7 April 2021

Mr Andrew Braggins
Berry Simmons Environmental Law
Level 1
3 - 13 Shortland Street
Auckland 1140

Dear Andrew

RE: Geotechnical Update - 4 Scott Road, Hobsonville, Auckland
(Our Reference: 17971.000.001_05)

1 Introduction

ENGEO Ltd was requested by Berry Simmons Environmental Law to provide a geotechnical update on the proposed development at 4 Scott Road, Hobsonville, Auckland. This work has been carried out in accordance with our existing engagement with Aedifice Development Ltd.

1.1 My name is David Brodie and I am an associate geotechnical engineer at ENGEO. This is a joint letter with my colleague, Heather Lyons. Heather is an associate engineering geologist at ENGEO. Our colleagues prepared the report titled *'Geotechnical Investigation 4 Scott Road Hobsonville Auckland'* dated 3 December 2020 in respect of the site at 4 Scott Road in Hobsonville, Auckland ("the Geotechnical Report"). We have read the Geotechnical Report and conferred with the authors of it, in preparing this update on the development.

1.2 Following that report, and after further discussions with the project team, we have been asked to provide an update and advise whether there are engineering design options which would allow Aedifice Development Limited to establish stable flood-free building platforms without undertaking work within the heritage area overlay.

1.3 The extent of the heritage overlay area is shown in purple on the below figure, taken from Auckland Council's GeoMaps.

Figure 1: ***The property at 4 Scott Road and the scheduled Extent of Place indicated by purple hatching (AUP historic heritage overlay)***

The purpose of this letter is to briefly summarise ENGEO's previous report, the Geotechnical Report, and provide geotechnical context for the issue identified above.

2 Geotechnical Report Summary

2.1 The Geotechnical Report includes a site description, a geomorphological assessment, a site investigation, and a geohazard and geotechnical assessment, along with some preliminary geotechnical recommendations and a description of the general site works.

2.2 In summary:

(a) The key geotechnical constraints relative to future residential development of the site include slope instability, elevated groundwater levels, and surface water overland flow, coastal regression, expansive soils, liquefiable soils and weak and compressible soils.

(b) Slope stability analyses indicate that the slopes at the site are susceptible to future movement under both elevated groundwater conditions and seismic loads. A network of subsoil and counterfort drains may be required to supress groundwater levels, and geotechnical remediation measures such as (but not limited to) bulk earthworks, palisade walls, ground improvement and / or MSE walls may be required to support stable building platforms in areas of instability.

(c) The coastal margin may need to be protected to reduce the rate of coastal regression and minimise loss of toe support. Further detail on protection options will be available following a coastal hazard assessment, which is in progress.

(d) Future building platforms in the north-eastern third of the site, away from sloping ground, are likely to be suited to conventional shallow foundations with a reduced geotechnical ultimate bearing capacity of 200 kPa. Future foundations in the remaining areas of the site may require specific engineering design measures following land development earthworks such as (but not limited to) the drainage and slope stabilisation options discussed above. The recommended engineering measures will depend on the final earthworks plans and levels.

3 Engineering Options Discussion

3.1 Other projects in Hobsonville have addressed slope stability and coastal regression issues with construction of revetment walls or similar along the toe of the slope of the land meeting the coastline. The implementation of these measures can require substantial earthworks.

3.2 On this site, the toe of the slope requiring stabilisation sits within a heritage overlay area, and any earthworks in this area (e.g. for construction of a revetment wall) would require additional authorisations under the Heritage New Zealand Pouhere Taonga Act 2014 (“the Heritage Act”). We understand the client is seeking a solution which does not involve earthworks in the heritage area overlay.

3.3 ENGEO has undertaken an initial geotechnical investigation scope of work to support the early stages of the project and feasibility, as set out in the Geotechnical Report dated 3 December 2020. At the time of preparing this letter, ENGEO has been engaged to return to site to undertake a more detailed geotechnical investigation. The data from this supplementary investigation work and associated geotechnical modelling will support “optioneering” of possible solutions to address slope stability and coastal regression issues.

3.4 While we are confident there is a solution to improve the global stability of the land identified for development, the refinement of a suitable solution to avoid works occurring in the heritage overlay area will be determined from this additional scope of work.

3.5 There are a number of different established engineering solutions which may be suitable for the site; these solutions have been used locally in and around Hobsonville, as well in the wider Auckland region. Examples of these include bulk earthworks measures to regrade steep slopes, including undercuts to remove and replace unstable material with engineered fill, as well as installation of geotechnical drainage to suppress and control groundwater levels. Where bulk

earthworks solutions are not feasible, in-ground palisade pile walls can be constructed at the development margins to prevent instability from undermining future development areas. Building restriction or exclusion zones may be established where site constraints prevent the construction of engineered solutions to address the identified geohazards. As discussed above, ENGEO is undertaking supplementary geotechnical investigations and associated modelling to assess options to address slope stability and coastal regression issues within the next scope of works.

3.6 At this stage of the design process, we are not able to identify what the optimal geotechnical solution is to support redevelopment of the site at 4 Scott Road (i.e. in terms of avoiding the heritage area overlay, feasibility, effectiveness, cost etc). However, we can confirm that based on our previous local experience, a suitable solution is available to allow site redevelopment that does not result in works within the heritage area overlay.

3.7 We note that while the final design for this site is yet to be refined, a combination of ground improvement across an esplanade boundary with a retention structure sitting on top has been used successfully on other local coastal sites around Hobsonville.

4 Limitations

i. We have prepared this letter in accordance with the brief as provided. This letter has been prepared for the use of our client, Aedifice Development Limited, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the letter for any other purpose or by any other person or entity.

ii. The recommendations in this letter are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in the referenced report, based on accepted normal methods of site investigations. The letter does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.

iii. This Limitation should be read in conjunction with the Engineering NZ / ACENZ Standard Terms of Engagement.

iv. This letter is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on s 9(2)(a) if you require any further information.

Report prepared by

David Brodie

Associate Geotechnical Engineer

Report reviewed by

Heather Lyons, CMEngNZ (PEngGeol)

Associate Engineering Geologist

Arboricultural report

To: Nick Mattison, Project Planner, Civix s 9(2)(a)

From: Andrew Barrell, Consultant Arborist Tree 3 Ltd s 9(2)(a)

Date: 11 November 2020

Re: 4 Scott Road, Hobsonville – *Notable Trees: development constraints assessment*

Introduction

1) I have been engaged to identify four Notable trees located on the property at 4 Scott Road, Hobsonville ("*the site*") and provide an assessment of the scale of constraints they may pose to future development of the site.

2) This assessment will consist of mark-ups on an aerial image to show the approximate location of each tree and guidance about minimum approach distances for any root zone disturbances. This advice will be based on the Australian Standard AS4970 and the *Protected Root Zone* (see definitions below) and measurements will be provided that can be overlaid on a scaled site plan by others to show the level of exclusion that will be expected around the trees.

3) I visited the site on 4 November 2020. All inspection work was carried out by visual inspection from ground level and I had unrestricted access to all four Notable trees. The site owner was present during this meeting to clarify the location of the Notable trees.

4) The Auckland Council Unitary Plan (AUP) refers to these trees within Schedule 10 *Notable Trees Schedule* as reference number 1888, four trees, species Oak and Norfolk Pine. There is no clarification as to how many of each species are present.

5) I have arboricultural experience and qualifications, the details of which are summarised on my website at the following address: http://tree3.co.nz/about-us/andy-barrel-cv/. I have based this report on my site observations and the subsequent assessments have been made in light of my experience.

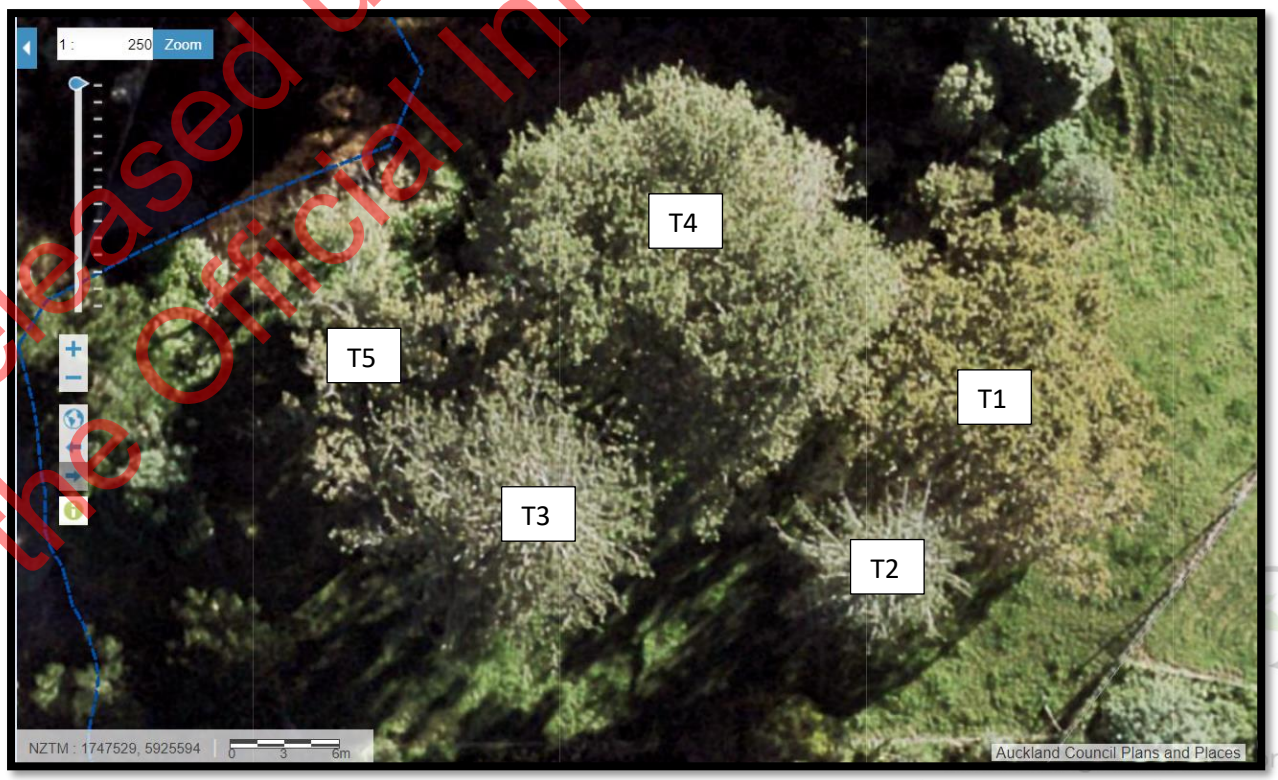
Background information

Location & tree details

6) Figure 1 is an annotated screenshot image taken from the Auckland Council (AC) Geomaps tool showing the site and approximate location of the relevant trees. I have assumed these are the relevant trees as there are no other large trees of these species on the site. Figure 2 is a close-up version of Figure 1 and shows the approximate location of each individual tree – note there are five trees shown on this image. Relevant tree details are shown in Table 1 below.

Figure 1 – *Screenshot of AC Geomaps tool showing overall site and general location of the Notable trees.*

Figure 2 – *Close up view of above image showing precise location of trees.*



7) Table 1 below contains relevant tree details.

Table 1 *– Relevant tree details.*

Tree #	Species	Bc	Cch	Rcs N/S/E/W	Ht	TPZ	PRZ
1	Oak (*Quercus* species)	4300	3670	13/10/5/8	15	14	13
2	Norfolk island pine (*Araucaria heterophylla*)	3700	3080	5/4/4/4	25+	11.8	5
3	Norfolk island pine	4800	3700	7/7/8/8	25+	14.1	8
4	Oak	5250	5030 + 2570	11/7/10/15	15	15	15
5	Oak	3220	2930	7/3/7/10	10	11.2	10

Explanatory notes for Table 1:
Tree # = tree identification number as shown on Figure 2; **Bc** = basal circumference in mm; **Cch** = circumference at chest height, in mm; **Rcs** = radial canopy spread to north/south/east/west, in metres; **Ht** = estimated height, in metres; **TPZ** = tree protection zone (radius) as per AS4970, in metres; **PRZ** = protected root zone (radius) as per AUP definition, in metres (see below).

8) There are five trees in this group but the AUP indicates there are four Notable trees. It has been assumed that the larger trees are the Notable trees and that the smaller tree (T5) is not afforded Notable status.

Industry and AUP standards

9) Australian Standard *AS4970-2009 Protection of tree on development sites* (AS4970) defines the *Tree Protection Zone* (TPZ) as a circular area around a tree with a radius equal to twelve times the stem diameter at 1.4m above ground level. This area should be appropriately managed to allow for the survival of the tree. In addition, AS4970 describes the *Structural Root Zone* (SRZ) as an area within a circle around the tree within which important roots will be present that are critical to the support of the tree although this metric is not so relevant in this context.

10) AS4970 states the following with regards to encroachments that affect over 10% of the TPZ:

> *"If the proposed encroachment is greater than 10% of the TPZ or inside the SRZ, the project arborist must demonstrate that the tree(s) would remain viable. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ. This may require root investigation by non-destructive methods…"*

11) In addition, the AUP refers to the *Protected Root Zone* (PRZ) which is defined as follows in Chapter J – *Definitions* of the AUP:

> *"The circular area of ground around the trunk of a protected tree, the radius of which is the greatest distance between the trunk and the outer edge of the canopy. For columnar crown species the protected root zone is half the height of the tree."*

Assessment

12) All the trees appeared to be in reasonably good health with no obvious or significant structural defects which in turn means there is no compelling reason to justify their removal.

13) The numbers in Table 1 above represent minimal approach distances for any disturbance from each of the four Notable trees. In my opinion the TPZ will take precedence over the PRZ as it is a more precautionary method and this will be the preferred option for Council when assessing any development-related impacts on these trees. Based on this assessment the minimum approach distance of any ground disturbance from the trees ranges from 11.8m (T2) to 15m (T4).

14) The Notable trees stand on a small, slightly elevated spur which drops away into a creek on the north western side and is confined by site boundaries to the south east and south west. It is reasonable to assume that no development will occur on the south east or south west due to site boundaries, nor to the north west due to the creek and associated riparian/ecological implications. Consequently the only realistic area where development may encroach towards the trees will be from the north/north east of the trees, as constrained by the landform and site boundaries.

Conclusions

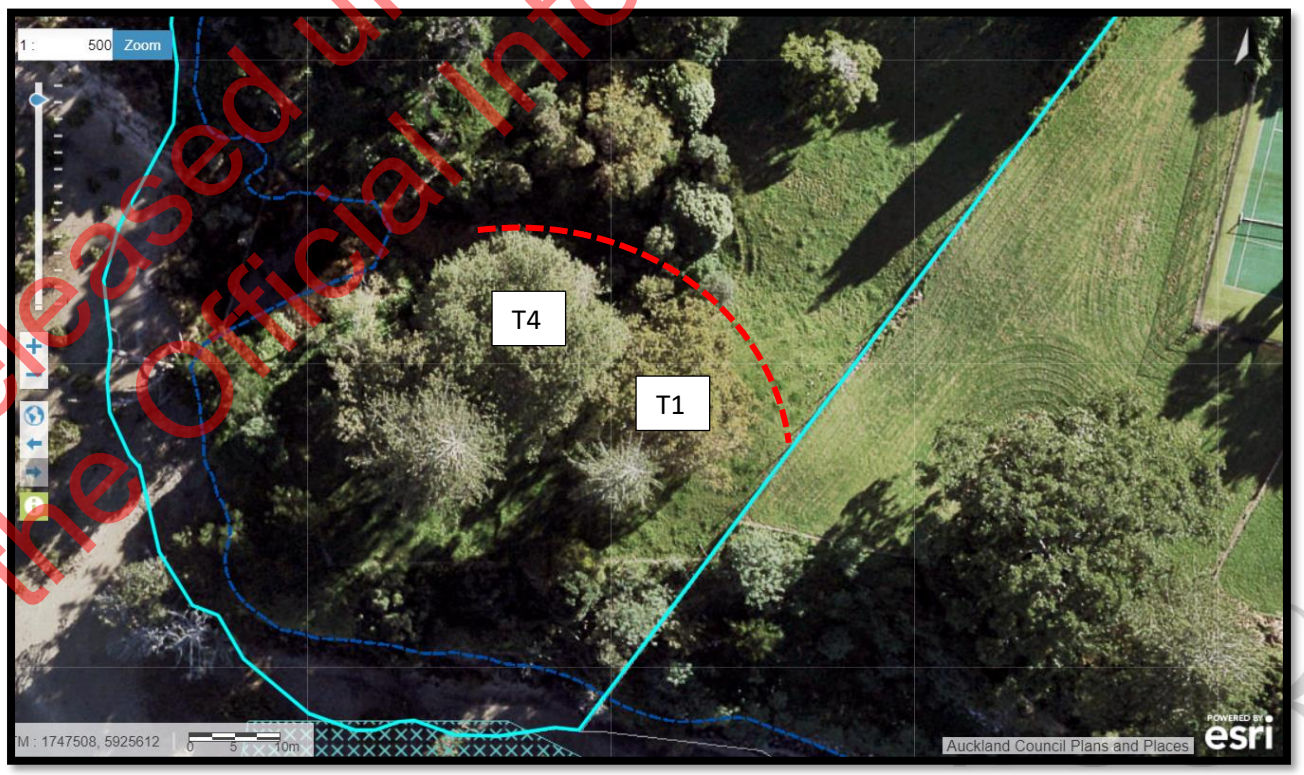
15) Based on my site observations and assessments as described above I consider the most relevant and significant constraint associated with any proposed development in the vicinity of the four Notable trees will be the required separation from T1. The TPZ of T1 is 14m therefore in my opinion Council will not be supportive of any development that encroaches within this TPZ radius.

16) AS4970 does indicate that encroachments can occur under certain circumstances (see section 10 above) however given the size of the site and the location of the Notable trees, I do not believe Council will be supportive of any significant encroachment into TPZ areas.

17) In the event that the constraints to the north west (the creek) and to the south east and south west (site boundaries) become irrelevant for any reason, the limit of encroachment into root zone areas will still relate directly to the TPZ of each tree, as noted in Table 1.

18) In summary I consider the most likely chance of a successful outcome for any development proposal will be dependent upon any ground disturbance occurring no closer than at least 14m from the trunk of T1 and furthermore, no ground disturbance occurring to the south/south west of this exclusion line i.e. the spur of land on which the trees stand remains materially unchanged. Figure 3 below shows what I consider to be a supportable demarcation between any ground disturbances and the subject trees.

***Figure 3** – Estimated limit of encroachment towards the Notable trees (red dotted line).*



19) The red dotted line in Figure 3 represents a distance of at least 14m from the trunk of T1 and at least 15m from the trunk of T4. No ground disturbance should come any closer to the trees than this distance apart from minor works as described below. The site boundaries and landform limit any encroachments from the remaining points of the compass.

20) There may be scope to install recreational-type infrastructure within this area to the south west of the red dotted line in Figure 3 (e.g. picnic benches, footpaths etc.) provided any such works occur in a manner that avoids any kind of damage to roots or above-ground parts of trees and will not have any short or long term impact on the health or stability of the Notable trees. The same applies to installation of any infrastructure (primarily stormwater infrastructure) which may be absolutely necessary – it will need to be installed in a manner that avoids any adverse impacts on roots or above-ground parts of the Notable trees.

Please feel free to contact me if you require further clarification of any of the above points.

Andrew Barrell

Director, *Tree3* Ltd

11 November 2020

OLIVE + HERO

OLIVE + HERO
8 Kawakawa Place
Whenuapai
Auckland 8014

15 February 2021

Aedifice Development Limited
Lockhart O'Shea Limited
9-11 Galatos Street, Newton
Auckland, 1140
New Zealand

Dear Francois/Kieran

FAST TRACK APPLICATION – AEDIFICE DEVELOPMENT LIMITED – 4 SCOTT ROAD, HOBSONVILLE

We have been asked by Aedifice Development Limited (Aedifice) to provide details about their proposed development at 4 Scott Road, Hobsonville, Auckland (the site), regarding the construction of approx. 440 dwellings if resource consent is granted.

Olive + Hero is a partnership between Olive Homes and Hero International. We have worked with Aedifice on similar residential developments, including Orchard Lane/Cherry Lane, Scott Terraces, Camelot Terraces and Chivalry Terraces, cumulatively totalling 115 homes.

About us

Dan Oliver, formally National Operations Manager for G.J. Gardner Homes New Zealand set up Olive Homes in response to the growing medium density gap between low and high-volume builders. By recognising the different business model required for delivering successful volume developments, Olive Homes formed a working partnership with Hero International, a business combining the organisation of commercial construction with the quality requirements of residential building.

