominant land use zone proposed is MDRZ. This is proposed to apply to effectively all of the site, although an additional height overlay is proposed in the eastern part of the site to reflect the superior accessibility of that part of Rotokauri North and the desirability of concentrating greater density there.

7.5 A small area of B6Z is also proposed based on the projected yield of the PPC and that a neighbourhood centre within Rotokauri North could complement the primary Rotokauri Centre in the southern part of the Structure Plan. The B6Z has been placed to align it with the internal collector road and green corridor networks as well as give it relative centrality within the future neighbourhood (in terms of employee access from the Structure Plan's identified employment land as well as just for residents).

7.6 Key collector and arterial roads are identified, however the Structure Plan's eastern arterial has been realigned slightly (from the operative Rotokauri Structure Plan) to make it more direct and bring it partially into the PPC area (this will help to ensure that it gets delivered between SH1 and the future Arthur Porter Drive in a planned manner). Other roads are also proposed to be realigned from the Rotokauri Structure Plan however the accessibility between the PPC site and adjacent sites identified within the Structure Plan have been maintained. The key 'internal' north-south collector road has been realigned to be further east, creating a more efficient spine that will run through the PPC site. One, more direct, east-west collector is also proposed (compared with the singular disconnected east-west route signalled in the Rotokauri Structure Plan) to as to enable a more efficient internal street network. Depending on design and storm water management decisions reached at the time of subdivision, a second de-facto east-west collector road would also eventuate along the green network corridor in the northern part of the site.

7.7 Stormwater conveyance issues have been identified, including by using road-based swales. This is so as to help provide public frontage of these facilities, as well as using them to add visual amenity to the streets.

7.8 Indicative neighbourhood parks have been identified (x 2) based on providing access to future houses within a 5-minute walk. These would be confirmed at the time of subdivision. A potential District Park has also been identified.

7.9 The area of SNA identified in the Structure Plan has been protected.

7.10 The ridgeline protection identified on the operative Rotokauri Structure Plan has not been included within the PPC on the basis of technical analysis by LA4 that identified the hills within the PPC site, although part of the wider hill and ridgeline network, are at the low commencement of the system. They are not visually prominent and cross section simulations identified that once developed, following the Structure Plan's subdivision model, it was unlikely the hilltops would

be visible behind dwellings in any event due to their low elevation. Removing this aspect of the design allows for a better future road network in the south-eastern part of the site in particular.

7.11 A large district-level recreational facility shown in the western part of the PPC site on the operative Rotokauri Structure Plan has not been carried through into the PPC. Analysis has identified that a reasonable allowance for this facility, should the Council seek to acquire it, can be met by a large potential open space area in the site's south-east, aligning with the future extension of Arthur Porter Drive, recreation facility and the community focal point identified on the Rotokauri Structure Plan. This was primarily to align the facility with the intended 'focal point' (an undefined term but understood to mean some form of important community significance or coming together), and make it as accessible as possible to its intended city-wide user audience (i.e. as far eastwards as possible). Should the Council wish to acquire land for a District facility, it would be able to acquire this through existing RMA or LGA (PWA) instruments.

7.12 In my opinion, the proposed zone framework and refined Structure Plan proposed as part of the PPC reflect the concept 6 master plan well and this gives me confidence that a successful subdivision outcome could be achieved based on it and the spatial distribution of elements shown. I also consider that it is consistent with, although proposes a number of updates or augmentations to, the Council's Rotokauri Structure Plan. Where updates or augmentations are proposed, I consider they have been justified by the technical analysis and master plan tests completed as part of developing the PPC.

8. proposed subdivision and development controls

8.1 The proposal is based on the existing relevant HCDP chapters (being Chapter 4-Residential and Chapter 23 – Subdivision, as they relate to the MDRZ). However, based on the specific needs and opportunities of Rotokauri North, it is proposed to vary those provisions. The changes were identified as a result of housing and typology tests undertaken at the same time the concept master plan work was occurring in terms of:

a. visiting existing medium density housing developments in Hamilton and researching sales and construction cost data;

b. previous experience by GSCL's parent entity MADE's technical team in promoting affordable housing solutions that also achieve high-quality urban design outcomes;

c. achieving the best-practice urban design outcomes identified earlier in this report;

d. various lot design scenarios based on iterations of site width, site depth, and the HCC medium density residential controls; and

e. architectural testing and validation of the technical team's preferred affordable housing solution (addressed in the Acceptable Solutions Code section).

8.2 The key consequence of the above was identification that an optimal lot depth in Hamilton would be 28m. This follows on to typical block depths of 56m, or 63m where a rear lane is required to allow vehicle access where it is not to be provided from a street frontage (e.g where a vehicle access restriction applies as per the proposed PPC rule). The variable that in turn influences lot size will be the lot frontage width. Based on information from GSCL, and following on from its own discussions with the Council's staff regarding what parameters (including cost and price) would best suit affordable housing for the community, a number of typical lot dimensions have been identified for the PPC area. They are:

a. 28m x >12.5m (more than 350m2) – these lots are likely to be detached fee simple lots accommodating standard (non-affordable) housing. These lots can also accommodate a double garage without the garaging and associated vehicle manoeuvring coming to dominate the street scape or the footpath.

b. 28m x >12.5m as a duplex unit (minimum 350m2, or 175m2 net per unit) – these lots have been identified as being suitable for affordable housing and will be discussed in detail in the next section of the report. One key reason this dimension is suitable is that it is as efficient as possible (land area), but is wide enough to accommodate two cars (one per unit parked side-by-side) without creating any greater adverse street scape or pedestrian amenity effects than a standard house could.

c. 28m x 10m-to-12.5m (280m2 – 350m2) – these lots would be too narrow to accommodate the affordable duplex but could accommodate a standard dwelling subject to only having a single-garage and vehicle crossing width.

d. 28m x 7m-to-10m (196m2 – 280m2) – developed as a comprehensive development (e.g. terraced units) these lots could potentially accommodate front-loaded (i.e. vehicle access from a street) if car parking and garaging was managed and as part of a comprehensive residential development such as a terraced housing row. Such housing would need to be proposed concurrently with the subdivision and occur by way of re-subdivision of a superlot or several other lots being amalgamated. These lots could alternatively also occur as a rear-loaded typology, where vehicle access and car parking came from a rear lane or other solution.

e. 28m x 4.5m-to-7m (126m2 to 196m2) – developed as a comprehensive residential development, (e.g. terraced units) these lots would only be possible if rear-loaded garaging was provided off a rear lane, and would need to be proposed as part of a combined land use and subdivision resource consent proposal based on a superlot or several other lots being amalgamated.

8.3 The key changes to the standard MDRZ framework proposed, relevant to urban design, are:

a. No requirement for a Comprehensive Development Plan. The core detail or guiding future development is contained on the Structure Plan, which was derived from a series of master-plan tests. The fine-detail of the development will be delivered via proposed changes to the subdivision standards including requirements to limit rear lots and cul-de-sacs, and to produce connected urban blocks within specified dimensions. This is considered an equally effective but more efficient urban design solution to the problem of ensuring logical, well-planned subdivisions.

b. changes in the height in relation to boundary controls ("**HiRB**", rule 4.6.3);

The proposed rule enables and passively encourages buildings to mass towards street frontages and rear lane edges (for garages), but to otherwise provide spacious and deep back gardens that can in turn accommodate outdoor living spaces.

This is in turn part of a development strategy seeking to encourage outdoor living spaces to the rear where they are genuinely private and do not lead to pressure for tall fences along road boundaries. The relaxation of HiRB at the side boundaries (other than for the rear 8m of lots) is to help promote a denser and more urban character of 2-storey buildings on efficient, narrow-width sites. Without the proposed rule, accommodating a 2-storey building of at least 6m height and with a frontage width of at least 11m, lots would need to be at least 18m wide or 504m2. This is not considered efficient or even 'medium density' in urban design terms.

However, it is acknowledged that key complementary rules seeking to avoid rear lots where practicable and also provide a deeper rear yard will work in conjunction together to achieve this on a consistent whole-of-block basis.

It is also acknowledged that north-facing lots, where the outdoor living space may be more desirably located at the frontage or to the side of a dwelling, also justify a rules framework that does not seek to explicitly direct how outdoor living spaces are to be configured on sites.

c. changes to maximum building / site coverage (rule 4.6.6);

The proposed rule enables more efficient development of terraced housing (where no side yards are provided between units), in particular where accessed via a rear-lane and where a detached garage is typically required and where more building coverage typically results. The urban design rules that encourage buildings to locate and mass

towards street frontages also means that where additional site coverage is proposed it is unlikely to be occur in a manner that has readily discernible effects in the wider environment.

d. changes to the maximum height rule (rule 4.6.7);

The proposed rule provides for additional building height in the eastern part of the PPC area. This reflects the accessibility advantages of this are in terms of the PPC area's neighbourhood centre, identified employment area east of the PPC site, and the transport links that are readily available. This part of the site has an accessibility advantage over the western part of the site and the height variation rule signals this advantage. The rule gives greater direction that the optimal location of apartments within Rotokauri North will be in the eastern area and the rule enables an efficient, urban outcome that would be unlikely to exceed 4-storeys in height.

e. provision for ancillary units (rule 4.7.1);

The proposed rule provides for ancillary units in locations where they can be accommodated without compromising on-site or neighbour amenity. These sites have outlook space on at least 2-sides and this can accommodate the additional ancillary household's needs. However, the rules do not provide for a circumstance where a duplex development also incorporates ancillary units.

Providing for ancillary units overlooking rear lanes provides not only an additional housing opportunity but a greater likelihood of the laneways being passively overlooked from adjacent units. Given the functional purpose of rear lanes, achieving such surveillance points at lane entrances and exits is in particular likely to passively contribute to safety within the lanes based on Crime Prevention Through Environmental Design principles.

f. provision for duplex housing (rule 4.7.12);

This is a key feature of the PPC. It allows a mechanism where a minimum 12.5m x 28m lot can be developed as a duplex building (2-units), in a way where a high-quality urban design outcome can also be achieved. The method proposed is an Acceptable Solutions Code (next section of this report) included within the District Plan as a design appendix, that specifies spatially how the duplex is to be designed (where proposed to be a Permitted Activity). This will ensure the opportunity of a duplex can be given an enabling activity status without the risk of poor-quality outcomes eventuating.

A key complementary rule proposed for affordable duplex housing is a reduction in the car parking requirement from two parking spaces per unit to only one. Given that the objective is affordable houses, it is considered less likely that households that are affluent enough to

maintain two or more private cars would be in the market being aimed at to begin with.

But of urban design significance is the spatial requirements of car parking spaces. Not only are spatial dimensions fixed (approximately 14m2 per space, or 56m2 on a 350m2 'parent' duplex lot for 4 x spaces), car parks require particular gradients and manoeuvring paths to be functional. This can frequently result in such parking pads and garages visually dominating street frontages and creating undesirable low-amenity footpath conditions where pedestrians face extended lengths where vehicles frequently reverse across the path of the pedestrian. The typical approach in the City to overcome the frontage car parking problem is to establish duplexes in a 'sausage flat' arrangement along the length of sites, with car parking accessed from driveways along site side boundaries. This method is considered equally poor and undesirable in urban design terms. It results in de-facto rear lots within blocks which are not considered appropriate in a greenfields environment.

Reducing the duplex car parking requirement to 1 space per unit also enables the duplex to achieve a key urban design objective for this form of housing choice – that from the street the duplex unit appears at first glance to be very similar to a standard large family dwelling with two parking spaces. Achieving this sense of visual compatibility is considered an important factor in making the affordable duplex a viable solution that can be mixed around the subdivision pattern rather than be always visually identifiable and thus more likely to be spatially segregated from other forms of housing in the neighbourhood.

It is also noted that where a household wishes to maintain two vehicles, the duplex affordable housing solution is not the only one envisaged within Rotokauri North. Terraced housing rows accessed via rear lanes are also likely to be developed, including at an affordable housing price range, and which will (when at least 6m width) provide for two vehicle parking spaces.

g. Requirements for superlots / apartment sites (4.7.12)

The proposed rule provides for a 20m site width where 3+ units are proposed because that width provides for minimum side yard setback and then 3 units where, if each had a single garage in the front façade, the resultant elevation would not be visually dominated by garaging and car parking or manoeuvring. For a rear-accessed site where there would be no garage disruptions at the street, the minimum width drops to 15.5m, reflecting minimum side yard setbacks and three terraced units @ 4.5m unit width.

h. changes to building setbacks (rule 4.8.2);

The proposed rule requires a generous rear yard setback and limits what buildings can locate within it. This is to help provide a consistent placement of sunny and open corridors within blocks and where outdoor living spaces occur in groups so as to maximise spaciousness, sunlight access, and freedom from overlooking. It is fair to surmise that the rule has the effect of seeking a more uniform management of outdoor living spaces, across the lots within each block and this is considered appropriate in medium density housing settings given the increased potential for adverse nuisance effects between neighbours to occur.

The rule also enables un-enclosed, 1-storey tall verandahs up to 1m from the front boundary. This is intended to promote more efficient use of front yard space, and promote socialisation at the street. It also provides opportunity for secondary outdoor living spaces where the visual amenity of the street can be better taken advantage of by residents (this in turn is the basis of the proposal to reduce the front-yard permeable surface requirement from 50% to 40% in rule 4.6.5). Verandahs have been enabled because they are very useful architectural elements to:

- *Soften the bulk and scale of buildings by placing a small-scale and visually permeable (i.e. open-walled) structure in front of dwellings.*
- *Provide residents with a defensible and safe-feeling extension of their dwelling that they are more likely to occupy compared to a general front yard landscape area.*
- *Provide an all-weather (roofed) opportunity to add outdoor seating or other furniture that helps give the street the impression that it is occupied, with resultant Crime Prevention Through Environmental Design benefits.*

In conjunction with rule 4.8.3, The rule also requires the garage to be setback from the street to ensure that active parts of the dwellings are located forward on the inactive garage door. The rule requires a 5m minimum setback from the front boundary, and in addition at least 1m recess behind the front face of the dwelling. In other words, if the front face of the dwelling is itself 5m back from the front boundary, the garage would need to be at least 6m back. Where a garage may be located to side-on to the street, the same setback rules apply and in addition a requirement for windows within the garage's side façade apply. This package of rules intends to make sure that garaging cannot visually dominate or detract from the visual qualities of houses, and to in turn promote street scape and neighbourhood amenity values.

i. changes in requirements relating to garage width and setbacks in front elevations (rule 4.8.3);

In addition to the above, the proposed rule provides for lot frontage widths below what could be otherwise acceptable by restricting garage width. This in turn allows a more efficient use of the PPC land without compromising the urban design quality and pedestrian amenity of streets.

This is regarded as a key urban design technique to allow housing choice and flexibility without compromising urban design quality. In a single-garage-width scenario, it would still be possible for a unit to accommodate two cars within a garage (stacked arrangement), and retain a parking pad for visitors in front of this.

Setbacks for garages also ensure that garage doors do no dominate street fronts.

j. changes in the building separation and privacy rule (rule 4.8.4);

This rule reinforces the subdivision and lot layout approach of encouraging dwellings to face either streets or sunny back gardens / rear lanes. As it is likely that habitable windows will be predominantly orientated to the front and back, rather than the sides, a more refined requirement can apply that requires smaller side setbacks.

Key supporting rules relevant to this approach are the restriction on rear lots (subdivision) and the rear yard requirement. Rear lots create a number of nuisances within blocks, including a fracturing of the consistent 'what is public / what is private' spatial delineation. When rear lots exist in blocks, access driveways introduce frequent points of public access within blocks, spoiling privacy for adjacent lots.

Units built on rear lots also typically lack meaningful outlook space, such as across a street, and the risks of creating unappealing, low-amenity and 'enclosed' outlook outcomes increases significantly. By seeking to avoid rear lots where ever practicable, the need for extensive on-site outlook and privacy protections between side-to-side or side-to-rear neighbours. This is complemented by the rear yard rule that seeks, in the absence of a rear lane, an opportunity for outdoor living space to provide a secondary private outlook area that is entirely within the subject lot rather than across a neighbour's garden.

k. reduction in required outdoor living space requirements (rule 4.8.5);

This rule enables outdoor living spaces that are generous by medium density housing standards across New Zealand's urban centres. In conjunction with complementary rules that promote these spaces to locate in the private rear garden space at the back in conjunction with a HiRB rule that promotes openness in these spaces, it is likely that these

will be consistently functional, attractive and well-used by residents in such a manner that the reduced area will not result in a reduction in actual amenity provided to residents.

In part this is due to the likely 'pooling' of outdoor living spaces adjacent to one another within blocks, reducing the proximity of buildings or potential overlooking, potential shadowing, or potential loss of spaciousness.

The rules also promote development of un-enclosed, 1-storey tall verandahs in the front yard and these can be pooled as a lot's overall combined area of outdoor living space, recognising the positive and public amenity outcomes possible through the provision of these spaces and practical real-world recognition of solar access variations that will result in the subdivision pattern.

l. removal of service courts (rule 4.8.6);
The service yard requirement is not considered necessary on lots larger than 300m2, simply as a function of the size of the site and likelihood that space will be available. On sites smaller than 300m2, the needs of affordability and promoting compact urban lots and blocks justify a different approach.

The requirements for outdoor living space are considered sufficient to accommodate a garden shed and fold-up washing line in a way that will not impinge on the usability of the space. It is also relevant to note that for affordable housing and medium density housing envisaged in Rotokauri North, while there will be some large multi-bedroom family homes, many future units will have two bedrooms and be occupied by a small household that will have less service yard and storage needs than the default HCDP assumption of a 'worst case' large family dwelling and ancillary housing unit on the same lot.

m. changes to subdivision requirements (rule 23.3);

The rules enable subdivision based on the lot sizes identified as being able to accommodate affordable housing and also achieve a high-quality urban design outcome. This includes subdivision of affordable duplex houses where they are in accordance with the conditions specified in the Acceptable Solutions Code (see next section). Compliance with a Code has been identified as a suitable method because design tests have identified that generically permitting two units on a 12.5m x 28m site may result in a number of poorly performing outcomes including rear sites and a muddle of public frontages and private spaces that diminish onsite amenity and public space quality.

n. specification of requirements relating to road and block layout (rules 23.3 and 23.7.8).

The land use outcomes identified as appropriate and on which the land use rules described above will be effective and efficient in urban design terms rely on certain assumptions regarding the arrangement of future lots in blocks. These rules will require an urban structure (roads and blocks) that will deliver the lot configurations that are being relied on. For example, the creation of a 'rear lot' (also known as a 'battle axe lot') would trigger a full Non-complying activity consent and would need to pass the proposed zone policies that focus on a well-connected block structure where direct lot frontage to streets is expected and rear-lots need to be justified as impractical to avoid.

The rules also specify maximum block dimensions so as to ensure a highly walkable and permeable outcome eventuates. In recognition that while there may be practical reasons that support occasional rear lots, it is not anticipated that any justification for impermeable and very inefficient pedestrian networks is likely and as such contravention of those block dimension rules would be a Discretionary activity.

o. Vehicel Access restrictions (in Chapter 25)
Lastly, the rules preclude front / street-based vehicle access on roads that accommodate a cycle facility. This is to promote cyclist safety by reducing conflict with vehicles.

9. acceptable solution duplex housing

9.1 As discussed previously, consideration was given to how to most effectively and efficiently provide for affordable housing within Rotokauri North. Analysis of a number of real-world developments in Hamilton and elsewhere, and development feasibility modelling, identified that 1-to-2-storey duplex houses were likely to be the most cost effective and high-quality means of accommodating affordable housing.

9.2 A key benefit from a well-designed duplex is that from the street it can be designed to look very similar to a standard detached house. In this way, affordable housing can be distributed equitably across the development rather than concentrated in one readily identifiable 'cheaper' part of the neighbourhood. In this respect, I set a goal to make duplex housing as indiscernible as possible within the development.

9.3 Based on a design I helped develop for MADE's flagship Auranga development in Drury West, Auckland, and in recognition that duplex housing is likely to be a key part of GSCL's provision of affordable housing in Rotokauri North, Mark Tollemache, Tollemache Consulting Ltd, and I worked together to identify the optimal way of streamlining the provision of this form of housing. It struck us as inefficient to require what is effectively the same planning issue to be resource consented every time it was proposed (which could be 100 times or more).

9.4 We identified that it would not be desirable to make duplex housing an outright permitted activity as this could unintentionally enable very-small-lot subdivision in a manner that did not tie it to a specific and acceptable design solution (i.e. if subdivision was based on a 'permitted baseline' development rather than a real one). We also identified that while a duplex development could achieve the proposed zone's urban design outcomes, it would also be possible to fail them depending on the design approach taken. Regardless of the resource consent activity status for a duplex, we agreed that subdivision should always require a resource consent given that it involves the creation of new allotments and potential development entitlements.

9.5 The key issue seemed to be how to 'lock in' a suitable design approach as well as just the 'activity' of a duplex unit.

9.5 We identified that a very effective and efficient solution would be to tie a permitted activity duplex to a specified site design and layout, and minimum site conditions. This led to the Rotokauri North Acceptable Solutions Code ("**Acceptable Solutions Code**"), proposed as part of the PPC and which would sit within the District Plan as a design appendix (inserted by the PPC in Appendix 1). The purpose of the Acceptable Solutions Code is to set out the conditions under which a duplex would be a permitted activity within Rotokauri North. Where these conditions are met, a building consent for the duplex can be sought and construction commenced on a lot. A subdivision consent for the resultant duplex could also be obtained, and to that end a specific consent matter has been proposed limiting the ability of a subdivision consent holder to commence such a subdivision consent until the pre-line (building) inspection of the building has been passed. This has been proposed to ensure that subdivision can only occur in relation to the acceptable duplex design on a site in the real-world, and not allow an unintended under-sized vacant fee simple subdivision outcome.

9.6 The key conditions that are required to be met in order for a duplex to be a permitted activity in Rotokauri North are:

1. the parent lot must have a frontage width of at least 12.5m and a depth of at least 28m;

2. each unit shall have 1 parking space only, provided as a parking pad with each pad next to one another in the form of a double-width driveway and a double-width vehicle crossing (the pad cannot be enclosed as a carport or garage);

3. the parking pads shall be provided on one side of the site and be contained entirely within 6.25m of the relevant site boundary;

4. the duplex units must be 'off-set' such that 1 unit shall be located behind the parking pads and otherwise be no more than 6.5m from the front boundary to either the front of the unit or the front of a verandah, if one is provided, and the other unit no more than 3m from the front boundary to the front of the unit or the front of a verandah; and

5. all other relevant Rotokauri North rules must also be complied with.

9.7 As illustrated in the Acceptable Solutions Code / Appendix 1 (Section 1.4.10), a specific building design / façade design, materials, roof profile and colours are not subject to control. This is intentional so as to ensure variation results and avoid a generic or singular design outcome repeated over and over.

9.8 The Acceptable Solutions Code includes a variety of duplexes sizes and the number of bedrooms provided. These can be mixed and matched by an individual Lot owner to suit. This is to maximise choice.

9.9 Subdivision for lots to be formed as a result of an Acceptable Solutions Code duplex is proposed to be a Restricted Discretionary Activity. Although a Controlled Activity would be appropriate, Restricted Discretionary was chosen in consultation with Council officers regarding the more general approach taken to subdivision within the District Plan. Discretion is restricted to:

a. engineering and infrastructure requirements;

b. conditions of consent relating to the administration of the consent; and

c. restricting the commencement of the subdivision consent until the Acceptable Solution duplex had at least passed a pre-line inspection for its Building Consent.

9.10 Restriction (a) relates to standard subdivision matters and is important to assure health and safety outcomes. Restriction (b) relates to standard consent administration (such as the payment of fees or to require site meetings or the submission of pre-or-post works reports). Restriction (c) is necessary to ensure that the Acceptable Solutions Code cannot, by enabling a permitted baseline, be used to create freehold lots that are of themselves unacceptably small.

9.11 For completeness, subdivision that was based on a duplex that did not meet the conditions of the Acceptable Solutions Code would be a Discretionary activity.

9.12 Overall, the Acceptable Solutions Code is considered to be an innovative way of enabling an affordable housing solution in Rotokauri North. It will provide certainty that an appropriate urban design quality will be achieved, but will also very effectively avoid the need for what could be potentially 100 or more unnecessarily repetitive separate resource consents to be obtained.

10. overall urban design assessment

require a well-connected and walkable block and street network that recognises the road hierarchy and the needs of strategic through movement

10.1 In my opinion, and informed by the concept master plans, the proposed zone and rules framework will successfully and appropriately provide for a well-connected and walkable block structure, as follows:

a. The re-zoning plan requires an arterial road and numerous collector roads to be provided across Rotokauri North. This will ensure an appropriate road hierarchy and strategic connectivity occurs.

b. The re-zoning plan also specifies the maximum number and approximate location of road access points to Te Kowhai Road (State Highway 39). In recognition of the strategic needs of the Highway, it is proposed to limit direct property (lot) access to Te Kowhai Road, and also simplify the intersection of Te Kowhai Road and Burbush Road with the new north-south arterial along the zone's eastern edge.

c. Proposed subdivision rules require urban blocks that are of a size that will be readily walkable and provide a number of walking routes.

d. The provisions discourage rear lots, and this will help to keep the lateral depth of blocks low (also resulting in more streets and greater network permeability).

e. The provisions promote road frontage to public open spaces and the major storm water conveyance and storage devices. This will help connect these to the wider pedestrian and cycle network.

f. Where dedicated cycle paths or shared pedestrian / cycle paths are to be provided, the zone provisions limit direct vehicle access to lots. By requiring rear or alternative vehicle access, safety risks to pedestrians and cyclists (especially children) presented by reversing vehicles can be avoided.

g. The indicative road cross sections proposed, if followed in subdivision, would require footpaths on each side of streets and provision has been made for street trees and on-street parking so as to provide pedestrian comfort and visual interest.

h. Buildings are required to activate and front streets, providing visual interest and passive safety benefits for pedestrians and cyclists.

i. Where front-access is provided for vehicles, the proposed rules will ensure that footpaths do not become dominated by vehicle crossings and that buildings and front facades do not become dominated by car parking and garaging. This will contribute to walkability by enhancing comfort and visual amenity along streets.

10.2 Overall I consider that the PPC will result in a movement network that is walkable, safe and well-connected. I consider that any adverse urban design effects will be adequately avoided, remedied or mitigated.

require development to activate and front public spaces, and have private space to the rear, and avoid lot frontages becoming dominated by vehicle access and parking functions

10.3 In my opinion, and informed by the concept master plans, the proposed zone and rules framework will very successfully ensure development activates public spaces, has genuinely private spaces, and will have frontages that are not dominated by parking and vehicle access, as follows:

a. The PPC discourages rear lots. This is the most effective means of ensuring blocks have a standard 2-lot depth, and will provide for the public fronts / private backs spatial arrangement that underpins successful urban structure outcomes.

b. The configuration of yard setbacks (including for storeys above ground level) encourages buildings to mass towards front boundaries.

c. The enablement of verandahs will promote socialisation of front yards and interaction at streets.

d. The exception to the above will be north-facing lots where outdoor living space at the frontage may be required. To minimise this, the concept master plan shows a maximisation of north-south orientated blocks, where practicable, so as to minimise north-facing lots.

e. Subdivision controls will ensure that lots less than 10m wide will require comprehensive resource consent; lots between 10m – 12.5m wide will be limited to a single-width garage and vehicle crossing, and only lots wider than 12.5m will be able to have a double garage. This will in turn ensure that garages will not dominate the frontage of lots.

f. Where individual lot frontage less than 10m are to be proposed this will be likely to be based on super-lot development and integrated housing developments. These are likely to include rear-access or another means of providing access without dominating street frontages. I expect that consent would be refused to development that was not able to perform adequately in this respect.

10.4 Overall, I consider that the PPC will result in well-activated, high-amenity public frontages. I consider that any adverse urban design effects will be adequately avoided, remedied or mitigated.

maximise housing choice and variety, including affordable housing

10.5 In my opinion, and informed by the concept master plans, the proposed zone and rules framework will successfully and appropriate provide for a wide variety of housing, as follows:

a. The PPC rules framework requires a minimum of 10% housing to be affordable housing.

b. The proposed Acceptable Solutions Code provides guidance for appropriate design outcomes for duplex type dwellings (including those to be used to meet the 10% affordability criteria).

c. The medium density zone proposed provides for a wider range of housing typologies and sizes.

d. The site itself has characteristics that support a variety of lot sizes being promoted, from a more urban and connected condition in the east to a more conventional suburban residential area in the east.

e. The 28m lot depth that will be used in Rotokauri North lends itself to a variety of site sizes based on frontage width, from 280m2 (10m wide) to 560m2 (20m wide). Notwithstanding the developer's vision at the time of subdivision it would also be possible for purchasers to amalgamate lots of their own accord to make sites larger.

10.6 Overall, I consider that the PPC will result in a variety of housing choices and options being released to market. I consider that any adverse urban design effects will be adequately avoided, remedied or mitigated.

maximise the efficiency of development in a way that contributes to a high-quality built environment and new neighbourhood character

10.7 In my opinion, and informed by the concept master plans, the proposed zone and rules framework will ensure a high-quality built environment is achieved because:

a. The urban design rules give emphasis on buildings massing towards and fronting streets.

b. The rules provide for rear lanes in instances where a high-frequency of driveways could diminish pedestrian amenity.

c. The concept master plans illustrate how a well-integrated network of open spaces can be achieved.

d. Subdivision rules require a well-connected, easily walkable pattern that will be easily navigable and interesting to move through.

e. The rules provide for density to be maximised while not compromising urban design quality. The Acceptable Solutions Code demonstrates how quality can be safeguarded.

f. The neighbourhood centre will in time become a neighbourhood focal point and the PPC rules promote additional height here to reinforce that.

g. While density is sought to be maximised, the rules discourage cul-de-sacs and rear lots; these are traditional means of improving yield but in a way that diminishes quality and amenity values.

10.8 Overall, I consider that the PPC will result in a high-quality built environment. I consider that any adverse urban design effects will be adequately avoided, remedied or mitigated.

prominently integrate public open spaces and storm water facilities into the neighbourhood and have them contribute to its character

10.9 In my opinion, and informed by the concept master plans, the proposed zone and rules framework will successfully and appropriate provide for the daily needs of residents, as follows:

a. The stormwater facilities will be dominant elements across the site and it is intended that other open spaces, roads and road-based swales will directly connect to these. This will be a key contributor to new neighbourhood character.

b. Where possible, road frontage along the sides of the green corridors will be provided, making these visually obvious within the development.

c. The existing bush has been protected and it likely to be expanded as a result of the subdivision process.

d. State Highway 39 has been integrated by way of vehicle access restrictions, a planned realignment of Exelby Road's intersection with it, and an open space setback / buffer from it.

e. Public reserves will be designed to be fronted by roads and development.

10.10 Overall, I consider that the PPC will result in well-integrated public open spaces and storm water facilities. I consider that any adverse urban design effects will be adequately avoided, remedied or mitigated.

integrate logically into and otherwise be consistent with the Rotokauri Structure Plan

10.11 In my opinion, and informed by the concept master plans, the proposed zone and rules framework is consistent with the Rotokauri Structure Plan, as follows:

a. The proposal provides for the key road network indicated on the structure plan, and where links have been modified, links to neighbouring sites are still provided for.

b. The proposal provides residential development on the land as well as extensive green corridors for storm water purposes.

c. Cycle and pedestrian networks are proposed across the site.

d. A District-scale open space has been identified and could be established in a way that would also provide the community foal point identified on the structure plan.

e. The identified existing bush area is to be safeguarded.

f. The structure plan did not provide for a neighbourhood centre within the site however based on its likely small size and limited function, I consider it will not disrupt the centres hierarchy that the structure plan intended to contribute to.

g. The ridgeline protection area has not been provided for on the basis of technical analysis demonstrating that its protection in these low-level undulations is not warranted.

10.12 Overall, I consider that the PPC will be compatible with the Rotokauri Structure Plan and will in particular not undermine the ability of any adjoining or adjacent site to be developed as envisaged by the structure plan. I consider that any adverse urban design effects will be adequately avoided, remedied or mitigated.

maximise solar access to lots and ensure a good standard of on-site amenity is achieved

10.13 In my opinion, and informed by the concept master plans, the proposed zone and rules framework will successfully and appropriate provide for on-site amenity, as follows:

a. The subdivision rules minimise rear lots and this allows all sites to face a street. The width of streets will in turn provide ample sun and daylight access.

b. The subdivision rules encourage north-south orientated blocks. This in turn provides for east (morning sun) or west (evening sun) facing lots.

c. The rules package encourages buildings at the site frontage, maximising truly private and high-amenity outdoor living space at the rear.

d. The subdivision rules governing lot and block layouts will make it very unlikely that any lot is overlooked by another lot.

e. The rules package will ensure that lots are suitably sized and fit for purpose. Where higher density is enabled, this is limited to specified circumstances so as to ensure that an appropriate amenity outcome is assured.

10.14 Overall, I consider that the PPC will provide for appropriate on-site solar access and amenity. I consider that any adverse urban design effects will be adequately avoided, remedied or mitigated.

ensure the daily needs of residents are met as conveniently as is possible

10.15 In my opinion, and informed by the concept master plans, the proposed zone and rules framework will successfully and appropriate provide for the daily needs of residents, as follows:

a. The land to be re-zoned is within an existing structure plan area earmarked for residential-based growth.

b. The zone plan requires key east-west and north-south road connections to be formed. This will facilitate access (including in the future by way of bus routes) from Rotokauri North to adjacent employment areas, centres and other destinations including major transport infrastructure.

c. A neighbourhood centre has been provided in a logical location likely to be accessible to locals as well as passing traffic (in terms of maximising the prospects that the centre will remain commercially viable over the long term).

d. Local recreation reserves (indicative) have been identified in two locations so as to maximise the proportion of residents that will be within a 5-minute walk of a reserve. These have also been planned to integrate logically into the wider 'green network' of open spaces in the site. It is however noted that the final location of reserves will be determined at the subdivision stage.

e. The additional height overlay promotes higher density to locate in the eastern part of the site, where accessibility to daily need activities and employment land will be highest.

f. An opportunity for a primary school in Rotokauri North has been identified where it would be as accessible as possible to residents. This is however a matter entirely under the control of the Ministry of Education and cannot be taken further.

10.16 Overall, I consider that the PPC has demonstrated how adverse environmental effects relating to the daily needs of residents have been avoided, remedied or mitigated.

overall urban design merit

10.17 Overall and for the reasons above, the PPC is well-considered and has demonstrated a logical response to the site and its wider context.

10.18 The PPC will enable subdivision and development that will achieve outcomes in line with accepted best-practice urban design outcomes.

10.19 The proposed zone framework and planning provisions are considered efficient and effective in urban design terms, and will be suitable to manage the land's development.

11. conclusions

11.1 This report documents an independent urban design analysis of an application for a private plan change ("**PPC**") to rezone approximately 140ha of Future Urban ("**FUZ**") zoned land to Medium Density Residential Zone ("**MDRZ**") and Business 6 Zone ("**B6Z**") made by Green Seed Consultant Ltd ("**GSCL**") on an area of land known as Rotokauri North, within the Hamilton City Council's Rotokauri Structure Plan area. The application has been made to Hamilton City Council ("**Council**") under the Resource Management Act 1991 ("**RMA**"). The key conclusions of this report are that:

a. The PPC has been prepared following best-practice urban design principles and has benefited from a master plan-based design process. The master plan, although proposed to remain non-statutory, has demonstrated that the land can be subdivided logically and in a way that will support a high-quality neighbourhood, and also remain compatible with the Council's Rotokauri Structure Plan.

b. The PPC would provide for approximately 1,700 – 2,000 houses on sites typically ranging between 150m2 up to 400m2 (as a result of either subdivision which accords with a land use activity (e.g. of a duplex) or vacant fee simple subdivision). To support the needs of this neighbourhood, the PPC provides for a neighbourhood centre (B6Z) to help meet daily convenience needs in a way that will respect the wider

centres hierarchy and support existing centres. Opportunity for a new primary school has also been identified, although the Ministry of Education ("**MoE**") would follow a separate process to make any decisions in that regard and it is not proposed to zone or 'lock in' a future school through the PPC.

c. Provision has also been made for recreation reserves, the protection of an existing area of notable bush, the needs of New Zealand Transport Agency ("**NZTA**"), and creation of a logical transport network that satisfies the Council's strategic network imperatives for arterial and collector roads.

d. The PPC has been based on the provision of affordable housing and a variety of housing typologies and to this end the Council's existing MDRZ development controls have been reviewed and augmented so as to maximise the efficiency at which high-quality housing can be provided. This includes provision for an 'acceptable solution' approach to duplex housing. This model is considered to be industry-leading and is particularly supported.

e. Changes proposed to the 'standard' MDRZ zone rules also seek to require higher standard of urban design quality, and well-laid out subdivisions that are walkable and safe. This includes attempts to minimise cul-de-sac roads and rear lots, and govern the maximum dimensions of urban blocks so as to not undermine pedestrian convenience and legibility.

11.2 On the basis of the above, the PPC is considered to result in few adverse urban design effects, many positive urban design effects, and is an effective and efficient means to enable the land's development. The PPC could therefore be accepted on urban design grounds.

FIGURE 5.1 - ROTOKAURI STRUCTURE PLAN. SOURCE: HAMILTON CITY COUNCIL

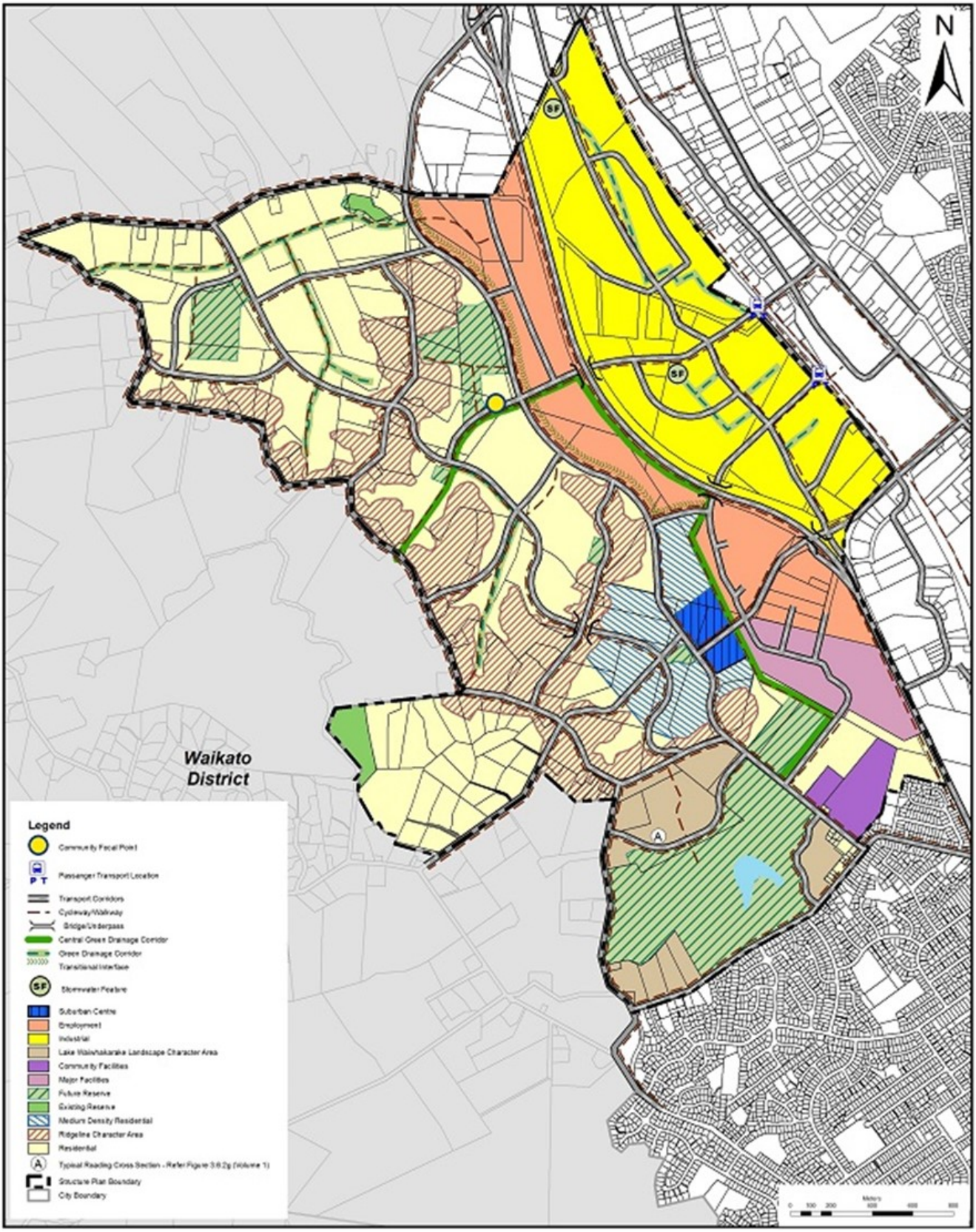


FIGURE 5.2 - RIDGELINE PROTECTION CONCEPT. SOURCE: HAMILTON CITY COUNCIL

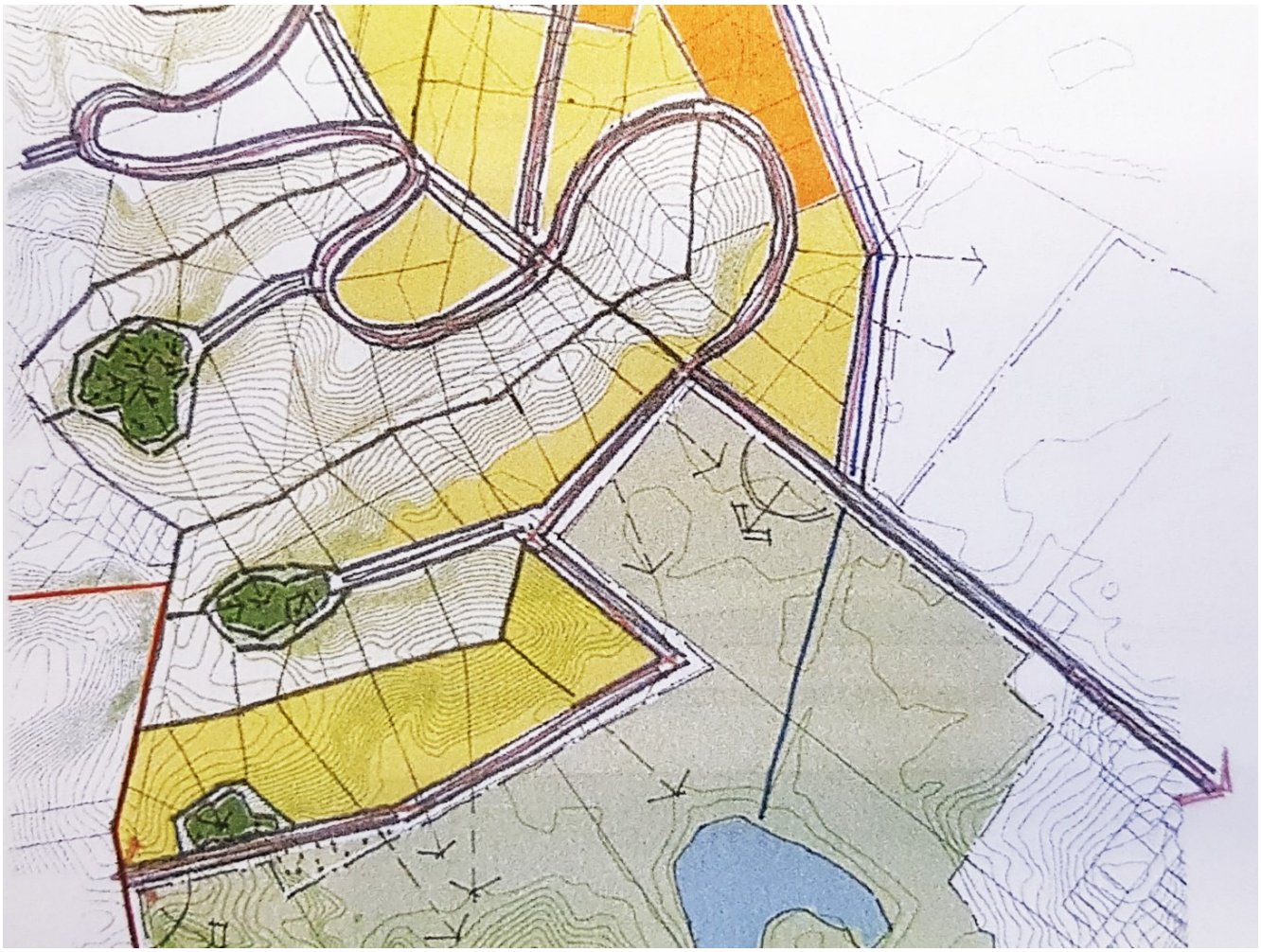


FIGURE 5.3 - ROTOKAURI NORTH STORMWATER CONCEPT MAP SOURCE: HAMILTON CITY COUNCIL
Stormwater storage and conveyance concept identified in blue

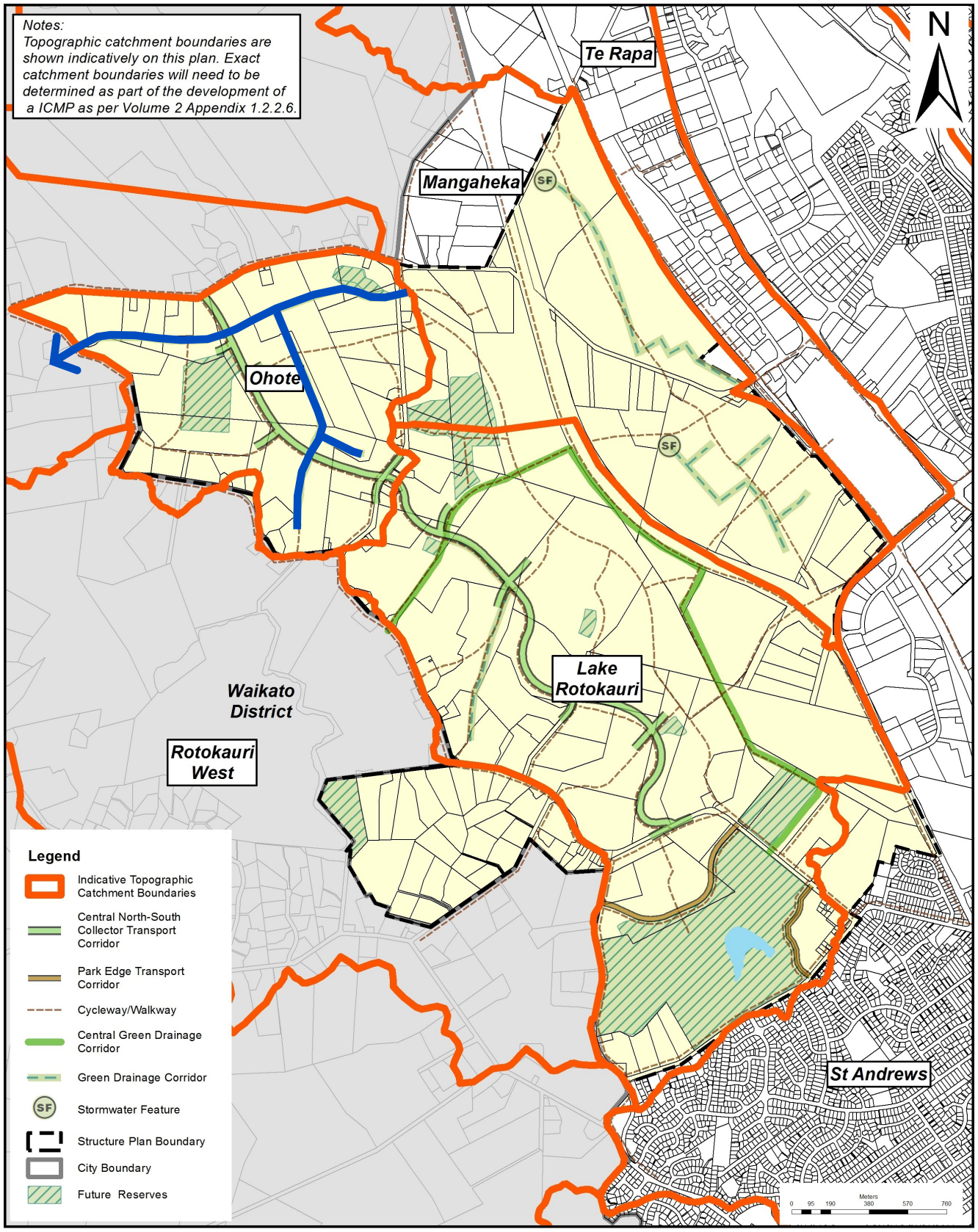


FIGURE 5.4 - ROTOKAURI STRUCTURE PLAN ROAD NETWORK. SOURCE: HAMILTON CITY COUNCIL

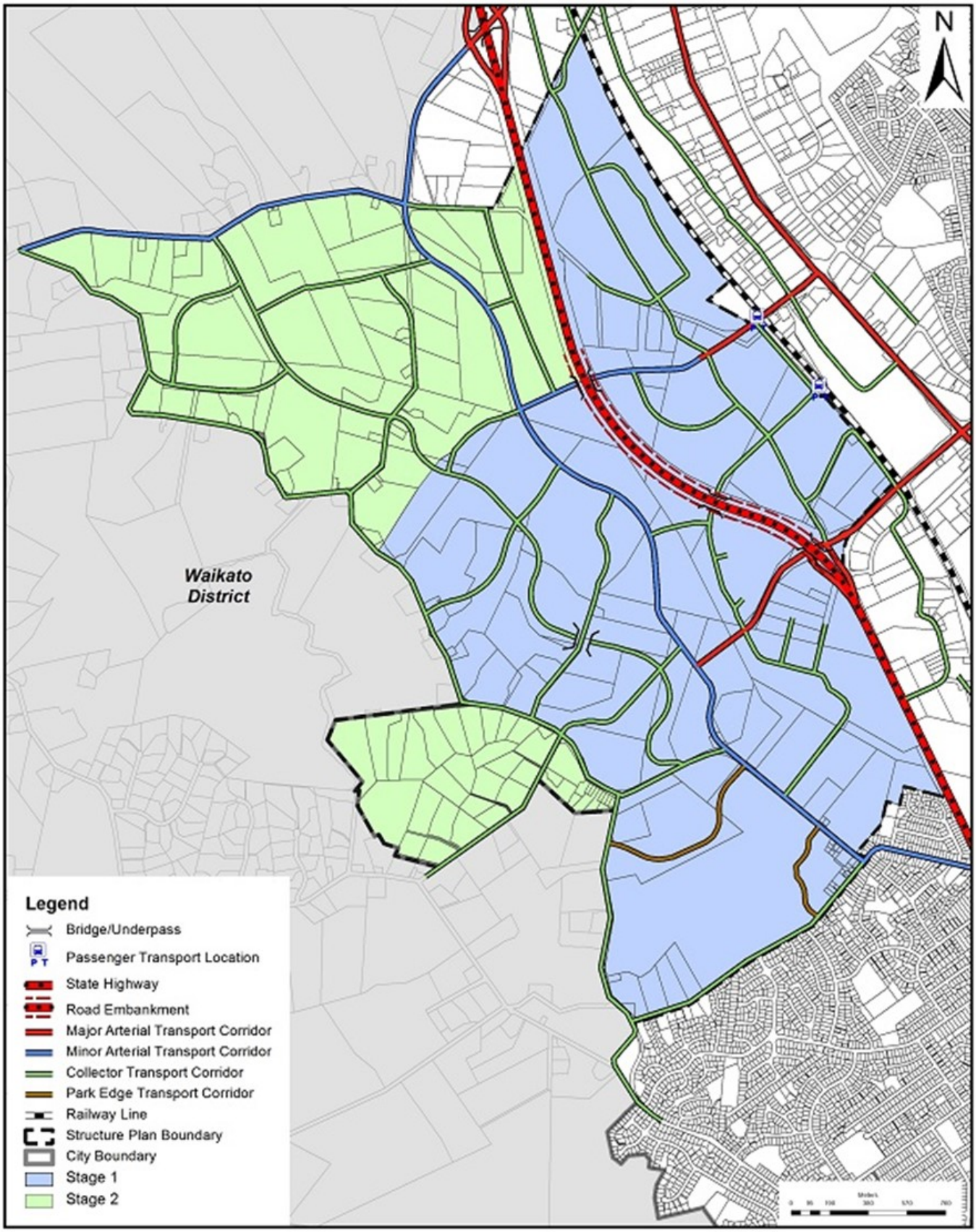


FIGURE 6.1 - CONCEPT 1 MASTER PLAN, NO SCALE. SOURCE: DESIGNURBAN PTY LTD



FIGURE 6.2 - CONCEPT 1 MASTER PLAN - STORM WATER MANAGEMENT CONCEPT, NO SCALE.
SOURCE: TOP: ROTOKAURI ICMP (COUNICL); BOTTOM: CKL LTD

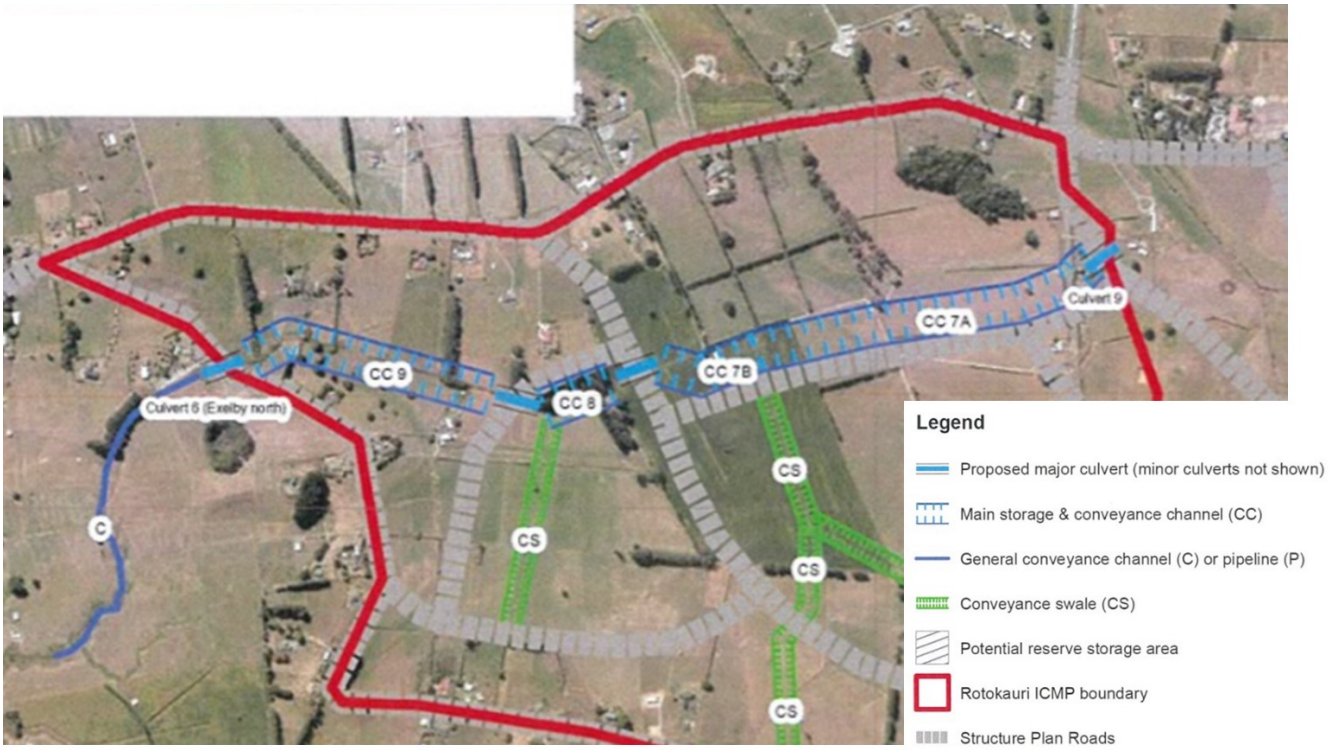
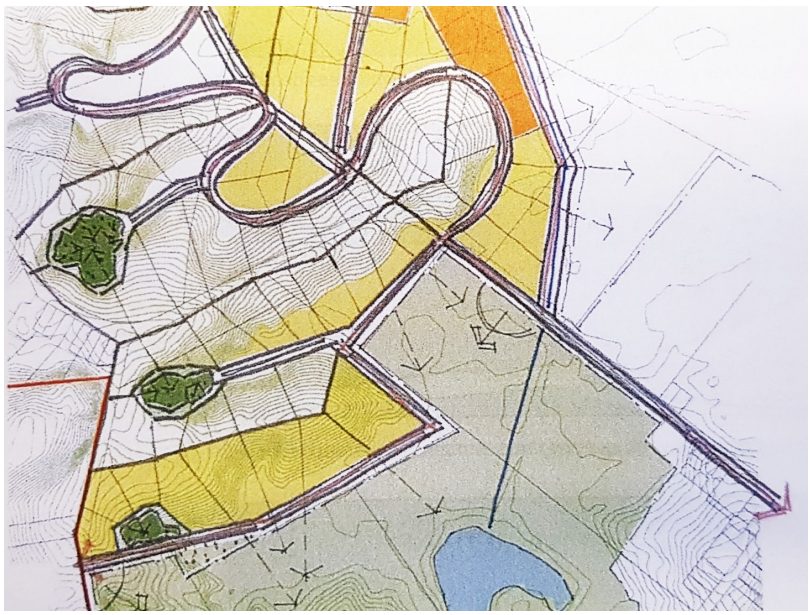




FIGURE 6.3 - DESIGN WORKSHOP TESTS OF RIDGELINE PROTECTION IN PRACTICE

Example of ridgeline protection design (LEFT), from Hamilton City Council; and example from Concept 1 Master Plan (RIGHT) showing incorporation of the concept (the green strip denotes a protected ridgeline area)





Overlay of the Structure Plan ridgeline protection area on the Concept 1 Master Plan and key cross section reference



Cross section showing likelihood that placement of houses will block views of the hill and ridge.

