17 August 2018

Mr Ben Inger
Weston Lea Limited
c/- Harrison Grierson Limited
Panama House, 15 Grantham Street
Hamilton 3204

Dear Ben

RE: Request for Further Information of Amberfield Development, Peacockes Road, Hamilton

(Our Reference: 14280.000.000_21)

1 Introduction

ENGEO Ltd was requested by Weston Lea Limited to prepare a response to the Request for Further Information letter received from Hamilton City Council dated 5 July 2018. We have been asked to respond to particular questions (as detailed below) and understand that the remaining queries will be answered by other members of the consulting team.

The following responses are labelled and numbered in accordance with the original letter received from Council.

2 Response to Queries

2.1 Stormwater Management Effects and ICMP Requirements

5. Provide more detail on the installation methodology; e.g. will the lower sections of the counterfort drains be installed via open trench with directional drilling at the slopes?

Counterfort drainage will be constructed as per the standard detail (Appendix 8C) included in Appendix 8 of the ENGEO Geotechnical Investigation Report (GIR) supplied as part of the application package.

It is intended that counterfort drains will be constructed from existing ground levels and will taper out at the end to meet existing ground levels adjacent to the esplanade reserve. Fill will then be placed as required within the drained area as shown on Figure 1. The depth of the drains will be reduced at the downslope end to exit the drains and a collection manifold drain will be installed parallel to the river, to connect the drains to a common outlet point. This is shown on drawings SK 281 & 282.

This will ensure that disturbance to important vegetation is avoided and that there are no adverse effects from erosion at the outlet.

This methodology means that construction will be undertaken via hydraulic excavator using open cuts. No thrusting will be required to form outlets.

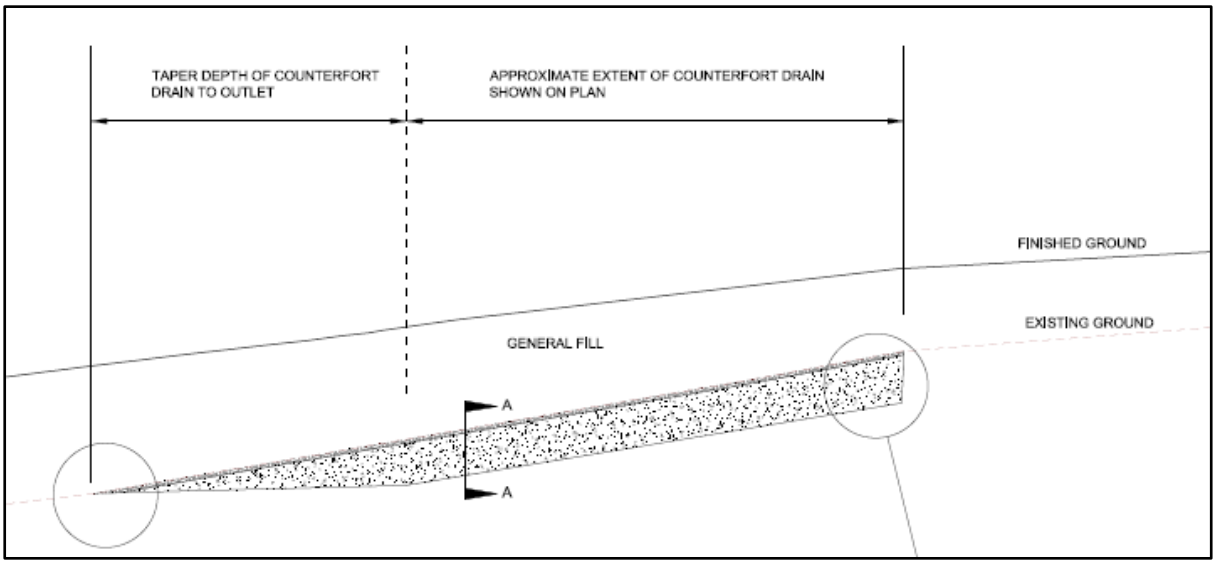


Figure 1: Typical Counterfort Drain Detail

6. What impacts will private soakage and counterfort drains have on each other where they overlap?
a. Has counterfort drain sizing considered additional (and continued) loading from private soakage devices? How?
b. What is the design life of the counterfort drains?
c. Describe the potential for premature clogging of counterfort drains (particularly for sections installed via directional drilling)
d. What is the soakage potential for private soakage devices after counterfort drainage design life is exceeded?

a. We have reviewed the possible conflict between counterfort drains, stormwater soakage to ground and potential increases in flows in the counterfort drains. We have modified the proposed design solutions to eliminate the counterfort drains beneath private lots, as shown on drawings SK281 & 282. We have also eliminated the stormwater treatment and disposal elements in the road reserve where there are counterfort drains and diverted the stormwater flows to the adjacent basins.
The stormwater from the areas of private lots not discharging to ground on the lots and the stormwater from the road catchments, which sit above the counterfort drain network, will discharge directly to the stormwater pipe network. This will eliminate any risk of preferential flow from soakage devices towards the counterfort drain network.

b. The counterfort drains are a subsoil drain surrounded by drainage metal and protected by filter fabric. They are relatively deep with very little structural loading due to trench support and have very low flow. The surrounding ground is high in sand content and relatively low in silt and clay content, i.e. highly permeable. The lack of notable flow and low source of fines (clay and silt), combined with the protection of the drainage metal and filter fabric, results in reduced risk of failure or clogging. The drains also include an inspection cap at the upper end that could provide access for flushing in the event that the drains become clogged.

We therefore consider the design life of the counterfort drains to be at least 50 years.

c. As described in Item 5 above, it is no longer intended to construct any sections of counterfort drains by directional drilling. We address the issue of clogging in (6b) above.

d. As described above, the counterfort drains have been deleted in private property.

7. Please address the potential for preferential flow (piping) of groundwater from soakage devices to counterfort drains and any mitigation proposed; particularly for sections installed via directional drilling.

Directional drilling is no longer proposed for counterfort drains. Soakage devices are physically separated from the counterfort drains as noted in the answer to question 6a above.

8. What outfall structures are proposed for each counterfort drain?

As noted in the answer to question 5, a collection manifold drain will be installed parallel to the river, to connect outfalls from the counterfort drains to a common outlet point. This will ensure that disturbance to important vegetation is avoided and that there are no adverse effects from erosion at the outlet.

9. What inspections and maintenance procedures are required for counterfort drains?

Counterfort drains will be flush tested at the completion of the earthworks – prior to preparation of the geotechnical completion report. This testing will confirm that the drains are operational. A flushing port will be constructed for each drain (as shown on the details supplied in Appendix 8 of the GIR), to allow future flushing maintenance, if required. This port will be surveyed and buried within publically accessible locations following successful flush testing. No other inspection or maintenance is required.