Hero International, in operation since 2005 (previously Hero Construction) has a large office facility in Westgate, Whenuapai, with approximately forty-five staff employed at present and growing. The business is solely owned by Gavin Liu, a New Zealand resident who has lived on Auckland's North Shore since 2005.

Hero International has built nearly 2,000 homes in Auckland, making them one of New Zealand's leading non-franchised residential builders. In 2019 Hero International won a prestigious Master Builders House of the Year bronze award for terraced homes in Massey, Auckland, alongside an additional award in 2020 for a standalone home.

Head office

The Olive + Hero head office is located at 8 Kawakawa Place, Whenuapai, Auckland.

Numbers of employees required

We estimate that we will be required to employ between 202 and 270 tradespeople to ensure the construction of the dwellings. Hero International directly employs the majority of its trades. Approximate employees required will be in the following roles:

(a) Project Managers/Supervisors/Team leads – 10-20 required;

(b) Carpentry (including cladding and roofing) – 90-110 required;

(c) Brick and block layers – 12-15 required;

(d) Plasterers (stoppers) – 12-15 required;

(e) Electricians – 12-15 required;

(f) Plumbers – 12-15 required;

(g) Painters – 12-15 required;

(h) Tilers – 12-15 required;

(i) Office support – 20-30 required; and

(j) Other professionals/skills/disciplines – 10-20 required.

Our hiring process involves placing advertisements on Seek and TradeMe. In our experience employing staff previously, we receive job applications from those living locally to the construction site. Therefore, we expect that the people that we will employ for this project will be based local to the site in North-West Auckland.

In addition Hero International always look to utilise apprentices where possible, given our teams are directly employed we are able to provide extremely good exposure and development across many different construction elements. By ensuring a broad skills base for apprentices they are able to become better overall builders. We believe this is important to the future of the NZ construction industry and we are currently contacting various organisations looking for apprentices.

Additional subcontractors required

In addition to the staff we will hire, we will be looking to approximately employ the following external subcontractors:

(k) Scaffolders – 8 subcontracting teams required (approximately 3-5 per team);

(l) Joiners – 8 subcontracting teams required (approximately 2-4 per team);

(m) Carpet fitters – 8 subcontracting teams required (approximately 2-3 per team); and

(n) Landscapers – 8 subcontracting teams required (approximately 2-4 per team).

Recruitment of subcontractors

We employ additional subcontractors based on their skillset, accreditations, capability, quality, value and locality to the construction site. Having subcontractors living and working in their local area increases both productivity and pride.

Construction duration

Whilst developed designs are not available yet, it would be anticipated that a development of this scale would take approximately 24-36 months to deliver vertical construction elements.

Where we source our building materials from

We use many local suppliers to source our building supplies, for example ITM, Placemakers, Chesters Plumbing, Pink Batts etc. Many of our suppliers have multiple sites/stores all around Auckland. For example, ITM, Placemakers and Chester Plumbing all have stores within the neighbouring area of the proposed site. We will be able to source most of our building materials from these companies, with many other products supplied from within the Auckland area.

Systems

We recognise that good systems and processes are required to coordinate the delivery of successful volume house projects. All our teams have access to shared OneDrive platforms, alongside comprehensive construction scheduling programmes through Microsoft Project. Our dedicated internal IT/Systems team are constantly developing and refining systems to ensure that we promote effective labour utilisation, minimal construction wastage and timely compliance elements.

Sustainability

Where possible we specify building products of recycled, secondary or sustainable sources, for example responsibly sourced timber through the Forest Stewardship Council (FSC) certification scheme.

Hero International has a Responsible Sourcing document available, listing the Environmental Management Systems in operation at many of their key local suppliers. This approach is taken to ensure we have an understanding that many of these local suppliers are operating with responsibility, taking various approaches to minimise their environmental impact. We believe this is an important balance to promote practical, durable and sustainable building without jeopardising the commercial viability of development.

Please contact us if you have any questions.

Yours sincerely

Dan Oliver
Owner, Olive Homes

TPC TRAFFIC PLANNING CONSULTANTS LTD

Ref: 20706

01 April 2021

Nick Mattison
Civix Limited

By Email: s 9(2)(a)

Dear Nick,

4 SCOTT ROAD, HOBSONVILLE - PRELIMINARY CONCEPT – TRANSPORT

I can provide the following preliminary advice regarding the proposed residential development at 4 Scott Road, Hobsonville. A copy of the general site layout has been enclosed and is anticipated to generate 435 residential dwellings and a series of public and private roads to provide access to the wider road network.

The concept plan has been developed with my input and alongside other professionals and I consider that this will have a successful transport outcome that will integrate well in the surrounding road network.

In terms of the relevant transport provisions within the Auckland Unitary Plan the following is set out in the Scott Point Precinct Plan:

Transport

a) the local road network should provide a highly inter-connected roading system so as to reduce trip distances and to improve local accessibility to community facilities, reserves, public transport facilities and retail activities.

b) traffic generation from proposed activities should not create adverse effects on the:
- *i. capacity of roads giving access to the site*
- *ii. safety of road users including cyclists and pedestrians*
- *iii. sustainability of the primary road network; activity and capacity*
- *iv. neighbourhood character.*

c) if more than 1000 dwellings in the Scott Point precinct are to be approved without the following upgrades then the proposal should consider what effect the proposal will have on the wider road network, and in particular:
- *i. the Hobsonville Road/Squadron Drive intersection; and*
- *ii. a new arterial road and signal controlled intersection from an extended Scott Road to Hobsonville Road.*

Furthermore, under the Auckland Unitary Plan E27 Transport standards the following provision is relevant to this assessment:

E27.4.1(A3) - Any activity or subdivision which exceeds the trip generation standards set out in Standard E27.6.1.

Auckland Office:
P O Box 60-255, Titirangi, Auckland 0642
Level 1, 400 Titirangi Road, Titirangi Village
Tel: (09) 817 2500
Fax: (09) 817 2504
www.trafficplanning.co.nz

The following points are noted with regards to these transport provisions:

a) The proposed network of roads follows those indicated in the Precinct Plans providing direct and multiple connections to Scott Road, the coastal walkway and neighbouring site to ensure a highly connected network for all users.

b) The proposal can make the most of the opportunities to promote walking and cycling. It aims to provide for the daily needs of pedestrian and cyclist movements by:

- Creating footpaths along both sides of the new streets that meet Auckland Transport standards;
- Connecting new footpaths with the existing footpath network immediately outside the site;
- Pedestrian crossing facilities will be incorporated into the intersection layouts,
- Vehicle crossings are limited providing rear lanes for lot access and minimising the conflicts on footpaths; and
- Providing a low-speed street network that allows cyclists and vehicles to share the same carriageway on an equal basis.

c) The proposal will follow best practice road design principles that will meet Auckland Transport standards and expectations for safe and efficient residential streets by:

- Adopting a design speed of 30km/hr on all new roads with traffic calming at regular intervals is intended;
- Having road reserve widths that will accommodate all users and support safe and efficient use;
- New intersections will be sufficiently separated from others intersection reducing conflicts and congestion; and
- Appropriate intersection controls can be established to provide safe and clear priority for all users.

d) We have undertaken initial traffic modelling based on 435 residential dwellings mixed with the predicted 2021 Hobsonville Point and Scott Road Precinct full build out (understood to allow for 1000 dwellings within the Scott Point Precinct). The modelling suggests:

- The proposed site access intersections onto Scott Road are forecast to operate well within capacity in both the AM and PM peak hours; and
- The existing Scott Road/Clark Road/Ngaroma House Views crossroads intersection is forecast to operate within their capacity, however the right turn-out movement from Clark Road is likely to experience an increase in delay during the AM peak hour because of the additional development traffic.

e) The Hobsonville Point Road / Squadron Drive intersection has been upgraded to a signalised intersection and we understand no further upgrades are required to this intersection meeting the requirements set out above.

f) Scott Road also has other completed (or near completed) connections to Hobsonville Road via Clark Road, Nugget Avenue and Te Rito Road both of which are signalised intersections. I consider that these connections meet the requirements of a new road connection to Hobsonville Road as set out above.

g) A further connection to Hobsonville Road is also possible via Clark Road and Wiseley Road and a priority-controlled intersection. This intersection is planned to be upgraded as Hobsonville Road is widened and upgraded. This however requires land acquisitions outside of the control of the developer of 4 Scott Road. Nevertheless, as Scott Road has the opportunity of three other signalised connections to Hobsonville Road, the development traffic is expected to not rely on this connection.

Whilst I expect Auckland Transport to be generally supportive of the proposal, we anticipate some matters to be raised and additional assessment and infrastructure to be requested. These matters include:

a) Further, consideration of effects on the wider road network and the connection to Hobsonville Road;

b) Auckland Transport (AT) generally operate on a zero-tolerance basis about increasing movements across a crossroads intersection. Given the development is likely to generate vehicle movements to/from Clark Road and Ngaroma House Views to/from the school and other facilities, AT may request an upgrade to a roundabout junction in this location;

c) Provision of a footway along the site frontage towards the north to Ngaroma House Views;

d) Provision of a pedestrian crossing location over Scott Road, given the likely number of increased pedestrian movements to/from the site; and

e) Further information on the future road connections to the south of the site and neighbouring site.

We will engage further with AT to discuss these matters. I trust that the above provides sufficient information. However, should you have any further queries in relation to the above, we would be happy discuss further if needed.

Yours faithfully
TRAFFIC PLANNING CONSULTANTS LTD

Todd Langwell
Director

Attachment 1
Concept Masterplan

Note: The area's shown are indicative only and are without consultant input or relevant council approvals. BDG Architects Ltd. accepts no responsibility for the accuracy of these area's and do not recommend they be used as part of any legal agreement or marketing material

Key:
- Feature end wall
- Front Door Access / Letterbox location
- All landscaping by Helen Mellsop
- Rain Gardens - by CIVIX

PRELIMINARY - ROADING LAYOUT TO BE CONFIRMED

Rev.	Issue Date
A - WIP	Work in Progress

Work in Progress

FOR RESOURCE CONSENT

BDG ARCHITECTS
2 Enfield Street, Mt Eden
Auckland, 1024
09 638 8989
www.bdgarchitects.co.nz

Proposed Masterplan

SCOTT ROAD DEVELOPMENT
25/03/2021 Job # 2448 Drawing No: 00-09
Scale 1:2000, 1:600@ A1, @ A3 = 50% Rev: A - WIP

Nga Maunga Whakahii o Kaipara Development

Tamsin Gorman

From: Alvin Jung <s 9(2)(a)>
Sent: Tuesday, 6 April 2021 5:03 PM
To: s 9(2)(a)
Cc: s 9(2)(a); Nick Mattison; Tamsin Gorman; Andrew Braggins
Subject: Iwi meeting follow up 4 Scott Road
Attachments: Master Plan 2021-03-254 SCOTT ROAD DEVELOPMENT - WIP.pdf; 4 Scott Rd Landscape Plan WIP small 01-04-21.pdf

Hi Shona,

Thanks for taking my call this afternoon.

As discussed, we are currently investigating whether we would need to employ coastal protections across that coastline to stop erosion from occurring. While initially we were wanting to avoid any earthworks in that coastal area however if protection is required, we would require some earthworks in the proposed reserve area. We are currently looking at using rock revenants to slow the erosion however this will be confirmed by our coastal expert. It is a difficult situation, as if we avoid all earthworks along the coastline and any potential artifacts of significance (Maori and European) would erode away, and if protection is required then earthworks are required causing disturbance. In any case, we have tentatively had confirmation Councill will accommodate pre-application meeting to confirm the best approach.

The other matter that overflows during emergencies from the pumpstation may occur during massive storm events which will discharged to the coast. The engineers are still working through the final design however they will be designed so they can accommodate capacity for at least five times the average dry weather flow from the maximum probable development of the serviced network area.

We are happy to do another walkover if required but it would be good to know if you are requiring a CVA.

I have attached the latest plans for your reference and will pass on those coastal comment as I get them however if you have any further questions please let me know.

Thanks,

Alvin

Alvin Jung
Senior Planner

M s 9(2)(a) | W www.civix.co.nz
A Level 1, 87 Albert Street, Auckland
P PO Box 5204 Victoria Street West, Auckland 1142

From: Alvin Jung
Sent: Thursday, 25 March 2021 4:25 pm
To: Resource Management Services <s 9(2)(a) >
Cc: Andrew Braggins <s 9(2)(a) >; Tamsin Gorman s 9(2)(a) ; Nick Mattison <s 9(2)(a) >
Subject: RE: Iwi Engagement 4 Scott Road Hobsonville

Kia Ora Shona,

Thanks for getting back to me. Happy to have you tomorrow.

Thanks,

Alvin

Alvin Jung | CIVIX | Senior Planner | M s 9(2)(a) | W www.civix.co.nz

---

From: Resource Management Services s 9(2)(a) >
Sent: Thursday, 25 March 2021 4:23 pm
To: Alvin Jung <s 9(2)(a) >
Subject: RE: Iwi Engagement 4 Scott Road Hobsonville

Kia ora Alvin,

Sorry I have been out of the office for a few days.
I can meet you at 9am for a brief time. I have an NZTA meeting so cannot stay too long.

Nga mihi,

Shona Oliver
Pou Whakahaere Kaipakihi

KAIPARA

Business Services Manager
Nga Maunga Whakahii o Kaipara Development Trust
16 Commercial Road, Helensville
PO Box 41 Post Code: 0840
E:businessservices@kaiparamoana.com
P: s 9(2)(a)
M: s 9(2)(a)

From: Alvin Jung <s 9(2)(a)>
Sent: Wednesday, 24 March 2021 3:52 pm
To: Resource Management Services s 9(2)(a) >
Cc: Andrew Braggins <s 9(2)(a) >; Tamsin Gorman <s 9(2)(a) >; Nick Mattison <s 9(2)(a) >
Subject: RE: Iwi Engagement 4 Scott Road Hobsonville

Hi Shona,

Hope you're doing well. I tried calling yesterday and today but it seems like you were busy.

I am just wanting to inform you that we have an onsite walkover with Ngati Manuhiri at 9am this Friday 26/03/2021 at 4 Scott Road and was wondering if you were available to attend as well?

I have provided a link below to the documents which were lodged with the MfE below.

Please let me know if you have any questions.

out of scope

Thanks,

Alvin

Alvin Jung | CIVIX | Senior Planner | M s 9(2)(a) | W www.civix.co.nz

From: Tetaritaiao <s 9(2)(a) >
Sent: Tuesday, 23 February 2021 4:28 pm
To: Alvin Jung <s 9(2)(a) >
Subject: RE: Iwi Engagement 4 Scott Road Hobsonville

Kia ora Alvin,

My apology for the delay in reply. Ngā Maunga Whakahii o Kaipara is interested in engaging with you regarding the development.
Given the archaeological heritage already recorded for the site, both pre European, New Zealand Archaeological Assoc NZAA sites R11/483, R11/484 & R11/2462 and early settlement brickworks NZAA R11/1508 we have an interest in the development of the site. There is a significant risk of accidental discovery and we would like to see this recognised in the consent conditions as well as the potential that any discovery may then invoke Heritage New Zealand requirements.

I would be happy to discuss this with you further.

Nga Mihi,

Shona Oliver
Pouwhakahaere Te Tari Taiao
(Environmental Services)

KAIPARA

P: s 9(2)(a) Nga Maunga Whakahii o Kaipara Development Trust

M: s 9(2)(a)
E: s 9(2)(a)

16 Commercial Road, PO Box 41
Te Awaroa - Helensville 0840

From: Alvin Jung s 9(2)(a) >
Sent: Monday, 22 February 2021 4:15 pm
To: s 9(2)(a)
Cc: Nick Mattison < s 9(2)(a) >; Tamsin Gorman < s 9(2)(a) >; Andrew Braggins < s 9(2)(a) >; Jennifer van Rouveroy < s 9(2)(a) >
Subject: RE: Iwi Engagement 4 Scott Road Hobsonville

Kia Ora,

I am following up on the email below.

Nāku noa, nā

Alvin

Alvin Jung | civix | Senior Planner | M s 9(2)(a) | W www.civix.co.nz

From: Alvin Jung
Sent: Friday, 5 February 2021 4:14 pm
To: s 9(2)(a)
Cc: Nick Mattison < s 9(2)(a) >
Subject: Iwi Engagement 4 Scott Road Hobsonville

Kia Ora,

Civix Ltd is assisting Adefice Development Ltd with a comprehensive residential development seeking 422 residential units at 4 Scott Road in Hobsonville.

The site is located in the Residential Mixed Housing Urban, Mixed Housing Suburban, and Single House Zone under the Auckland Unitary Plan, and we are currently the in preliminary stages of the design of the proposal. We have sought advice from urban design, visual landscaping, engineering, heritage, traffic and arboricultural experts and the architectural plans will continue to be developed with their input however I have attached the latest concept plans for your reference.

We would appreciate your time to review this and welcome any feedback on the proposal at this preliminary phase of the proposal.

We will be seeking consent under the Covid-19 Recovery (Fast Track Consenting) Act 2020 in order to obtain the most efficient processing pathway once the design is finalised.

Please contact me if you require any clarification.

I look forward to working with you from here onwards.

Best regards,

Alvin

Alvin Jung
Senior Planner

M s 9(2)(a) | **W** www.civix.co.nz
A Level 1, 87 Albert Street, Auckland
P PO Box 5204 Victoria Street West, Auckland 1142

From: Tetaritaiao <s 9(2)(a) >
Sent: Tuesday, 23 February 2021 4:28 pm
To: Alvin Jung s 9(2)(a) >
Subject: RE: Iwi Engagement 4 Scott Road Hobsonville

Kia ora Alvin,

My apology for the delay in reply. Ngā Maunga Whakahii o Kaipara is interested in engaging with you regarding the development.
Given the archaeological heritage already recorded for the site, both pre European, New Zealand Archaeological Assoc NZAA sites R11/483, R11/484 & R11/2462 and early settlement brickworks NZAA R11/1508 we have an interest in the development of the site. There is a significant risk of accidental discovery and we would like to see this recognised in the consent conditions as well as the potential that any discovery may then invoke Heritage New Zealand requirements.

I would be happy to discuss this with you further.

Nga Mihi,

Shona Oliver
Pouwhakahaere Te Tari Taiao
(Environmental Services)

KAIPARA

P: s 9(2)(a) Nga Maunga Whakahii o Kaipara Development Trust
M: s 9(2)(a) 16 Commercial Road, PO Box 41
E: s 9(2)(a) Te Awaroa - Helensville 0840

From: Alvin Jung <s 9(2)(a) >
Sent: Monday, 22 February 2021 4:15 pm
To: s 9(2)(a)
Cc: Nick Mattison <s 9(2)(a) >; Tamsin Gorman <s 9(2)(a) >; Andrew

Braggins < s 9(2)(a) >; Jennifer van Rouveroy s 9(2)(a)
Subject: RE: Iwi Engagement 4 Scott Road Hobsonville

Kia Ora,

I am following up on the email below.

Nāku noa, nā

Alvin

Alvin Jung | CIVIX | Senior Planner | M s 9(2)(a) | W www.civix.co.nz

---

From: Alvin Jung
Sent: Friday, 5 February 2021 4:14 pm
To: s 9(2)(a)
Cc: Nick Mattison < s 9(2)(a) >
Subject: Iwi Engagement 4 Scott Road Hobsonville

Kia Ora,

Civix Ltd is assisting Adefice Development Ltd with a comprehensive residential development seeking 422 residential units at 4 Scott Road in Hobsonville.

The site is located in the Residential Mixed Housing Urban, Mixed Housing Suburban, and Single House Zone under the Auckland Unitary Plan, and we are currently the in preliminary stages of the design of the proposal. We have sought advice from urban design, visual landscaping, engineering, heritage, traffic and arboricultural experts and the architectural plans will continue to be developed with their input however I have attached the latest concept plans for your reference.

We would appreciate your time to review this and welcome any feedback on the proposal at this preliminary phase of the proposal.

We will be seeking consent under the Covid-19 Recovery (Fast Track Consenting) Act 2020 in order to obtain the most efficient processing pathway once the design is finalised.

Please contact me if you require any clarification.

I look forward to working with you from here onwards.