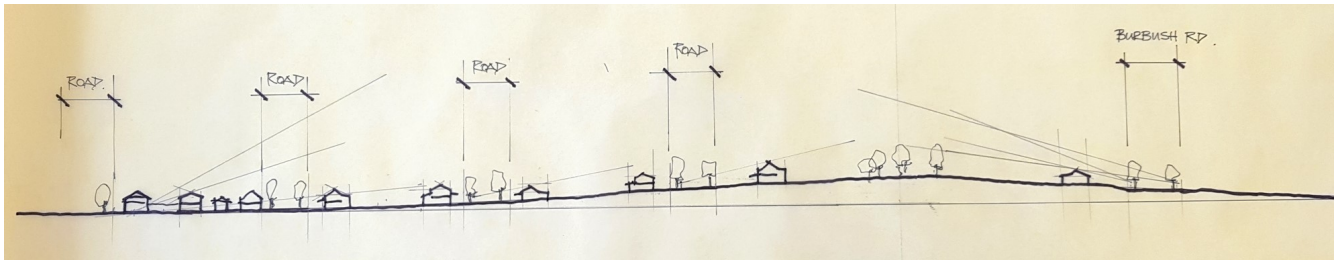


FIGURE 6.4 - CONCEPT 2 MASTER PLAN, NO SCALE. SOURCE: DESIGNURBAN PTY LTD



FIGURE 6.5 - CONCEPT 3 MASTER PLAN, NO SCALE. SOURCE: DESIGNURBAN PTY LTD.

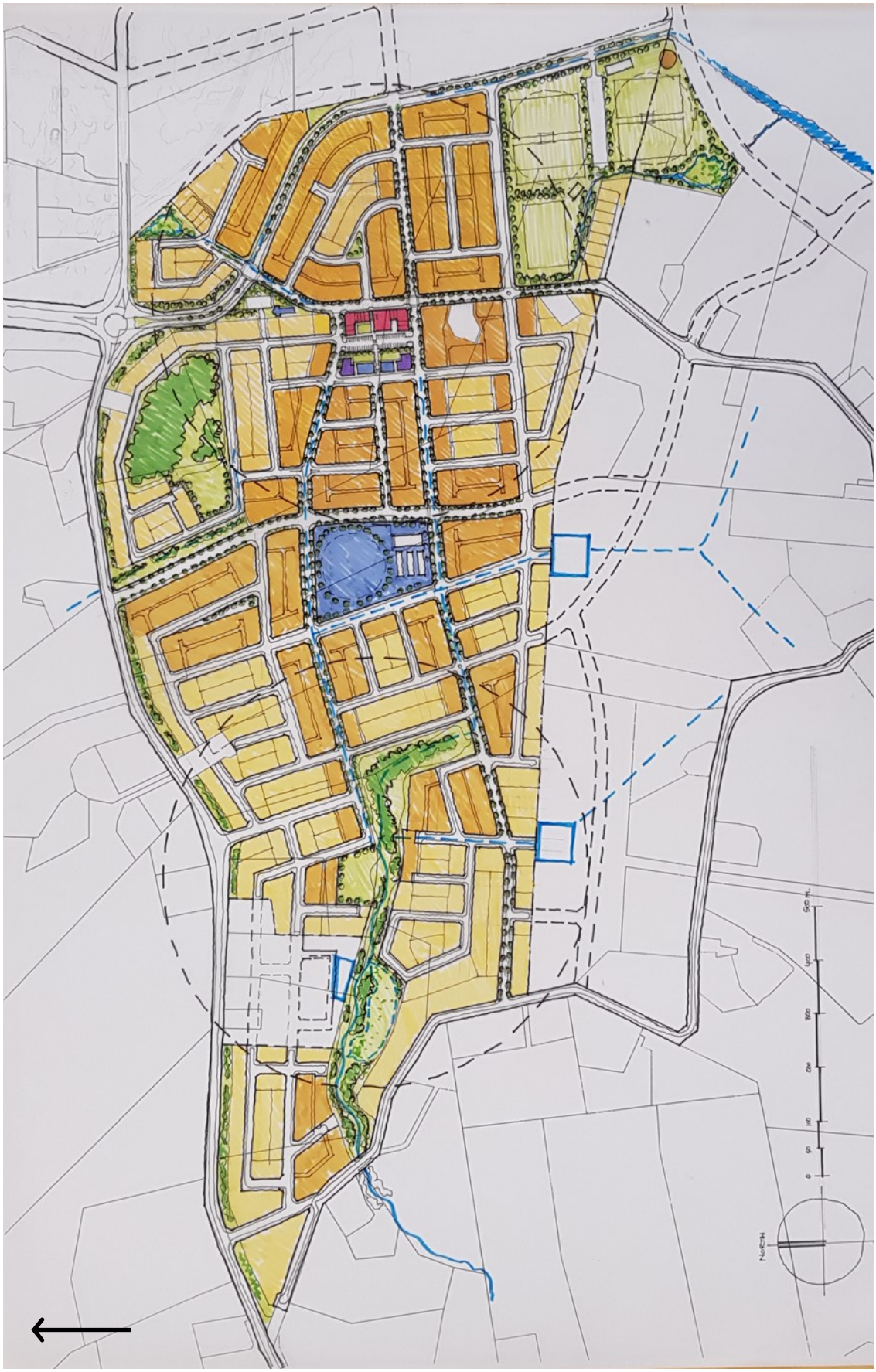


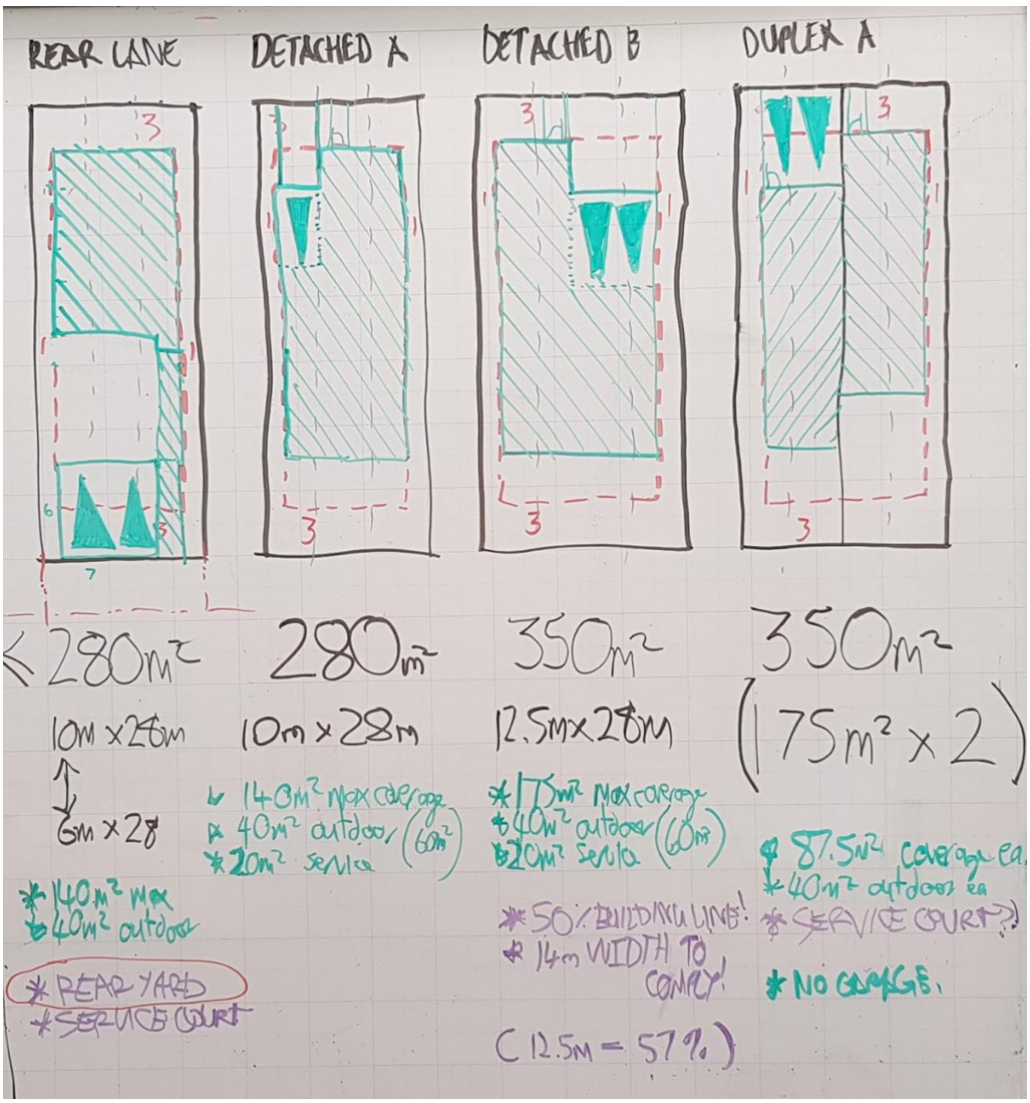
FIGURE 6.6 - CONCEPT 3 MASTER PLAN STORMWATER MANAGEMENT CONCEPT, NO SCALE. SOURCE: MCKENZIE & CO. LTD.



FIGURE 6.7 - EXAMPLES OF LOT AND LAYOUT TESTS UNDERTAKEN IN CONJUNCTION WITH THE CONCEPT 3 MASTER PLAN

Examples testing rule compliance and unit layout options and configurations, and potential urban design issues / effects.

Specific example showing impact of HiRB on narrow lots



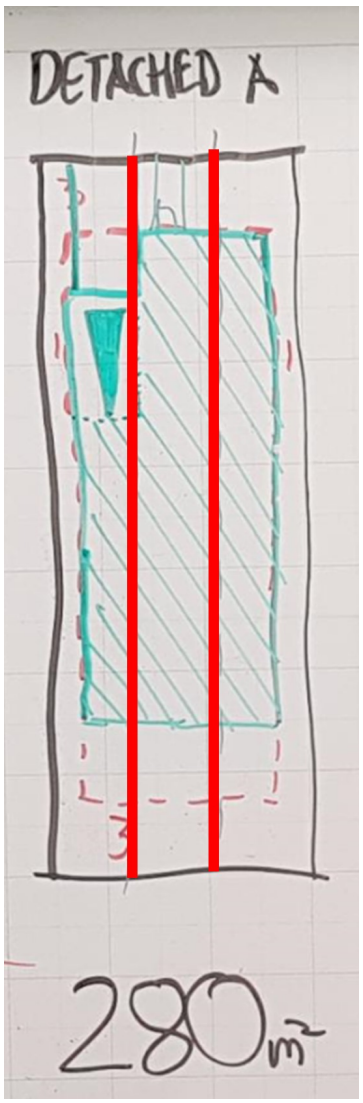


FIGURE 6.8 - EXAMPLE OF SUCCESSFUL “OFFSET” AFFORDABLE DUPLEX DEVELOPED BY MADE IN AURANGA, DRURY.





FIGURE 6.9 - EXAMPLE OF SUCCESSFUL REAR LANE-BASED DEVELOPMENT AND ITS PEDESTRIAN / CYCLE ADVANTAGES ALONG STREETS

Example of medium density residential housing where the lot frontage width is not able to accommodate vehicle access without significantly undermining pedestrian and cycle amenity along streets (Arrowsmith Drive, Flat Bush, Auckland).



Example of medium density residential housing where provision of rear lanes to manage vehicle access provides high quality, pedestrian and cycle-friendly streets (Hakawai Avenue, Takanini, Auckland).



FIGURE 6.10 - CONCEPT 4 MASTER PLAN, NO SCALE. SOURCE: DESIGNURBAN PTY LTD.

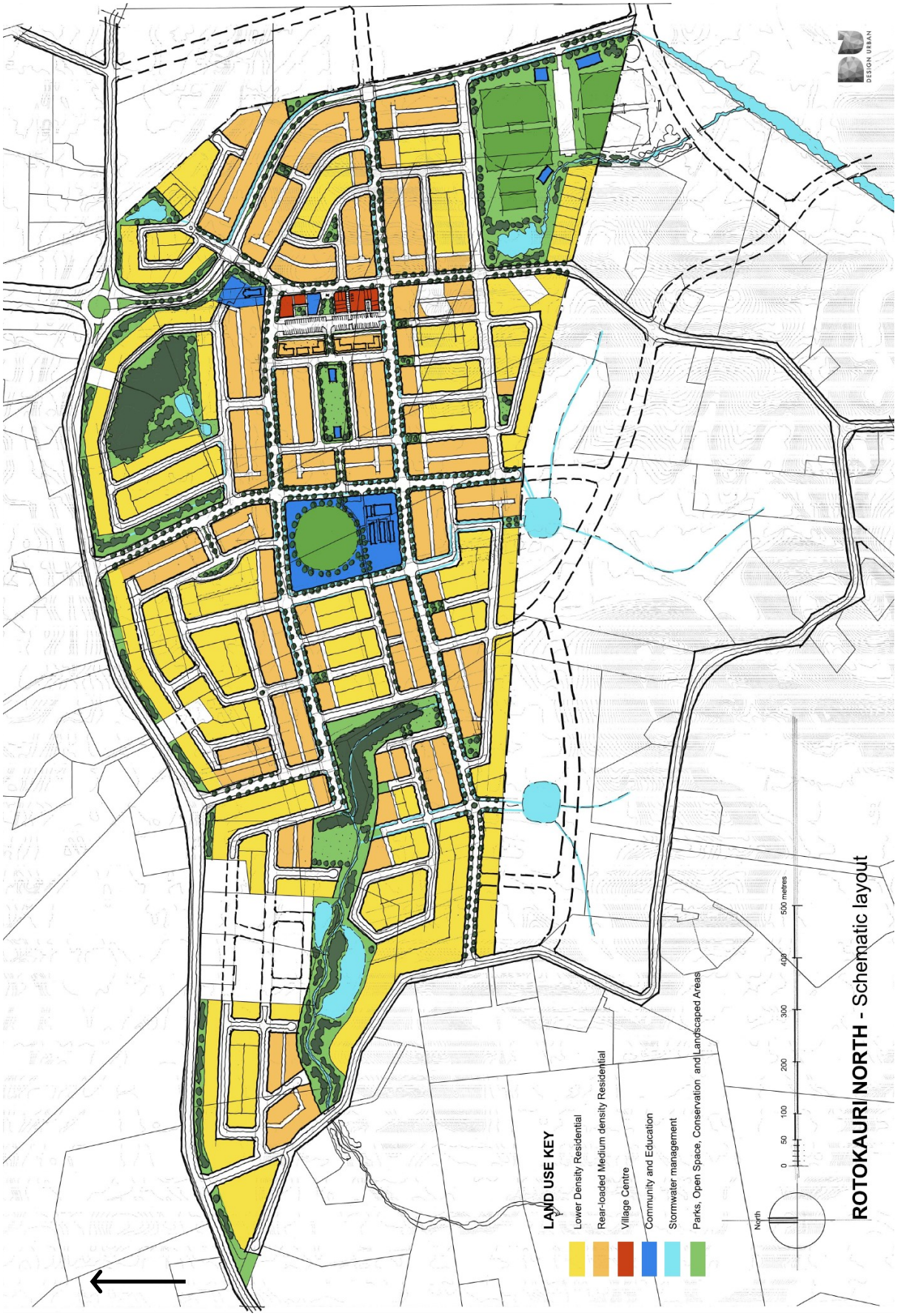


FIGURE 6.11 - CONCEPT 5 MASTER PLAN, NO SCALE. SOURCE: DESIGNURBAN PTY LTD.

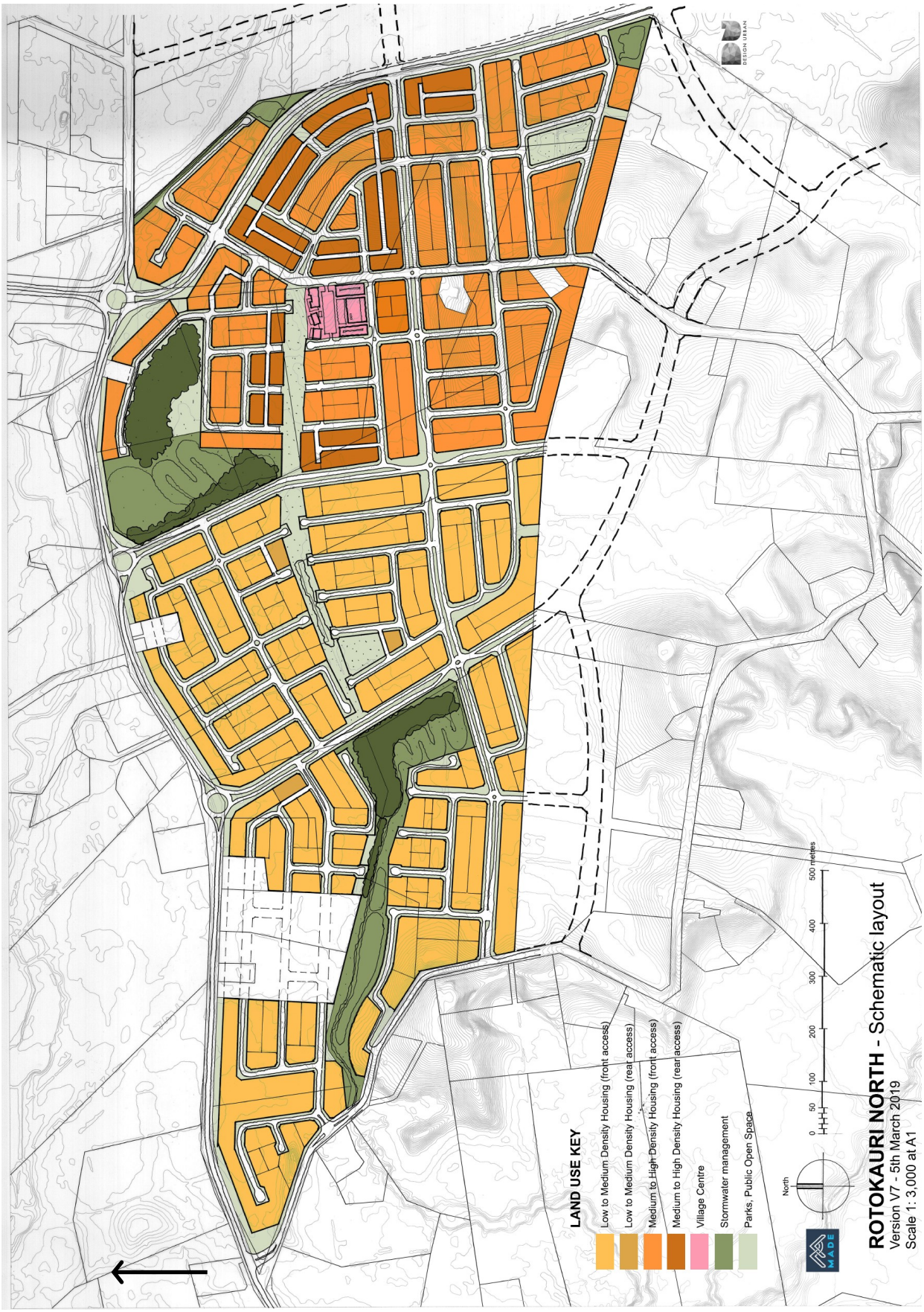


FIGURE 6.12 - CONCEPT 6 MASTER PLAN, NO SCALE. SOURCE: DESIGNURBAN PTY LTD.

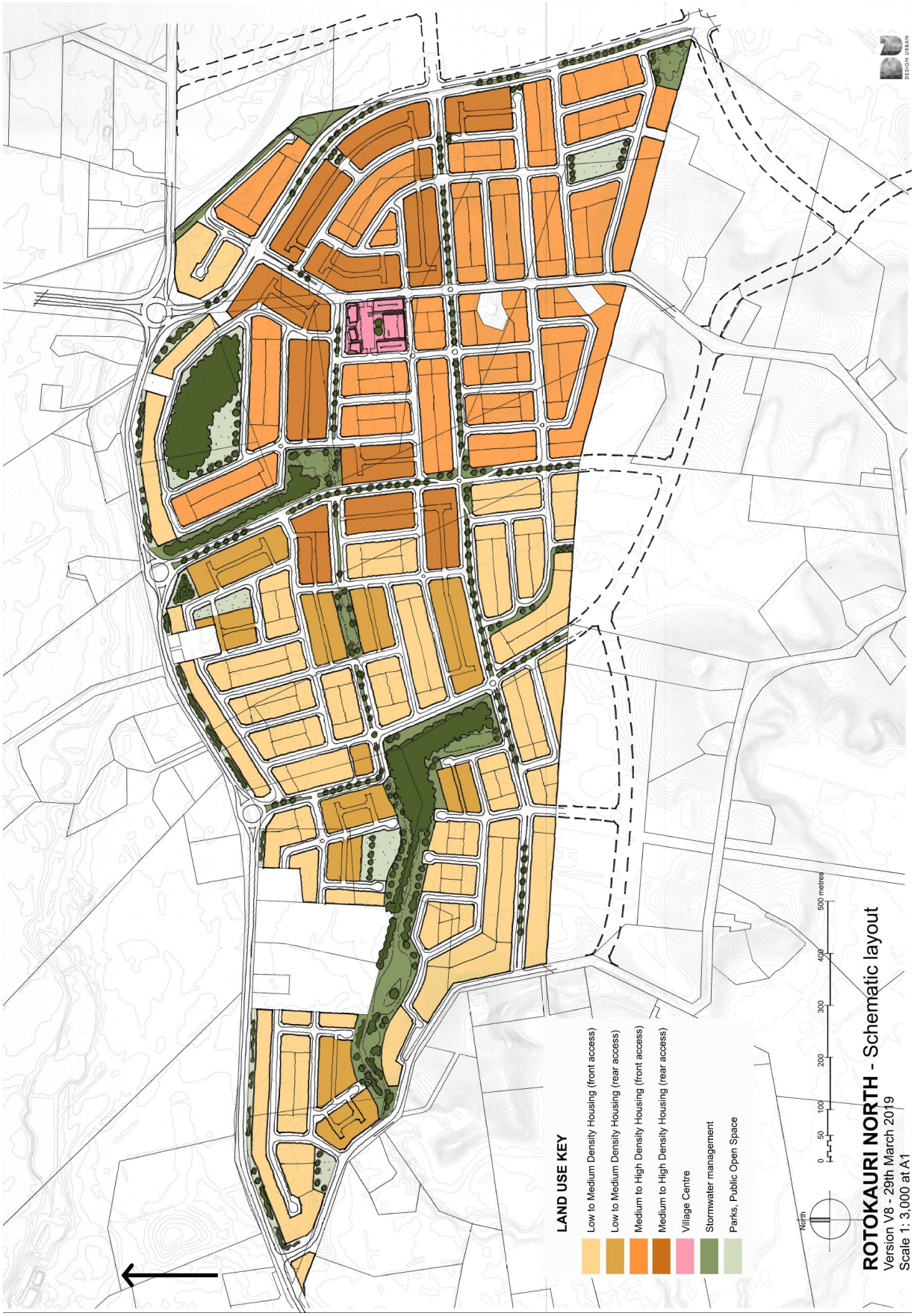


FIGURE 6.13 - CONCEPT 6 MASTER PLAN, INDICATIVE SCHOOL AND DISTRICT PLAYING FIELDS, NO SCALE.

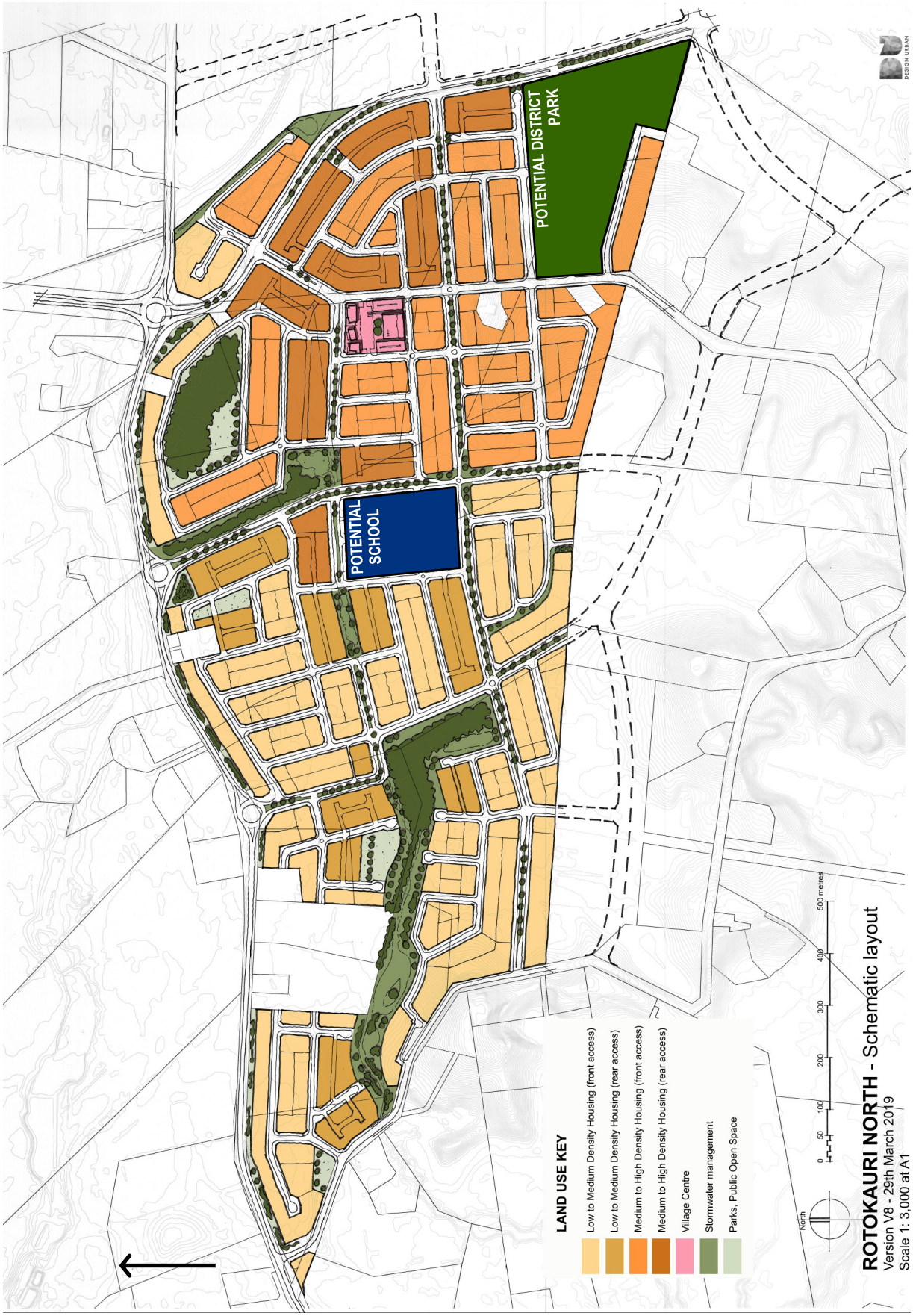


FIGURE 7.1 - PROPOSED STRUCTURE PLAN FOR ROTOKAURI NORTH

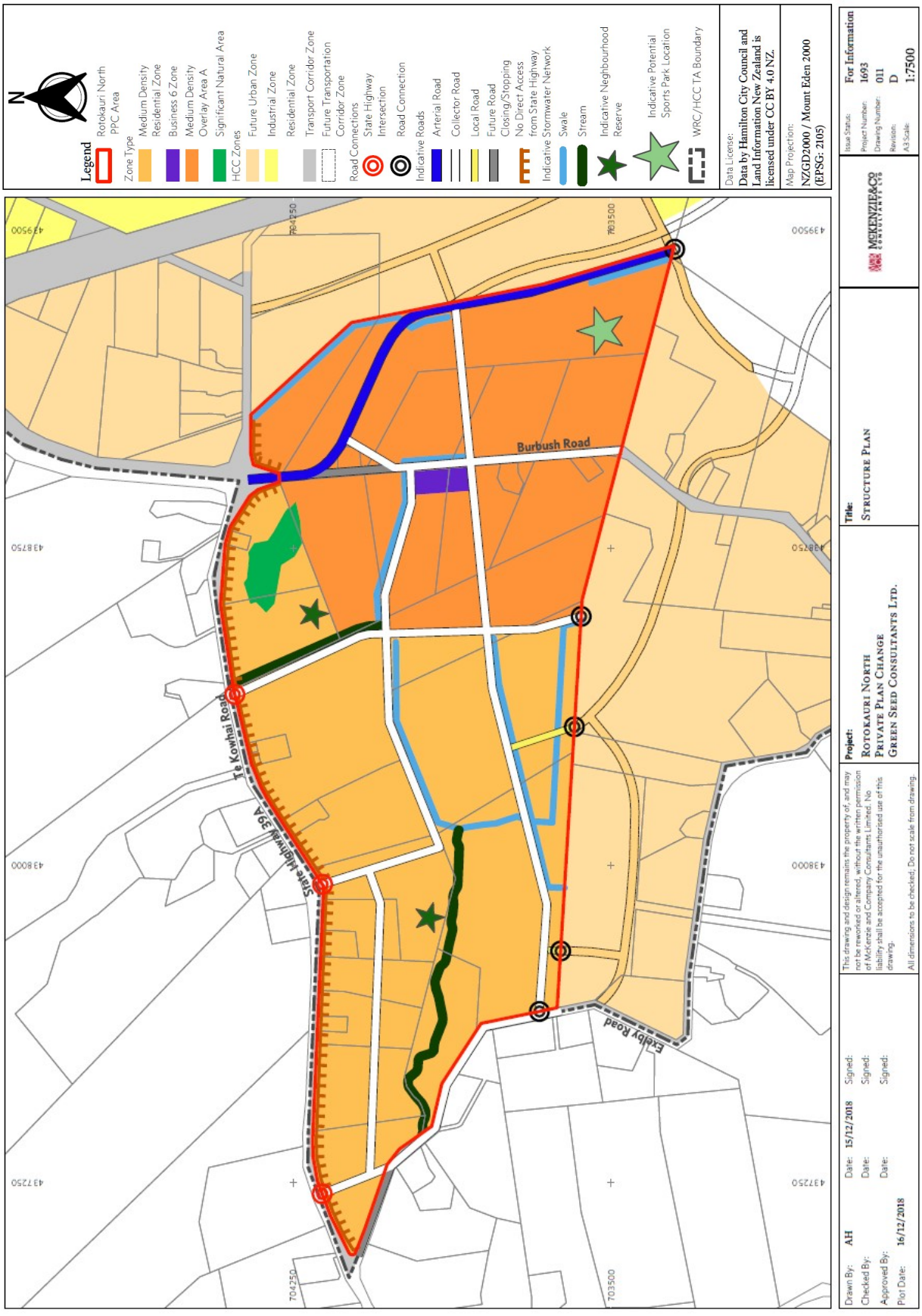
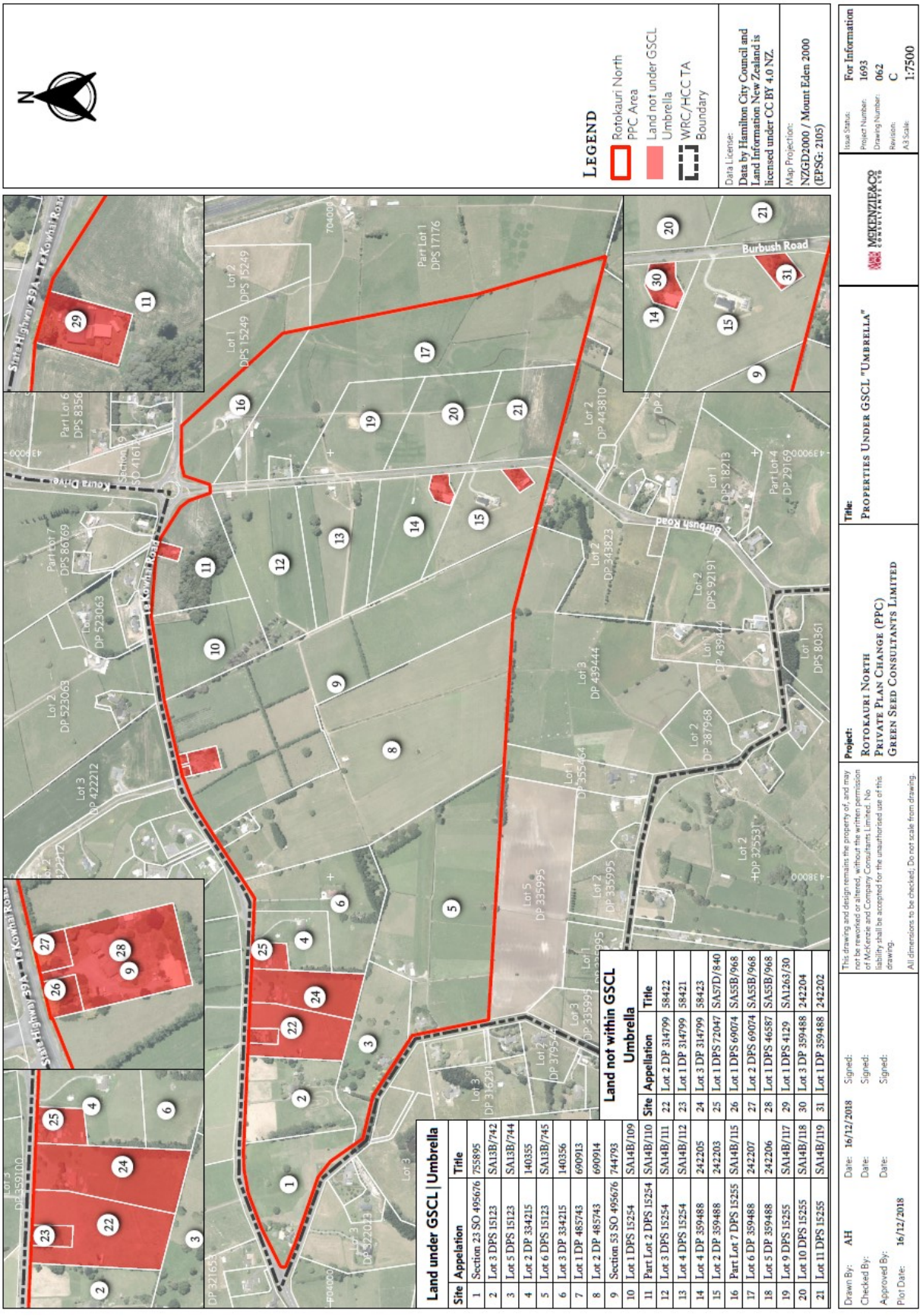


FIGURE 7.2 - IDENTIFICATION OF THIRD-PARTY SITES PROPOSED TO BE RE-ZONED



Site	Appelation	Title
1	Section 23 SO 495676	755895
2	Lot 3 DPS 15123	SA13B/742
3	Lot 5 DPS 15123	SA13B/744
4	Lot 2 DP 334215	140355
5	Lot 6 DPS 15123	SA13B/745
6	Lot 3 DP 334215	140356
7	Lot 1 DP 485743	690913
8	Lot 2 DP 485743	690914
9	Section 53 SO 495676	744793
10	Lot 1 DPS 15254	SA14B/109
11	Part Lot 2 DPS 15254	SA14B/110
12	Lot 3 DPS 15254	SA14B/111
13	Lot 4 DPS 15254	SA14B/112
14	Lot 4 DP 359488	242205
15	Lot 2 DP 359488	242203
16	Part Lot 7 DPS 15255	SA14B/115
17	Lot 6 DP 359488	242207
18	Lot 5 DP 359488	242206
19	Lot 9 DPS 15255	SA14B/117
20	Lot 10 DPS 15255	SA14B/118
21	Lot 11 DPS 15255	SA14B/119

Site	Appellation	Title
22	Lot 2 DP 314799	58422
23	Lot 1 DP 314799	58421
24	Lot 3 DP 314799	58423
25	Lot 1 DPS 72047	SA57D/840
26	Lot 1 DPS 69074	SA55B/968
27	Lot 2 DPS 69074	SA55B/968
28	Lot 1 DPS 46587	SA55B/968
29	Lot 1 DPS 4129	SA1263/30
30	Lot 3 DP 359488	242204
31	Lot 1 DP 359488	242202

ATTACHMENT 16 - Infrastructure Report prepared by
McKenzie & Co Consultants Ltd
dated April 2019

INFRASTRUCTURE REPORT

ROTOKAURI NORTH PRIVATE PLAN CHANGE

Prepared for Green Seed Consultants Ltd

Document Control Record

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Project:	Private Plan Change
Project Location:	Rotokauri North, Hamilton
Document:	Infrastructure Report
Date of Issue:	April 2019
Status:	Final for PPC lodgement
Originator:	
Approved	Brad Rudsits  Andrew Hunter
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Email:	brad@mckenzieandco.co.nz

Document history and status

Revision	Date	Description	By	Review	Approved
A	12/12/2018	Draft for client review	Brad Rudsits	Andrew Hunter	Andrew Hunter
B	20/12/2018	Draft for HCC Review	Brad Rudsits	Andrew Hunter	Andrew Hunter
C	25/04/2019	PPC Lodgement	Brad Rudsits	Andrew Hunter	Andrew Hunter

Executive Summary

The following report supports the proposed Private Plan Change (PPC) for the re-zoning of Rotokauri North from Future Urban Zone to Medium Density Residential Zone and Business 6 Zone. The report provides an outline of the necessary engineering infrastructure works required to enable development of the site as anticipated by the PPC. The key infrastructure works include the development of roads, stormwater, wastewater, water supply, and utility servicing works.

The report affirms that the appropriate infrastructure is available, or can be readily provided, to support the proposed re-zoning of Rotokauri North.

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Appendices

Appendix 1: Zone & Structure Plans
Appendix 2: Rotokauri North Land Parcels
Appendix 3: Topographic Plan, Typical Road Sections and Concept Plans for Stormwater, Wastewater and Water

1 Introduction

McKenzie & Co Consultants Ltd. has been engaged by Green Seed Consultants Ltd. (GSCL) to prepare this Infrastructure Report (IR) in support of the proposed Private Plan Change (PPC) of approximately 140 hectares within the "Future Urban Zone" (FUZ) to "Medium Density Residential" and "Business 6" zones located at Burbush Road, Exelby Road, and Te Kowhai Road, Rotokauri North.

This report summarises the suitability of the existing infrastructure and proposed upgrades/extensions required to service the anticipated development sought for the Rotokauri North area as shown on the structure plan attached, **1693-0-011** in **Appendix 1**.

The purpose for this report is to demonstrate to Hamilton City Council (HCC) the deliverability of infrastructure to Rotokauri North in accordance with the requirements of the Council and other service providers.

2 Site Description

The site subject to the PPC is located at the north west extent of Hamilton City and consists of a total area of approximately 140 hectares as per Figure 1. Its bounded by Te Kowhai Road (SH39) to the north, greenfield lands to the east and south and Exelby Road to the west and south. Burbush Road runs north to south through the eastern portion of the PPC area.

The PPC area consists of 31 parcels of land described on Figure 1 and plans **1693-0-062** (see **Appendix 2**). These being:

- 21 parcels having a total area of 133.1 ha under GSCL's umbrella; and
- 10 parcels having a total area of 6.9 ha not under GSCL's umbrella.

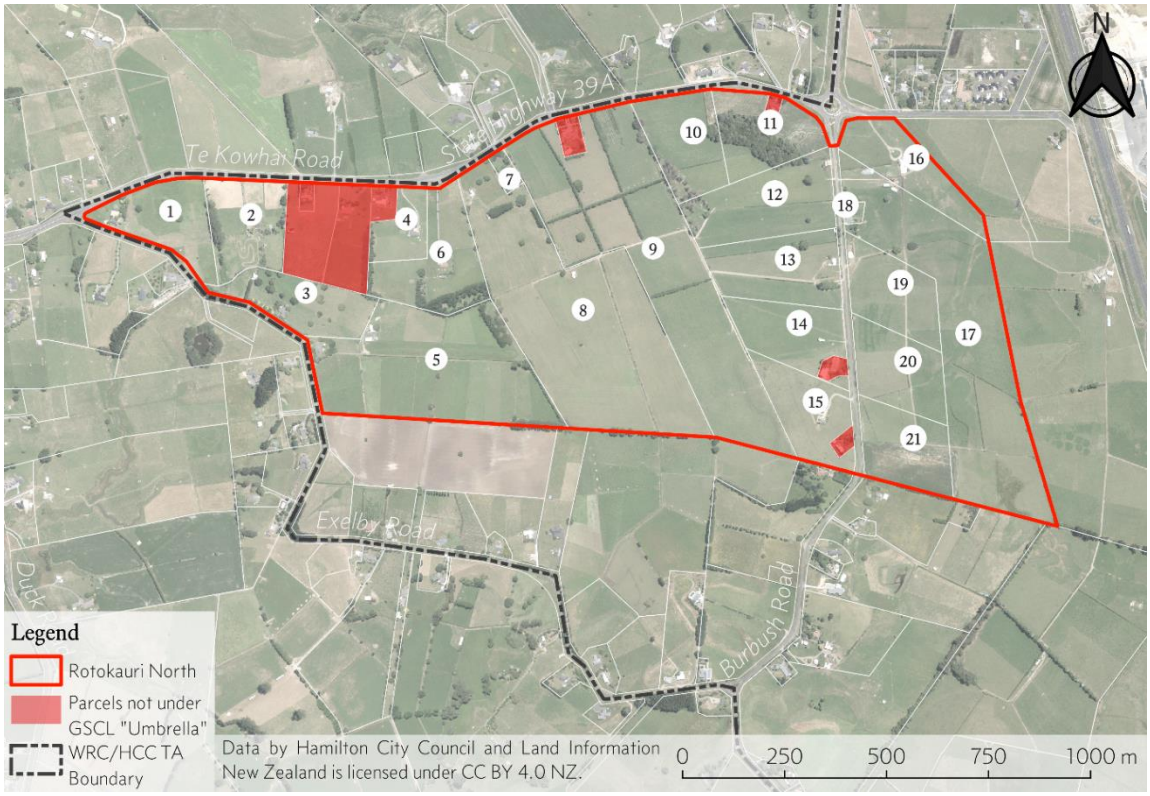

Figure 1: Rotokauri North Private Plan Change Area

The site is generally flat either side of a ridgeline that follows Burbush Road and the southern alignment of Exelby Road. The ridgeline rises to approximately 51 m RL at its highest. The area east of Burbush Road has an approximate elevation of 31 m RL, while the larger western side has an elevation generally ranging between 29 and 30 m RL – see Figure 2 below and also drawing **1693-0-015** in **Appendix 3**.

The eastern side of the PPC area has an easterly aspect, while the western side is generally north-westerly facing. The predominant land use is pastoral with some residential lifestyle blocks.

Due to the flat topography, a manmade drainage network has been constructed over a number of years. The drainage channels have varying permanent water levels, which are directly related to local groundwater levels, hydrogeology of the area, and seasonal affects. Maintenance of the drainage network varies across the area depending on land usage, i.e., cropping compared with stock grazing. The drainage channels form part of four different stream catchments:

- Ohote (draining west);
- Te Otamanui (draining north);
- Mangaheka (draining north); and
- Rotokauri South (draining south).

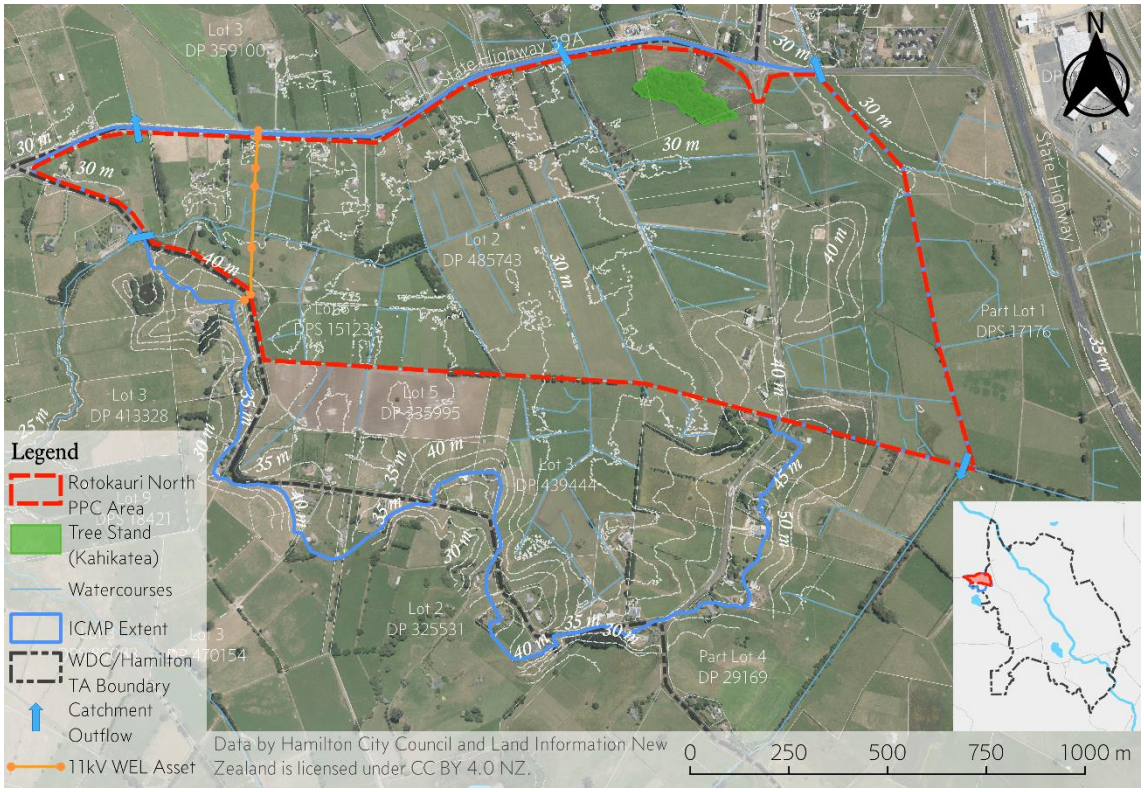

Figure 2: Topographic Features Rotokauri North

The natural stream sections of these catchments are typically highly modified, receiving stormwater from the farm drainage networks. The stream sections were classified by Tonkin and Taylor (D. Miller, personal communication, 2018) in accordance with definitions within the Waikato Regional Plan (WRP) (Waikato Regional Council, 2012).

The extent of existing flooding has been considered within the reports:

- Rotokauri North Private Plan Change: Catchment Modelling (Rudsits, 2019);
- Rotokauri North Catchment Stormwater Modelling, Ohote Stream Capacity Assessment Model Build Report; (Vajilikova, 2018)
- Mangaheka Integrated Catchment Management Plan (Adams, 2018); and
- The Te Otamanui Stream Flood Assessment (Howe, 2018).

Due to the flat topography there are areas predicted to have wide spread flooding, specifically the western part of the PPC area. The stormwater conveyance network for the PPC and Rotokauri North Sub-Catchment Integrated Catchment Management Plan (ICMP) (Fraser-Smith, Hunter, & Rudsits, 2018) areas has been developed with regard to grade limitations across the site see **Figure 3** and drawing **1693-0-065** in **Appendix 3**.

Soil types consist predominantly of layers of silt, clay and sand throughout the lower areas, with the ridgeline having hard clay/silts consistent with Hamilton Ash formation (Alder, 2018b). Due to the high groundwater table liquefaction is considered to be a moderate to severe risk for the site (Alder, 2018b).

