Laura Bowman

From: Official Information
Sent: Thursday, 20 October 2022 8:32 am
To: 7(2)(a) [redacted]
Cc: Official Information
Subject: Final Response (Part 2) - LGOIMA 283693 - 7(2)(a) [redacted] - Information regarding the proposed sale and development of Sonning Car Park
Attachments: [27.9.22] HCC - OIA Request.docx; Sonning Carpark map- Updated September 2022-2022.10.03.PDF; 191-197 River Road - Sonning Carpark - Veros - Property Summary Report - Final(2).PDF

Importance: High

Kia Ora,

I refer to your **information request attached**, Hamilton City Council is able to provide the following response.

As advised in our email dated 30 September 2022, please find below some further information with regards to Part E(ii) and (iii) of your request:

Your Request E
All expert reports or discussion papers or other documents held by Council relating to the Sonning site and nearby Waikato River relating to the proposed development and the impact of the development including relating to:

ii. vehicle congestion issues
iii. use of services such as waste collection, aging infrastructure

Our Response E

ii. Please see the attached PDF document for the most recent Sonning Carpark Traffic Flows Map 2022
iii. Please refer to the previously released 2020 Veros Property Report (D-3950326). Council notes that the wastewater line is no longer in use as it's the head of the line and the watermain is in road reserve. The stormwater is local to the site. Our services have little, to no impact on the site.

You have the right to seek an investigation and review by the Ombudsman of this decision. Information about how to make a complaint is available at www.ombudsman.parliament.nz or freephone 0800 802 602.

Kind Regards,

Laura | Official Information Coordinator
Governance & Assurance Team | People and Organisational Performance
Email: officialinformation@hcc.govt.nz

Hamilton City Council
Te kaunihera o Kirikiriroa

From: Official Information <officialinformation@hcc.govt.nz>
Sent: Friday, 30 September 2022 6:17 pm
To: 7(2)(a) [redacted]
Cc: Official Information <officialinformation@hcc.govt.nz>
Subject: Final Response - LGOIMA 283693 - 7(2)(a) [redacted] - Information regarding the proposed sale and development of Sonning Car Park

Kia Ora,

I refer to your **information request attached**, Hamilton City Council is able to provide the following response.

Some of the responses below refer to documentation as part of the response. These documents are provided via One Drive:
LGOIMA 283693 - Sonning Car Park

Please note that due to the number of documents we are releasing, we have left the Hamilton City Council documentation reference number (D-number) as the main identifier for each document. Please use this reference number to correspond the document in table below to the documents in the OneDrive link.

Your Request A:
Sale and purchase agreement(s) relating to Sonning Car park

Our Response A:
There is no Agreement for Sale and Purchase for the site. Therefore, as this information does not exist, we are refusing this part of your request per S 17(e) of LGOIMA.

Your Request B
Any contract(s) relating to either the sale or development of Sonning Car park

Our Response B
There are no contracts relating to the sale or development of Sonning Car park. Therefore, as this information does not exist, we are refusing this part of your request per S 17(e) of LGOIMA.

Your Request C
Any documents relating to the proposed development at Sonning Car park either prepared by the Council, its committees, the developer or any expert

Our Response C
Please see the following documents via the One Drive link provided above for response to this part of your request:

- Veros Property Report (D-3950326)
- Nightingale "Project Korimako" Concept (D-3950359).

Your Request D
Any records of any decisions made by Council or by a Council committee relating to the sale and development of Sonning Car park

Our Response D
We are refusing this aspect of your request as any relevant Council / Committee decisions were made in a Publically Excluded Economic Development Committee Meeting. As such, the Reports and Minutes of said meeting are being withheld in accordance with S 7(2)(h) of LGOIMA – to enable any local authority holding the information to carry out, without prejudice or disadvantage, commercial activities.

This is not to say this information will not be released in the near future.

Your Request E
All expert reports or discussion papers or other documents held by Council relating to the Sonning site and nearby Waikato River relating to the proposed development and the impact of the development including relating to:

i. geotechnical issues
ii. vehicle congestion issues
iii. use of services such as waste collection, aging infrastructure
iv. environmental issues including on the Waikato River and it banks
v. impact on historical issues such as relating to Maori history at the site
vi. alternatives for the site
vii. any other relevant information to inform me of essential information that I need to provide to relevant experts (eg geotechnical, congestion) or to assess the urgency of any court action

Our Response E

i. Please refer to the following documents for geotechnical issues: WSP Opus Preliminary Geotechnical Assessment (D-3592495); Veros Property Report (D-3950326)
ii. Please refer to the following documents for vehicle congestion issues: Sonning Carpark Traffic Flows Map 2016 (D-2254813)*
iii. Please refer to the following documents for use of services: Veros Property Report (D-3950326)*
iv. Please refer to the following documents for environmental issues: WSP Opus Preliminary Geotechnical Assessment (D-3592495);
v. Please refer to the following documents for impact on historical issues: WSP Opus Archaeological Risk Assessment (D-3592532)
vi. There have been at least three serious proposals for the site. The proposals submitted represented the respective developers views as to the best and highest use for the land.
    - Hopper Proposal 2012 (D-4414191);
    - Trig Proposal 2015 Plans (D-3681664);
    - Trig Proposal 2015 Flyover (D-3459894);
    - Trig Hotel Proposal (D-2365025)
vii. Please see above. We have no further information to provide.

*We are currently awaiting further information for these aspects of your request from another internal Hamilton City Council team. These will be provided to you in due course.

Your Request F
Copies of all consultation documents provided by the Council to any person or entity or group

Our Response F
Please see the following documents for resposne to this part of your request:

- WSP Opus Preliminary Geotechnical Assessment (D-3592495)
- Veros Property Report (D-3950326)
- WSP Opus Archaeological Risk Assessment (D-3592532)
- Sonning Carpark Information Pack (D-3733704)
- Development Sites Brochure (D-4414598)

Your Request G
Copies of any submission or correspondence provided by consulted parties to the Council

Our Response G
No submissions or consultations have been proposed. As such, as this information does not exist, this aspect of your request is being refused as per S 17(e) of LGOIMA.

Your Request H

Any correspondence that provides additional information to the above that is relevant and necessary for me to consider to properly assess any legal or other action

Our Response H
All information which we believe to be relevant has been provided above. The Council has not provided anything further with regard to this request due to lack of specificity in accordance with the LGOIMA 10(2).

You have the right to seek an investigation and review by the Ombudsman of this decision. Information about how to make a complaint is available at www.ombudsman.parliament.nz or freephone 0800 802 602.

Kind Regards,

Official Information Team
Governance & Assurance Team | People and Organisational Performance
Email: officialinformation@hcc.govt.nz

Hamilton City Council | Private Bag 3010 | Hamilton 3240 | Hamilton City Council

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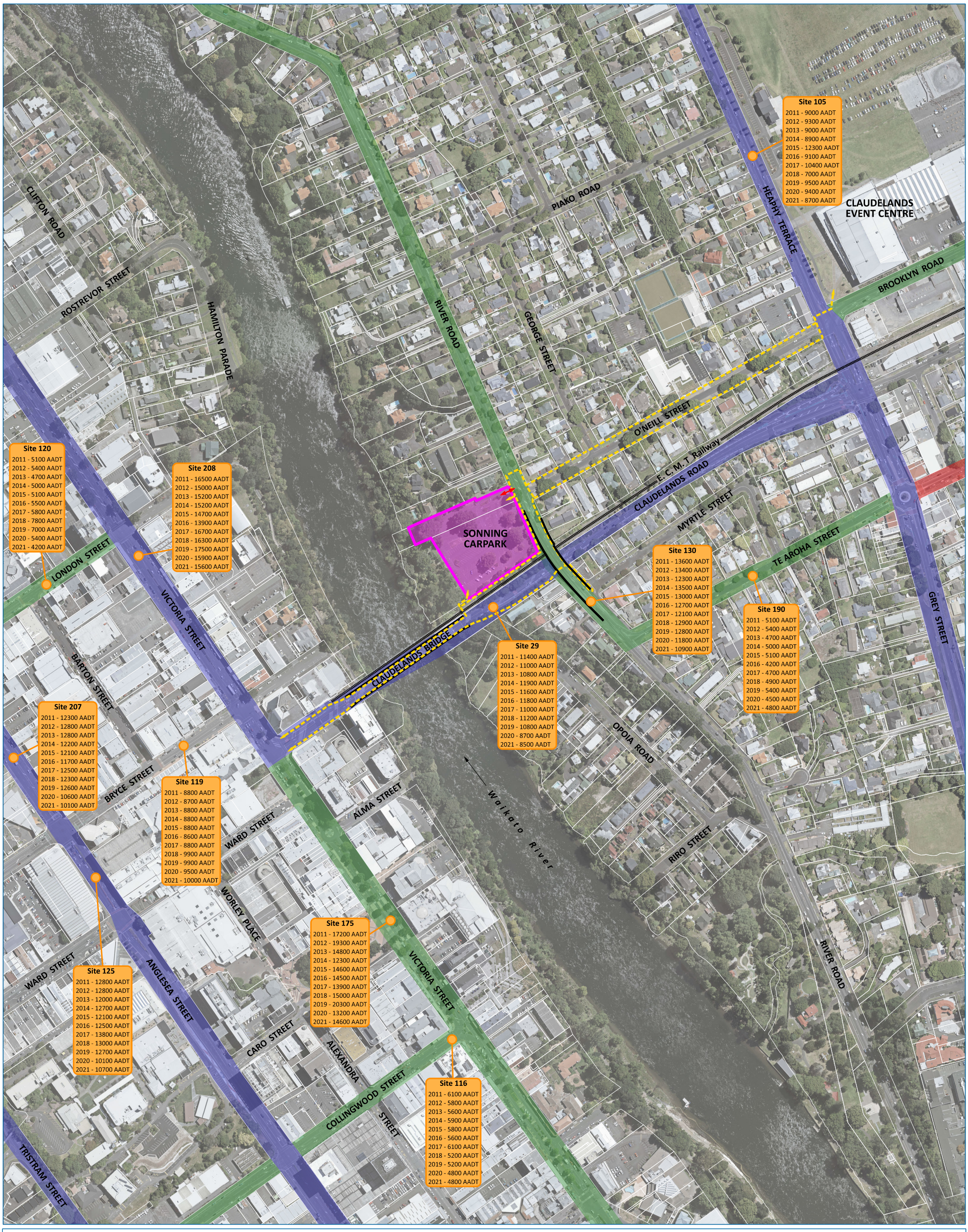
From: 7(2)(a)
Sent: Tuesday, 27 September 2022 9:10 am
To: CEO <CEO@hcc.govt.nz>
Subject: Official Information Act/ LGOIMA request

Good morning Lance,

Please find attached an urgent request for information under the OIA and LGOIMA.