Best regards,

Alvin

Alvin Jung
Senior Planner

M s 9(2)(a) | **W** www.civix.co.nz
A Level 1, 87 Albert Street, Auckland
P PO Box 5204 Victoria Street West, Auckland 1142

Ngati Manuhiri

From: Tarryn Wentzel <s 9(2)(a) >
Sent: Monday, 29 March 2021 10:20 am
To: Alvin Jung <s 9(2)(a) >
Cc: Fanua Meyer <s 9(2)(a) >
Subject: 4 Scott Road - Hobsonville

Ata mārie, mōrena Alvin

After discussing the matter with our cultural advisor, please see our letter of deferral attached hereto.

Kia ora rawa atu,

Tarryn Wentzel
Environmental Improvement Officer
Ngāti Manuhiri Settlement Trust
P: s 9(2)(a)
E: s 9(2)(a) **W:** http://www.ngatimanuhiri.iwi.nz/
A: 2-4 Elizabeth Street, Warkworth **P:** P.O Box 117, Warkworth 0910

NGĀTI MANUHIRI
SETTLEMENT TRUST

Ngāti Manuhiri Settlement Trust
2-4 Elizabeth Street, Warkworth, Auckland 0910
P.O Box 117, Warkworth 0941
0508 MANUHIRI

29 March 2021

Attention:

Alvin Jung (Civix)

s 9(2)(a)

IN RE: 4 Scott Road – Hobsonville – fast-track resource consent

Tēnā koe Alvin,

In response to the fast-track application under Section 20 of the COVID-19 Recovery (Fast-track Consenting) Act 2020 for the residential development at 4 Scott Road, Hobsonville, the Ngāti Manuhiri Settlement Trust set's out its involvement in this matter below.

In 2012, Ngāti Manuhiri achieved and settled their Treaty Settlement with the Crown. The Ngāti Manuhiri Settlement Trust (NMST) is a post settlement governance entity (PSGE) who are the mandated and approved entity to represent Ngāti Manuhiri and its environs. Ngāti Manuhiri has a large rohe as set out below which includes the oceans and islands.

Ngāti Manuhiri boundaries (rohe) encompass Bream Tail / Mangawhai to the north and extend south to the Okura river mouth south of Whangaparaoa. Our easterly boundary takes in the islands of Hauturu O Toi (Little Barrier), Kawau O Tumaro, Tiritiri Matangi, Panetiki, the Mokohinau islands, Hawere a Maki, Motu Tohora, Motuihe, Moturekareka, Motuketekete, Motutara, Te Haupa and associations in the Waitemata and the lower Hauraki Gulf. The western boundary starting in the North at Patumakariri, Kaipara, Moturemu, Arapareira, Makarau through to Oteha / Takapuna.

Ngāti Manuhiri Settlement Trust
2-4 Elizabeth Street, Warkworth, Auckland 0910
P.O Box 117, Warkworth 0941
0508 MANUHIRI

Deferral:

Having read the documents provided and attending a site visit the Ngāti Manuhiri Settlement Trust will defer to the Nga Maunga Whakahii o Kaipara Development Trust and support any recommendations made in terms of this development (4 Scott Road) made by the aforesaid trust.

Thank you for engaging with the Ngāti Manuhiri Settlement Trust.

Ngā mihi nui,

Tarryn Wentzel
Environmental Improvement Officer
Ngāti Manuhiri Settlement Trust
P: s 9(2)(a)
E: s 9(2)(a) **W:** http://www.ngatimanuhiri.iwi.nz/
A: 2-4 Elizabeth Street, Warkworth **P:** P.O Box 117, Warkworth 0910

From: Tarryn Wentzel [s 9(2)(a) >
Sent: Friday, 26 March 2021 12:25 pm
To: Alvin Jung <[s 9(2)(a) >
Subject: 4 Scott Road Hobsonville

Kia ora Alvin,

Thank you for arranging the site visit today and having the archaeologist was really helpful too. I will have chat with our cultural advisor with regards to the need for issuing a kaitiaki report or a CIA.

Please could you provide me with the client's details who will be responsible for our invoice?

Thank you so much,

Tarryn Wentzel
Environmental Improvement Officer
Ngāti Manuhiri Settlement Trust
P: s 9(2)(a)
E: s 9(2)(a) **W:** http://www.ngatimanuhiri.iwi.nz/
A: 2-4 Elizabeth Street, Warkworth **P:** P.O Box 117, Warkworth 0910

From: Alvin Jung [s 9(2)(a)] >
Sent: Tuesday, 9 February 2021 2:35 PM
To: Manuhiri Kaitiaki Charitable Trust < [s 9(2)(a)] >
Cc: Nick Mattison [s 9(2)(a)] >; Andrew Braggins [s 9(2)(a)] >; Tamsin Gorman < [s 9(2)(a)] >
Subject: RE: Iwi Engagement 4 Scott Road Hobsonville

Tēnā koe Tarryn,

Thank you very much for getting back to me.

We are currently working through the earthworks required, and the other ecological matters that you have referred to below. At this stage, we are still working through the urban layout of the proposal but happy to send you more developed plans as we progress through the project.

Please let me know if you have any comments on the design so far though.

Nāku noa, nā

Alvin

Alvin Jung | CIVIX | Senior Planner | M [s 9(2)(a)] | W www.civix.co.nz

---

From: Manuhiri Kaitiaki Charitable Trust [s 9(2)(a)]
Sent: Tuesday, 9 February 2021 10:29 am
To: Alvin Jung < [s 9(2)(a)] >
Subject: RE: Iwi Engagement 4 Scott Road Hobsonville

Tēnā koe Alvin,

Thank you for engaging with Ngati Manuhiri.

Please could you provide further information on this? Please could you advise on the amount the earthworks, the need for filling in streams, sensitive areas and vegetation clearance and so on?

Much appreciated.

Ngā mihi,

Tarryn Wentzel
Environmental Improvement Officer
Ngāti Manuhiri Settlement Trust
P: s 9(2)(a)
E: s 9(2)(a) **W:** http://www.ngatimanuhiri.iwi.nz/
A: 2-4 Elizabeth Street, Warkworth **P:** P.O Box 117, Warkworth 0910

From: Alvin Jung < s 9(2)(a) >
Sent: Friday, 5 February 2021 4:14 PM
To: Manuhiri Kaitiaki Charitable Trust s 9(2)(a)
Cc: Nick Mattison < s 9(2)(a) >
Subject: Iwi Engagement 4 Scott Road Hobsonville

Kia Ora,

Civix Ltd is assisting Adefice Development Ltd with a comprehensive residential development seeking 422 residential units at 4 Scott Road in Hobsonville.

The site is located in the Residential Mixed Housing Urban, Mixed Housing Suburban, and Single House Zone under the Auckland Unitary Plan, and we are currently the in preliminary stages of the design of the proposal. We have sought advice from urban design, visual landscaping, engineering, heritage, traffic and arboricultural experts and the architectural plans will continue to be developed with their input however I have attached the latest concept plans for your reference.

We would appreciate your time to review this and welcome any feedback on the proposal at this preliminary phase of the proposal.

We will be seeking consent under the Covid-19 Recovery (Fast Track Consenting) Act 2020 in order to obtain the most efficient processing pathway once the design is finalised.

Please contact me if you require any clarification.

I look forward to working with you from here onwards.

Best regards,

Alvin

Alvin Jung

Senior Planner

M s 9(2)(a) | **W** www.civix.co.nz
A Level 1, 87 Albert Street, Auckland
P PO Box 5204 Victoria Street West, Auckland 1142

Ngati Whatua Orakei

From: Alvin Jung <s 9(2)(a) >
Sent: Tuesday, 6 April 2021 5:13 PM
To: Robbie Paora
Cc: Andrew Braggins; Tamsin Gorman; Nick Mattison; TokiTaiao
Subject: RE: Iwi Engagement 4 Scott Road Hobsonville
Attachments: Master Plan 2021-03-254 SCOTT ROAD DEVELOPMENT - WIP.pdf; 4 Scott Rd Landscape Plan WIP small 01-04-21.pdf

Hi Robbie,

Thanks for meeting me the other day.

Just following on from our meeting, we are currently investigating whether we would need to employ coastal protections across that coastline to stop erosion from occurring. While initially we were wanting to avoid any earthworks in that coastal area however if protection is required, we would require some earthworks in the proposed reserve area. We are currently looking at using rock revenants to slow the erosion however this will be confirmed by our coastal expert. It is a difficult situation, as if we avoid all earthworks along the coastline and any potential artifacts of significance (Maori and European) would erode away, and if protection is required then earthworks are required causing disturbance. In any case, we have tentatively had confirmation Councill will accommodate pre-application meeting to confirm the best approach.

We note that there still be no changes to the fact that we are still creating that park area but how to best protect it once it is vested and that the best practice stormwater discharge methods will be employed so that pre and post development flows are the same.

We are happy to do another walkover if required but it would be good to know if you are requiring a CVA.

I have attached the latest plans for your reference and will pass on those coastal comment as I get them however if you have any further questions please let me know.

Thanks,

Alvin

Alvin Jung | CIVIX | Senior Planner | M s 9(2)(a) | W www.civix.co.nz

---

From: Alvin Jung
Sent: Friday, 26 March 2021 2:07 pm
To: TokiTaiao s 9(2)(a) >
Cc: Andrew Braggins < s 9(2)(a) >; Tamsin Gorman < s 9(2)(a) >; Nick Mattison < s 9(2)(a) >; Robbie Paora < s 9(2)(a) >
Subject: RE: Iwi Engagement 4 Scott Road Hobsonville

Kia Ora,

That works for me but I will check with the remainder of the team just in case.

We'll have this tentatively booked in and I'll send that meeting invite by Monday afternoon.

Thanks,

Alvin

Alvin Jung | CIVIX | Senior Planner | M s 9(2)(a) | W www.civix.co.nz

---

From: TokiTaiao <s 9(2)(a)>
Sent: Friday, 26 March 2021 1:04 pm
To: Alvin Jung <s 9(2)(a)>
Cc: Andrew Braggins <s 9(2)(a)>; Tamsin Gorman <s 9(2)(a)>; Nick Mattison <s 9(2)(a)>; Robbie Paora <s 9(2)(a)>
Subject: RE: Iwi Engagement 4 Scott Road Hobsonville

Kia Ora ano,

Thursday 1st April works for us, however, only in the morning say 10am?

Ngā manākitanga,

Toki Taiao Team

Īmera: s 9(2)(a)

Toi tū te whenua, toi tū te tangata, toi tū te mana o Ngāti Whātua ki runga o Tāmaki.
Everlasting land, everlasting people, everlasting the mana of Ngāti Whātua upon Tāmaki.

From: Alvin Jung <s 9(2)(a)>
Sent: Thursday, 25 March 2021 3:06 pm
To: TokiTaiao <s 9(2)(a)>
Cc: Andrew Braggins <s 9(2)(a)>; Tamsin Gorman <s 9(2)(a)z>; Nick Mattison <s 9(2)(a)>; Robbie Paora <s 9(2)(a)>
Subject: RE: Iwi Engagement 4 Scott Road Hobsonville

Kia Ora,

Unfortunately that is the only date that does work for me. Can be try for Thursday 1st April?

Thanks,

Alvin

Alvin Jung | CIVIX | Senior Planner | M s 9(2)(a) | W www.civix.co.nz

---

From: TokiTaiao <s 9(2)(a)>
Sent: Thursday, 25 March 2021 10:29 am
To: Alvin Jung <s 9(2)(a)>
Cc: Andrew Braggins <s 9(2)(a)>; Tamsin Gorman <s 9(2)(a)>; Nick Mattison

< s 9(2)(a) >; Robbie Paora < s 9(2)(a) >
Subject: RE: Iwi Engagement 4 Scott Road Hobsonville

Kia Ora Alvin,

Unfortunately, tomorrow does not work for us. Are we able to schedule a site visit for 12.30pm on Wednesday 31 March?

Ngā manākitanga,

Toki Taiao Team

Īmera: s 9(2)(a)

Toi tū te whenua, toi tū te tangata, toi tū te mana o Ngāti Whātua ki runga o Tāmaki.
Everlasting land, everlasting people, everlasting the mana of Ngāti Whātua upon Tāmaki.

From: Alvin Jung < s 9(2)(a) >
Sent: Wednesday, 24 March 2021 4:34 pm
To: TokiTaiao < s 9(2)(a) >
Cc: Andrew Braggins < s 9(2)(a) >; Tamsin Gorman < s 9(2)(a) >; Nick Mattison < s 9(2)(a) >
Subject: RE: Iwi Engagement 4 Scott Road Hobsonville

Kia Ora,

I hope you are doing well. I tried calling yesterday and today but it seems like you were busy.

I am just wanting to inform you that we have an onsite walkover with Ngati Manuhiri at 9am this Friday 26/03/2021 at 4 Scott Road and was wondering if you were available to attend as well?

I have provided a link below to the documents which were lodged with the MfE below.

We are seeking to consent this development through the fast track process rather than the typical resource consent process so a full report and assessment will provided to the EPA and the consent expert panel.

Please let me know if you have any questions.

out of scope

Thanks,

Alvin

Alvin Jung | CIVIX | Senior Planner | M s 9(2)(a) | W www.civix.co.nz

From: TokiTaiao [redacted] >
Sent: Thursday, 25 February 2021 1:15 pm
To: Alvin Jung < [redacted] >
Subject: RE: Iwi Engagement 4 Scott Road Hobsonville

Tēnā koe Alvin,

Thank you for sending this update.

This project is within our rohe and could have an impact on our cultural values. We are unable to make appropriate comments until we have reviewed the resource consent information including the AEE. In the meantime, I have attached our iwi management plan for you to review and understand our priorities, expectations and positions.

Ngā manākitanga,

Toki Taiao Team

Īmera: [redacted]

Toi tū te whenua, toi tū te tangata, toi tū te mana o Ngāti Whātua ki runga o Tāmaki.
Everlasting land, everlasting people, everlasting the mana of Ngāti Whātua upon Tāmaki.

From: Alvin Jung < [redacted] >
Sent: Friday, 5 February 2021 4:14 pm
To: [redacted]
Cc: Nick Mattison < [redacted] >
Subject: Iwi Engagement 4 Scott Road Hobsonville

Kia Ora,

Civix Ltd is assisting Adefice Development Ltd with a comprehensive residential development seeking 422 residential units at 4 Scott Road in Hobsonville.

The site is located in the Residential Mixed Housing Urban, Mixed Housing Suburban, and Single House Zone under the Auckland Unitary Plan, and we are currently the in preliminary stages of the design of the proposal. We have sought advice from urban design, visual landscaping, engineering, heritage, traffic and arboricultural experts and the architectural plans will continue to be developed with their input however I have attached the latest concept plans for your reference.

We would appreciate your time to review this and welcome any feedback on the proposal at this preliminary phase of the proposal.

We will be seeking consent under the Covid-19 Recovery (Fast Track Consenting) Act 2020 in order to obtain the most efficient processing pathway once the design is finalised.

Please contact me if you require any clarification.

I look forward to working with you from here onwards.

Best regards,

Alvin

Alvin Jung
Senior Planner

M s 9(2)(a) | **W** www.civix.co.nz
A Level 1, 87 Albert Street, Auckland
P PO Box 5204 Victoria Street West, Auckland 1142

Te Kawerau a Maki

From: Alvin Jung <s 9(2)(a)>
Sent: Tuesday, 6 April 2021 5:30 PM
To: s 9(2)(a)
Cc: Nick Mattison; Andrew Braggins; Tamsin Gorman
Subject: Te Kawerau a Maki Engagement 4 Scott Road Hobsonville

Kia Ora Robin,

I hope this email finds you well.

Civix Ltd is assisting Adefice Development Ltd with a comprehensive residential development seeking 432 residential units at 4 Scott Road in Hobsonville.

We have been working with Sarah Macready from Clough on the archaeological significance of the site and she has suggested that we consult with yourself (Te Kawerau a Maki).

I have provided a link below to the documents so far but they are being adjusted so that we can achieve the best outcome with regard to not only Iwi values, but also urban design, visual landscaping, engineering, heritage, traffic and arboricultural experts.

out of scope

I understand you have huge workloads at the moment but we would appreciate your time to review this and welcome any feedback on the proposal.

We will be seeking consent under the Covid-19 Recovery (Fast Track Consenting) Act 2020 in order to obtain the most efficient processing pathway once the design is finalised.

Please contact me if you require any clarification.

I look forward to working with you from here onwards.

Nāku noa, nā

Alvin

Alvin Jung
Senior Planner

M s 9(2)(a) | W www.civix.co.nz
A Level 1, 87 Albert Street, Auckland
P PO Box 5204 Victoria Street West, Auckland 1142

From: s 9(2)(a)
To: s 9(2)(a)
Cc: s 9(2)(a)
Subject: FW: Iwi Engagement 4 Scott Road Hobsonville
Date: Tuesday, 23 February 2021 4:54:29 pm
Attachments: out of scope

Kia Ora,

Civix Ltd is assisting Adefice Development Ltd with a comprehensive residential development seeking 422 residential units at 4 Scott Road in Hobsonville.

The site is located in the Residential Mixed Housing Urban, Mixed Housing Suburban, and Single House Zone under the Auckland Unitary Plan, and we are currently the in preliminary stages of the design of the proposal. We have sought advice from urban design, visual landscaping, engineering, heritage, traffic and arboricultural experts and the architectural plans will continue to be developed with their input however I have attached the latest concept plans for your reference.

We would appreciate your time to review this and welcome any feedback on the proposal at this preliminary phase of the proposal.

We will be seeking consent under the Covid-19 Recovery (Fast Track Consenting) Act 2020 in order to obtain the most efficient processing pathway once the design is finalised.

Please contact me if you require any clarification.

I look forward to working with you from here onwards.

Best regards,

Alvin

Alvin Jung
Senior Planner

M s 9(2)(a) | W www.civix.co.nz
A Level 1, 87 Albert Street, Auckland
P PO Box 5204 Victoria Street West, Auckland 1142

The rest:

- Ngāti Maru;
- Ngāti Paoa;
- Ngāti Tamatera;
- Ngāti Te Ata;
- Te Rūnanga Ngāti Whatua;
- Ngāi Tai ki Tāmaki; and
- Te Ākitai Waiohua.

From: Alvin Jung s 9(2)(a) >
Sent: Tuesday, 6 April 2021 5:44 PM
To: s 9(2)(a)
Cc: Nick Mattison; Tamsin Gorman; Andrew Braggins; s 9(2)(a)
Subject: RE: Iwi Engagement 4 Scott Road Hobsonville

Kia Ora,

I am following up on the emails below.

Please see a link below to the fast track application documents for 4 Scott Road which have been sent to the Ministry of Environment for review.

out of scope

Dropbox:
out of scope

We have currently held on site meetings with Ngati Whatua Orakei, Ngati Manuhiri, and Ngā Maunga Whakahii o Kaipara, and am happy to do a walkover again with any other Iwi interested.

Please review and let me know if you have any questions.

Best regards,

Alvin

Alvin Jung | CIVIX | Senior Planner | M s 9(2)(a) | W www.civix.co.nz

---

From: Alvin Jung
Sent: Monday, 22 February 2021 4:15 pm
To: s 9(2)(a)
Cc: Nick Mattison < s 9(2)(a) >; Tamsin Gorman < s 9(2)(a) >; Andrew Braggins < s 9(2)(a) >; Jennifer van Rouveroy < s 9(2)(a) >
Subject: RE: Iwi Engagement 4 Scott Road Hobsonville

Kia Ora,

I am following up on the email below.

Nāku noa, nā

Alvin

Alvin Jung | CIVIX | Senior Planner | M s 9(2)(a) | W www.civix.co.nz

From: Alvin Jung
Sent: Friday, 5 February 2021 4:14 pm
To: s 9(2)(a)

Cc: Nick Mattison < s 9(2)(a) >
Subject: Iwi Engagement 4 Scott Road Hobsonville

Kia Ora,

Civix Ltd is assisting Adefice Development Ltd with a comprehensive residential development seeking 422 residential units at 4 Scott Road in Hobsonville.

The site is located in the Residential Mixed Housing Urban, Mixed Housing Suburban, and Single House Zone under the Auckland Unitary Plan, and we are currently the in preliminary stages of the design of the proposal. We have sought advice from urban design, visual landscaping, engineering, heritage, traffic and arboricultural experts and the architectural plans will continue to be developed with their input however I have attached the latest concept plans for your reference.

We would appreciate your time to review this and welcome any feedback on the proposal at this preliminary phase of the proposal.

We will be seeking consent under the Covid-19 Recovery (Fast Track Consenting) Act 2020 in order to obtain the most efficient processing pathway once the design is finalised.

Please contact me if you require any clarification.

I look forward to working with you from here onwards.