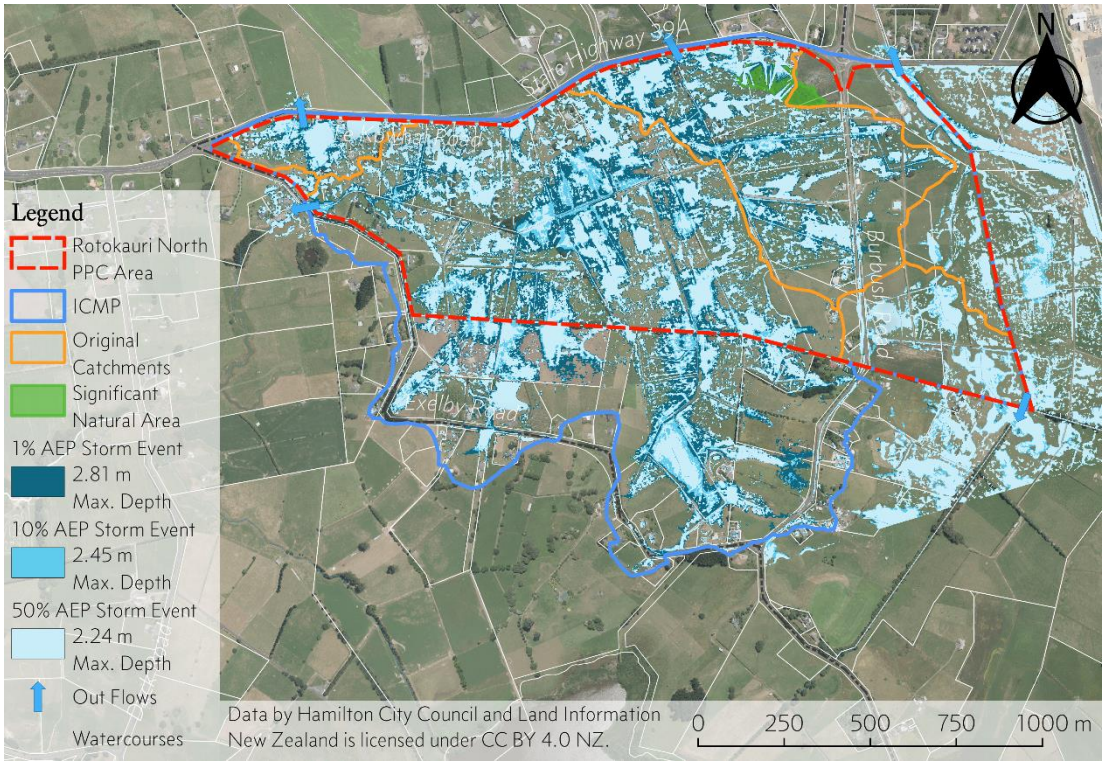

Figure 3: Flood Assessment

3 Geotechnical Investigation

A preliminary geotechnical investigation (Alder, 2018b) and geotechnical assessment reporting (Alder, 2018a)has been undertaken by HD Geo (Alder, 2018b, 2018a) for the PPC area. The reports are summarised as follows:

3.1 Geology

The geology of the area is underlain by the Walton Subgroup, Hinuera Formation, and Piako Subgroup. The Walton Subgroup (early to middle Pleistocene epoch) deposits comprise alluvium (clays, silts, sands) and re-worked non-welded ignimbrite, and are generally found on the hills/ridges through the site. The Hinuera Formation and Piako Subgroup (late Pleistocene) were generally found across the flat areas. The Hinuera Formation deposits are cross-bedded pumice sand, silt and gravel interbedded with peat. The Piako Subgroup consists of locally derived mud, silt, gravel and peat.

The preliminary assessment was based on a desktop review and field investigations comprising hand augers, cone penetrometer tests and dissipation tests.

HD Geo recommended that:

- The liquefaction hazard at the site should be refined through further investigation and assessment and outline mitigation measures where necessary. These investigations should include shear wave velocity testing and laboratory testing of onsite soils;
- Assessment of the liquefaction induced lateral spreading risk adjacent to proposed stormwater swales;

- Investigation of the risk of settlement in areas where significant fill is likely;
- Establish the ground water regime for detailed liquefaction analysis through dissipation testing or piezometers;
- Investigation of cut areas to determine fill properties.

HD Geo concludes that the liquefaction risk can be mitigated for residential development with strengthened foundations and/or shallow ground improvements. Further investigation and assessment is recommended prior to earthworks and infrastructure design. Given the recommendations above, HD Geo consider the site to be suitable for the proposed development (Alder, 2018a).

4 Staging

Development within the PPC area would be progressively staged, with key infrastructure sized for the ultimate development. Ultimately sized infrastructure would include road/movement networks, stormwater management devices, water and wastewater reticulation. The extent and location of staging will be determined through subdivision resource consent applications.

5 Anticipated Yields and Timeframe

The intention is to deliver approximately 2,000 houses. It is expected that the project will take 10 to 15 years to build out depending on market demand.

6 Servicing

6.1 Introduction

This section covers the following servicing aspects for development;

1. Stormwater;
2. Wastewater;
3. Potable Water;
4. Roads; and
5. Utilities

6.2 Stormwater

The reader is referred to the ICMP for the Rotokauri North PPC area (Fraser-Smith et al., 2018) . The ICMP provides a comprehensive overview of the existing stormwater system, and proposes infrastructure required to enable development to occur at within the PPC area.

The ICMP was developed to be complimentary to the approved Rotokauri South and Mangaheka ICMPs.

The key stormwater management opportunities and constraints have been developed with a focus on reducing flood risk and protecting the receiving environment. Future development must incorporate various stormwater elements to ensure that urban outcome include opportunities for:

- Ecological enhancement of existing stream habitat and the riparian margin;
- Mitigation of flood risk such that development is located outside the 100-year flood plain;
- Minimisation of overland flow paths through private property; and
- Provide various options for slow release of frequent rainfall events to downstream catchments.

The ICMP includes Water Sensitive Urban Design (WSUD) principles for all stormwater design within the development, for treatment, discharge, and conveyance of stormwater so as to mitigate downstream erosion.

The ICMP (Fraser-Smith et al., 2018) proposes a range of treatment options for stormwater, both at source, and communally. The primary conveyance system will comprise swales and channels capable of conveying the 10-year ARI peak runoff from all impervious services, such as roads, carparks and buildings. The secondary flow network will accommodate flood flows up to the 100-year ARI plus climate change by utilising the swales, channels and road carriageways. Refer to **Figure 4** and drawing **1693-0-032, Appendix 3,** showing an indicative primary swale network for conveyance and treatment, and wetlands for stormwater treatment.

The ICMP (Fraser-Smith et al., 2018) provides design solutions to meet the outcomes prescribed in the Regional Infrastructure Technical Specifications (RITS) (Waikato Local Authority, 2018) and the Waikato Regional Council Stormwater Management Guideline (SMG) (Shaver, 2018a). Final options will be determined at the subdivision stage for public and communal infrastructure, and at building consent stage for individual lots.

In general, development within catchments that discharge to streams must provide detention (temporary storage) such that the post development flows for the 50%, 10% and 1% Average Exceedance Probability (AEP) 24-hour rainfall events do not exceed 80% of the pre-development peak flows.

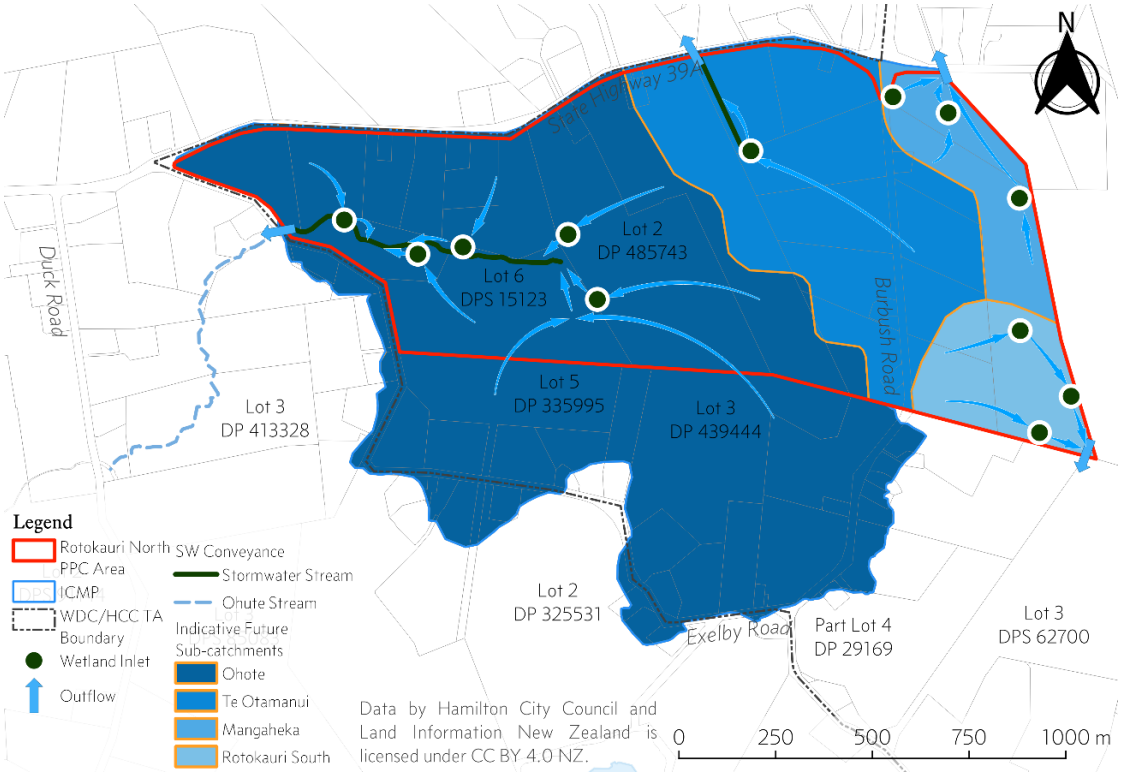

Figure 4: Indicative Subcatchments and SW Conveyance Network

Preliminary hydrogeological comments by Beca (Nutsford, 2018) indicate that the existing groundwater levels show a direct and immediate response to rainfall, soils are expected to have low permeability and overall groundwater level is very shallow. Subsequently the use of infiltration devices for stormwater management is likely to be limited across the PPC area.

McKenzie & Co. (Rudsits, 2019) identify some flood potential in the existing PPC area (see **Figure 3**, and drawing **1693-0-065**, **Appendix 3**). It is anticipated that much of the flood potential indicated will be mitigated during detailed subdivision design through earthwork design to lift development areas out of the flood plain, and shaping of green corridors to improve stormwater conveyance and management.

McKenzie & Co. (Rudsits, 2019) note that differences in modelling software and input datasets used by AECOM and McKenzie & Co. have produced differing results that effect stormwater detention requirements within the majority of the Rotokauri North PPC area(the Ohute catchment). It was recommended that the peak value of 0.7m^3/s be adopted as per the Rotokauri ICMP (Hart, 2017) for the 1% AEP design rainfall event, and that, subject to additional information being gathered (topography) and runoff analyses design parameters being agreed between all relevant parties (GSCL, HCC, WRC), the final value to be used for ED flows be further assessed during Resource Consenting.

The development of the ICMP (Fraser-Smith et al., 2018) was based on the following documents, which should also be referred to in future design:

- Waikato Local Authority Shared Services – Regional Infrastructure Technical Specifications (Waikato Local Authority, 2018);
- Hamilton City Council Three Waters Practice Note HCC02 – Rainwater Reuse System (Rain Tanks) (Hamilton City Council, 2016c);
- Hamilton City Council Three Waters Practice Note HCC05 – Rainwater Reuse and Detention System (Hamilton City Council, 2016b);
- Hamilton City Council Three Waters Practice Note HCC06 – Detention Tank (Hamilton City Council, 2016a);
- Hamilton City Council Three Waters Practice Note HCC09 – Water Impact Assessments (Hamilton City Council, 2016d);
- Waikato Regional Council Technical Report 2018/01 – Waikato Stormwater Management Guideline (Shaver, 2018a);
- Waikato Regional Council Technical Report 2018/02 – Waikato Stormwater Runoff Modelling Guideline (Shaver, 2018b);
- Auckland Council TP-108 - Guidelines for Stormwater Modelling in the Auckland Region (1999);
- Auckland Council's TP 10 (2003) Stormwater Management Devices: Design Guidelines Manual.

All stormwater infrastructure within the PPC area will be constructed and funded by the developers.

Network discharge consent(s) from the Regional Council will be required for the new stormwater network. This would likely be obtained by the developer(s) and transferred at a later date to HCC with the vesting of the assets.

6.3 Wastewater

Currently the PPC area is not serviced by a wastewater network, however provision has been made within the existing Far Western Interceptor (FWI) to cater for future urban development. A new trunk wastewater network with associated connecting branches would service the PPC area and future upstream catchments.

Two servicing options have been developed for the PPC area based on McKenzie & Co. conceptual designs (Rudsits, 2018):

6.3.1 Conventional gravity sewer

A wastewater network based on servicing all lots using gravity connections has been conceptually investigated for the ultimate development. The network is based on the catchment west of Burbush Road draining to a new wastewater pumping station (WWPS). This WWPS would discharge to the gravity wastewater catchment east of Burbush Road. The catchment east of Burbush Road would connect to the existing DN1050 wastewater network manhole (WWK09003) on FWI, immediately west of State Highway 1.

The gravity reticulation would comprise pipe diameters ranging from 150mm to 300mm, with depths expected to range from 2 to 7 m.

The WWPS would be sized for a pumping rate of 100 l/s, equivalent to population of approximately 6,000 people. The pump station site would be located on separate land parcel adjacent to the stormwater reserve area, with sufficient space for related infrastructure such as emergency storage tanks. A single 355mm rising main, approximately 1.0 km long discharge the pumped flows, however the opportunity for dual rising mains to manage septicity and lower initial flows is expected to be investigated during detailed design.

The design of the pump station, sewer pipework, manholes, and associated sewer infrastructure is subject to detailed design.

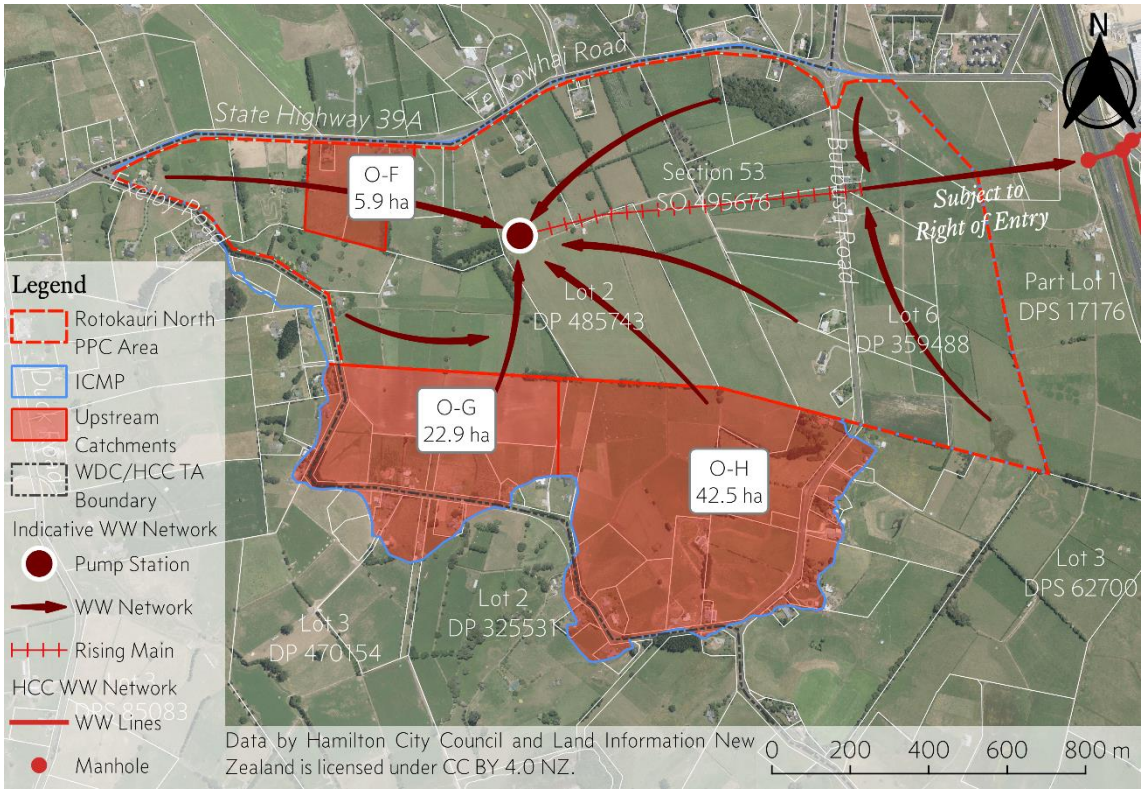

Figure 5: Indicative Trunk Gravity Network

Refer to the catchment **Figure 5** above, and drawing **1693-0-570**, **Appendix 3**, showing indicative location of the pump station, and a trunk wastewater gravity network for the PPC area.

Preliminary investigation also suggests that two or more pump stations can also service the wastewater requirements for the ultimate development: one pump station within the Ohute catchment, and one within the Te Otamanui catchment. The benefit of multiple pump stations is that wastewater construction depths can be minimised.

All wastewater reticulation network design and pump station design must comply with RITS.

6.3.2 Low pressure sewer reticulation

A low-pressure sewer (LPS) network has been conceptually designed for the ultimate development as an alternative to a typical gravity servicing design (should agreement with HCC be reached on its application/use). The LPS network allows for the reticulation to be installed shallower than a gravity network with the following benefits:

- Reduced inflow and infiltration because the system is sealed;
- Avoid ground water management during construction;
- Avoid deep trenching and associated impacts on other services;
- Future maintenance and emergency responses can be undertaken without need for significant trenching; and
- Lower capital costs through reduced pipe size.

Each individual lot would have a dedicated pressure sewer unit, which would pump into the reticulation. The collective pumping of all the pressure sewer units would convey the wastewater to the DN1050 wastewater network manhole (WWK09003) connecting to the Far Western Interceptor (FWI).

The concept design was based on two low pressure sewer mains being installed along each street (one in each berm). However, the opportunity to use a single main along with longer property connection laterals will be investigated during detailed design.

The developer(s) would install the reticulation network and the property boundary connection points at subdivision stage. The dwelling builder would be responsible for the purchase and installation of the pressure sewer unit as well as its ongoing maintenance. All pressure sewer units to be purchased and installed must be pre-approved by HCC. This aspect can be dealt with via consent notices on individual titles at subdivision stage.

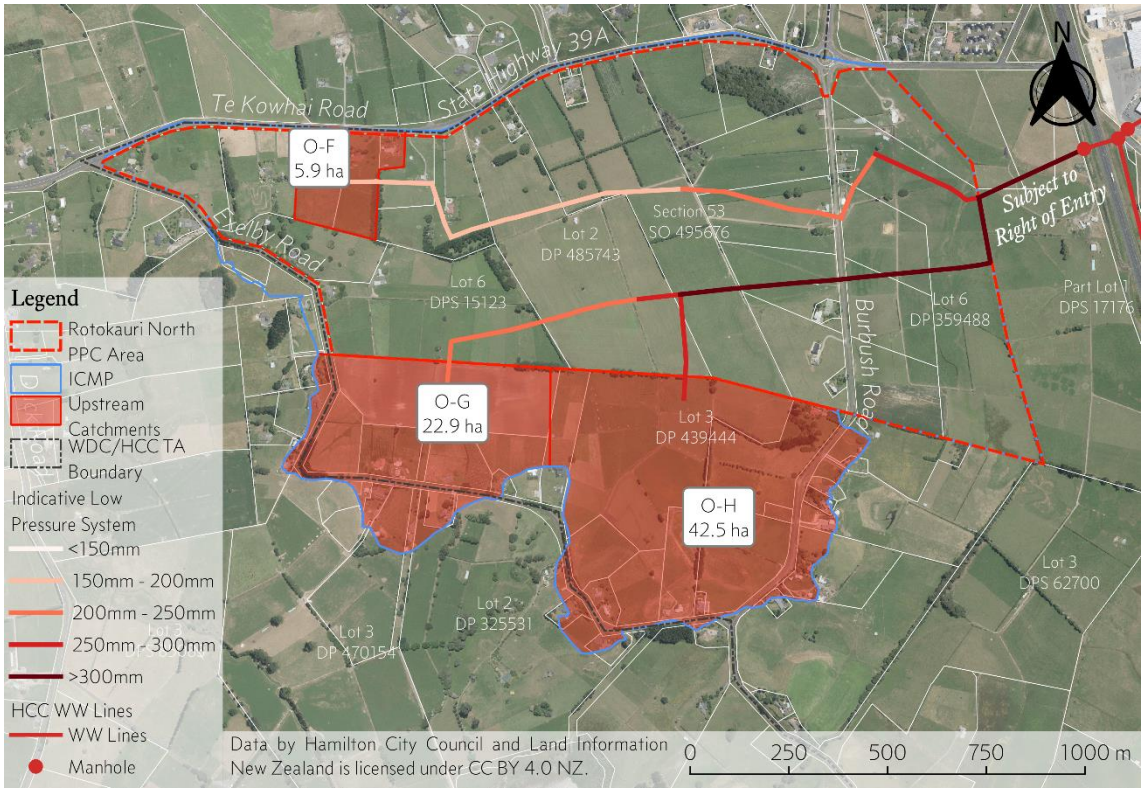

Figure 6: Indicative Low-Pressure Trunk Wastewater Network

Refer to **Figure 6**, and catchment drawing **1693-0-572**, **Appendix 3**, showing indicative locations of the primary low-pressure network proposed through the PPC area.

6.3.3 Overall

In general, the PPC area can be serviced for wastewater disposal.

It is recommended that cost estimates be prepared for both the low pressure and gravity methods to allow for a whole of life comparison to aid discussions with HCC on the preferred wastewater disposal method.

The design of the low-pressure sewer pipework and associated sewer infrastructure is subject to detailed design. Design and construction requirements for the low-pressure sewer network will require agreement with HCC prior to commencement of design, as well as agreement to utilise this option (or a hybrid of the low pressure and gravity if desirable/suitable).

Similarly, the selection of pressure sewer units would be subject to review and approval by HCC.

6.4 Water

As with wastewater, the PPC area is currently not serviced by water, and requires the extension of water service from existing trunk network. Mott McDonald have prepared a hydraulic modelling report (Tomasi, 2017) that incorporated water demands from the

PPC area and the trunk upgrades as per HCC Infrastructure Strategy (Hamilton City Council, 2018). The modelling was based on expanding that done for the Rotokauri ICMP (Plessis, 2015).

The modelling confirmed that when the long-term upgrades were implemented, there was sufficient capacity and pressure to service the PPC area. The long-term upgrades required to service the PPC area include:

- New 520 mm trunk main from Pukete Reservoir to Te Wetini Drive, to service both Rotokauri South and the PPC area (completed);
- New 450 mm trunk watermain extension along Te Wetini Drive, reducing to 250 mm at connection to Rotokauri Road;
- Connect existing 250 mm water main on Arthur Porter Drive to the new Te Wetini Drive 520 mm trunk main (completed);
- New 450 mm trunk watermain crossing State Highway 1, from approximate intersection of Te Kowhai Road East and Arthur Porter Drive, to the Rotokauri development area.

Specific upgrades required for the PPC area would be:

- New 250 mm water main from intersection of Ruffell Road and Arthur Porter Drive, following Te Kowhai Road to the first stage of the PPC area to provide initial supply.

The proposed 450 mm trunk watermain crossing State Highway 1 will need to be brought forward to allow for security of supply for subsequent stages of the PPC area. The timing for these works will be determined through additional demand modelling and detailed design in the relevant stages. We expect that the existing 250 mm line from Arthur Porter Drive along Te Kowhai East Road to the roundabout at Earthmover Crescent will be upgraded to a 450 mm line at this time.

As the 450 mm would provide supply to a region greater than the PPC area only, detailed discussions over costs and the ability for cost sharing with HCC are required as part of a private development agreement (PDA).

Refer to **Figure 7** and drawing **1693-0-670**, **Appendix 3**.

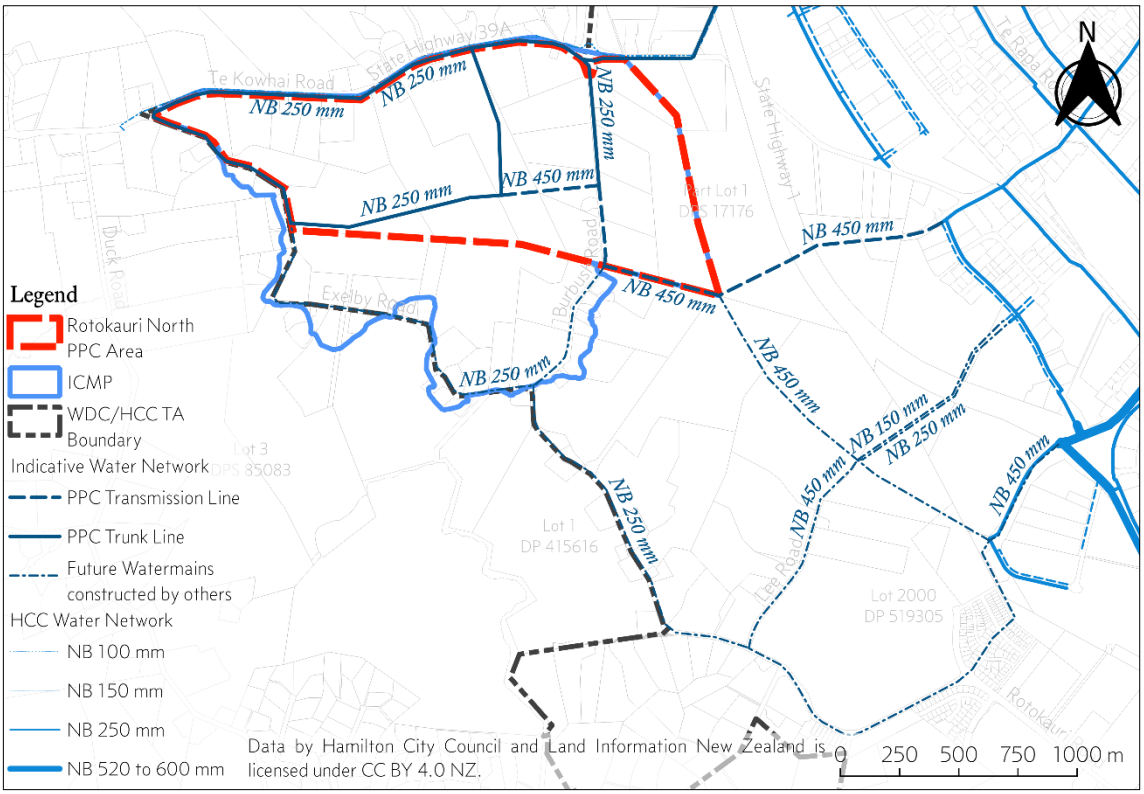

Figure 7: Indicative Water Network

The reticulation within the PPC area would be based on sizing to meet the capacity and pressure requirements within Waikato LASS RITS (2018). The conceptual network design was based on looped networks branching off a central trunk main. The central trunk main would form part of the wider regional ring main connecting Rotokauri North and South with the Te Wetini Drive and State Highway 1 mains.

Water Staging Plan

The initial stage of the PPC area could be serviced by a new 250 mm diameter pipeline from Ruffell Road and Arthur Porter Drive intersection. The water main would cross State Highway 1, parallel to the existing 100 mm water main to Errol Close. Thereafter it would follow Te Kowhai Road to the first stage of the PPC area.

The existing 100 mm watermain along Te Kowhai Road would be used to provide security of supply for the first stage. Given the 100 mm watermain on the north side of Te Kowhai Road and west of the Te Kowhai Road Burbush Road intersection is a Waikato Regional Council asset, we recommend installing a new 150 mm watermain starting east of the Te Kowhai Road Burbush Road intersection (i.e., connecting to an HCC asset) and then running west to the initial stage along the south side of Te Kowhai Road. Detailed demand analysis and modelling will be completed to verify that capacity and pressure requirements are meet for this arrangement.

As demand increases with additional staged development across the PPC area, the existing 100 mm water main would not be expected to provide sufficient security of supply. It would be expected that the 450mm trunk main crossing State Highway 1

from Te Kowhai Road East would need to be constructed. Demand analysis and modelling would be completed during detailed design so as to confirm timing requirements for the construction of the new 450 mm, relative to the staging plan when developed.

6.5 Roads

Commute Transportation Consultants have undertaken an Integrated Transportation Assessment (ITA) (Seneviratne & Hills, 2019) for PPC area that identifies specific transportation improvements required to support the PPC. In summary these improvements include:

- Two new collector road intersections on Te Kowhai Road (State Highway 39), consisting of one single lane roundabout, and one priority control intersection (initially) with potential to be upgraded to a roundabout control in the future;
- Upgrade of existing roundabout at Te Kowhai and Burbush to a two-lane roundabout;
- Upgrade of Burbush Road to collector road status;
- Upgrade of Exelby Road to collector road status.

A minor arterial road is anticipated along the eastern edge of the PPC area.

Within the PPC area there would be new local and collector roads developed to service the community, including appropriate allowances for pedestrian, cycling, private and public transportation. Intersections would range from give way controlled for local to local and local to collector intersections, to signalised or roundabout controlled for arterial to collector and collector to collector. Demand analysis during future design stages would be used to determine intersection control types and requirements for construction of new required intersections (or upgrades to existing intersections).

Refer to drawings **1693-0-360** to **1693-0-362**, **Appendix 3**, for indicative local, collector, and minor arterial typical section.

Commute recommend that public transportation to service the area is implemented by the time 1,000 dwellings have been constructed and occupied.

6.6 Utility Services

6.6.1 Gas Reticulation

First Gas have confirmed that their supply network has capacity to provide reticulated gas supply for the PPC area.

6.6.2 Telecommunications

Chorus advise that the PPC area can be serviced. This will be confirmed at each subdivision stage once detailed design has been commissioned.

6.6.3 Power

WEL advise they can service the PPC area with electrical supply. At each subdivision stage the location of above ground infrastructure of transformers and switch gear locations will be determined, with space set aside within legal road corridors

WEL also have an existing above ground 11kV asset towards the western side of the PPC Area that they wish to retain – see **Figure 2** and drawing **1693-0-015**, **Appendix 3**. Discussions will be held between the developer and WEL should the asset be relocated underground within a future road corridor.

6.6.4 Summary

All utility operators will enter into commercial agreements to service each subdivision at the time of detailed design.

7 Conclusion

Investigations, meetings and correspondence with the respective Council departments and utility providers to date indicate that existing infrastructure can be extended and be made available to service the PPC area.

Future subdivision and development associated with land subject to the PPC can provide essential infrastructure necessary for use and enjoyment of the developed lots in compliance HCDP and Council standards.

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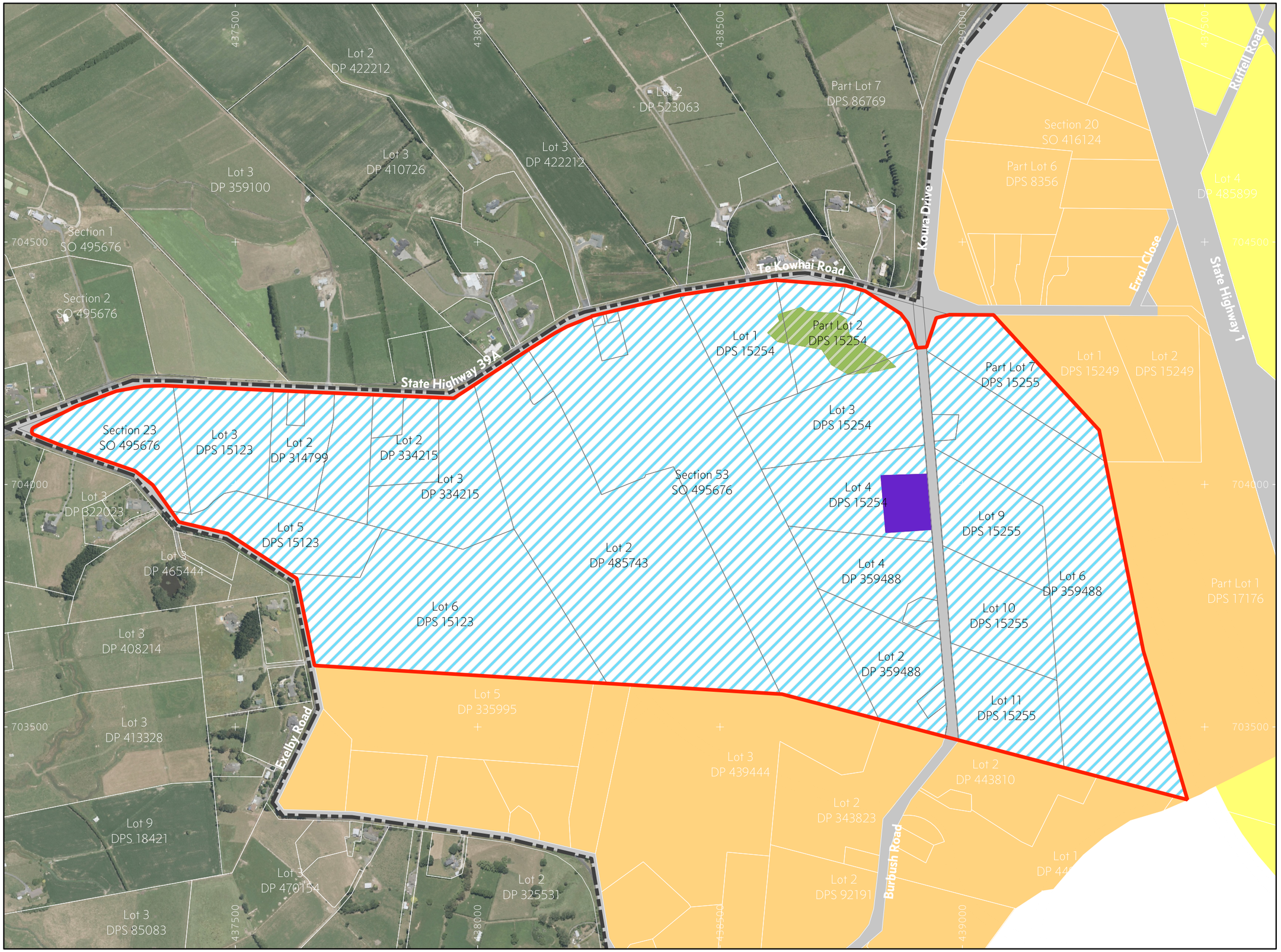
9 Appendices

Appendix 1: Zone & Structure Plans

1693-0-010 – Rotokauri North Zone Map
1693-0-011 – Rotokauri North Structure Plan



N

Legend

- Rotokauri North PPC Area

Proposed Land Use Zones

- Medium Density Residential Zone
- Business 6 Zone

HCC Zones

- Future Urban
- Industrial
- Residential
- Transport Corridor Zone
- Natural Open Space Zone
- WDC/HCC TA Boundary

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Map Projection:
NZGD2000 / Mount Eden 2000 (EPSG: 2105)

Drawn By:	FW	Date: 26/04/2019	Signed:
Checked By:		Date:	Signed:
Approved By:		Date:	Signed:
Plot Date:	26/04/2019		

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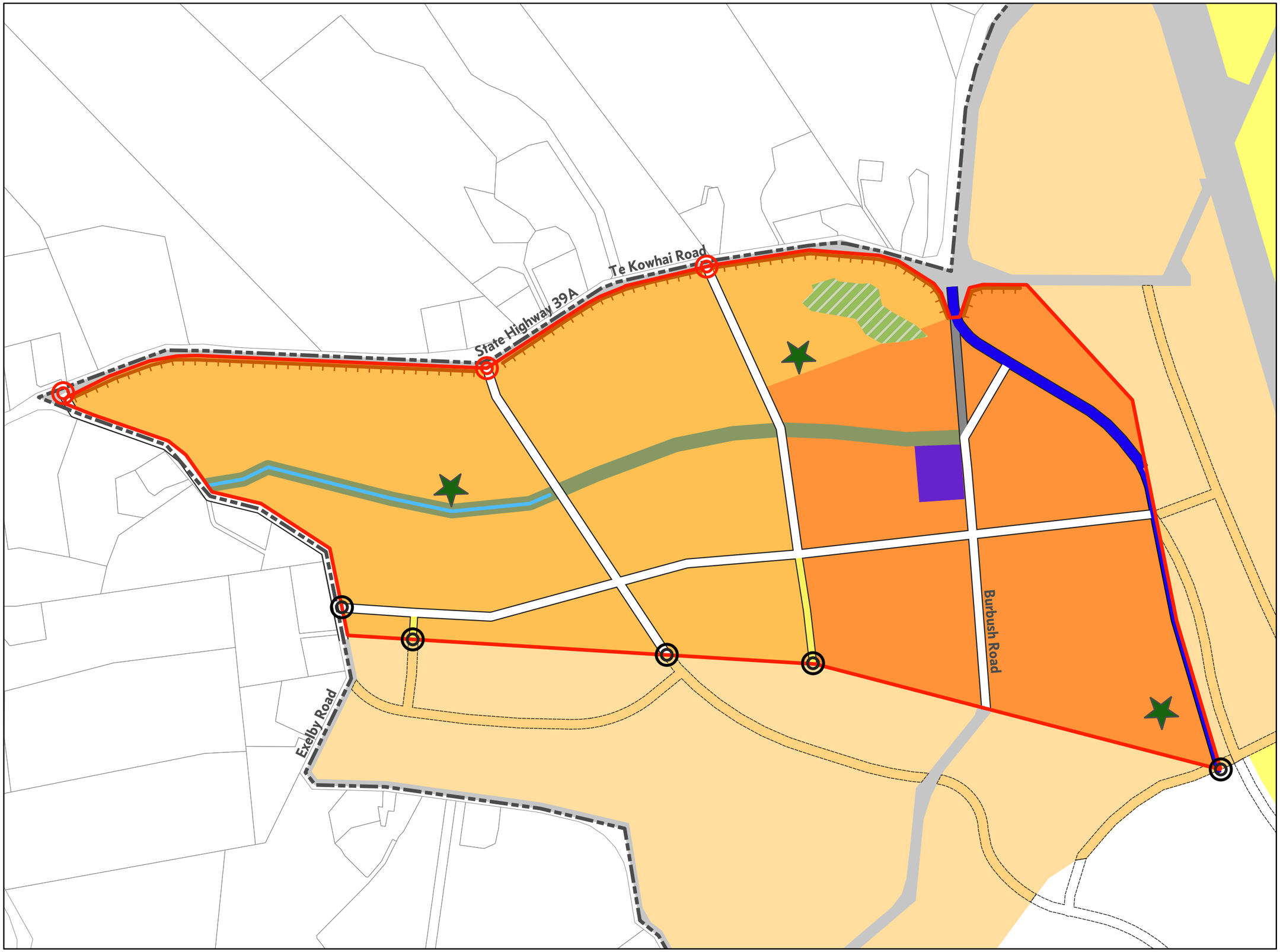
All dimensions to be checked; Do not scale from drawing.

Project:
Rotokauri North
Private Plan Change (PPC)
Green Seed Consultants Limited

Title:
Zone Map

McKENZIE&Co CONSULTANTS LTD

Issue Status:	For Information
Project Number:	1693-0
Drawing Number:	010
Revision:	G
A3 Scale:	1:7500



N

Legend

- Rotokauri North PPC Area

Zone Type

- Medium Density Residential Zone
- Business 6 Zone
- Medium Density Overlay Area A

HCC Zones

- Future Urban Zone
- Industrial Zone
- Residential Zone
- Transport Corridor Zone
- Natural Open Space Zone
- Future Transportation Corridor Zone

Road Connections

- State Highway Intersection
- Road Connection

Indicative Roads

- Minor Arterial Road
- Collector Road
- Local Road
- Future Road Closing/Stopping
- No Direct Access from State Highway /Landscape Buffer
- Green Spine (could include a road)
- Ohute Stream
- Indicative Neighbourhood Reserve
- WDC/HCC TA Boundary

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Map Projection:
NZGD2000 / Mount Eden 2000 (EPSG: 2105)

Drawn By:	FW	Date: 26/04/2019	Signed:
Checked By:		Date:	Signed:
Approved By:		Date:	Signed:
Plot Date:	26/04/2019		

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All dimensions to be checked; Do not scale from drawing.

Project:
Rotokauri North
Private Plan Change
Green Seed Consultants Ltd.

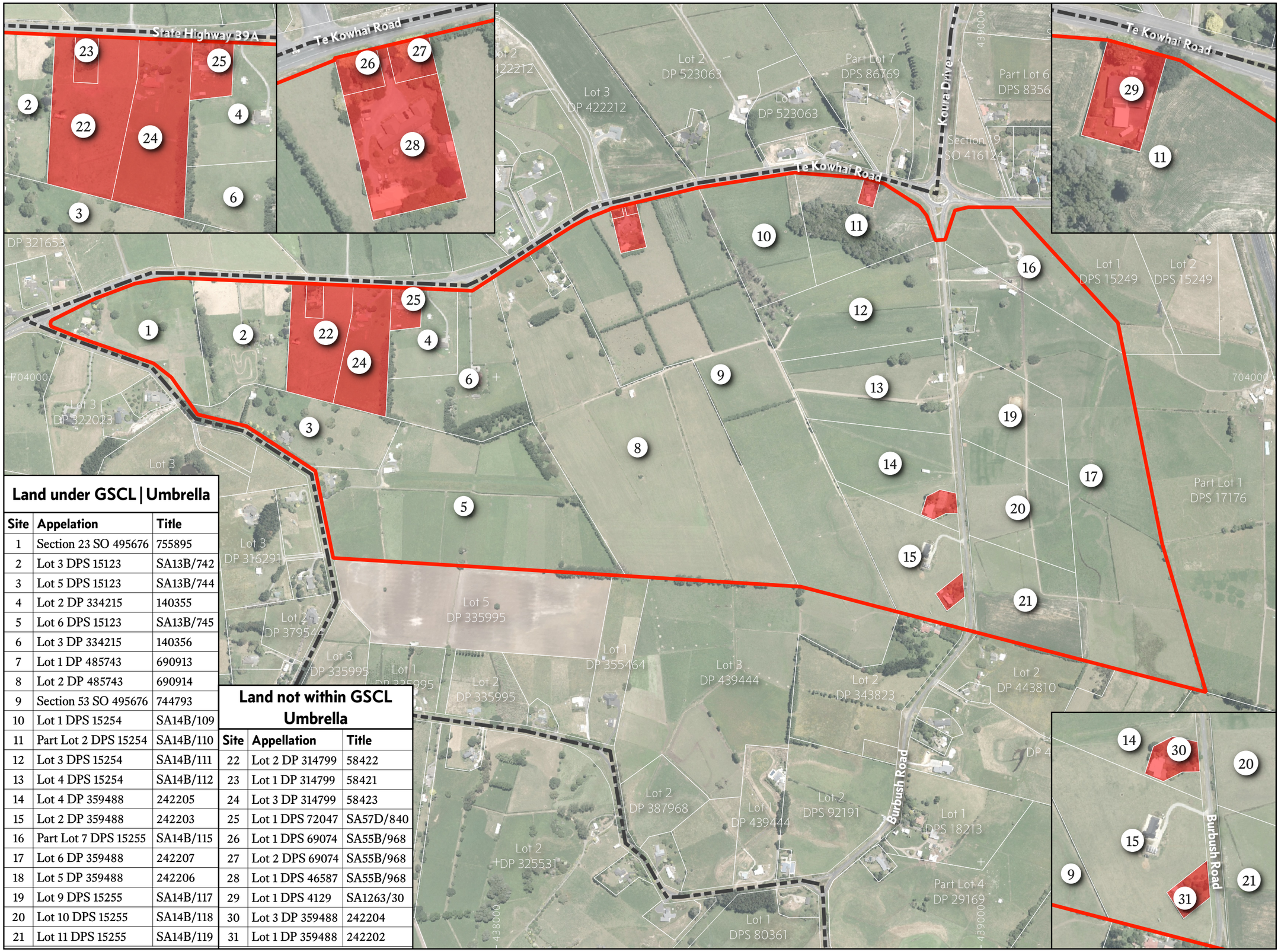
Title:
Structure Plan

McKENZIE&Co CONSULTANTS LTD

Issue Status:	For Information
Project Number:	1693-0
Drawing Number:	011
Revision:	I
A3 Scale:	1:7500

Appendix 2: Rotokauri North Land Parcels

1693-0-062 – Green Seed Consultants Properties



Land under GSCL | Umbrella

Site	Appelation	Title
1	Section 23 SO 495676	755895
2	Lot 3 DPS 15123	SA13B/742
3	Lot 5 DPS 15123	SA13B/744
4	Lot 2 DP 334215	140355
5	Lot 6 DPS 15123	SA13B/745
6	Lot 3 DP 334215	140356
7	Lot 1 DP 485743	690913
8	Lot 2 DP 485743	690914
9	Section 53 SO 495676	744793
10	Lot 1 DPS 15254	SA14B/109
11	Part Lot 2 DPS 15254	SA14B/110
12	Lot 3 DPS 15254	SA14B/111
13	Lot 4 DPS 15254	SA14B/112
14	Lot 4 DP 359488	242205
15	Lot 2 DP 359488	242203
16	Part Lot 7 DPS 15255	SA14B/115
17	Lot 6 DP 359488	242207
18	Lot 5 DP 359488	242206
19	Lot 9 DPS 15255	SA14B/117
20	Lot 10 DPS 15255	SA14B/118
21	Lot 11 DPS 15255	SA14B/119

Land not within GSCL Umbrella

Site	Appellation	Title
22	Lot 2 DP 314799	58422
23	Lot 1 DP 314799	58421
24	Lot 3 DP 314799	58423
25	Lot 1 DPS 72047	SA57D/840
26	Lot 1 DPS 69074	SA55B/968
27	Lot 2 DPS 69074	SA55B/968
28	Lot 1 DPS 46587	SA55B/968
29	Lot 1 DPS 4129	SA1263/30
30	Lot 3 DP 359488	242204
31	Lot 1 DP 359488	242202

N

Legend

- Rotokauri North PPC Area
- Land not under GSCL Umbrella
- WDC/HCC TA Boundary

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Map Projection:
NZGD2000 / Mount Eden 2000 (EPSG: 2105)

Drawn By:	FW	Date:	26/04/2019
Checked By:		Date:	
Approved By:		Date:	
Plot Date:	26/04/2019		

Signed:

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All dimensions to be checked; Do not scale from drawing.

Project:
Rotokauri North
Private Plan Change (PPC)
Green Seed Consultants Limited

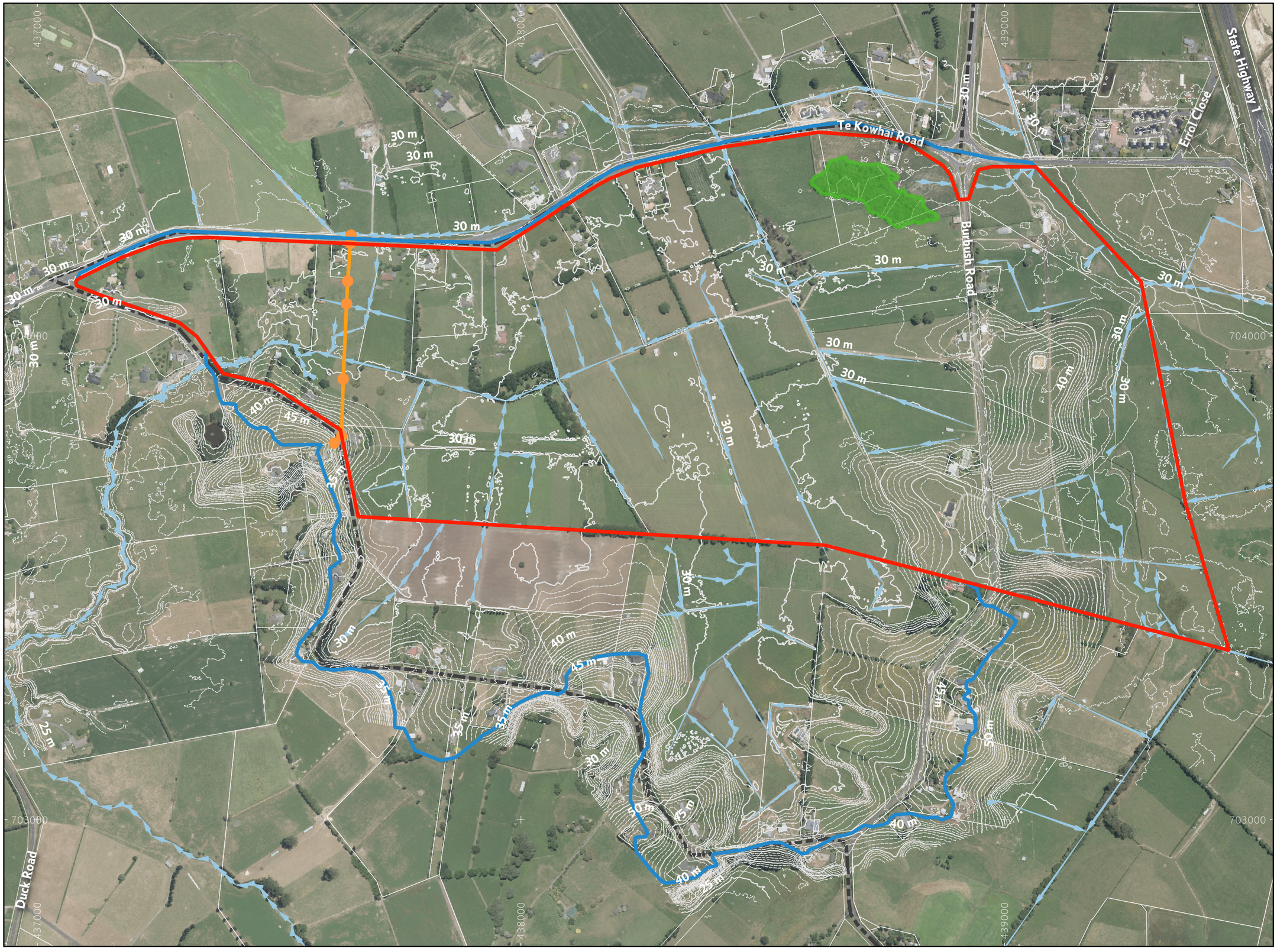
Title:
Properties Under GSCL "Umbrella"

McKENZIE&Co CONSULTANTS LTD

Issue Status:	For Information
Project Number:	1693-0
Drawing Number:	062
Revision:	E
A3 Scale:	1:7500

Appendix 3: Topographic Plan, Typical Road Sections and Concept Plans for Stormwater, Wastewater and Water

1693-0-015 – Topographic Plan
1693-0-032 – Subcatchments with Indicative Swales and Wetland Locations
1693-0-065 – Flood extents under existing conditions
1693-0-360 – Local Road Typical Section
1693-0-361 – Collector Road Typical Section
1693-0-362 – Minor Arterial Road Typical Section
1693-0-570 – Wastewater Catchment Plan, Gravity Sewer (Single Pump Station)
1693-0-571 – Wastewater Catchment Plan, Gravity Sewer (Two Pump Stations)
1693-0-572 – Wastewater Catchment Plan, Low Pressure Sewer
1693-0-670 – Overall Water Concept Plan
1693-0-671 – Water Concept Plan PPC Area



N

Legend

- Rotokauri North PPC Area
- Tree Stand (Kahikatea)
- Watercourses
- Rotokauri North Catchment

Catchment In/Out Flows

- WDC/HCC TA Boundary
- 11kV WEL Asset

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Map Projection:
NZGD2000 / Mount Eden 2000 (EPSG: 2105)

Drawn By:	FW	Date:	26/04/2019
Checked By:		Date:	
Approved By:		Date:	
Plot Date:	26/04/2019		

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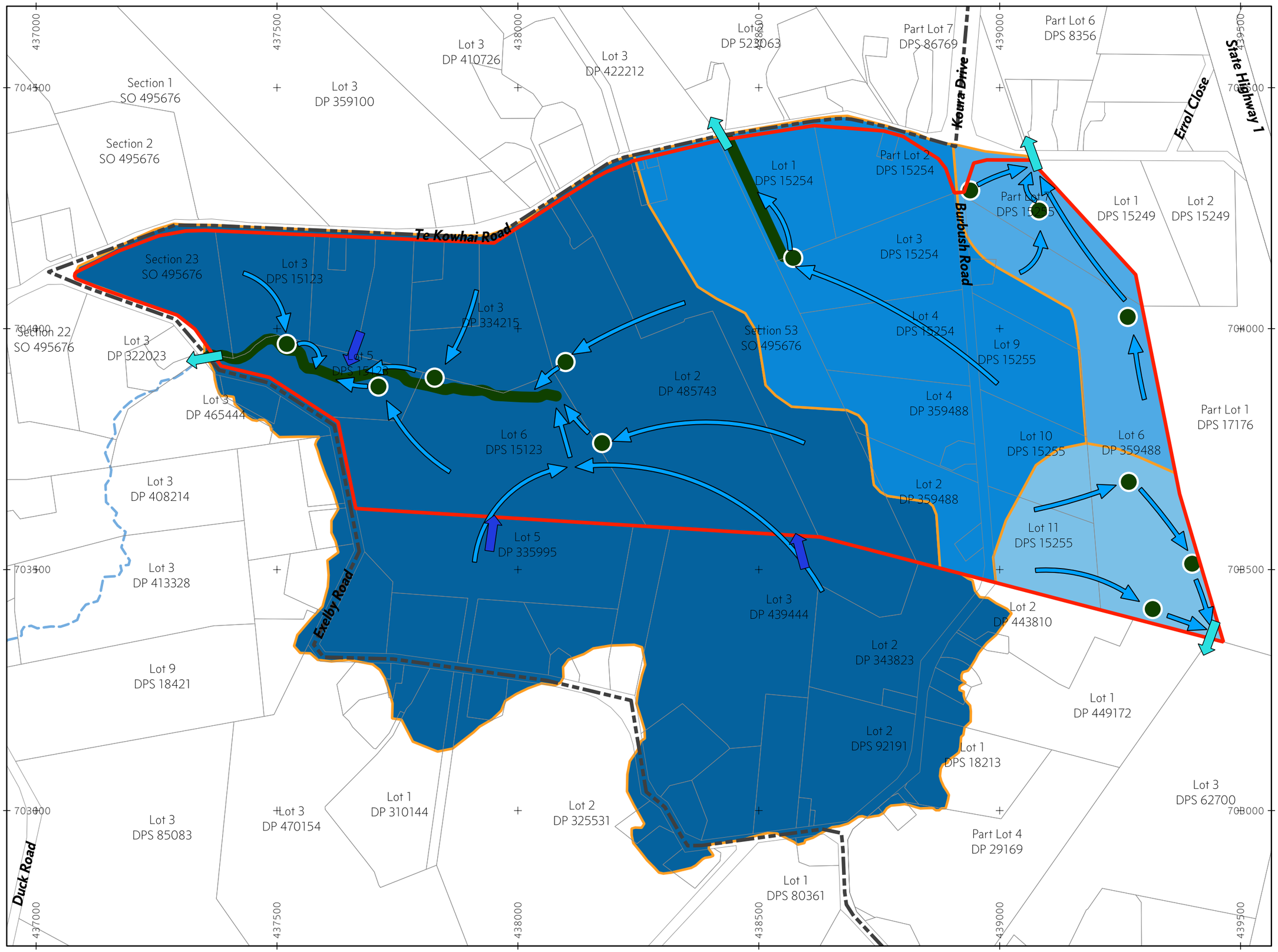
Project:
Rotokauri North
Private Plan Change (PPC)
Greenseed Consultants Ltd

Title:
Topographic Plan

McKENZIE&Co CONSULTANTS LTD

Issue Status:	For Information
Project Number:	1693-0
Drawing Number:	015
Revision:	F
A3 Scale:	1:7500





Legend

- Rotokauri North PPC Area
- WDC/HCC TA Boundary
- Indicative Wetland Inlet

Catchment in/Out Flows

- Inflow
- Outflow
- Stormwater Network

Swales

- Stormwater Stream
- Ohote Stream

Indicative Future Catchments

- Ohote
- Te Otamanui
- Mangaheka
- Rotokauri South

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Map Projection:
NZGD2000 / Mount Eden 2000 (EPSG: 2105)

Drawn By:	FW	Date: 26/04/2019	Signed:
Checked By:		Date:	Signed:
Approved By:		Date:	Signed:
Plot Date:	26/04/2019		

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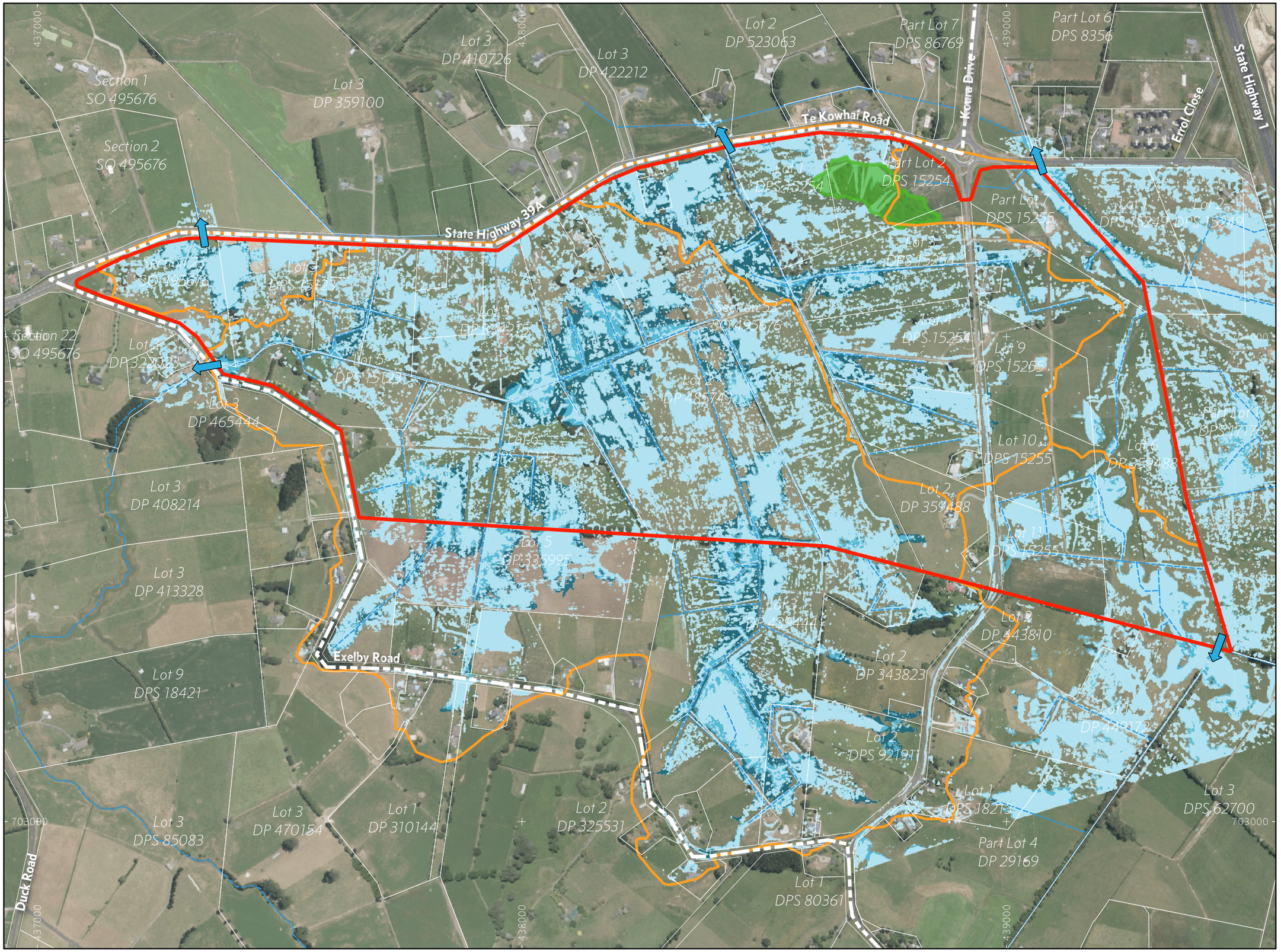
All dimensions to be checked; Do not scale from drawing.