2.2 Post Development Flow Assessment

10. The Sub-Catchment ICMP does not include a quantitative assessment of the change in impervious areas and flows between pre-development and post-development scenarios including changes to baseflow, frequent storm, and 2, 10, and 100-yr ARI events.
Please provide a clear statement of the proposed change in flows, including sensitivity analysis for the elements of the proposal that have ability to change influence on the hydrograph including:
a. Areas of road too steep for soakage
b. Locations where larger centralised devices may be more appropriate
c. Allowance for loss of soakage capacity over time
d. Change to site infiltration from earthworks and compaction

Responses to a. b. and c. are addressed in the Civil Engineering Report.

d. The proposed earthworks for the construction of the Amberfield development are shown on drawings 141842 1201 – 1206 and are attached to the Application. These drawings show the depths of cut and fill across the developed area. It can be seen from these drawings that most of the filled area is less than 1 m depth and there is no filling in the areas of the seven proposed basins. Where it is proposed to discharge stormwater to ground within soakage trenches within the road reserve, the bottom of the trenches will be approximately 1.5 m deep, which will be deeper than the fill across most of the site. There will be a small proportion of the site where fill depth extends below the bottom of the soakage trenches.

In these areas (as per the rest of the site where soakage trenches are used), soakage tests will be carried out following completion of earthworks to establish the appropriate soakage design rate.

Soakage rates within cut areas may vary to some extent with depth due to soil layering. However, the change from an overall "good soakage" site to a "poor soakage" site within the cut areas is considered unlikely based on the testing carried out to date. As shown in the bore log results and hand auger results in the GIR appended to the Application, more than 75% of the tests show sand being consistent with depth. The remaining 25% of tests contain some silt and clay soils. However, on-site soakage testing carried out as part of the geotechnical investigations found these soils to still have "good soakage" characteristics and so it is expected that suitable soakage characteristics will be found at greater depths with the larger cut areas.

Bulk fills will be constructed with site won sands and silts. We expect that the effect of compaction on these materials will be to reduce permeability from pre-development levels. However, it is considered that these materials will remain highly permeable due to their largely granular nature. Soakage testing will be undertaken at the location of proposed soakage devices once bulk earthworks are completed. This testing will confirm sizing of the proposed soakage devices.

11. Please provide any specific requirements to preserve the infiltration capacity of soils for pervious areas subject to earthworks and re-compaction across the site used in addressing 10 above including statement of testing required or contingency in sizing of downstream devices.

Site soils are largely granular and while compaction is expected to reduce permeability, these soils are expected to remain highly permeable relative to other soil types. Site specific permeability testing is recommended for each soakage device within areas of bulk fill where fill is placed to depths greater than the proposed soakage device.

24. What are the environmental impacts of directional drilling of counterfort drains?
a. What methods will be employed to prevent preferential flow of groundwater along annulus of drain pipes?
b. How will drilling mud and any temporary discharges be managed during directional drilling works?

Directional drilling is no longer proposed to facilitate outlets for counterfort drains.

2.3 Geotechnical / ICMP Requirements

29. Section 11.2 of the Interim Geotechnical Investigation Report (Appendix J) states that 'expansive soils are not considered to be an issue identified on-site', however, HA01 is logged as clay and the laboratory tests appear to indicate they are potentially expansive. Please confirm if expansive soils are an issue for the site and identify the mitigation of the potential effect of these soils if required.

Foundation design options regarding expansive soils will be provided in the Geotechnical Completion Report once specific laboratory testing is undertaken on samples recovered from finished subgrade levels across the development.

30. *The Interim Geotechnical Investigation Report makes no specific reference to the bridge and culvert that cross the gully to the Island area. Please comment on the suitability of the ground conditions for the bridge and culvert structures.*

Final configuration of the bridge and culvert had not been decided upon at the time of preparation of the geotechnical investigation report. Investigations in the vicinity of the proposed structures indicates the presence of loose sands overlying dense sands at depth. Ground conditions are considered suitable for the proposed structures subject to further investigation and specific design.

The bridge and culvert structures will be the subject of specific geotechnical site investigations at detailed design stage to determine ground conditions in this area and give recommendations for appropriate foundations for these structures.

31. *The MBIE document for 'Planning and Engineering Guidance for Potentially Liquefaction- Prone Land' recommends that a 500 year return period event is considered as the minimum earthquake scenario for a liquefaction assessment. However, the Interim Geotechnical Investigation Report has only considered a 150 year return period event [Section 12.3] for the majority of the CPT at the site, and the reason for this has not been sufficiently justified. While there are good reasons to consider the shorter 150 year return period event for liquefaction analyses, such as identifying when the onset of liquefaction related land damage may occur, the higher level of earthquake shaking associated with the 500 year return period event should be used as the primary screening tool for liquefaction risk. Furthermore, as outlined in Section 4.3.4 of the MBIE guidance document, consideration should also be given to longer return period events of low probability to understand whether or not there is a large step change worsening of land performance compared to the 500-year scenario. Please provide a liquefaction assessment against a 1 in 500-year case for the whole site.*

This issue will be covered by the peer review response. The Peer Review is being prepared by HD Geotechnical Ltd and will be submitted to HCC as soon as possible.

32. *Liquefaction and lateral spreading risks have only been considered for the point locations where investigations were undertaken (Section 12.4). Consideration of the liquefaction risk across the entire site is required to fully understand the risk. Please provide a consideration of liquefaction risk across the whole site.*

This issue will be covered by the peer review response. The Peer Review is being prepared by HD Geotechnical Ltd and will be submitted to HCC as soon as possible.

33. *The liquefaction assessment appears to have been undertaken at the site by considering the current ground surface elevation rather than the proposed finished ground surface elevation for the subdivision. However, changes in ground surface elevation can have a significant effect on the liquefaction vulnerability. Section 106 of the RMA requires an assessment of the manner in which the use of the land for which the consent is sought could worsen the risk from natural hazards and consideration of the proposed ground surface elevation rather than the current ground surface elevation is an important aspect of this. Please provide an assessment of the liquefaction risk for the proposed ground contours.*

This issue will be covered by the peer review response. The Peer Review is being prepared by HD Geotechnical Ltd and will be submitted to HCC as soon as possible.

34. *While the Interim Geotechnical Investigation Report identifies the presence of pumiceous silts and sands on the site and has identified the challenges associated with assessing the*

liquefaction potential of pumice soils there are some concerns about how this has been addressed.

Shear wave velocity techniques can be seen to under-predict the amount of liquefaction-induced ground movements. Please provide further analysis and discussion on the liquefaction potential of pumiceous soils.

This issue will be covered by the peer review response. The Peer Review is being prepared by HD Geotechnical Ltd and will be submitted to HCC as soon as possible.

35. *Due to the complexity of the liquefaction hazard, including the difficulties in predicting liquefaction in pumiceous soils, please provide a peer review of the liquefaction assessment by an appropriately qualified geotechnical engineer.*

This issue will be covered by the peer review response. The Peer Review is being prepared by HD Geotechnical Ltd and will be submitted to HCC as soon as possible.

36. *The slope stability assessments appear to use the soil models given in the geological sections in Appendix 8 of the Interim Geotechnical Investigation Report. These cannot be reviewed effectively without the borehole information superimposed. The assessment makes an assumption that the hard layer encountered at the base of the CPT investigations is continuous with depth (Section 13.1). It is not possible to review this claim as the data has not been provided and it is not clear what the geological unit is. The geological units in question are highly variable so the assumption that this layer is continuous with depth is not necessarily sound and should be justified. Please provide substantiation for assumptions made in the geological model.*

Please find updated geological sections attached.

37. *The undrained shear strength of the soft to firm SILT is marked as 35 kPa (Section 13.1 - Table 13); however, the slope stability sections use 50 kPa (Appendix 7). Please confirm undrained shear strength for soft to firm silt and re-run the slope stability assessment if required.*

This is a transcription error. Table 13 in Section 13.1 should read 50 kPa. No re-run of the assessment is required.