Best regards,

Alvin

Alvin Jung
Senior Planner

M s 9(2)(a) | **W** www.civix.co.nz
A Level 1, 87 Albert Street, Auckland
P PO Box 5204 Victoria Street West, Auckland 1142

From: s 9(2)(a)
To: s 9(2)(a)
Cc: s 9(2)(a)
Subject: RE: Iwi Engagement 4 Scott Road Hobsonville
Date: Monday, 22 February 2021 4:15:10 pm
Attachments: image001.png

Kia Ora,

I am following up on the email below.

Nāku noa, nā

Alvin

Alvin Jung | CIVIX | Senior Planner | M s 9(2)(a) | W www.civix.co.nz

From: Alvin Jung
Sent: Friday, 5 February 2021 4:14 pm
To: s 9(2)(a)
Cc: Nick Mattison < s 9(2)(a) >
Subject: Iwi Engagement 4 Scott Road Hobsonville

Kia Ora,

Civix Ltd is assisting Adefice Development Ltd with a comprehensive residential development seeking 422 residential units at 4 Scott Road in Hobsonville.

The site is located in the Residential Mixed Housing Urban, Mixed Housing Suburban, and Single House Zone under the Auckland Unitary Plan, and we are currently the in preliminary stages of the design of the proposal. We have sought advice from urban design, visual landscaping, engineering, heritage, traffic and arboricultural experts and the architectural plans will continue to be developed with their input however I have attached the latest concept plans for your reference.

We would appreciate your time to review this and welcome any feedback on the proposal at this preliminary phase of the proposal.

We will be seeking consent under the Covid-19 Recovery (Fast Track Consenting) Act 2020 in order to obtain the most efficient processing pathway once the design is finalised.

Please contact me if you require any clarification.

I look forward to working with you from here onwards.

Best regards,

Alvin

Alvin Jung
Senior Planner

M s 9(2)(a) | W www.civix.co.nz
A Level 1, 87 Albert Street, Auckland
P PO Box 5204 Victoria Street West, Auckland 1142

From: s 9(2)(a)
To: s 9(2)(a)
Cc: s 9(2)(a)
Subject: Iwi Engagement 4 Scott Road Hobsonville
Date: Friday, 26 February 2021 1:49:47 pm
Attachments: out of scope

Kia Ora,

Civix Ltd is assisting Adefice Development Ltd with a comprehensive residential development seeking 432 residential units at 4 Scott Road in Hobsonville.

The site is located in the Residential Mixed Housing Urban, Mixed Housing Suburban, and Single House Zone under the Auckland Unitary Plan, and we are currently the in preliminary stages of the design of the proposal. We have sought advice from urban design, visual landscaping, engineering, heritage, traffic and arboricultural experts and the architectural plans will continue to be developed with their input however I have attached the latest concept plans for your reference.

We note that Te Kawerau a Maki and Ngāi Tai ki Tāmaki are a party to the Coastal Statutory Acknowledgement Area, and while we not proposing any works along the coastline, we would appreciate your time to review our proposal so far. We will provide more developed plans and documents however the plans I have attached to this email are the latest design set as of 26.02.21.

We will be seeking consent under the Covid-19 Recovery (Fast Track Consenting) Act 2020 in order to obtain the most efficient processing pathway once the design is finalised.

Please contact me if you require any clarification.

I look forward to working with you from here onwards.

Best regards,

Alvin

Alvin Jung
Senior Planner

M s 9(2)(a) | W www.civix.co.nz
A Level 1, 87 Albert Street, Auckland
P PO Box 5204 Victoria Street West, Auckland 1142

2.6 Framework plans

Introduction

A framework plan is a voluntary resource consent that enables land owners to demonstrate and achieve the integrated development and/or subdivision of land within brownfield and greenfield development areas.

Framework plans are enabled within a precinct. The precinct contains specific:

- objectives and policies that articulate the development outcomes for the area and encourage the use of framework plans
- rules that give effect to those outcomes
- assessment matters that need to be addressed within a framework plan
- information requirements for framework plans in addition to those specified in the general provisions.

If approved by the council, the framework plan authorises land uses such as the location and physical extent of roads/open spaces and allowable building envelopes within a precinct or sub-precinct. Enabling this spatial planning to occur through a resource consent is flexible and allows for the site to be planned and integrated into the surrounding environment based on the latest information available. In some cases, the Unitary Plan incentivises land owners to prepare a framework plan, for instance by providing additional development potential if a framework plan is prepared.

As an activity a framework plan must comply with the underlying zone and Auckland-wide provisions unless otherwise stated in the precinct. The framework plan must also comply with all relevant rules in the precinct and any applicable overlays.

Subsequent development/subdivision, as the case may be, must comply with an approved framework plan, and subsequent resource consent applications for development and/or for subdivision must comply with the most recently approved framework plan, or an application to amend or replace the framework plan must be made and approved at that time.

A framework plan does not address strategic planning matters such as zoning changes and significant increases in development potential and does not replace the need to undertake structure planning where appropriate and as required by the Regional Policy Statement.

It is expected that framework plans will be amended from time to time over the life of the framework plan. Where this occurs the framework plan will be assessed against the relevant provisions of the Unitary Plan and not against previously approved framework plans. The land owner has the ability to apply for resource consent to amend or replace the framework plan if circumstances change.

As framework plans are voluntary, a land owner may apply for resource consent for development or subdivision prior to the approval of a framework plan, however a more onerous activity status will apply to allow the full consideration of potential effects and notification subject to the standard RMA tests.

The Unitary Plan encourages the preparation of joint framework plans for larger redevelopment areas. Where this opportunity is not taken up by landowners, the Unitary Plan requires the framework plan for individual sites or multiple sites held in single ownership to demonstrate how the development integrates with neighbouring sites and

achieves the objectives of the precinct.

Where Framework Plans are applied

1. It is important that framework plans are only used where necessary to achieve the integrated and efficient redevelopment of sites. For this reason, the Unitary Plan applies framework plans where both of the following criteria are met:

a.large greenfield or brownfield landholdings proposed to be urbanised or intensified that either have no established urban pattern or that have an urban pattern that is proposed or required to fundamentally change that have undergone a structure planning process

b.contiguous landholdings that are held predominantly in single ownership.

Activity status and notification

2.The following rules apply to framework plans unless otherwise specified in the precinct:

a.A framework plan, amendments to an approved framework plan and a replacement framework plan within a precinct is a restricted discretionary activity where it complies with all of the applicable controls.

b.Subsequent resource consent applications for subdivision, land use and development within a precinct must comply with the most recently approved framework plan for the application area.

c.Any subsequent resource consent applications within a precinct that do not comply with the most recently approved framework plan applying to the application area will be assessed as a non-complying activity, or alternatively must be accompanied by an application for approval of either an amended or a replacement framework plan.

d.An application for a framework plan must apply only to land that the applicant is the owner of, unless otherwise specified in the precinct.

e.A restricted discretionary activity application for a framework plan will be assessed without the need for public notification unless special circumstances exist. Limited notification may be undertaken, including notice being given to any parties specified in the precinct rules.

f.A concurrent application for a development control infringement will be assessed together with a framework plan.

Land use and subdivision control infringements

3.Framework plans must comply with all relevant land use and subdivision controls. Unless otherwise specified, any land use or subdivision control infringement will be considered as part of the application for a framework plan.

Development control infringements

4.Framework plans must comply with the precinct development controls. Unless otherwise specified, any development control infringement will be considered as part of the application for the framework plan.

5.The development control infringement will not alter the restricted discretionary status of the framework plan unless otherwise stated in the precinct rules.

Matters of discretion

6.The council will restrict its discretion to the matters below for the activities listed below, unless otherwise stated in the precinct rules.

a.Framework plans, amendments to an approved framework plan or a replacement framework plan

i.the location, physical extent and design of streets and pedestrian connections

ii.the location, physical extent and design of open space

iii.the location and capacity of infrastructure servicing

iv.integration of development with neighbouring areas

v.staging of development and the associated resource consent lapse period.

7.Land use, development or subdivision that complies with an approved framework plan

a.When considering a restricted discretionary resource consent application for land use, development or subdivision that complies with an approved framework plan, the council will restrict its discretion to the matters set out for the activity in the underlying zone, precinct or Auckland-wide rules.

Assessment criteria

8.The council will consider the relevant assessment criteria below for the restricted discretionary activities listed unless other specified in the precinct.

a.Framework plans, amendments to an approved framework plan or a replacement framework plan

i.The location, physical extent and design of streets and pedestrian connections

•Streets and pedestrian connections should be provided in the location identified in the precinct plan to achieve a legible street network. Where no location is identified, an integrated and efficient street and pedestrian network should be provided, including connections to existing and future streets and networks.

ii.The location, physical extent and design of open space

•Public open spaces should be provided in the location(s) identified in the precinct plan to meet the needs of the local community. Where no location is identified, open space

should be provided to and located the serve the future needs of the local community.

iii. The location and capacity of infrastructure servicing

- Adequate infrastructure should be provided to service the proposed development including stormwater, wastewater, water supply, electricity and telecommunications.

- Stormwater management methods that use low impact stormwater design principles and improved water quality systems are encouraged.

iv. Integration of development with neighbouring areas

- Where the framework plan is for a particular site or sub-precinct within a wider precinct, the framework plan should demonstrate how the development achieves the overall objectives of the precinct, including the integration of streets, pedestrian connections, open spaces and other infrastructure that will serve the development.

v. Staging of development and the associated resource consent lapse period

- The framework plan should provide details of how the development will be staged. The council may impose conditions enabling a lapse period longer than five years, having regard to s. 79 of the RMA and the need for unimplemented resource consents to generally reflect the planning strategy contained in the Unitary Plan.

b. Land use, development or subdivision that complies with an approved framework plan

i. When considering a restricted discretionary resource consent application for land use, development of subdivision that complies with an approved framework plan, the council will consider the relevant assessment criteria set out for the activity in the underlying zone, precinct or Auckland-wide rules.

2.7.3 Framework plans

1.An application for a framework plan must be accompanied by the relevant information listed in the general information requirements as well as plans and supporting information showing the following, where relevant:

a.the overall context of the application area relative to existing buildings, public open space and any approved buildings and approved framework plans

b.where changes to site contours are intended, the relationship of those site contours to existing and proposed streets, lanes, any adjacent coastal environment, and, where information is available, public open space

c.the location, width and function of proposed streets, cycle routes and pedestrian routes

d.the location, dimension and function of public open spaces

e.the location of stormwater, wastewater and water supply infrastructure

f.the location and dimensions of vehicle access and car parking areas

g.the location of building platforms

h.profile of any proposed buildings and height as viewed from all existing and proposed street frontages, existing and proposed public open spaces, and any adjacent coastal margin. This should include two dimensional and three dimensional building block elevations and building cross sections

i.the distribution of various densities/site sizes throughout the application area

j.the landscaping concept for the application area

k.the location of any heritage or natural features

l.details of how the development on the application site will be staged.

2. Where a joint framework plan is not prepared the application will need to show how the development integrates with other sites within the precinct and land surrounding the precinct including details of any development proposals on adjoining sites, including any other approved framework plan for the precinct and/or sub-precinct how the development provides or facilitates adequate transport connections across the precinct and/or sub-precinct, including connections to the surrounding road network.

helen mellsop | LANDSCAPE ARCHITECT

landscape design
landscape planning
project management

s 9(2)(a)

39 Willcott Street
Mt Albert
AUCKLAND 1025
Email: s 9(2)(a)
www.helenmellsop.co.nz

Memo

FILE REF: 4 Scott Road, Hobsonville

TO: **Nick Mattison** , Civix Ltd

FROM: Helen Mellsop – Registered NZILA Landscape Architect

DATE: 30 March 2021

SUBJECT: **Landscape strategy – proposed residential development**

---

1. This memo provides a high-level overview of the landscape strategy for the proposed residential development at 4 Scott Road, Hobsonville (refer Brown Day Group masterplan, dated 25 March 2021).

2. A landscape concept will be prepared for the residential areas of the development that will include the following elements:

   - Street tree planting with indigenous coastal species;
   - Street berm rain gardens with hardy indigenous planting;
   - Amenity planting within rear lanes and parking lanes, including evergreen native trees and hardy shrubs and groundcovers;
   - High quality landscaping of apartment surrounds and individual unit lots, with low permeable fencing and hedges on road frontages, privacy fences to side and rear boundaries, and small to medium scale trees that will integrate the built form;
   - Taller exotic tree species near apartments and on larger lots that link to the former rural use of the site (columnar oak, ash and liquidamber), while smaller growing indigenous and deciduous exotic trees are used closer to dwellings;
   - Use of varied hard surface treatments within streets and rear lanes to promote a safe slow speed environment and to visually break up larger areas of paving;
   - Screening of communal refuse storage areas with high quality 1.4m high fencing, and with landscaping where feasible;
   - Fencing of private lots that is varied through the neighbourhood, with low timber, keystone concrete block or railing fences on front boundaries and the first section of side boundaries. Other boundary fencing will provide privacy for residents and neighbouring properties, except where passive surveillance of adjoining reserves or accessways is required;
   - Generous landscaped connections from the residential area to the coastal esplanade reserve;
   - True species indigenous plants will be eco-sourced from the Waitākere Ecological District and bush and coastal restoration species will be chosen from the Hobsonville Peninsula Compiled Native Plant Species List.

3. Existing vegetation (including a Phoenix palm and mixed species hedge) adjacent to the heritage dwelling on Scott Road will be retained and will provide a landscape setting for this cottage that distinguishes it from the surrounding apartments.

4. It is intended that native trees within the proposed esplanade reserve along the coastal edge would be retained, as well as the four notable trees (two Norfolk Island pines and two oaks) in the south-eastern corner of the site. Wetland areas within the coastal edge would be enhanced through weed control and indigenous planting and a public walkway connection would be formed along the coast, with connections back into the development and a future connection to 6 Scott Road.

5. Informal passive recreation areas and lookouts are proposed within the esplanade reserve. These would take advantage of the amenity and shade provided by the existing trees, the areas of flat to sloping open grassland, and the available views out across the upper Waitematā. Ground disturbance would be minimised within the heritage overlay area and on the south-eastern Gunn's Point, where midden sites and notable trees are present. Interpretation signage would be installed to provide information about the Māori and European heritage of the area. The esplanade reserve would be designed to link with a future contiguous reserve within No. 6 Scott Road, which could potentially extend across to the protected Moreton Bay fig and Norfolk Island pine on that property.

6. A landscape and visual assessment in support of the proposed development will be provided, focusing on the effects of proposed development within the Auckland Unitary Plan Residential – Single House Zone on the coastal edge. This assessment will evaluate the effects of development on the coastal landscape character and on visual amenity values within the harbour waters and those existing coastal residential areas and reserves from which development would be visible.

Helen Mellsop
BLA, BHB, Dip Hort (Distinction)
Registered NZILA Landscape Architect

+64 9 303 1113
www.civix.co.nz
Level 1, 87 Albert Street, Auckland
PO Box 5204 Wellesley St, Auckland 1141

Civix Limited
Level 1, 87 Albert St
Auckland Central, Auckland, 1010

24 February 2021

4 Scott Road, Hobsonville Government Fast Track Application – Civil Engineering

Dear Nathan,

This letter has been written to provide comment on Civil Infrastructure matters relevant to the Fast-Track application for 4 Scott Road, Hobsonville. Discussed in this letter are Earthworks, Flooding and 3 Waters Servicing for this proposed development.

We have undertaken preliminary bulk earthworks modelling for the site based on a 437 unit development proposal. Our initial assessment is that compliant road grades and cross-sections can be achieved within the site and that the development layout proposed can be achieved with reasonable earthworks and retaining.

The site currently has several minor overland flow paths running through the site. We have not completed flood modelling for these flow paths however due to the generous fall across the site, we are comfortable with the ability to convey the flows through the site whilst maintaining sufficient freeboard to the proposed dwellings.

Stormwater for the site will be managed in accordance with the Scott Point Peninsula stormwater management plan. The site falls within peninsula catchment 4 which will have sub catchments draining to several discreet coastal outlets.

A meeting with Watercare has been requested to discuss the water and wastewater strategies for the proposed development. An initial assessment of the site lends itself to the following water and wastewater servicing strategy:

Water supply servicing for the site is available via an extension of the existing public network adjacent to the site. A capacity assessment will be undertaken to confirm capacity of the surrounding network.

Wastewater generated from the site is proposed to drain to a new pump station located at the lowest point of the site which will be sized to cater for the catchment which includes both No.4 and No.6 Scott road. This will then be pumped via a new rising main to the existing gravity discharge manhole located at the intersection of Scott Road and Ngaroma House Drive.

Our initial results indicate some local asset upgrades being required but no significant downstream network upgrades have been identified. In our opinion the site can be serviced without major network upgrades downstream.

Should you have any questions in relation to any of the above, please feel free to contact the undersigned on s 9(2)(a) or via email s 9(2)(a).

Kind Regards,

Written By:

Gregg Cunningham
Senior Civil Engineer
s 9(2)(a)
s 9(2)(a)

CIVIX LIMITED

Reviewed By:

Sam Blackbourn
Senior Engineer (CPENG 1002456)
s 9(2)(a)
s 9(2)(a)

MEMORANDUM

Bioresearches
A Babbage Company

TO:	Aedifice Development Limited	Date:	25 February 2021
COPY TO:	Nick Mattison, Civix	Job No:	63905
FROM:	Mark Delaney, Senior Ecologist		

4 SCOTT ROAD – ECOLOGY ASSESSMENT

Introduction

Aedifice Development Limited are proposing a residential development[1] at 4 Scott Road, Hobsonville (Site). This memorandum provides a high-level assessment of ecological effects for the aforementioned development.

Methodology

An initial site visit was undertaken by an experience ecologist on October 21st, 2020. Botanic and terrestrial fauna values within the Site were qualitatively assessed. Fauna habitats assessed considered indigenous lizards, birds, and bats. Overland flow paths / watercourses were classified under the Auckland Unitary Plan - Operative in Part (AUP-OP) to determine, in accordance with the definitions in this plan, the ephemeral, intermittent or permanent status of these watercourses. Wetlands were identified within the Site as per the definitions and criteria laid out in the National Policy Statement for Freshwater Management 2020 (NPS-FM). The aquatic habitat was then qualitatively assessed. The identified ecological features within the Site are presented in Appendix I and photos of these features are provided in Appendix II.

Existing Environment

Background and Ecosystem Classification

The Site is within the Tāmaki Ecological District of the Auckland Region. Historically (pre-human), the area would have comprised the forest ecosystem type of pūriri forest (WF7-1) and would have supported a diverse range of invertebrates, amphibians, reptiles, birds and bats (Singers et al., 2017). WF12 ecosystems have a regional International Union for Conservation of Nature (IUCN) threat status of "Critically Endangered". Earliest historical aerials available, indicate that the Site and much of the surrounding landscape has been devoid of native vegetation and managed as agricultural land for at least the last 80 years (Appendix III).

[1] Proposed Masterplan, Drawing no. 2448-00-13, prepared by Brown Day Group

Bioresearches Group Ltd
68 Beach Road, Auckland 1010
P O Box 2828, Shortland Street
Auckland 1140, New Zealand
T 09 379-9417 F 09 307-6409
Website: www.bioresearches.co.nz

Currently, the Site consists of managed pasture, two dwellings, farm outbuildings and a mix of exotic and native vegetation. The Site does not support a recognised current terrestrial ecosystem type, as classified under the AUP OP: Biodiversity current extent and is not subject to any Significant Ecological Area (SEA) overlay.

The Site is surrounded by a mixture of residential development and agricultural land and the coastal marine area to the south-west. The surrounding agricultural land is zoned for residential.

Terrestrial Ecology

The site predominately consists of managed pasture with associated exotic shelterbelts and amenity plantings surrounding the dwellings. Along the southwestern boundary a stand of mature exotic and native trees runs along the coastal edge which transitions into the coastal marine environment. The coastal marine environment consists of salt marshes and a mangrove estuary, some of which is located within the Site boundary.

The botanical value of the native trees along the coastal edge was low, consisting of scattered common native trees (e.g. tōtara, mānuka and kānuka) with a damaged understorey. Although some of the native trees were mature, they provide overall low-quality fauna habitat due to the lack of complexity, high edge effects and low terrestrial connectivity. However, this vegetation does provide buffering functions to the more sensitive marine, wetland and stream environments and constitutes a part of a high value ecotone (transition areas between ecosystems, i.e. estuary-saltmarsh-wetland-stream-terrestrial transition).

Freshwater Ecology

One stream and one natural wetland was identified within the Site. The stream originates as an intermittent stream within the southern corner of the Site and transitions into a natural wetland with a permanent stream channel. The wetland and stream were considered of moderate-high ecological value due to their context on a national scale and their role in the localised ecotone.