Project:
Rotokauri North
Private Plan Change (PPC)
Green Seed Consultants Limited

Title:
Subcatchments with Indicative Swales and Wetland Locations

McKENZIE&Co CONSULTANTS LTD

Issue Status:	For Information
Project Number:	1693-0
Drawing Number:	032
Revision:	G
A3 Scale:	1:7500



N

Legend

- Rotokauri North PPC Area
- Rotokauri North Catchment
- Existing Catchments
- Significant Natural Area
- Watercourses

Flood Depths

1% AEP Storm Event

2.81 m Max. Depth

10% AEP Storm Event

2.45 m Max. Depth

50% AEP Storm Event

2.25 m Max. Depth

Catchment In/Out Flows

Outlet

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Map Projection:
NZGD2000 / Mount Eden 2000 (EPSG: 2105)

Drawn By:	FW	Date: 26/04/2019	Signed:
Checked By:		Date:	Signed:
Approved By:		Date:	Signed:
Plot Date:	26/04/2019		

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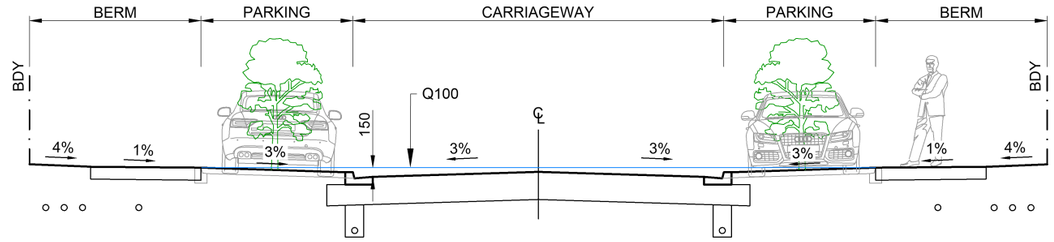
Project:
Rotokauri North
Private Plan Change (PPC)
Green Seed Consultants Ltd

Title:
Flood Map

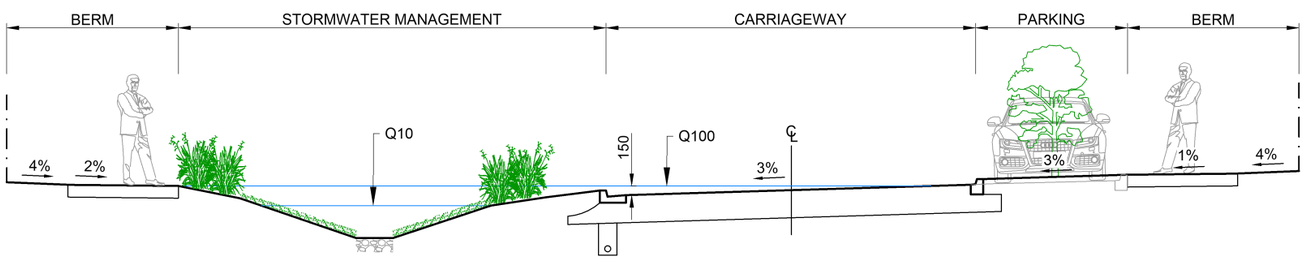
McKENZIE&Co CONSULTANTS LTD

Issue Status:	For Information
Project Number:	1693-0
Drawing Number:	065
Revision:	C
A3 Scale:	1:7500

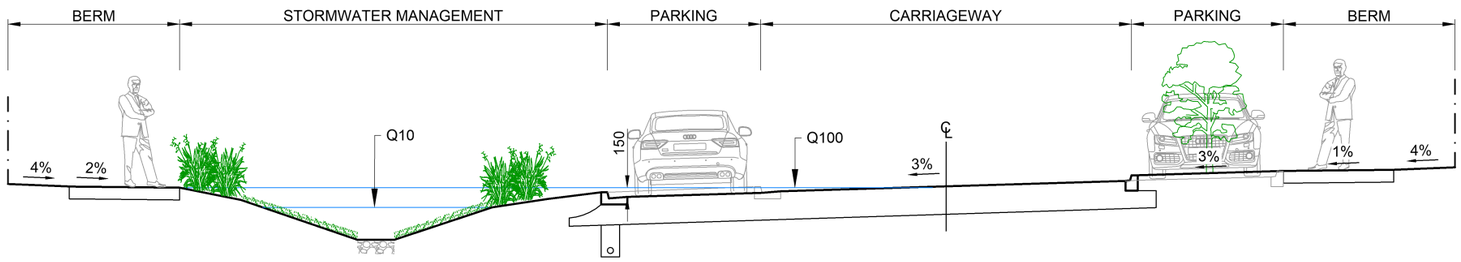


INDICATIVE LOCAL ROAD CROSS SECTION

NOTE: THIS SECTION ONLY APPLIES FOR CATCHMENTS UP TO 1.5 ha



INDICATIVE LOCAL ROAD CROSS SECTION OPTION WITH PARKING ONE SIDE



INDICATIVE LOCAL ROAD CROSS SECTION OPTION WITH PARKING BOTH SIDES

REV	DESCRIPTION	BY	DATE
C	ISSUED FOR DRAFT PLAN CHANGE	BH	03/04/19
B	ISSUED FOR DRAFT PLAN CHANGE	BH	19/12/18
A	FIRST ISSUE	BH	01/07/18

ORIGINATOR: BH | DATE: 01/07/18 | SIGNED: | PLOT BY:
DRAWN: BH | DATE: 01/07/18 | SIGNED: | PLOT DATE:
CHECKED: | DATE: | SIGNED: | SURVEY BY:
APPROVED: | DATE: | SIGNED: | SURVEY DATE:

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ALL DIMENSIONS TO BE CHECKED; DO NOT SCALE FROM DRAWING

PROJECT:
GREEN SEED CONSULTANTS LIMITED
ROTOKAURI NORTH

TITLE:
ROADING
TYPICAL CROSS SECTIONS
LOCAL ROADS

McKENZIE&CO CONSULTANTS LTD

ISSUE STATUS: FOR APPROVAL
PROJECT NO: 1693
SCALES: 1:50 @ A1, 1:100 @ A3
A1
DRAWING NO: 1693-0-360
REV: C

2019-04-17 11:06:48

REFER TO APPROVED MASTER DRAWING FOR ORIGINAL SIGNATURES

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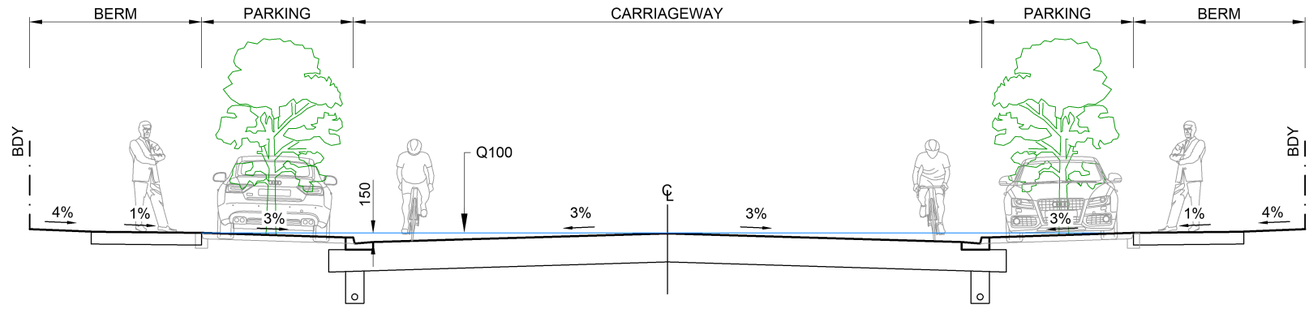
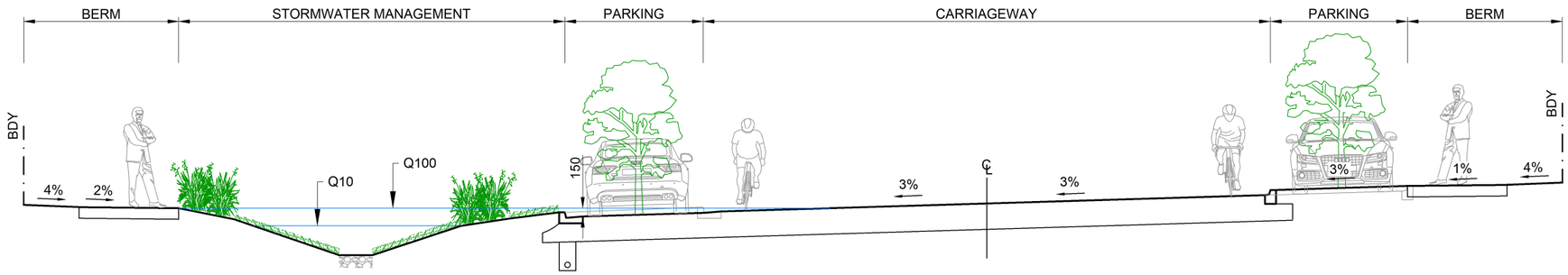
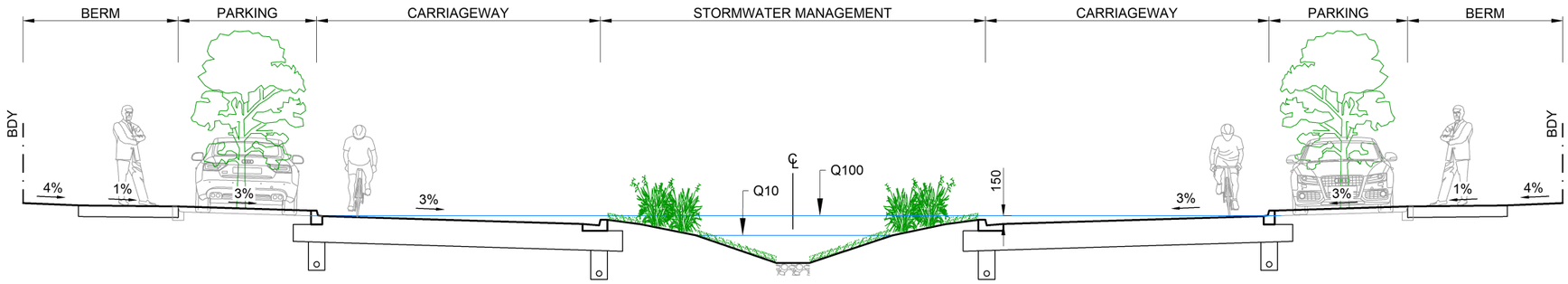


INDICATIVE COLLECTOR ROAD CROSS SECTION
WHERE NO SWALE IS REQUIRED



INDICATIVE COLLECTOR ROAD CROSS SECTION
WITH SIDE SWALE



INDICATIVE COLLECTOR ROAD CROSS SECTION
WITH CENTRAL SWALE

REV	DESCRIPTION	BY	DATE
C	ISSUED FOR DRAFT PLAN CHANGE	BH	03/04/19
B	ISSUED FOR DRAFT PLAN CHANGE	BH	19/12/18
A	FIRST ISSUE	BH	01/07/18

ORIGINATOR: BH | DATE: 01/07/18 | SIGNED: | PLOT BY:
DRAWN: BH | DATE: 01/07/18 | SIGNED: | PLOT DATE:
CHECKED: | DATE: | SIGNED: | SURVEY BY:
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ALL DIMENSIONS TO BE CHECKED; DO NOT SCALE FROM DRAWING

PROJECT:
GREEN SEED CONSULTANTS LIMITED
ROTOKAURI NORTH

TITLE:
ROADING
TYPICAL CROSS SECTIONS
COLLECTOR ROADS

McKENZIE&CO CONSULTANTS LTD

ISSUE STATUS: FOR APPROVAL
PROJECT NO: 1693
SCALES: 1:50 @ A1, 1:100 @ A3
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DRAWING NO: 1693-0-361
REV: C

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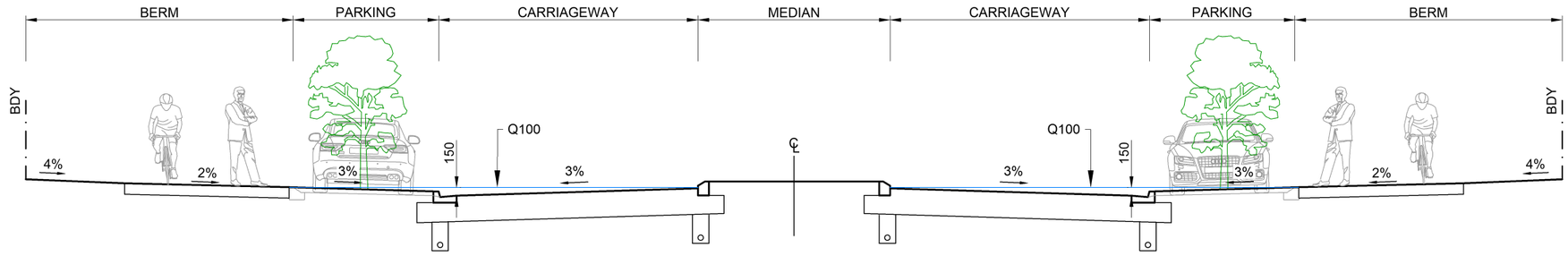
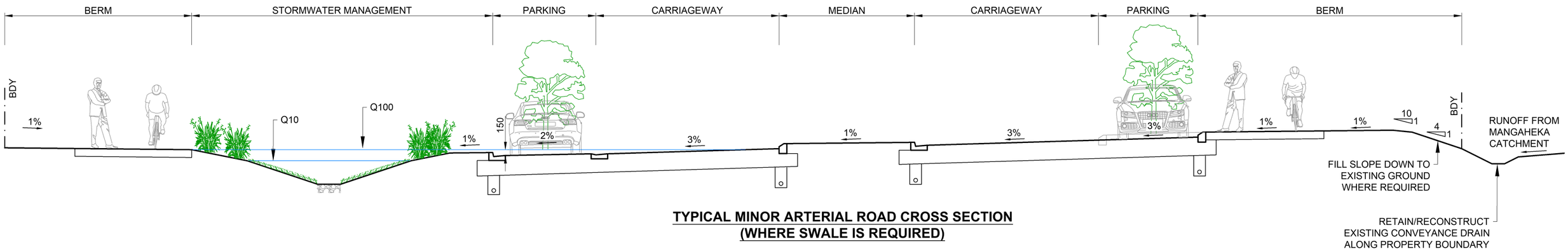
NOTES
1. DIMENSIONS SHOWN BASED ON ROTOKAURI SOUTH CONSTRUCTION DRAWING S1057320 Rev 3 ISSUED BY CKL LTD ON 28/06/17.



TYPICAL MINOR ARTERIAL ROAD CROSS SECTION
(WHERE SWALE IS NOT REQUIRED)

WEST SIDE

EAST SIDE



TYPICAL MINOR ARTERIAL ROAD CROSS SECTION
(WHERE SWALE IS REQUIRED)

REV	DESCRIPTION	BY	DATE
C	ISSUED FOR DRAFT PLAN CHANGE	BH	03/04/19
B	ISSUED FOR DRAFT PLAN CHANGE	BH	19/12/18
A	FIRST ISSUE	BH	01/07/18

ORIGINATOR: BH | DATE: 01/07/18 | SIGNED: | PLOT BY:
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APPROVED: | DATE: | SIGNED: | SURVEY DATE:

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ALL DIMENSIONS TO BE CHECKED; DO NOT SCALE FROM DRAWING

PROJECT:
GREEN SEED CONSULTANTS LIMITED
ROTOKAURI

TITLE:
ROADING
TYPICAL CROSS SECTIONS
MINOR ARTERIAL

McKENZIE&CO CONSULTANTS LTD

ISSUE STATUS: FOR APPROVAL
PROJECT NO: 1693
SCALES: 1:50 @ A1, 1:100 @ A3
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DRAWING NO: 1693-0-362
REV: C

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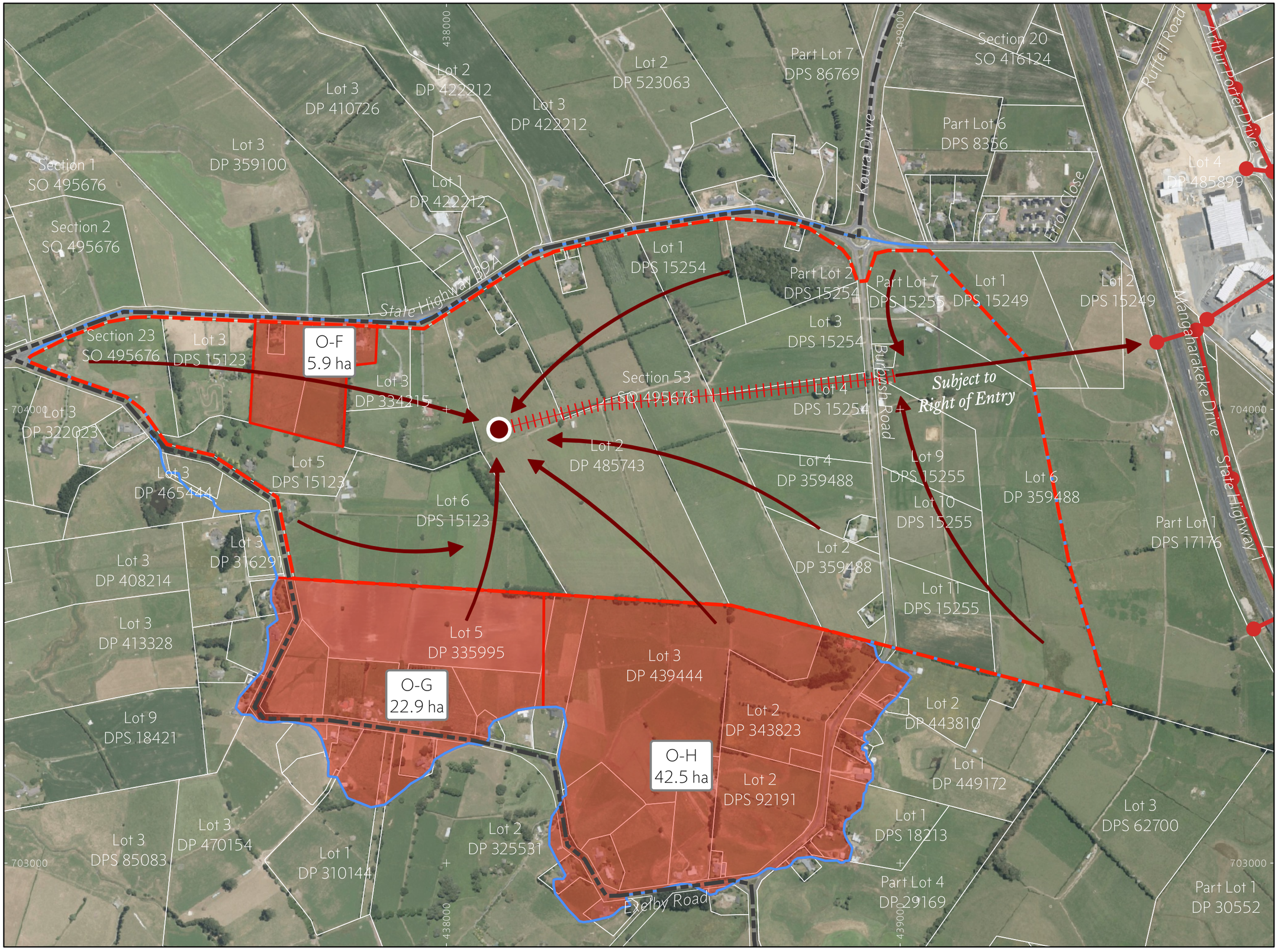

N

Legend

- Rotokauri North PPC Area
- Rotokauri North Catchment
- Upstream Catchments
- WDC/HCC TA Boundary

Indicative WW Network

- Pump Station
- WW Network
- Rising Main

HCC WW Network

- WW Lines
- Manhole

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Map Projection:
NZGD2000 / Mount Eden 2000 (EPSG: 2105)

Drawn By:	FW	Date:	26/04/2019
Checked By:		Date:	
Approved By:		Date:	
Plot Date:	26/04/2019		

Signed:

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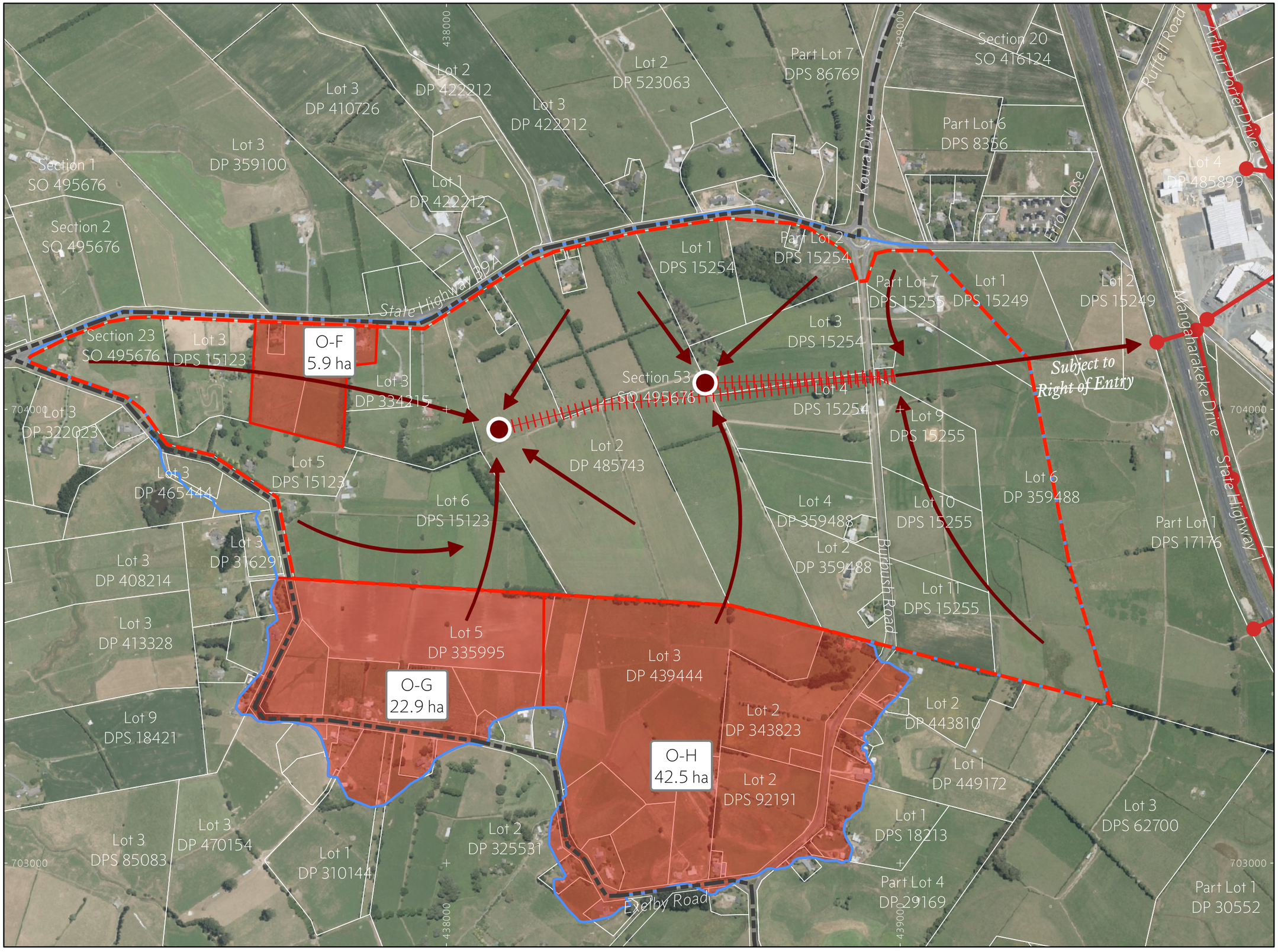
All dimensions to be checked; Do not scale from drawing.

Project:
Rotokauri North
Private Plan Change (PPC)
Green Seed Consultants Limited

Title:
Gravity Wastewater Network
Concept Design of Ultimate Network
With One Pump Station

McKENZIE&Co CONSULTANTS LTD

Issue Status:	For Information
Project Number:	1693-0
Drawing Number:	570
Revision:	C
A3 Scale:	1:8000



N

Legend

- Rotokauri North PPC Area
- Rotokauri North Catchment
- Upstream Catchments
- WDC/HCC TA Boundary

Indicative WW Network

- Pump Station
- WW Network
- Rising Main

HCC WW Network

- WW Lines
- Manhole

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Map Projection:
NZGD2000 / Mount Eden 2000 (EPSG: 2105)

Drawn By:	FW	Date:	26/04/2019
Checked By:		Date:	
Approved By:		Date:	
Plot Date:	26/04/2019		

Signed:

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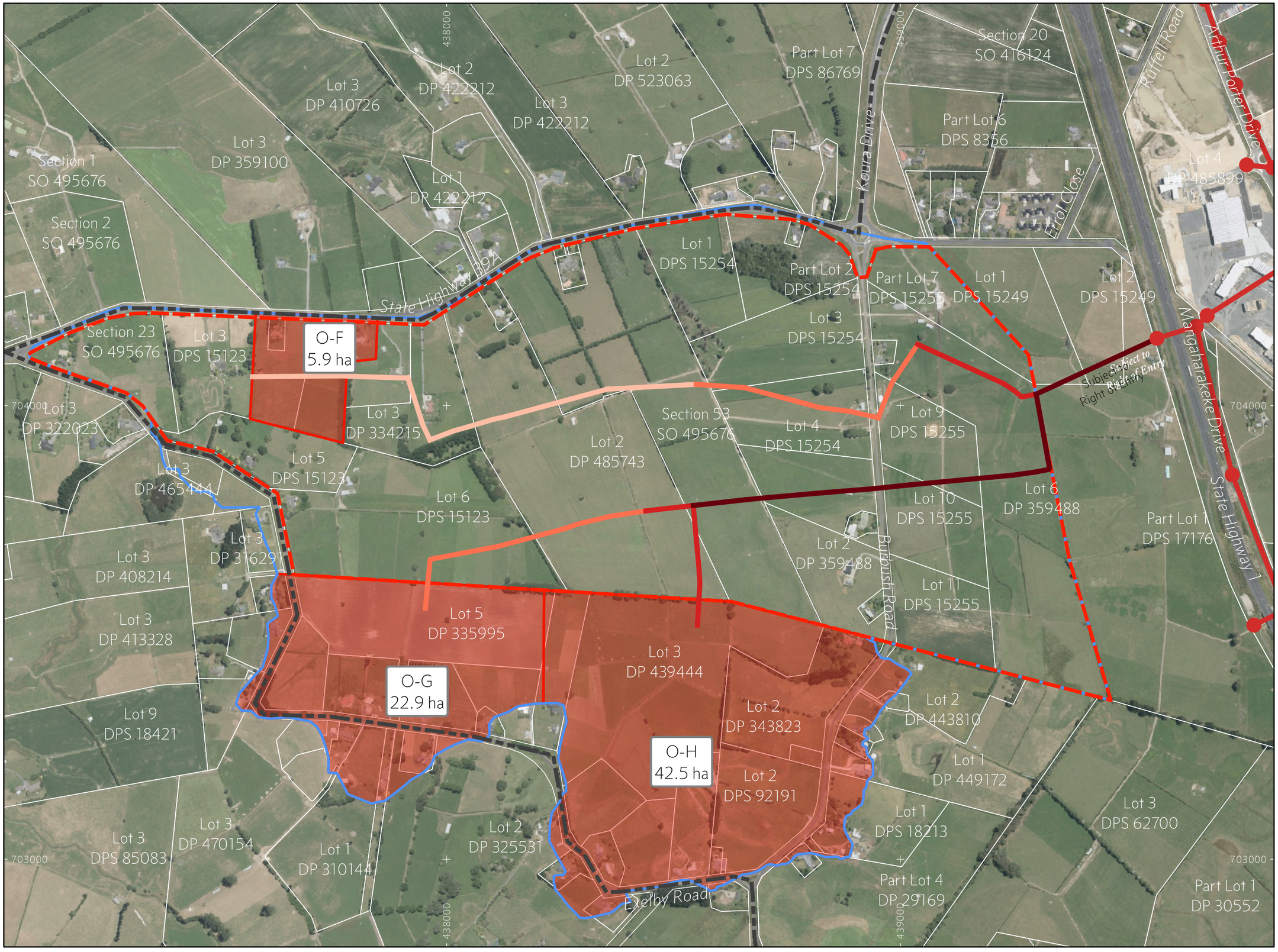
All dimensions to be checked; Do not scale from drawing.

Project:
Rotokauri North
Private Plan Change (PPC)
Green Seed Consultants Limited

Title:
Gravity Wastewater Network
Concept Design of Ultimate Network
With Two Pump Stations

McKENZIE&Co CONSULTANTS LTD

Issue Status:	For Information
Project Number:	1693-0
Drawing Number:	571
Revision:	C
A3 Scale:	1:8000



N

Legend

- Rotokauri North PPC Area
- Rotokauri North Catchment
- Upstream Catchments
- WDC/HCC TA Boundary

Indicative Low Pressure System

- <150mm
- 150mm - 200mm
- 200mm - 250mm
- 250mm - 300mm
- >300mm

HCC WW Lines

- WW Lines
- Manhole

Data License:
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Map Projection:
NZGD2000 / Mount Eden 2000 (EPSG: 2105)

Drawn By:	FW	Date: 26/04/2019	Signed:
Checked By:		Date:	Signed:
Approved By:		Date:	Signed:
Plot Date:	26/04/2019		

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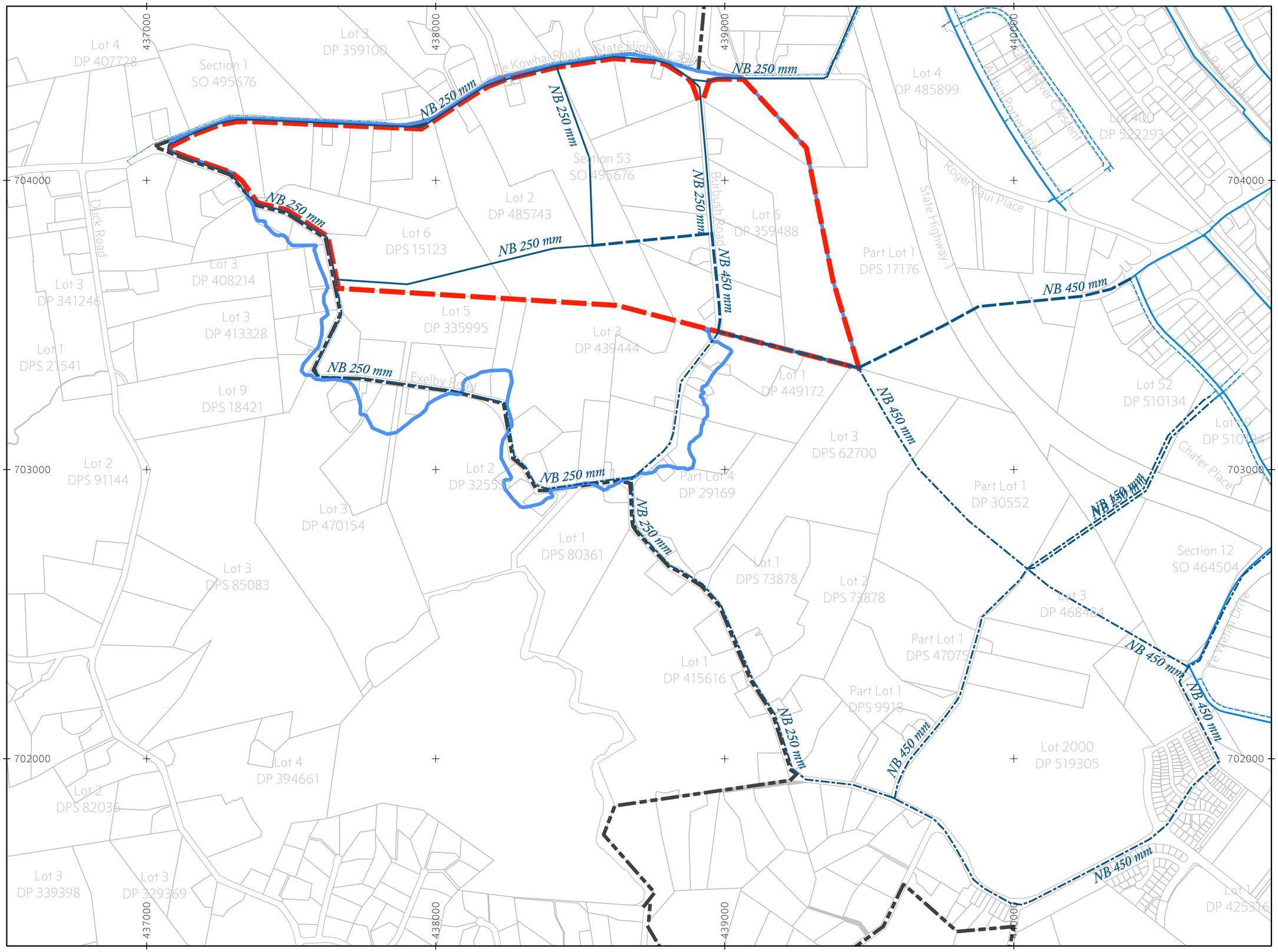
All dimensions to be checked; Do not scale from drawing.

Project:
Rotokauri North
Private Plan Change (PPC)
Green Seed Consultants Limited

Title:
Low Pressure Sewer Network
Concept Design of Trunk Network

McKENZIE&Co CONSULTANTS LTD

Issue Status:	For Information
Project Number:	1693-0
Drawing Number:	572
Revision:	C
A3 Scale:	1:8000



N

Legend

- Rotokauri North PPC Area
- Rotokauri North Catchment
- WDC/HCC TA Boundary

Indicative Water Network

- Future watermains constructed by others
- PPC Area Transmission Line
- PPC Area Trunk Line

HCC Water Network

- NB 100 mm
- NB 150 mm
- NB 225 to 250 mm
- NB 520 to 620 mm

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Map Projection:
NZGD2000 / Mount Eden 2000 (EPSG: 2105)

Drawn By:	AH	Date: 5/04/2019	Signed:
Checked By:		Date:	Signed:
Approved By:		Date:	Signed:
Plot Date:	27/04/2019		

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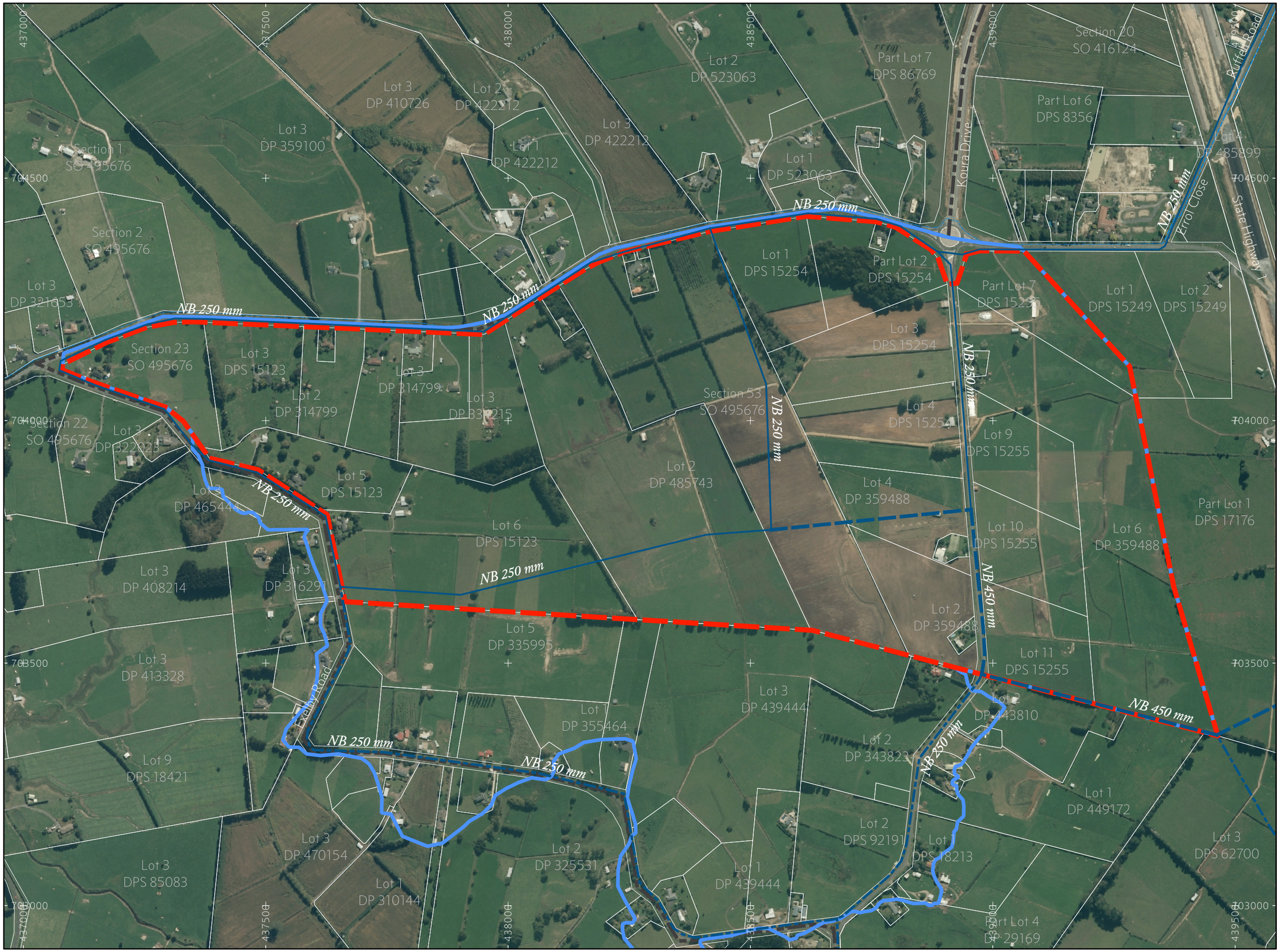
All dimensions to be checked; Do not scale from drawing.

Project:
Rotokauri North
Private Pland Change (PPC)
Green Seed Consultants Limited

Title:
Water Supply Network
ConceptDesign of Ultimate Network

McKENZIE&Co CONSULTANTS LTD

Issue Status:	For Information
Project Number:	1693-0
Drawing Number:	670
Revision:	B
A3 Scale:	1:12500



N

Legend

- Rotokauri North PPC Area
- Rotokauri North Catchment
- WDC/HCC TA Boundary

Indicative Water Network

- Future watermains constructed by others
- PPC Area Transmission Line
- PPC Area Trunk Line

HCC Water Network

- NB 100 mm
- NB 150 mm

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Map Projection:
NZGD2000 / Mount Eden 2000 (EPSG: 2105)

Drawn By:	AH	Date: 5/04/2019	Signed:
Checked By:		Date:	Signed:
Approved By:		Date:	Signed:
Plot Date:	27/04/2019		

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All dimensions to be checked; Do not scale from drawing.

Project:
Rotokauri North
Private Pland Change (PPC)
Green Seed Consultants Limited

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McKENZIE&Co CONSULTANTS LTD

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Green Seed Consultant Limited

Rotokauri North – Private Plan Change Request

Landscape and Visual Effects Assessment

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Rotokauri North – Private Plan Change Request
Landscape and Visual Effects Assessment

1. Introduction

1.1 LA4 Landscape Architects have been requested by Green Seed Consultant Limited ("**GSCL**") to undertake a landscape and visual effects assessment to inform and support the proposed Private Plan Change Request ("**PPC**") for the site at Rotokauri North, Hamilton.

1.2 This assessment investigates the existing character of the PPC area and surrounding environment, identifies the key landscape and visual features of the area and describes the visual and landscape implications of the PPC on the site and surrounding Rotokauri North environs.

1.3 Investigations of the PPC area and surrounding environment were carried out during February 2019.

2. Project Overview

2.1 The Private Plan Change proposes to re-zone approximately 140 hectares of Future Urban ("**FUZ**") zoned land for urban activities. The application has been made to Hamilton City Council ("Council") under the Resource Management Act 1991 ("RMA").

2.2 Specifically, the PPC includes:

- 137.6 hectares is proposed a Medium Density Residential zone ("**MDRZ**");
- 1.2 hectares is proposed as Business 6 zone (Neighbourhood) ("**B6Z**");
- Amending the existing Rotokauri Structure Plan ("**RSP**") map to specifically exclude the Rotokauri North area;
- Insert a new Rotokauri North Structure Plan ("**RNSP**") and associated rules;
- A planted landscape buffer along Te Kowhai Road; and
- Retention of the existing Significant Natural Area ("**SNA**") overlay located within the site (approximately 1.2 hectares).

2.3 The PPC has been prepared following best-practice urban design principles and has included a master plan-based design process. The master plan has demonstrated that the land can be subdivided in a way that will support a high-quality neighbourhood, and also remain compatible with the Council's Rotokauri Structure Plan.

2.4 The PPC would provide for approximately 1,700 – 2,000 houses on sites typically ranging between 150m^2 up to 400m^2. The PPC provides for a neighbourhood centre (B6Z) to help meet daily convenience needs and respect the wider centres hierarchy and support existing centres. Provision has also been made for a green network and a number of recreation reserves.

2.5 The development will contain a number of new local roads and collector roads linking internal areas with Te Kowhai Road, Exelby Road and yet to be constructed roads to the south as part of the wider Rotokauri North Structure Plan area.

3. The Subject Site and Surrounding Environment

Site Context

3.1 The site is located at the north-western edge of Hamilton City. Te Kowhai Road (State Highway 39 ("**SH39**"), immediately north of the site, demarcates the boundary with Waikato District. The site is bounded by Te Kowhai Road to the north, grazed pastureland to the east (and beyond to the Waikato Expressway), farmland to the south and Exelby Road to the west. Burbush Road runs in a north-south direction in the eastern part of the site.

3.2 The site is located centrally within the Hamilton Basin, characterised by low rolling hills and plains with low terraces and gullies draining into the Waikato and Waipa Rivers.

3.3 Refer to:

Figure 1 – The Site and Viewpoint Location Map
Figure 2 – Structure Plan 01
Figure 3 – Structure Plan 02
Figure 4 – Site Landscape Character Photographs
Figure 5 – Site Landscape Character Photographs

Landform and Catchment

3.4 The site lies in an area that consists of flat-lying plains and rolling hill terrain. The hill terrain is located at the western and eastern edges of the site, rising up to 18m above the plains. The plains are typically at 30m ASL with the hills to the east rising to between 43m ASL and 46m ASL along the southern boundary. The hills to the west rise to a height of approximately 40m ASL along Exelby Road. The hill areas merge to the south of the site, rising to approximately 55m ASL, forming a south to north draining basin in which the majority of the site lies.

3.5 The plains make up the majority of the west and central portion of the site. The plains are flat and low-lying with typically less than 1m of elevation across much of the site. Numerous open drains dissect the plains, generally between 0.5m to 2m in depth and width.

Land Use

3.6 The majority of the land is in grazed pasture with cattle with a dairy farm and associated buildings in the north east of the site. Gravel and dirt drives and tracks traverse the site providing vehicular access. A number of rural-residential lifestyle dwellings are located on the site (approximately 17) along with hay barns, accessory sheds, garages and buildings.

3.7 Access to the various landholdings is from SH39, Burbush Road and Exelby Road.

Streams and Watercourses

3.8 An existing stream, being a tributary of the Ohute catchment, runs east-west through the western part of the site, and passes under Exelby Road via a small culvert. A second stream, being a tributary of Te Otamanui catchment, runs north across SH39.

Vegetation

3.9 Vegetation on the site is mainly grazed pasture grasses and exotic tree species used for hedging and shelter belts. Some native trees are present on the site but are generally located in amenity gardens surrounding dwellings.

3.10 There is an existing significant stand of kahikatea in the north eastern corner of the site, which is identified by the HCDP as a SNA. The SNA, known as Burbush Road Forest or Perkins Bush is a small patch of kahikatea. Kessels (2016) records it as: "The canopy is dominated by kahikatea with emergent rewarewa, with an understorey of tawa, mahoe, white maire, pohuehue and titoki. In 2011 the area was mostly fenced from stock. Weed species include woolly nightshade, Chinese privet, Tradescantia and pasture grasses are prevalent in the ground tier".

3.11 Vegetation patterning also comprises exotic hedgerow and shelterbelt plantings along the paddock fence lines, road boundaries and the modified watercourses. A mixture of native and exotic ornamental plants have been planted around the farm dwellings.

Soils

3.12 Landcare Research identifies the soils within the site to be a mix of Land Use Capabilities (ranging from 1 in the flats adjacent to Te Kowhai Road to 4 towards the southern extent of the catchment). They also identify the site as having well drained soils (along the ridges) and very poorly drained soils within the main basin. The soil moisture regime ranges from moderate (along the ridges) to very high in the main basin.

The Wider Landscape Context

3.13 The Rotokauri growth cell is described in the Hamilton City District Plan ("**HCDP**") as "an area of approximately 1000 hectares on the north west fringe of Hamilton. It was brought into the city during the 1980's to provide for long-term development and city growth. The majority of the area is zoned for future urban development within the District Plan. The vision is for "the sustainable expansion of the City into Rotokauri, through a coherent, integrated and people focused mixed use development based on best practice urban design principles."

3.14 The Rotokauri North area lies in the north west corner of the HCC boundaries. Land on the northern side of SH39 and west of Exelby Road fall under the Waikato District Council ("**WDC**") jurisdiction and are zoned under both the operative and proposed Waikato District Plans ("**WDP**") as 'Rural' and utilised for a mix of rural lifestyle and farming activities.

3.15 Land within the HCC boundary to the south and east is zoned FUZ and is also currently used for a mix of rural lifestyle and small scale farming activities. Further to the east is the Waikato Expressway beyond which is the developing Industrial area Te Rapa Park (rezoned as part of Rotokauri Stage 1). Further to the east is the extensive Te Awa and Base Shopping Complex.

3.16 Lake Rotokauri is located approximately 1 kilometre south of the site. Lake Rotokauri is a peat lake and is part of the Waipa peat lake complex. The catchment area surrounding the lake is a mixture of three main land uses including residential, industrial and pastoral.

3.17 The wider surrounding area is dominated by horticultural and agricultural land uses. There is a general patterning of smaller scale lifestyle type lots scattered along the roads surrounding the area. Further away from the site to the south, west and north, lot sizes tend to increase in size.

3.18 Rural and rural lifestyle land use surrounding the site has an influence on the existing character and visual amenity of the area. Pastoral grazing and horticultural activities are the predominant land uses and impart the wider landscape with a largely open spatial character. A degree of compartmentalisation is provided by exotic shelter planting on property and paddock boundaries, which enclose views to the broader landscape from some locations.

The Western Hills Landscape

3.19 In 2007, Boffa Miskell prepared the 'Rotokauri Structure Plan – Western Hills Landscape Study' that investigated the landscape significance of the rolling topography that characterises the western part of the Rotokauri Growth node. Subsequently, the RSP includes a series of low ridgelines that have been identified as the Rotokauri Ridgeline Character Area ("**RRCA**").

3.20 These have been identified as locally significant landscape features in the Western Hills of Rotokauri and are regarded as warranting special landscape management and planning provisions to retain the legibility of the ridgelines and achieve a form and density of development that enables a sense of the underlying landform to be retained.

3.21 The northern RRCA comprises a primary ridgeline that runs from north to south and follows the alignment of Exelby Road and secondary ridgelines aligned in a generally northeast-southwest direction following Burbush Road. The RRCA is outlined as being made up of a number of key visual and physical characteristics, including the pattern that creates a backdrop to the western edge of the City.

3.22 The hills are low landforms rising to a maximum height of approximately 55m ASL above the surrounding low lying basins and terrace flats that are predominantly located at approximately 30m ASL – representing an elevation of 25m.

4. Evaluation of the Proposal

4.1 The key to assessing the landscape and visual effects of the PPC is first to establish the existing characteristics and values of the landscape and then to assess the effects of the proposal on them. In accordance with the Resource Management Act (1991) this includes an assessment of the cumulative effects of the development enabled by the PPC combined with existing developments.

Natural Character Effects

4.2 Natural character relates to the degree of 'naturalness' of a landscape. It is primarily determined by the nature and extent of modification to a landscape and can be expressed in relation to natural processes, patterns and elements in the landscape. The highest levels of natural character are where there is the least modification. Natural character effects relate to the degree to which a proposal alters the biophysical and / or perceived naturalness of a landscape.