38. *No Liquefied case has been considered in the slope stability assessment. Please consider a liquefied case for the slope stability assessment.*

Liquefaction analysis to date concludes that only limited liquefaction is expected onsite under ULS conditions. Where liquefaction is considered likely in locations proximate to the steep slopes adjacent to the Waikato River (as further defined by the peer review of the liquefaction analysis), these areas will be included into the specific design zone as detailed in the Geoconstraints Maps included in Appendix 3 of the GIR. These areas will the subject of geotechnical specific design reports.

39. *It is understood that counterfort drains are required in some areas to maintain a minimum factor of safety of 1.5 against instability. The current stormwater drawings (Appendix W) appear to show combined stormwater and subsoil/counterfort drains. The Interim Geotechnical Investigation Report detail for counterfort drains (Appendix 8c) show a trench construction as expected for this type of drain. The stormwater drawings show a bored drain. Please confirm that the subsoil/counterfort drains and stormwater drains are separate design items to maintain the 1.5 factor of safety.*

Counterfort drainage will be separated from underfill, subsoil and stormwater drainage systems.

40. The assessment has considered slope stability for the proposed development and suggested potential mitigation to achieve acceptable factors of safety. Slope stability analyses should be repeated in the event of any changes to the parameters quoted in Section 13.1 — Table 13 or any changes to the proposed levels and / or slope angles in response to the further information requests.

Further analysis will be undertaken on any areas revised as part of this Section 92 response will be undertaken as part of detailed design. This work will be undertaken for each stage of the development as required.

2.4 Contaminated Soil Effects

56. The PSI prepared by Environmental Scientist Courtney Armstrong and reviewed by Associate Environmental Engineer Erica McDonald (Appendix K) does not contain a statement of the certifier's capabilities qualifying them as a Suitably Qualified Experience Practitioner (SQEP) to undertake the contaminated land site investigation. Please provide the certifier's statement confirming that the report has been prepared by a SQEP in accordance with the NES requirements for Assessing and Managing Contaminants in Soil to Protect Human Health.

ENGEO's contaminated land investigations are supported and certified by a SQEP. With respect to this particular investigation, Erika McDonald certified the investigation and reporting.

Erika holds a Master of Science degree in Civil and Environmental Engineering (Stanford University, 2003) and a Bachelor of Science degree in Environmental Engineering (State University of New York at Buffalo, 2002). She has 15 years' experience working on contaminated land projects in both New Zealand and the United States.

Erika is Professional Member of the Engineering New Zealand and an Auckland steering committee member for the Australasian Land and Groundwater Association.

Erika's CV is attached for reference.

2.5 Landscape / Visual Effects

63. The Walking and Cycling Strategy Plan (OFS 05 — Appendix F) shows the location of the shared paths through Open Space. The Plan shows a considerable length of path within the Waikato riverbank open space area (an indicative location also appears to be depicted on the subdivision plans). A significant part of this area is identified as Waikato Riverbank and Gully Hazard Area in the District Plan. The AEE states that the exact location of the path will be addressed at detailed design to address accessibility, safety and security aspects. Whilst the use of this area for walkways and cycle paths are permitted there are controls on the extent of vegetation removal and earthworks.
Please provide a level of design to demonstrate the location of the path can be safely accommodated in a manner resilient to instability with an assessment of the estimated volume of required earthworks and the extent and nature of vegetation removal required to construct the path.

Policy 22.2.1 L: of the District Plan states that new use and development which is vulnerable to the adverse effects of land instability shall avoid the Waikato Riverbank and Gully Hazard Area, where the adverse effects and risks have not been minimised to an acceptable or tolerable level.

Policy 22.2.1m New use and development which is resilient to the adverse effects of land instability shall be provided for in the Waikato Riverbank and Gully Hazard Area.

From a geotechnical perspective it is considered that walkways and cycle paths can be developed within this area and that these paths can be adequately protected from local instability features. However, it is not considered possible to protect structures within this area from large scale instability events such as landslides occurring during extreme weather or seismic events due to the typically steep nature of the slopes leading to the Waikato River.

Assessment of hazards related to the walking and cycle paths will be undertaken at detailed design stage and the routes of these paths altered to follow alignments with the lowest possible risk of being affected by instability.

This item is also addressed by other relevant consultants in their reports.

110. The AEE makes reference to natural hazards in section 7.8.7 Management and response to natural hazards. In this section flooding and land instability are identified as the key potential risks, however this does not reference the geotechnical report or discuss the wide range of natural hazards that can affect the site.

Section 7.8.7 of the AEE makes reference to Chapter 22 objectives and policies, however there is no specific reference to S106 of the RMA. Please provide an assessment against S106 of the RMA, taking into account the further geotechnical information requested above.

Some portions of the site adjacent to the Waikato River i.e. within the Waikato Riverbank and Gully Hazard Area and as mapped on the Geoconstraints plans included in Appendix 3 of the geotechnical investigation report (GIR) are currently subject to slope instability in accordance with Section 106 of the Resource Management Act.

We have visited the site and undertaken geomorphic mapping of the visible signs of slope instability noted onsite. This geomorphic map is included in Appendix 4 of the GIR. This mapping process, along with slope stability and liquefaction analysis lead to the preparation of the Geoconstraints Maps included in Appendix 3 of the GIR. These maps detail the extent of specific design zones within which further geotechnical assessment will be required for any proposed development.

Outside of the areas noted above, following the completion of bulk earthworks and civil services construction, which will act to reduce site gradients and manage stormwater flows, we consider that future residential use of the land is not likely to accelerate, worsen or result in material damage to the land provided that proper engineering practices are followed during any development, including those recommended in the GIR and the specific geotechnical investigation and reporting which will be undertaken for any services or structures proposed within the specific design zones noted in Appendix 3 of the GIR and any areas of development proposed within the Waikato Riverbank and Gully Hazard Area. This item is also dealt with in the planning response.

Report prepared by

Paul Fletcher, CMEngNZ (CPEng)

Associate Geotechnical Engineer

Report reviewed by

Craig Wright, CEG

Associate Engineering Geologist

Attachments:

CV Erika McDonald

Updated geological sections

Education

Master of Science in Civil and Environmental Engineering, Stanford University, 2003.

Bachelor of Science in Environmental Engineering, State University of New York at Buffalo, 2002.

Experience

Years in Industry: 15

Registrations & Certifications

CMEngNZ – Professional Member of Engineering New Zealand.

Professional Engineer in California (Civil).

Specialisation

Environmental Site Investigation and Assessments.

Environmental Remediation System Design and Operation.

Environmental and Human Health Risk Management.

Project Management and Tender Advice.

Strategic Management and Business Planning.

Affiliations

Australasian Land and Groundwater Association – Steering Committee Member.

Erika McDonald, MIPENZ | Associate Environmental Engineer

Erika is an Associate Environmental Engineer with ENGEO Ltd. She has technical and project management experience gained while working on projects in both New Zealand and the United States. Erika specialises in the assessment, remediation and management of contaminated land and groundwater.

Erika has worked on a variety of large and small scale projects over her career for government, industry and land development. Her involvement in these projects has included design and implementation of field programmes, technical input, remedial design and project management. Her role also includes frequent liaison with councils and government entities to ensure that consent conditions, regulatory requirements and complex environmental factors are clearly understood by all stakeholders. Erika is an effective communicator and client manager.