All other overland flow paths were classified as ephemeral reaches, due to their lack of; defined channel, flowing water, pools and substrate sorting processes. Additionally, terrestrial vegetation (pasture), was established within the ill-defined channels. No other natural wetlands were identified within the Site, with other potential areas defined as improved pasture as per the NPS-FM.

Estuarine Ecology

Two salt marsh areas were identified within the site, both of which transitioned into a mangrove estuary. The salt marshes were considered of high ecological value, due to their local rarity and role as an ecotone.

Assessment of Ecological Effects

It is intended that all the native trees within the proposed reserves along the coastal edge will be retained. Additionally, the identified salt marshes, natural wetland and stream are proposed to be retained. As such, there will be no direct adverse effects (i.e. removal/reclamation) on these ecosystems.

Indirect adverse effects, such as sedimentation and stormwater contaminants, are proposed to be adequately mitigated through appropriate controls and following best practice guidelines, to ensure adverse effects on aquatic life are no more than minor.

Earthworks are proposed within 100m of the natural wetland, however the proposed earthworks and development are to be designed and/or mitigated to ensure there is no partial drainage of the natural wetland. Vegetation removal may occur within 10m of the wetland, stream and saltmarshes, however this will be for the purpose of restoration and will target exotic and pest plant species. No building infringements within the riparian yards are proposed.

The proposed development of the Site will allow for the protection and enhancement of the identified ecological features, including the wetland, stream and saltmarshes, providing for an overall net biodiversity gain.

A more comprehensive ecological assessment will be provided to support the development application, at the expert consenting panel stage, which will further assess the potential indirect adverse effects and detail the proposed ecological enhancement actions.

Regards,

Mark Delaney MSc. | Ecologist | Bioresearches Group Ltd
Level 3, 68 Beach Road | PO Box 2828, Auckland 1140
s 9(2)(a)

Bioresearches
A Babbage Company

Appendix I: Identified Ecological Features

Appendix II: Photos of Identified Ecological Features

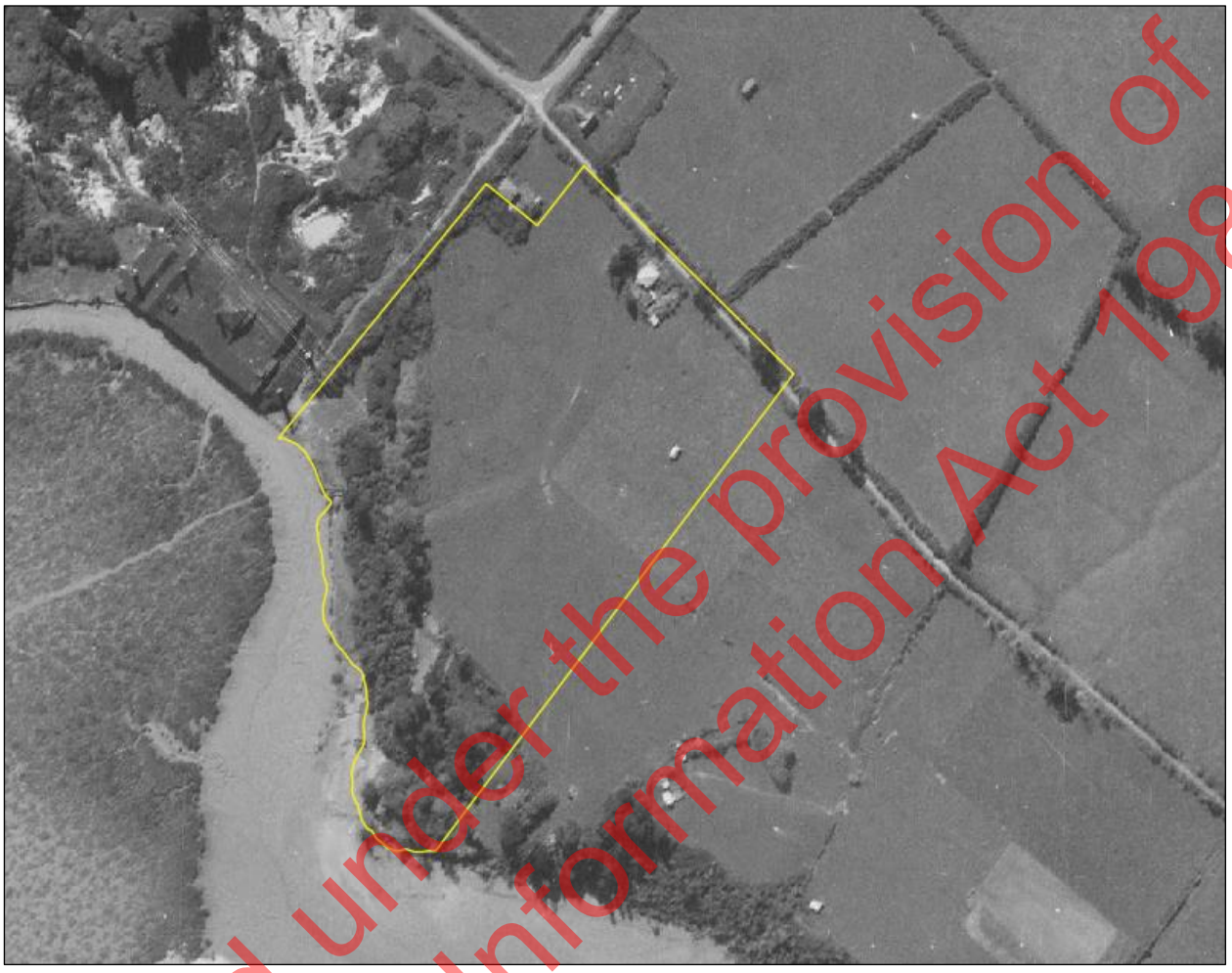



Exotic and native vegetation along the coastal edge.


Stream and natural wetland.


Two salt marshes.

Appendix III: 1940 Aerial Image



*Base image sourced from Retrolense. Yellow polygon represents the approximate Site boundary.

Expect Excellence

Environmental Site Investigation

4 Scott Road
Hobsonville
Auckland

Submitted to:

Aedifice Development Limited
9 - 11 Galatos Street
Newton
Auckland 1010

ENGEO Limited
8 Greydene Place, Takapuna, Auckland 0622
PO Box 33-1527, Takapuna, Auckland 0740
Tel +64 9 972 2205 Fax +64 3 328 9013
www.engeo.co.nz

02.12.2020
17971.000.001_01

ACENZ

268

Contents

1	Introduction	3
2	Objectives of the Assessment	3
3	Site Description	4
4	Site History	5
4.1	Auckland Council Site Contamination Enquiry	5
4.2	Auckland Council Property File Review	6
4.3	Historical Aerial Photograph Review	7
5	Current Site Conditions	8
6	Potential HAIL Activities	10
7	Site Investigation	11
7.1	Investigation Methodology	11
7.2	Quality Assurance and Quality Control	13
7.3	Investigation Criteria	13
8	Soil Analysis Results	14
8.1	Summary of Soil Results	14
9	Conceptual Model	15
10	Summary and Conclusions	17
11	Recommendations	19
12	References	21
13	Limitations	22

Tables

Table 1: Site Information

Table 2: Site Setting

Table 3: Discharge Consent Summary

Table 4: Property File Summary

Table 5: Historical Aerial Photograph Summary

Table 6: Current Site Conditions

Table 7: Summary of General Ground Conditions

Table 8: Potential Contaminants

Table 9: Summary of Soil Samples Collected and Requested Analyses

Table 10: Conceptual Site Model

Figures

Figure 1: Site Investigation Plan

Appendices

Appendix 1: Contaminated Site Enquiry

Appendix 2: Historical Aerial Photographs

Appendix 3: Site Walkover Photographs

Appendix 4: Analytical Reports and Chain of Custody Documentation

ENGEO Document Control:

Report Title	Environmental Site Investigation - 4 Scott Road, Hobsonville			
Project No.	17971.000.001	Doc ID	01	
Client	Aedifice Development Limited	Client Contact	Kieran Doe	
Distribution (PDF)	Kieran Doe, Aedifice Development Limited			
Date	Revision Details/Status	WP	Author	Reviewer
02/12/2020	Issued to Client	JT	CD	EM

1 Introduction

ENGEO Ltd was requested by Aedifice Development Limited to undertake an Environmental Site Investigation to support the proposed redevelopment of the property located at 4 Scott Road, Hobsonville, Auckland (herein referred to as 'the site'; Figure 1). This work has been carried out in accordance with our signed agreement, dated 29 October 2020. The purpose of the assessment was to support an application to Auckland Council for Resource Consent for the proposed development.

The details of the proposed development are yet to be confirmed, however we understand it is intended to undertake a residential subdivision at the site, with similar densities to the neighbouring developments (i.e. 50-100 lots).

This combined Preliminary and Detailed Site Investigation (PSI and DSI) has been undertaken to satisfy the requirements of the Resource Management (*National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*) Regulations 2011, herein referred to as the "NES" (NES, 2011). The investigation provides information regarding the presence of land contaminants that pose a potential human health risk to future site users and site redevelopment workers during earthworks and construction. The results of this investigation have been used to evaluate whether remediation is necessary prior to site redevelopment, and to further assess the resource consents required under the NES.

This investigation also addresses the requirements of regional regulations covering discharges to the environment from contaminated sites during and post-redevelopment works; namely, the Auckland Unitary Plan Operative in part - 15 November 2016 (herein referred to as the AUP; AUP, 2016).

This investigation was undertaken in general accordance with the Ministry for the Environment (MfE) Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand (MfE, 2011a).

2 Objectives of the Assessment

The PSI component of the work included a desktop review of historical site information and review / assessment of information gathered during the site walkover undertaken on 10 November 2020. The objective of the PSI was to gather information relating to current and historical potentially contaminating activities at the site.

The DSI was an intrusive investigation, and was undertaken to assess:

- The type, extent and level of contamination within the proposed development site.
- Whether contaminants of concern identified present an unacceptable risk to human health or identified environmental receptors.
- Disposal options for the potentially impacted soil that may be required to be removed from site during development.
- Whether the soils remaining on-site are suitable for the proposed end use.

The soil sampling locations were positioned to target areas on-site where activities listed on the Ministry for the Environment's Hazardous Activities and Industries List (HAIL) (MfE, 2011b) may have been historically and / or are currently present at the site. Further details of the scope of work are provided in Section 7.

3 Site Description

The property at 4 Scott Road is located in Hobsonville, Auckland and is currently largely undeveloped with the exception of a single residential house in the central northern area of the site (adjacent to Scott Road), as well as a larger residential lifestyle block in the southern area of the site containing a house, swimming pool, tennis court and sheds. The balance of the site is grassed and, in some areas, densely vegetated (particularly along the south-western property boundary).

Site information is summarised in Table 1, and the site setting is summarised in Table 2.

Table 1: Site Information

Item	Description
Legal Description	Lot 1 DP 71841
Current Land Use	Rural residential
Proposed Land Use	Residential
AUP Zone	Single House Zone along the coastal margin and Mixed Housing Suburban Zone across the balance of the site.
Site Area	Approximately 7.5 hectares
Territorial Authority	Auckland Council

Table 2: Site Setting

Item	Description
Topography	The site significantly varies in topography, although generally consists of gentle to moderate (~5-15 degrees) southeast, south and southwest facing slopes. The south-western property boundary forms the coastal margin of the inner Waitemata Harbour, and is a steep to very steep (~25-55 degrees) coastal cliff up to 7 m in height. The sites topography and associated geomorphology is described in further detail in the geotechnical investigation report prepared by ENGEO (ENGEO, 2020).
Local Setting	The site is situated in Hobsonville, with residential land use to the west, and rural residential land use to the north and east. The site is bounded by the Waitemata Harbour to the south. There are no “Conservation Zones” along the coastal margin of the site (AUP, 2016). A portion of the coast line is identified in the AUP as a “Mangrove forest and scrub” ecosystem. A small area along the southern coastal boundary is identified in the AUP as a Significant Ecological Area (“Marine 2”). With the exception of the Waitemata Harbour, there are no identified environmental receptors within close proximity to the site.

Item	Description
Nearest Surface Water & Use	As noted above, the site is bounded by the Waitemata Harbour to the south. Several overland flow paths are present within the site as mapped on Auckland Council GeoMaps, generally out-letting into the coastal marine area. A network of minor overland flow paths are shown to flow from the north-eastern corner of the site, southeast into the neighbouring property (6 Scott Road).
Geology	The site is regionally mapped by GNS Science to be underlain by soil of the Puketoka Formation, comprising pumiceous mud, sand, silt, clay, gravel and peat beds. A geotechnical investigation was completed in conjunction with the environmental investigation, although the subsurface conditions are variable, they broadly align with the regional geological mapping (ENGEO, 2020). One notable variance from published geology is the presence of undocumented fill material encountered adjacent to the coastal margin and previous pottery and brickworks site (Limeburners Bay), to at least 0.8 m depth (Figure 1). This investigation refused on impenetrable blocky fill material comprising clay pipe debris.
Hydrogeology	An assessment of standing groundwater levels was undertaken as part of the geotechnical assessment (ENGEO, 2020). The results indicate that the groundwater table is likely to be present within the upper 3 m of the ground surface, particularly near overland flows and at the toe of slopes. The AUP identifies the site and surrounding area as a "High-Use Aquifer Management Area". Groundwater flow direction beneath the site is assumed to be south toward the Waitemata Harbour.

4 Site History

ENGEO obtained and reviewed available environmental and geological information relevant to the site, including geological maps, historical aerial photographs and the Auckland Council property files. Historical site information obtained during review of this information is summarised in this section.

4.1 Auckland Council Site Contamination Enquiry

The Site Contamination Enquiry response provided by Auckland Council was received and reviewed on 11 November 2020 (Appendix 1). No contamination information is held within Council records for the site, however the adjacent site is identified as subject to historical horticultural activity.

In preparing the response, the former Auckland Regional Council and current databases were searched for records of closed landfills, bores, air discharge, industrial and trade process consents, contaminated site discharge consents, and environmental assessments within approximately 200 metres of the site. Relevant findings in relation to our environmental assessment are provided in Table 3 below.

Table 3: Discharge Consent Summary

Date	Description	Applicability to Investigation
2009 – 2011	Consents for contaminated site discharge, earthworks and stormwater discharge for the residential redevelopment on land to the west of the site. The consent indicates that earthworks are complete.	No further detail relating to pollution incidents have been recorded for this property. Significant contamination on this nearby property is assumed to have been managed appropriately, and therefore considered to be low risk with respect to contamination and associated redevelopment risks on the site.
2013	A pollution incident was reported to Auckland Council hotline regarding sediment entering the sea from 2 Scott Road. The incident was investigated, however no further detail is provided.	2 Scott Road is adjacent to the site on the northwest boundary, and the western portion of the site is positioned between 2 Scott Road and the sea. If this sediment was contaminated, it may have deposited contamination on the portion of the western portion of the site.

4.2 Auckland Council Property File Review

The property file held by Auckland Council was reviewed on 4 November 2020. Relevant findings in relation to our environmental assessment are provided in Table 4 below.

Table 4: Property File Summary

Date	Description
1975	Plans for extending the dwelling in the northern portion of the site indicates that a concrete tank positioned to the northeast of the dwelling was proposed to be demolished. The plan identifies the location of a new septic tank, and therefore it is assumed that the tank previously mentioned was a septic tank.
1975	Building permit application for construction of a hay barn. The proposed location is approximately in the same location as the existing barn identified approximately at the centre of the site. Construction details comprise timber and iron framing, steel roof and concrete foundations.
1989	Correspondence relating to a request for rezoning of the site from the current owner (Barry Winter) indicates that his family have owned the land for 15 years. Prior to this, Mr Winter indicates that the site was a 'wilderness'. Mr Winter's letter indicates that the site should be zoned residential rather than present zoning of 'horticulture'. The Auckland Council response letter indicates that the Rural 1 Zone (applicable to the site) is not specific 'horticultural" zoning. *There is no information indicating that the site was being used for horticultural purposes, and other documentation in the file indicates that the site was used as a 'hobby farm'.*
1991	Building permit application for construction of an implement shed. Later documentation indicates that this was constructed adjacent to the barn.
1991	Geotechnical report completed by Harrison Grierson Consultants Limited to support construction of the southernmost dwelling. No evidence of contamination or undocumented fill material was logged in the five boreholes drilled.

Date	Description
1992	Building permit application for construction of a garage connected to the northernmost dwelling.
1998	Architectural drawings for construction of the southernmost dwelling. Other documentation available on the file indicates the dwelling was constructed in 1992.
2001	A Waitakere City Council Heritage Assessment for the northernmost dwelling states that "*the land on which the house stands was originally part of a large block of Crown grant land". "In 1854, the land was bought from the Crown by Rice Owen Clark Im who in the 1860s set up a pottery nearby".* The site *"remained in ownership of the Clark family until 1932".* Buildings are first mentioned in the deed dated 1932, when the house was sold to a farmer, Richard Powell.
1999 2008 2011 2014 2017	Various Sewer Maintenance Work Orders. Auckland Council reports relating to septic tank pump out and visual inspection of two tanks (one to the southwest of dwelling located in the southern portion of the site and one to the southeast of the dwelling in the northern portion of the site). No areas of concern identified.

4.3 Historical Aerial Photograph Review

Aerial photographs dating from 1940 to 2019 have been reviewed and are included in Appendix 2 for reference. These photographs were sourced from Auckland Council GeoMaps, Retrolens and Google Earth Pro.

Relevant visible features on the site are summarised in Table 5. Historically, the surrounding area was primarily occupied by horticultural and other agricultural land use.

Table 5: Historical Aerial Photograph Summary

Date	Description
1940	The site and surrounding area are predominantly being used for agricultural purposes with rural residential lots in the surrounding area. Land to the west of the site is occupied by the R O Clark Limited clay pottery works. A large factory is noted on the water's edge, earthworks (presumably mining clay) to the north of the factory. The existing dwelling and a small structure (likely a former shed) are observed in the northern portion of the site. A small structure is also present in the eastern portion of the site. The southern coastal margin is densely vegetated, with the exception of the westernmost corner which is cleared and may form part of an access route to the adjacent site activities or harbour.
1950	No significant changes to the site are observed. The small structure in the eastern portion of the site appears to have been relocated or demolished. The pottery works has been demolished, and only remnants of what appears to be former kilns are observed.
1963	With the exception of a small structure in the southern portion of the site, adjacent to the coastal margin, no significant changes to the site or surrounding area are observed.

Date	Description
1972	Some soil disturbance may be occurring in the northwest portion of the site (possibly indicating crops or filling activities); the wider land use remains as pasture. No significant changes to the surrounding area are observed.
1980 - 1988	The site appears to have been separated into paddocks. The hay barn (identified in the property file review) is noted approximately at the centre of the site. A very small area of what appears to be bare ground is observed in the northernmost corner of the site. Clearing of vegetation along the coastal margin appears to have occurred. Horticultural activity is observed on surrounding land.
1996 - 2000	Image quality is poor, however the implement shed (identified in the property file review) appears to have been constructed adjacent to the hay barn. The dwelling in the southern portion of the site has also been constructed. A large greenhouse has been constructed on neighbouring land to the east, and a large dwelling is being constructed on the same property in the 2000 aerial image.
2017 - 2019	The swimming pool and tennis court have been constructed adjacent to the southern dwelling.

5 Current Site Conditions

A site walkover was completed on 10 November 2020 by an ENGEO environmental scientist. Observations of activities and conditions present at the site are summarised in Table 6. ENGEO did not conduct an interview with current site occupants during the walkover.

Photographs taken during the site visit are included in Appendix 3.

Table 6: Current Site Conditions

Site Conditions	Comments
Site Layout / Primary Features	Two site sheds are located in the centre of the site. The southernmost shed is constructed on a concrete base, access was not available. The northernmost shed was constructed on an earthen base. Timber, disused building materials, bikes and tyres were observed. No chemical / oil storage areas within either shed were observed, and no evidence of significant staining noted. Potential asbestos containing material (PACM) was identified on the cladding of the small building attached to the shed. PACM was observed on the dwelling in the northern portion of site, as well as on the surface of surrounding soils. A burn pile was observed to the south of the dwelling in the southern portion of the site. The pile appeared to primarily comprise of burned vegetation, however what appeared to be a charred piece of jib board was also observed. Fill material was observed along the coastal margin in the southwest portion of the site (adjacent to the former pottery and brickworks site).