Kind regards

7(2)(a)



KEY

- Sonning Carpark Site
- Pedestrian Flow & Access
- Vehicle Access/Exit
- Traffic Flow Site
- Edge of Bridge/Overbridge
- Roading Hierarchy - Major
- Roading Hierarchy - Minor
- Roading Hierarchy - Collector
- Railway Line

0 1 km 2km
Graphical Scale

North

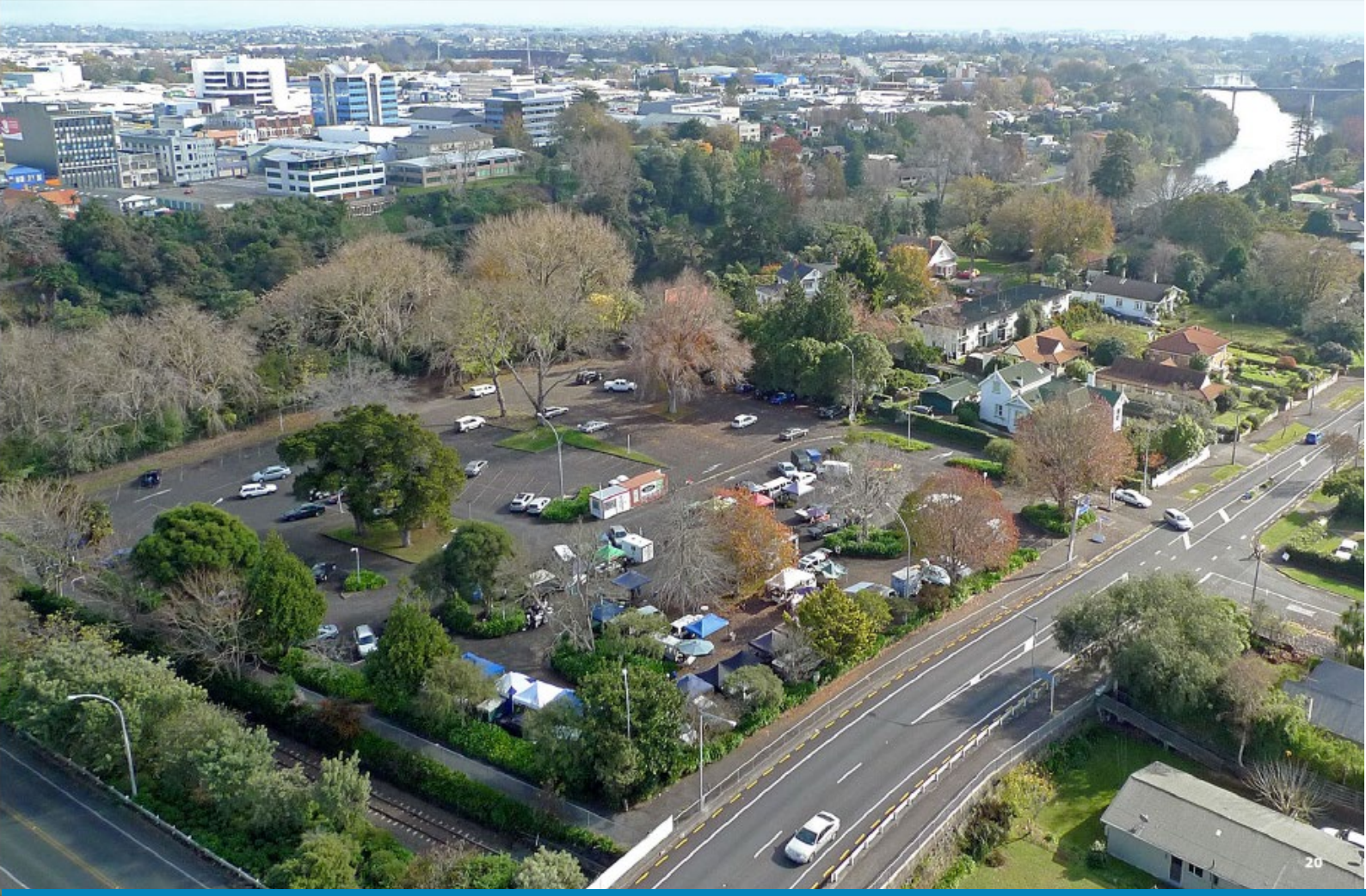
Hamilton City Council
Te kaunihera o Kirikiriroa
GIS & CAD Services

SONNING CARPARK MAP

Trim No. D-2254813
version 2

FILE PATH: g:/hccmap/Events and Economic Development/Strategic Property/Sonning Carpark.dgn

Updated: 30 Sept 2022



Sonning Car Park
191 River Road, Hamilton
Property Summary Report

Veros

Hamilton City Council
Te kaunihera o Kirikiriroa

STATEMENT OF LIMITATION

This property report has been prepared by Veros Property Services Limited for the sole use of the client and is not to be used by, or distributed to, any other person(s) or entity without the prior written consent of Veros Property Services Limited. Veros Property Services Limited have provided this report on the condition, subject to any statutory limitation on its ability to do so, Veros Property Services Limited accept no liability under any cause of action, including but not limited to, negligence for any loss arising from reliance upon this report, or to any third party.

The content has been derived, in part, from third party sources and based on estimates, assumptions, dated and or forecasted information, in response to the clients brief. Any assumptions have associated risks and Veros Property Services Limited do not warrant such statements are or will be accurate, correct, or complete.

Veros Property Services Limited are suitably qualified, knowledgeable and experienced in property related fields and have prepared property reports for similar projects. The preliminary assessment of development options is an aid to clients, and they accept the information contained within the report on the condition they make their own enquiries and obtain independent advice to verify the accuracy, correctness or completeness of the information presented.

PREPARED FOR:

Hamilton City Council
Te kaunihera o Kirikiriroa

PREPARED BY:

Contents

1 Introduction

Hamilton City Council owns the property at 191 River Road, Hamilton commonly referred to as Sonning Car Park. The property is located on the Eastern side of the Waikato River between the Claudelands Events and Entertainment Centre and the Hamilton central business district. The site has been identified as a key through-site link due to its location between the CBD and Claudelands. The Council has indicated that this site would be sold if a reputable developer expressed interest in purchasing the site. Accordingly, Veros have been engaged to prepare a Property Summary Report outlining the key information for the site. The following tasks were undertaken:

- Review all existing property information.
- Collate findings into a report.

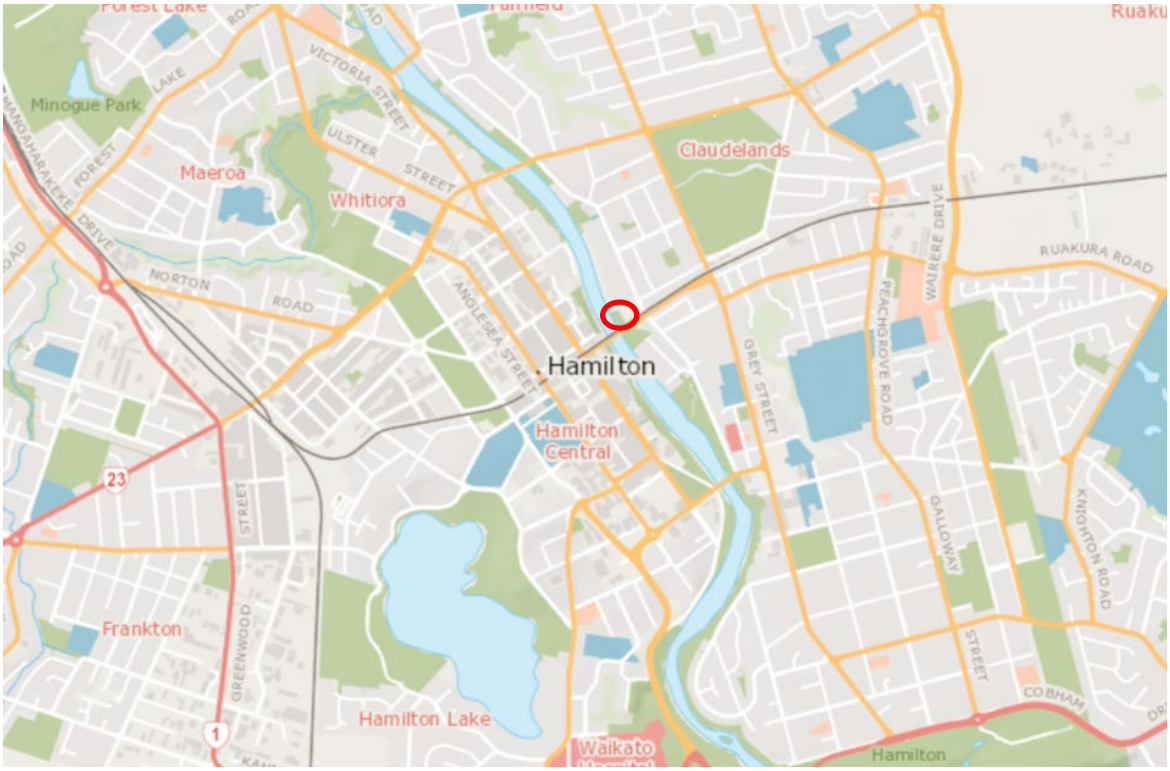
This report comprises a collocation of existing information for the property and is provided for information only. This report does not comprise a due diligence review of the property or provide advice on the suitability of the property for redevelopment.

Any aspects of the property identified within this report will need to be investigated further as part of prudent due diligence.

2 Property Overview

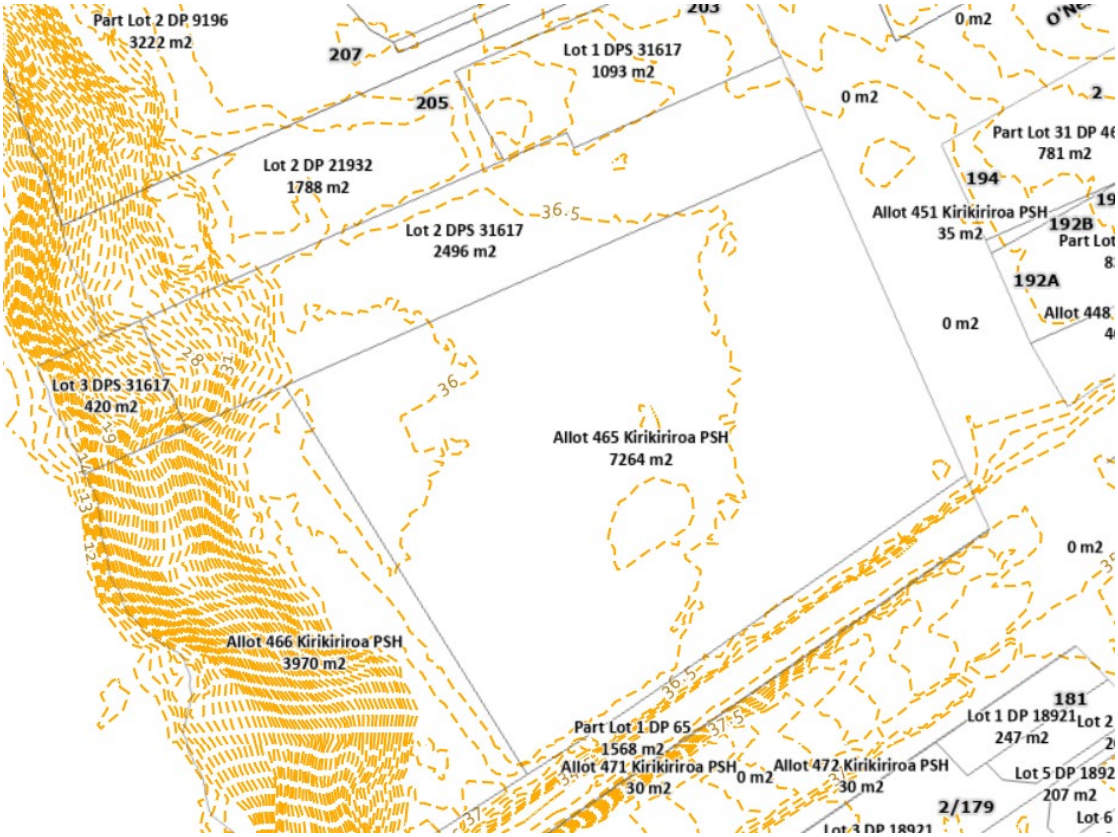
2.1 LOCATION

The property is located on the Eastern side of the Waikato River on the corner of River Road and Claudelands Road (Claudelands Bridge), Hamilton. The site is immediately adjacent to and elevated above the Waikato River with wide views over the river and back towards the Hamilton CBD. The property is in a central location, approximately 300m east of Hamilton's central business district, and approximately 450m west from the Claudelands Events and Entertainment Centre.