Natural Character Effects Analysis

4.3 While the SNA retains a moderate level of natural character the site itself is not high in natural character values and has been highly modified through past pastoral activities. The area has previously undergone extensive agricultural activities and is modified by vegetation clearance, artificial farm drains, farm buildings and dwellings. The site is a component of the wider modified rural environment and located within an area zoned for future urban intensification.

4.4 The SNA is to be retained and protected. Several reserves are proposed and connected through a green-network based on the enhanced stream network and stormwater management area which will enhance the natural character values of the site. Overall, the adverse effects of the proposal on the natural character values of the site and surrounding area would be low.

Landscape Effects

4.5 Landscape character results from a combination of physical elements together with aesthetic and perceptual aspects that combine to make an area distinct. Landscape

effects take into consideration physical effects to the land resource. Assessments of landscape effects therefore investigate the likely nature and scale of change to landscape elements and characteristics. Landscape effects are primarily dependent on the landscape sensitivity of a site and its surrounds to accommodate change and development.

4.6 Landscape sensitivity is influenced by landscape quality and vulnerability, or the extent to which landscape character, elements/features and values are at risk to change. Sensitivity can be determined by the degree of naturalness, land use homogeneity, landform and screening elements.

Landscape Effects Analysis

4.7 Development enabled by the PPC will inevitably transform the local rural character to that of mixed urban which will also have an influence on the surrounding area. It is important to note however that this type of development has been advanced by a number of planning strategies and the HDP identifies the site within the Rotokauri North Structure Plan as an area to accommodate future urban growth requirements in the area.

4.8 It is also important to note that although the site and local area currently exhibit rural characteristics, neither display a high degree of 'ruralness' due to a combination of the size of landholdings, the patterns of rural-residential settlement, existing infrastructure, the surrounding roading network, proximity to the Waikato Expressway and the Te Rapa industrial area.

4.9 Based on the preceding description and analysis of the site and surrounds it is clear that there are relatively low landscape values and sensitivity associated with the area. The PPC site is a relatively degraded, modified rural environment lacking any significant landscape features, has low natural character values (primarily focussed around the SNA), and generally relatively low visual amenity. Therefore the only negative outcomes in landscape terms will be the loss of the remaining rural character, which is anticipated by the relevant planning strategies for the area.

4.10 The key methods of mitigating for this loss are to retain and enhance where possible existing landscape features and create a quality urban development. Although the proposal will result in the loss of rural character there are number of positive landscape outcomes associated with the development.

4.11 The establishment and enhancement of the green network, including the provision for associated open space with extensive planting, will have beneficial landscape effects including the enhancement of amenity and habitat values, and the establishment of ecological linkages.

4.12 An indicative masterplan has been designed in accordance with best practice and established urban design principles, which will ensure a high level of green open space and be comprehensively planted to enhance its overall amenity and assist in its integration with the surrounding rural area over time. These are addressed in more detail in the Urban Design assessment prepared by Ian Munro. The PPC development will result in a change in landscape character, but will ensure a suitable level of amenity, albeit an urban, rather than a rural character is achieved.

Visual Effects

4.13 The assessment of visual effects analyses the perceptual (visual) response that any of the identified changes to the landscape may evoke, including effects relating to views and visual amenity. Visual sensitivity is influenced by a number of factors including the visibility of a proposal, the nature and extent of the viewing audience, the visual qualities

of the proposal, and the ability to integrate any changes within the landscape setting, where applicable.

4.14 The nature and extent of visual effects are determined by a systematic analysis of the visual intrusion and qualitative change that a proposal may bring, specifically in relation to aesthetic considerations and visual character and amenity.

4.15 The methodology used in this assessment is designed to assess whether or not future development enabled by the PPC would have more than minor adverse visual effects on the nature and quality of the surrounding environment.

The process of analysing such effects involves:

- *Identification of the physical area or catchment from which development enabled by the PPC would be visible;*
- *Identification of the different viewing audiences that would be affected by future development enabled by the PPC; and*
- *Evaluation of the visual amenity effects taking into account the preceding analysis.*

Visual Catchment and Viewing Audience

4.16 The visual catchment is the area from which noticeable visual effects of future development of the site are likely to be evident to any significant degree. Te Kowhai Road, Exelby Road and Burbush Road extending along the periphery of and through the PPC area result in a number of open views into the site, however existing vegetation patterns and landform variations currently provide a level of screening from many of the surrounding areas.

4.17 The relative openness of the site, means that it has a relatively high level of exposure, although the existing vegetation patterns and landform within the surrounding area combine to limit the extent of visibility beyond the immediate area. Consequently, Te Kowhai Road, Exelby Road and Burbush Road and the properties accessed off these roads in the vicinity define the main visual catchment.

4.18 Views from the land holdings to the west and south will be largely screened by the existing hill terrain spurs extending along Exelby and Burbush Roads. Views will be gained from the landholdings on the northern side of SH39. Elevated views will be gained from the adjacent landholdings immediately to the south of the site (albeit that these are similarly zoned for urban development).

4.19 Views towards parts of the site will be gained from the southern end of Errol Close and parts of the Brylyn Rest Home. Views will be gained from the Koura Drive on-ramp to the Waikato Expressway and from parts of the Te Rapa industrial area on the eastern side of the Expressway.

4.20 The viewing audience will therefore comprise the following main groups:

- Road users on parts of the surrounding road network including SH39, Burbush Road, Exelby Road and Errol Close;
- Residents within the properties on the northern side of SH39;
- Residents within the properties on the western and southern side of Exelby Road;
- Residents within the adjoining properties to the south;
- Residents within the properties on the south eastern side of Burbush Road;
- Residents and visitors to the Brylyn Rest Home; and
- Road users on the more distant roads including the Koura Drive on-ramp to the Waikato Expressway and the expressway itself in the vicinity of the site.

Visual Amenity Effects Analysis

4.21 The visual effects of the PPC have been assessed from viewpoints within the visual catchment area that have potential for visual effects. Nine viewpoints have been identified in order to assess the potential visual effects. The viewpoints were selected as locations that capture and fairly represent the range of public and private views towards the PPC site.

4.22 The assessment has been undertaken by reference the following viewpoints:

Viewpoint 1: SH39 / Exelby Road
Viewpoint 2: 350 Exelby Road
Viewpoint 3: 212 Exelby Road
Viewpoint 4: 56 Burbush Road
Viewpoint 5: 38 Burbush Road
Viewpoint 6: Te Kowhai Road
Viewpoint 7: 304 SH39
Viewpoint 8: Errol Close / Te Kowhai Road

Refer to: Figure 1: The Site and Viewpoint Location Map
VP01-VP09: Viewpoint Photographs

4.23 Photographs have been taken with a 35mm SLR camera with a fixed 50mm lens from the viewpoints and a detailed assessment and analysis of potential effects have been carried out using a Visual Effects Matrix, which ensures that each view and changes within each view are evaluated thoroughly and consistently.

4.24 The key factors contained in that matrix are given in detail in Appendix A. It covers aspects such as the sensitivity of the view to change, the size of the viewing audience that would be affected, the legibility of the proposal, how well the proposal integrates with its surroundings and whether or not the proposal intrudes into any existing views.

4.25 The total score given in the descriptions denote the overall visual effects rating. The following seven-point scale has been used to rate effects, based on the guidelines contained within the NZILA 'Best Practice Guide – Landscape Assessment and Sustainable Management 2010' and Auckland Council's 'Information Requirements for Landscape and Visual Effects Assessments 2017':

Negligible | **Very Low** | **Low** | **Moderate** | **High** | **Very High | Extreme**

Negligible Effect
The proposed development is barely discernible or there are no changes to the existing character, features or landscape quality.

Very Low Effect
The proposed development is barely discernible with little change to the existing character, features or landscape quality

Low Effect
A slight loss to the existing character, features or landscape quality

Moderate Effect
Partial change to the existing character or distinctive features of a landscape and a small reduction in the perceived amenity.

High Effect

Noticeable change to the existing character or distinctive features of the landscape or reduction in the perceived amenity or the addition of new but uncharacteristic features and elements.

Very High Effect
Major change to the existing character, distinctive features or quality of the landscape or a significant reduction in the perceived amenity of the outlook. The proposal causes adverse effects that cannot be avoided, remedied or mitigated.

Extreme Effect
Total loss of the existing character, distinctive features or quality of the landscape resulting in a complete change to the landscape or outlook. The proposal significantly affects and entirely changes the character of the surrounding area. The proposal causes extreme adverse effects that cannot be avoided, remedied or mitigated.

4.26 With respect to comparable planning or RMA terminology, effects:

"High" to "Extreme" world be considered "more than minor";
"Low to moderate" would be "minor"; and
"Very Low" or "Negligible" would be "less than minor".

4.27 The proposal raises a number of visual issues, including the potential effects on visual amenity to the following key areas:

- Adjoining land holdings
- Surrounding road network
- Wider area

4.28 The assessment has been undertaken in terms of the following criteria:

i) Sensitivity of the view – the relative quality of the view, values attached to a view, and their vulnerability to change.

ii) Viewpoint / perceptual factors – the type and size of population exposed to views, including the viewing distance, focus and level of exposure, and context from which they experience the view.

iii) Context – the degree to which the proposed development would fit into the existing surrounding environs.

iv) Magnitude of change – including consideration relating to prominence and legibility, size/scale, visual intrusion/contrast, the impact upon key landscape elements and patterns, geographical extent and duration.

v) Mitigation potential – the extent to which any potential adverse effects of the development could be mitigated through integration into its surrounds by specific measures.

Adjoining Properties

4.29 The adjoining properties to the site will be most affected by future development enabled by the PPC. This includes the residential properties to the rural and rural-residential properties to the south, west, east and north of the site. **Viewpoints 1, 2, 3, 6 and 7** are indicative of potential views from these areas.

4.30 Views towards the site from a number of these however will be moderated, filtered or screened in entirety by the landform and existing vegetation patterns within the

surrounding properties, particularly in relation to a number of established shelterbelt plantings.

4.31 For the immediately adjoining properties to the east, west, south and north the existing outlook will change significantly from an open rural pastoral scene into a comprehensive urban residential view. Although this will constitute a significant change to the existing rural character and a loss of the existing spaciousness, it is not the type of change which is totally unexpected within the planning context of the area, as the land is signalled to undergo this change by its current FUZ zoning and inclusion in the RSP. Furthermore, the adjoining southern and eastern landholdings are also subject to the same FUZ zone and will undergo the same or a similar change after re-zoning in the future.

4.32 Once the site is developed, the existing views will be replaced with a mixture of urban development with extensively vegetated streetscapes, open spaces and the green network. Development enabled by the PPC will not be entirely out of context and gradual in nature due to the zoning of the site and surrounding area. The green network, riparian plantings in conjunction with the open space areas, and street tree plantings will maintain a sense of spaciousness and assist in visually integrating the future development into the surrounding landscape.

4.33 From the surrounding areas the full effects of the change brought about by the PPC will be gradual as the land is retired from productive use, modified and staged built development extends across the landform. It is anticipated that the full progression from rural to urban will take a number of years. This will reduce the impact of the change to some degree, due to the incremental nature of the change and a general conditioning of the audience over time as development progresses.

4.34 The green network extending up the stream corridors, planted streets and the planted conveyance channels in the streets will assist in breaking the development into more discrete units and filter views so that although the view will have changed from a rural to essentially an urban one, the full extent of the development will not be apparent. The extensive green network will assist in breaking up the expansiveness of the development, however the proposal will entirely change the visual amenity currently experienced for the surrounding properties.

4.35 The planted landscape buffer proposed in the RNSP adjoining SH39 will assist in mitigating the visual effects from the rural environment to the north and establish a visual transition between the two zones.

4.36 The visual effects resulting from this change for the adjoining and adjacent rural and rural-residential properties would be moderate to high however the quality nature of the future urban development will ensure that a suitable level of urban amenity is achieved.

Surrounding Road Network

4.37 For road users on the surrounding road network, in particular those who live locally in rural situations, the development of the PPC site is likely to result in visual effects of some significance, particularly for SH39 and Burbush Road users in the vicinity of the site. **Viewpoints 1, 4, 5, 6, 7, 8** and **9** are indicative of the potential views from the surrounding roads. For general road users the effects are likely to be of much less significance as the development will be seen as part of a pattern of land use changes expected to occur under the RSP.

4.38 Although a large audience, the road users are unlikely to be particularly sensitive to future development, as they will have fleeting views of parts of the site whilst moving through a landscape. The sensitivity and the effects of the PPC will be reduced further by the fact that the development will be gradual and staged over a number of years. The extensive street tree plantings and green corridor will assist in integrating the built

development and infrastructure into the landscape and provide a vegetated framework of appropriate form and scale.

4.39 The planted landscape buffer proposed in the RNSP adjoining SH39 will assist in mitigating the visual effects from the highway and establish a visual transition between the anticipated residential zone and adjoining rural environment north of the RNSP area.

Wider Area

4.40 Views will be gained towards parts of the PPC area from land holdings within the wider area. Views from the land holdings further to the west will be largely screened by the ridge extending along Exelby Road. Similarly views from the south will be screened by the ridge extending along Exelby Road to the south of the site and views to the east screened by the spur extending along Burbush Road. Views will not be gained from Lake Rotokauri and the Rotokauri residential lifestyle area to the south. Views will not be gained from the Te Kowhai settlement to the north west of the site.

4.41 Views towards parts of the PPC site will be gained from peripheral areas within the Te Rapa Park industrial areas, albeit across the foreground of the Waikato Expressway. In addition, the industrial audience will be less sensitive to visual change enabled by the PPC.

4.42 Overall the visual effects from the wider area will be low to negligible.

Construction Effects

4.43 Earthworks will be necessary to facilitate the anticipated developments within the PPC area, including the preparation of building platforms, formation of roads, and construction of infrastructure and services for the anticipated developments.

4.44 Due to the nature and scale of the development, and the level of disturbance it will bring to the existing landscape, the visual effects will generally be high during and immediately following construction.

4.45 These visual effects will reduce on completion with the establishment of the green network, landscape buffer along SH39, open space and street tree plantings assisting in integrating the residential development into the surrounding landscape.

5. Relevant Planning Documents

5.1 The statutory context is covered fully in the application. The principles for the structure plan areas contained with the Hamilton City Operative District Plan ("**ODP**") identify a number of requirements to manage existing features within the proposed plan change area.

Hamilton City Operative District Plan

5.2 The objectives and policies relevant to landscape and amenity are:

Objective 3.3.6
Development responds to land suitability including topography, landscape, natural features, soil type, natural hazards, heritage features, adjoining land uses.

Policy 3.3.6a
The loss of significant vegetation is minimised.

Policy 3.3.6b
Large-scale earthworks and modifications to landforms are avoided where possible

to ensure development retains features of the landscape identified on structure plans.

Policy 3.3.6c
Road layouts adjacent to identified natural features recognise and retain their natural form where practicable.

Policy 3.3.6d
The scale and quantum of development and land use type recognises land characteristics and suitability and adjoining land uses.

Comment:

5.3 Development within the RNSP area will achieve a medium density residential environment which has high levels of amenity and allows for a range of housing densities and typologies. Potential adverse effects of urban activities on the environment will be avoided, remedied or mitigated through the proposed provisions for land within the RNSP area and the existing HCDP rules.

5.4 No significant vegetation is to be removed and the existing SNA is to be protected and enhanced. The subdivision layout has responded to the land suitability including the topography and landscape features. The PPC is an efficient use of the natural and physical resource in that it will utilise land already earmarked for urban development under the HCDP.

5.5 While the east-west transport corridor indicated to the south of the proposed business zone will dissect the underlying topography perpendicular to the underlying topography, attempts will be made at the detailed design stage to minimise earthworks and integrate the road sensitively into the landscape.

Objective 3.3.7
A range of well-connected, functional public open spaces.

Policy 3.3.7a
The location and size of public open spaces is provided in accordance with Council's Open Space Plan.

Policy 3.3.7b
Recreational activities are considered for co-location with:

i. Multi-functional stormwater management
ii. Walkways and cycleways
iii. Cultural and heritage sites
iv. Significant Natural Areas

Comment:

5.6 The PPC incorporates a number of over arching design principles including a well-connected and walkable block and street network that recognises the road hierarchy and the needs of strategic through movement.

5.7 The masterplan incorporates a number of well-connected, functional public open spaces. Public access provided for along the streams through pedestrian and cycle paths and open space linkages that will create recreational opportunities.

5.8 The PPC also integrates public open spaces and storm water facilities into the neighbourhood to contribute to its character. The plan also anticipates at least one district-scale recreational open space of several hectares but provides for two such

large spaces. These are connected to the key road network to maximise legibility and accessibility. Not indicated but understood to be expected at the time of development, are small-scale neighbourhood reserves and parks.

5.9 Shared cycle-pedestrian routes are indicated as occurring along the roads and the green corridors. Local recreation reserves have been identified in two locations so as to maximise the proportion of residents that will be within a 5-minute walk of a reserve. These have also been planned to integrate logically into the wider 'green network' of open spaces in the site. It is however noted that the final location of reserves will be determined at the subdivision stage.

5.10 The stormwater facilities will be dominant elements across the site and it is intended that other open spaces, roads and road-based swales will directly connect to these. This will be a key contributor to new neighbourhood character. The existing SNA is to be protected and enhanced.

5.11 Overall, the PPC will result in well-integrated public open spaces and stormwater facilities.

Rotokauri Structure Plan (Operative)

5.12 In terms of the Rotokauri Structure Plan (Operative) the objectives and policies relevant to landscape and amenity are:

Objective 3.6.1.1
Preservation of key natural features and topography that are characteristic of Rotokauri.

Policy 3.6.1.1a
Development shall maintain the natural ridgelines.

Policy 3.6.1.1b
The central green corridor shall function as the principal stormwater drainage channel and a recreational and transportation corridor connecting the wider network of open spaces and natural features.

3.6.2 Structure Plan Components – 3.6.2.2 Residential
ii. The Ridgeline Character Area, which seeks to retain legibility of these locally important landforms in a suburban context.

Comment:

5.13 The northern RRCA comprises a primary ridgeline that runs from north to south and follows the alignment of Exelby Road and secondary ridgelines aligned in a generally northeast-southwest direction following Burbush Road. The RRCA is outlined as being made up of a number of key visual and physical characteristics, including the pattern that creates a backdrop to the western edge of the City.

5.14 The hills are low landforms rising to a maximum height of approximately 55m ASL above the surrounding low lying basins and terrace flats that are predominantly located at approximately 30m ASL – representing an elevation of 25m.

5.15 I do not consider that the Western Hills represent a significant landscape feature within the local landscape or citywide context. The hills rise to a maximum height of approximately 55m ASL above the surrounding flats at approximately 30m ASL – representing an elevation of 25m. This height and characteristic of the landscape feature cannot be considered significant by any degree. Given the low elevation of the

hills, typical residential development on the lower slopes and terrace flats is likely to obstruct views to the underlying landform in any case.

5.16 The Western Hills are not a prominent landscape feature from the surrounding area and are viewed as an integral component of the gently rolling western landscape. They are not significant enough to command attention from a distance and are not the natural focus of view.

5.17 The primary western ridgeline extending along Exelby Road forms an important buffer (and territorial boundary to Waikato District) between the urban area to the east and the rural land to the west, extending down towards Lake Rotokauri. This ridgeline will be unaffected by development enabled by the PPC. Similarly, the more significant southern ridgeline along Exelby Road will be unaffected by the PPC/

5.18 **Viewpoint 8** is the view looking in a south westerly direction towards the secondary ridge extending along Burbush Road from the intersection of Te Kowhai Road / Errol Close. This is one of the few locations from the surrounding roads where clear views are gained towards the ridgeline. The ridgeline is not visually distinctive, is not the focus of view and does not command the viewer's attention. The viewer's eye is drawn to the vegetation on the skyline. The Burbush Road ridge extends to a height of 43m ASL, 13m above the lower flats. I do not consider that this is a significant difference in height to warrant protection. In addition, the land in the foreground is within the RSP area zoned for employment and once developed will entirely screen views towards the ridge.

5.19 **Viewpoint 9** is the view looking in a south westerly direction towards the secondary ridge from the Te Kouma Drive expressway on-ramp. While the ridgeline is in the focus of the view it is not legible as a significant landscape feature due to its low elevation and the diversity of elements within the view including vegetation, dwellings and the built infrastructure of the expressway. Similarly, from this viewing angle, development enabled by the structure plan process will entirely transform the foreground view in the foreseeable future.

5.20 The visual integrity of the hills is resultant from the current pastoral slopes contrasting with the surrounding low-lying basins and terrace flats. This contrast will inevitably be lost with the future urbanisation of the land as part of the RSP process.

5.21 In landscape terms the hills value is greatest as the eastern backdrop to the Waikato rural landscape to the west and in particular the Lake Rotokauri environs to the south. From these directions, Exelby Road extends along the primary ridgeline with resulting future development on the slopes to the east of the road which will retain the visual and physical integrity of the ridgeline from the west.

5.22 The imposition of the RRCA to cover the primary and secondary ridgelines with associated planning provisions to provide for lower suburban density based around a minimum lot size of 600m2 with an average of 800m2 will not in my opinion reinforce the key qualities and characteristics of the underlying landscape to any greater degree than higher density development.

5.23 I concur with the Boffa Miskell report that a distinctive and locally derived urban character is influenced by the qualities and characteristics of the underlying landscape character and the elements and attributes of the form. I do not consider however that the Western Hills comprise major landscape elements and features capable of defining a unique sense of place for Rotokauri North. The modest changes in topography, while locally pleasant, are not distinctive landscape features.

5.24 I concur that ridgeline protection is an important mechanism to ensure the visual landscape qualities and integrity of significant ridgelines are protected and maintained

in accordance with their particular context. The Western Hills do not constitute a significant landscape element or feature capable of defining a unique sense of place or identity to the RSP area. While they provide a pleasant variation in landform they cannot be considered worthy of protection afforded by the RCCA provisions.

5.25 I consider that if the Western Hills had been valued and considered distinct and significant enough in landscape and visual terms, in the context of the surrounding landscape to warrant protection, then this would have occurred as part of the RSP process, precluding any form of built development on them.

5.26 The pattern of primary and secondary ridges forming the discrete topographic feature in the western part of the northern structure plan area will still be apparent, albeit with a built form of development reinforcing the changes in landform and topography.

5.27 In my opinion, the most effective means to protect the significance of the Western Hills is, as outlined in the Boffa MIskell report, through defining and reinforcing the Exelby and Burbush Road roading pattern that extends along the primary and secondary ridgelines with significant street tree plantings that will preserve the legibility of the ridgeline features in views from outlying areas, provide a backdrop to future dwellings and heighten awareness of the hill landform for future residents.

5.28 I therefore do not consider that the imposition of the RCCA planning provisions would assist in differentiating the primary and secondary ridgelines from the surrounding landscape due to the modest changes in topographical elevation. In my opinion a distinct and locally derived urban character will result more from high quality urban design initiatives responsive to the underlying landform patterns and the establishment of a high quality open space network and linkages throughout the area than restricting development on the ridgelines.

Conclusion

5.29 I consider that future development enabled by the PPC is consistent with the intent of the landscape, visual, natural character and amenity objectives and policies of the relevant statutory documents and when considered in totality is entirely acceptable in landscape and visual terms.

6. Conclusions

6.1 The proposed urbanisation of the PPC area will significantly change its current open rural landscape character. The development will however be consistent with the FUZ zoning of the site, with urban expansion envisaged under the HCDP, RPS and Future Proof Framework.

6.2 Although the subject site is largely in open pasture fragmented by shelterbelts, its rural character is lessened to a degree by the existing land uses, relatively degraded pasture, the proximity to the state highways (SH 39 and the Waikato Expressway), and the developing industrial area to the east within Te Rapa Park.

6.3 While the subject site includes land used for farming and agricultural purposes, it is a significantly modified degraded site with relatively low landscape values (except for the existing protected SNA).

6.4 The proposed urbanisation of the land will inevitably result in the transformation of the site from a rural area to a mixed density urban residential area. This will have implications on the surrounding rural and rural-residential land, with the urban development impacting on the rural qualities of these areas. Nevertheless, this is an area identified for urban expansion in the RSP. Consequently, it is only the timing of

that change from rural to urban which is different from the current timeframes outlined in Chapter 3 of the HCDP.

6.5 Because of the size and nature of the development and the anticipated eventual urbanisation of the area, rather than trying to screen the development or create significant buffers to the adjacent rural areas, the approach has been to accept the change and attempt to develop the site in accordance with accepted urban design principles to create a quality development with a high level of amenity, albeit an urban amenity. Additionally, a planted landscape buffer is proposed on the RNSP adjoining SH39. This is to separate development from the state highway, and to also establish a visual transition between the anticipated residential zone and adjoining rural environment north of the RNSP area.

6.6 The change from the existing rural character of this landscape to one dominated by the built form of a residential area will also introduce a range of beneficial effects, including:

i. Enhancement to watercourses and stream corridors;

ii. Extensive framework of planting including riparian planting, vegetated swales and conveyance channels, specimen trees in streets and open space areas, which will improve the character and amenity as well as enhance habitat values, and break up the contiguous urban expanse increasingly with time and contribute to the wider surrounding area;

iii. Opportunities to eco-source seed stock from the Kahikatea stand within the SNA to increase the biodiversity and extent of this forest remnant; and,

iv. Public access provided for along the streams through pedestrian and cycle paths and open space linkages that will create recreational opportunities.

6.7 While the proposed development will result in a significant visual change from the site's current open and undeveloped state to one with urban characteristics, particularly for some of the immediate neighbours, such visual change is anticipated and is in accordance with the key planning initiatives (including the existing RSP) for the area.

6.8 While development enabled by the PPC will result in a significant visual change from the site's current open and undeveloped state to one with urban characteristics, particularly for some of the adjoining areas, such visual change is anticipated and is in accordance with the key planning initiatives for the area.

6.9 Despite the relatively low landscape values and limited visual catchment area, the development will initially generate landscape and visual effects of some significance. These are inevitable with urban development in a predominantly rural area at the start of a process of urbanisation. In addition, the visual effects of the development of the site apparent from the early stages will decrease over time as proposed vegetation matures.

6.10 In conclusion, the PPC will fulfil the need for a greenfield housing area and provide an opportunity for an innovative and environmentally sustainable urban development in keeping with the vision and principles established within the masterplan. The PPC proposal is consistent with regional growth strategies for the area and will result in a high quality urban development with a range of positive landscape and environmental outcomes.

Rob Pryor
Director | Registered NZILA Landscape Architect
LA4 Landscape Architects
April 2019


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ARCHITECT

APPENDIX A: VISUAL EFFECTS MATRIX

Use of a matrix offers one way in which the various facets of visual change - qualitative change, visual contrast etc. - can be pulled together and evaluated in a way which gives due weight to each. This matrix was designed to measure the scale of no or low visual effects through to high visual effects.

The assessment matrix is broken into two stages. The first involves looking at the existing situation and assessing the visual quality and sensitivity of the present view to change. This is followed by an evaluation of the changes associated with the proposed development. Key issues or variables are addressed within each stage and ratings for these are eventually combined to provide a composite visual effects rating. Set out below is the basic structure, showing what these key variables are and how they are arranged:

PART A - SENSITIVITY OF THE VIEW AND SITE TO CHANGE

A1. Analysis of the view's **Visual Quality** is carried out on the basis that higher quality views are more sensitive to potential disruption and degradation than poorer quality views.

A2. Analysis of the view's **Visual Absorption Capability** is an evaluation of the degree to which a view is predisposed, or otherwise, to change by virtue of its land uses and/or screening elements and will either accommodate change or make it stand out from its setting.

A3. Analysis of **Perceptual Factors.** In this section the type and size of population represented by the viewpoint, the viewing distance to the development site and other factors which indicate its sensitivity in terms of both viewing audience and the inherent exposure of the viewpoint to the site because of its physical character is assessed.

PART B - INTRUSION AND QUALITATIVE CHANGE

B1. Analysis of **Intrusion / Contrast**: the degree to which a proposal's location and specific structural content and appearance make it either blend into its surroundings or be made to stand out from them in terms of form, linearity, mass, colour and physical factors. Whether or not the proposal would intrude into existing views.

B2. Analysis of the proposal's **Aesthetic Characteristics**: exploring the degree to which it would relate aesthetically and in terms of general character to its surroundings.

Ratings are combined for each viewpoint via a system of averaging and multiplying of ratings to progressively indicate each viewpoint's **sensitivity**, followed by levels of **intrusion and qualitative change**, and culminate in an **overall visual effects rating**.

GREEN SEED CONSULTANT LIMITED

ROTOKAURI NORTH PRIVATE PLAN CHANGE

ANNEXURES TO ASSESSMENT OF LANDSCAPE + VISUAL EFFECTS

Prepared by LA4 Landscape Architects

Issued 17.04.2019

Drawing Index :

DRAWING NUMBER	TITLE	REVISION	DATE
FG01	Figure 1: The Site + Viewpoint Location Map	-	27/2/19
FG02	Figure 2: Structure Plan 01	A	17/4/19
FG03	Figure 3: Structure Plan 02	A	17/4/19
FG04	Figure 4: Site Landscape Character Photographs 01	-	27/2/19
FG05	Figure 4: Site Landscape Character Photographs 02	-	27/2/19
VP01	Viewpoint 1: SH39 Exelby Road	-	27/2/19
VP02	Viewpoint 2: 350 Exelby Road	-	27/2/19
VP03	Viewpoint 3: 212 Exelby Road	-	27/2/19
VP04	Viewpoint 4: 56 Burbush Road	-	27/2/19
VP05	Viewpoint 5: 38 Burbush Road	-	27/2/19
VP06	Viewpoint 6: Te Kowhai Road	-	27/2/19
VP07	Viewpoint 7: 304 SH39	-	27/2/19
VP08	Viewpoint 8: EPPOL Vlose / Te Kowhai Road	-	27/2/19
VP09	Viewpoint 9: Waikato Expressway	-	27/2/19



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Drafting	JC
Drafting Checked	RP
Approval	RP

Client: GREEN SEED CONSULTANT LTD

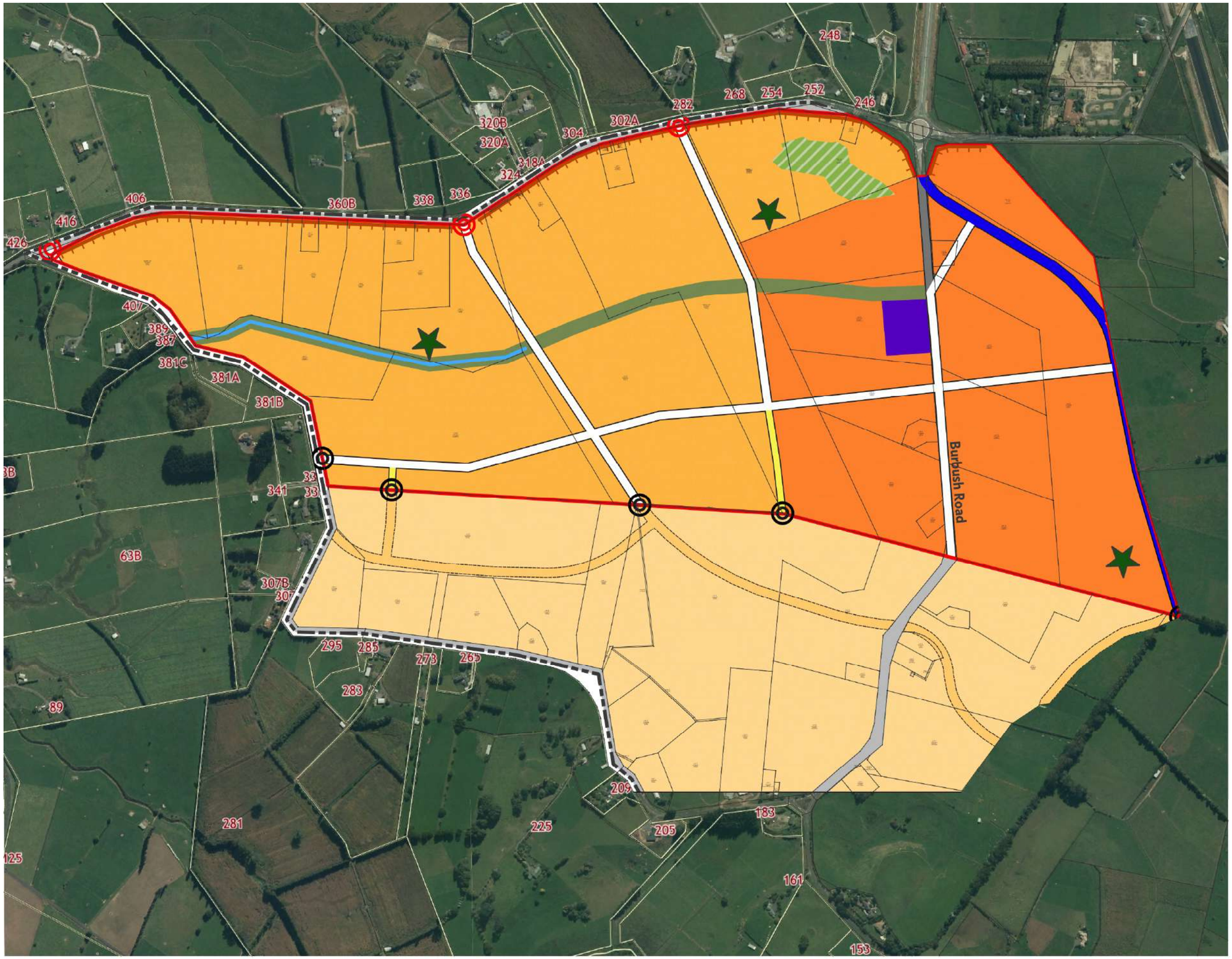
Project: ROTOKAURI NORTH PRIVATE PLAN CHANGE

Title: FIGURE 1: THE SITE + VIEWPOINT LOCATION MAP

Project No. 19753

Drawing No. FG01

Rev. -



Legend

- Rotokauri North PPC Area

Zone Type

- Medium Density Residential Zone
- Business 6 Zone
- Medium Density Overlay Area A

HCC Zones

- Future Urban Zone
- Industrial Zone
- Residential Zone
- Transport Corridor Zone
- Natural Open Space Zone
- Future Transportation Corridor Zone

Road Connections

- State Highway Intersection
- Road Connection

Indicative Roads

- Minor Arterial Road
- Collector Road
- Local Road
- Future Road
- Closing/Stopping
- No Direct Access from State Highway /Landscape Buffer
- Green Spine (could include a road)
- Ohute Stream
- Indicative Neighbourhood Reserve
- WDC/HCC TA Boundary

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Map Projection:
NZGD2000 / Mount Eden 2000 (EPSG: 2105)

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Client: GREEN SEED CONSULTANT LTD

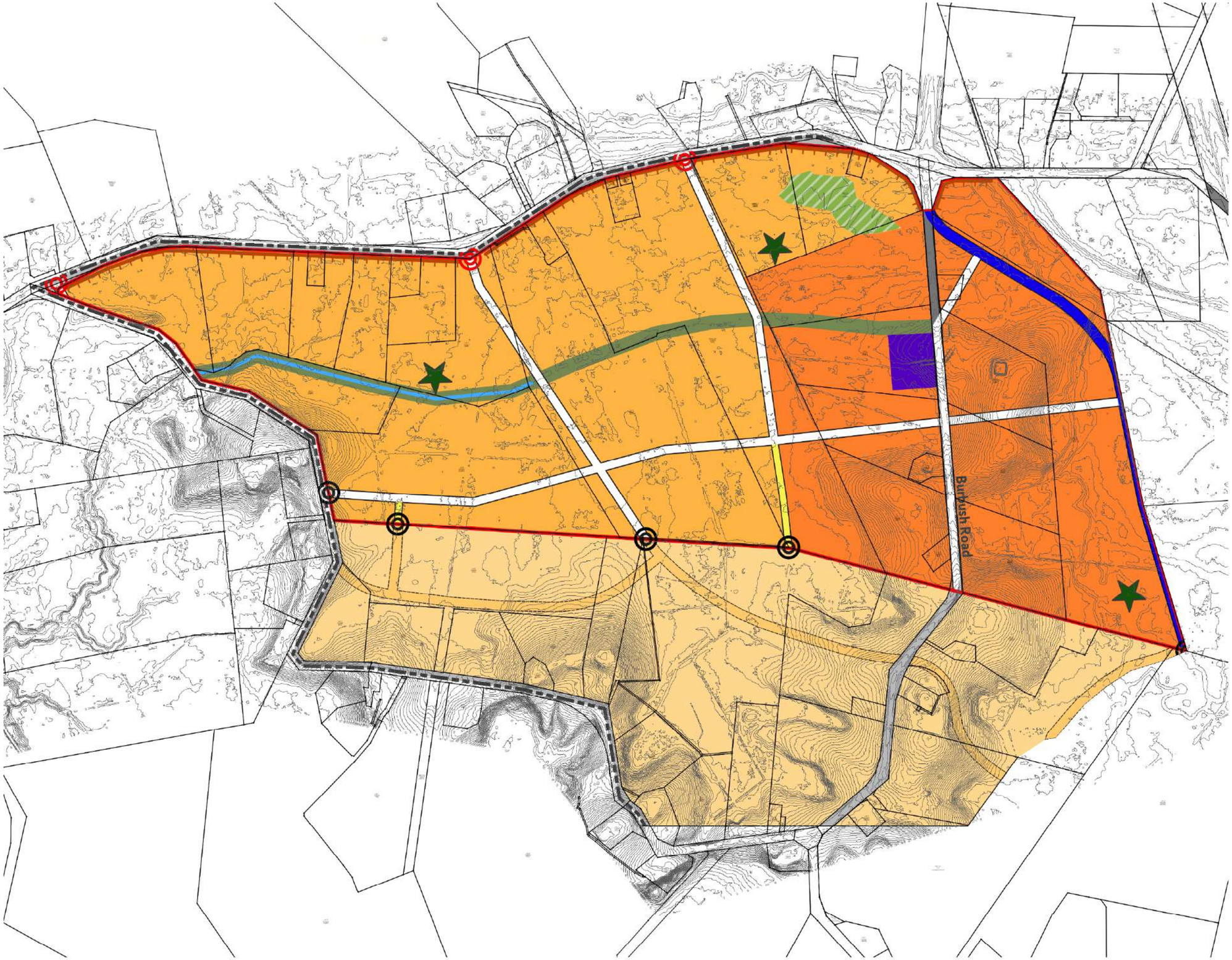
Project: ROTOKAURI NORTH PRIVATE PLAN CHANGE

Title: FIGURE 2: STRUCTURE PLAN 01

Project No. 19753

Drawing No. FG02

Rev. A



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Legend

- Rotokauri North PPC Area

Zone Type
- Medium Density Residential Zone
- Business 6 Zone
- Medium Density Overlay Area A

HCC Zones
- Future Urban Zone
- Industrial Zone
- Residential Zone
- Transport Corridor Zone
- Natural Open Space Zone
- Future Transportation Corridor Zone

Road Connections
- State Highway Intersection
- Road Connection

Indicative Roads
- Minor Arterial Road
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- Local Road
- Future Road Closing/Stopping
- No Direct Access from State Highway /Landscape Buffer
- Green Spine (could include a road)
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Project: ROTOKAURI NORTH PRIVATE PLAN CHANGE

Title: FIGURE 3: STRUCTURE PLAN 02

Project No. 19753

Drawing No. FG03

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Approval	RP

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Project: ROTOKAURI NORTH PRIVATE PLAN CHANGE

Title: FIGURE 4: SITE LANSCAPE CHARACTER PHOTOGRAPHS 01

Project No.: 19753

Drawing No.: FG04

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Approval	RP

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Project: ROTOKAURI NORTH PRIVATE PLAN CHANGE

Title: FIGURE 4: SITE LANSCAPE CHARACTER PHOTOGRAPHS 02

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Project: ROTOKAURI NORTH PRIVATE PLAN CHANGE

Title: VIEWPOINT 1: SH39 EXELBY ROAD

Project No.: 19753

Drawing No.: VP01

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Client: GREEN SEED CONSULTANT LTD

Project: ROTOKAURI NORTH PRIVATE PLAN CHANGE

Title: VIEWPOINT 2: 350 EXELBY ROAD

Project No. 19753

Drawing No. VP02

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CONSULTANT LTD

Project:
ROTOKAURI NORTH
PRIVATE PLAN CHANGE

Title:
VIEWPOINT 3: 212 EXELBY ROAD

Project No.
19753

Drawing No.
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Client: GREEN SEED CONSULTANT LTD

Project: ROTOKAURI NORTH PRIVATE PLAN CHANGE

Title: VIEWPOINT 4: 56 BURBUSH ROAD

Project No. 19753

Drawing No. VP04

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Title: VIEWPOINT 5: 38 BURBUSH ROAD

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Drawing No.: VP05

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Approval	RP

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Project: ROTOKAURI NORTH PRIVATE PLAN CHANGE

Title: VIEWPOINT 6: TE KOWHAI ROAD

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Project: ROTOKAURI NORTH PRIVATE PLAN CHANGE

Title: VIEWPOINT 7: 304 SH39

Project No. 19753

Drawing No. VP07

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Approval	RP

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Project: ROTOKAURI NORTH PRIVATE PLAN CHANGE

Title: VIEWPOINT 8: ERROL CLOSE / TE KOWHAI ROAD

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Drawing No. VP08

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Client: GREEN SEED CONSULTANT LTD

Project: ROTOKAURI NORTH PRIVATE PLAN CHANGE

Title: VIEWPOINT 9: WAIKATO EXPRESSWAY

Project No. 19753

Drawing No. VP09

Rev. -

ATTACHMENT 18 - Cultural Impact Assessment Working Draft for Lodgement [April 2019]

CULTURAL IMPACT ASSESSMENT

ROTOKAURI NORTH
PRIVATE PLAN CHANGE

APRIL 2019

DOCUMENT CONTROL RECORD

PROJECT:	Rotokauri North Private Plan Change
DOCUMENT:	Cultural Impact Assessment
APPLICANT:	Green Seed Consultants Limited
PROJECT LOCATION:	Rotokauri North
AUTHOR:	**Rotokauri North Tangata Whenua Working Group**
STATUS:	**Working Draft** for Private Plan Change Lodgement

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Appendices

Appendix 1 – 2001 Cultural Values Assessment

1.0 INTRODUCTION

This Cultural Impact Assessment (CIA) has been developed from the information and feedback gained during consultation and engagement meetings between Green Seed Consultants Limited (GSCL) and the Tangata Whenua Working Group (TWWG) in relation to the Rotokauri North Private Plan Change (PPC) and subdivision/development in the Rotokauri North area.

The CIA report includes a brief background to the project and CIA scope, the methods undertaken in completing this report, overview of raupatu and relevant legislation, Waikato Tainui mana whenua connections, cultural values and potential impacts of the development. This report provides a list of mitigation recommendations for potential issues and opportunities to consider alongside the subdivision development.

As the Rotokauri North area falls within the existing Rotokauri Structure Plan area, a Cultural Value Assessment (CVA) was previously completed as part of the Rotokauri Plan Change (dated 2001) which established the Future Urban Zone, Stage 1 Rotokauri Zonings and the Rotokauri Structure Plan.

This document represents a more specific opportunity to provide for specifics relating to the Rotokauri North Plan Change area and is expected to be a "living document", which is added to throughout the various phases of the project.

This document has been produced as a collaborate document by the members of the Rotokauri North Tangata Whenua Working Group (TWWG). The TWWG is made up of mandated representatives from each of the Waikato-Tainui hapuu within the vicinity of the project – namely Ngaati Mahanga, Ngaati Hauaa, Ngaati Tamaiunapo, Ngaati Wairere, Ngaati Reko -Waikeri Marae and Te Uri o Mahanga.

2.0 BACKGROUND

The site's location falls within the tribal boundary of Waikato-Tainui, and as such Waikato-Tainui has the Mana Whakahaere (authority) over its lands and resources, including the Waikato River and its associated natural environs. Various section of this report provide further expands on mana whenua and their ancestral relationship to the whenua.

In accordance with the Waikato-Tainui Environmental Plan: Tai Timu, Tai Pari, Tai Ao, Waikato-Tainui encourages pre-application consultation on proposed development activities of this nature, to ensure appropriate consideration is given to matters of importance to Waikato-Tainui. GSCL is committed to follow this process.

This assessment is required under the RMA 1991 and was requested on behalf of The Tangata Whenua Working Group (TWWG) to fulfil these requirements.

3.0 PURPOSE OF THIS REPORT

This report documents the Māori history, values, ecological and environmental interests in relation to potential impacts of the proposed activity or development. In regard to these matters the CIA aims to:

- Highlight the relationship of Māori with their culture and traditions, ancestral lands, waters, sites, waahi tapu and other taonga
- Uphold the values of kaitiakitanga in accordance with Waikato-Tainui in exercising functions and powers under the Resource Management Act 1991
- Identify the effects and/or impacts of a proposed activity upon Tangata Whenua cultural, ecological and social associations with the environment
- Identify or assist in the identification and formulation of methods to avoid, minimise and mitigate cultural and ecological impacts on the environment

A CIA is important in articulating cultural and environmental values of tangata whenua. It helps to understand how the proposal might impact on these values and how parties might work together address and mitigate issues. It provides evidence that meaningful engagement has taken place. It also assists both applicants and the council to meet statutory obligations.

The Resource Management Act 1991 (including but not limited to sections 6(e), 7(a), and 8), and the Waikato-Tainui River Settlement Act 2010 provide statutory provision that where these effects cannot be avoided, they will require appropriate mitigation. These statutory requirements have also been given effect to by several key policy documents including the Waikato Regional Policy Statement (RPS), the Future Proof Growth Strategy and Implementation Plan (2009) and the Hamilton City District Plan (HCDP). Key objectives and policies from those documents, that Act as guidance for this CIA.

4.0 METHODOLOGY

This section sets out the key tasks and work programme that supported the preparation of the CIA. In summary, the preparation of this CIA has included:

i. Identification of relevant iwi management plans and planning documents. These included the:
    - Waikato-Tainui Environmental Plan, called Tai Timu, Tai Pari, Tai Ao
    - Te Ture Whaimana o Te Awa o Waikato – the Vision and Strategy for the Waikato River
    - Draft Rautaki Taiao o Ngāti Hauā

ii. Reading and reviewing relevant Cultural Impact Assessment Reports and consent documentation in relation to the large-scale developments throughout Waikato.

iii. Contact with Waikato-Tainui regarding consultation regime and the Waikato-Tainui Environmental Plan.

iv. Formal consultation and engagement meetings with representatives of the Tangata Whenua Working Group. The TWWG is made up of mandated representatives from each of the Waikato-Tainui hapuu within the vicinity of the project – namely Ngaati Mahanga, Ngaati Hauaa, Ngaati Tamaiunapo, Ngaati Wairere, Ngaati Reko -Waikeri Marae and Te Uri o Mahanga.

v. Assessment and evaluation of technical reports that have been presented to the TWWG for the Rotokauri North area against Waikato-Tainui values, objectives and policies outlined in the Tai Tumu, Tai Pari, Tai Ao.

vi. Feedback from iwi regarding cultural impact assessment from

The above are expected to be undertaken throughout the lifecycle of the Rotokauri North development), as it is anticipated that this document be a "living document" which is expanded on and added to as part of various stages of development of the Rotokauri North area (i.e. future resource consent applications beyond the PPC).

5.0 TRADITIONAL LANDS

The region of the Waikato people is described in the following saying:

Ko Mookau ki runga

Ko Taamaki ki raro

Ko Mangatoatoa ki waenganui

Pare Hauraki, Pare Waikato

Te Kaokaoroa o Paatetere

Mooakau is above

Taamaki is below

Mangatoatoa is between

The boundaries of Hauraki, the boundaries of Waikato

To the place call 'the long armpit of Paatetere'.

Mookau refers to the river in the north Taranaki and Taamaki to the isthmus on which the city of Auckland now stands.

Mangatoatoa is a small village south of Te Awamutu.

Pare Hauraki is the Hauraki region including the Piako, Ohinemuri and Coromandel districts.

Pare Waikato is the regional north of Kaawhia to the Manukau Harbour and across to the Huuna and Hapuuakohe Range. Hence the Waikato region today includes cities and towns such as Te Awamutu, Cambridge, Hamilton and Huntly.

Te Taamaki district is sometimes referred to as the kei (stern) of the Tainui canoe and the Mookau district as the tauihu (prow) The Coromandel Peninsula is referred to as the canoes's ama (outrigger).

6.0 KIINGITANGA

Kiingitanga had its genesis in the 1840s when the Māori began to perceive the strength of the British settlers as resulting from their unity under Queen Victoria. Conversion to Christianity endorsed this belief alongside the Scriptural insistence that all are equal in the sight of God, they discovered passages such as Deuteronomy, Chapter 17, verse 15, which says: "*One from among thy brethen shalt thou set king over you.*"

By the 1850s the belief was widespread that a king was necessary to preserve Māori mana, culture and language and prevent the loss of land and livelihood.

Wiremu Tamehana - later to be dubbed the Kingmaker travelled the country to collect the names of likely contenders for the kingship. After discussion and debate lasting many months it was unanimously decided in November 1856 at a meeting at Pukawa on the shores of Lake Taupo that Te Wherowhero of Waikato should be created Monarch. His lineage and credentials were impeccable. A direct descendant of Hoturoa who captained the Tainui canoe in the Great Migration, he came from a line of great fighting chiefs and in his youth was regarded as an outstanding combatant.

It took Tamehana a long time to persuade Te Wherowhero to accept the Monarchy that the majority of other tribes had decided should be his. Te Wherowhero's reluctance stemmed from his age, he was in his mid-80's and a personal dislike for the title "king". However, in 1858 he agreed to be crowned by Tamehana and took the name King Potatau.

On his death (June 1860) two years later, he was succeeded by his son King Tawhiao, who pledged himself to hold fast to his father's belief that the Māori should have self - determination and hold fast to their lands. Three years later the peace-loving king found himself at war, when imperial troops entered his territory. The King Movement held off the invaders for nine months, before King Tawhiao and his closest followers fled into the Maniapoto hinterland. The Government punished them by seizing 500,000 hectares as war reparations.

King Tawhiao's exile lasted 18 years (the area where he hid is still called the King Country) before a truce was declared in 1881.

In 1884 he went to England to ask Queen Victoria to return his land, but she refused to grant him an audience. Later when the Government refused to establish a Māori Council, King Tawhiao set up his own Parliament which brought down laws ranging from land development policy, to the prohibition of cruelty to animals.

And it was King Tawhiao who instituted the Poukai, a day when war widows, orphans and the poor could be fed and entertained by others in the district. There are now 29 Poukai held annually, where the people can meet their Monarch, discuss current issues and give monetary tributes toward the cost of Kingitanga.

King Tawhiao died on 26 August 1894 at Parawera. In death King Tawhiao continued to be a trendsetter. He established the precedent that in death the Kahui Ariki (Royal Family) should be indistinguishable from their subjects and so was buried in an unmarked grave on the sacred Mt Taupiri. His successor King Mahuta by invitation of Prime Minister Dick Seddon, took a seat in the Legislative Council, and sat on the Executive Council as "Minister representing the Māori race".

By the time his son King Mahuta came to the throne, King Mahuta's niece Princess Te Puea had become a powerful force in Kiingitanga. It was her drive which saw the King Movement capital re-established at Ngaruawahia, where she personally supervised the building of Turangawaewae.

On the death of King Te Rata in 1933, his 24-year-old son King Koroki came to power and Turongo House was built to be his official residence. King Koroki passed away on May 18, 1966 and five days later his daughter was crowned. The late Queen Te Atairangikaahu became the first New Zealand woman to become a Monarch and celebration of her 20th anniversary was held on the 18th May 1985. King Tuheitia now holds the throne as the son of the late Te Atairangikaahu. Kiingitanga is a support network to and for the people as the people support Kiingitanga.

Waikato are responsible for upholding the mana of the Kiingitanga. Whilst the tribal structures and organisations established within Waikato-Tainui have changed overtime due to political evolution, all are based around the Kingitanga philosophy to unite and care for the people and their natural resources.

7.0 WAIKATO-TAINUI TREATY SETTLEMENT CLAIMS

"E hara ma te moni hei utu e ai ngoo korero"

Money alone will not pay for the injustices Māori endured.

Waikato-Tainui has settled two (2) key treaty settlements over the past 23 years. They are:

- Waikato Raupatu Claims Settlement Act 1995 (enacted into legislation)
- Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010 (enacted into legislation)

As a result of these settlements, Waikato-Tainui as the tribal authority has provided a long-term strategic direction for the iwi. The tribal strategic plan, known as 'Whakatupuranga 2050' was developed through the tribal parliament Te Kauhanganui o Waikato-Tainui Inc and ratified by whaanau, hapuu and marae of Waikato- Tainui. The plan identifies the following priority areas:

- Cultural
- Economic
- Education

- Marae and Development
- Environment

In more recent times the Vision and Strategy for the Waikato River Settlement provides guidelines regarding the health and wellbeing of the Waikato River. This has been captured and entrenched in legislation as part of the Settlement (2010). The vision and strategy has also been captured in the RPS which means that the affected district and regional councils 'must give effect' to this strategy.

7.1 Waikato Raupatu Claims Settlement Act 1995

The Waikato Raupatu Deed of Settlement 1995 is a hugely relevant piece of legislation today. The Waikato Raupatu Settlement is largely based around events that took place 1863 onwards that relate to land confiscation; an event that has echoed in the hearts, souls and minds of Waikato-Tainui as a tribal entity.