Surface Water Appearance	A pond was observed on the eastern boundary of the site (Photograph 6, Appendix 3). Based on review of Auckland Council GeoMaps, it appears that this pond is connected via an overland flow path to a larger pond on the neighbouring property to the east. No visual evidence of potential contamination of surface water was observed.
Current Surrounding Land Use	Agricultural / Residential.
Local Sensitive Environments	No sensitive environments were observed on the site, or on the site boundaries to the north, west or east. However, the site is bounded to the south by the Waitemata Harbour. As noted above, a small area along the southern coastal boundary is identified in the AUP as a Significant Ecological Area ("Marine 2").
Visible Signs of Plant Stress	None observed.
Ground Cover	Primarily grassed.
Potential for On - Or - Off - Site Migration of Contaminants	No obvious sources of contamination migrating on or off site were observed. The site and surrounding area are primarily occupied by other horticultural facilities and residential housing.
Visible Signs of Contamination	Fill material was observed along the coastal margin in the southwest portion of the site (adjacent to the former pottery and brickworks site). Material comprised primarily pottery remnants.

Table 7: Summary of General Ground Conditions

Sample Location	Depth, m bgl	Description
All locations	Upper 0.2 – 0.3 (All locations)	Brown clayey silt, minor rootlets.
All locations	0.3 – 0.5*	Brown / orange clayey silt.
CS01 (A,B,C) and CS02 (B only)	0.3 – 0.5*	Grey silty clay, rare orange mottles.
FS1 and FS2	0.1 – 0.2	Fill material comprising brown clayey silt with brick, gravel and terracotta fragments.
F3	0.2 – 0.5*	Fill material comprising grey / light brown silty clay with traces of terracotta.

**Maximum hand auger depth*

Groundwater was not encountered in any of the sample locations. No visual or olfactory indicators of contamination were observed in the soil samples collected. Please see Figure 1 for the sample locations.

6 Potential HAIL Activities

Activities included on the Ministry for the Environment's Hazardous Activities and Industries List (HAIL) (MfE, 2011b) trigger the requirement for an intrusive contaminated land investigation (DSI) prior to redevelopment. Based on the information reviewed as part of this PSI, the following activities listed on the HAIL may have been historically and /or are currently present at the site:

- HAIL ID G5: *Waste disposal land* – Fill material was observed along the coastal margin (Figure 1). Due to the unknown source of this material, it is possible that the material contains contaminants above levels of concern with respect to human health and / or environmental risks.
- HAIL ID I: *Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment:*
    - Due to the age of the existing and former site buildings, it is likely that asbestos products are present within building materials. Construction materials containing asbestos may result in contamination of soils adjacent to site buildings. Typically, this impacted area extends up to 2 metres from the building exterior (referred to as the building 'halo'), however the impacted area may be more widespread where a previous building has been demolished. There is also potential for asbestos containing materials to have been buried beneath building footprints and / or hardstand areas.
    - There is potential for lead-based paint on existing and former buildings, which has the potential to leach / flake and contaminate surrounding soils.
    - The shed with the earthen floor may have historically housed agrichemicals and or workshop-type chemicals (oils, fuels, greases). Potential for historical spills and leaks to contaminate underlying soils, however no visual indicators were observed during the walkover.
    - Potential area of historical filling or horticultural activity associated with disturbed soil identified in historical aerial images in the northern portion of the site.
- HAIL ID H: *Any land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be a risk to human health or the environment*
    - Historical and existing horticultural activity on the neighbouring property to the east is identified. There is potential for "spray drift" onto the site, particularly within the eastern portion of the site.

Given the identification of these potentially hazardous activities on-site, further intrusive works were recommended to assess if the site is suitable for the proposed end land use.

The potential contaminants of concern identified based on the findings of the PSI component of this investigation are summarised in Table 8.

Table 8: Potential Contaminants

Potential source of contamination	Primary Contaminants of concern	Possible extent of contamination	HAIL activity as defined by the NES (Soil)
Undocumented filling	Heavy metals, polycyclic aromatic hydrocarbons (PAHs), and asbestos	Along the coastal margin of the site	Category G5: Waste disposal to land
Building materials containing asbestos	Asbestos fines and fibrous asbestos	Shallow soil near site buildings	Category I: Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment
Potential lead-based paint on buildings	Lead	Shallow soil near existing and former site buildings	
Shed with an earthen floor may have historically housed agrichemicals and or workshop-type chemicals i	Heavy metals, hydrocarbons, and asbestos	Shallow soil in the vicinity of the site shed	
Potential horticultural activity or filling in the northern portion of site	Heavy metals, PAHs and organochlorine pesticides (OCPs)	Shallow soil within the northern portion of the site	
Small area of burning to the southeast of the southern dwelling	Heavy metals and PAHs	Shallow soil underlying the area of burning	
Spray drift from neighbouring horticultural land use	Heavy metals and OCPs	Shallow soil along the eastern portion of the site	HAIL ID H: Any land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be a risk to human health or the environment

7 Site Investigation

7.1 Investigation Methodology

ENGEO completed the environmental investigation on 10 November 2020. Table 9 provides a summary of the soil samples collected. Refer to attached Figure 1 for sample locations.

Table 9: Summary of Soil Samples Collected and Requested Analyses

Sample ID	Sample Depth (m bgl)	Sampling Rationale	Requested Analyses
SS01 – SS02	0.1	Assess a potential area of historical filling or horticultural activity in the northern portion of the site	Heavy metals, OCPs, PAHs and asbestos
SS03	0.1	Targeting the approximate location of a former shed to assess the potential impact of the use of the lead-based paint and / or asbestos	Total concentration of lead and asbestos
SS04 – SS08	0 – 0.1	Samples collected adjacent to and, for SS08, within the storage shed to assess the potential impact of the use of the lead-based paint and / or asbestos, or storage / spills of hazardous substances	Total concentration of lead and asbestos (SS06 and SS07) Heavy metals, OCPs, hydrocarbons (PAHs and TPHs) and asbestos (SS04 and SS08)
SS09 – SS15	0.1 0.2 (SS14 only)	Target soils adjacent to the southern dwelling to assess potential impact of the use of the lead-based paint and / or asbestos	Total concentration of lead and asbestos
SS16	0.1	Burn pile - sample was collected from soil underneath the burn pile that does not appear to be visually impacted by fire residue (assumed that the visually impacted material is contaminated)	Heavy metals, PAHs and asbestos
SS18 – SS22	0 – 0.15	Target soils adjacent to the northern dwelling to assess potential impact of the use of the lead-based paint and / or asbestos	Total concentration of lead and asbestos
CS01 (comprising CS01A/B/C) CS02 (comprising CS02A/B/C) CS03 (comprising CS03A/B/C)	0.1 – 0.15	Assess the potential impact on-site or off-site (“spray drift”) horticultural activity	Three-point composite samples analysed for heavy metals and OCPs
FS1 – FS3	0.1 – 0.5	Undocumented fill material identified on coastal margin	Heavy metals, PAHs and asbestos

Note: Sample SS05 and SS17 were not selected for analysis.

The following was undertaken during the investigation:

- All soil samples were screened for visual and olfactory evidence of contamination.
- Samples were compressed directly into laboratory supplied containers using a new pair of nitrile gloves for each sample. Prior to sampling, the equipment was decontaminated using a triple wash procedure with potable water, Decon 90 solution and deionised water.
- All samples were placed directly into a cooled container prior to transport to or Eurofins laboratory under ENGEO standard chain of custody.
- All fieldwork and sampling was undertaken in general accordance with the procedures for the appropriate handling of potentially contaminated soils as described in the MfE Contaminated Land Management Guidelines No.5: Site Investigation and Analysis of Soils (MfE, 2011c).

7.2 Quality Assurance and Quality Control

The quality assurance / quality control (QA / QC) procedures undertaken during the works included:

- The use of standard sample registers and chain of custody records for all samples collected.
- Each soil sample was given a unique identification number.
- Sampling equipment was decontaminated using the triple wash method (as previously stated) between each sample location.
- Sampling equipment was decontaminated using the triple wash method (as previously stated) between each sample location. Eurofins are accredited by International Accreditation New Zealand (IANZ) for the analyses performed, except for asbestos which they are accredited to AS 4964-2004. To maintain their accreditation, Eurofins undertake rigorous cross checking and routine duplicate sample testing to ensure the accuracy of their results.

7.3 Investigation Criteria

Human Health Criteria

High-density and standard residential human health criteria referenced in this report were selected from the:

- NES (MfE, 2012) – for chemical contaminants.
- BRANZ guidelines (BRANZ, 2017) – for asbestos.
- In accordance with the MfE's Contaminated Land Management Guidelines No.2 – Hierarchy and Application in New Zealand of Environmental Guideline Values (MfE, 2011d) – for chemical contaminants not included in the NES.

When comparing contaminant concentrations in composite samples with human health criteria, the criteria are often adjusted by dividing each criterion by the number of sub-samples used to create the composite. This accounts for the potential dilution of 'hotspots' that could occur when mixing soil from different parts of the site. The human health criteria were adjusted in this report for an initial screening of the data given the limited historical information available for site and the recommendation to do so in the MfE's Contaminated Land Management Guideline No. 5 which forms part of the NES regulations (incorporated by reference).

Environmental Discharge Criteria

In the Auckland region, potential discharges to the environment from land containing elevated levels of contaminants are managed through the AUP (AUP, 2016), operative in part on 15 November 2016. Therefore, the Auckland Council permitted activity criteria referenced in this report were adopted from the AUP.

Environmental discharge criteria were not adjusted when compared to composite sample results as, unlike human health exposures which would be assessed on a lot by lot basis, potential discharges to the environment are assessed on a site-wide basis.

Background Criteria

The soil analysis results have also been compared to the background concentration for non-volcanic soils in the Auckland region (AC, 2001). This comparison allows for further assessment of consenting requirements under the NES and provides information regarding disposal options for excess spoil.

As with environmental discharge criteria, background criteria were not adjusted when compared to composite sample results.

8 Soil Analysis Results

Table A (Appendix 4) compares soil contaminant concentrations in the samples tested with the adopted investigation criteria. Full analytical laboratory reports are included in Appendix 4.

8.1 Summary of Soil Results

A summary of the chemical and asbestos testing results is provided below:

Human Health Assessment

- The concentration of arsenic in the sample collected at sample location SS08, positioned inside the shed, exceeds the standard residential human health criterion, however is below the high-density residential human health criterion.
- The concentration of lead in two of the five samples (SS19 and SS22) collected around the northern dwelling exceed the standard residential human health criterion. Sample SS22 also exceeds the high-density residential human health criterion, and contains a concentration of asbestos that exceeds the “all site uses” criterion for fibrous asbestos / asbestos fines (FA / AF).
- The concentration of arsenic in composite sample CS03 exceeds the adjusted standard residential human health criterion, however is below the adjusted high-density residential human health criterion.

Environmental Discharge Assessment

- The concentration of lead in one of the five samples (SS22) collected around the northern dwelling exceeds the the environmental discharge criterion.

Background Criteria

- Elevated heavy metal concentrations (arsenic and lead), and the presence of PAHs and asbestos indicate that areas of the site exceed the regional background criteria. The affected areas identified are associated with fill material along the coastal margin and shallow soil in the vicinity of the northern dwelling, sheds and in the northeast portion of the site.

9 Conceptual Model

A conceptual site model has been developed to assess the potential exposure pathways present at the site. A contamination conceptual site model consists of three primary components. For a contaminant to present a risk to human health or an environmental receptor, all three components are required to be present and connected. The three components of a conceptual site model are:

- Source of contamination.
- An exposure route, where the receptor and contaminants come into contact (e.g. ingestion, inhalation, dermal contact).
- Receptor(s) that may be exposed to the contaminants.

The potential source, pathway, receptor linkages at this subject site are provided in Table 10.

Table 10: Conceptual Site Model

Source	Exposure Pathway	Potential Receptor	Acceptable Risk?
Undocumented filling along the coastal margin	Soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents and environment	**Likely** Concentrations were below the human health criteria.
	Leaching of contaminants	Surrounding environment	**Likely** Concentrations were below the environmental discharge criteria.
Building materials containing asbestos contaminating site soil with asbestos	Inhalation of asbestos fibres released from impacted soils / dust	Future site users / site redevelopment workers Surrounding residents	**No – appears to be limited to northern dwelling halo** Asbestos fibres / fibrous asbestos were detected in one sample adjacent to the northern dwelling above the guidance criterion. Asbestos fibres / fibrous asbestos and ACM were present in two other samples around the northern dwelling; however, the reported concentrations are below the guidance criterion. No asbestos was detected in the samples collected around the shed, southern dwelling, and approximate footprint of a former shed.

Source	Exposure Pathway	Potential Receptor	Acceptable Risk?
Lead-based paint contaminating site soil with lead	Soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents and environment	**No – appears to be limited to northern dwelling building 'halo'** The concentrations of lead in two samples collected around the northern dwelling were above the human health criteria. No exceedances were identified in the samples collected around the shed, southern dwelling, and approximate footprint of a former shed.
	Leaching of contaminants	Surrounding environment	**No – appears to be limited to northern dwelling building 'halo'** The concentration of lead in one sample was above the environmental discharge criterion. No exceedances were identified in the samples collected around the shed, southern dwelling, and approximate footprint of a former shed.
Storage of miscellaneous items was observed in on-site shed	Soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents and environment	**No for single-family residential land use – appears to be limited to the shed footprint** The concentration of arsenic in the sample collected with the shed was above the standard residential human health criterion.
	Leaching of contaminants	Surrounding environment	**Likely** Concentrations were below the environmental discharge criteria.
Potential horticultural activity or filling in the northern portion of site	Soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents and environment	**Likely** Concentrations were below the human health criteria.
	Leaching of contaminants	Surrounding environment	**Likely** Concentrations were below the environmental discharge criteria.

Source	Exposure Pathway	Potential Receptor	Acceptable Risk?
Spray drift from neighbouring horticultural land use	Soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents and environment	**No for single-family residential land use – appears to be limited to the area associated with sample CS03 (A, B and C)** The concentration of arsenic in one of the composite samples was above the adjusted standard residential human health criterion. Analysis of the composite sub-samples and comparison to the unadjusted standard residential human health criterion may result in a different conclusion.
	Leaching of contaminants	Surrounding environment	**Likely** Concentrations were below the environmental discharge criteria.
Small area of burning to the southeast of the southern dwelling	Soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents and environment	**Likely** Concentrations of soil below visually impacted material were below the human health criteria (burned waste and ash in soil is assumed to be contaminated).
	Leaching of contaminants	Surrounding environment	**Likely** Concentrations were below the environmental discharge criteria.

10 Summary and Conclusions

ENGEO was requested to undertake an Environmental Site Investigation of the property at 4 Scott Road, Hobsonville currently planned for redevelopment. The objectives of the investigation were to evaluate:

- The type, extent and level of contamination within the proposed development site.
- Whether contaminants of concern identified present an unacceptable risk to human health or identified environmental receptors.
- Disposal options for the potentially impacted soil that may be required to be removed from site during development.
- Whether the soils remaining on-site are suitable for the proposed end use.

The PSI component of this investigation identified three potential site activities included on the HAIL (MfE, 2011b):

- HAIL ID G5: *Waste disposal land* – Fill material was observed along the coastal margin (Figure 1). Due to the unknown source of this material, it is possible that the material contains contaminants above levels of concern with respect to human health and / or environmental risks.
- HAIL ID I: *Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment*:
    - Due to the age of the existing and former site buildings, it is likely that asbestos products are present within building materials. Construction materials containing asbestos may result in contamination of soils adjacent to site buildings. Typically, this impacted area extends up to 2 metres from the building exterior (referred to as the building 'halo'), however the impacted area may be more widespread where a previous building has been demolished. There is also potential for asbestos containing materials to have been buried beneath building footprints and / or hardstand areas.
    - There is potential for lead-based paint on existing and former buildings, which has the potential to leach / flake and contaminate surrounding soils.
    - The shed with the earthen floor may have historically housed agrichemicals and or workshop-type chemicals (oils, fuels, greases). Potential for historical spills and leaks to contaminate underlying soils, however no visual indicators were observed during the walkover.
    - Potential area of historical filling or horticultural activity associated with disturbed soil identified in historical aerial images in the northern portion of the site.
- HAIL ID H: *Any land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be a risk to human health or the environment:*
    - Historical and existing horticultural activity on the neighbouring property to the east is identified. There is potential for "spray drift" onto the site, particularly within the eastern portion.

The soil sampling locations were positioned to target areas on-site where activities listed on the (HAIL) may have been historically and / or are currently present at the site. The results from the laboratory analysis indicate that:

- The concentration of arsenic in the sample collected at sample location SS08, positioned inside the shed, exceeds the standard residential human health criterion, however is below the high-density residential human health criterion.
- The concentration of lead in two of the five samples (SS19 and SS22) collected around the northern dwelling exceed the standard residential human health criterion. Sample SS22 also exceeds the high-density residential human health criterion, and contains a concentration of asbestos that exceeds the "all site uses" criterion for fibrous asbestos / asbestos fines (FA / AF).

- The concentration of arsenic in composite sample CS03 exceeds the adjusted standard residential human health criterion, however is below the adjusted high-density residential human health criterion.
- The concentration of lead in one of the five samples (SS22) collected around the northern dwelling exceeds the the environmental discharge criterion.
- Elevated heavy metal concentrations (arsenic and lead), and the presence of PAHs and asbestos indicate that areas of the site exceed the regional background criteria. The affected areas identified are associated with fill material along the coastal margin and shallow, soil in the vicinity of the northern dwelling, sheds and in the northeast portion of the site.

Due to the presence of elevated concentration of heavy metals (arsenic and lead) and asbestos above the adopted standard residential human health criteria, remediation of soils is required for the site to be suitable for future single-family residential land use. Some or all of these areas of site may not require remediation should future development comprise high-density residential land use. The details of recommended remedial works are discussed further in Section 0.

Depending on the future land use, redevelopment works may be considered a controlled activity under Regulation 9 of the NES (high-density residential) or a restricted discretionary activity under Regulation 10 of the NES (single-family residential land use).

The analysis results identified one sample with a lead concentration in soil above the regional environmental discharge criterion (i.e. permitted activity criterion). On sites with elevated levels of contaminants, soil disturbance requires consent unless the conditions of Rule E30.6.1.1.2 of the AUP can be met. These conditions include, but are not limited to, a maximum soil disturbance volume of 200 m^3 per site with the duration of soil disturbance lasting two months or less. The proposed disturbance volumes in this area are unlikely to exceed permitted activity criterion under Section E30.6.1.12 of the AUP therefore a short-term environmental discharge consent is not anticipated to be required.

The presence of contaminations above regional background levels indicates fill material and excess surface soil generated during redevelopment works cannot be considered “cleanfill” for disposal purposes or reused at another earthworks site (AUP, 2016). Note that it is likely that shallow soils in portions of the site, and deeper soil across the majority of the site can be classified as cleanfill; however, additional testing prior to, or as part of, redevelopment works is required to confirm this.

11 Recommendations

Based on the results of this investigation, the following is recommended:

Remedial Action Plan

Prepare a Remedial Action Plan (RAP) to support the resource consent application. The RAP will outline remediation requirements for soil impacted by contaminants above human health and environmental discharge criteria, as well as monitoring and management procedures for the balance of the earthworks due to the detection of contaminants above background levels and potential for encountering unidentified contamination. The remedial works are likely to include:

- Removal of impacted soil in identified “hot spot” areas.
- Validation soil sampling to confirm impacted soil above human health and environmental discharge criteria has been removed from site.

Contaminated Land Related Consents

Future land subdivision and associated land disturbance is likely to be considered either a controlled activity under Regulation 9 of the NES (high-density residential land use) or a restricted discretionary activity under Regulation 10 of the NES (single-family residential land use).

As the proposed disturbance volumes are unlikely to exceed permitted activity criteria under Section E30.6.1.12 of the AUP (<200 m^3 of soil disturbance), a short-term environmental discharge consent is not anticipated to be required.

Completion Reporting

The RAP will include requirements for oversight and validation sampling during earthworks by a suitably qualified and experienced contaminated land consultant. Following completion of site earthworks, a Site Validation Report (SVR) will be required to present the validation sampling data and confirm that site earthworks were performed in accordance with the RAP.

12 References

AC, 2001. Auckland Regional Council. (2001). Background Concentration of Inorganic Elements in Soils from the Auckland Region, Auckland Regional Council, Technical Publication No. 153.

AUP, 2016. Auckland Regional Council. (2016). The Proposed Auckland Unitary Plan Decisions version (notified 19 August 2016).

BRANZ, 2017. The Building Research Association New Zealand. (2017). New Zealand Guidelines for Assessing and Managing Asbestos in Soil.