2.2 THE SITE

The property comprises two adjoining allotments with a combined area of 9,760m² and 82m of frontage to River Road. The East Coast Main Trunk railway sits between the site and Claudelands Road. A pedestrian overbridge links the site to the footpath on the northern side of Claudelands Road, leading into the CBD. The contour of the site is generally flat apart from an approximately 495m^2 area of the North-Western corner that falls approximately 10m to the boundary. The site has not been assessed as part of the Hamilton City Council's 1 in 100-year flood hazard mapping.



2.3 LEGAL OVERVIEW

2.3.1 Titles

An overview of the legal details of each of the properties is shown as follows:

	191 River Road	197 River Road
Identifier	SA50D/392	SA30A/477
Legal Description	Allot 465 Parish of Kirikiriroa	Lot 2 DPS 31617
Registered Owner	Hamilton City Council	Hamilton City Council
Estate	Fee Simple	Fee Simple
Area	7,264m² more or less	2,496m² more or less
Registered Interests	Subject to Section 11 Crown Minerals Act 1991 Subject to Part IV A Conservation Act 1987	Nil.

2.3.2 Legislation for Disposal

Tompkins Wake have assessed the property to determine any potential buy-back rights that may impact the ability of Council to dispose of the properties on the open market. They have advised the Council has no obligations in respect of offer-back to previous owners. The Council is free to dispose of the property.

2.4 EXISTING IMPROVEMENTS

The site currently comprises a paid parking facility. Site improvements consist of a flat asphaltic surface carpark yard as well as other minimal curb and channel improvements. Lighting, as part of the carpark, make up the only other improvements on site.

2.5 EXISTING LEASE

Secure Parking operate the car park under a management agreement where Council earn an income based on performance of the parking facility. This agreement contains a termination right in favour of HCC and therefore this can be terminated to facilitate redevelopment. The current income received from Secure Parking is approximately $240,000 plus GST, noting this fluctuates based on performance.

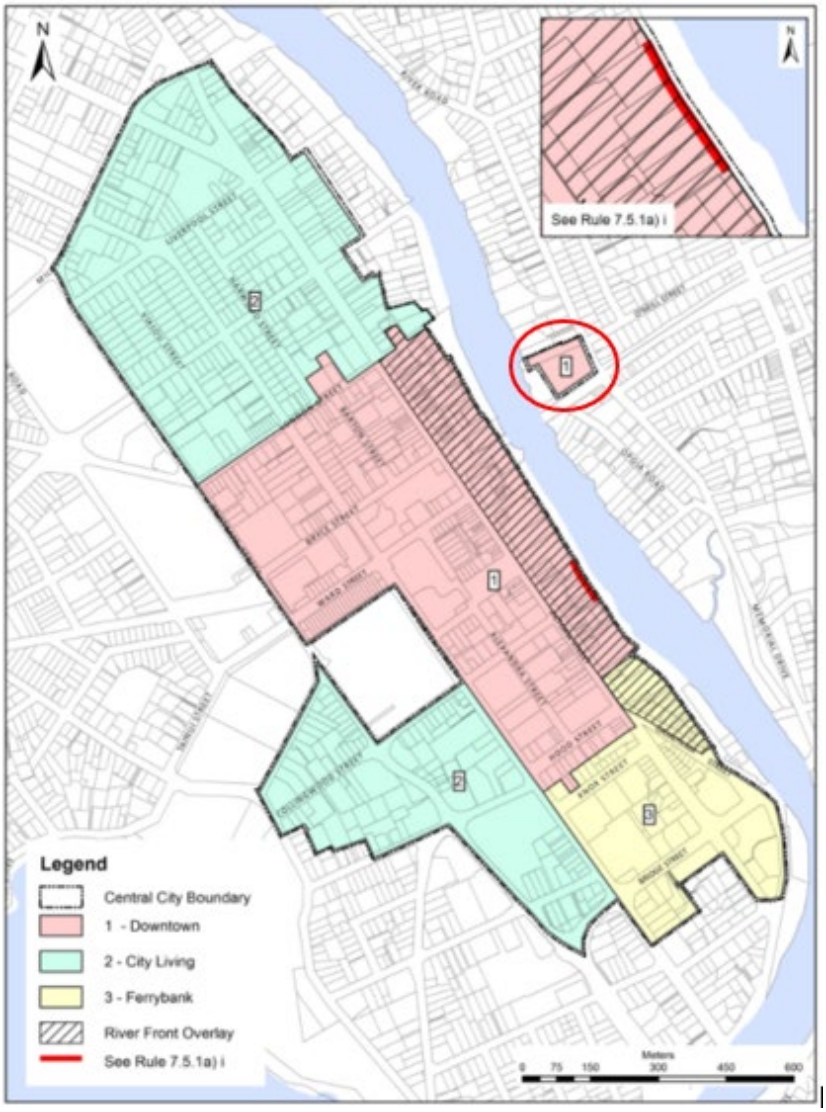
2.6 TREES

Hamilton has over 350 protected specimen trees which have significant heritage value. The trees – a mix of exotic and native species – are often more than 100 years old and are among the most striking features of the city's natural landscapes. Many of these specimens are planted in the city's more historic neighbourhoods, particularly Hamilton East and Claudelands.

There are several mature trees on the site as seen in the image below. Hamilton City Council's list of Protected Trees "Schedule 9D: Significant Trees" has been checked and this site is not named as an area having protected trees present.

2.7 DISTRICT PLAN ZONING

The site is zoned Central City Zone - Precinct 1 - Downtown Precinct in the Hamilton City Council Operative District Plan. Whilst situated outside of the CBD, this property is considered a strategic site given its connectivity to the CBD and the Claudelands Events and Entertainment Centre.



The Downtown Precinct zone will provide for the largest proportion of the region's commercial growth over the next 30 years. In order to achieve both commercial growth and higher residential densities within this precinct, taller building height is encouraged, providing buildings are well designed, adverse effects are mitigated, are appropriate to their setting and achieve public amenity bonuses to safeguard pedestrian amenities at ground level.

At street level, there will be a requirement for active building frontages, including retail, dining and entertainment. Above ground level, high-density commercial offices and residential use will be encouraged.

The table below provides a breakdown of the activities and their status under the District Plan relative to the site. An overview of the key terms referenced in the table is outlined below, including the activity status of each land use, how they relate to the Resource Management Act and how Council will process any required resource consent application.

- P: Permitted Activity
  - Can establish onsite without the need for planning permissions

- C: Controlled Activity
  - Anticipated on site but requires planning permission.
  - Council and must approve the application.
- RD: Restricted Discretionary Activity
  - Mostly anticipated to occur on site but requires planning permission.
  - Council has restricted discretion when assessing an application to specific matters and may impose conditions of consent.
- D: Discretionary Activity
  - Requires planning permission and could establish if any actual or potential adverse effects can be appropriately mitigated.
  - Council may approve or decline or application and may impose conditions of consent.
- NC: Non-Complying
  - Requires planning permission and generally not supported within the zone.
  - Council may approve or decline or application, and may impose conditions of consent.

Activity	Status
Industry	
Light industry	NC
Service industry	P
Transport depot	NC
Emergency service facilities	D
Offices	
Offices <1000m^2 GFA per site	P
Offices >1,000m^2 GFA per site	P
Home-based business	P
Ancillary office	P
Retail / Commercial	
Ancillary retail	P
Retail < or equal to 250m^2 GFA per tenancy	P
Retail >250m^2 GFA (per tenancy)	P
Supermarkets	P
Tourism ventures and information centres	P
Yard-based retail < or equal to 400m2	NC
Restaurants, cafes, licensed premises	P
Places of assembly	P
Drive-through services	
i. excluding automotive fuel retailing	NC
ii. including automotive fuel retailing	NC

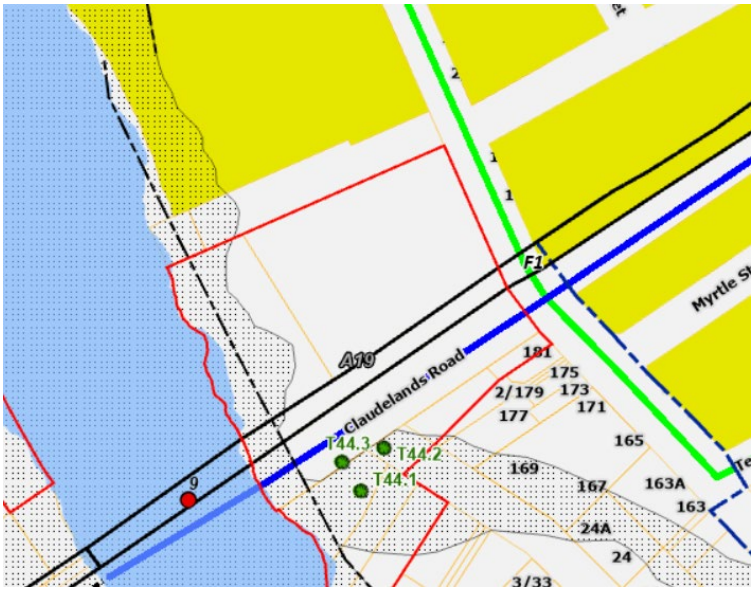
Parking buildings	RD*
Parking lots	
i. operating for twelve months or less	RD*
ii. operating for more than twelve months	NC
Passenger transport facilities	PD
Community	
Health care services	
i. at ground floor < or equal to 250m^2 GFA	P
ii. at ground floor > 250m^2 GFA	RD
iii. above ground floor	P
Childcare facilities	
i. at ground floor < or equal to 250m^2 GFA	P
ii. at ground floor > 250m^2 GFA	RD
iii. above ground floor	P
Community centres	
i. at ground floor < or equal to 250m^2 GFA	P
ii. at ground floor > 250m^2 GFA	RD
iii. above ground floor	P
Tertiary education and specialised training facilities	
i. at ground floor < or equal to 250m^2 GFA	P
ii. at ground floor > 250m^2 GFA	RD
iii. above ground floor	P
Public art	P
Residential	
Apartments at ground floor	RD*
Apartments above ground floor	P
Single dwellings	NC
Residential centres	NC
Visitor accommodation	P
Ancillary residential units above ground floor	P

Rules - General Standard

- Maximum Height = 20m
- Maximum site coverage = 100%
- Building Setbacks. A building setback of 6m applies to the Waikato Riverbank and Gully Hazard Area, otherwise boundary setbacks are 0m. Note the Waikato Riverbank and Gully Hazard Area the is shown in the figure below in the 2.9 Archaeological section as the black shaded area. This does not consider building setbacks required as part of geotechnical restrictions.
- Minimum permeable surface area = Nil
- Any new wholesale redevelopment in excess of 5,000m2 at ground level shall provide a ground level through-site link. A through-site link generally described as a public pedestrian walkway traversing the site of a minimum width of 2.8m.

2.8 ARCHAEOLOGICAL

Part of the site (7,264m² of Allot 465 Parish of Kirikiriroa) is classified as a Significant Archaeological Site – Group 1. See below image with Red Border outlining the Significant Archaeological Site Group 1 boundary. Note the Red area shown also includes neighbouring properties.



An Archaeological Risk Assessment was completed by WSP in November 2020, see Appendix 1. The Archaeological Risk Assessment concluded that any modification of open ground or below the carpark has risk of modifying archaeology. It will be a legal requirement to have an active Archaeological Authority in place from Heritage New Zealand Pouhere Taonga prior to commencing any ground disturbance. It is recommended that any future development should avoid the more intact high archaeology risk areas identified during the site visit, refer image (Figure 3) below. Heritage New Zealand Pouhere Taonga and the relevant tangata whenua should also be contacted in advance to discuss the impact of any development proposals.

The following recommendations are made in this report:

- An Archaeological Authority should be sought for any proposed ground disturbance in the car park because of the potential for encountering buried archaeological remains.
- Development proposals should take into account avoiding the more intact high-risk areas identified in the site visit where there is a high expectation of encountering intact archaeological remains.
- Heritage New Zealand Pouhere Taonga and the relevant tangata whenua groups should be contacted in advance to discuss any development proposals.