Project Experience

Industrial Warehouse Development – Manukau, New Zealand

Project Manager. The property covered a portion of a former Auckland Rail site. During decommissioning of the rail yard, contaminated fill and asbestos-containing building debris was buried on-site. As such, fill across the site contains elevated metals, PAHs and asbestos in soil, as well as methane in soil gas. Erika performed the following work on this project:

- Designed and oversaw implementation of soil, groundwater and soil gas sampling plans to support the new warehouse development;
- Prepared and oversaw implementation of an Environmental Management Plan, including health and safety measures related to soil contamination and air monitoring for asbestos and explosive gases during construction works;
- Prepared a monitoring and management plan, which included an assessment of risks from methane in soil gas at the site and recommendations for protection measures to incorporate into the development in accordance with British Standard 8485:2007;
- Oversaw and reported on the first year of warehouse operation, including sub-slab methane gas monitoring; and
- Liaised with Auckland Council to obtain works approvals resulting in successful conversation of a landfill site to an industrial development.

Project Experience *(continued)*

Huapai Triangle SHA – Huapai, New Zealand

Project Manager and Director. Acted as both Project Manager and Project Director for several investigations within the Huapai Triangle Special Housing Area. The land has primarily been used for agriculture, including orchards and vineyards. Elevated contaminants, in particular metals from historical pesticide application, were identified in areas across the site. Erika's involvement in this project has included design and management of remediation field trials to assess the efficacy of reducing arsenic concentrations through dilution with cleaner soils and developing innovative strategies for managing low-level contaminated topsoil on-site.

Bledisloe Park PSI/DSI – Pukekohe, New Zealand

Project Director. During preparation of a PSI and DSI for the site to support reserve upgrade works, an unlined landfill was identified near the proposed works area. Erika acted as Project Director for this site, advising on the landfill gas assessment required to support the consent application for construction of a new clubroom and car park. The assessment included indoor air testing within the existing clubhouse followed by a qualitative assessment of the risk of landfill gas migration to areas within the proposed works area based on the location and depth of the landfill, age of the landfill and site geology. The indoor air testing and qualitative risk assessment effectively demonstrated to council that an intrusive soil gas sampling programme within the redevelopment area was not required.

Particle Board Dumping Site – Huapai, New Zealand

Project Manager. A gully crossing 12 lifestyle blocks in Huapai had been subject to uncontrolled filling with treated wood waste from a neighbouring particle board manufacturing facility. Erika designed and managed an environmental assessment of soil, groundwater, surface water and sediment contamination across the 12 lifestyle blocks. The historical uncontrolled filling of the gully resulted in metal contamination at the site (including arsenic, lead and chromium). The environmental assessment delineated the extent of contamination at the site and recommended remedial measures.

Proposed Men's Prison – Auckland, New Zealand

Project Manager. The site was a former quarry that had undergone uncontrolled filling with excess spoil and imported material, including scrap materials. Erika managed an environmental assessment of potential contamination at the site, which was proposed for a new men's prison. The results of soil, groundwater and soil vapour sampling were used to evaluate and recommend strategies for managing contaminated material during site redevelopment.

Arise Church Redevelopment – Wellington, New Zealand

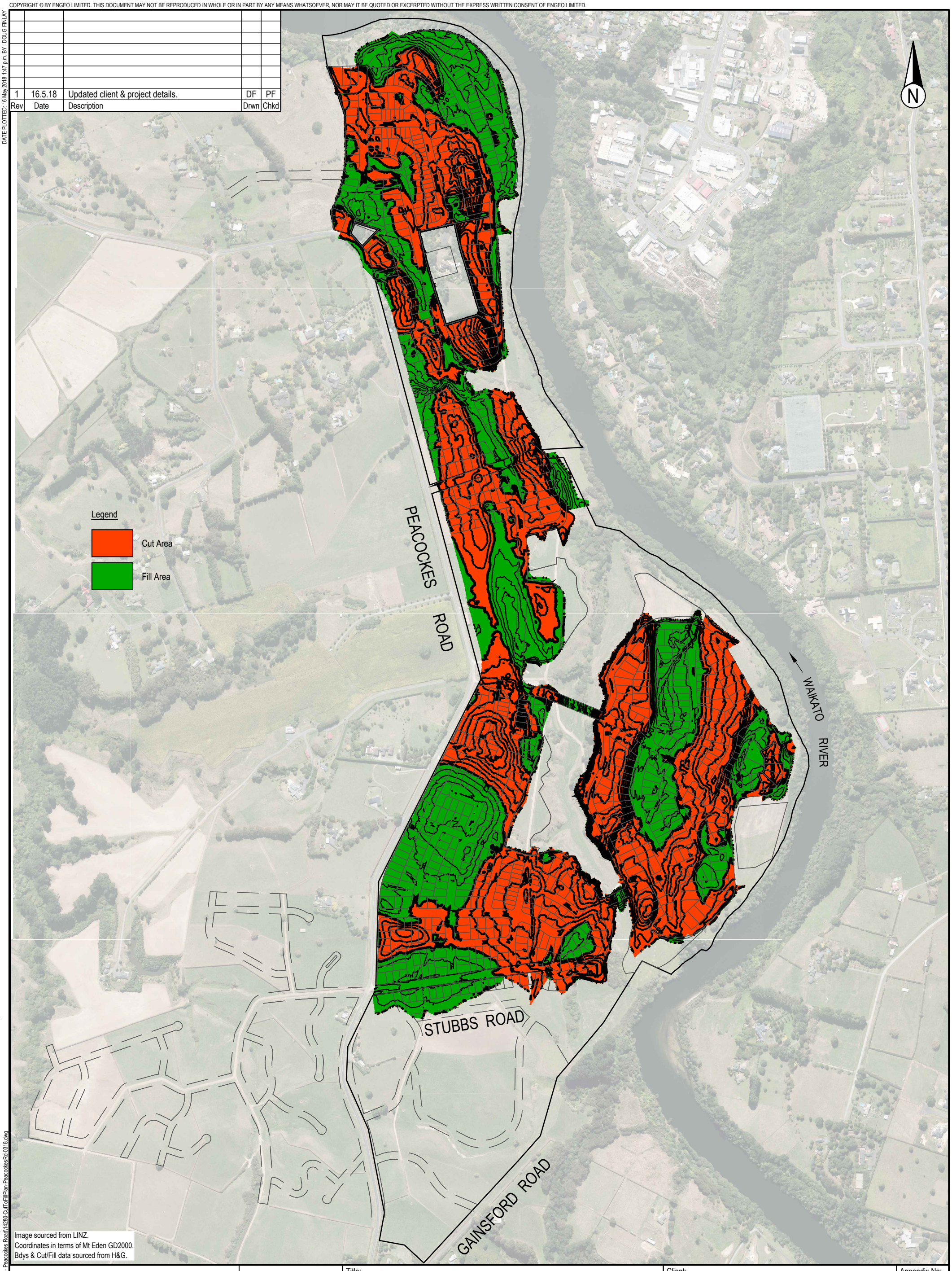
Project Manager. Degraded wood waste was found on site during a geotechnical investigation to support development of a new church. Erika managed an investigation into the methane-generating potential of this waste, including installation and monitoring of soil gas wells. The monitoring data were used to assess risks from methane in soil gas at the site and to provide recommendations for protection measures to incorporate into the development in accordance with British Standard 8485:2007.