ENGEO, 2020. ENGEO Limited. (2020). Geotechnical Investigation Report (report reference 17971.000.001_02)

GNS, 2001. Institute of Geological and Nuclear Sciences Ltd. 2001. 1:250,000 Geological Map 3, Auckland.

MfE, 1997. Ministry for the Environment. (1997). Guidelines for assessing and managing contaminated gasworks sites in New Zealand.

MfE, 2006. Ministry for the Environment. (2006). Identifying, investigating and managing risks associated with former sheep-dip sites: A guide for local authorities.

MfE, 2011a. Ministry for the Environment. (2011). Contaminated Land Management Guidelines No.1: Reporting on Contaminated Sites in New Zealand.

MfE, 2011b. Ministry for the Environment. (2011). Hazardous Activities and Industries List (HAIL).

MfE, 2011c. Ministry for the Environment. (2011). Contaminated Land Management Guidelines No. 5: Site Investigation and Analysis of Soils.

MfE, 2011d. Ministry for the Environment. (2011). Contaminated Land Management Guidelines No.2: Hierarchy and Application in New Zealand of environmental guideline values.

MfE, 2011e. Ministry for the Environment. (2011). Guidelines for assessing and managing petroleum hydrocarbon contaminated sites in New Zealand.

MfE, 2011f. Ministry for the Environment. (2011). Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health.

MfE, 2012. Ministry for the Environment. (2012). Users' Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.

NEPM, 2013. Australian National Environmental Protection Council. (2013). National Environmental Protection (Assessment of Site Contamination) Measure 1999, Schedule B(1): Guideline on the Investigation Levels for Soil and Groundwater.

NES, 2011. The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations (2011).

13 Limitations

i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Aedifice Development Limited, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.

ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.

iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

iv. This Limitation should be read in conjunction with the Engineers NZ/ACENZ Standard Terms of Engagement.

v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (s 9(2)(a) if you require any further information.

Report prepared by

Claire Davies, CEnvP

Senior Environmental Consultant

Report reviewed by

Erika McDonald, CMEngNZ

Principal Environmental Engineer

FIGURES

Legend

- Site Boundary
- Sample Locations
- Burn Pile
- Fill Material (approx. extent)
- Former Shed (approx)
- Kid's playhouse
- Potential area of filling or horticultural activity
- Pond
- Site Sheds

30 m

ENGEO

Produced by Evalu8.earth

Title: Site Investigation Plan		
Client: Aedifice Development Ltd		Figure No: 1
Project: 4 Scott Road	Drawn: TP	
Date: 19-11-2020	Checked: CD	
Proj No: 17971.000.001		Version: 1

ENGEO
Expect Excellence

APPENDIX 1:

Contaminated Site Enquiry

11 November 2020

ENGEO Ltd
8 Greydene Place
AUCKLAND

Attention: Claire Davies

Dear Claire

Site Contamination Enquiry – *4 Scott Road, Hobsonville*

This letter is in response to your enquiry requesting available site contamination information within Auckland Council records for the above site. Please note this report does not constitute a site investigation report; such reports are required to be prepared by a (third-party) Suitably Qualified and Experienced Practitioner.

The following details are based on information available to the Contamination, Air & Noise Team in the Resource Consent Department. The details provided may be from former regional council information, as well as property information held by the former district/city councils. For completeness the relevant property file should also be requested to obtain all historical records and reports via 09 3010101 or online at:

https://www.aucklandcouncil.govt.nz/buying-property/order-property-report/Pages/order-property-file.aspx.

1. Hazardous Activities and Industries List (HAIL) Information

This list published by the Ministry for the Environment (MfE) comprises activities and industries that are considered likely to cause land contamination as a result of hazardous substance use, storage, and/or disposal.

There is no information held within our records to suggest this site has been subject to HAIL activities, however, the adjacent site is identified as subject to historical horticultural activity..

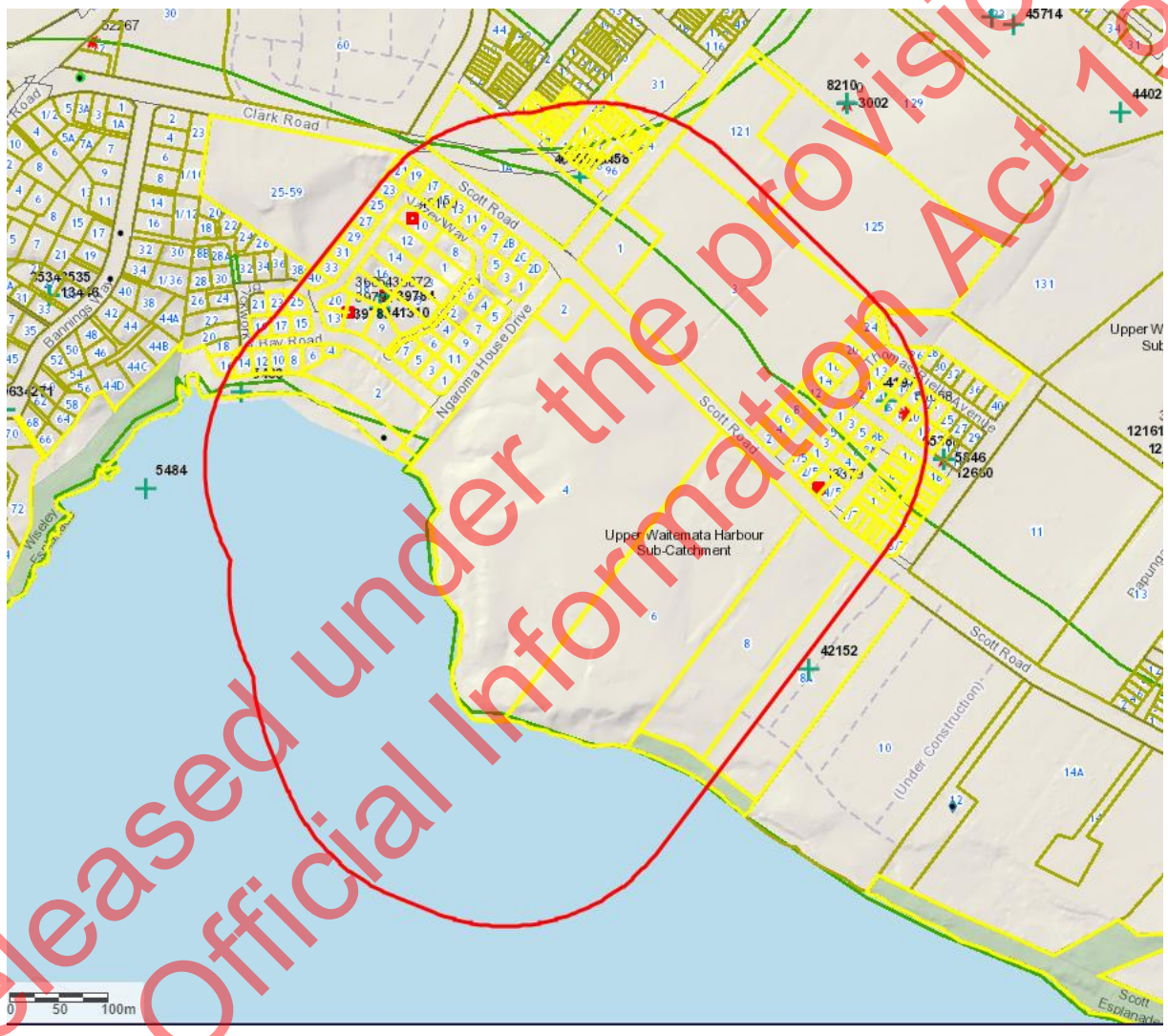
Please note:

- *If you are demolishing any building that may have asbestos containing materials (ACM) in it, you have obligations under the Health and Safety at Work (Abestos) Regulations 2016 for the management and removal of asbestos, including the need to engage a Competent Asbestos Surveyor to confirm the presence or absence of any ACM.*
- *Paints used on external parts of properties up until the mid-1970's routinely contained lead, a poison and a persistent environmental pollutant. You are advised to ensure that soils affected by old, peeling or flaking paint are assessed in relation to the proposed use of the property, including high risk use by young children.*

2. Consents and Incidents Information (200m radius of the selected site)

The Council database was searched for records of the following activities within approximately 200 metres of the site:

- Pollution Incidents (including air discharges, oil or diesel spills)
- Bores
- Contaminated site and air discharges, and industrial trade process consents
- Closed Landfills
- Air quality permitted activities



Legend:

All Consents
All Applications
All Permitted Activities
All Bores
Closed Landfill (Auckland Council owned)
Closed Landfill (Privately owned)

Relevant details of any pollution incidents and consents are appended to this letter (Attachment A). Please refer to the column titled 'Property Address' on the spreadsheet to aid in identifying corresponding data on the map.

While the Auckland Council has carried out the above search using its best practical endeavours, it does not warrant its completeness or accuracy and disclaims any responsibility or liability in respect of the information. If you or any other person wishes to act or to rely on this information, or make any financial commitment based upon it, it is recommended that you seek appropriate technical and/or professional advice.

If you wish to clarify anything in this letter that relates to this site, please contact contaminatedsites@aucklandcouncil.govt.nz. Any follow up requests for information on other sites must go through the online order process.

Should you wish to request any of the files referenced above and/or listed in the attached spreadsheet for viewing, please contact the Auckland Council Call Centre on 301 0101 and note you are requesting former Auckland Regional Council records (the records department requires three working days' notice to ensure the files will be available).

Please note Auckland Council cost recovers officer's time for all site enquiries. As such an invoice for $128 for the time involved in this enquiry will follow shortly.

Yours Sincerely,

Contamination, Air and Noise Team
Specialist Unit | Resource Consents
Auckland Council

ACTIVITY	APPLICANT	APPLICATION_STATUS	LODGED_DATE	PROCESSING_OFFICER	PURPOSE	ACTIVITY_STATUS	ACTIVITY_DESCRIPTION	SITE_NAME	SITE_DESCRIPTION	DATE_CREATED	PROPERTY_ADDRESS
Take	Noel McKenzie	Withdrawn	19941116	Jonathan Moores	TAKING OF WATER FROM LAKE FOR IRRIGATION OF GREENHOUSE FLOWERS/LILIES				Scott Road, Hobsonville	2/06/2017	6 SCOTT ROAD HOBSONVILLE Waitakere City
Earthwork	Limeburners Bay Limited (In Liq) C/- Chris Horton Associates	Withdrawn	20090403	Graeme Ridley		Completed	Earthworks associated with the development of a 97 lot residential development including accessways and reserve.	18-28 Bannings Way, Hobsonville		2/06/2017	18-28 Bannings Way Hobsonville Waitakere
Stormwater Discharge	Limeburners Bay Limited (In Liq) C/- Chris Horton Associates	Withdrawn	20090403	Graeme Ridley		Proposed	To divert & discharge stormwater associated with the development of a 97 lot residential development including accessways and reserve.	18-28 Bannings Way, Hobsonville	residentual subdivision with 2.6ha of impervious area.	2/06/2017	18-28 Bannings Way Hobsonville Waitakere
Earthwork	JY Family Trustees Limited	Not Accepted For Processing	20160307	David Hampson		Proposed	Proposed construction of a new dwelling on vacant site. Earthworks outside building platform - total area 116m2, total volume -85m3.	10 Vazey Way		2/06/2017	10 Vazey Way Hobsonville Waitakere
Contaminated Site Discharge	King Kylin Holding Limited	Not Accepted For Processing	20111019	Andrew Kalbarczyk		Occurring	To authorise distrubance of contaminated land	18-28 Banning Way, Hobsonville		2/06/2017	18-28 Bannings Way Hobsonville Waitakere

BORE_ID	GRANTED_DATE	CONSENT_STATUS	PROCESSING_OFFICER	PURPOSE	WORKS_DESCRIPTION	ACTIVITY_STATUS	BORE_USE	ACTIVITY_DESCRIPTION	SITE_NAME	TLA	CONSULTANT	DATE_CREATED	PROPERTY_ADDRESS	LOC_TYP
29227	20140326	Assessment Completed	Reginald Samuel	To authorise the construction of one bore for Geotechnical investigation purposes.	The construction of one 100mm diameter bore to a maximum depth of 10m. Installation of casing material to an approximate depth of 10m.	Proposed	Geotechnical	To authorise the construction of one bore for Geotechnical investigation purposes.	Peter Oborn	Waitakere	Soil & Rock Consultants	20170601	1 5 Scott Road Hobsonville Waitakere	Point

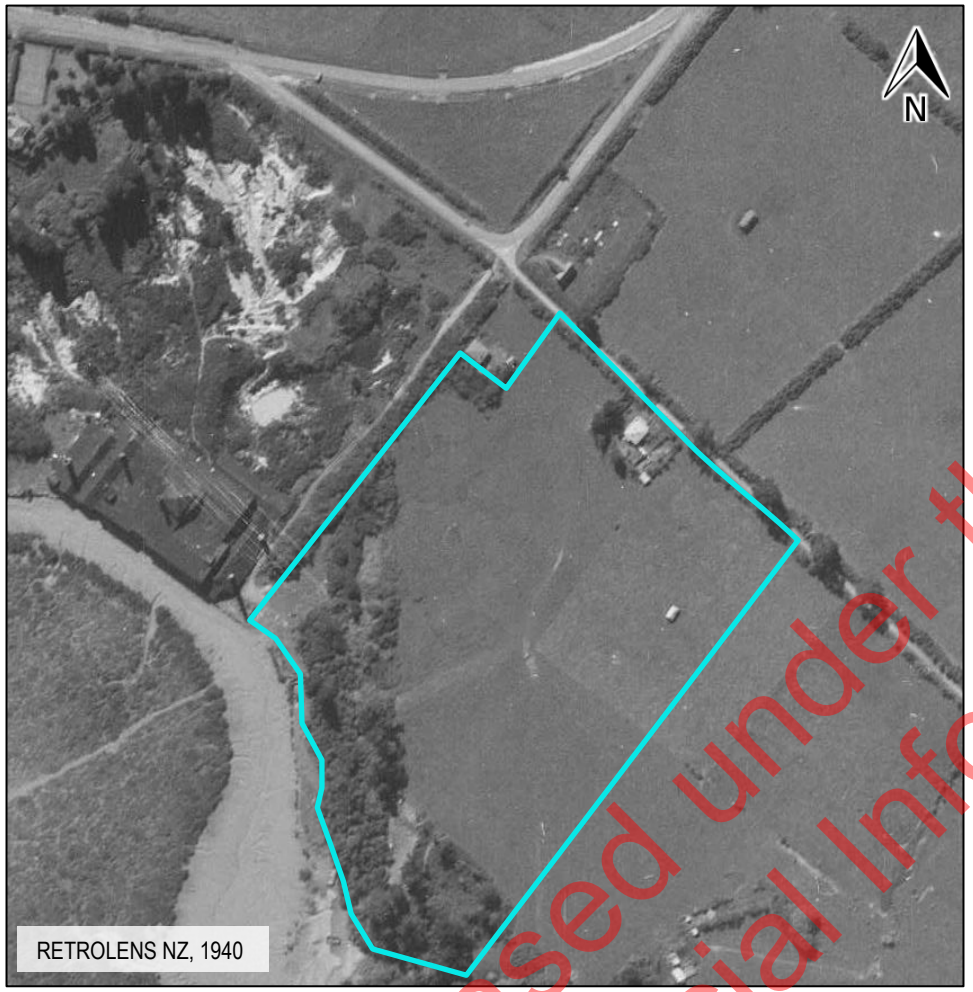
INCIDENTNUMBER	LOCATION	SUBURB	CATCHMENTCODE	POLLUTANTTYPE	RECIEVED	REPORT	INCIDENTTYPE	ACTIONEDBY	IMPACT	VOLUME	PROBLEMFOUND	CULPRITTRACED	RECORDDATE	INVESTIGATIONDATE
13/1900	2 Scott Road	Hobsonville	510	Dirt / Inert Minerals / Sediment	Hotline	sed entering sea	Sediment / Stormwater	Joe Marshall	Natural Water	N/A	YES	YES	23/05/2013	23/05/2013

PERMITTED_ACTIVITY_ID	PERMITTED_ACTIVITY_TYPE	ACTIVITY	CONSENT_ STATUS	PROCESSING_ OFFICER	PURPOSE	WORKS_DESCRIPTION	ACTIVITY_STATUS	ACTIVITY_DESCRIPTION	SITE_NAME	DATE_CREATED	PROPERTY_ADDRESS
53058	Bore	Bore	sment Comp	Reginald Samue	To authorise the construction of one bore for Geotechnical investigation purposes.	The construction of one 100mm diameter bore to a maximum depth of 10m. Installation of casing material to an approximate depth of 10m.	Proposed	To authorise the construction of one bore for Geotechnical investigation purposes.	Peter Oborn	2/06/2017	1 5 Scott Road Hobsonville Waitakere

ENGEO
Expect Excellence

APPENDIX 2:

Historical Aerial Photographs



Rev	Date	Description	Drwn	Chkd

ENGEO
Expect Excellence

Title:

Historical Aerial Photographs

Client: Aedifice Development Limited

Project: 4 Scott Road, Hobsonville

Designed: CD
Drawn: CD
Checked: EM
Date: Dec 20

Project No: 17971.000.001

Scale: NTS

Appendix: 2

Size: A4

Revision: 0

Rev	Date	Description	Drwn	Chkd

ENGEO
Expect Excellence

Title:

Historical Aerial Photographs

Client: Aedifice Development Limited		Appendix: 2
Project: 4 Scott Road, Hobsonville	Designed: CD Drawn: CD Checked: EM Date: Dec 20	Size: A4
Project No: 17971.000.001	Scale: NTS	Revision: 0

Rev	Date	Description	Drwn	Chkd

ENGEO
Expect Excellence

Title:

Historical Aerial Photographs

Client: Aedifice Development Limited

Project: 4 Scott Road, Hobsonville

Designed: CD
Drawn: CD
Checked: EM
Date: Dec 20

Project No: 17971.000.001

Scale: NTS

Appendix: 2

Size: A4

Revision: 0

Rev	Date	Description	Drwn	Chkd

ENGEO
Expect Excellence

Title:

Historical Aerial Photographs

Client: Aedifice Development Limited		Appendix: 2
Project: 4 Scott Road, Hobsonville	Designed: CD Drawn: CD Checked: EM Date: Dec 20	
Project No: 17971.000.001	Scale: NTS	Revision: 0

Rev	Date	Description	Drwn	Chkd

ENGEO
Expect Excellence

Title:

Historical Aerial Photographs

Client: Aedifice Development Limited		Appendix: 2
Project: 4 Scott Road, Hobsonville	Designed: CD Drawn: CD Checked: EM Date: Dec 20	Size: A4
Project No: 17971.000.001	Scale: NTS	Revision: 0

APPENDIX 3:

Site Walkover Photographs

Arrows indicate the orientation of the following photographs.

Photograph 1: View across the western portion of the site, facing south.

Photograph 2: Southern side of the dwelling in the northern portion of the site.

Photograph 3: Access road / driveway through the center of the site.

Photograph 4: Eastern portion of the site, facing east.

Photograph 5: Glasshouses on the neighbouring property to the east.

Photograph 6: Small pond on the eastern boundary of site. No evidence of potential contamination was observed.

Photograph 7: Approximate location of a former shed in the eastern portion of site.

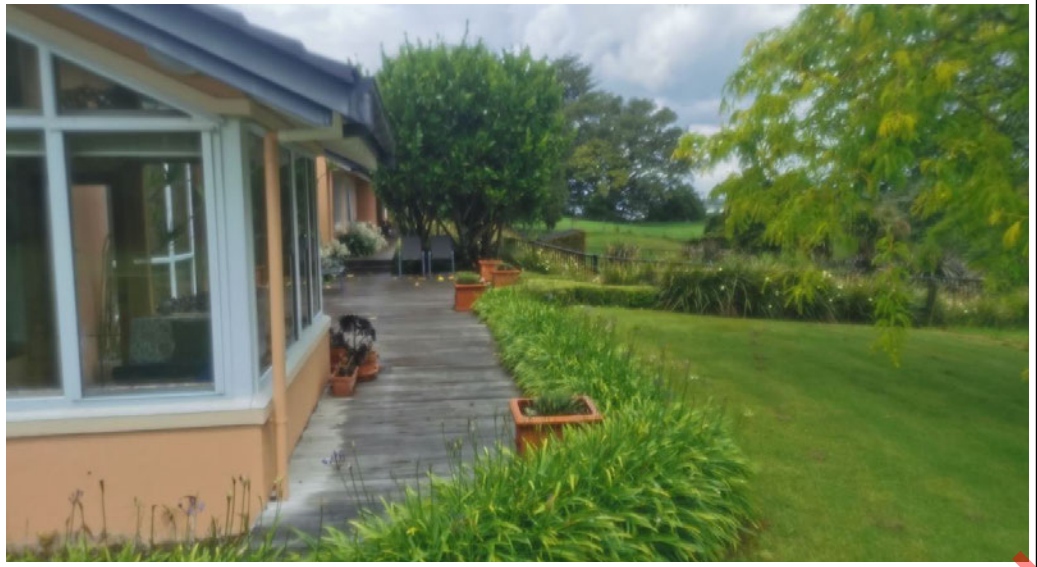
Photograph 8: Exterior of storage shed approximately at the center of site.