Figure 3. Results of site visit 23/11/2020, showing areas of high archaeology risk (red), where intact archaeological remains are highly likely and moderate archaeological risk (yellow), where the archaeology is likely to have been disturbed.

The archaeology report indicates that redevelopment will need to closely consider the heritage and cultural aspects of the property. Council have made no further investigations or undertaken any consultation with Iwi. Any party looking to undertake substantial redevelopment of the site will need to consider these heritage and cultural aspects as part of their full due diligence of the property and its suitability for redevelopment.

2.9 GEOTECHNICAL

A Preliminary Geotechnical Assessment Report was completed by WSP in December 2020, see Appendix 2. The WSP report concluded that further engineering assessment and design will be required to reduce or mitigate the identified risks for the development of the site. Foundation options for the development may include the following:

- Shallow foundations will be suitable for buildings located at least 25m east of the crest of the riverbank slope.;
- The adoption of geo grid reinforced gravel rafts, strengthened floor slabs or 'waffle' slabs to reduce the risk of damage due to differential settlements.;
- Benching of the riverbank slope incorporating a retaining wall to support the development footprint to the east;
- The use of a piled shear wall (or similar) within the slope;
- Piled foundation options for buildings located less than 25m from the slope crest could include the use of ground anchors or soil nails for the stabilisation of the slope in combination with piled foundations for the buildings;
- For larger multi storey buildings, piled foundations may be required extending through the very soft to soft cohesive soils into the underlying dense and weakly cemented cohesionless soils at depth.

The report also concluded that due to the variability of the subsoils across the whole of the site, further geotechnical investigations are recommended in advance of the detailed design of foundations.

2.10 POWER

Overhead power lines are located within the road reserve (River Road) adjacent to site. The overhead lines run parallel with River Road, and the site boundary from the North, for approximately 25.5m before they cross eastwards over River Road away from the site. No investigations have been made into the power available within the property itself.

Any future development on site will have its own specific power requirements that will be determined by an electrical engineer through detailed design. For a comprehensive development, it is likely that a transformer upgrade will be required.

2.11 THREE WATERS

We provide as follows, an overview of the three waters as outlined in Hamilton City Council's 3 Waters Viewer. We note that we have not investigated capacity of existing infrastructure and suitability of a new development.

Stormwater

A stormwater main is located on the property as shown above with the green dotted line with arrows showing direction of flow towards the river. Three stormwater catchpits, and catchpit leads are also present within the property leading to an outlet structure into the Waikato River. A manhole is also present represented by the green circle symbol. This stormwater infrastructure appears to service the property only and does not appear to service a wider catchment. Capacity of this infrastructure is unknown however any comprehensive development of the property will need to consider treatment of stormwater albeit the existing site is almost fully impervious.

Water

A water main exists along the River Road frontage of the property, with only one connection to the larger Allot 465 Kirikiriroa site. Redevelopment will be able to connect into this existing supply, albeit backflow devices and water meters will need to be installed.

Wastewater

A wastewater main, indicated by the red dotted line, exists along the neighbouring property to the west, and through part of the site. A wastewater service line (red solid line) and manhole (red circle) are also located on site. This site appears to be at the top end of the main, with an abandoned line connected that runs to the south of the site. Therefore this infrastructure could be relocated to accommodate redevelopment without affecting wider catchment. This is likely to have capacity however development may need to consider low flow measures to be installed to reduce impact on existing infrastructure.

2.12 CONTAMINATION

The property is not listed on the Hazardous Activities & Industries List (HAIL) as advised by the Hamilton City Council's Contaminated Land Officer, see appendix 3. No other contaminated land assessment has been undertaken for the site.

2.13 FLOODING

Hamilton City Council has an ongoing programme to understand what would happen in areas of Hamilton if there was a very large, and rare amount of rain. The measure used is an event which would happen, on average, once in 100 years. Statistically, this means there is a 1% chance of this happening in any given year.

This is referred to as a 'one-in-100-year event' and it provides a consistent measure for Councils to use across the district. Mapping of potential flooding in a one-in-100-year event is developed with computer modelling that uses land contours, climate change information and known and predicted rainfall and water flow patterns. This information has been identified for around one third of Hamilton so far.

The Hamilton City Council's Flood Hazard Information system "Floodviewer" the site has not been assessed and no flood information is available.

2.14 RAILWAY LINE

The East Coast Main Trunk Railway line sits immediately adjacent the site to the South. The Railway is position approximately 2m below the level of the majority of the site.

Any future development on site will need to consider the affects of the Railway line and should include design and materials to reduce interior noise and vibration to acceptable levels.

3 Summary

The property presents a strong development opportunity having regard to the underlying zoning, proximity to the CBD and the Claudelands Events and Entertainment Centre. Notwithstanding, the site has characteristics that will need further investigation, primarily relating to ground conditions and site archaeology. These aspects could have significant impact on redevelopment and need to be further investigated as part of prudent due diligence.

4 Appendices

Please refer Appendices for the following:

- Appendix 1 – Archaeological Risk Assessment
- Appendix 2 – Preliminary Geotechnical Assessment Report
- Appendix 3 – Hazardous Activities & Industries List (HAIL) Record

Appendix 1: Archaeological Risk Assessment

27 November 2020

Wendy O'Neill
Strategic Team Lead
Hamilton City Council

SONNING CAR PARK ARCHAEOLOGICAL RISK ASSESSMENT

2-WLASS.BL

Dear Wendy,

The following assessment advice is provided for the purposes of determining if there are pre-1900 archaeological risks to be addressed in regard to future development options for the Sonning Car Park in Hamilton East. All recommendations are made in accordance with statutory requirements.

Please note, the following information is provided for information purposes and does not constitute a full archaeological assessment for the purposes of applying for an archaeological authority. An Assessment of Archaeological Effects (AAE) specific to actual developments is recommended once proposed development plans are confirmed.

The information contained in this letter is based on a review of publicly available information and the results of a brief site visit and the accuracy of whether there are archaeological remains present on the property cannot be guaranteed. The buried nature of archaeological sites means that they may often only be found once excavation commences, even if documentary research suggests that a property is low risk. WSP accepts no liability if unanticipated remains are found.

An archaeological site is defined under the *Heritage New Zealand Pouhere Taonga Act 2014* as any place in New Zealand, including any building or structure (or part of a building or structure), that was associated with human activity prior to 1900 and may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand.

There are no statements on the cultural values of the project area nor are the view of tangata whenua represented in this assessment.

Disclaimer

This report ('Report') has been prepared by WSP exclusively for Hamilton City Council ('Client') in relation to Sonning Car Park ('Purpose') and in accordance with the IFS signed 9/11/2020. The findings in this Report are based on and are subject to the assumptions specified in the Report and IFS. WSP accepts no liability whatsoever for any reliance on or use of this Report, in whole or in part, for any use or purpose other than the Purpose or any use or reliance on the Report by any third party.

WSP
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Blenheim 7012
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+64 3 520 9500
wsp.com/nz

Physical Setting

The Sonning Car Park is located on the eastern bank of the Waikato River, on north side of the Claudelands Bridge in Hamilton. The Waikato River is the major geographical feature of the landscape and, for both Māori and early Europeans, was an important source of fresh water, food, and also provided a transport route. The car park area itself is asphalted and relatively flat with steep banks dropping to the river immediately to the west. The East Coast Main Trunk Railway line runs along the southern border of the project area.

A single soil type is recorded extending across the car park, comprising of Horotiu soils (Bruce 1979). Horotiu soils were often modified by pre-European Māori for gardening purposes (Gumbley and Hutchinson 2013:4-5).

Historic Background

The date of first Māori occupation of the Waikato Basin is not certain and while there is currently limited dating evidence for settlement within the Project area, investigations are beginning to build a picture of occupation for the Waikato region. Recent dates from archaeological investigations at Burns Block, Cambridge, indicate Māori occupied the site from the middle of the 15th century (Gumbley and Laumea 2017:70).

The Kirikiriroa area, in which the Project area is located, was first settled by Ngati Wairere around 1700, on the western side of the river although the boundaries of their rohe fluctuated over the years. The area had many pa including Kirikiriroa (located between London and Bryce Street), Te Rapa, Waitewhiriwhiri, Whatanoa, Te Tahuki and Pukete on the west side; Opoia, Miropiko, Waipahihi, Te Taraahi and Te Parapara on the east side (Gibbons 1977:26).

Fortified settlements (pā) have traditionally dominated the recorded archaeological landscape throughout the region with under-recording of often less visible archaeological sites associated with day-to-day living activities, for example garden areas, undefended settlements and food storage locations (Cable 2012). However, this situation has changed in recent decades with more recent development-led archaeological survey and investigations, including those undertaken as a part of the wider Waikato Expressway development.

Prior to the military settlement of the 1860s, early European settlement in the Waikato was generally confined to flax traders and mission stations. Reports from the early 1800s, particularly from the 1820s onwards, describe European goods entering the Waikato region in the form of muskets; crops such as potatoes, kūmara, maize, melons, pumpkins and marrows; as well as animals such as pigs. Descriptions from European travellers passing through the inland Waikato in the 1850s and 1860s mention crops such as maize, wheat, potatoes and kūmara growing (Gumbley and Higham 2000:6; Keith 2015). Māori became proficient and productive growers, selling their surplus to the Auckland market, transporting goods via canoes along the Waikato and Waipa Rivers (Stowers and Field 2014; O'Malley 2016).

During the 1850s, Māori became increasingly disenfranchised due to the ongoing disregard of the principals of the Treaty of Waitangi by the Government. Consequently, the King Movement (Kingitanga) began within the Waikato to protect Māori interests by Māori. By the late 1850s pressures regarding land were mounting, and disputes over land, law and sovereignty led to a full-scale Crown invasion of the Waikato lands in 1863 (O'Malley 2016).

In 1864 and 1865, Kirikiriroa was occupied by soldiers and the 4th Waikato Military regiment was sent to establish a settlement. Two main redoubt were established on each side of the Waikato River south of the Project area at Bridge Street. In 1867 the military structures were transferred to the Armed Constabulary and by the end of the decade, the administrative centre was on the western side if the river. The two sides of the river, Hamilton East and Hamilton West, were connected by punt and the outside world via government steamer, then by commercial companies. The divide between the developing settlements was eased with the 1879 construction of Union Bridge (Victoria Street) (Gibbons 1977).

From the 1880s growth in the Waikato district was facilitated by the opening of railway lines, including from Auckland to Wellington and the East Main Trunk to Tauranga. The latter of these, the East Main Trunk, first constructed in 1883, crosses the Waikato River and runs along the southern boundary of the car park. Previously reliant on a river steamer service these new transport routes allowed the easier transport of goods to markets in Auckland, Hamilton and Thames (Stowers and Field 2014; Keith 2015).

Site History of the Car Park

The earliest identified survey plan covering the car park is SO 201 (1864). The plan is annotated with "[?] Pah" in the approximate location of the car park, although there is no mention of the pa site in subsequent plans. An 1884 plan (SO 2378) shows the project area in the ownership of "Kennedy Hill". By 1905 (DP 3487), the project area is shown as being owned by E. de. C. Drury. A 1965 plan of railway realignment (SO 42918) indicates the project area as containing a student's hostel owned by H.M. the Queen.

The earliest identified aerial photograph from 1943 shows the project area to be primarily open space with a number of buildings at the river end. This continues to be the case into the 1960s. An aerial photograph from 1961 shows the construction of the new railway bridge and tie in along the southern border of the Project area. It also shows the student's hostel, as well as a couple of additional buildings and what appears to be gardens (Figure 1). Aerial plans indicate little change until the site was razed and a carpark developed between 1971 and 1974.