The Waikato River Deed of Settlement was a part of the initial Raupatu claim, but was carried over for settlement from 1995 until 2010. The attention required to complete the river claim section of the wider Raupatu Act was considered to be a task that required concise and focused attention.

7.2 Waikato Raupatu Claims (Waikato River) Settlement Act 2010

The Waikato River Deed of Settlement signing (2009) and legislating (2010) heralded a new era of co- management with respects to the Waikato River and its tributaries (lakes, streams, wetlands, lands, waahi tapu and minerals).

The preparation and compilation of the stories and historical accounts that Waikato-Tainui tribal elders provided over 30 years to support the intrinsic value and integrity of the Waikato River was evident when the Office of Treaty Settlements (OTS) and Judge for Treaty Settlements ruled in favour of Waikato-Tainui treaty claim for the Waikato River. Without prejudice, the historical accounts from Kaumaatua have ensured the return of the Waikato River back to Waikato-Tainui and its tribal benefactors who have fought tirelessly for many years, with many sacrificing their own lives and families to fulfil their roles and responsibilities of kaitiakitanga and stewardship over the domain of Papatuanuku and Ranginui.

Part 2 (Settlement redress through legislation), 8(3) of the Waikato Tainui Raupatu Claims (Waikato River) Settlement Act 2010 statement of significance of the Waikato River to Waikato- Tainui recognises the following:

> *"The Waikato River is our tuupuna (ancestor) which has mana (spiritual authority and power) and in turn represents the mana and mauri (life force) of Waikato-Tainui. The Waikato River is a single indivisible being that flows from Te Tahekeheke Hukahuka to Te Puuaha 0 Waikato (the mouth) and includes its waters, banks and beds (and all minerals under them) and its streams, waterways, tributaries, lakes, aquatic fisheries, vegetation, FLOOD PLAINS, wetlands, islands, springs, water column, airspace, and substratum as well as its metaphysical being. Our relationship with the Waikato River, and our respect for it, gives rise to our responsibilities to protect te mana o te awa and to exercise our mana*

Whakahaere in accordance with long established tikanga to ensure the wellbeing of the river. Our relationship with the river and our respect for it lies at the heart of our spiritual and physical wellbeing, and our tribal identity and culture".

In this regard Waikato-Tainui has opted to work with the crown and their respective delegated authorities to work collectively/collaboratively for the health and wellbeing of the Waikato River and its tributaries.

It is therefore the view of the TWWG to inform all stakeholders, who have some involvement with the Rotokauri North development that we are consistent in upholding the legislation which enables the Waikato-Tainui governance and administration bodies to advocate on behalf of all Waikato-Tainui marae and tribal members.

8.0 TE TURE WHAIMANA O TE AWA O WAIKATO

The Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010 is underpinned by Te Ture Whaimana o te Awa o Waikato (The Vision and Strategy for the Waikato River). The vision for the river is;

"for a future where a healthy Waikato River sustains abundant life and prosperous communities who, in turn, are all responsible for restoring and protecting the health and wellbeing of the Waikato River, and all it embraces, for generations to come."

This is underpinned by the whakatauki (proverbial saying) of King Tawhiao;

Tooku awa koiora me oona pikonga he kura tangihia o te mataamuri.

The river of life, each curve more beautiful than the last.

The streams in the wider Kirikiriroa rohe flow to the Waikato River. It is therefore the responsibility of all those who have direct and indirect interests with the Waikato River to ensure that the Vision and Strategy to return the Waikato River to a level of abundance for generations to come is maintained and practiced at all levels. This includes, but not limited to, urban and rural development, water use, water discharge, water take and recreational use. The Rotokauri North development must be consistent with Te Ture Whaimana and contribute to the restoration and protection of the health and well-being of the Waikato River, in its holistic form.

9.0 WAIKATO-TAINUI ENVIRONMENTAL PLAN

The Vision of the Waikato-Tainui Environmental Plan called Tai Tumu, Tai Pari, Tai Ao Plan is taken from the Mamae aroha of the second Māori King, Taawhiao, where he laments with a heavy heart his longing for and adoration of the taaonga and natural resources of his homeland. The tongi (proverb) of King Taawhiao is the key driver and indicator of environmental health and wellbeing in the Tai Tumu, Tai Pari, Tai Ao plan. Waikato-Tainui aspires to the restoration of the environment to the way it was when King Taawhiao observed it when his Tongi was spoken.

The Plan is designed to enhance Waikato Tainui participation in resource and environmental management, designed to allow developers, local and national statutory bodies to gain first hand understanding as to what the aspirations of Waikato-Tainui as an Iwi Authority are.

The plan is also particularly useful to its own tribal people within the Waikato-Tainui catchment who are kaitiaki and/or exercise kaitiakitanga and/or are Mana Whenua (local tangata whenua with decision making authority) within their particular areas of interest. This plan does not supersede Hapuu or Marae within the Waikato-Tainui catchment who have Environmental Management Plans and/or policies in place that address their environmental needs, but can be used to support those who do not have plans or policies in place.

The plan will provide valuable insight as to what some of the key constraints for developers may be in terms of environmental impacts and the desires of how those impacts can be addressed.

The plan supports and promotes a coordinated, co-operative and collaborative approach to natural resource and environmental management, restoration and care within the Waikato- Tainui rohe. The plan is living, evolving and operational that will be monitored, revised and updated to ensure it remains relevant and provides a framework for continuous improvement.

10.0 RESOURCE MANAGEMENT ACT 1991

While there is no statutory requirement upon an applicant to prepare a CIA, such an assessment can assist council's and applicants to meet statutory obligations in a number of ways, such as:

- Preparation of PPCs
- Preparation of an Assessment of Environmental Effects (AEE) in accordance with section 88(2)(b) and Schedule 4 of the Resource Management Act 1991. Requests for further information under section 92 of the Act in order to assess the application.
- Providing information to assist the council in determining notification status under sections 95 to 95G of the RMA
- Providing information to enable appropriate consideration of the relevant Part 2 matters when making a decision on an application for resource consent under section 104 of the RMA.
- Consideration of appropriate conditions of resource consent under section 108 of the RMA.
- Informing Councils of an applications implications in relation to any relevant Iwi Management Plans
- Meeting any specific requirements for councils arising from particular Treaty of Waitangi Settlement legislation.

Part 2, section 5 of the Resource Management Act 1991 (RMA 1991) outlines the 'purpose and 'principles' of the act, where the fundamental purpose is to promote the sustainable management of natural and physical resources. The Act further explains sustainable management to mean the use, development and protection of natural and physical resources in a way that allows people and communities to provide for their social, economic and cultural well-being and for their health and safety.

Part 2, section 6 outlines that people must recognise and provide for matters of national importance when exercising the functions and powers of the RMA. Of great significance to the TWWG are sections 6(a), (b), (c), (d), (e), (f) and (g). Upon initial discussions with local taangata whenua of the area section 6(e) was of great significance which outlines the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu (sacred sites), and other taaonga (treasures).

Part 2, section 7 of the RMA outlines what each person must have regard to when exercising the functions and powers of the act in relation to managing the use, development and protection of natural and physical resources. Of great significance to the TWWG and Waikato- Tainui are the inherent responsibilities of Kaitiakitanga, section 7(a). It is important to note that Kaitiakitanga extends further than that illustrated in the RMA 1991. Section 7(d) outlines the intrinsic values of the eco-systems which align with the overall desired outcomes of Kaitiakitanga. Section 7(f) is relevant to the desired outcomes of the Rotokauri North development in terms of maintenance and enhancement of the quality of the environment.

Part 2 section 8 of the RMA outlines that all persons exercising the functions and powers of the RMA in relation to managing the use, development and protection of natural and physical resources, shall take into account the principles of the Tiriti o Waitangi (Treaty of Waitangi). The Tiriti is what binds taangata whenua and pakeha to work collectively within Aotearoa, New Zealand. Failure to recognise, provide for and give effect to the Tiriti o Waitangi often results in miscommunication and poor relationship development. For it is these two (2) values that the TWWG consider to be extremely important when working with GSCL.

Effects on the environment are specifically defined in Section 3 of the RMA as including: any positive or adverse effect; and any temporary or permanent effect; and any past, present or future effect; and any cumulative effect that arises over time or in combination with other effects regardless of scale, intensity, duration or frequency; and any potential effect of high probability and any potential effects of low probability which has a high potential impact.

The TWWG is keen to participate in the wider planning initiatives that GSCL are undertaking to manage future effects in and around the areas that have significant cultural and ecological value to the Waikato River and its tributaries.

11.0 WAIKATO-TAINUI MANA WHENUA

In the early years of the 1700s a majority of lands within the Waikato were targets of war and encroachment of both Māori and pakeha. Over time development of relationship between tribes, hapuu have evolved and created the current tribal politic structures we operate under today.

Waikato-Tainui descends from the Tainui Waka with over thirty-three hapuu (sub tribes) and approximately seventy thousand registered beneficiaries. Our main rohe (boundary) of significance covers the Waikato region through to Tamaki Makaurau.

Waikato-Tainui's tribal parliament, Te Whakakitenga o Waikato Incorporated is the sole trustee of the tribal group and has approximately one hundred and twenty members representing approximately sixty-eight Marae.

The whakapapa / traditional history of the Rotokauri North area (whilst not exclusive) connects Ngaati Mahanga, Ngaati Hauaa, Ngaati Tamaiunapo, Ngaati Wairere and Ngaati Reko -Waikeri Marae. The area has extensive pre-European Māori history.

Clearly ngaa hapuu is bound by its cultural rules or cultural responsibilities to protect and safeguard the spiritual and physical aspects of the environment including the Waikato River. In this respect Ngaa Hapuu has publicly stated its mana whenua status over the whenua rivers and waterways within its tribal boundary.

12.0 ROTOKAURI STRUCTURE PLAN CULTURAL VALUES ASSESSMENT

In 2001 a CVA was commissioned by Hamilton City Council (HCC) for the development of the Rotokauri Structure Plan area. The assessment was utilised throughout the Plan Change (Variation 18) for Rotokauri and the development of the Rotokauri Integrated Catchment Management Plan (ICMP).

The assessment provided:

i. An overview of pre-european Maori history of the Rotokauri area,

ii. Identification of features of note which tangata whenua wished to see protected (notably for the Rotokauri North area includes the Kahikatea stand identified as Perkins Bush (and identified as the *Pikihinau Reserve* in the 2001 CVA) and protected under the HCDP as a Significant Natural Area (SNA)); and.

iii. Recognition of the potential for human remains, carved artefacts and other taonga to be uncovered during works.

A full copy of this assessment is provided in Appendix 1.

13.0 HAPU HISTORIES

To come before notification

14.0 OVERARCHING PRINCIPLES

Through the TWWG an overarching set of key pou/mitigation objectives have been identified. These are as follows:

i. Rangatiratanga: the active involvement of tangata whenua in the planning, management and development of Rotokauri North;

ii. Waahi Taaonga: the protection and enhancement of 'whakapapa' cultural connectivity and indigenous place-making, and sites of significance;

iii. Ngaa Wai Ora: the protection and enhancement of freshwater, waterways, springs andwetlands;

iv. Mahinga Kai – customary food and resource species and biodiversity and

v. Kotahitanga: working to improve partnership outcomes with tangata whenua

These five Key Areas led to recommendations falling within these areas, which relate to key principles and values.

I. Rangatiratanga – ongoing involvement of mana whenua

Tangata Whenua recognises that relationships are key to achieving holistic, positive environmental outcomes. In order to meaningfully participate in regulatory processes and to realize cultural, environmental values and aspirations, it is important that relationships are established and maintained with an approach that is enduring and authentic.

Recommendation 1: The TWWG continue to work in good faith and partnership with GSCL on outcomes for Rotokauri North. Including further engagement to provide opportunities for Iwi to have input into technical reports.

Recommendation 2: Ensure that the future resource consent applications provides an appropriate summary of the engagement undertaken with TWWG as well as the issues (and potential remedies) identified in this cultural impact assessment.

II. Waahi Taaonga - Heritage Issues and Significant Sites

The TWWG considers the whole Rotokauri North a waahi taaonga area. Values associated with taaonga and heritage are important to because it affirms identity and provides physical and emotional links to the past. Recognition of the cultural values of the identified archaeological sites provides opportunities for interpretation of the significance of these ancestral landscapes and advocacy for protection and preservation of similar sites.

Recommendation 3: To reaffirm 'whakapapa' the traditional cultural story/cultural narrative to support the cultural indigenous place-making throughout the Rotokauri North area. The focus on opportunities to recognise and provide for the enhancement and tangible reflection of mana whenua cultural values as a key element of land management and developments, including but not limited to:

- Potential to use traditional mana whenua names for street and neighbourhood names.

- Re-name the Significant Natural Area/kahikatea stand and any associated (future) reserve to *TE UUHI PAA RESERVE.* This name is in reference to the nearby ancient paa site of TeUuhi, a paa that all the members on the Twwg have an interest in through whakapapa.

- Use of indigenous plant species in riparian restoration, as street trees, in open space and reserves;

- Landscaping design that reflects cultural perspectives, ideas and materials, contemporary Māori culture in building design, artwork and furniture in public open space;

- Inclusion of interpretation materials, communicating the history and significance of places, resources and potential to use taangata whenua inspired and designed artwork and structures (pou);

- Appropriate karakia or other cultural protocols to be implemented when appropriate;

- GSCL are committed to ensuring the appropriate protocols (tikanga and kawa) are followed throughout the project (on land falling within GSCL ownership/management);

- The TWWG consider it important to include the requirement for a cultural monitor to be present with the archaeologist upon the removal of topsoil or other times where deemed necessary. This also supports knowledge transfer and enhancing of cultural capacity of the local iwi.

- Implementation of accidental discovery protocols (ADP) whereby in the event of a discovery or archaeological material, earthworks will stop and appropriate iwi and NZ Heritage advice will be sought and appropriate actions followed. That any contractors involved in earthworks be given appropriate guidance on the ADP (via cultural health and safety induction) by a designated TWWG representative and that agreement to this is duly noted)

III. Ngaa Wai Ora - Freshwater and Waste Management

Freshwater has high spiritual, social and cultural value to tangata whenua. The Waikato River water quality is important to maintain the health of taaonga (treasures) and the mauri (life essence) of the freshwater ecosystem.

Wastewater treatment systems associated with residential development require careful management in terms of their location, suitability and capacity. Nutrients from poor performing, unsuitable wastewater treatment systems can discharge into the Waikato River, and have adverse impacts on water quality, therefore its mauri.

***Recommendation 4*:** Endorse the proposed Sub-Catchment ICMP utilising latest best practise techniques or the management and treatment of stormwater and recognition that all sites will be serviced for wastewater (therefore no new individual sites will have onsite wastewater disposal systems, and all sites will connect to the HCC reticulated network), and :

- The use of vegetated swales, rain gardens, wetlands and/or reduced impervious surfaces within the development and within street and reserve design.

- Treating stormwater close to source, using native plant species.

- Providing opportunities were possible for onsite re-use of water.

- Ongoing monitoring and maintenance of storm water treatment and control according to regulatory requirements.

Recommendation 5: Any water take and water allocation applications be reviewed by TWWG to ensure efficient use and management of the resource.

Recommendation 6: Water sensitive designs are included within the development to mimic natural systems including restoration of any natural streams that flows through the site.

Recommendation 7: That the subdivision be developed to require and/or encourage the incorporation of innovative low impact urban design by future development, including rainwater collection and re-use (where practicable) landscaping, low energy/water fittings, insulation and solar or alternative energy sources/systems, as well as solar hot water system.

IV. Mahinga Kai – Customary Food and Resource Species and Biodiversity of taonga species

To tangata whenua, the health and wellbeing of the environment is paramount. Appropriate consideration be given to wider biodiversity gains for native bats, birds, lizards and other taonga species.

Recommendation 8: Endorse the continued protection of the native kahikatea stand as a SNA and encourage the enhancement of this area.

Recommendation 9: To include valued food gathering species or those that support habitat for mahinga kai species for both reserves and roads/streets. Consideration should be given to wider biodiversity gains for native birds, bats, insects and also lizards by providing specific habitat in reserves and roads/streets for these species including:

- Eco-sourcing of plants from within the Waikato basin and ensuring species that reflect history of the area
- Revegetation and re-establishment of riparian margins with indigenous plants for land cover and the creation of indigenous habitat
- Development of reserve areas, integrated storm water ponds, green corridors and open space to provide buffer zones between the development and the commercial and residential areas
- Integration of the landscaping into the esplanade reserve, taking into account any corridor for native bats.
- Develop and restore indigenous riparian, forest, grassland and wetland habitats
- Support cultural harvest and long-term utilisation of natural resources.

Recommendation 10: Encourage use of *Te Reo Te Repo Wetland Handbook* in delivering joint biodiversity and cultural outcomes for any riparian, wetland or reserve planting.

V. Kotahitanga. Tangata Whenua Partnership Outcomes

Recommendation 11: Encourage ways to incorporate Tangata Whenua in business, social and education enterprise and commercial ventures, including but not limited to:

- Plant supply, landscape and riparian planting and plant maintenance
- Capacity building of kaitiaki to undertake monitoring, archaeological surveying.

15.0 RECOMMENDATIONS

An ongoing role for Waikato Tainui, via the Tangata Whenua Working Group, is critical to both the current and future work for Rotokauri North.

Engagement with iwi is not consultation, but more a partnership approach based on authentic, value based kanohi ki te kanohi korero. As a reflection of goodwill and trust, TWWG and GSCL recognise that good faith consultation has taken place, but will continue through further negotiation and discussion to achieve mutual satisfied short and long-term mitigation and development outcomes.

It is expected that as a living document further additions and chapters will be included and added to this document, as different staged of development progresses.

ATTACHMENT 17 - Landscape and Vicual Assessment by LA4 dated April 2019

ROTOKAURI LAKE STRUCTURE PLAN – CULTURAL ASSESSMENT.

INTRODUCTION

In the Maori language Rotokauri means "lake of Kauri trees". Lake Rotokauri was given this name because of the many Kauri logs which are buried in the bed of the lake and around it's margins. These are the remains of ancient Kauri trees which grew throughout this area, some of which, through natural causes, fell over into the lake. The Rotokauri area was extensively dug over for Kauri Gum by Maori during the 1840's-1920's

PRE-EUROPEAN MAORI HISTORY OF THE AREA.

In pre-European times, the flora and fauna of this whole region was significantly different from today. The region was renowned, and fabled in Maori legends and Waiata (songs), for its large forests and abundance of birds and fish. The serious destruction of these forests began around the 1820's when Ngapuhi forces armed with muskets, invaded the region and set fire to many of the settlements and surrounding forests along the Waipa River. Later huge land clearances were directed by European Christian missionaries such as Rev, Ashwell (known to Tainui as Potaenui) who himself set fire to many of the ancient forest reserves in the area. He also encouraged Maori who had been converted to Christianity to clear the forests and transform the land into European type farms. This had an enormously deleterious effect upon the natural resource based commercial trade which Tainui undertook prior to 1860.

In ancient times, the hills and ranges overlooking the Rotokauri investigation area were densely forested with a mixture of Matai, Miro, Totara, Rimu and Tawa trees. By contrast, the forests of the peat swamps and low lying plains were dominated by Kahikatea, Titoki, Rewarewa and Pukatea trees, with Maire trees on the margins of the swamps.

Within these dense forest stands there was ground cover of ferns such as Rauruhe, Maheuheu, Punga and Mamaku. Several species of vines (Mangemange) climbed up, and hung from, the forest trees. These vines were particularly significant for the Maori people of the area as they provided an important raw resource required in their every day lives. For example, Kareao (supplejack) was used for lashings in the manufacture of eeling pots (hinaki), construction of the defense stockades of fortified Pa, house structures, agricultural implements, musical instruments and canoes.

The lakes Rotokauri, Rotokaeo and Waiwhakareke (Horseshoe Lake) held special spiritual and sustenance significance to Maori of this region. Freshwater mussels grew in abundance particularly in Waiwhakareke , and were gathered by Maori for food. The mussel shells were manufactured into cutting implements for gathering flax and stripping the soft flesh from the leaves to extract the long fibrous strands which were used for

manufacturing clothes, cloaks, mats, fishing line and many other every day items. In addition, these lakes held an abundance of eels, freshwater crayfish, and native trout, all of which provided essential foods for the Maori people of the area.

In more specific detail, the area to the north of Rotokauri lake was a vast peat swamp called Te Maire. This name was derived from the abundance of Maire trees which grew on the margins of the swamp. The berries of this tree were highly favoured by the native pigeon which came to the area in considerable numbers. The swamp flora aslo contained Tikouka (Cabbage tree), a variety of species of flax such as Tihore, Ngutunui and clumps of Toetoe and Raupo. Te Maire swamp is recorded on a map from 1865, a copy of which is attached in appendix to this report.

Lake Rotokauri received the water from the surrounding catchment area and formed the head waters of the Te Ohote stream, which ran out of the west end of the lake and into the Waipa River. Te Ohote stream and lake Rotokauri were important sources of Kaimoana, particularly eels, which were trapped in a series of eel weirs (Rauwiri) which were constructed along the stream. Many of these eel weirs were given names, being owned, maintained and jealously guarded by individual hapu or families who lived by the lake and stream.

The swamps also provided a variety of food for Maori living in the region. Ducks such as Parera (grey duck) Putangitangi (paradise duck) and Pakeke (brown duck) lived in the swamps and were hunted using light weight spears, or snared using nooses set in the creeks between stakes. The swamps also supported, Tuna (eels). The different species of eels living in this area were given different names in Maori. One eel, the large silver bellied eel, was called Kokopu by the local Tainui people and significant numbers of Kokopu were recorded living in the lake and streams. However, such records have cause some confusion and misinterpretation of the ancient fish fauna of the area as in other parts of New Zealand Kokopu is the name given to the native trout. Thus some historians have been lead to believe that there were large numbers of native trout in this area when infact such references were to the silver bellied eel.

Ancient Maori history records orange "discolourations" on the margins of the swamp and the associated creeks. These were not records of ancient environmental pollution, but rather identify the location of iron oxide deposits, which typically form in such peat swamps. This iron oxide, correctly called Kokowai, but more commonly known as Ochre, was traditionally dug out of the swamps in large lumps and heated in wood fires. The resultant orange/red pigment was used by ancient Maori people for personal adornment, and for painting their houses, wooden carvings, the palisades of the Pa and the scraped bones of their dead, to give them a red colour. In addition people commonly painted themselves or their children prior to going to sleep to ward off evil spirits (pokepokewai and patupaiarehe) whilst they slept. Chiefs commonly smeared Ochre over their faces and bodies to indicate a state of tapu during ceremonial occasions.

Ochre was, and is still, given a high spiritual value by Maori. It's red colour symbolizes the blood of Papatuanuku (the land). Hence it's use provides a tangible expression of the

spirit (Mauri) of the land itself and the bond which exists between the life forces of the land and all people, plants and animals which live on the land. Because of the many spiritual, ritual and decorative uses of Ochre, the iron oxide deposits on the margins of the swamp were, and are, extremely valuable and prized by Maori, even today.

The trees of the forest and the plants of the swamp margins not only provided sustainable sustenance to ancient Maori, but they were also important as Maori environmental indicators. Elders used to observe and interpret the changes in the environment in terms of the appropriate time to undertake a variety of tasks. For example, early or late fruiting of certain berries, the rise and setting of the heavenly bodies, or the waxing and waning of stars determined the best time for hunting particular birds or fish, sewing the seeds, cultivating and harvesting the crops. Similarly, when the native white clematis (Winika) was in bloom this was the correct time to fish for eels, or when the Koroi (berries of the Kahikatea) were at their brightest, the native birds and rats came to feed on them. This was therefore a time of plenty for trapping these animals and preserving them for future use in times when food was scarce. At certain time of the year Rahui (embargoes) were established by the local chiefs to conserve or sustain local plant and animal resources.

The exact start of the traditional Maori year, which is sometime in June, was determined by the rising of Te Paki O Matariki. This "New Year" was traditionally celebrated with religious rituals and ceremonies.

Individual trees within the forests held special significance for Maori. There was an area of bush to the north west of the Lake which can be identified on an 1865 map of the area. This bush contained a large Rata tree called Nga Karu O Mahuta which marked a tribal boundary. This particular tree was sacred to the people of the area as when the flowers bloomed they were said to be the eyes of Mahuta (Nga Karu O Mahuta).

The area around Lake Rotokauri was the scene of many battles between different hapu of Tainui. For example, ancient Maori documents record a battle fought in the margins of the swamp near this same bush area in which Ngati Mahuta fought Ngati Ngamurikaitaua, Ngati Koura, and Ngati Wairere. Another battle was fought on the hills close to Exeby Road, near the Hilldale zoo. At the base of these hills there was a swamp which contained a clump of Toetoe. These Toetoe were named Te Maro o Rangitara and were believed the hold the spirits of the warriors killed in that battle.

THE MAORI PEOPLE OF THE AREA.

The first people to occupy these lands were an ancient, pre-Tainui, Maori tribe called Nga Iwi. They originally lived in, and around, Paraureroa Pa near Mangatawhiri, north of Mercer. However they were driven from that Pa and the area by Hanui and Hotumauea, two Ngati Wairere (Tainui) war lords. The Nga Iwi people traveled south, eventually arriving in the Lake Rotokauri area. Here they established a number of Pa, one of which was on the northern lakeside, close to the boat ramp marked on the map of the area shown in this Management Plan.

However, Nga Iwi were not left to occupy the Pa in peace. Hanui and Hotumauea who had driven them from their original Pa continued to pursue them. The two war lords came to the Rotokauri area, attacked the Pa and drove Nga Iwi from the area. From the time when the Nga Iwi people were driven from the area, this land has been occupied by hapu (sub-tribes) of Tainui.

The Pa and surrounding lands taken by Hanui and Hotumauea were later occupied by the people of three other Tainui hapu: Ngati Ngamurikaitaua, Ngati Ruru and Ngati Koura. Ngati Ngamurikaitaua built another Pa, called Kahikawaka, on the banks of Te Ohote stream. This stream which no longer exists, ran out of the lake into the Waipa river and was recognised as a boundary marker between these three hapu who lived in the area. There were a number of Maori settlements along the Waipa close to Te Ohote Stream.

The Pa built on the northern margin of the lake and which Tainui took from Nga Iwi became known as Te Uhi (the Chisel Blade used in tattooing) because it was a renowned centre for traditional tattooing. It was the skills of the tattooers, supported by the availability of Kauri gum in the area, that contributed to the development of this Pa as a centre for tattooing. The Kauri gum was essential, as it was the soot from burning Kauri gum that was the basis for the ink used in the tattooing ritual. Because tattooing has always been an extremely tapu (spiritual and sacred) ritual for Maori, and because the soils of the Pa contain the blood which ran from those being tattooed, Te Uhi pa is still a Waahi Tapu site.

These Rotokauri lands were rich in natural resources, which the Maori people used for their own sustenance and also as a basis of economic trade with other, neighbouring hapu. Because of this trade various hapu of the area became famous in Maori legends for the particular resources which they traded. These included wood from the forests, preserved birds or fresh water fish from the streams and lakes. Some of the hapu (tribes) who have lived in the area at different times are presented below.

Ngati Ngamurikaitaua

The people of this hapu owned and occupied Te Uhi Pa and Kahikawaka Pa. The name of the hapu is derived from an incident where the dead bodies of warriors killed in a battle were left in a canoe. The canoe floated away, only to be stopped down stream, where the bodies of the dead warriors were eaten.

Ngamurikaitaua people became fabled in Maori legends for the types of flax capes which they manufactured and wore. Because of the use of particular species of flax in the manufacture of these cloaks, certain clumps of flax (Harakeke) around the Pa have been designated as tapu as a commemoration to their memory. Some of their traditional burial grounds are situated at Kahikawaka and along the Te Ohote stream near Duck Road.

The whakapapas of the descendants of the Ngamurikaitaua people identify that people of Meretiaua, Ngaparaki and Mihipare lived at Kahikawaka pa.. It is also recalled that Hori Te Rongo, and Ngaoko dug gum and gathered flaxes in the area prior to 1915. Wi Patena a note such as, Paraere, Tawharu, Paora, Pupuha Himeme, Hori Tukituki, Tataua, Hopiwai, who was a chief of the Ngati Tamainupo performed one of the last burial rites at Kahikawaka Pa.

Ngati Koura

It was the people of Ngati Koura who, lead by Hotumauea and Hanui, waged war and took possession of this area from the Nga Iwi tribe. Ngati Koura originated from the Taupiri area and Hoe O Tainui which is just north east of Morrinsville. One of their traditional landmarks, Te Raratuna O Tutumua, is a gully which discharges into the Waikato River near Hamilton City Council's water treatment station.

Ngati Ruru.

Ngati Ruru are a sub-tribe of the larger hapu Ngati Koroki and Ngati Wairere. They originated from Horotiu Pa and Tikapa pa at Cambridge. In 1846 a dispute arose between Ngati Ruru and Ngati Ngamurikaitaua over eeling rights and the ownership of a Rauwiri (eel weir) called Manuwhiri kopa at Lake Rotokauri. At this time Mokoroa, sometimes referred to Mokorau, was chief of the Ngati Ruru. A European missionary, Rev Ashwell, known to Tainui as Potaenui (big hat) because of the large brimmed hat which he always wore, was passing through the area traveling from Taupiri to Kirikiriroa Pa at the time. He intervened and acted as a mediator to resolve the dispute. The incident was recorded by Rev. Ashwell, but he did not record the detail of the settlement. Chief Mokoroa died about 1859 at Whatawhata.

The people of Ngati Ruru occupied the land between what is now Rotokauri Road and Lindsay Road and legend records them as hunting pigeons throughout this area. Some of their ancestors who lived in this area were Tarau, Toroa, Ruha, Te Warihi. Te Warihi owned a Rauwiri (eel weir) on the Te Ohote stream close to where it flows out from Lake

Rotokauri. Te Warihi's descendants are understood to now be located at the Ngati Reko Marae, called Tangirau, near Ngaruawahia.

Ngati Hourua

Whilst there were some Ngati Hourua people living around Lake Rotokauri, they were not the main occupants of the area. The people of Ngati Hourua, a subtribe of the Ngati Haua, mainly occupied the banks of the Waipa river, with many living at Mangapukeake Pa during the 1850s. This Pa is close to the point where the Te Ohote stream discharges into the Waipa river. Some Ngaati Hourua people married into the Ngati Mahanga hapu who whose lands include the Whatawhata, Aotea Harbour and Whaingaroa (Raglan) areas. The Ngaati Hourua ancestors who occupied this area were Te Rongomau, Matatewa, Ihaka Te Ruki, Terekia, Rangitita, Paritiaho and later their descendants Hita, Rawiri, Te Aho, Taunga, Ika, Huhana Pohe and Te Rutu who died in 1889.

Most of these three hapu hunted and gathered food throughout this region, including Rotokauri, until the arrival of Europeans. They operated their own flax mills and flour mills during the 1850s and collected Kauri gum up to the 1920s.

OTHER FEATURES OF NOTE IN THE AREA.

The Te Tongahuanui walking track.

There was a walking track named Te Tongahuanui which ran from Kirikiriroa (Hamilton City) past Te Uhi Pa and on to Whatawhata. The Exeby-Rotokauri Roads are now built over the top of this walking track. This track was regularly used by local hunting and fishing parties and occasionally by invading war parties.

Certain clumps of cabbage trees, flaxes or toetoe along the track were believed to have supernatural powers. At various points along the track there were shrines (tuahu) to local deities. One such shrine, located on a prominent hill named Puketehetehe, over looking Te Uhi pa, was dedicated to one of the most significant deities of the area. This deity, Tikiraupo, was a taniwha which occupied Lake Rotokauri and his presence in the lake was believed to be shown by a large clump of rushes and raupo which floated on the surface of the lake. This "island" was blown around the lake by the wind. Occasionally swarms of flies could be seen flying around the island and this was always a sign that a chief was about to die.

Some Maori believe that was Mokoroa, the Chief of Ngati Ruru who drowned in the Lake, who became the Taniwha Tikiraupo. Other accounts claim that it was one of the Nga Iwi chiefs, whom Hotumauea killed by drowning in the lake, who became Tikiraupo and now haunts the lake.

Prior to 1820 Ngati Raukawa and the war lord Te Rauparaha attacked Ngati Ruru and Ngati Koura at Nukuhou Pa and Whatukoruru Pa near Peacocks Road. Ngati Wairere warriors, lead by Te Ahipainga, Te Ironui and, Iraia Papoto and Ngati Koura warriors under Porokoru and Tatangi Te Roore drove the attackers off.

They pursued Te Rauparaha through the Rotokauri area, along the Te Tongahuanui track towards the Waipa river, but he escaped along the Kaniwhaniwha track, south of Whatawhata. From there he crossed Mt. Pirongia, traveling through to Te Tihi O Moerangi and on into Kawhia. Apart from being a fabled warrior and war lord, Te Rauparaha is famous as the composer of the haka "kamate, kamate" performed by Maori teams and the All Blacks

Ripo (swamps)

Whilst ancient Maori had well developed and defined Urupa (burial grounds) it was also common practice to bury Koiwi (human remains) just about anywhere. Maori tradition believed that the mist (Kohu) rising from swamps or hills was the Patupaiarehe or Pokepokewai (guides) who lead the spirits of the newly departed to the sacred mountain Taupiri. Hence the bodies of the dead were often buried in swamps, along with Taonga (carved artifacts, talismen etc.) as offerings to these gods. The preferred sites for such burials within the swamps was only known to a select few and were identified by specific

landmarks such as a Toetoe clump or a crooked tree. Because of this association of spirits with the swamps, Maori were often afraid to travel past them at night and smeared their bodies with Kokowai (Ocre) to protect themselves from the spirits.

The swamps provided an environment which not only allowed ease of burial, but also one which preserved and protected material buried in them. Because of this it was common in times of impending war for Maori to bury their prized possessions such as carvings, house structures, implements and Taonga in swamps to be reclaimed once the war was past.

Some of the most prized, and best preserved, wooden artifacts have been found in modern times in swamps and peats, where the water logged conditions have stopped oxygen driven degeneration of the cell structure of the wood. However, when such water logged artifacts are exposed to the air, they very quickly dry out and this causes them to crumble and disintegrate within hours. Herein lies an area of particular concern to Maori, as any draining of the swamps and peats of the area during subdivision will destroy any waterlogged Taonga which are buried in these areas.

Urupa.

The Te Uhi Pa on the northern side of Lake Rotokauri falls within the Waikato District Council boundary and hence is not part of the present investigation area. However, a recent investigation of the Pa site uncovered sufficient human bones to indicate that there was an Urupa in the vicinity of the Pa. Given this, it is highly likely that there are also Urupa at other places around the margin of Lake Rotokauri, including the part which falls within the present investigation area.

ANCIENT MAORI RESOURCES.

Flax.

The people of the Te Uhi Pa gathered the flax from the margins of the swamp. They scraped the flesh and pith from the flax leaves using shells, thereby extracting the long fibers (Muka) which were pounded to soften them for weaving. In pre-European times this flax was for their own use for manufacturing cloaks, mats, fishing lines, nets etc. After the arrival of Europeans, much of the processed flax fibres (muka) were braided into ropes and rigging for sailing ships. These products were transported by canoe along the Waipa river, destined for sale in the Auckland markets in exchange for muskets and iron ware.

Fire and burn-offs

Fire was not only a necessity of ancient Maori life, but it was also used as a "tool". On the hills to the South of the lake, areas of the forest were often burned off. This served two purposes. First it created a clearing from which the surrounding hinterland could be easily viewed. From such a vantage position the different hapu living in the area could determine which traditional bird hunting blocks on the flats belonged to them, and "police" the blocks to ensure that neighbouring hapu did not poach on their blocks. An ahitapu (scared fire) was often lit on the hill to identify that the block which it overlooked and the hill itself, was occupied by that tribe.

The second purpose for clearing the hillside by burn off was associated with a particular food source. Ferns were one of the first plants to regenerate in these burned soils and the roots of these ferns were used as a food. The roots (Rauruhe) were harvested, roasted, pounded with wooden hardwood pounders or beaters (Patu aruhe) to soften them and then the fibres chewed. Such fern roots were known as Koata and Pitau and the soils supporting these types of ferns were highly prized by Maori.

Once the regenerated ferns had all been harvested, the land was planted with kumara. Such hill gardens were particularly suited for cultivation of kumara as they typically had a shallow covering of top-soil over underlying clay. This soil profile was especially conducive to the growth of large kumara tubers.

It was also a traditional practice to clear tracks which had become overgrown by fern and bracken with a burn off. Ceremonial rituals were preformed by a Tohunga before the fires were lit.

Some times dried peat margins away from the Pa were set alight and left to smoulder. The people of the Pa would take the smouldering embers in pumice containers for use as domestic fires within villages. This minimised the risk of the pa being set on fire, given that the Te Uhi pa was constructed over peat deposits. The smoldering peat also allowed eeling parties to light rama (fire torches) at the start of their expeditions to the Lake and its' tributaries.

These traditions explain the purpose and function of the pumice container, named Pungapunga, which was found during the excavation of Te Uhi Pa in 1974.

Springs

Ancient Maori legends record many fresh water springs in the Rotokauri area, some of which can still be seen today and others which have now dried up. These springs not only provided water for drinking and cooking, but also had spiritual and ceremonial significance for ancient Maori. Tohunga used the spring water to purify houses, people who were ill or under tapu, and as a medium for communicating with dead ancestors and benevolent local deities.

Some springs in the area were overhung by vegetation, and the leaves and debris from the overhanging plants often fell into the water and decomposed. Flax textiles, cloaks and carvings were steeped in the resultant slurry, thereby dying them black. In time of warfare, or invasion of the area by other tribes, taonga, wooden carvings, agricultural implements or ancestral remains were often hidden in springs so that they were protected by the spirit of the spring.

Birds

Whilst there are few records of native birds in this area today, this region was renowned for its bird populations in pre-European times.

There were several different "types" of bird in the area. First there were birds which were attracted to the forests by the berries and fruits of the trees. Examples of these are Kuku (native pigeon), Tui, Komako (bellbird) Kokako, Totoroheti, Kaka (parakeets). These birds which visited the branches and canopy of the forest trees were captured using snares and traps (Waituhi) set in loops or nooses of cabbage tree leaves. Alternatively Kupenga (nets) were set in trees to trap the birds which were then impaled using long spears (tao). The native pigeon was so highly prized by Tangata Whenua that special areas of land were set aside as bush reserves dedicated to the maintenance and protection of this species.

Once the berries and fruit of the trees of the area had fallen to the ground, they attracted a second group of birds, the flightless ground feeding birds. In this way the Weka, Pukeko, and Kiwi were common in this area and were hunted and caught using Kuri (Maori dog). Most of these birds, once caught, were preserved for food, and the feathers used for clothing and personal adornment,

The third group of birds were those which were seldom caught and never eaten as they were considered deities. These were birds such as the Kaahu or Karearea (brown hawk), Ruru (owl), Peho (white owl) and the cuckoo (koakoea).

A special and impressive bird hunting stand named Te Raukaka (many Parrots) is recorded in legends, situated near Waiwhakareke (Horseshoe Lake). The stand extended over the hill rise along Baverstock and Rotokauri Roads encompassing most of what are now the nearby residential sections and allotments. The only remaining remnants of this bush are the few trees within the Mooney Street Reserve.

The manufacture of the spears, snares and traps used to catch birds was a sacred and ritual practice and as such was tapu. Consequently it was only undertaken by Tohunga at a special place inside purpose built, thatched structures (Whare mata). All of the rites and rituals associated with harvesting birds from the forest were observed at these sacred camp sites. They were generally located along the hill-tops near the bush or forests stands where the birds lived.

Once the birds had been caught, they were seldom eaten straight away, rather they were preserved for future times of food scarcity. The tail and wing feathers were plucked from prized birds such as the Kuku (Pigeons), Tui and Kaka, the carcass skinned and roasted over open fires. The fat dripping from them was collected, poured into gourds and the cooked birds embedded in the gourds in their own fat, thereby preserving them for future consumption.

Alternative methods of preparation involved placing hot hangi stones into gourds full of water until the water boiled. The plucked and skinned birds were boiled in the gourds until all of their natural fats floated to the surface. The gourds were left to cool and the remaining water drained off. In this way the floating fat settled onto the cooked birds encasing and preserving them in their own fat.

Such gourds containing preserved birds (Taha-huahua) were a great delicacy and as such were eaten only by chiefs during ceremonial occasions or used by chiefs for bartering for weapons or greenstone taonga.

Many species of birds were prized for their feathers as well as for food. The brownish red feathers of the Kaka were particularly prized, the under wing feathers being used for personal adornment and for weaving into the fabric of special cloaks (Korowai). They were also used to embellish the staff of Taiaha and ceremonial god sticks (Tikiwananga). Pigeon feathers were also precious. These were typically spit in half and tied in bundles to decorate ceremonial house carvings, or embroidered and interwoven into cloaks and weapon adornments.

The Huia, now extinct, was particularly prized by Maori for its black and white tail feathers which were worn only by high ranking Ariki (Paramount Chiefs) or some local Chiefs. Some Huia feathers are still held by Maori today.

Papa Huarakau - Traditional Forest hunting blocks.

The forests played a significant role in the every day lives of the Maori people of the area. Consequently Maori traditions and customs protected and preserved the forests.

Certain stands of trees within the forests were placed under a tapu when an important chief died. No cooked food or hunting was permitted in these areas.

At certain time of the year the transportation of cooked food through the forest was prohibited. Similarly, when human remains were being carried as part of the Tangi procedures, it was the general rule that the body should not be taken through the forest, but rather the mourners had to stay on the walking tracks around the perimeters of the forests.

The forests were also placed under tapu during the tree "flowering" season. At such times entry to the forest, and hunting of birds, was forbidden so that nothing would disturb the natural process of pollination of the trees' flowers. In this way maximum "set" of berries was promoted and this in turn ensured there would be plenty of berries to attract the maximum number of berry eating birds to the forest in the forthcoming hunting season.

Because of the importance of birds to the life and sustenance of these ancient Maori people, most parts of the process of forest growth and bird capture were accompanied with rituals, ceremonies and rites. Taumata atua (talismen) were ceremonially buried under the roots of selected forest trees such as the Kahikatea, Hinau, Totara and Miro. Some of these taonga were carved from the roots of famous trees, pumice or river stone. A famous Talisman, commonly used in the Rotokauri area was named Te Rongokaka. This was believed to be endowed with the tapu which promoted certain trees to fruit and attract birds.

The berries from the forest trees did not only attract birds to the area. Small mammals such as the native rat (Kiore) came to feast on fallen berries and were caught in rat traps (Rawhiti), cooked and eaten.

The berries themselves were also collected, particularly for ceremonial occasions. Kahikatea berries (Koroi) were collected from the branches when they were bright red. These were placed into calabashes or very fine baskets and either eaten as whole fruit or preserved as a pulp stored in gourds. An alternative technique for collection was to place mats under the tree and gently shake the branches. The berries which fell rolled off the mat into gourds at the base of the tree.

The Trees of the Forest

Piki Hinau. (The climbing hinau)

Hinau trees have special significance for Maori, not only because of the fruit which they bear, but also because they often represented landmarks denoting ownership of land. Because of this some Hinau trees were given specific names which often described some unique identifying feature, such as height, shape etc. of the tree itself. Maori legends record one such sacred tree in the forest block that existed between what is now Burbush and Te Kowhai Roads. This scared Hinau tree was called Te Pikihinau (the climbing

Hinau) because its' shape allowed easy climbing to collect the Hinau berries. The exact locality of this tree has been lost as it was burnt or felled by European settlers.

The berries of the Hinau tree were considered as a special delicacy by Tainui people. The brown berries were gathered by shaking the branches of the tree until the berries fell into waiting mats or by using vines to climb up the tree. Sometimes climbers would fall out of the tree to their death. That tree would then be placed under tapu.

Once the berries had been picked they were taken back to the Pa or Papakainga. There they were placed in a Kumete (wooden bowl) and beaten to a pulp with wooden pounders or beaters (Ta Tuki). This separated the fleshly part of the berry (Renga) from the stone (Karihi). The pulped Renga was then vigorously shaken in a fine woven basket (Kete or Pukete), thereby sifting out any residual stone pieces. The sifted Renga was placed into gourds, half full of water and kneaded into a thick paste. This paste was put into plaited Kiekie baskets, wrapped in Rangiora leaves and steamed in an Umu or Hangi for half a day. This produced a type of bread which resembled a large brown loaf, which was stored in a gourd lined with leaves such as Kawakawa.

Alternatively, the hinau berries were gathered in baskets (Kete) and soaked in fresh water for several months. The baskets were then vigorously shaken so that the flesh pulp (Renga) separated through the gaps in the woven baskets, leaving the stones (Karihi) in the baskets. The Renga was spread out on mats and left to dry in the sun. The dried Renga was stored and later steamed in the Umu (oven) until it was soft and then baked into patties.

Hinau berries so prepared were sometimes fed to the sick or used as offerings to appease the forest deities when Maori undertook certain ceremonies associated with berry gathering. The Hinau was a particularly highly prized delicacy when cooked as a Komeke, a type of pudding.

The bark of the Hinau was used for manufacture of a chocolate brown dye. It was pounded to a pulp and boiled in a gourd, half filled with hot water, heated using hot stones. These stones were replaced each 4-5 hours with newly heated stones using sticks as "chop sticks". The dye was used to colour flax fibre for the manufacture of garments, cloaks and mats etc.

Tawa

The berries of the Tawa tree were similarly collected and prepared by boiling for many hours to remove the poison that they contain. The kernels were removed and the resultant pulp pounded into a jelly. This jelly is reported to taste similar to a Blackcurrant. Tawa berry pulp was eaten at certain ceremonial occasions.

The hard wood of the Tawa made it ideal for the manufacture of the long, light-weight spears required for hunting birds and for thrusting through the palisades when defending the Pa.

MITIGATIONS and PROTOCOLS.

General Approach

Because of the enormous de-forestation which has occurred in the Study area, with associated conversion of the land into European type farms, most of the surface features which would mark Maori occupation of this area have been modified, destroyed or obliterated. Consequently it is no longer possible to identify the exact location of specific features, with the notable exception of the Pa on the northern side of the lake. Hence any mitigation for this area must be focused upon commemorating the life and practices of the Maori people who lived here, rather than specific preservation of particular features.

More particularly, Maori history records that this whole region was once forested with native berry bearing trees which attracted and supported large flocks of native birds. These native birds were an essential sustenance food for the people of the area. Hence, as a general approach, Tangata Whenua would wish to see, where ever possible, plantings of native berry bearing trees in sufficient numbers to attract native birds back to this area.

Specific mitigations for the Rotokauri area can not be determined until a more detailed investigation is undertaken of the area as part of any pre-development planning. However, the following "generic" mitigations would be appropriate.

The Pikihinau Reserve.

The last remnants of a once famous stand of Kahikatea trees still survives between Te Kowhai Road and Burbush Road. This stand of trees was a traditional bird hunting area and contained the famous landmark Hinau tree called Te Pikihinau.

Because of it's historic significance, Tangata Whenua wish to see this particular stand of trees protected and where possible enhanced with planting of more native trees.

Waiwhakereke (Horseshoe Lake)

This small lake was special to Maori people as it contained Kaeo, the fresh water mussel. These mussels not only provided food, but also the shells which were used for a variety of purposes. Hence, it is likely that middens were created around the lake margins. Given the waterlogged condition of this area, these middens, and the artifacts and Taonga which they typically held, may well still be preserved today.

For this reason, Tangata Whenua would wish to undertake a thorough archaeological investigation of the lake to identify possible camp sites, or wooden post structures (used for drying eels) which would evidence the former occupation of this lake by ancient Maori.

Tangata Whenua would also wish to see a traditionally carved Pourahui (boundary post) erected at the lake. This post would signify the placing of a Rahui (restriction) on the lake which would allow the life force and the food resources within the lake to be replenished and restored. The Pourahui would have to be enclosed within a fence structure to protect it from vandalism and this fence surrounded with appropriate plantings of flax species or Ongaonga (the native nettle).

Puea - Waitapu Water Springs.

The springs in the area are recorded in ancient Maori legends and Waiata. They had both a sustenance and spiritual significance.

To commemorate this, Tangata Whenua wish to see the margins of the springs planted with native ferns, Parekawakawa, Karamu and Karaka to attract native birds to the area and to signify the ritual cleansing properties of the water.

It was traditional to bury human remains and artifacts at some springs. Where Koiwi or Taonga are unearthed at or near any springs, these should be commemorated by planting a Karakeke (flax grove) and Toetoe to acknowledge the sacred significance of the site as a Tuahu (shrine) in accordance with ancient Waikato Tainui traditions.

Te Raukaka (Mooney Reserve).

Te Raukaka was another stand of Kahikatea forest, the remnants of which now stand within the Mooney Reserve. The Te Tongahuanui track, which is now covered by Rotokauri Road ran through this forest.

In commemoration of this forest, Tangata Whenua wish to have this reserve renamed Te Raukaka, along with the erection of an interpretive panel explaining how pre-European Maori snared and preserved the Kaka (parakeets) from this grove.

Lake Rotokauri.

Lake Rotokauri has many features of significance to Maori. These include the Kauri logs within the lake which give the Lake it's name, the association of the lake with the taniwha Tikiraupo, the proximity of Te Uhi pa to the lake and the human remains of Tainui ancestors who are undoubtedly buried around the margins of the lake.

Given this, it is neither appropriate nor possible to give a clear indication at present of the mitigations which will be appropriate to commemorate the many associations between the lake and Maori. This can only be determined at a future date following detailed archaeological investigation of the Lake and its hinterland.

Protocols.

Whilst there are some legendary records of ancestral bodies being buried in ancient Urupa (burial grounds) around the lake and Te Uhi Pa, the actual location of these Urupa were never documented and hence are not now known. However, it is clear that Maori traditionally buried Koiwi (human remains) virtually anywhere, without any record of where the bodies were buried. In this context, the descendants of the dead knew where the bodies were so why should they document it. Often swampy areas were favoured burial grounds and bodies were buried there as offerings to local deities, often accompanied by buried artifacts, talismen and Taonga.

It is therefore highly probable that human remains, carved artifacts or other taonga will be uncovered, particularly in swamp areas, springs and lake margins, during any future earthworks to develop and subdivide this whole area. Consequently, it will be essential that any such earthwork must be carried out following an appropriate Protocol which details the procedures to be followed in the event that such Taonga or Koiwi are uncovered. Nga Mana Toopu O Kirikiriroa can provide and explain such a Protocol when required.

ATTACHMENT 19 - Summary of Consultation

Rotokauri North	Neighbour Engagement Register				*Date: 29/04/2019*
Date	**Stakeholder**	**Personel**	**Purpose**	**Notes**	**Actions**
10/11/2019	Community	Local community	Community Consultation Open Day	This was an open day for the local community held at local Rotokauri school, the masterplan was presented and the plan change and rezoning process was explained. The community came in and inquired about the development	
11/02/2019	Landowner	Bo Ram Yu	Meet Charles and discuss Plan Change and impacts on their property	Bo Ram Yu had some concerns regarding our masterplan (roads cutting into her property), however we reassured her that the masterplan is a concept only of what could be done, and we would not do anything to her land without her permission. We also explained to her that she will be getting a free uplift in land value due to the plan change. She is now supportive of the plan change.	To keep her updated and send her a copy of the plan change request once formally submitted
21/02/2019	Landowner	James Lin	Meet Charles and discuss Plan Change and impacts on their property	Explained through the Plan Change process, James is supportive of the plan change	To keep them updated and send them a copy of the plan change request once formally submitted
14/03/2019	Landowner	Val & John Temm	Meet Charles and discuss Plan Change and impacts on their property	Explained through the Plan Change process, James is supportive of the plan change	They requested a one page summary of the plan change + plan change to be sent to them and their lawyer.
14/03/2019	Landowner	Tim & Karen Hennessey	Meet Charles and discuss Plan Change and impacts on their property	Explained through the Plan Change process, James is supportive of the plan change	To keep them updated and send them a copy of the plan change request once formally submitted
14/03/2019	Landowner	John & Bev Utting	Meet Charles and discuss Plan Change and impacts on their property	Explained through the Plan Change process, James is supportive of the plan change	To keep them updated and send them a copy of the plan change request once formally submitted

Rotokauri North	Government/Local and Regional Authorites Engagement Register				*Date: 29/04/2019*
Date	**Stakeholder**	**Personel**	**Purpose**	**Notes**	**Actions**
18/08/2017	NZTA	Jenni Fitzgerald (NZTA) Christina Walker (NZTA)	Initial Introduction to Charles/MADE as well as the Rotokauri project	Formal comments will be provided after a full ITA is completed. Need to consider SH39 NZTA highlighted the need to address road safety and promote public transport and reduce dependance on cars. NZTA has indicated key concern being out-of-sequence development lacking transport infrastructure. There is a Northern Growth Corridor MoU which needs to be taken into account during design phase.	Preliminary Traffic report prepared by TDG sent to NZTA.
9/07/2018	NZTA	Jenni Fitzgerald (NZTA) Christina Walker (NZTA)	Overview of the PPC process, August workshops and coordination of traffic peer review		
Dec-17	HCC	Council Staff	SHA Masterplanning Workshop	A 3 day workshop was held at HCC to draw up the first draft of the masterplan. Council staff were invited to partake and give input into the masterplanning.	
Feb 2017-May 2018	HCC	Luke O'Dwyer Paul Bowman Nathanael Savage Blair Bowcott	Numerous discussions on technical issues as well as commercial arrangements for the purposes of the SHA	Council has been supportive of our project, technical reports have been prepared to show there are no prohibitive constraints - servicing options are available. The design of the solutions are programmed for the plan change phase. Commercial negotiations regarding private funding as well as HCC land acqusition has begun. GSCL has committed to the delivery of 40% affordable housing to be accepted as SHA.	Council SHA decision on 10 May 2018
Aug-18	HCC	Council Staff	Masterplanning Workshop for PC	3 day workshop was held at HCC for the redraw of the masterplan based on technical developments and site investigations. This workshop resulted in the MP v4.	
28/10/2018	WDC	Council Staff	PPC and SP introduction	Overview of the proposed PPC, SP and progress going forward with SHA and PPC	

20/11/2018	WDC	Councillors	Presentation to Council Committee	Overview of the proposed PPC, SP and progress going forward with SHA and PPC	
Aug-18	MOE		Overeview and intro to Rotokauri North and pressure on existing schools	MOE to review and likely will need a school in the area	ongoing consultation with HCC

ATTACHMENT 20 - Legal Opinion by Berry Simons

BERRYSIMONS
ENVIRONMENTAL LAW

2 May 2019

Mr Charles Ma
Managing Director
Green Seed Consultants Limited
Level 15, 55 Shortland Street
Auckland Central
AUCKLAND 1010

Email: charles@made.co.nz

Dear Charles

ROTOKAURI NORTH – APPROPRIATE PROCEDURE FOR PROCESSING OF GREEN SEED'S PRIVATE PLAN CHANGE REQUEST

1. INTRODUCTION

1.1 On behalf of Green Seed Consultants Limited ("Green Seed"), Mark Tollemache has requested our advice regarding the appropriate procedure for the processing of Green Seed's private plan change request ("PPC") to the Hamilton City Council ("HCC") for the Rotokauri North development. In particular, we have been asked to address:

(a) What avenues are legally available to HCC in terms of its initial decision on how the PPC should be dealt with;

(b) Which of those is the most appropriate avenue in the circumstances; and

(c) Assuming HCC decides to either accept or adopt the PPC request, whether the request can legally be progressed on a limited notified basis.