Redevelopment of Subsurface PCB Containment Area – San Francisco Bay Area, USA

Project Engineer. The project involved environmental investigations to support redevelopment of a PCB containment area in the San Francisco Bay area into a transit centre and commercial/industrial building. Erika's work included preparing a feasibility study of remedial alternatives and performing a site-specific human health risk assessment for on-site workers and off-site workers and residents during the redevelopment works.

DATE PLOTTED: 16 May 2018 1:47 p.m. BY : DOUG FINLAY

Rev	Date	Description	Drwn	Chkd
1	16.5.18	Updated client & project details.	DF	PF



XREFs: 141842-XREF-D-BASE (MPLAN-180329; X-14280-Bdys; 141842-XREF-D-CONT_DEPTH; 141842-XREF-D-CONT_HATCH; hamilton-01m-urban-aerial-photos-2015
CAD File: Z:\Drafting\14001 to 15000\14280 - Peacockes Road\14280-CutToFillPlan-PeacockesRd-0318.dwg

ENGEO Expect Excellence

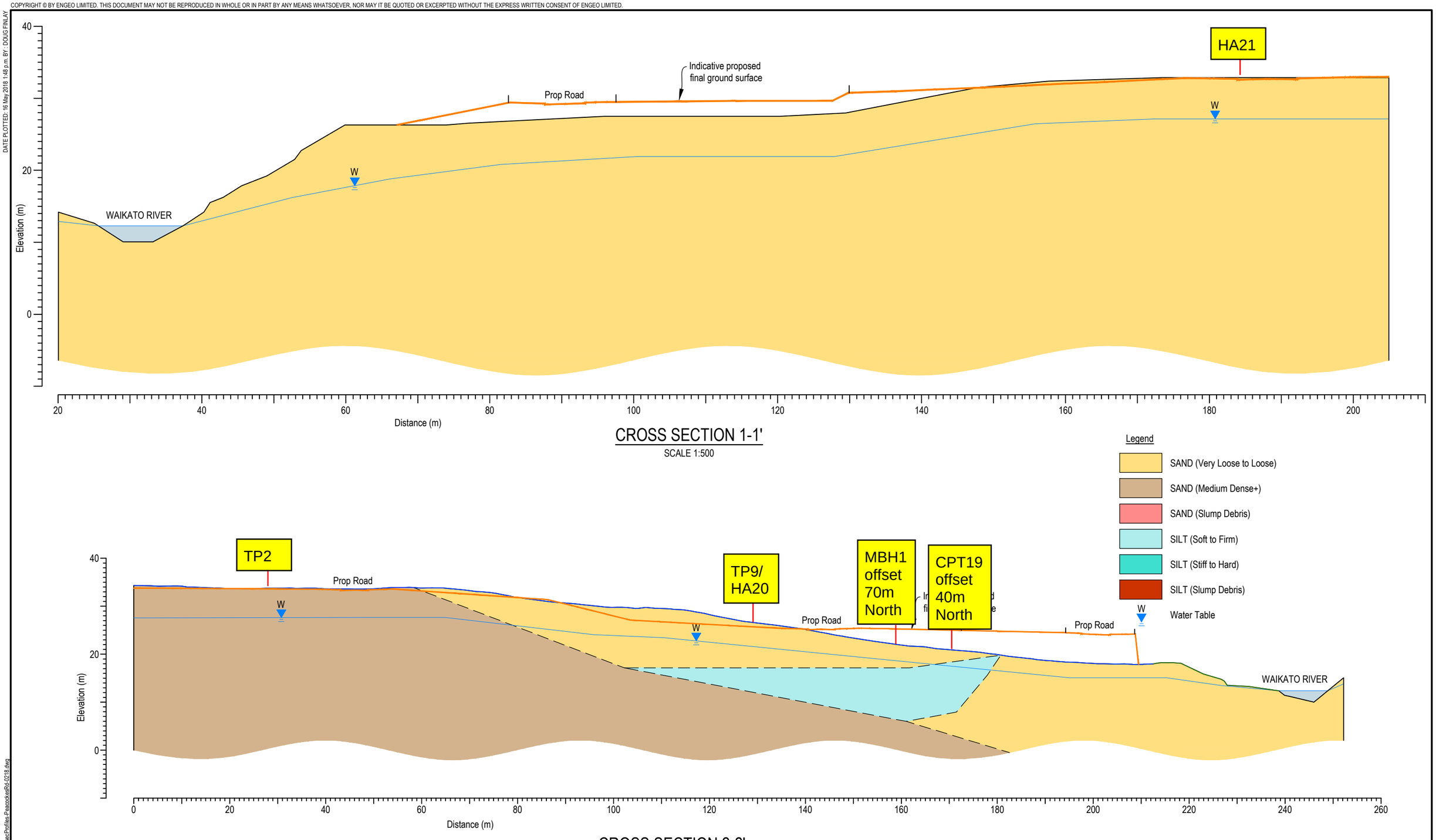
Auckland Office
6 Antares Place, Rosedale
North Shore City 0632, Auckland
Tel: 09 972 2205,
www.engeo.co.nz

Title: CUT TO FILL PLAN

Client:	WESTON LEA LIMITED		Appendix No: 8A
Project:	AMBERFIELD SUBDIVISION HAMILTON	Designed: MM Drawn: DF Checked: - Date: 29.3.18	Size: A3
Proj No:	14280.000.000	Scale: 1:7500	Rev: 1

ORIGINAL FIGURE PRINTED IN COLOUR

DATE PLOTTED: 16 May 2018 1:48 p.m. BY: DOUG FINLAY



CROSS SECTION 1-1'

SCALE 1:500

CROSS SECTION 2-2'

SCALE 1:750

Legend

- SAND (Very Loose to Loose)
- SAND (Medium Dense+)
- SAND (Slump Debris)
- SILT (Soft to Firm)
- SILT (Stiff to Hard)
- SILT (Slump Debris)
- Water Table

Rev	Date	Description	Drwn	Chkd
3	16.5.18	Updated client & project details.	DF	PF
2	29.3.18	Appendix No. change.	DF	MM
1	26.3.18	Add indicative prop final ground level.	DF	MM

ENGEO — Expect Excellence

Auckland Office
6 Antares Place, Rosedale
North Shore City 0632
Auckland, Tel: 09 972 2205
www.engeo.co.nz