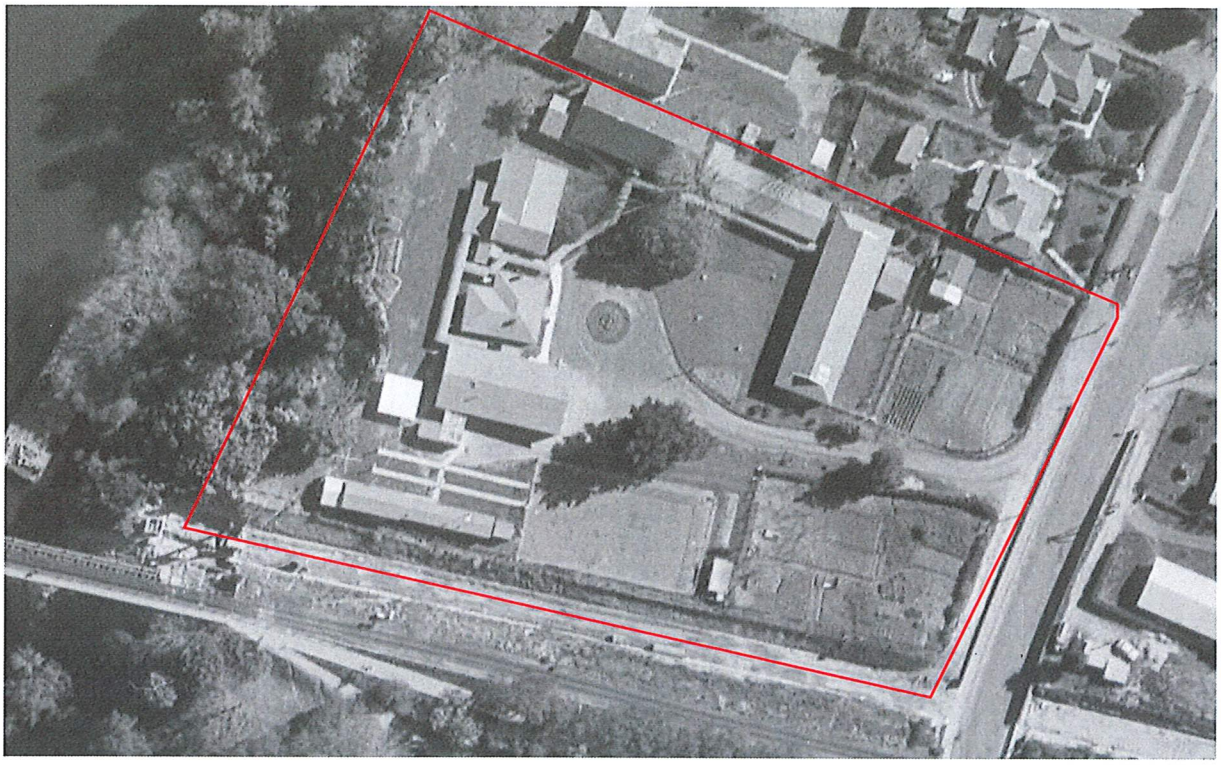

Figure 1: Aerial photograph, dated 1961, of the Project area (red box). Source: Retrolens

Previous Archaeological Work

The car park falls within the recorded extent of archaeological site S14/41, Opoia Pā, a river terrace pā at the eastern end of and bisected by the Claudelands Bridge. The site was recorded in the 1960s and described as once being a large area of Māori cultivations, later used as a Chinese market garden and now almost completely destroyed by modern developments and the construction of Claudelands Road and the railway bridge. "Old residents can remember signs of fortifications which have since disappeared" (NZAA Site Record S14/41). The area is described as that being owned partly by the railway and partly by the Girls High School Hostel.

The pa is also scheduled as a protected heritage site in the Hamilton City Operative District Plan, although the schedule refers to a location further to the south-east of the Claudelands Bridge.

Nga Tapuwae O Hotumauea (2003) identifies that Opoia Pā was settled by Maramatutahi, the eldest son of Wairere from his third wife, Tukapua. They had a son who was named Karaka ki Opoia after a sacred Karaka tree at the pā. The pā was later home to Poukawa, who led Ngati Wairere against Ngati Raukawa in the battle of Hurimoana, near Otorohonga. In this battle, Poukawa captured and killed Te Rerenga, a Ngati Wakatere Chef, and took his famous Patu Onewa.

A 2000 archaeological and cultural assessment of the Central City Riverside area by Opus International Consultants and Cultural Interface Solutions mapped the extent of Opoia Pā on both sides of Claudelands Road (Figure 2).

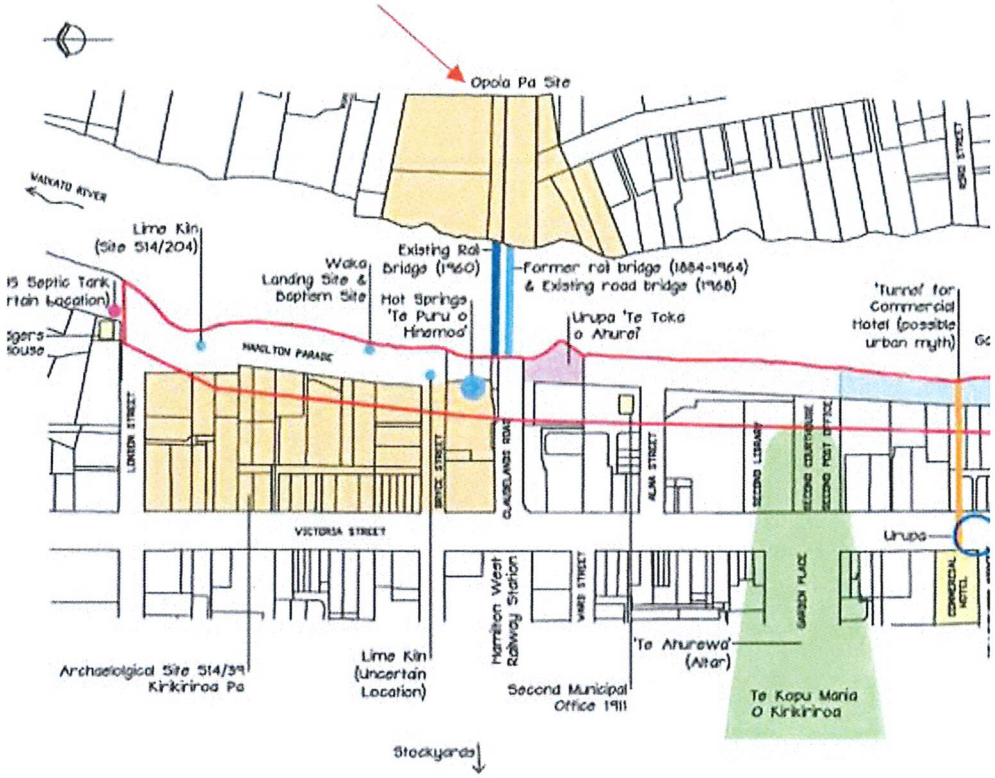

Figure 2. Portion of Summary Plans from Opus & Cultural Interface Solutions (2000) showings sites of archaeological and cultural sites.

Site Visit

A field visit was undertaken on 23rd of November 2020, by WSP Archaeologist Kirsty Potts, to assess the area of proposed work. A visual inspection of the Project area was undertaken. The majority of the Project area was unable to be fully assessed due to it being under the asphalt carpark. Exposed sections included a strip of grass alongside the western side of the property and the various garden areas within the carpark.

It appears that the methodology for the installation of the carpark was to remove 200 – 300 mm of topsoil and overlay at that level with gravel and asphalt. The older trees on the property are visible in the 1940s and 1960s aerial photographs. These trees with grass surrounds and the grass strip to the west appear to be the original ground level. Inclusions of sand, gravel and charcoal were noted within an exposed topsoil across the property. These soils were consistent with culturally modified soils / pre-European Maori gardening soils. A pre-1910 house was also noted next door to the Project area and attests to the historic use of the wider area.

These observations indicate that there is risk of intact archaeological material along the western edge of the project area and in the grassed garden areas (Figure 3). It is likely that the development of the carpark has truncated the site across the remainder of the Project area. However, there remains risk that deeper archaeological features remain intact below the carpark.

Figure 3. Results of site visit 23/11/2020, showing areas of high archaeology risk (red), where intact archaeological remains are highly likely and moderate archaeological risk (yellow), where the archaeology is likely to have been disturbed.

Discussion and Recommendations

Any modification of open ground or below the carpark has risk of modifying archaeology. It will be a legal requirement to have an active Archaeological Authority in place from Heritage New Zealand Pouhere Taonga prior to commencing any ground disturbance. It is recommended that any future development should avoid the more intact high archaeology risk areas identified during the site visit. Heritage New Zealand Pouhere Taonga and the relevant tangata whenua should also be contacted in advance to discuss the impact of any development proposals.

The following recommendations are made in this report:

- An Archaeological Authority should be sought for any proposed ground disturbance in the car park because of the potential for encountering buried archaeological remains.
- Development proposals should take into account avoiding the more intact high risk areas identified in the site visit where there is a high expectation of encountering intact archaeological remains.
- Heritage New Zealand Pouhere Taonga and the relevant tangata whenua groups should be contacted in advance to discuss any development proposals.

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Regards,

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021 243 2899

Documentary History and Status

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Prepared by:	Kirsty Sykes	20/11/2020	
Reviewed by:	Nicholas Cable	26/11/2020	

Appendix 2: Preliminary Geotechnical Assessment Report

Project Number: 2-WLASS.BN

Sonning Carpark Development

Preliminary Geotechnical Assessment Report

1 December 2020

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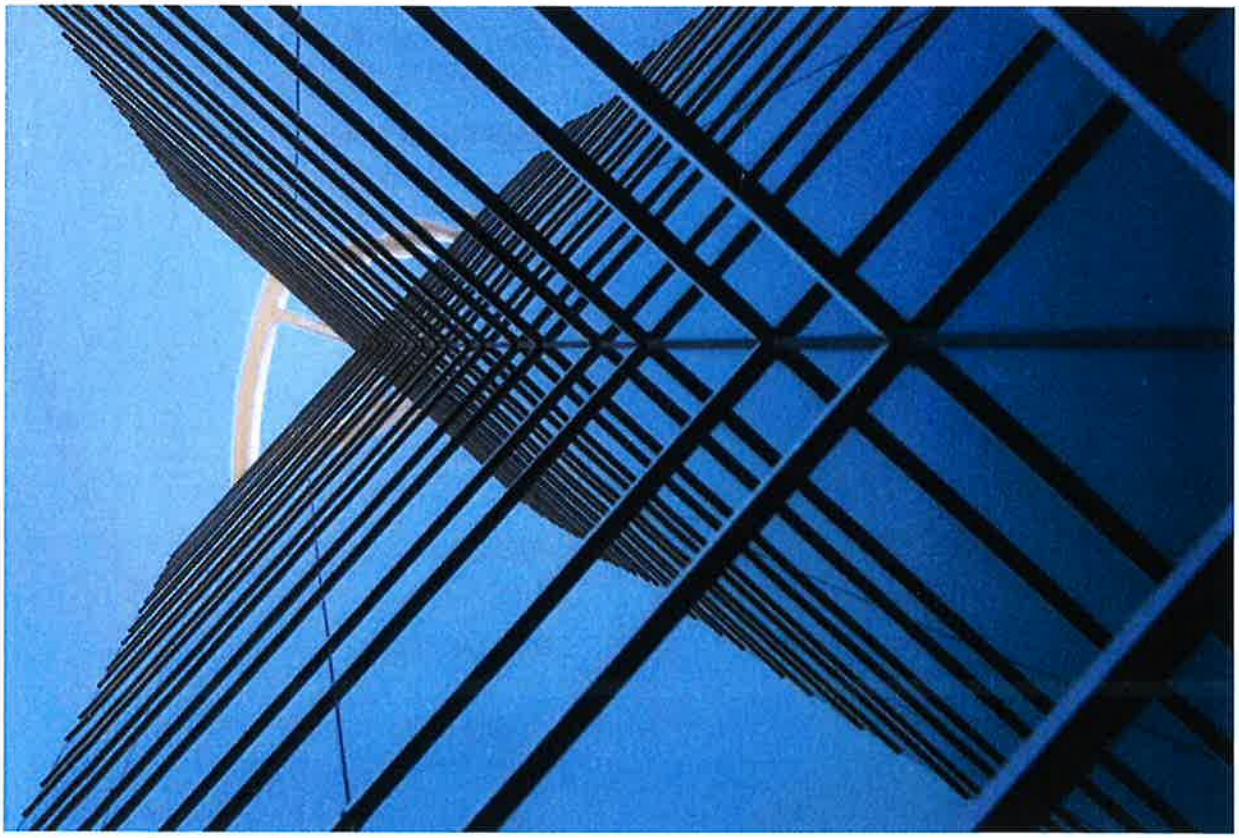

wsp

150 YEARS IN AOTEAROA

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Contents

List of Figures

List of Tables

List of Appendices

Disclaimers and Limitations

This report has been prepared by WSP New Zealand Ltd (WSP) for the Hamilton City Council (the Client) in respect of the proposed development at Sonning Carpark, 191 River Road, Hamilton. The report purpose is to provide preliminary geotechnical assessment for the proposed development agreed between the Client and WSP (Purpose). WSP accepts no responsibility for the validity, appropriateness, sufficiency or consequences of the Client using the report for purposes other than for the defined Purposes and the report is not to be reproduced without WSP' prior written permission.