Context

1.2 Green Seed is a subsidiary of your umbrella development company, Ma Development Enterprises ("MADE"). Green Seed's Rotokauri North development will comprise a 1450-2000 dwelling residential community. The land to be developed consists of approximately 133.11ha in Rotokauri North, located on the edge of HCC's boundary with Waikato District. The PPC will relate to a further 7ha of additional landholdings in the Rotokauri North area to provide for an integrated planning outcome, establishing a PPC area of approximately 140ha (together, "the PPC area").

1.3 On 10 May 2018, HCC resolved to recommend that Green Seed's application to have the PPC area declared a Special Housing Area ("SHA") be approved in accordance with HCC's Hamilton Special Housing Area Policy, the Hamilton Housing Accord and the Housing Accords and Special Housing Areas Act 2013 ("HASHAA"). As at the date of this advice, HCC's recommendation to declare the land a SHA is still to be confirmed via gazette notice.

1.4 The PPC area is located within the Future Urban Zone ("FUZ") and within the existing Rotokauri Structure Plan ("RSP") area in the operative Hamilton City District Plan ("District Plan"). Accordingly, it will require rezoning before it can be developed for residential purposes. Green Seed has therefore prepared a request for a PPC to achieve that rezoning, which has recently been lodged with HCC.

1.5 We understand that Green Seed intends to provide our advice to Council officers in conjunction with lodging the request for the PPC in order to assist their assessment of the request and we have borne that in mind in drafting it. We are also happy to discuss this advice directly with HCC's legal counsel, Mr Muldowney.

Purpose and scope of advice

1.6 Against that background, the purpose of this advice is to address the correct legal approach to the issues outlined above. In doing so, our advice covers the following:

(a) Background and context (Section 3);

(b) Statutory framework and factors relevant to processing Green Seed's request for a PPC (Section 4);

(c) Risk of the PPC being rejected (Section 5);

(d) Ability for HCC to process the PPC as a resource consent (Section 6);

(e) Appropriateness of adopting or accepting the PPC (Section 7);

(f) Availability of the limited notification process (Section 8); and

(g) Conclusions (Section 9).

1.7 We provide a summary of our advice in Section 2.

2. SUMMARY

Accepting the PPC is the most appropriate processing avenue

2.1 Under clause 25 of Schedule 1 to the Resource Management Act 1991 ("RMA")[1], HCC is required to deal with the PPC request by either:

(a) Rejecting the request;

(b) Converting the request to a resource consent application;

(c) Adopting the request as a Council plan change, either in whole or in part; or

(d) Accepting the request as a PPC, either in whole or in part.

2.2 As regards the availability and appropriateness of each of those options for dealing with the PPC, our view is as follows.

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[1] Assuming that Green Seed fully responds to any further information requests under clause 23 of Schedule 1 to the RMA, so that HCC is not entitled to reject the PPC in accordance with clause 23(6) of Schedule 1 to the RMA. We also note that given the date on which the PPC was lodged, all references to the RMA in this advice are to the provisions as amended by the Resource Legislation Amendment Act 2017 ("2017 Amendment Act").

No ability to reject the PPC

2.3 Clause 25(4) of Schedule 1 to the RMA establishes limited circumstances in which PPC requests can be rejected, namely that:

(a) The request is frivolous or vexatious;

(b) The substance of the request has been considered within the last two years and has been given effect to, or rejected by, the local authority or the Environment Court;

(c) The PPC is not in accordance with sound resource management practice;

(d) The PPC request would make the relevant plan inconsistent with Part 5 of the RMA; and

(e) The plan to be changed by the PPC request has been operative for less than two years.

2.4 As to whether there is a valid basis for rejecting Green Seed's PPC request on the basis of those provisions and having reviewed the PPC documentation that has been lodged with HCC, our assessment is that:

(a) The PPC request is clearly not frivolous or vexatious.

(b) Although issues as to where Hamilton's growth should be accommodated were considered during the hearings and appeals on the District Plan, those hearings were completed in October 2014 and all appeals relating to the FUZ and RSP were resolved by October 2016. Further, the consideration of those wider strategic-growth issues only involved a high-level assessment as to the appropriate nature and form of urban growth within the Rotokauri North area, as required to determine the RSP. The PPC represents the next stage of implementing the RSP, rather than a reconsideration or attempt to overturn the decisions that were made in that regard. It is therefore unlikely that HCC could validly reject the PPC on the basis that the substance of the PPC has been considered within the last two years.

(c) It would not be appropriate for the Council to reject the PPC request as not being in accordance with sound resource management practice, given that:

(i) The PPC is supported by comprehensive expert assessments which demonstrate that Rotokauri North is an appropriate location for residential development, consistent with the policy directives of both the *Future Proof Strategy: Planning For Growth*, November 2017 ("Future Proof") and the District Plan.

(ii) As also outlined in the expert assessments that support the PPC, the Rotokauri North development will achieve the sustainable management purpose of the RMA.

(iii) The PPC does not seek to change plan provisions that are about to be superseded. While the PPC relates to land that has recently been subject to a structure planning exercise, the PPC does not seek to overturn or enable development that is inconsistent with the RSP. Rather, it is the next necessary step to implementing the RSP.

(iv) Green Seed is not seeking to rezone the land without providing the necessary infrastructure to service the proposed development. The expert reports accompanying the PPC demonstrate that the proposed development will be adequately served by infrastructure.

(d) Given that the District Plan, Future Proof and the RSP identify Rotokauri as being suitable for residential development of the nature Green Seed is proposing, the PPC does not make the District Plan inconsistent with Part 5 of the RMA (regarding the purpose and contents of planning instruments including district plans).

(e) Although the District Plan which Green Seed is seeking to change will have been fully operative for less than two years, the Council does not have an unfettered discretion to reject PPC requests on this ground but must exercise the discretion in a principled manner, consistent with sound resource management practice.

Inappropriate to deal with the PPC as a resource consent application

2.5 We understand that there has been no suggestion that HCC may deal with the PPC by converting it to a resource consent application.

2.6 In any event, we consider this would not be an appropriate or reasonable way of dealing with the PPC. This is on the basis that dealing with the PPC as a resource consent application would be contrary to good planning and resource management practice for the following reasons:

(a) Green Seed is proposing a large-scale urban development which will unavoidably have more than minor effects on the environment and is inconsistent with the objectives and policies of the PPC area's current zoning as FUZ.

(b) Proceeding with the development by way of a resource consent, without having the land rezoned for residential purposes, could potentially establish a precedent that may undermine the integrity of the District Plan.

(c) Green Seed has sought that the land be declared a SHA, so that it can utilise the consenting process under the HASHAA once its land is rezoned. As noted, HCC has resolved to accept this request. Determining that the PPC should instead be progressed as a resource consent under the RMA would be inconsistent with HCC's prior acceptance that the PPC area should be declared a SHA.

PPC request should be accepted

2.7 HCC is empowered to determine that it should deal with the PPC by either accepting or adopting it. In the present circumstances, we understand that Green Seed would prefer that PPC is adopted by HCC, on the basis that this process:

(a) Signals the Council's endorsement of and support for addressing the need for housing supply in Hamilton, via the Rotokauri North development; and

(b) Would result in the PPC being a "proposed plan" in terms of section 43AAC of the RMA. This in turn means that agencies considering applications for and submissions on Qualifying Developments ("QDs") under section 34 of the HASHAA are required to have regard to the PPC. By contrast, PPC requests that are simply accepted for processing are not included in the definition of a "proposed plan" for the purposes of the RMA. The ability to have regard to the PPC for the purposes of consenting processes under the HASHAA may therefore be less certain. It may also result in design outcomes advanced by the PPC being given considerably less weight than outdated outcomes expressed in the RSP.

2.8 However, we also understand that HCC's preference is that the PCC be accepted, rather than adopted. In our view, this avenue is also legally available to HCC, should it consider that option is more appropriate.

2.9 If HCC decides to deal with the PPC other than by adopting or accepting it (and in particular, if it tried to reject the PPC), this would be subject to challenge by way of appeal to the Environment Court.

The PPC can be processed on a limited notified basis

2.10 If the PPC is adopted, HCC is required[2] to notify the PPC in accordance with either clause 5 or 5A of Schedule 1 to the RMA within 4 months of the date on which it is adopted.

2.11 If the PPC is accepted, HCC is required[3] to process the PPC in accordance with Part 1 of Schedule 1 (which includes clauses 5 and 5A), with all necessary modifications and except as otherwise modified by the remaining sub-clauses of clause 29. In our view, none of these provisions preclude the ability to limited notify a PPC request that is accepted rather than adopted.

2.12 Accordingly, we consider that the limited notification option is available for all PPC requests, whether the request is adopted or accepted. We note that, consistent with this conclusion, the Auckland Council has used the limited notification provisions for Plan Change 8 ("PC8"), which was a PPC that the Council accepted (not adopted)[4].

2.13 Under clause 5A(2) of Schedule 1 to the RMA, a local authority may give limited notification of a PPC if it is able to identify all the persons "directly affected" by the PPC. The only judicial guidance as to the meaning of "directly affected" in this context is that it should be applied on a case-by-case basis.

2.14 In the absence of any further guidance, we consider that it is appropriate to apply the following principles in determining who may be "directly affected" by Green Seed's PPC request:

(a) To determine the category of people "directly affected" by a PPC request, it is not appropriate to consider whether they are "affected persons" in respect of a resource consent application because the statutory tests are intentionally different.

(b) That said, it will still be relevant to consider the nature of the effects that may arise as a result of the PPC, in considering the extent of directly affected parties. For example, in making its notification decision on PC8, the Auckland Council considered all those who could potentially suffer amenity and / or traffic effects as a result of the proposed re-zoning to be "directly affected" parties[5].

(c) It is unlikely that all parties that will be directly affected by a PPC request can be identified, where a PPC covers areas accessed by, or includes rules that affect, the general public.

2.15 In the present circumstances, we consider that it is possible to identify all persons who may be "directly affected" by Green Seed's PPC request for the following main reasons:

(a) The PPC land is already zoned FUZ and subject to the RSP, both of which went through a robust submissions and hearing process in accordance with Schedule 1 to the RMA. This process has determined that the land is appropriate for urban development. Thus, the PPC relates to the specific methods for implementing this development, rather than being an opportunity to revisit the issue of whether the land can or should be used for residential purposes.

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2 Clause 25(2)(a)(i) of Schedule 1 to the RMA.
3 Clause 29(1) of Schedule 1 to the RMA.
4 PC8 (Private): King's College, Notification Assessment, Auckland Council, 24 November 2017.
5 Ibid.

(b) The PPC is supported by a comprehensive suite of expert assessments which outline the potential effects of the proposed re-zoning and how these are proposed to be addressed. Having regard to these reports, it is possible to identify the immediately adjacent landowners and other key stakeholders (for example, the New Zealand Transport Agency etc.) who may be directly affected by the PPC.

(c) The PPC land is already subject to the Rotokauri Integrated Catchment Management Plan ("RICMP") and is supported by a draft sub-catchment Integrated Catchment Management Plan ("ICMP") to implement specific stormwater solutions.

(d) The PPC does not:

(i) Apply to any publicly available land or areas; or

(ii) Include any rules that manage resources with communal value.

2.16 On that basis, we are confident that the persons who will be "directly affected" by the PPC is a readily identifiable category. We therefore consider that HCC planners can safely conclude the request can appropriately be processed on a limited notified basis.

2.17 The RMA does not contain any provisions for objecting to or appealing a local authority's decision regarding notification of a PPC request. Should Green Seed be unhappy with HCC's notification decision, the only legal avenue to challenge that decision is by way of application to the High Court for judicial review.

3. BACKGROUND AND CONTEXT

3.1 In 2007, HCC's Growth Model indicated that it was necessary for additional land to be brought forward to meet the City's ongoing development needs. Rotokauri, comprising approximately 1,000 hectares at Hamilton's north-west fringe, was identified as appropriate for future urban development at this time.

Rationale for the Rotokauri North development – the need for housing

3.2 In terms of the need for rapid expansion of housing in Hamilton, Hamilton's Housing Market and Economy Growth Indicator Report (March 2017) notes that:

(a) Over 2015 and 2016, Hamilton has experienced its strongest residential housing demand since reporting began, both in the volume of new dwellings and average sale prices;

(b) Housing affordability has deteriorated and Hamilton is now less affordable than it was during the last peak in 2007;

(c) Wages have not been growing at the same rate as house prices and the average house price for the 12 months to February 2017 had risen 17% compared with a year earlier; and

(d) Hamilton's average house price growth has exceeded that of the average growth for both Auckland and New Zealand respectively.

Suitability of the PPC area for urban development

3.3 HCC has prepared the RSP to guide the long-term development of the Rotokauri area. The RSP provides a high level and logical framework to guide subsequent development

of the PPC area. Green Seed is supplementing this with a more detailed master planning process to determine the final development pattern.

3.4 As recognised in the RSP, the PPC area has a number of attributes which make it ideal for residential development. Importantly, the PPC area exists in large enough parcels to allow investors to agglomerate it into an overall development area. As with MADE's flagship Auranga project in Auckland, this means MADE / Green Seed can lead and fund the provision of infrastructure, rather than having to wait for HCC to provide infrastructure trunk mains in the future.

3.5 A significant amount of work has already been undertaken by HCC to confirm the land is suitable for residential development. In particular, the RICMP has already proven the feasibility of the land to be urbanised.

3.6 The PPC area is currently in a mix of rural residential properties and medium to larger scale sites associated with pastoral and horticultural activities. Investors associated with Green Seed have secured or have options on approximately 133ha of the PPC area, which falls into distinctive hydrological catchments.

3.7 Utilising the work already undertaken for the RICMP, Green Seed has been investigating the feasibility of servicing the PPC area, to enable its development to be advanced ahead of the time frames identified in HCC's various strategic documents for Rotokauri. This investigation has included Green Seed purchasing land to enable stormwater to be managed (through securing the downstream sites) and for infrastructure and roading connections to be achieved (though securing sites with key road frontages).

3.8 The upshot is that:

(a) The PPC area can be serviced and developed in advance of HCC's programme, reducing costs to HCC and the community, while enabling much needed housing development to be brought forward; and

(b) The Rotokauri North development is not reliant on any funding from the Housing Infrastructure Fund nor on any other works being completed by third parties, which may cause delays in construction of the necessary infrastructure to deliver housing.

3.9 HCC sought public feedback on Green Seed's SHA application during a two-stage consultation process from November 2017 to January 2018. The New Zealand Transport Agency, Waikato-Tainui and the Ministry of Education all provided feedback which either supported the proposal or confirmed that there was no impediment to the PPC area being declared a SHA.

Provision of affordable housing

3.10 MADE / Green Seed is a strong advocate for the HASHAA's focus on housing supply and affordable housing. For Auranga, MADE has made a public commitment to deliver a range of housing opportunities and price points beyond the minimum statutory requirements. Auranga is delivering 25% of the housing product at a size of three bedrooms or less, and voluntarily providing a total of 15% of homes at the Auckland affordability standard. In short, MADE has demonstrated its track record of being able to deliver affordable housing through Auranga.

3.11 HCC has sought that SHAs achieve 10% affordable housing. For Green Seed's Rotokauri North development, this equates to up to 200 affordable homes.

Why a PPC request is required for the PPC area

3.12 Sections 61(1) and (2) of the HASHAA only provide for plan changes to be made under that legislation so that resource consent applications can be made for activities that

would otherwise be a prohibited activity under the relevant plan. The existence of prohibited activities is therefore a prerequisite to being able to apply to rezone the land for residential use under the HASHAA.

3.13 Despite HCC's recommendation that the PPC area be declared a SHA, the District Plan does not contain any prohibited activities.

3.14 Green Seed could lodge a series of QD applications under the HASHAA while the land is still zoned Future Urban. However, that approach is not considered appropriate, because residential development would be contrary to the policies and objectives of the FUZ, the purpose of which is to "control subdivision and land use, and...avoid fragmentation of the land", in order to preserve its potential for future urban development.

3.15 In any event, HCC would still need to introduce a "tidy up" plan change at some point, to give the PPC area a live urban zone. In addition, QD resource consents are limited to a one-year expiry under the HASHAA and given that it will take 10 to 15 years to complete the development of Rotokauri North, a longer-term planning approach is warranted.

3.16 On this basis, both HCC and Green Seed would prefer that a PPC be lodged and progressed concurrently with applications for QDs.

4. STATUTORY FRAMEWORK AND FACTORS RELEVANT TO PPC REQUEST

Requirements for requesting a PPC

4.1 Under clause 21 of Schedule 1 to the RMA, any person may lodge a request for a PPC. Clause 21 provides as follows:

> *"**21 Requests***
>
> *(1) Any person may request a change to a district plan or a regional plan (including a regional coastal plan).*
>
> *(2) Any person may request the preparation of a regional plan, other than a regional coastal plan.*
>
> *(3) Any Minister of the Crown or any territorial authority in the region may request a change to a policy statement.*
>
> *(3A) However, in relation to a policy statement or plan approved under Part 4 of this schedule, no request may be made to change the policy statement or plan earlier than 3 years after the date on which it becomes operative under clause 20 (as applied by section 80A(2)(a)).*
>
> *(4) Where a local authority proposes to prepare or change its policy statement or plan, the provisions of this Part shall not apply and the procedure set out in Part 1, 4, or 5 applies.*
>
> *(5) If a request for a plan change is made jointly with an application to exchange recreation reserve land (as permitted by section 65(4A) or 73(2A)), the application must be—*
>
> *(a) Processed, with the request for a plan change, in accordance with this Part, other than clauses 27 and 29(4) to (8); then*
>
> *(b) Decided under section 15AA of the Reserves Act 1977."*

4.2 Clause 22 of Schedule 1 to the RMA requires that a PPC request must:

(a) Be made to the appropriate local authority in writing.

(b) Explain the purpose of and reasons for the proposed change.

(c) Describe any anticipated environmental effects of the proposed change, taking into account clauses 6 and 7 of Schedule 4 to the RMA.

(d) Include an evaluation in accordance with section 32 of the RMA for the proposed change.

4.3 The Council may request further information and commission reports in respect of the plan change request and modify the request (with the applicant's permission) as a result[6].

Council's options for dealing with PPC request

4.4 Under clause 25 of Schedule 1 to the RMA, HCC has 30 working days after receiving the necessary information to consider the PPC request and how it should be dealt with. In that regard, the Council can decide to:

(a) Adopt the request as a Council plan change, either in whole or in part[7];

(b) Accept the request as a PPC, either in whole or in part[8];

(c) Convert the request to a resource consent application; or

(d) Reject the request.

4.5 These are HCC's only options for dealing with the PPC and it must decide to use one of them. In the circumstances, Green Seed's preference is that the PPC be adopted by HCC and processed as a Council-initiated plan change, for the reasons outlined in Section 7 below. However, in our view HCC is also legally able to accept the PPC request, if it considers that more appropriate.

4.6 The Council's ability to reject a PPC request is limited to the grounds set out in clause 25(4) of Schedule 1 to the RMA, which states:

> *"(4) The local authority may reject the request in whole or in part, but only on the grounds that—*
>
> *(a) The request or part of the request is frivolous or vexatious; or*
>
> *(b) Within the last 2 years, the substance of the request or part of the request—*
>
> *(i) Has been considered and given effect to, or rejected by, the local authority or the Environment Court; or*
>
> *(ii) Has been given effect to by regulations made under section 360A; or*

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6 Clauses 23 and 24 of Schedule 1 to the RMA.

7 This implies the Council generally supports the proposal and recognises the extensive work that has already been undertaken by the applicant. It also means Council would become responsible for the processing costs. However, the Council then gains complete control of the process and could theoretically modify or withdraw the request at a later stage without the applicant having any say in the matter.

8 This means that the Council agrees that the PPC can proceed to notification. It remains a PPC with Council administering the legal process and the applicant generally bearing the costs. However, there may be some agreement (or Council policy) about cost sharing where the plan change request includes an element of public benefit / interest.

(c) The request or part of the request is not in accordance with sound resource management practice; or

(d) The request or part of the request would make the policy statement or plan inconsistent with Part 5; or

(e) In the case of a proposed change to a policy statement or plan, the policy statement or plan has been operative for less than 2 years."

4.7 If HCC rejects the PPC request on any of the grounds included in clause 25(4) of Schedule 1 to the RMA, Green Seed has the right to appeal that decision to the Environment Court under clause 27(1A)(d) of Schedule 1 to the RMA.

Criteria for determining PPC requests

4.8 If the PPC is adopted by HCC, then in accordance with clause 25(2)(a) of Schedule 1 to the RMA:

(a) HCC must notify the request in accordance with clause 5 or 5A of Schedule 1 to the RMA within 4 months of the request being adopted;

(b) The provisions of Part 1 or 4 of Schedule 1 to the RMA must apply; and

(c) The request has legal effect once notified.

4.9 If the PPC is accepted under clause 25(2)(b) of Schedule 1 to the RMA, the procedure under clause 29 of Schedule 1 to the RMA applies, which (as relevant) states:

*"**29 Procedure under this Part***

(1) Except as provided in subclauses (1A) to (9), Part 1, with all necessary modifications, shall apply to any plan or change requested under this Part and accepted under clause 25(2)(b).

(1A) Any person may make a submission but, if the person is a trade competitor of the person who made the request, the person's right to make a submission is limited by subclause (1B).

(1B) A trade competitor of the person who made the request may make a submission only if directly affected by an effect of the plan or change that—

(a) Adversely affects the environment; and

(b) Does not relate to trade competition or the effects of trade competition.

..."

4.10 In either case, the PPC would be determined having regard to the matters outlined in sections 31, 32 and 72 to 76 of the RMA, to the extent these are relevant to the PPC[9]. In summary, these include whether the PPC:

(a) Accords with HCC's functions under section 31 of the RMA and will assist HCC in carrying out those functions so as to achieve the RMA's purpose;

(b) Accords with any regulations (including national environmental standards);

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[9] As confirmed in *Colonial Vineyard Limited v Marlborough District Council* [2014] NZEnvC 55 (EC), at paragraph 17.

(c) Gives effect to any relevant national or regional policy statement (where those are operative);

(d) Has regard to:

(i) Other higher order planning documents;

(ii) Management plans and strategies under other Acts; and

(iii) The actual and potential effects of activities on the environment;

(e) Is the most appropriate way to achieve the District Plan's objectives, by identifying other reasonably practicable options for achieving those objectives and summarising the reasons for deciding on the provisions (including zoning) sought by the PPC; and

(f) Contains a level of detail that corresponds to the scale and significance of the environmental, economic, social and cultural effects that are anticipated from implementing the PPC.

4.11 Clauses 10 and 29(4) of Schedule 1 to the RMA respectively provide that after considering the PPC and undertaking a further evaluation of the PPC in accordance with section 32AA of the RMA, HCC:

(a) May decline or approve the PPC and may make modifications if approving the PPC; and

(b) Must give reasons for its decision.

5. RISK OF PPC BEING REJECTED UNDER CLAUSE 25(4)

5.1 There is a presumption that PPC requests which have "more than minimal planning worth" should be accepted for processing so that they may be determined on their merits[10]. As the High Court noted in *Malory Corporation Limited v Rodney District Council,* this means that[11]:

> *"...unless one of the limited rejection grounds in clause 25(4) exists, the request must proceed to public notification, submissions, and a hearing in accordance with the well-established procedures of the Act."*

5.2 As noted, the grounds for rejecting a PPC in clause 25(4) of Schedule 1 to the RMA are relatively limited. We address each of those grounds as follows.

Clause 25(4)(a) - Is the PPC "frivolous or vexatious"?

5.3 Having reviewed the final PPC documents, we do not consider Council can reject the PPC on the basis that it is frivolous or vexatious[12]. The PPC is a comprehensive document that is fully supported by a suite of technical reports prepared by independent experts at significant expense. The PPC has also been carefully drafted to be appropriate for the PPC area, as well as consistent with the existing District Plan provisions, Future Proof and the application to declare the PPC area a SHA, which HCC has supported.

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10 See for example *Countdown Properties (Northlands) Ltd v Dunedin City Council* [1994] NZRMA 145 (HC), at paragraph 169.

11 [2010] NZRMA 392 (HC), at paragraph 65.

12 Clause 25(4)(a).

Clause 25(4)(b) – Has the substance of the PPC request been considered in the last two years?

5.4 The Council may reject the PPC request under clause 25(4)(b) of Schedule 1 if the substance of the PPC has been considered within the last two years.

5.5 The proper application of clause 25(4)(b) was considered by the Environment Court in *Malory Corporation*, where it held that[13]:

> *"...cl 25(4) is not focused on the procedure adopted, but rather upon the substance. The very use of the word substance in (b) demonstrates to us that the intention of the Act is that where the subject matter has been considered by the council or the Court within two years, then the council may reject the application. The appeal process forms a proper check to ensure that such a limitation is not abused."*

5.6 In that case, the Court placed significant weight on the fact that a comprehensive structure plan process had been undertaken within the preceding two years, which specifically considered the applicant's proposal, along with other proposals for the relevant area. In that regard, the Court accepted[14] that the Council did not reject the request simply because it was inconsistent with their conclusions as to the appropriate growth for the area, but because the substance of the matter had been considered by the Council in detail in a process which parallels the public and participatory process envisaged for a plan change[15].

Analysis – Rotokauri North

5.7 In our view, there is a strong argument that HCC would not have a robust basis for rejecting Green Seed's PPC on the grounds that the substance of the request has been considered in the last two years. In that regard, decisions regarding the scope and location of FUZ land under the District Plan were made in 2014 and appeals regarding those provisions (as well as the RSP) were resolved prior to November 2016.

5.8 It is accepted that issues as to Hamilton's growth and the appropriate location of this were extensively canvassed and the subject of detailed consideration in the District Plan process and the development of the RSP.

5.9 However, that assessment has only extended to considering whether the area should be identified as a greenfields location appropriate for future urban development (and it has been accepted that it should). To date there has not been any detailed consideration of, or decisions made regarding, the nature and form of future urban growth at Rotokauri North.

5.10 Further, Green Seed is not seeking to implement a proposal that is inconsistent with or which will undermine the RSP (for example, by seeking to extend the area that is zoned FUZ). To the contrary, its PPC simply represents the next stage of implementing that structure plan.

Clause 25(4)(c) – Does the PPC accord with sound resource management practice?

5.11 In *Hall v Rodney District Council*[16], the (then) Planning Tribunal considered the factors that may indicate that a plan change request is not consistent with the statutory purpose of the RMA, as follows[17]:

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13 [2010] NZRMA 1 (EC), at paragraph 39.
14 And this was subsequently upheld by the High Court on appeal.
15 Supra Note 13, at paragraph 40.
16 [1995] NZRMA 537 (PT).
17 Ibid, at page 12.

> *"It is our understanding of the law…that on a privately promoted plan change a judgment needs to be made whether the most appropriate means of achieving the statutory purpose is by the proposed change or by some other method such as on a forthcoming review. A relevant consideration in making that judgment is that the Resource Management Act provides (as the former regime did not) for privately initiated plan changes, so a general attitude of refusing such changes on the basis of a forthcoming review could frustrate the opportunity that Parliament has deliberately made. Other relevant considerations are relative efficiency and effectiveness (see 32(1)(c)); extent of implications for a wider area, possible prejudice to other interests and the need for general review. That is not necessarily an exhaustive list, nor with those considerations necessarily be relevant in every case."*

5.12 In some limited circumstances, the timing of a PPC request may mean that to process it would be inconsistent with sound resource management practice. The Environment Court in *Malory Corporation* considered that procedural or timing issues may give rise to issues about whether a proposal represents "sound resource management practice". The Court said in this regard[18]:

> *"We have come to the conclusion that cl 25 clearly contemplates that plan changes should represent sound resource management practice in terms not only of substance, but also in terms of timing. This essentially is a matter of discretion and degree."*

5.13 However, on appeal the High Court, did not go so far, stating[19]:

> *"In general terms I think it is drawing a long bow to hold that a timing issue (assuming a request's timing is not frivolous or vexatious) will result in an otherwise unobjectionable proposal offending."*

5.14 Nevertheless, in that case, the High Court considered that the Environment Court was correct to find that the timing of the PPC request did not represent sound resource management practice, in particular because:

(a) The PPC request sought to change an operative plan that was shortly to be superseded; and

(b) As outlined above, it also related to an area that had recently been the subject of a detailed structure planning process.

5.15 It has also been held (in the context of resolving plan references) that[20]:

> *"It is bad resource management practice and contrary to the purpose of the Resource Management Act – to promote the sustainable management of natural and physical resources – to zone land for an activity when the infrastructure necessary to allow that activity to occur without adverse effects on the environment does not exist and there is no commitment to provide it."*

Analysis – Rotokauri North

5.16 Having reviewed the final PPC documents and proposed plan provisions, we are firmly of the view that the PPC request for Rotokauri North accords with (and promotes) sound resource management practice. In that regard, the PPC:

(a) Is supported by a suite of comprehensive expert assessments, which demonstrate:

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18 Supra Note 13, at paragraph 67.
19 Supra Note 11, at paragraph 98.
20 *Foreworld Developments Limited v Napier City Council* W008/2005 (EC), at paragraph 15.

(i) Why Rotokauri North is an appropriate location for the proposed residential development, consistent with the policy directives from the District Plan and Future Proof;

(ii) How the proposed development will achieve the sustainable management purpose of the RMA; and

(iii) That the proposed development can be appropriately serviced by all relevant infrastructure, which will be developer led and funded.

(b) Is not seeking to alter plan provisions that are due to be superseded.

5.17 While the PPC relates to land that has recently been subject to a structure planning exercise, the PPC does not seek to overturn or enable development that is inconsistent with the RSP. Rather, it is the next necessary step to implementing the RSP.

5.18 On that basis, we do not consider that HCC would have a valid or credible basis for rejecting the PPC request on the grounds that it would not be in accordance with sound resource management practice and that any decision by HCC to do so on that basis would be vulnerable to legal challenge.

Clause 25(4)(d) - Would the PPC result in the District Plan being inconsistent with Part 5 of the RMA?

5.19 We do not consider that the PPC would result in the District Plan being inconsistent with Part 5 of the RMA[21] (regarding the purpose and contents of planning instruments including district plans). That is on the basis that that the District Plan, RSP and Future Proof all indicate that Rotokauri North has been identified as being suitable for residential development, as Green Seed is proposing. Indeed, the PPC has been carefully drafted in light of this legal requirement to have precisely the opposite effect.

5.20 Further, the PPC request clearly demonstrates how it will meet the relevant criteria from Part 5 of the RMA and sections 72 to 76 of the RMA in particular.

Clause 25(4)(e) – Has the District Plan been operative for less than two years?

5.21 Although the Council is empowered to reject a plan change request if the plan has been operative for less than two years[22], that power is not unfettered.

5.22 The Environment Court considered the scope of the Council's power to reject a PPC request under clause 25(4)(e) in *Kerikeri Falls Investments Limited v Far North District Council*[23]. The Council argued that it had an unfettered statutory power under clause 25(4)(e) to reject PPC requests on the basis that the relevant planning instrument has been operative for less than two years. In this regard, the Council said that time should be given for the new plan to "settle in" and this would help the Council identify unforeseen implementation issues.

5.23 The Court disagreed with this approach, stating[24]:

> *"[38] "We agree with the submissions of counsel for the appellants that the 2 years in clause 24(4)(e) is a maximum, and the discretion to reject a request is not an unfettered one.*
>
> ...

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21 Clause 25(4)(d).
22 Clause 25(4)(e).
23 [2010] NZRMA 425.
24 Ibid, at paragraphs 38 and 42.

[42] We agree that the grounds in sub-clause (4), apart from (e) are very narrow, and that there is no sensible basis for holding that (e) suddenly introduces powers of a wide and unrestricted kind."

5.24 Ultimately, the Court held that the decision to accept or reject the plan change in circumstances where the plan has been operative for less than two years must be undertaken on a principled basis consistent with sound resource management practice and the purpose of the RMA.

Analysis – Rotokauri North

5.25 The District Plan has been fully operative for less than two years, having been made operative on 18 October 2017. We nevertheless consider that Green Seed's PPC faces only minimal (if any) risk of rejection on this basis.

5.26 Having regard to the applicable *Kerikeri Falls* criteria, this is for the following reasons:

(a) The Council is required to accept plan changes which have "more than minimal" planning worth and in our view, the PPC request satisfies that test by a considerable margin.

(b) For the reasons outlined above, we consider that there is a robust basis for being satisfied that the PPC request accords with sound resource management practice and will promote the purpose of the RMA.

5.27 In light of the above, we do not consider that HCC will have credible or valid grounds for rejecting the PPC request on the basis that the request has been made within two years of the District Plan becoming operative and that any decision to reject the PPC on that basis would be vulnerable to legal challenge.

6. ABILITY FOR HCC TO PROCESS THE PPC AS A RESOURCE CONSENT UNDER CLAUSE 25(3)

6.1 Mark Tollemache has advised that there has been no suggestion that HCC might convert the PPC request to a resource consent application and we do not consider it would be appropriate or reasonable to do so. However, we address that issue briefly for completeness.

6.2 In our view, dealing with the PPC as a resource consent application would be contrary to good planning and resource management practice for the following reasons.

6.3 First, Green Seed is proposing a large-scale urban development, of approximately 1450-2000 dwellings, which would take between 10 to 15 years to complete. Such a proposal will unavoidably have more than minor effects on the environment. It would be inconsistent with the objectives and policies of its land's current zoning as FUZ, the purpose of which is described in clause 14.1(a) of the District Plan as follows:

"The Future Urban Zone provides potential urban development areas for Hamilton's long term growth. It controls subdivision and land use, and seeks to avoid fragmentation of the land. Fragmentation and inappropriate land uses can make future conversion of land to urban use difficult…Urban growth is controlled by the preparation of structure plans, which determine if urbanisation is appropriate, its form, any necessary phasing and infrastructure requirements and land use controls."

6.4 Consistent with that purpose, the objectives for the FUZ include the following:

"Objective 14.2.1

Subdivision, activities and development are compatible with the existing rural character and amenity, which is:

i. Open pasture.

ii. Pockets of vegetation.

iii. Low-density development.

iv. Predominantly farming activities.

Objective 14.2.2

Subdivision, activities and development does not compromise future urban use or the potential of land to be used for farming activities."

6.5 Second, proceeding with the development by way of a resource consent, without having the land rezoned for residential purposes, could potentially establish a precedent which results in the integrity of the District Plan being undermined.

6.6 Third, Green Seed has sought that the land be declared a SHA, so that it can utilise the consenting process under the HASHAA once its land is rezoned. As noted, HCC has resolved to accept this request. Determining that the PPC should instead be progressed as a resource consent under the RMA would be inconsistent with HCC's prior acceptance that the PPC area should be declared a SHA.

6.7 On the basis of the above, we consider that it would be inappropriate and unreasonable for HCC to determine that it should deal with the PPC by progressing it as a resource consent application, rather than a PPC.

7. APPROPRIATENESS OF ACCEPTING OR ADOPTING THE PPC UNDER CLAUSE 25(2)

7.1 In dealing with the PPC, we consider that HCC is legally entitled to accept or adopt the PPC. We understand that Green Seed's preference is for the PPC to be adopted, for the following reasons.

7.2 First, HCC's adoption of the PPC would clearly signal the Council's endorsement of and support for projects (such as Rotokauri North) which address the need for housing in Hamilton. HCC has already publicly expressed this view, both in media reports[25] and by unanimously voting that the PPC area should be declared a SHA. Having HCC extend this support by adopting the PPC would:

(a) Be consistent with HCC's previous decision to have the PPC area declared a SHA;

(b) Further signal the strength of its commitment to addressing the need for housing in Hamilton;

(c) Acknowledge that Green Seed has proposed a District Plan objective, policy and rule for affordable housing, an approach unprecedented in Hamilton; and

(d) Assist the Hearings Panel when it subsequently comes to determine the PPC on its merits.

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[25] For example, "Homes for Rotokauri: Fast-track housing proposal clears another hurdle", Stuff article, 13 May 2018.

7.3 Second, HCC's adoption of the PPC would have the effect of bringing the PPC within the definition of a "proposed plan" in section 43AAC of the RMA whereas a PPC that has only been accepted for processing does not.

7.4 The significance of this distinction is that agencies considering applications for and submissions on QDs under section 34 of the HASHAA are required to "have regard to" a proposed plan (as defined in the RMA) as the third priority in the list of five matters that are relevant to their discretion under that section. Section 34 of the HASHAA provides as follows:

> *"34 Consideration of applications*
>
> *(1) An authorised agency, when considering an application for a resource consent under this Act and any submissions received on that application, must have regard to the following matters, giving weight to them (greater to lesser) in the order listed:*
>
> *(a) The purpose of this Act:*
>
> *(b) The matters in Part 2 of the Resource Management Act 1991:*
>
> *(c) Any relevant proposed plan:*
>
> *(d) The other matters that would arise for consideration under—*
>
> *(i) Sections 104 to 104F of the Resource Management Act 1991, were the application being assessed under that Act…"*
>
> (Emphasis ours.)

7.5 Accordingly, if HCC adopts the PPC, it becomes a matter which must be given particular weight in considering QD applications. By contrast, PPC requests that are accepted for processing fall to be considered as an "other matter" under section 34(1)(d) of the HASHAA and thus may be accorded less weight in the subsequent QD process.

7.6 Given the PPC will be subject to robust consideration via submissions and hearing whichever route is adopted, we consider that it is appropriate to ensure that the final provisions can be given as much weight as possible in the QD process and this will occur if HCC adopts, rather than accepts, the PPC.

7.7 Adopting the PPC also means that the PPC rules will have legal effect from the date of public notification, in accordance with clause 25(2)(a)(iii) of Schedule 1 to the RMA. By contrast, it is arguable that the rules of a PPC which is accepted can only have legal effect once they are operative.

7.8 However, we understand that HCC's preference is that the PCC be accepted, rather than adopted. In our view, this avenue is also legally available to HCC, should it consider that option is more appropriate.

7.9 If HCC decides to deal with the PPC other than by adopting or accepting it (and in particular, if it tried to reject the PPC), this would be subject to challenge by way of appeal to the Environment Court.

8. AVAILABILITY OF LIMITED NOTIFICATION PROCESS

8.1 Clause 25(2)(a)(i) of Schedule 1 to the RMA provides that where a PPC is adopted:

(a) The provisions of Part 1 or 4 of Schedule 1 to the RMA apply; and

(b) The local authority is required to either publicly or limited notify the PPC within 4 months, in accordance with either clause 5 or 5A of Schedule 1 to the RMA.

8.2 If the PPC is accepted, the PPC must be processed in accordance with Part 1 of Schedule 1 (which includes clauses 5 and 5A)[26], with all necessary modifications and except as modified by the remaining sub-clauses of clause 29. Limited notification is therefore also available for PPC that are accepted, unless that is precluded by clauses 29(1A) to (9) of Schedule 1 to the RMA. In our view, none of these provisions preclude the ability to limited notify a PPC request that is accepted rather than adopted.

8.3 We therefore consider that limited notification is a potentially available option for all PPC requests, whether the request is adopted or accepted.

8.4 Under clause 5A(2) of Schedule 1 to the RMA, a local authority may give limited notification of a PPC if it is able to identify all the persons "directly affected" by the PPC. The term was (deliberately) not defined when the limited notification provisions were introduced into Schedule 1 to the RMA by the 2017 Amendment Act. Given the provisions only came into force in April 2017, there is also not yet any judicial guidance on those specific provisions.

8.5 However, the phrase "directly affected" is used elsewhere in the RMA[27]. It is also used in related legislation[28] and has been the subject of judicial consideration in this context.

8.6 The leading case in this regard is *Ngatiwai Trust Board v New Zealand Historic Places Trust (Pouhere Taonga)*[29], in which the High Court held that the words 'directly affected' "apply to the particular circumstances of each case". This guidance was acknowledged in the report from the Local Government and Environment Committee which considered the Resource Legislation Amendment Bill 2015 ("the Bill"), which stated[30]:

> *"We do not consider it appropriate to specify in this legislation a definition of "directly affected", as we consider that this would be inhibiting. Additionally, this term is already present in clause 5 of Schedule 1 and has so far been interpreted by practitioners on a case-by-case basis. The High Court has also previously determined that the most suitable approach is on a case-by-case basis."*

8.7 Applying the *Ngatiwai Trust Board* decision in the context of a heritage designation, the High Court accepted that persons who could be said to be "directly affected" by a decision could include[31]:

(a) Any person with a proprietorial interest in land;

(b) Tangata whenua who are linked to a site through their ancestry; and

(c) Certain other persons without a proprietorial interest in land, who nonetheless have an attachment or connection to the land to sufficiently differentiate them from the public at large.

8.8 Persons without a direct proprietorial interest who have been, or could be, considered directly affected include:

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26 Clause 29(1) of Schedule 1 to the RMA.
27 See for example sections 37A and 317 of the RMA and clause 5 of Schedule 1 to the RMA.
28 See for example sections 45 and 59 of the Heritage New Zealand Pouhere Taonga Act 2014.
29 [1998] NZRMA 1 (HC), at page 13.
30 Report from the Local Government and Environment Committee on the Resource Legislation Amendment Bill, at page 28.
31 *Campaign for a Better City v New Zealand Historic Places Trust (Pouhere Taonga)* [2004] NZRMA 493 (HC), at paragraph 25.

(a) Children or grandchildren with a parent or grandparent buried on the affected land, in the context of a heritage designation[32]; and

(b) Persons who had submitted on similar issues in the proposed District Plan (which the variation intended to alter), in the context of a variation to a District Plan[33].

8.9 In light of the above and the absence of any further guidance, we consider that the following principles can be applied to determining whether it is possible to identify all persons who may be "directly affected" by Green Seed's PPC request:

(a) To determine who is "directly affected" by a PPC request, it is not appropriate for a council to apply the same test it uses to determine whether there are any "affected persons" in respect of a resource consent application, because the statutory tests and relevant context are different. If Parliament had meant the same test to be applied in both circumstances, it would have said so. It did not. In other words, the scope of parties who may be "directly affected" by a PPC request is potentially wider than those who may be considered "affected persons" in respect of a resource consent application (which is limited to where the adverse effects on the person will be "minor or more than minor", but not less than minor).

(b) That said, it will still be relevant to consider the nature of the effects that may arise as a result of the PPC, in considering the extent of directly affected parties. For example, in making its notification decision on PC8, the Auckland Council considered all those who could potentially suffer amenity and / or traffic effects as a result of the proposed re-zoning to be "directly affected" parties[34].

(c) It is unlikely that all parties that will be directly affected by a PPC request can be identified, where the PPC covers areas accessed by, or includes rules that affect, the general public. Thus, limited notification is likely to be unavailable (and inappropriate) where the PPC:

(i) Applies to publicly available areas, such as parks or the coastal marine area; or

(ii) Includes rules that manage resources (such as indigenous vegetation or historic heritage) with communal value.

8.10 In light of the above, we consider that it would be possible to identify all persons who may be "directly affected" by Green Seed's PPC request, so that the request should appropriately be processed on a limited notified basis, for the following reasons:

(a) The PPC land is already zoned FUZ and subject to the RSP, both of which went through a robust submissions and hearing process in accordance with Schedule 1 to the RMA. This process has determined that the land is appropriate for urban development. Thus, the PPC relates to the specific methods for implementing this development, rather than being an opportunity to revisit the issue of whether the land can or should be used for residential purposes.

(b) The PPC is supported by a comprehensive suite of expert assessments which outline the potential effects of the proposed re-zoning and how these are proposed to be addressed. Having regard to these reports, it is possible to identify the immediately adjacent landowners and other key stakeholders (for

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32 Ibid.

33 *Protect Pauanui Incorporated v Thames Coromandel District Council* [2013] NZHC (HC) 1944, at paragraph 44.

34 Supra Note 4.

example, the New Zealand Transport Agency etc.) who may be directly affected by the PPC.

(c) The PPC land is already subject to the RICMP and is supported by a draft sub-catchment ICMP to implement specific stormwater solutions.

(d) The PPC does not:

(i) Apply to any publicly available land or areas; or

(ii) Include any rules that manage resources with communal value.

8.11 The RMA does not contain any provisions for objecting to or appealing a local authority's decision regarding notification of a PPC request. Should Green Seed be dissatisfied with HCC's notification decision, its only option would be to challenge this by way of judicial review to the High Court.

9. CONCLUSIONS

9.1 For the reasons outlined in detail above, we consider that:

(a) The only avenues open to HCC are to adopt or accept the PPC. If HCC decides to deal with the PPC in any way (in particular, if it tried to reject the PPC), this would be subject to challenge by way of appeal to the Environment Court.

(b) As all persons directly affected by the proposed change are able to be identified, the PPC can be progressed on a limited notified basis, pursuant to clause 5A of Schedule 1 to the RMA.

(c) If HCC determined not to progress the PPC on a limited notified basis, Green Seed's only option would be to challenge this decision by way of judicial review to the High Court.

9.2 We trust the above is clear and sufficient for present purposes. Please make contact if you wish to discuss any aspect of the above.

Yours sincerely

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BERRYSIMONS
ENVIRONMENTAL LAW

1 May 2019

Green Seed Consultants Limited
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Level 15, 55 Shortland Street
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For: Charles Ma
Email: charles@made.co.nz

BY EMAIL

Dear Charles

ROTOKAURI NORTH PRIVATE PLAN CHANGE - IMPLICATIONS OF THE ROTOKAURI STRUCTURE PLAN

1. INTRODUCTION

1.1 We write further to our recent correspondence with your various expert consultants regarding Green Seed Consultant Limited's ("GSCL") private plan change request at Rotokauri North ("PPC"). The PPC relates to an area of approximately 140 hectares, known as Rotokauri North.

1.2 The existing Rotokauri Structure Plan ("RSP") is included in the operative Hamilton City District Plan ("HCDP"). As it applies to the Rotokauri North land, the RSP includes two future reserve areas of approximately 10 hectares each. We have been advised that the Hamilton City Council ("the Council") wishes to set these areas aside for sports parks ("the Sports Park Land") which will serve a district-wide function, not only the needs of the future Rotokauri North community.

1.3 We understand the Council considers that the inclusion of the Sports Park Land in the RSP means that GSCL is required to provide this area to the Council as part of the PPC, without any entitlement to compensation.

1.4 We further understand that GSCL is not opposed to the provision of sports parks / open spaces within Rotokauri North, if the Council deems them necessary. However, it considers that the location of the open spaces must be properly integrated into a logical plan for development of opens spaces within the city, rather than being determined by the fact the Sports Park Land has been shown (without any context) on the RSP maps. GSCL also considers it must be properly and fairly compensated by the Council for any sports park / open space land that is provided within the PPC area.

Purpose and scope of advice

1.5 Against that background, the purpose of this advice is to set out our analysis of whether the Council can legally require GSCL to set aside the Sports Park Land for the wider community, without providing compensation.

1.6 To that end, this advice addresses the following:

(a) Background and issue arising (Section 3);

(b) Council's interpretation of the RSP (Section 4);

(c) Regulatory framework regarding the provision of reserves (Section 5);

(d) Assessment of whether GSCL's land can be rezoned for public purposes and acquired by the Council without compensation (Section 6); and

(e) Concluding comments (Section 7).

1.7 We provide a summary of our advice in Section 2.

1.8 We understand that you intend to provide this advice to the Council to assist with the processing of the PPC request. This advice has been drafted for that purpose. We are happy to discuss any aspect of this advice directly with Council and / or its legal advisors, if that would assist.

2. EXECUTIVE SUMMARY

2.1 The Council has advised that, as part of its Rotokauri North PPC application, GSCL is required set the Sports Park Land aside and transfer ownership of the same to the Council, free of charge. This is on the basis that the RSP illustrates the Sports Park Land as "future reserve" and despite the fact that the Council has not to date demonstrated the need or justification for sports parks of the size proposed.

2.2 We do not agree that Council's analysis or position is correct. To the contrary and having regard to the assessment provided below, our view is as follows:

(a) Council is incorrect that including the Sports Park Land in the RSP means it has already been rezoned for open space purposes or designated for reserve purposes. The notation for the Sports Park Land in the RSP simply indicates a possible future land use outcome that is subject to subsequent plan changes and / or subdivision applications. The correct position is that the Sports Park Land is currently zoned Future Urban ("FUZ") and can only be rezoned for open space purposes via the PPC or other Schedule 1 process.

(b) GSCL is not legally required to provide for or show the Sports Park Land in the RNSP, which will supersede the RSP.

(c) GSCL would be able to challenge any proposed rezoning of the Sports Park Land through a submission on the relevant plan change, in accordance with section 85 of the Resource Management Act 1991 ("RMA"). It would also be notified of and able to lodge a submission on any notice of requirement to designate the land for reserve purposes under section 168A of the RMA.

(d) Irrespective of the Sports Park Land's current zoning or designation, the Council does not currently own the land. If it wishes to acquire the land, even by agreement, GSCL is entitled to be compensated for the acquisition in accordance with the relevant provisions of the RMA (in particular section 86(3)) and the Public Works Act 1981 ("PWA").

(e) We understand that the Council does not have any provision in its current Long Term Plan ("LTP") to purchase the Sports Park Land. Accordingly, providing for this land in the PPC and RNSP would be setting up expectations that are inconsistent with Council's current strategy and financial arrangements.

3. BACKGROUND AND ISSUE ARISING

The PPC area and proposal

3.1 The majority of Rotokauri North is currently zoned FUZ and not due to be released for development until post-2028, in accordance with the Council's *Future Proof Strategy: Planning For Growth*, November 2017. However, there is already an urgent need for additional housing in Hamilton City.

3.2 The PPC proposes to rezone the Rotokauri North area to predominantly Medium Density Residential Zone. It anticipates that all additional infrastructure required to support residential development in Rotokauri North will be provided by GSCL, such that development may take place ahead of the Council's current schedule.

Issue arising

3.3 The Rotokauri North area is subject to the RSP. Figure 3.6.3a of the RSP shows the Sports Park Land, which is marked as "Future Reserve". The RSP describes the sports parks as including sports fields suitable for senior grade play, junior fields and training areas, and an area that serves a Neighbourhood Park function. However, the Sports Park Land is privately owned by GSCL, which (in accordance with the PPC) wishes to develop this area to provide residential housing.

3.4 The Council has advised that it interprets the provisions of the RSP, including depiction of future reserve areas, as enforceable requirements of the HCDP. It therefore considers (and has requested) that GSCL provide the Sports Park Land to the Council free of charge. Further, this is additional to and does not reduce GSCL's liability for development contributions or financial contributions (particularly as the RSP does not include any provisions relating to reserve acquisitions).

3.5 GSCL does not agree with the Council's interpretation of the RSP. It considers that if the Council wishes to ensure the Sports Park Land is used as provided for in the RSP, it should have to purchase the land from GSCL at market value and formally rezone it.

3.6 Further, even if Council's interpretation of the RSP were correct, GSCL is proposing a new Structure Plan specific to the Rotokauri North area ("RNSP") as part of the PPC. This will supersede the RSP and there is no obligation for the PPC or RNSP to give effect to the RSP or its contents. GSCL therefore also considers that the PPC, its proposed zoning and the RNSP are a further impediment to the Council being able to acquire the Sports Park Land without compensation.

3.7 Finally, we understand that the Council has confirmed that there is currently no budget allocated in its LTP to acquire the Sports Park Land. Even if GSCL were required to show the Sports Park Land on the RNSP (which is not accepted), this would be setting up an expectation which is inconsistent with the Council's current budget / strategy.

3.8 GSCL has accordingly requested us to provide an opinion to clarify the status of the Sports Park Land and whether legally, this has been (or can be) acquired by the Council without compensation, as the Council has requested.