Title: GEOLOGICAL SECTIONS

Client: WESTON LEA LIMITED

Project: AMBERFIELD SUBDIVISION HAMILTON

Designed: MM
Drawn: DF
Checked: -
Date: 12.02.18

Proj No: 14280.000.000

Scale: AS SHOWN

Appendix No: 8B
Sheet 1

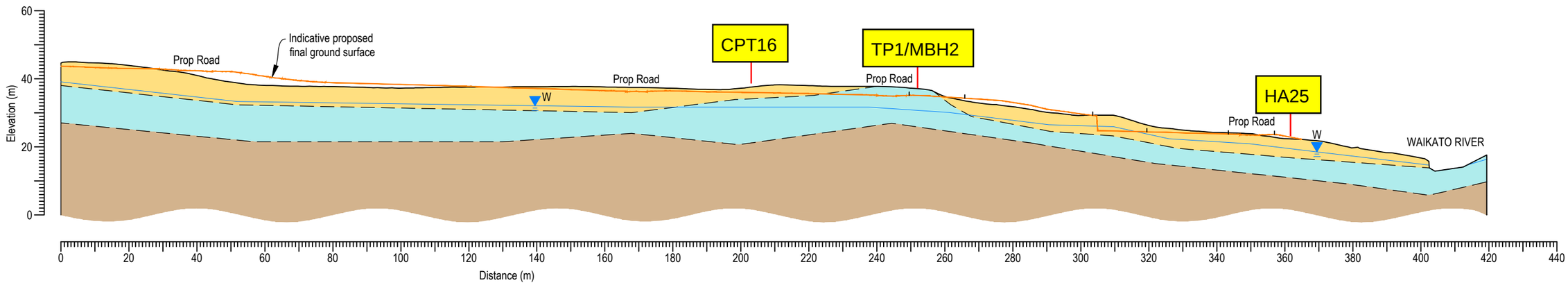
Size: A3

Rev: 3

XREFs:
CAD File: Z:\Drafting\14001 to 15000\14280 - Peacockes Road\14280-XsecProfiles-PeacockesRd-02\18.dwg

ORIGINAL FIGURE PRINTED IN COLOUR

DATE PLOTTED: 16 May 2018 1:50 p.m. BY: DOUG FINLAY

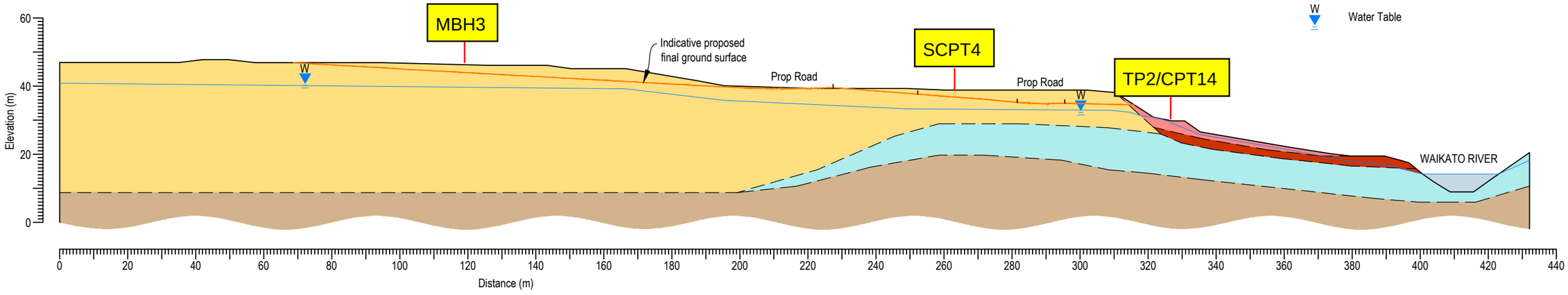


CROSS SECTION 3-3'

SCALE 1:1250

Legend

- SAND (Very Loose to Loose)
- SAND (Medium Dense+)
- SAND (Slump Debris)
- SILT (Soft to Firm)
- SILT (Slump Debris)
- W Water Table



CROSS SECTION 4-4'

SCALE 1:1250

Rev	Date	Description	Drwn	Chkd
3	16.5.18	Updated client & project details.	DF	PF
2	29.3.18	Appendix No. change.	DF	MM
1	26.3.18	Add indicative prop final ground level.	DF	MM

ENGEO Expect Excellence

Auckland Office
6 Antares Place, Rosedale
North Shore City 0632
Auckland, Tel: 09 972 2205
www.engeo.co.nz

Title: GEOLOGICAL SECTIONS

Client: WESTON LEA LIMITED

Project: AMBERFIELD SUBDIVISION HAMILTON

Proj No: 14280.000.000

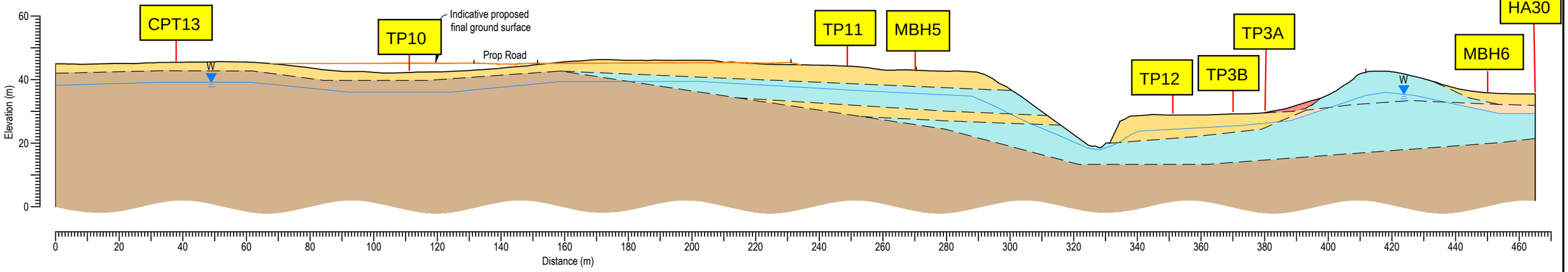
Designed: MM
Drawn: DF
Checked: -
Date: 12.02.18
Scale: AS SHOWN

Appendix No: 8B Sheet 2
Size: A3
Rev: 3

ORIGINAL FIGURE PRINTED IN COLOUR

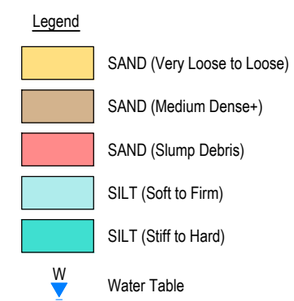
XREFs:
CAD File: Z:\Drafting\14001 to 15000\14280 - Peacocks Road\14280 XsecProfiles-PeacocksRd-0218.dwg

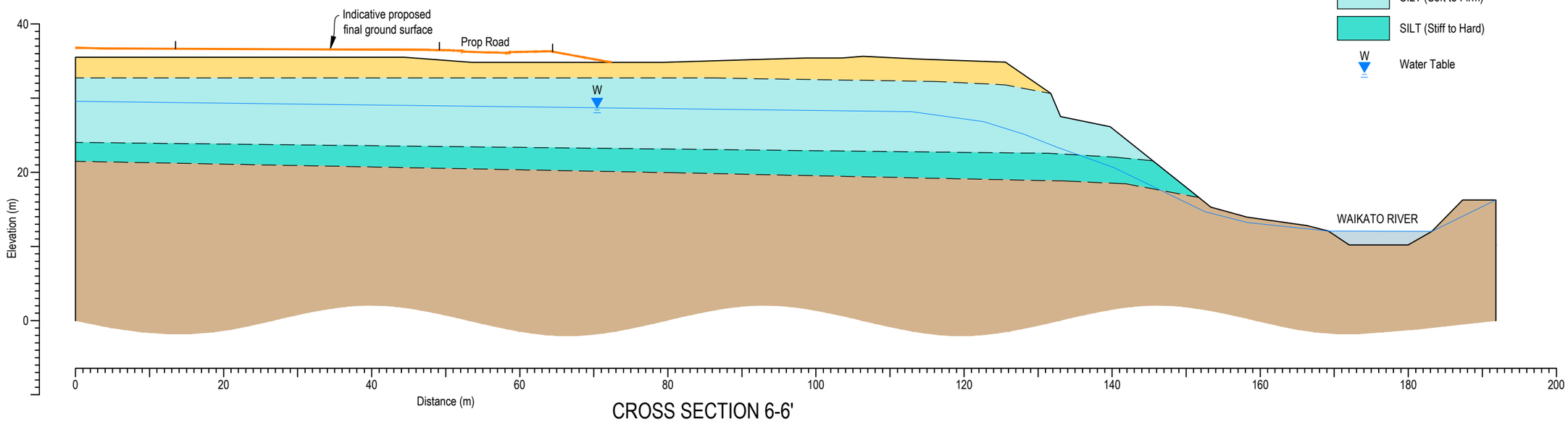
DATE PLOTTED: 16 May 2018 1:51 p.m. BY: DOUG FINLAY