This report is not intended for general publication or circulation and is not intended for, and may not be used, by third parties. WSP disclaims all risk and all responsibility to any third party.

This report is subject to the following limitations:

- WSP has provided the report based on the various assumptions contained in this report.
- Where we have obtained information from a government register or database, we have assumed that the information is accurate. Where an assumption has been made, we have not made any independent investigations with respect to the matters the subject of that assumption. We are not aware of any reason why any of the assumptions are incorrect.
- No calculations, other than those noted within, have been undertaken in support of the conclusions of this report.
- A change in circumstances, facts, information after the report has been provided may affect the adequacy or accuracy of the report. WSP is not responsible for the adequacy or accuracy of the report as a result of a change.
- This report specifically excludes assessment or advice relating to hazardous materials, such as asbestos or contaminated land.
- WSP's professional services are performed using a degree of care and skill normally exercised, under similar circumstances, by reputable consultants practicing in this field at this time.

Subsurface conditions are formed through a variety of natural processes and can be altered by human activities. The behaviour of the ground, groundwater and contaminants are complex and conditions can vary across a particular site. As a result, subsurface conditions cannot be exhaustively defined by investigations at discrete locations. Therefore, it is unlikely that the results and assessments expressed in this report will represent conditions at any location removed from the specific points of sampling. The precision with which conditions can be inferred depends largely on the uniformity of subsurface conditions and on the frequency and method of sampling as constrained by factors such as project budget and time limitations and physical constraints.

Furthermore, subsurface conditions can change over time, which should be considered when interpreting or using the data within this report.

The opinions and recommendations in this report apply to the proposed development and the site existing at the time of study using available information and cannot necessarily apply to changes in the proposed development or site changes of which WSP is not aware and has not had the opportunity to evaluate. The results of our study should be considered to be preliminary and subject to verification during future design phases of the project. If conditions encountered at the site during implementation are subsequently found to differ significantly from those anticipated, WSP must be notified and be provided with an opportunity to review the recommendations.

1 Introduction

Hamilton City Council (HCC) has engaged WSP NZ Ltd (WSP) to produce a preliminary geotechnical assessment report for future development of the Sonning Road Carpark, 191 River Road, Hamilton. No plans have been received detailing the nature of the development however it is understood this will potentially be a commercial or residential development.

2 Scope of Works

In order to provide a preliminary geotechnical assessment of the subject site and to assist in making recommendations for development of the site, the following works have been undertaken, as detailed in our offer of service letter dated 9th November 2020.

- A desktop study (review of underlying geology, available online maps, WSP geotechnical report database, NZ Geotechnical Database (NZGD) and Client supplied information);
- A site walkover to identify any specific geotechnical constraints to the proposed development and finalise the proposed investigation scope; and,
- Preparation of a Preliminary Geotechnical Assessment Report (PGAR) to covers the following:
    - Findings from the desk study;
    - An assessment of the soil geotechnical characteristic (soil profile, the key geotechnical findings and soil parameters);
    - Consideration of ground and surface water conditions;
    - An assessment of the stability of the adjacent riverbank slope and its potential impact on development options;
    - A liquefaction risk assessment and its potential impact on development options; and,
    - Preliminary foundation and earthworks recommendations.

3 Site Description

The site is situated on the eastern bank of the Waikato River to the north of Claudelands Road and adjacent railaway. It is currently occupied by a flat asphaltic surfaced carpark with sporadic grassed areas and large mature trees. The site is bounded to the west by the Waikato River, to the east by River Road and to the north by an existing residential area. The riverbank slopes downwards from car park level at gradients of up to 40°with a height of between 20m up to 23m above river level..

At the time of the site walk over, a previous shallow seated slip was identified within the slope to the south west corner of the carpark, located approximately 27m north of the railway boundary. The slope was observed to be heavily vegetated at the time of inspection. Reviewing the Retro lens database (Waikato Regional Council, 2020), the slip was identified as having occurred around 1953. A crib wall is present along the sites southern boundary supporting the railway and Claudelands Road with a second crib wall to the south-east corner of the site of supporting the approach to River Road overbridge. A masonry block wall is present at the northern boundary providing support to the properties within the residential area. The car park area was observed to be relatively flat with several trees present.

The site location is presented in Figure 1 and Appendix A

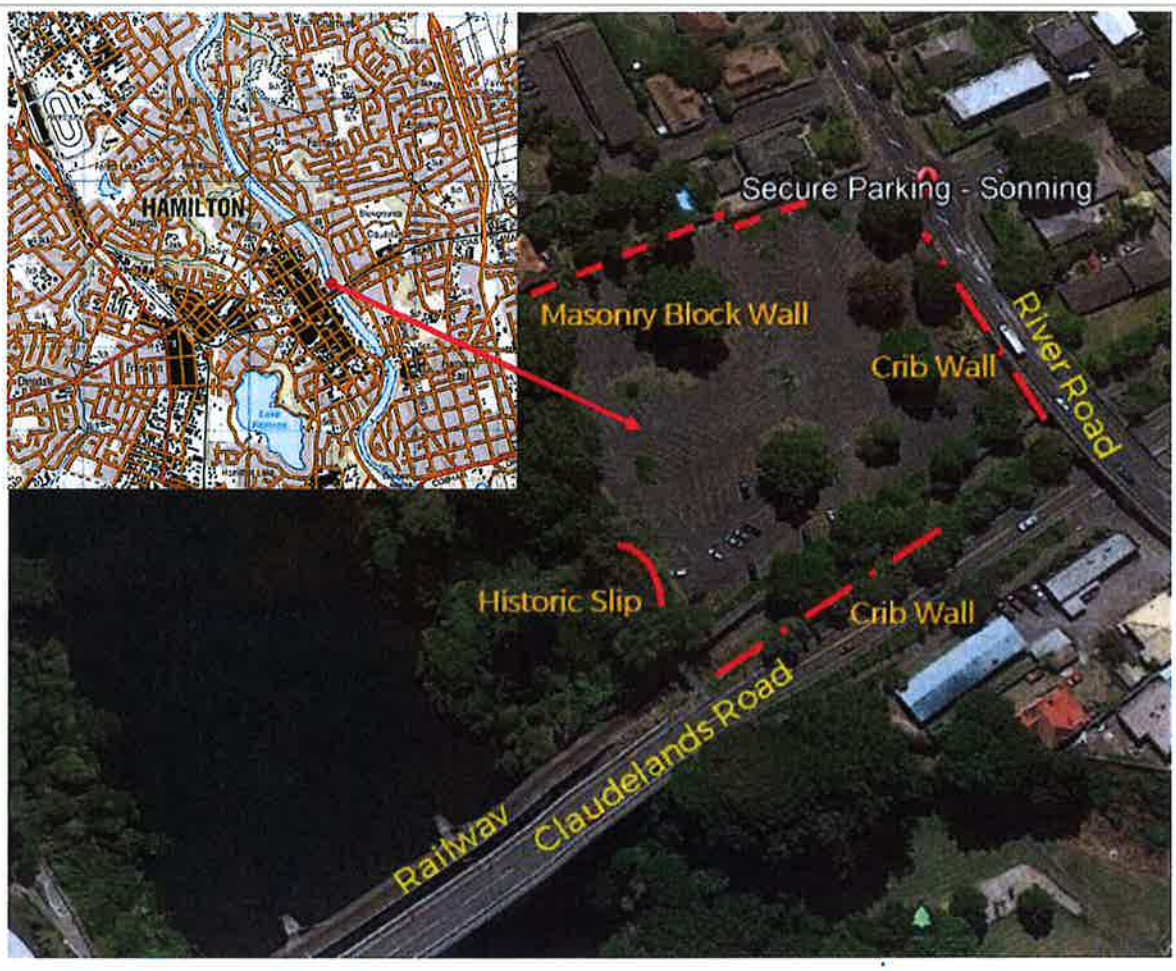

Figure 1: Site Location

4 Desk Study

4.1 Previous Investigations

A desktop study of nearby geotechnical reports and ground investigation data in the vicinity of the subject site has been undertaken with the objective of determining the an outline of the likely strata and soils properties beneath the site. The following sources were referred to:

- Claudelands Bridge East Abutment – Factual Report HA16/033 (WSP - OPUS, 2017)
- Claudelands Bridge East Abutment – Geotechnical Design Requirements HA 17/037 (WSP - OPUS, 2017)
- Claudelands Bridge East Abutment – Preliminary Geotechnical Assessment HA16/021 (WSP-OPUS, 2016)

5 Geological Setting

5.1 Published geology

With reference to the 1:250,000 scale geological map of the region (Edbrooke, 2005), the site is underlain by soils of the Hinuera Formation (Q3a). It was deposited by braided river systems of the ancestral Waikato River, on a large, low angle fan surface, which passed northward into an extensive braided river plain. Dating from between 50,000-17,000 years ago, this formation reaches up to 90m thick. Cross bedded sands, silts and gravels dominate this highly variable unit

(Figure 2). The Hinuera Formation was deposited in channels and depressions eroded into the surface of the Walton Subgroup which is dominated by primary and reworked, non-welded ignimbrite and tephra.

The older, but more detailed 1: 25,000 scale geological map (Kear, 1965) also indicates the site to be underlain by deposits of the Hinuera Formation.

An extract of the geological map is presented in Appendix A. Overlying the Hinuera formation, topsoil is present at this site.

Figure 2: Hinuera Formation showing lensed nature of the soils (McCraw, 2011)

The GNS active faults database indicates that the nearest active fault is the Kerepehi Fault which is situated approximately 43km east of the subject site.

5.2 Seismicity

A design earthquake magnitude and ground acceleration for the site have been determined based on MBIE Guidelines Module 1 (NZGS/MBIE, 2016) and the Bridge Manual (Waka Kotahi, May 2016). The following design parameters have been adopted:

- Site Soil Class of "D" (Deep soil site) based on NZS1170.5 (NZS, 2004);
- Importance Level 2 (for residential buildings) and Importance Level 3 (for multi storey high occupancy buildings) based on Table 3.2 of New Zealand Structural Design Standard for earthquake (NZS, 2004).
- Design life of 50 years

The design earthquake ground motion parameters are summarised in Table 1

Table 1: Summary of Seismic Design Parameters

Limit State	Return Period	Design Earthquake Magnitude	Design Earthquake PGA
SLS (Serviceability Limit State)	25 Years	5.9	0.05g
ULS-IL2 (Ultimate Limit State for IL2)	500 years	5.9	0.22g
ULS-IL3 (Ultimate Limit State for IL3)	1000 years	5.9	0.28g

5.3 Intermediate Seismicity

The Earthquake Geotechnical Engineering Practice Module 4 (MBIE & NZGS, 2016) advises that "..with liquefaction triggering at a site, however, there may be a pronounced degradation in foundation performance and this is likely to happen at a shaking level which is Intermediate

between SLS and ULS earthquakes. Where liquefaction triggering is likely at a modest, intermediate return period, the resulting level of damage may be excessive and inappropriate for such a high likelihood of occurrence".