4. COUNCIL'S INTERPRETATION OF THE RSP

4.1 We consider that the Council's interpretation of the RSP relies on the following four propositions:

(a) Depiction of the Sports Park Land in the RSP is effectively equivalent to an open space zoning or possibly a designation for open space purposes;

(b) The PPC and the RNSP must therefore include provision for Sports Park Land as per the operative RSP;

(c) The Council is accordingly entitled to take ownership of the Sports Park Land without going through a rezoning and potentially designation process; and

(d) This means that the owners of the Sports Park Land have no opportunity (and are not entitled) to challenge or be compensated for the Council's proposed acquisition of that land.

4.2 We set out our analysis of these propositions in Section 6 below. Before doing so, we outline the relevant regulatory framework.

5. REGULATORY FRAMEWORK REGARDING THE PROVISION OF RESERVES

Legislative framework

Resource Management Act 1991

5.1 There are no provisions in the RMA which empower the Council to rezone private land without going through the Schedule 1 process or providing affected landowners with adequate compensation. To the contrary, section 85 of the RMA makes it clear that landowners can challenge proposed plan provisions on the basis that they would render any interest in land incapable of reasonable use and place an unreasonable burden on that landowner, as follows:

> *"**85 Environment Court may give directions in respect of land subject to controls***
>
> *(1) An interest in land shall be deemed not to be taken or injuriously affected by reason of any provision in a plan unless otherwise provided for in this Act.*
>
> *(2) Notwithstanding subsection (1), any person having an interest in land to which any provision or proposed provision of a plan or proposed plan applies, and who considers that the provision or proposed provision would render that interest in land incapable of reasonable use, may challenge that provision or proposed provision on those grounds—*
>
> *(a) in a submission made under Schedule 1 in respect of a proposed plan or change to a plan; or*
>
> *(b) in an application to change a plan made under clause 21 of Schedule 1.*
>
> *(3) Subsection (3A) applies in the following cases:*
>
> *(a) on an application to the Environment Court to change a plan under clause 21 of Schedule 1:*
>
> *(b) on an appeal to the Environment Court in relation to a provision of a proposed plan or change to a plan.*
>
> *(3A) The Environment Court, if it is satisfied that the grounds set out in subsection (3B) are met, may,—*
>
> *(a) in the case of a plan or proposed plan (other than a regional coastal plan or proposed regional coastal plan), direct the local authority to do whichever of the following the local authority considers appropriate:*
>
> *(i) modify, delete, or replace the provision in the plan or proposed plan in the manner directed by the court:*

(ii) acquire all or part of the estate or interest in the land under the Public Works Act 1981, as long as—

(A) the person with an estate or interest in the land or part of it agrees; and

(B) the requirements of subsection (3D) are met; and

...

(3B) The grounds are that the provision or proposed provision of a plan or proposed plan—

(a) makes any land incapable of reasonable use; and

(b) places an unfair and unreasonable burden on any person who has an interest in the land."

[Our emphasis]

5.2 Also relevant is section 86 of the RMA, in accordance with which the Council has the power to acquire the Sports Park Land by agreement with GSCL under the PWA. Section 86 of the RMA states:

"86 Power to acquire land

(1) In addition to any power it may have to acquire land for any public work which it is authorised to undertake, a regional council or territorial authority may, while its plan is operative, acquire by agreement under the Public Works Act 1981 any land (including any interest in land) in its region or district, if, in accordance with the plan, the regional council or territorial authority considers it necessary or expedient to do so for any of the following purposes:

(a) terminating or preventing any non-complying or prohibited activity in relation to that land:

(b) facilitating activity in relation to that land that is in accordance with the objectives and policies of the plan.

(2) Except as provided in sections 85(3A)(a)(ii), 185, and 198, nothing in any plan shall impose on any regional council or territorial authority any obligation to acquire any land.

(3) Every person having any interest in land taken for any purpose authorised by subsection (1) shall be entitled to all compensation which that person would be entitled to if the land had been acquired for a public work under the Public Works Act 1981."

[Our emphasis]

5.3 Importantly, there is also no provision in the RMA (including within the Schedule 1 process under which the PPC is being prepared) which would require the PPC or RNSP to give effect to the RSP or its contents.

Other relevant legislative provisions

5.4 For completeness, we note that the Rotokauri North area is currently in the process of being gazetted as a Special Housing Area pursuant to the Housing Accords and Special Housing Areas Act 2013 ("HASHAA"). However, the HASHAA provisions do not impact on the status of the Sports Park Land or Council's ability to require GSCL to provide that

land for public purposes free of charge. They are therefore not relevant to or considered further for the purpose of this advice.

5.5 Similarly, subdivision and development of Rotokauri North would trigger an obligation on the developer to provide development contributions or financial contributions under the HCDP. However, development and financial contributions are not triggered by the PPC and are not considered further for the purposes of this advice. We also note that the area of the Sports Park Land greatly exceeds the amount of land that could be required by the Council as either a development or financial contribution, given that it is intended to serve as district-wide function (and given its location on the edge of the Council's boundary, arguably even a regional function) well beyond the demand created by GSCL's development.

Planning framework

The HCDP

5.6 The HCDP became operative on 18 October 2017. Appendix 17 of the HCDP contains the associated planning maps. Maps 13A and 14A illustrate the Rotokauri North area, including the Sports Park Land, and show that it is currently zoned FUZ. The purpose of the FUZ is to provide urban development areas for Hamilton's long term growth. It does this by controlling subdivision and land use to avoid fragmentation of the land.

5.7 Chapter 15 of the HCDP sets out the provisions applicable to Hamilton's Open Space Zones. It includes five open space zones including a Sport and Recreation Zone. However, the Sports Park Land is currently zoned FUZ and is not subject to any designation as public reserve. Therefore, the Chapter 15 provisions are not relevant.

Provision for Structure Plans in the HCDP

5.8 Chapter 3 of the HCDP sets out the principles, objectives, and policies that are generally applicable to Structure Plans. It also incorporates four individual Structure Plans including the RSP. Chapter 3 relevantly describes the purpose of the Structure Plans as follows:

> *"**3.1 Purpose***
>
> *...*
>
> *b) A Structure Plan illustrates the proposed layout of a future development area.*
>
> *c) The preparation of a Structure Plan is one of the first steps in advancing the development of new urban areas. It illustrates land uses such as residential, commercial, industrial and public open space. Structure plans usually contain broad servicing details such as transport configuration and may include other important key infrastructure features such as Three Waters networks. The level of detail can vary and may also show information such as housing density.*
>
> *d) The purpose of a Structure Plan is to plan for the future in an integrated manner by:*
>
> *i. Outlining a vision for the future.*
>
> *ii. Setting out where growth can be accommodated and setting out a future land use pattern.*
>
> *iii. Providing for staging of development.*

iv. Guiding infrastructure planning including transport corridors, Three Waters, community facilities and public open space.

v. Identifying the financial feasibility of the development from a Council, Infrastructure provider and landowner perspective.

...

f) The maps or plans are at a high level of information and do not typically go into such detail as individual lot boundaries or the physical form of buildings and structures. Although a Structure Plan indicates future land uses, the rules that control the development of the land are contained in the District Plan zone chapters.

g) Currently prepared Structure Plans are incorporated into the District Plan. Future Structure Plans should also be incorporated into the District Plan, either through a variation or plan change."

[Our emphasis]

5.9 It is clear from the above provisions that the Structure Plans are a planning tool which is intended to guide future development by providing a high-level outline of Hamilton's development priorities and vision for the future. While the current Structure Plans (including the RSP) are included in the HCDP, they do not contain finalised rules or zoning. This is particularly clear from provision 3.1(f), which confirms that the "the rules that control the development of the land are contained in the District Plan zone chapters". In the case of the Sports Park Land, the applicable rules are set out in the FUZ provisions.

Status of Structure Plans

5.10 The intended approach to the Structure Plan provisions is clarified by a number of other HCDP provisions. Chapter 2 of the HCDP (Strategic Framework) includes Policy 2.2.2b:

"Any development that is within an identified growth area is to be undertaken in general accordance with an approved Structure Plan."

[Our emphasis]

5.11 Chapter 3 sets out the principles applicable to Structure Plans, which include the following:

"3.2 Principles

To provide consistency across the City, Structure Plans should adopt the following principles where appropriate:

a) Outline planning outcomes for each Structure Plan area, for example:

...

iv. Reserves (the location of these may be fixed or indicative depending on context).

...

b) Include indicative maps that illustrate the broad planning outcomes sought."

5.12 Objective 3.3.1 and the associated policies address greenfield development within Structure Plan areas:

> *"**Objective 3.3.1:** Optimised, long-term, positive environmental, economic, social and cultural effects of greenfield development.*
>
> ***Policy 3.3.1a:** Development should be in general accordance with the relevant Structure Plan."*
>
> *[Our emphasis]*

5.13 The above provisions of the HCDP again confirm that the Structure Plan provisions and maps are intended to provide a high-level, indicative guide to future development, and do not constitute district plan rules or zoning with current effect. The term "in general accordance" indicates the approach that Councils and developers should take to the Structure Plan provisions.

5.14 Principle 3.2(a)(iv) contemplates that some reserve locations may be fixed within a Structure Plan. However, the absence of any policy or rules in the RSP that confirms the location of the Sports Park Land is fixed means that those spaces must be treated as being indicative. In any event, even if the location of the Sports Park Land was considered to be fixed in accordance with the RSP, this does not also mean that the land has been zoned for open spaces or designated for reserve purposes. It also does not relieve the Council from need to purchase that land from its current owner at market price, if it wishes to acquire it for that purpose.

The Hamilton City Open Space Plan

5.15 HCDP's Objective 3.3.7 and the associated policies address public open spaces which are identified in a Structure Plan, as follows:

> *"**Objective 3.3.7:** A range of well-connected, functional public open spaces.*
>
> ***Policy 3.3.7a:** The location and size of public open spaces is provided in accordance with Council's Open Space Plan.*
>
> ***Explanation:***
>
> *Public open space is usually indicative on Structure Plan maps, and exact sizes and locations will be determined at the time of subdivision consent. The Hamilton City Open Space Plan, September 2013 sets out a 50-year strategic direction for Hamilton's parks and open spaces. The Open Space Plan presents a series of goals, priorities and an action plan that responds to the needs, challenges and opportunities facing Hamilton's open spaces."*
>
> *[Our emphasis]*

5.16 Hamilton City's Open Space Plan is a strategic planning document that was published in September 2013. It is not incorporated into the HCDP, although it is referred to, including in Policy 3.3.7a above. The Open Space Plan includes Map 1 which identifies the Sports Park Land as "Possible Future Reserves". This clarifies that the status of the land has not been confirmed.

5.17 Further, as with the RSP, the Open Space Plan only seeks to confirm the location and type of open spaces across Hamilton. The process of acquiring and paying for necessary open space land is not addressed within, and is separate from, the Plan.

The RSP

5.18 The current RSP is set out in Chapter 3 of the HCDP. Figure 3.6.3a (Rotokauri Catchment Boundaries) shows the Sports Park Land, which is labelled "Future Reserves".

5.19 However, there is no express mention of the Sports Park Land in the RSP, and no relevant objectives and policies. The only reference to sports parks is in the RSP's description of the Structure Plan Components, as follows:

> *"**3.6.2.5 Open Space Network***
>
> *a) The open space network develops and connects existing natural features. The Rotokauri open space network comprises:*
>
> *...*
>
> *ii. Sports parks – each will provide sports fields suitable for senior grade play, junior fields and training areas, and an area that serves a Neighbourhood Park function."*

5.20 The status of the Structure Plan maps is clarified by provision 3.6(b), which states:

> *"In addition to a Structure Plan map indicating the eventual pattern of development within Rotokauri, there are maps indicating the nature and extent of the proposed transportation hierarchy, proposed reserve and open space network, staging plans and a Concept Plan illustrating the relationship between land uses within the suburban centre and future commercial/community focal point."*
>
> *[Our emphasis]*

5.21 The above provision confirms that the RSP maps are indicative only, and that the reserves and open spaces they show are aspirational proposals or goals on behalf of the Council which have yet to be finalised. As noted, the Council evidently chose not to take up any opportunity it may have given itself to specify that open spaces on the RSP were in fixed locations.

The 2007 RSP

5.22 The RSP does not state the mechanism by which the privately-owned areas indicated as "Future Reserve" are to receive an open space zoning once Rotokauri is live-zoned. However, this is addressed in the RSP's predecessor, the Rotokauri Structure Plan 2007, which states:

> *"Sports Parks – These are required to provide for formal active recreation at a level to meet the current standard of provision within the city. Each will provide sports fields suitable for senior grade play, junior fields and training areas and an area that serves a Neighbourhood Park function. Whilst they will primarily serve the local population, they will also form part of the city wide network of sporting facilities. They are located so as to be accessible to their catchment and contribute to the legibility and amenity of the area. It is anticipated that Council will use the designation process to determine precise boundaries to proposed sports parks."*
>
> *[Our emphasis]*

5.23 The above provision demonstrates that even the Council originally expected that a designation and acquisition under the PWA would be necessary to transfer the Sports Park Land into public ownership, following rezoning. The fact that this express mention of the designation process was not carried over into the current RSP does nothing to change the legal position in this regard.

5.24 As noted, there is also no requirement within the relevant planning framework to include the Sports Park Land within the PPC or RNSP, simply because it is included in the RSP.

Legal principles – Acquisition of private land for public purposes

5.25 The issue of local authorities attempting to acquire private land for public purposes through the rezoning process has been considered by the Court on several occasions. It is not necessary to traverse all of those cases in detail for the purposes of this advice. The Court's consistent approach is clearly encapsulated in the Environment Court decision of *Capital Coast Health v Wellington City Council* W101/98. Capital Coast Health Limited ("CCHL") appealed Wellington City Council's ("WCC") proposal to rezone land owned by CCHL from *Residential* to *Open Space B* in the (then) Wellington City Proposed District Plan.

5.26 Unlike the present case, WCC was not attempting to argue that the land in question had been (or should be) rezoned and transferred to WCC without compensation. However, CCHL considered WCC was attempting to "down-zone" the land in order to reduce its market value, which would reduce the compensation payable to CCHL if the land was acquired.

5.27 CCHL challenged the proposed rezoning on the basis that it would make the land incapable of reasonable use. In its interim decision, the Environment Court made the following findings:[1]

> *"164. Having regard to the Open Space policies and assessment criteria in the proposed plan which place emphasis on public enjoyment of the site's recreation potential, together with the clear intent of the zone to avoid structures and maximise open space, we accept Mr Thomas' conclusion that a private landowner would not be able to make reasonable use of Open Space zoned land. Therefore, Open Space B zoning is inappropriate for private land such as this which is perfectly capable of other uses.*
>
> *165. We agree with Mr Thomas too that it is not the role of private landowners to provide for general open space and the recreational needs of the community. There is a considerable body of case law to support that view."*
>
> *[Our emphasis]*

5.28 The Court rejected the Council's proposed Open Space zoning on the basis of the above. The Environment Court also noted that WCC's analysis of the proposed plan change under section 32 of the RMA had not looked at the issue of whether privately owned land should be zoned Open Space. This meant that WCC:[2]

> *"was in no position to analyse some of the threshold tests under its s.32 evaluation and consequently in no position to establish the effects of its Open Space proposal on the landowner."*

5.29 In its final decision (*Capital Coast Health Limited v Wellington City Council* W4/200), the Court also adopted (at paragraph 7) the following summary of the correct legal position that had been provided by the parties:

> ***"Open Space Zoning***
>
> *As a general principle private land should not be zoned for reserve purposes (however described and either expressly or effectively) unless:*

[1] *Capital Coast Health v Wellington City Council* W101/98, at 164 – 165.
[2] *Ibid*, at 163.

- *It is already reserved for such purposes; or*
- *The landowner agrees; or*
- *It is incapable of being used for other purposes.*

If the Council wishes to protect land for reserve purposes, then that purpose should be achieved by designation or acquisition.

However, this general principle is always subject to the provisions in Part 2 of the Act. Where particular land has such significance in terms of any of the factors listed in sections 6 and 7 of the Act that its use or development ought to be substantially limited or precluded, then land use controls which may have that effect may be appropriate regardless of the ownership of that land (but subject to sections 32 and 85)."

6. ANALYSIS – IS GSCL REQUIRED TO SET THE SPORTS PARK LAND ASIDE FOR PUBLIC PURPOSES?

6.1 Having regard to the above regulatory framework, we consider that GSCL is not required to set the Sports Park Land aside for public purposes (and certainly not without receiving adequate compensation from the Council), for the following reasons.

Sports Park Land has not yet been rezoned / designated for open space or reserve purposes

6.2 In our view, the fact the Sports Park Land has been included in the RSP does not mean it has yet been rezoned or designated for open space / reserve purposes. Such a rezoning and designation can only occur by way of the Schedule 1 process and in accordance with Part 8 of the RMA respectively.

6.3 In summary, the Sports Park Land is currently privately owned and zoned FUZ. It not subject to the provisions of the Open Space Zones under the HCDP or any designation for reserve purposes. The RSP map that the Council seeks to rely on constitutes an indicative guide only and is not a current and enforceable rule of the HCDP. As such, our strong view is that there is no basis for the Council to argue that GSCL is already required to set the Sports Park Land aside as public open space, let alone transfer ownership of the land to the Council without compensation, as it is trying to do.

GSCL not required to show Sports Park Land in RNSP

6.4 Importantly, there is no legal obligation on GSCL to provide for or identify land for sports park purposes (which serve a district wide benefit) within the RNSP, which (in accordance with the PPC) will replace the RSP with respect to the Rotokauri North land.

GSCL could object to any proposed rezoning or designation of Sports Park Land

6.5 As noted in *Capital Coast Health*:

(a) In general, private land should not be zoned for reserve purposes except under specific circumstances; and

(b) This change of use should be achieved by designation or acquisition, neither of which has yet occurred with respect to the Sports Park Land.

6.6 As such, in our view the Council must go through a rezoning and / or designation process, followed by acquisition, if it wishes to have the Sports Park Land set aside for open space purposes. In accordance with section 85 of the RMA, GSCL would be able to challenge any proposed plan provisions which sought to rezone the Sports Park Land for open space purposes on the basis that this:

(a) Makes its land incapable of reasonable use; and

(b) Places an unfair and unreasonable burden on it as a landowner.

6.7 While this is a high test, in the present case, we consider it is likely that such a challenge would be successful. In our view, the Council's interpretation of the RSP would have an even more onerous effect on GSCL than WCC's proposal did in *Capital Coast Health*, as it would preclude all uses of the Sports Park Land other than as a sports park. That is, it would certainly preclude development of the land for residential purposes, as proposed by GSCL. There is also no evidence that the Sports Park Land is of such significance in terms of any of the matters listed in sections 6 or 7 of the RMA that its use or development ought to be substantially limited or precluded, to meet the Act's sustainable management purpose.

6.8 We also note that the Council has not yet provided any evidence that it has properly analysed the costs and benefits of rezoning the Sports Park Land for open space purposes, as it is required to do in order to support any rezoning in accordance with section 32 of the RMA.

6.9 Similarly, GSCL would be notified and able to make a submission on any notice of requirement issued under section 168A of the RMA to designate the land for reserve purposes. Any such submission could raise a range of issues, including the appropriateness of designating the land as proposed and the compensation that would be payable to GSCL if that occurred.

Council does not currently own the Sports Park Land

6.10 Finally, even if it the inclusion of the Sports Park Land in the RSP was determined to be the equivalent to rezoning the land for open spaces purposes (which is not accepted), the Council does not currently own the land. GSCL does. It is clear that the Council cannot acquire an interest in the land (even by agreement with GSCL) without providing adequate compensation to GSCL.

6.11 In this regard, section 86(3) of the RMA makes the provision of such compensation mandatory, not discretionary, and does not provide any exceptions which GSCL could rely on in order to avoid that requirement. The Council would also still be required to acquire the land from GSCL at market value under the PWA if it designated the land for reserve purposes. While the designation process would be available under the RMA, there is no provision that would then enable the Council to acquire the land without providing adequate compensation. The PWA makes it clear that any land required for public purposes must be purchased either by agreement or compulsory acquisition under that Act.

Summary – GSCL not required to set aside Sports Park Land

6.12 In summary, our view is as follows:

(a) The inclusion of the Sports Park Land in the RSP is not equivalent to an open space zoning. The land is currently zoned FUZ and can only be rezoned for open space purposes via the PPC or other Schedule 1 process. The Sports Park Land is also not currently designated for reserve purposes. In our view, the inclusion of the Sports Park Land in the RSP indicates a future land use outcome to be worked through in subsequent plan changes or subdivision applications, not an ownership or compensatory one.

(b) GSCL is not legally required to provide for or show the Sports Park Land in the RNSP, which will supersede the RSP.

(c) GSCL would be entitled and have the opportunity to challenge any proposed rezoning of the Sports Park Land through a submission on the relevant plan

change, in accordance with section 85 of the RMA. It would also be notified of and able to lodge a submission on any notice of requirement to designate the land for reserve purposes under section 168A of the RMA.

(d) Even if it was considered that the Sports Park Land had already been rezoned for open space purposes or designated for reserve purposes as a result of the RSP, the Council does not currently own the land. If the Council wishes to acquire the land, even by agreement, GSCL is entitled to be compensated for the acquisition in accordance with the relevant provisions of the RMA (in particular section 86(3)) and the PWA.

(e) In any event, the Council does not have funding for the Sports Park Land within its current LTP. GSCL would therefore be setting up expectations that are inconsistent with the Council's current budget and strategy, if it provided for the Sports Park Land within the PPC.

7. CONCLUDING COMMENTS

7.1 The Council has advised that, as part of its Rotokauri North PPC application, GSCL is required set the Sports Park Land aside and transfer ownership of the same to the Council, free of charge. This is on the basis that the RSP illustrates the Sports Park Land as "future reserve".

7.2 For the reasons outlined above, our strong view is that the Council's interpretation of the RSP is not correct. We consider the correct legal position is that:

(a) The Sports Park Land is zoned FUZ, and the applicable provisions are found in the FUZ chapter of the HCDP. The land can only be rezoned via the PPC or other Schedule 1 process, through which GSCL would have the opportunity to object to the rezoning in accordance with section 85 of the RMA. GSCL would also be able to make a submission on any notice of requirement issued by the Council to designate the Sports Park Land for reserve purposes.

(b) Even if the land is rezoned and or / designated, the Council can only acquire an interest in the land by entering into an agreement with and providing compensation to GSCL.

7.3 We trust the above is clear and sufficient for present purposes. We are happy to discuss any aspect of this advice with your other advisors and / or the Council's representatives, as necessary.

Yours sincerely

Helen Andrews | Edwin Sheppard
Partner | Solicitor

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ATTACHMENT 21 - Notification Assessment

Attachment 21

To:	Hamilton City Council – Paula Rolfe
From:	Tollemache Consultants Limited (Renee Fraser-Smith & Mark Tollemache)
Date	April 2019
Subject:	Rotokauri North: Notification Planning Assessment

1.0 Overview

1.1 Under clause 25(2)(a)(i) of Schedule 1 of the RMA, Plan Changes may be limited notified.

1.2 The test for notification is being able to identify all persons directly affected by the plan change. Following the guidance from Berry Simons, the following assessment of effects draws on the draft Assessment of Effects (dated April 2019 prepared by Tollemache Consultants) and includes headings which correspond to sections (6.1-6.10 of that document) to summarise potential for effects and determining persons that would be considered an affected person:

Alternatives / General Effects of Land use Change

1.3 The Council's own structure planning and growth evaluation has identified Rotokauri as an area suitable for growth, as anticipated by the existing Future Urban Zone ("FIZ") and inclusion in the RSP. The release of land under the RSP is premised on the basis that appropriate infrastructure be provided to service the development/portion of land to be release.

1.4 Effects on infrastructure are dealt with separately below, however, from a perspective of whether the land is suitable for urban development, as the Rotokauri area was already earmarked for growth the wider regional or Hamilton wide issues about its suitability to accommodate growth in the future instance is not applicable. Therefore, this is not an issue that requires full notification to the general public.

1.5 However, it is acknowledged that landowners falling within the Plan Change boundary (which are not affiliated to the applicant) are directly affected by the request for re-zoning.

1.6 Due to location of the site to the territorial border, Waikato District Council are considered an affected person, and obligations and functions of the regional council Waikato Regional Council are also identified an as affected person.

Social Effects

1.7 The existing immediate environment has no social or community amenities.

1.8 The Zoning and RNSP anticipate a small neighbourhood centre within the area, to support local needs to residents through provision of commercial day to day conveniences, and the RNSP includes indicative neighbourhood reserves which will contribute in a positive manner to social amenities and wellbeing.

1.9 Preliminary consultation with the Ministry of Education indicates that the wider area would likely require a new primary school. The Ministry is understood to be advancing land purchases to facilitate the development of a primary school within the RNSP area.

1.10 None of these social factors are considered affect any persons.

Archaeological / Cultural Heritage Effects

1.11 Although no evidence of archaeological features were found within the site, the cultural values and heritage associated with the plan change areas is recognised. On this basis, Mana Whenua, specifically Waikato Tainui, and the Te Haa o te whenua o Kirikiriroa ("THaWK") hapu are directly affected persons.

Visual Effects

1.12 Although the land is earmarked for growth it is acknowledged from a visual perspective that the adjoining properties to the site will be most affected by future development enabled by the PPC. This includes the rural and rural-residential properties to the south, west, east and north of the site. Notably, properties to the east and south are to remain FUZ as they fall within Stage 2 of the RSP. As the development with the RNSP needs to "tie into" future development it is expected that the change in land use will occur right up to the boundaries of these sites.

1.13 For road users on the surrounding road network, in particular those who live locally in rural situations, the development of the subject site is likely to result in some visual effects particularly for State Highway 39 ("SH 39") users, however this is merely the change from rural to urban anticipated by the RSP. For general road users the effects are likely to be of much less significance as the development will be seen as part of the pattern of land use change expected to occur under the RSP (albeit some years ahead of the HCC planned timeframe). The RNSP includes a landscape buffer to SH39 to establish a transition and setback of development from the State Highway, and to also ensure that there is no direct vehicle access from lots.

1.14 Any views onto the site from the wider area are generally consistent with the same as those experienced by adjacent properties (although to a lesser degree). The change will be noticeable, but not one that is unexpected in the context. The land has been envisaged for growth for some time, and it is only a change in expected timing of that delivery that is occurring.

1.15 Therefore, those adjoining and adjacent properties to the plan change area will experience the most change in vidual appearance (which could be considered to make them an affected person to the plan change).

Landscape Effects

1.16 The operative RSP includes a series of low ridgelines that have been identified as the Rotokauri Ridgeline Character Area ('RRCA') and referred to as "The Western Hills", and the operative RSP provisions seek to retain the legibility of the ridgelines and achieve a form and density of development that enables a sense of the underlying landform to be retained. However, the LA4 review found that the landforms are not worth of protection (as they do not constitute a significant feature). The general public is not considered to be affected by this change (the landforms are not considered to have been significant in the first place).

1.17 Two third party landowners whose properties are directly affected (albeit in a positive manner) by the removal of this overlay falling within the plan change boundary are Lot 1 DP 359488 and Lot 3 DP 359488.

Ecological Effects

1.18 The site comprises mostly pasture and agricultural land. There is a significant stand of kahikatea Trees adjacent to the intersection of Burshbush Road and SH39 which is already protected under the HCDP provisions (and has a SNA overlay applied). All other vegetation is either associated with shelterbelts/hedging, or associated with the garden areas of the dwellings.

1.19 Notwithstanding the currently degraded and modified nature of the streams, the existing HCDP and Waikato Regional Council policies and rules, which apply to the subject land, with respect to stream retention and ecological values and acknowledge that with replanting, a quality ecological environment could be established. This existing framework provides an appropriate level of protection already, which is enhanced by the draft ICMP.

1.20 For these reasons it is not considered that there are any effects from the proposed plan change that will affect the general public or any adjoining landowners etc persons. It is noted that there are cultural values associated with ecology, and as such mana whenua and local hapu are considered potentially affected persons.

General Infrastructure/Servicing

1.21 As all infrastructure can be provided without affecting supply or capacity from other serviced areas or the current "developing areas" to Rotokauri South, Ruakura, Peacocks etc there is no wider servicing effects – and all infrastructure to the service the RNSP area is funded by the applicant (GSCL) there is no impact on the LTP programme and as such this is not an issue that requires full notification to the general public.

1.22 Provision has been made to service the entire plan change area, therefore no persons within the plan change are considered affected. The cultural interest from mana whenua with infrastructure servicing and pipe locations etc is noted (and they may be considered potentially affected).

Stormwater / ICMP

1.23 The ICMP includes specific design parameters for development to adhere to in terms of flow, flood storage, overland flow paths, freeboard (for residential lots from flooding) and water quality targets. Water quality targets are as a minimum consistent with the National Policy Statement: Freshwater, National Bottom Lines, or better (where there is a higher Waikato Regional Plan standards).

1.24 All devices will be sized during the resource consent stage in accordance with the final ICMP and stormwater discharge consent requirements. The proposed stormwater management options outlined in the ICMP are considered to be practicable and consistent with the water sensitive design principles to ensure that the future developments can minimise and reduce effects on water quality, and downstream flooding and erosion. For these reasons the general public is not considered to be affected. The extent of the downstream affected parties is limited to the immediate downstream properties of the Ohute Catchment/stream.

1.25 Properties falling within the ICMP catchments (but outside the Plan change) may consider themselves affected parties, however, Council is reminded that the ICMP is an information requirement only for direction to deal with effects, actual effects are managed via Regional Stormwater Discharge Consents which are to be sought separately. This also makes the Waikato Regional Council a party to the Plan Change.

1.26 It is noted that there are cultural values associated with stormwater, and as such mana whenua and local hapu are considered potentially affected persons.

Roading

1.27 Traffic effects on the wider network fall within the original planned modelling for the Rotokauri Area and can be accommodated in the wider network. Therefore, users of the wider network are not considered affected persons.

1.28 The site direct adjoins SH39 and New Zealand Transport Agency ("NZTA") designations at the intersection of Burshbush Road, as the plan change includes new intersections with the NZTA network, they are considered an affected party.

Land Stability Hazards/Liquefaction

1.29 The Preliminary Geotechnical Appraisal Report for the area found the land to be typical of the Rotokauri area and other parts of Hamilton, for potential liquefaction hazards. The reporting has identified that although a hazard, geotechnical instability and risks can be managed via foundation etc techniques at building stage. Therefore, this aspect is not considered to affect the general public or any persons (other than those developing the land).

Contamination

1.30 Potential risks to human health from contaminants in the soil has been addressed in the Preliminary Site Investigation Report. The Report found that specific sites within the PPC area may potentially contain sources of contamination therefore a detailed investigation is required at time of future development. These matters would be subject to resource consent requirements under the National Environmental Standard for contaminants in soils at time of subdivision, earthworks or development. Therefore, any potential site contamination will be identified, and managed/remediated prior to enabling residential occupation of the land. Therefore, this aspect is not considered to affect the general public or any persons (other than those developing the land).

Flooding

1.31 As previously outlined under the stormwater section above, flood hazards have been taken into account in the modelling, final design and device sizing to manage potential flood risk within RNSP area and downstream. Affected persons are the same as listed under "stormwater".

Reverse Sensitivity (NZTA)

1.32 Whilst intersection locations with the Stage Highway have been designed to avoid conflict and safety concerns, NZTA are directly affected by the works and proposal to access and modify the state highway network (and land covered by their designations at the Burbush Road intersection).

Reverse Sensitivity (Adjoining FUZ)

1.33 It is acknowledged that until such time that the remaining FUZ zone is re-zoned, it will be used for rural activities. This does have the potential to create reverse sensitivity issues for future residential living on the boundary with the FUZ. Any actual potential for conflict though can be appropriately determined and addressed in future resource consents (as the exact timing of when this would actually become an issue over the lifespan on the development is unknown) – rather than created an affected persons situation at plan change stage.

Reverse Sensitivity (Waikato Rural Zones)

1.34 Land to the north and east falling within the WDC territory are zoned rural (and not proposed to change under the WDP review). However, both areas/zones are essentially "buffered" from the residential area proposed by this PPC by existing roads (SH39 and Exelby Road), which creates a separation distance of some 18 plus meters. This is considered sufficient to avoid reverse sensitivity effects between those rural uses and future residents of the RN area. For these reasons, they are no affected persons for reverse sensitivity effects (but may be identified as affected by other parts of the proposal).

Economic Effects

1.35 The economic assessment which reviews the scale of the proposed Business Zone 6 has taken into consideration the location and role of the major centres and the planned future centre in Rotokauri South, and finds that small neighbourhood centre such as that proposed would serve the immediate Rotokauri North area without jeopardising the retail or commercial provision in the future planned Rotokauri South Centre and/or the nearby facilities at The Base. For these reasons no persons are considered affected by an economic effects resting from the neighbourhood centre.

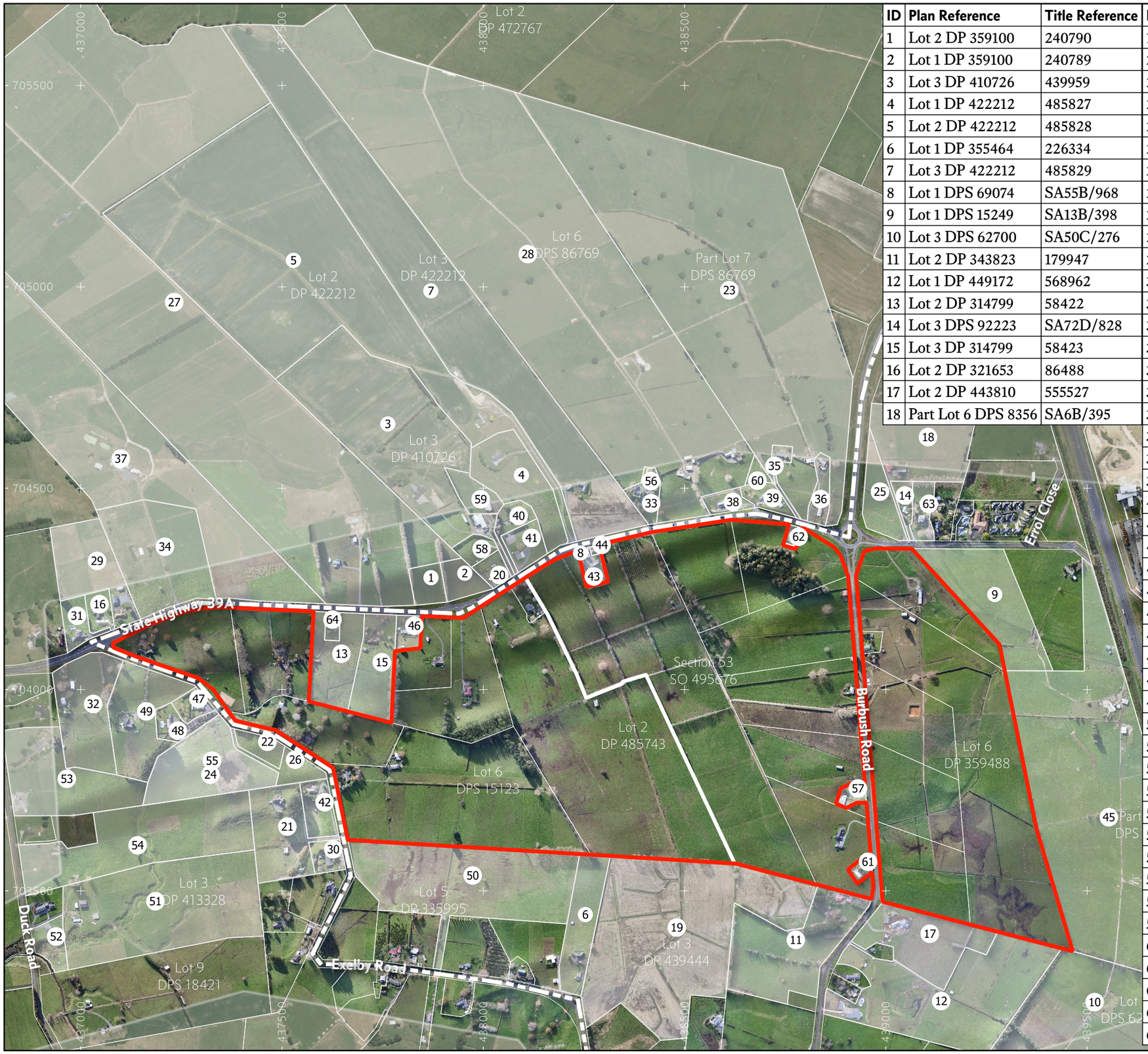
Urban Design / Positive Effects

1.36 The urban design qualities and outcome sought by the PPC align with current best practise and urban design principles - this is not a new concept or type of development that has not been seen before in the City – the applicant is proposing to utilise existing zones and the PPC provisions seek to enhance those zone provision to enable more tailored outcomes sought to achieve deign qualities and affordable housing. This is not an issue that requires full notification to the general public, nor does it create any other persons which could be considered affected (other than those developing the land).

Summary Identification of affected persons:

1.37 Taking into account the above following is a summary of statutory bodies or persons identified as being potentially affected and why:

Persons	Justification
Waikato District Council	The site falls on the border of the WDC boundary.
Waikato Regional Council	As the Regional Authority they are required to have oversight of the region and to ensure consistency with this own plans
Waikato – Tainui	Have a cultural interest in the area and potential affiliation to the land
Te Haa o te whenua o Kirikiriroa ("**THaWK**") – including all hapu groups which have formed part of the CIA process	Have a cultural interest in the area and potential affiliation to the land
New Zealand Transport Agency	The Plan Change area borders the state highway and access onto the highway is necessary.
Minister for the Environment	As required by Schedule 1 Clause 8
Ministry of Education	Continuation of pre-lodgement consultation
Landowners inside the Plan Change area	Direct affect by the proposed land use change
Adjacent and Adjoining landowners as mapped	Visual effects.



ID	Plan Reference	Title Reference
1	Lot 2 DP 359100	240790
2	Lot 1 DP 359100	240789
3	Lot 3 DP 410726	439959
4	Lot 1 DP 422212	485827
5	Lot 2 DP 422212	485828
6	Lot 1 DP 355464	226334
7	Lot 3 DP 422212	485829
8	Lot 1 DPS 69074	SA55B/968
9	Lot 1 DPS 15249	SA13B/398
10	Lot 3 DPS 62700	SA50C/276
11	Lot 2 DP 343823	179947
12	Lot 1 DP 449172	568962
13	Lot 2 DP 314799	58422
14	Lot 3 DPS 92223	SA72D/828
15	Lot 3 DP 314799	58423
16	Lot 2 DP 321653	86488
17	Lot 2 DP 443810	555527
18	Part Lot 6 DPS 8356	SA6B/395

ID	Plan Reference	Title Reference
19	Lot 3 DP 439444	544749
20	Lot 1 DP 410726	439957
21	Lot 3 DP 316291	63658
22	Lot 2 DP 465444	619792
23	Part Lot 7 DPS 86769	662173
24	Lot 3 DP 465444	619793
25	Section 19 SO 416124	662173
26	Lot 1 DP 465444	619791
27	Lot 3 DP 359100	240791
28	Lot 6 DPS 86769	SA68D/126
29	Lot 3 DP 321653	86489
30	Lot 1 DP 316291	63656
31	Lot 1 DP 321653	86487
32	Section 22 SO 495676	755898
33	Lot 1 DPS 18383	SA68D/123
34	Section 2 SO 495676	755897
35	Lot 1 DPS 63354	SA54B/393
36	Lot 5 DPS 86769	SA68D/127
37	Section 1 SO 495676	755899
38	Lot 2 DPS 86769	SA68D/124
39	Lot 3 DPS 86769	SA68D/125
40	Lot 1 DP 373390	485830
41	Lot 2 DP 373390	296464
42	Lot 2 DP 316291	63657
43	Lot 1 DPS 46587	SA55B/968
44	Lot 2 DPS 69074	SA55B/968
45	Part Lot 1 DPS 17176	SA15C/942
46	Lot 1 DPS 72047	SA57D/840
47	Lot 2 DP 322023	87874
48	Lot 1 DP 322023	87873
49	Lot 3 DP 322023	87875
50	Lot 5 DP 335995	147744
51	Lot 3 DP 413328	449729
52	Lot 1 DP 413328	449727
53	Lot 3 DP 421316	481484
54	Lot 3 DP 408214	429183
55	Lot 3 DP 465444	619793
56	Lot 1 DPS 86769	SA68D/123
57	Lot 3 DP 359488	242204
58	Lot 2 DP 410726	439958
59	Lot 4 DP 422212	485830
60	Lot 4 DPS 86769	SA68D/126
61	Lot 1 DP 359488	242202
62	Lot 1 DPS 4129	SA1263/30
63	Lot 2 DPS 92223	SA72D/827
64	Lot 1 DP 314799	58421

Legend

Adjacent Properties

Site

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Map Projection:
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Approved By:		Date:	Signed:
Plot Date:	20/09/2018		

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Project:
Rotokauri North Plan Variation

MADE

Title:
Affected Parties Rotokauri North

McKENZIE&Co CONSULTANTS LTD

Issue Status:	For Information
Project Number:	1693
Drawing Number:	017-a
Revision:	C
A3 Scale:	1:10000

ID	Appellation	Owner	Property Address	Postal Adress
1	Lot 2 DP 359100	Lorraine Patricia Van Asbeck & Richard George McRae Matthews & Robert Ian Copsey	338 Te Kowhai Road Te Kowhai	4 Edenpark Drive Rototuna North Hamilton 3210
2	Lot 1 DP 359100	Lorraine Patricia Van Asbeck & Richard George McRae Matthews & Robert Ian Copsey	336 Te Kowhai Road Te Kowhai	4 Edenpark Drive Rototuna North Hamilton 3210
3	Lot 3 DP 410726	Angela Maricia Holten & Malcolm Roy Carlyon	320B Te Kowhai Road Te Kowhai	320B Te Kowhai Road RD 8 Hamilton 3288
4	Lot 1 DP 422212	Juliet Lee Kelly & Peter Kieran Kelly	308 Te Kowhai Road Te Kowhai	308 Te Kowhai Road RD 8 Hamilton 3288
5	Lot 2 DP 422212	Juliet Lee Kelly & Peter Kieran Kelly	304 Te Kowhai Road Te Kowhai	308 Te Kowhai Road RD 8 Hamilton 3288
6	Lot 1 DP 355464	Stuart Douglas McFarlane & Susan Ann McFarlane	236 Exelby RD 8 Hamilton 3288	PO Box 5557 Frankton Hamilton
7	Lot 3 DP 422212	Ian Earl Willetts & Noeline Joyce Willetts	302 Te Kowhai Road Te Kowhai	302 Te Kowhai Road RD 8 Hamilton 3288
8	Lot 1 DPS 69074	Gae Heang Kim	301 Te Kowhai Road RD 8 Hamilton	266 Exelby Road RD 8 Hamilton 3288
9	Lot 1 DPS 15249	Maurice Conway Clarke, Wayne Maurice Clarke and Bruce Peter Sugar	173 Te Kowhai Road Northgate 3200	173 Te Kowhai Road RD 8 Hamilton 3288
10	Lot 3 DPS 62700	Melanie Jane Clarke & Roger Thomas Scott & Wayne Maurice Clarke	Exelby Road RD 8 Hamilton	131 Te Kowhai Road RD 8 Hamilton 3288
11	Lot 2 DP 343823	Trudi Monica Miles & William John Miles	92 Burbush Road RD 8 Hamilton 3288	
12	Lot 1 DP 449172	Paula Karyn Ruske & Richard Neville Ruske	121 Burbush Road RD 8 Hamilton 3288	
13	Lot 2 DP 314799	En Dian Company Limited	371 Te Kowhai Road Northgate 3200	PO Box 33102 Takapuna North Shore City 0740
14	Lot 3 DPS 92223	Alex Bernard Castle & Brett Bryan Young & Jillian Marianne Mould & Paul Clifford Wood Greaves	216 Te Kowhai Road Northgate 3200	150 Dickson Road Papamoa Beach Papmoa 3118
15	Lot 3 DP 314799	Chung Ying-Fang Hsiao	353 Te Kowhai Road Northgate 3200	5 Braithwaite Avenue Chartwell Hamilton 3210
16	Lot 2 DP 321653	David Morgan Buckley & Janine Georgiana Buckley	424 Te Kowhai Road Te Kowhai	424 Te Kowhai Road RD 8 Hamilton 3288
17	Lot 2 DP 443810	CR Rejthar Trustees Limited	87 Burbush Road RD 8 Hamilton 3288	203 Baverstock Road Nawton Hamilton 3200
18	Part Lot 6 DPS 8356	Mark Evan Blackmore	216B Te Kowhai Road Northgate	216 Te Kowhai Road RD 8 Hamilton 3288
19	Lot 3 DP 439444	Shaochun Wang & Xuemei Yuan	236 Exelby RD 8 Hamilton 3288	189E Cambridge Road Hillcrest Hamilton 3216
20	Lot 1 DP 410726	Hira Takuira-Mita & Rosemary Hiria Kouka Takuira-Mita	324 Te Kowhai Road Te Kowhai	324 Te Kowhai Road RD 8 Hamilton 3288
21	Lot 3 DP 316291	Glenn Richard Stirling & Helen Joanne Stirling	341 Exelby Road Rotokauri	341 Exelby Road RD 8 Hamilton 3288
22	Lot 2 DP 465444	Qinglan Hai	381 Duck Road Rotokauri	13 Raungawari Drive Huntington Hamilton 3210
23	Part Lot 7 DPS 86769	Thelma Jean Murray	Te Kowhai Road Te Kowhai	246 Te Kowhai Road RD 8 Hamilton 3288
24	Lot 3 DP 465444	Qinglan Hai Hongyan Han	381C Duck Road Rotokauri	13 Raungawari Drive Huntington Hamilton 3210
25	Section 19 SO 416124	Thelma Jean Murray	Te Kowhai Road Northgate Hamilton 3200	246 Te Kowhai Road RD 8 Hamilton 3288
26	Lot 1 DP 465444	Qinglan Hai	381B Duck Road Rotokauri	13 Raungawari Drive Huntington Hamilton 3210
27	Lot 3 DP 359100	Lorraine Patricia Van Asbeck & Richard George McRae Matthews & Robert Ian Copsey	360 Te Kowhai Road Te Kowhai	4 Edenpark Drive Rototuna North Hamilton 3210
28	Lot 6 DPS 86769	Clekar Farms Limited	268 Te Kowhai Road Te Kowhai	268 Te Kowhai Road RD 8 Hamilton 3288
29	Lot 3 DP 321653	Deborah Marie Lee & Kane Lee	416 Te Kowhai Road Te Kowhai	416 Te Kowhai Road RD 8 Hamilton 3288
30	Lot 1 DP 316291	Juanita Margaret Martin & Robin Kenneth Martin	337 Exelby Road Rotokauri	337 Exelby Road RD 8 Hamilton 3288
31	Lot 1 DP 321653	Peter Bernard Kanters & Wahnita Rose Kanters	426 Te Kowhai Road Te Kowhai	426 Te Kowhai Road RD 8 Hamilton 3288
32	Section 22 SO 495676	Delwyn Te Kuru Abraham & Gregory Shane Abraham	437 Te Kowhai Road Te Kowhai	437 Te Kowhai Road RD 8 Hamilton 3288
33	Lot 1 DPS 18383	Dennis Leslie Beaumont Smith & Sonia Genevieve Smith	282 Te Kowhai Road Te Kowhai	PO Box 10198 Te Rapa Hamilton 3241
34	Section 2 SO 495676	Kenneth Malcolm Anderson	406 Te Kowhai Road Te Kowhai	406 Te Kowhai Road RD 8 Hamilton 3288
35	Lot 1 DPS 63354	Thelma Jean Murray	Te Kowhai Road Te Kowhai	246 Te Kowhai Road RD 8 Hamilton 3288
36	Lot 5 DPS 86769	Roger Scott Murray & Vivian Louise Murray	Te Kowhai Road Te Kowhai	244 Te Kowhai Road RD 8 Hamilton 3288
37	Section 1 SO 495676	Kenneth Malcolm Anderson	406 Te Kowhai Road Te Kowhai	406 Te Kowhai Road RD 8 Hamilton 3288
38	Lot 2 DPS 86769	Catherine Jane Murray & Dean Phillip Murray	254 Te Kowhai Road Te Kowhai	254 Te Kowhai Road RD 8 Hamilton 3288
39	Lot 3 DPS 86769	Kenneth John Rowe & Linda Joy Rowe	252 Te Kowhai Road Te Kowhai	252 Te Kowhai Road RD 8 Hamilton 3288
40	Lot 1 DP 373390	Brien William Craig-Brown & Lisa Marie Pudney	318B Te Kowhai Road Te Kowhai	318B Te Kowhai Road RD 8 Hamilton 3288
41	Lot 2 DP 373390	Brett Herbert Lightfoot & Tania Sheree Lightfoot	318A Te Kowhai Road Te Kowhai	318A Te Kowhai Road RD 8 Hamilton 3288
42	Lot 2 DP 316291	Lisa Maria Pulman-Gaby	339 Exelby Road Rotokauri	339 Exelby Road RD 8 Hamilton 3288

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Drawn By: AH Date: 20/09/2018 Signed:
Checked By: Date: Signed:
Approved By: Date: Signed:
Plot Date: 20/09/2018

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Project:
Rotokauri North Plan Variation

MADE

Title:
Affected Parties Rotokauri North

McKENZIE&Co CONSULTANTS LTD

Issue Status: For Information
Project Number: 1693
Drawing Number: 017-b
Revision: C
A3 Scale: 1:10000

ID	Appellation	Owner	Property Address	Postal Adress
43	Lot 1 DPS 46587	Gae Heang Kim	301 Te Kowhai Road RD 8 Hamilton	266 Exelby Road RD 8 Hamilton 3288
44	Lot 2 DPS 69074	Gae Heang Kim	301 Te Kowhai Road RD 8 Hamilton	266 Exelby Road RD 8 Hamilton 3288
45	Part Lot 1 DPS 17176	Bruce Peter Sugar & Maurice Conway Clarke & Wayne Maurice Clarke	153 Te Kowhai Road Northgate 3200	173 Te Kowhai Road RD 8 Hamilton 3288
46	Lot 1 DPS 72047	John William Temm & Valerie Kathleen Temm	349 Te Kowhai Road Northgate 3200	349 Te Kowhai Road RD 8 Hamilton
47	Lot 2 DP 322023	Claire Ann Craven & David George Craven	389 Exelby Road Rotokauri	389 Exelby Road RD 8 Hamilton 3288
48	Lot 1 DP 322023	Edward John Burak & Linda Tracey Burak	387 Exelby Road Rotokauri	387 Exelby Road RD 8 Hamilton 3288
49	Lot 3 DP 322023	Michael Dean Sheeran	407 Exelby Road Rotokauri	407 Exelby Road RD 8 Hamilton 3288
50	Lot 5 DP 335995	Cheng Chung Lin & Chi-Lin Tsai & Due Xue & Jy Chi Fang & Luh-Rong Ho & Po-Chung Chao & Yung-Chin Chao Chen	284 Exelby Road RD 9 Hamilton 3289	674B Te Rapa Road Te Rapa Hamilton 3200
51	Lot 3 DP 413328	Acorn Farms Limited	63B Duck Road Rotokauri	PO Box 15489 Dinsdale Hamilton 3243
52	Lot 1 DP 413328	Lailaa Slater & Thomas John Slater	63C Duck Road Rotokauri	63C Duck Road RD 8 Hamilton 3288
53	Lot 3 DP 421316	Doreen Inez Thornton & Neville William Sydney Thornton	25 Duck Road Rotokauri	25 Duck Road RD 8 Hamilton 3288
54	Lot 3 DP 408214	BTC Holdings Limited	51 Duck Road Rotokauri	3 Windmill Road RD 3 Hamilton 3283
55	Lot 3 DP 465444	Qinglan Hai	381C Duck Road Rotokauri	13 Raungawari Drive Huntington Hamilton 3210
56	Lot 1 DPS 86769	Dennis Leslie Beaumont Smith & Sonia Genevieve Smith	282 Te Kowhai Road Te Kowhai	PO Box 10198 Te Rapa Hamilton 3241
57	Lot 3 DP 359488	Brian James Robertson & Eleanor Mary Robertson	64 Burbush Road RD 8 Hamilton 3288	
58	Lot 2 DP 410726	Ivan Andrew Murray & Roslyn June Murray	320A Te Kowhai Road Te Kowhai	320A Te Kowhai Road RD 8 Hamilton 3288
59	Lot 4 DP 422212	Brien William Craig-Brown & Lisa Marie Pudney	318B Te Kowhai Road Te Kowhai	318B Te Kowhai Road RD 8 Hamilton 3288
60	Lot 4 DPS 86769	Clekar Farms Limited	268 Te Kowhai Road Te Kowhai	268 Te Kowhai Road RD 8 Hamilton 3288
61	Lot 1 DP 359488	Karen Joy Hennessey & Timothy John Hennessey	82 Burbush Road RD 8 Hamilton 3288	
62	Lot 1 DPS 4129	Zee Holdings Limited	245 Te Kowhai Road Northgate 3200	245 Te Kowhai Road RD 8 Hamilton 3288
63	Lot 2 DPS 92223	Gregory John Rouse & Louise Antoinette Sullivan	212 Te Kowhai Road Northgate 3200	212 Te Kowhai Road RD 8 Hamilton 3288
64	Lot 1 DP 314799	Nicholapillai Canute Chandrakumaran	365 Te Kowhai Road Northgate 3200	48B West Lynn Road Titirangi Auckland 0604



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Drawn By: AH Date: 20/09/2018 Signed:
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Approved By: Date: Signed:
Plot Date: 20/09/2018

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Project:
Rotokauri North Plan Variation

MADE

Title:
Affected Parties Rotokauri North

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Issue Status: For Information
Project Number: 1693
Drawing Number: 017-c
Revision: C
A3 Scale: 1:10000