CROSS SECTION 5-5'

SCALE 1:1250





CROSS SECTION 6-6'

SCALE 1:600

Rev	Date	Description	Drwn	Chkd
3	16.5.18	Updated client & project details.	DF	PF
2	29.3.18	Appendix No. change.	DF	MM
1	26.3.18	Add indicative prop final ground level.	DF	MM

ENGEO — Expect Excellence

Auckland Office
6 Antares Place, Rosedale
North Shore City 0632
Auckland, Tel: 09 972 2205
www.engeo.co.nz

Title: GEOLOGICAL SECTIONS

Client: WESTON LEA LIMITED

Project: AMBERFIELD SUBDIVISION HAMILTON

Proj No: 14280.000.000

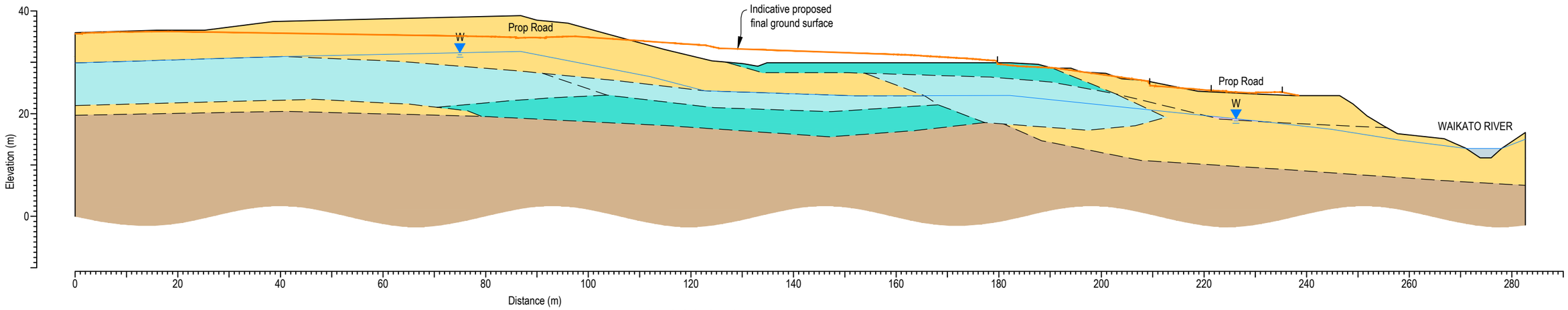
Designed: MM
Drawn: DF
Checked: -
Date: 12.02.18
Scale: AS SHOWN

Appendix No: 8B Sheet 3
Size: A3
Rev: 3

ORIGINAL FIGURE PRINTED IN COLOUR

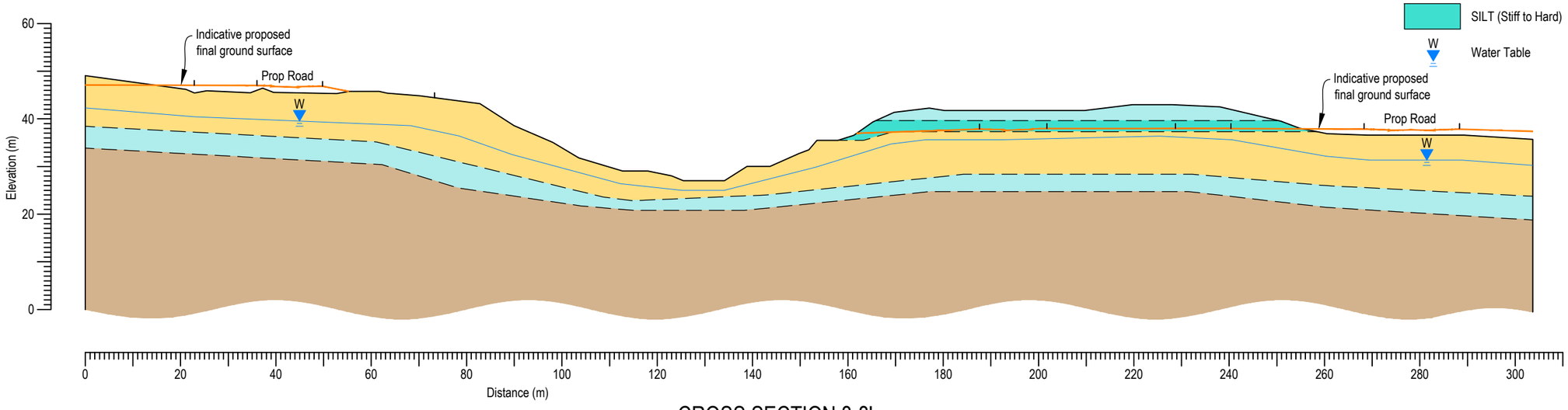
XREFs:
CAD File: Z:\Drafting\14001 to 15000\14280 - Peacockes Road\14280-XsecProfiles-PeacockesRd-0218.dwg

DATE PLOTTED: 16 May 2018 1:53 p.m. BY: DOUG FINLAY



CROSS SECTION 7-7'

SCALE 1:800



CROSS SECTION 8-8'

SCALE 1:1000

Legend

- SAND (Very Loose to Loose)
- SAND (Medium Dense+)
- SILT (Soft to Firm)
- SILT (Stiff to Hard)
- W Water Table

Rev	Date	Description	Drwn	Chkd
3	16.5.18	Updated client & project details.	DF	PF
2	29.3.18	Appendix No. change.	DF	MM
1	26.3.18	Add indicative prop final ground level.	DF	MM

ENGEO Expect Excellence

Auckland Office
6 Antares Place, Rosedale
North Shore City 0632
Auckland, Tel: 09 972 2205
www.engeo.co.nz