WSP has consequently assessed the intermediate seismic event that has the potential to trigger damage to buildings due to settlement or lateral spread of foundations based on the parameters detailed in Table 1

Table 2: Intermediate Seismic Event Design Parameters

Limit State	Return Period	Design Earthquake Magnitude	Design Earthquake PGA
Intermediate Seismic Event for IL2	100 years	5.9	0.11g
Intermediate Seismic Event for IL3	500 years	5.9	0.22g

5.4 Geotechnical Investigations

Geotechnical investigations were undertaken at the south-western corner of Sonning carpark in June 2016 in relation to the assessment of the stability of the riverbank adjacent to the Claudelands Bridge eastern abutment (WSP - OPUS, 2017).

The ground investigation (GI) works, comprised the following:

- 2 Cone Penetration Tests (CPTs).
- 2 Boreholes (BHs).

The assessment has been undertaken based on a ground model developed from the findings from BH01 and CPT01, these being in close proximity to the subject site.

The relevant borehole log, photographs and CPT log are presented in Appendix B.

5.5 Rotary Cored Borehole

The BH was drilled using the HQ triple tube coring method, this providing undisturbed soil samples for laboratory testing, with Standard Penetration Tests at approximately 1.5m intervals to a target depth of 30m below ground level (bgl). A hand-held shear vane was used to measure the strength of soils at selected depths. The BH was logged, sampled and photographed on site by a WSP Geotechnical Engineer in general accordance with the New Zealand Geotechnical Society's guidelines[1].

5.6 Cone Penetrometer Tests

The CPT was undertaken by WSP using a track mounted piezocone enabled rig, measuring end bearing pressure (q_c), sleeve friction and porewater pressure (u) with depth. This provides valuable information for assessing the strength and engineering properties of the soil. However, no samples are recovered for visual inspection.

6 Ground water conditions

BH01 was dipped at completion to measure the ground water level which was recorded at 10.7m bgl in Winter. It is considered that this likely represents a perched water table rather that the

regional water table. This is based on previous experience in the area. Groundwater was not encountered in the CPT.

For liquefaction analysis purpose, a ground water level at 10mbgl has been inferred for this site. For the slope stability analysis, a regional static groundwater level has been inferred to be co-incident with the river level, reducing in depth as measured from the car park level with a ratio of 1V:10H from the river towards the east.

7 Ground Conditions

Based on the BH and CPT logs a ground model for the site is presented in Table 3. The subsoils are variable across the whole site with interbedded sandy SILTS, SILTS and CLAYS present.

Table 3: Soil profile

Unit Description	Depth to Top of Layer [m]	Unit Thickness [m]	Range of SPT N Values	Range of Cone Resistance [MPa]
Firm to stiff SILT/CLAY	-	12	3 - 17	1 - 4
Very soft to soft SILT/CLAY	~12	8	0 - 4	0.5 - 3
Medium dense to dense SAND and silty SAND	~18	10	12 - 40	8 - 16
Cemented SAND and SILT	~20	Unknown. Unit exceeds investigation depth	50+	Refusal

7.1 Soil Parameters

The geotechnical soil parameters have been estimated based on the investigation data from the BH and CPT undertaken within the carpark and our experience with similar geological conditions in the vicinity. Preliminary soil parameters are summarised in Table 4

Table 4: Soil properties used for the stability assessment of the riverbank

Unit Description	Depth to Top of Layer [m]	Unit Weight, γ (kN/m³)	Friction Angle, φ' (°)	Effective Cohesion, c' (kPa)
Firm to Stiff SILT/CLAY with traces of SAND	-	17	28	15
Very soft to soft SILT/CLAY	~12	16	25	6
Medium dense to dense SAND and silty SAND	~18	18	38	5
Very dense SAND and stiff SILT	~20	19	40	10

8 Geotechnical Assessment

8.1 Liquefaction Susceptibility and Damage

8.1.1 *Liquefaction Definition*

During an earthquake, the shear waves from the seismic event propagate upwards through the soils from the underlying bedrock. The cyclic loading caused by the shear waves induces shear stress in the soil deposits, which causes the build-up of the excess pore water pressure in soils. When the excess pore water pressure approaches the level of the overburden confining pressure, the effective strength between the soil grains of cohesionless soils, typically silts and sands, reduces significantly to almost nil. At this point liquefaction occurs when the soils lose strength and behaves as liquid.

Effects of liquefaction can include:

- Flow failure (large deformations) or lateral spreading of slopes and embankments;
- Sand boils and disruption to ground surface;
- Reduced bearing capacity for structure foundations;
- Buoyancy of buried structures and services; and,
- Subsidence of ground surface.

The definition of the Factor of Safety (FoS_{liq}) against liquefaction is a ratio of the Cyclic Resistance Ratio (CRR) to the Cyclic Stress Ratio (CSR), as detailed below:

$$FoS_{liq} = CRR/CSR$$

The CSR is the predicted cyclic shear stress induced in the soil during an earthquake (τ_h), divided by the effective overburden pressure (σ'_v). The CRR is defined as the critical CSR that may result in liquefaction in a soil.

8.1.2 *Liquefaction Assessment Methodology*

An assessment of liquefaction potential below the subject site area has been undertaken for both the SLS and ULS seismic events using the CPT data.

The CPT data was analysed using the 'CLiq' CPT liquefaction assessment software. The methods of Idriss & Boulanger (Boulanger & Idriss, CPT and SPT Based Liquefaction Triggering Procedures, 2014) were adopted for analysis of CPT data. Fines content was inferred from the CPT data using the Robertson & Wride method (Robertson & Wride, 1998). Liquefaction settlement was calculated using Zhang et al method (Zhang, Robertson, & Brachman, Estimating liquefaction - induced ground settlements from CPT for level ground, 2002).

8.1.3 *Liquefaction Assessment, Liquefaction Induced Settlement and Lateral Spreading Results*

The liquefiable layer thicknesses consider layers of significant thickness and excludes thin (<300mm), potentially liquefiable lenses surrounded by non-liquefiable denser sands that, from experience and previous work, are typically discontinuous and as such will not substantially contribute to liquefaction induced settlements.

The liquefaction assessments for vertical settlement indicates that the site could experience a maximum settlement of up to 20mm and lateral spread of up to 30mm for the ULS (IL3) seismic event. The values of settlement and lateral spread for the ULS (IL2), intermediate (for both IL2 and IL3) and SLS1 (for both IL2 and IL3) seismic events have all been assessed as being negligible. Liquefaction analysis results are summarised in Table 5. Liquefaction potential interpretations are presented in Appendix C.

Table 5: Liquefaction Effects and Analysis Results

Seismic Limit State	Indicated Thickness of Liquefiable Layers	Geotechnical Parameter Characteristic Indices	
SLS1 (IL2 & IL3)	0m	Factor of Safety against Liquefaction Liquefaction Potential Index Liquefaction Severity Number	FL > 1.5* LPI = 0 LSN = 0
Intermediate 2 (IL2)	0m	Factor of Safety against Liquefaction Liquefaction Potential Index Liquefaction Severity Number	FL > 1.5* LPI = 0 LSN = 0
Intermediate 3 (IL3) and ULS 2 (IL2)	0m	Factor of Safety against Liquefaction Liquefaction Potential Index Liquefaction Severity Number	FL > 1.2* LPI = 0 LSN = 0
ULS (IL3)	10.2m – 11.5m	Factor of Safety against Liquefaction Liquefaction Potential Index Liquefaction Severity Number	FL > 1.0* LPI = 0 LSN= 0

*FL - Approximate average liquefaction triggering factor (Factor of Safety) of the liquefiable layers

Based on the assessed vertical settlement, lateral spreading and geotechnical parameter characteristic indices as presented above, the characteristics of liquefaction and its consequences have been assessed in accordance with MBIE Guidelines Module 3 – Table 5.1 General Performance Levels for Liquefied Deposits (NZGS/MBIE, 2016). The results are summarised in Table 6 The results also suggested a liquefaction resistance type foundation to mitigate liquefaction induced vertical settlement and lateral spreading risks.

Table 6: Liquefaction Characteristics & Consequences

Limit State	Performance Level	Effects from Excess Pore Pressure and Liquefaction	Characteristics of Liquefaction and Its Consequences
SLS1 (IL2 & IL3)	L0	Insignificant	No significant excess pore water pressures (no liquefaction)
Intermediate 2 (IL2)	L0	Insignificant	No significant excess pore water pressures (no liquefaction)
Intermediate 3 (IL3) and ULS 2 (IL2)	L1	Mild	Limited excess pore water pressure; negligible deformation of the ground and small settlement.
ULS (IL3)	L2	Moderate	Liquefaction occurs in layers of limited thickness (small proportion of the deposit, say 10 percent or less) and lateral extent; ground deformation results relatively small in differential settlements.

8.2 Slope stability analysis

Slope stability was modelled using SLOPE/W (GeoStudio 2021) – a computer-based model which allows for the assessment of slope stability under various conditions (seismic loading, elevated groundwater and static conditions). The slope was modelled using cross sections generated from LiDAR contours for the Hamilton City area obtained from LINZ.

Surcharges were initially modelled as being setback 7.5m from the crest of the slope simulating either a multi-storey importance level 3 (IL3) structure (e.g., a hotel) or a double storey importance level 2 (IL2) structure (e.g., residential development). Surcharges of 100kPa (approximately equivalent to a load imposed by a 7 storey building), 25kPa (approximately equivalent to a load imposed by a

2 storey building) and 15kPa (approximately equivalent to a standard 1 storey residential house) have been modelled.

For seismic analysis, a PGA of 0.28g, 0.22g, 0.11g and 0.05g were used which consistent with the ULS (IL3), ULS(IL2), Intermediate for IL3, Intermediate for IL2 and SLS1 seismic event loading conditions respectively.

A summary of the results is presented in Table 7. Output from the SLOPE/W slope stability analyses are included in Appendix D.

Table 7: Slope Analysis for Building Locates at the Slope crest

Analysis Case	Factor of Safety (FOS)			Target Factor of Safety (FOS)
	100kPa	25kPa	15kPa	
Case 1 – Static, normal basin water level (10mbgl)	0.9	0.9	0.9	1.50
Case 2 – Static, elevated basin water level (8.0mbgl)	0.9	0.9	0.9	1.25
Case 3 – Seismic ULS IL3 – 0.28g	0.7	0.7	0.7	1.0 or displacement within acceptable levels when FOS < 1.0
Case 4 – Seismic ULS-IL2 and Intermediate event (IL3) – 0.22g	0.7	0.8	0.8	1.0 or displacement within acceptable levels when FOS < 1.0
Case 5 – Intermediate event (IL2) – 0.11g	0.8	0.9	0.9	1.0 or displacement within acceptable levels when FOS < 1.0
Case 6 – Seismic SLS1 – 0.05g	0.8	0.9	0.9	1.0 or displacement within acceptable levels when FOS < 1.0

The results show that for a building located close to the slope's crest, the slope is unstable for both static and seismic load cases. An assessment of the slope lateral displacement has been undertaken based on a block analysis (W.Jibson, 2007). The predicted seismic induced lateral displacements at the slope crest for a range of seismic load cases are presented in Table 8

Table 8: Predicted Lateral Displacement

Seismic Load Cases	Surcharges (kPa)	Predicted Lateral Displacement
ULS-IL3 PGA - 0.28g	100	More than 30m
	25	2.5m
	15	1.0m
ULS-IL2 and Intermediate of IL3 PGA - 0.22g	100	20m
	25	2.0m
	15	0.5m
Intermediate of IL2 PGA – 0.11g	100	6.5m
	25	0.6m
	15	0.5m
SLS – PGA 0.05	100	2.0

Seismic Load Cases	Surcharges (kPa)	Predicted Lateral Displacement
	25	0.15m
	15	0.05m

The results show that the lateral displacement is significant for some load cases. Thus, an additional slope stability analysis has therefore been undertaken to determine an appropriate setback distance from the slope crest for the proposed building developments in order to achieve compliance with the required FOS. Table 9 details the results from the slope analysis and has identified that a minimum setback distance of 25m away from the slope crest will be required. Any development located closer than 25m from the slope crest will require specific engineered foundations to prevent lateral displacement from adversely affecting buildings. This could comprise the use of piled foundations or benching of the slope in combination with retaining walls supporting the development footprint

Table 9: Slope analysis for building at 25m setback from the slope crest

Analysis Case	Factor of Safety (FOS)			Target Factor of Safety (FOS)
	100kPa	25kPa	15kPa	
Case 1 – Static, normal basin water level (10mbgl)	1.5	1.5	1.5	1.50
Case 2 – Static, elevated basin water level (8.0mbgl)	1.5	1.5	1.5	1.25
Case 3 – Seismic ULS IL3 – 0.28g	0.9	0.9	0.9	1.0 or displacement within acceptable levels when FOS < 1.0
Case 4 – Seismic ULS-IL2 and Intermediate event (IL3) – 0.22g	1	1	1	1.0 or displacement within acceptable levels when FOS < 1.0
Case 5 – Intermediate event (IL2) – 0.11g	1.2	1.2	1.2	1.0 or displacement within acceptable levels when FOS < 1.0
Case 6 – Seismic SLS – 0.05g	1.3	1.3	0.9	1.0 or displacement within acceptable levels when FOS < 1.0

The predicted maximum lateral displacement for building locates at 25m away from the slope crest is less than 1m, which is reasonable for the foundation design of the proposed development.

8.3 Static vertical settlement

Imposed structural loadings of 100kPa, 25kPa and 15kPa have been considered for the static settlement assessment. The assessment has been undertaken using CPe-IT software programme with the logs from CPT01. CPTu data can be used to directly estimate induced settlements due to an external load. CPeT-IT uses the following simple formula (based on 1-D consolidation) to estimate vertical settlements:

$$s = q \times \sum h \times \frac{Iz}{Mcpt}$$

Where:
q: applied footing pressure
h: calculation layer thickness
Iz: stress reduction factor according to Boussinesq
M_{cpt}: Constrained modulus of soil layer

The results indicate that the total static settlement could range up to 350mm for a loading of 100kPa, 45mm for a loading of 25kPa and 25mm for 15kPa loading. A building footing of 25m x 25m square was assumed for the analysis.

The detailed settlement assessment is presented in Appendix E

9 Conclusions and Recommendations

Based on the conducted ground investigation and assessments, the site requires additional engineering design for foundation of the proposed development.

- Even though, the site has been assessed as having an "Insignificant to moderate vulnerability" (NZGS/MBIE, 2016), there is a slope instability risk for both static and seismic loading events.
- The predicted lateral displacement under a ULS seismic event is more than 30m, 2.5m and 1.0m for 100kPa, 25kPa and 10kPa importance level 3 buildings located at the river bank slope crest under ULS seismic loading The predicted lateral displacement is reduced for others seismic cases, but the pattern is the same with higher lateral displacement for higher surcharge and lesser displacement for smaller surcharge loading.
- Static settlements may potentially range from 25mm to 350mm for structure loadings of 10kPa to 100kPa respectively.

Further engineering assessment and design will be required to reduce or mitigate the identified risks for the development of the site. Foundation options for the development may include the following::

- Shallow foundations will be suitable for buildings located at least 25m east of the crest of the river bank slope.;
- The adoption of geogrid reinforced gravel rafts, strengthened floor slabs or 'waffle' slabs to reduce the risk of damage due to differential settlements.;
- Benching of the river bank slope incorporating a retaining wall to support the development footprint to the east;
- The use of a piled shear wall (or similar) within the slope;
- Piled foundation options for buildings located less than 25m from the slope crest could include the use of ground anchors or soil nails for the stabilisation of the slope in combination with piled foundations for the buildings;
- For larger multi storey buildings, piled foundations may be required extending through the very soft to soft cohesive soils into the underlying dense and weakly cemented cohesionless soils at depth.

Due to the variability of the subsoils across the whole of the site, further geotechnical investigations are recommended in advance of the detailed design of foundations

10 Risk Summary Table

Item No.	Geo – Hazard	Likelihood	Risk Description	Mitigation Measures
1	Liquefaction	Yes - "Insignificant" for SLS seismic event. - "Mild" for ULS (IL2) seismic event. - "Moderate" for ULS (IL3) seismic event	- Liquefaction is not a high risk at this site. Under ULS (IL3) seismic loading, liquefaction only occurs in a thin layer with negligible liquefaction induced settlement. The predicted liquefaction induced lateral spread in accordance with Cliq is 35mm.	- Even though liquefaction and liquefaction induced risk for this site is "Insignificant to Moderate", replacement and/or compaction of loose subsoils will be required for the development.
2	Slope Stability	Yes - Slope instability for both static, SLS, ULS (IL2) and ULS (IL3) seismic case.	- The site is next to the Waikato River. The slope angle is between 35° to 40° with a height of approximately 21m above the river level. Development near to slope crest may potentially experience instability. - Lateral displacement caused by slope instability in seismic case for development in proximity to the slope crest ranges between 0.5m to 6m for SLS and ULS seismic events respectively.	- Engineering foundation design is highly recommended. - Any development less than 25m away from the crest is recommended to have either pile foundation, sheet pile wall or anchor at the slope face to mitigate the slope instability risk

Item No.	Geo – Hazard	Likelihood	Risk Description	Mitigation Measures
3	Lateral Variability	Yes	- The soils of the Hinuera formation are extremely variable in grading both laterally and vertically as is common with braided fan deposits. This can cause differential settlement for the building structure.	- Foundations should be designed by a suitably qualified and experienced practitioner to relevant codes and practices. Consider variability during foundation design, vigilance for additional variability during construction.
4	Underground Services	Possibly	- Given the proposed development is located on an existing carpark site, contaminated land and redundant buried services maybe present. Risk of live services strike during excavation or any earthwork activities.	- Vigilance during excavation, due diligence and consider services scanning prior to excavation or any earthwork activities.
5	Uncontrolled Fill	Yes	- Given the proposed development is located on an existing carpark site with undetermined historical usage, there is the potential for the presence of uncontrolled fill of variable thickness beneath the site. Fill materials have been noted to be present within the nearby CPT and borehole located adjacent to Claudelands Bridge	- Foundations should be designed by a suitably qualified and experienced practitioner to relevant codes and practices. Consider potential for variable ground during foundation design. Vigilance for identification of unknown ground conditions during construction.

Item No.	Geo – Hazard	Likelihood	Risk Description	Mitigation Measures
6	Soft Compressible/ Expansive Soil	Yes	- The subsoil layers contain silts, clays and minor sands to a depth of up to 18m below ground level (bgl). A very soft to soft SILT/CLAY layer is present at depths between 12m bgl and 18mbgl. There is therefore the potential for static settlement of up to 350mm for c100kPa applied loadings (multi-storey structures) whilst for residential structures with imposed loads of c 25kPa settlements may extend up to 35mm.	- Foundation should be designed by a suitably qualified and experienced practitioner to relevant codes and practices. Consider piled foundations for high applied foundation loads (multi-storey structures). - Adopt foundation type or ground improvement method that can mitigate the vertical/ differential static settlement risk (e.g. Geogrid reinforced gravel raft/ strengthened ground floor slabs/ waffle slabs)
7	Groundwater depth and seasonal variation	Yes	- Although groundwater levels could not be ascertained by the CPT testing, perched water has been identified within the adjacent boreholes at a depth of approximately 10m below ground level. The river level is located some at 20m below the level of the car park. The regional ground water level may therefore be expected to be at a considerable depth below the current car park level.	- Need to confirm potential seasonal variations in both perched and regional groundwater levels for detail design - For the purpose of liquefaction and slope stability analysis, consideration should be given to the presence of a perched ground water level at a depth of 10mbgl.

Item No.	Geo – Hazard	Likelihood	Risk Description	Mitigation Measures
8	Active Faults	Yes	- The nearest active fault is the Kerepehi fault which is situated approximately 43km east of the subject site.	- Refer to Liquefaction Risk detailed in Item No. 1. - Foundation should be designed by a suitably qualified and experienced practitioner to relevant codes and practices.
9	Available/Related Reports	-	WSP – Opus reports prepared for Claudelands Bridge East Abutment - Factual Report HA16/033 - Geotechnical Design Requirements HA17/037 - Preliminary Geotechnical Assessment HA16/021	-

Appendix 3: Hazardous Activities & Industries List (HAIL) Record

Hamilton City Council
Te kaunihera o Kirikiriroa

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Hamilton 3240
New Zealand

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hamilton.govt.nz

8 October 2021

Scott Beaumont
Veros Property Services
554 Victoria Avenue
Hamilton

Dear Scott:

Request under Section 10 of the Local Government Official Information and Meetings Act 1987

This letter provides the response to your request for information under Section 10 of the Local Government Official Information and Meetings Act 1987. The property that is the subject of this request (details as provided by you and as held on file) is contained in this response as follows.

Address: 191 River Road, Hamilton (Sonning Carpark)
Legal Description: Allot 465 Parish of Kirikiriroa and Lot 2 DPS 31617

Council holds records of properties where certain hazardous activity and industrial landuses (HAIL) that are considered likely to cause land contamination are known to be occurring, may have occurred, or have occurred in the past.

As at 8 October 2021 a search of environmental health records has shown that no information in relation to the likely presence of contaminants in soil is held by the Environmental Health Unit in respect of the above property.

Important notes: -

The absence of information does not necessarily mean that no hazardous activity or industrial landuse is occurring or has occurred on the land, or the absence of hazardous contaminants on the land, but simply means that no information is currently held by Council.

For the purpose of resource consent applications, an assessment against NESCS regulations 5 and 6 would need to be undertaken to establish if the National Environmental Standard for Contaminants in Soil (NESCS) applies where it is believed or suspected that a HAIL may have occurred/be occurring. The relevant information, in terms of the likely storage, handing or use of hazardous substances and potentially contaminating activities generally associated with rural land use, would need to be sought from various sources including (but not limited to) current and past landowners, property files, historical aerials and dangerous goods files. This information serves as the line of evidence required to support whether a HAIL has or has not occurred on the land and serves as proof that an appropriate assessment has been done.

No inspection of the subject property has been carried out because of this application. This response relates only to the likely presence of hazardous contaminants. It does not include any information Council may hold in relation to any other matters listed in Section 44A (2) of the Local Government Official Information and Meetings Act 1987.

Disclaimer:
Hamilton City Council accepts no liability for any inaccuracy in, or omission from, the information provided above, or for any consequence of that inaccuracy or omission.

Any person who wishes to make any commercial decisions that involves an assessment of whether the site is impacted by hazardous contaminants should make their own enquiries and decisions.

Further information: -

More information on hazardous activities and industries (HAIL) that are considered likely to cause land contamination can be found at:- http://www.mfe.govt.nz/issues/hazardous/contaminated/hazardous-activities-industries-list.html.

Please contact me if you require any further assistance.

Regards
Laura Mills
Contaminated Land Officer

Council Building
Garden Place, Hamilton
Phone 07 838 6582
Website www.hamilton.co.nz

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