Title: GEOLOGICAL SECTIONS

Client: WESTON LEA LIMITED

Project: AMBERFIELD SUBDIVISION HAMILTON

Proj No: 14280.000.000

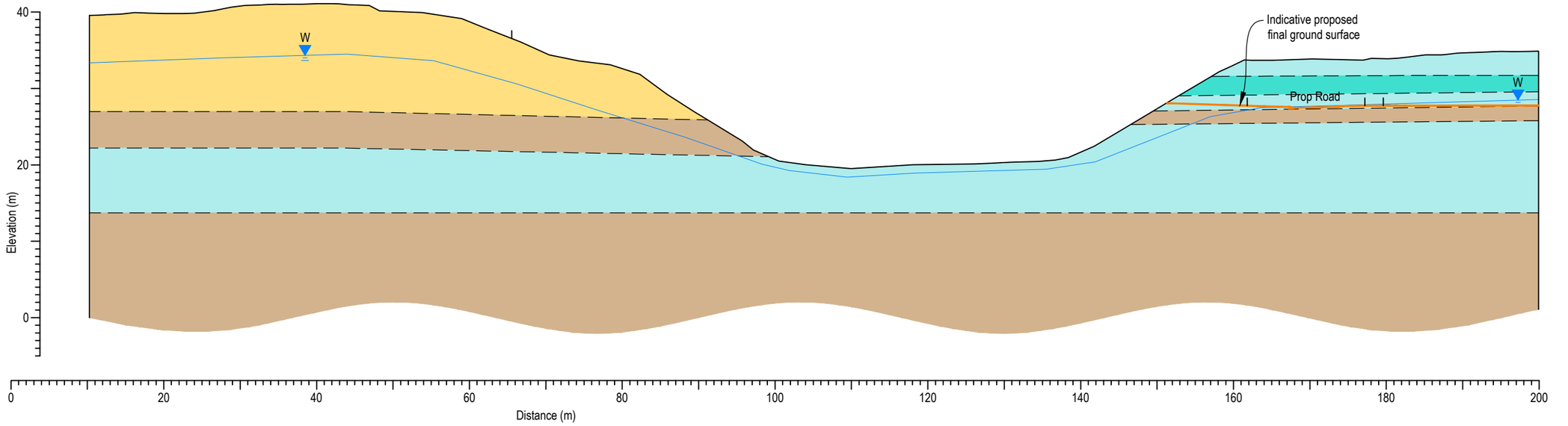
Designed: MM
Drawn: DF
Checked: -
Date: 12.02.18
Scale: AS SHOWN

Appendix No: 8B Sheet 4
Size: A3
Rev: 3

XREFs:
CAD File: Z:\Drafting\14001 to 15000\14280 - Peacocks Road\14280.XsecProfiles-PeacocksRd-0218.dwg

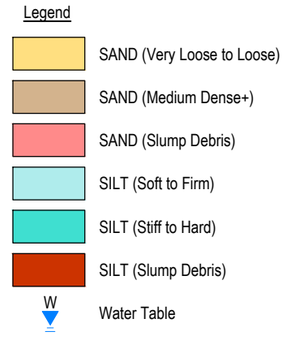
ORIGINAL FIGURE PRINTED IN COLOUR

DATE PLOTTED: 16 May 2018 1:54 p.m. BY: DOUG FINLAY



CROSS SECTION 9-9'

SCALE 1:600



CROSS SECTION 10-10'

SCALE 1:750

Rev	Date	Description	Drwn	Chkd
3	16.5.18	Updated client & project details.	DF	PF
2	29.3.18	Appendix No. change.	DF	MM
1	26.3.18	Add indicative prop final ground level.	DF	MM

ENGEO
Expect Excellence

Auckland Office
6 Antares Place, Rosedale
North Shore City 0632
Auckland, Tel: 09 972 2205
www.engeo.co.nz

Title: GEOLOGICAL SECTIONS

Client: WESTON LEA LIMITED

Project: AMBERFIELD SUBDIVISION
HAMILTON

Proj No: 14280.000.000

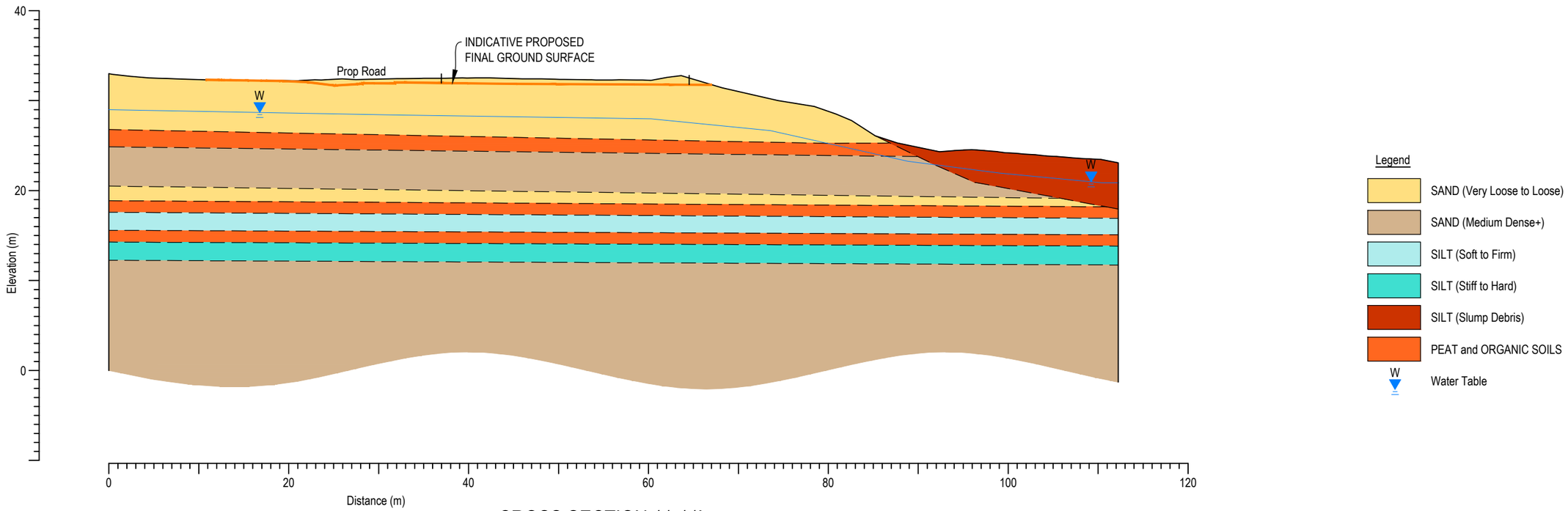
Designed: MM
Drawn: DF
Checked: -
Date: 12.02.18
Scale: AS SHOWN

Appendix No: 8B
Sheet 5
Size: A3
Rev: 3

XREFs:
CAD File: Z:\Drafting\14001 to 15000\14280 - Peacockes Road\14280-XsecProfiles-PeacockesRd-0218.dwg

ORIGINAL FIGURE PRINTED IN COLOUR

DATE PLOTTED: 16 May 2018 1:56 p.m. BY: DOUG FINLAY



CROSS SECTION 11-11'

SCALE 1:500

Rev	Date	Description	Drwn	Chkd
3	16.5.18	Updated client & project details.	DF	PF
2	29.3.18	Appendix No. change.	DF	MM
1	26.3.18	Add indicative prop final ground level.	DF	MM

ENGEO
Expect Excellence

Auckland Office
6 Antares Place, Rosedale
North Shore City 0632
Auckland, Tel: 09 972 2205
www.engeo.co.nz

Title: GEOLOGICAL SECTIONS

Client: WESTON LEA LIMITED

Project: AMBERFIELD SUBDIVISION
HAMILTON

Proj No: 14280.000.000

Designed: MM
Drawn: DF
Checked: -
Date: 12.02.18
Scale: AS SHOWN

Appendix No: 8B
Sheet 6
Size: A3
Rev: 3

XREFs:
CAD File: Z:\Drafting\14001 to 15000\14280 - Peacocke's Road\14280-XsecProfiles-PeacockesRd-0218.dwg

ORIGINAL FIGURE PRINTED IN COLOUR