Photograph 9: Interior of storage shed. Miscellaneous domestic items were being stored on an earthern floor. No evidence of potential contamination observed.

Photograph 10: Southern side of the dwelling in southeast corner of site.

Photograph 11: Shed located to the south of the shed identified in Photo 8.

Photograph 12: Northern side of dwelling in the southeast portion of the site.



Photograph 13: Southern side of dwelling in the southeast portion of the site.

Photograph 14: Burn pit to the south of rear dwelling. Appears to be used for burning vegetation only.

Photograph 15: Children's play house located near the southern boundary of site.

Photograph 16: Potential asbestos boarding observed around base of the dwelling in the northern portion of the site.

Photograph 17: Northern side of northern dwelling.

Photograph 18: Southern side of northern dwelling.

Photograph 19: Typical nature of filling along southern boundary. A significant amount of broken terrracotta pipe / tiles were observed at the surface and interbedded in soil.

Photograph 20: Western corner of site.

APPENDIX 4:

Analytical Reports and Chain of Custody Documentation

ENGEO Ltd
6 Antares Place
Rosedale
Auckland New Zealand 0632

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

Attention: **Claire Davies**

Report **756021-S**
Project name 4 SCOTT ROAD
Project ID 17971.000.001
Received Date Nov 11, 2020

Client Sample ID			SS01	SS02	SS03	SS04
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K20-No16399	K20-No16400	K20-No16401	K20-No16402
Date Sampled			Nov 10, 2020	Nov 10, 2020	Nov 10, 2020	Nov 10, 2020
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
2.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
2.4'-DDE	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
2.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
4.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
4.4'-DDE	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
4.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
DDT + DDE + DDD (Total)*	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
a-BHC	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Aldrin	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
b-BHC	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Chlordanes - Total	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
cis-Chlordane	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
d-BHC	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Endosulfan sulphate	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Endrin	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Endrin aldehyde	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Endrin ketone	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
g-BHC (Lindane)	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Heptachlor epoxide	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Hexachlorobenzene	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Methoxychlor	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Toxaphene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
trans-Chlordane	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Dibutylchlorendate (surr.)	1	%	71	76	-	72
Tetrachloro-m-xylene (surr.)	1	%	86	84	-	79
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	< 0.03	< 0.03	-	< 0.03
Acenaphthylene	0.03	mg/kg	< 0.03	< 0.03	-	< 0.03
Anthracene	0.03	mg/kg	< 0.03	< 0.03	-	< 0.03
Benz(a)anthracene	0.03	mg/kg	< 0.03	< 0.03	-	0.05
Benzo(a)pyrene	0.03	mg/kg	< 0.03	< 0.03	-	< 0.03

eurofins | Environment Testing

Certificate of Analysis

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

ENGEO Ltd
6 Antares Place
Rosedale
Auckland New Zealand 0632

Attention:	Claire Davies
Report	756021-AID
Project Name	4 SCOTT ROAD
Project ID	17971.000.001
Received Date	Nov 11, 2020
Date Reported	Nov 18, 2020

Methodology:

Asbestos Fibre Identification	Conducted in accordance with the Australian Standard AS 4964 – 2004: Method for the Qualitative Identification of Asbestos in Bulk Samples and in-house Method LTM-ASB-8020 by polarised light microscopy (PLM) and dispersion staining (DS) techniques. *NOTE: Positive Trace Analysis results indicate the sample contains detectable respirable fibres.*
Unknown Mineral Fibres	Mineral fibres of unknown type, as determined by PLM with DS, may require another analytical technique, such as Electron Microscopy, to confirm unequivocal identity. *NOTE: While Actinolite, Anthophyllite and Tremolite asbestos may be detected by PLM with DS, due to variability in the optical properties of these materials, AS4964 requires that these are reported as UMF unless confirmed by an independent technique.*
Subsampling Soil Samples	The whole sample submitted is first dried and then passed through a 10mm sieve followed by a 2mm sieve. All fibrous matter greater than 10mm, greater than 2mm as well as the material passing through the 2mm sieve are retained and analysed for the presence of asbestos. If the sub 2mm fraction is greater than approximately 30 to 60g then a sub-sampling routine based on ISO 3082:2009(E) is employed. *NOTE: Depending on the nature and size of the soil sample, the sub-2 mm residue material may need to be sub-sampled for trace analysis, in accordance with AS 4964-2004.*
Bonded asbestos-containing material (ACM)	The material is first examined and any fibres isolated for identification by PLM and DS. Where required, interfering matrices may be removed by disintegration using a range of heat, chemical or physical treatments, possibly in combination.The resultant material is then further examined in accordance with AS 4964 - 2004. *NOTE: Even after disintegration it may be difficult to detect the presence of asbestos in some asbestos-containing bulk materials using PLM and DS. This is due to the low grade or small length or diameter of the asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials. Vinyl/asbestos floor tiles, some asbestos-containing sealants and mastics, asbestos-containing epoxy resins and some ore samples are examples of these types of material, which are difficult to analyse.*
Limit of Reporting	The performance limitation of the AS 4964 (2004) method for non-homogeneous samples is around 0.1 g/kg (equivalent to 0.01% (w/w)). Where no asbestos is found by PLM and DS, including Trace Analysis, this is considered to be at the nominal reporting limit of 0.01% (w/w). The NEPM screening level of 0.001% (w/w) is intended as an on-site determination, not a laboratory Limit of Reporting (LOR), per se. Examination of a large sample size (e.g. 500 mL) may improve the likelihood of detecting asbestos, particularly AF, to aid assessment against the NEPM criteria. Gravimetric determinations to this level of accuracy are outside of AS 4964 and hence IANZ Accreditation does not cover the performance of this service (non-IANZ results shown with an asterisk). *NOTE: NATA News March 2014, p.7, states in relation to AS 4964: "This is a qualitative method with a nominal reporting limit of 0.01 % " and that currently in Australia "there is no validated method available for the quantification of asbestos".This report is consistent with the analytical procedures and reporting recommendations in the NEPM and the WA DoH.*

Project Name 4 SCOTT ROAD
Project ID 17971.000.001
Date Sampled Nov 10, 2020
Report 756021-AID

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
SS03	20-No16401	Nov 10, 2020	Approximate Sample 446g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
SS06	20-No16404	Nov 10, 2020	Approximate Sample 519g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
SS07	20-No16405	Nov 10, 2020	Approximate Sample 409g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
SS09	20-No16407	Nov 10, 2020	Approximate Sample 388g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
SS10	20-No16408	Nov 10, 2020	Approximate Sample 315g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
SS11	20-No16409	Nov 10, 2020	Approximate Sample 417g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
SS12	20-No16410	Nov 10, 2020	Approximate Sample 411g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
SS13	20-No16411	Nov 10, 2020	Approximate Sample 474g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
SS14	20-No16412	Nov 10, 2020	Approximate Sample 375g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
SS15	20-No16413	Nov 10, 2020	Approximate Sample 523g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
SS18	20-No16416	Nov 10, 2020	Approximate Sample 357g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
SS19	20-No16417	Nov 10, 2020	Approximate Sample 438g Sample consisted of: Fine grained soil and rocks	FA: Chrysotile asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.021g Estimated asbestos content in FA = 0.0096g* AF: Chrysotile asbestos detected in fibre cement fragments and in the form of loose fibre bundles. Approximate raw weight of AF = 0.00080g* Estimated asbestos content in AF = 0.00080g* Total estimated asbestos content in FA and AF = 0.010g* Total estimated asbestos concentration in FA and AF = 0.0024% w/w* Organic fibre detected. No respirable fibres detected.
SS20	20-No16418	Nov 10, 2020	Approximate Sample 405g Sample consisted of: Fine grained soil and rocks	AF: Chrysotile asbestos detected in the form of loose fibre bundles. Approximate raw weight of AF = 0.00040g* Estimated asbestos content in AF = 0.00040g* Total estimated asbestos concentration in AF = 0.000099% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
SS21	20-No16419	Nov 10, 2020	Approximate Sample 458g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
SS22	20-No16420	Nov 10, 2020	Approximate Sample 467g Sample consisted of: Fine grained soil and rocks	FA: Chrysotile asbestos detected in weathered fibre cement fragments. Approximate raw weight of FA = 0.0024g Estimated asbestos content in FA = 0.0018g* Total estimated asbestos concentration in FA = 0.00039% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
FS1	20-No16424	Nov 10, 2020	Approximate Sample 407g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
FS2	20-No16425	Nov 10, 2020	Approximate Sample 318g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.
FS3	20-No16426	Nov 10, 2020	Approximate Sample 537g Sample consisted of: Fine grained soil and rocks	AF: Chrysotile asbestos detected in the form of loose fibre bundles. Approximate raw weight of AF = 0.00080g* Estimated asbestos content in AF = 0.00080g* Total estimated asbestos concentration in AF = 0.00015% w/w* No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No respirable fibres detected.

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Asbestos - LTM-ASB-8020	Christchurch	Nov 16, 2020	Indefinite

eurofins | Environment Testing

NZBN: 9429046024954 web: www.eurofins.com.au email: EnviroSales@eurofins.com

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448

Company Name: ENGEO Ltd
Address: 6 Antares Place
Rosedale
Auckland New Zealand 0632

Project Name: 4 SCOTT ROAD
Project ID: 17971.000.001

Order No.:
Report #: 756021
Phone: 0011 64 9 9722 205
Fax:

Received: Nov 11, 2020 4:30 PM
Due: Nov 18, 2020
Priority: 5 Day
Contact Name: Claire Davies

Eurofins Analytical Services Manager : Swati Shahaney

Sample Detail	Asbestos - WA guidelines	HOLD	Lead	Moisture Set	Total Petroleum Hydrocarbons (NZ MfE 1999)	Organochlorine Pesticides (NZ MfE)	Metals M8 (NZ MfE)	Polycyclic Aromatic Hydrocarbons (NZ MfE)
Auckland Laboratory - IANZ# 1327		X	X	X	X	X	X	X
Christchurch Laboratory - IANZ# 1290	X							
External Laboratory								

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID							
1	SS01	Nov 10, 2020		Soil	K20-No16399			X		X	X	X
2	SS02	Nov 10, 2020		Soil	K20-No16400			X		X	X	X
3	SS03	Nov 10, 2020		Soil	K20-No16401	X		X	X			
4	SS04	Nov 10, 2020		Soil	K20-No16402			X	X	X	X	X
5	SS05	Nov 10, 2020		Soil	K20-No16403		X					
6	SS06	Nov 10, 2020		Soil	K20-No16404	X		X	X			
7	SS07	Nov 10, 2020		Soil	K20-No16405	X		X	X			
8	SS08	Nov 10, 2020		Soil	K20-No16406				X	X	X	X	X
9	SS09	Nov 10, 2020		Soil	K20-No16407	X		X	X			
10	SS10	Nov 10, 2020		Soil	K20-No16408	X		X	X			
11	SS11	Nov 10, 2020		Soil	K20-No16409	X		X	X			
12	SS12	Nov 10, 2020		Soil	K20-No16410	X		X	X			

eurofins | Environment Testing

NZBN: 9429046024954 web: www.eurofins.com.au email: EnviroSales@eurofins.com

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448

Company Name: ENGEO Ltd
Address: 6 Antares Place
Rosedale
Auckland New Zealand 0632

Project Name: 4 SCOTT ROAD
Project ID: 17971.000.001

Order No.:
Report #: 756021
Phone: 0011 64 9 9722 205
Fax:

Received: Nov 11, 2020 4:30 PM
Due: Nov 18, 2020
Priority: 5 Day
Contact Name: Claire Davies

Eurofins Analytical Services Manager : Swati Shahaney

Sample Detail						Asbestos - WA guidelines	HOLD	Lead	Moisture Set	Total Petroleum Hydrocarbons (NZ MfE 1999)	Organochlorine Pesticides (NZ MfE)	Metals M8 (NZ MfE)	Polycyclic Aromatic Hydrocarbons (NZ MfE)
Auckland Laboratory - IANZ# 1327							X	X	X	X	X	X	X
Christchurch Laboratory - IANZ# 1290						X							
External Laboratory													
13	SS13	Nov 10, 2020		Soil	K20-No16411	X		X	X				
14	SS14	Nov 10, 2020		Soil	K20-No16412	X		X	X				
15	SS15	Nov 10, 2020		Soil	K20-No16413	X		X	X				
16	SS16	Nov 10, 2020		Soil	K20-No16414				X			X	X
17	SS17	Nov 10, 2020		Soil	K20-No16415		X						
18	SS18	Nov 10, 2020		Soil	K20-No16416	X		X	X				
19	SS19	Nov 10, 2020		Soil	K20-No16417	X		X	X				
20	SS20	Nov 10, 2020		Soil	K20-No16418	X		X	X				
21	SS21	Nov 10, 2020		Soil	K20-No16419	X		X	X				
22	SS22	Nov 10, 2020		Soil	K20-No16420	X		X	X				
23	CS01	Nov 10, 2020		Soil	K20-No16421				X		X	X	
24	CS02	Nov 10, 2020		Soil	K20-No16422				X		X	X	
25	CS03	Nov 10, 2020		Soil	K20-No16423				X		X	X	
26	FS1	Nov 10, 2020		Soil	K20-No16424	X			X			X	X

eurofins | Environment Testing

NZBN: 9429046024954 web: www.eurofins.com.au email: EnviroSales@eurofins.com

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448

Company Name: ENGEO Ltd
Address: 6 Antares Place
Rosedale
Auckland New Zealand 0632

Project Name: 4 SCOTT ROAD
Project ID: 17971.000.001

Order No.:
Report #: 756021
Phone: 0011 64 9 9722 205
Fax:

Received: Nov 11, 2020 4:30 PM
Due: Nov 18, 2020
Priority: 5 Day
Contact Name: Claire Davies

Eurofins Analytical Services Manager : Swati Shahaney

Sample Detail						Asbestos - WA guidelines	HOLD	Lead	Moisture Set	Total Petroleum Hydrocarbons (NZ MfE 1999)	Organochlorine Pesticides (NZ MfE)	Metals M8 (NZ MfE)	Polycyclic Aromatic Hydrocarbons (NZ MfE)
Auckland Laboratory - IANZ# 1327							X	X	X	X	X	X	X
Christchurch Laboratory - IANZ# 1290						X							
External Laboratory													
27	FS2	Nov 10, 2020		Soil	K20-No16425	X			X			X	X
28	FS3	Nov 10, 2020		Soil	K20-No16426	X			X			X	X
29	SC01C 0.35	Nov 10, 2020		Soil	K20-No16427		X						
30	PACM1	Nov 10, 2020		Soil	K20-No16428		X						
31	CS01A	Nov 10, 2020		Soil	K20-No16429		X						
32	CS01B	Nov 10, 2020		Soil	K20-No16430		X						
33	CS01C	Nov 10, 2020		Soil	K20-No16431		X						
34	CS02A	Nov 10, 2020		Soil	K20-No16432		X						
35	CS02B	Nov 10, 2020		Soil	K20-No16433		X						
36	CS02C	Nov 10, 2020		Soil	K20-No16434		X						
37	CS03A	Nov 10, 2020		Soil	K20-No16435		X						
38	CS03B	Nov 10, 2020		Soil	K20-No16436		X						
39	CS03C	Nov 10, 2020		Soil	K20-No16437		X						
Test Counts						18	13	15	26	2	7	11	8

Internal Quality Control Review and Glossary

General

1. QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Samples were analysed on an 'as received' basis.
4. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
5. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

Units

% w/w: weight for weight basis	grams per kilogram
Filter loading:	fibres/100 graticule areas
Reported Concentration:	fibres/mL
Flowrate:	L/min

Terms

Dry	Sample is dried by heating prior to analysis
LOR	Limit of Reporting
COC	Chain of Custody
SRA	Sample Receipt Advice
ISO	International Standards Organisation
AS	Australian Standards
WA DOH	Reference document for the NEPM. Government of Western Australia. Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2009), including supporting document Recommended Procedures for Laboratory Analysis of Asbestos in Soil (2011)
NEPM	National Environment Protection (Assessment of Site Contamination) Measure, 2013 (as amended)
ACM	Asbestos Containing Materials. Asbestos contained within a non-asbestos matrix, typically presented in bonded and/or sound condition. For the purposes of the NEPM, ACM is generally restricted to those materials that do not pass a 7mm x 7mm sieve.
AF	Asbestos Fines. Asbestos containing materials, including friable, weathered and bonded materials, able to pass a 7mm x 7mm sieve. Considered under the NEPM as equivalent to “non-bonded / friable”.
FA	Fibrous Asbestos. Asbestos containing materials in a friable and/or severely weathered condition. For the purposes of the NEPM, FA is generally restricted to those materials that do not pass a 7mm x 7mm sieve.
Friable	Asbestos-containing materials of any size that may be broken or crumbled by hand pressure. For the purposes of the NEPM, this includes both AF and FA. It is outside of the laboratory’s remit to assess degree of friability.
Trace Analysis	Analytical procedure used to detect the presence of respirable fibres in the matrix.

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N/A	Not applicable

Asbestos Counter/Identifier:

Katyana Gausel	Senior Analyst-Asbestos (NZS) (Key Technical Personnel)

Authorised by:

Irene Suresh	Senior Analyst-Asbestos (NZS)

Katyana Gausel
Senior Analyst-Asbestos (Key Technical Personnel)

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates ISO/IEC 17025:2017 accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Client Sample ID			SS01	SS02	SS03	SS04
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K20-No16399	K20-No16400	K20-No16401	K20-No16402
Date Sampled			Nov 10, 2020	Nov 10, 2020	Nov 10, 2020	Nov 10, 2020
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.03	< 0.03	-	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.04	0.04	-	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.08	0.07	-	0.08
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.03	< 0.03	-	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.03	< 0.03	-	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	< 0.03	< 0.03	-	< 0.03
Chrysene	0.03	mg/kg	< 0.03	< 0.03	-	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.03	< 0.03	-	< 0.03
Fluoranthene	0.03	mg/kg	< 0.03	0.04	-	0.08
Fluorene	0.03	mg/kg	< 0.03	< 0.03	-	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.03	< 0.03	-	< 0.03
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Phenanthrene	0.03	mg/kg	< 0.03	< 0.03	-	< 0.03
Pyrene	0.03	mg/kg	< 0.03	0.06	-	0.06
p-Terphenyl-d14 (surr.)	1	%	78	70	-	65
2-Fluorobiphenyl (surr.)	1	%	83	75	-	85
Metals M8 (NZ MfE)						
Arsenic	2	mg/kg	10	6.8	-	12
Cadmium	0.4	mg/kg	< 0.4	< 0.4	-	< 0.4
Chromium	5	mg/kg	22	14	-	23
Copper	5	mg/kg	41	9.2	-	19
Lead	5	mg/kg	150	28	-	28
Mercury	0.1	mg/kg	0.2	0.2	-	0.2
Nickel	5	mg/kg	12	7.4	-	12
Zinc	5	mg/kg	48	32	-	70
Lead	5	mg/kg	-	-	12	-
% Moisture	1	%	34	32	33	33
Total Petroleum Hydrocarbons (NZ MfE 1999)						
TPH-SG C7-C9	5	mg/kg	-	-	-	< 5
TPH-SG C10-C14	10	mg/kg	-	-	-	< 10
TPH-SG C15-C36	20	mg/kg	-	-	-	< 20
TPH-SG C7-C36 (Total)	35	mg/kg	-	-	-	< 35

Client Sample ID			SS06	SS07	SS08	SS09
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K20-No16404	K20-No16405	K20-No16406	K20-No16407
Date Sampled			Nov 10, 2020	Nov 10, 2020	Nov 10, 2020	Nov 10, 2020
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
2.4'-DDD	0.01	mg/kg	-	-	< 0.01	-
2.4'-DDE	0.01	mg/kg	-	-	< 0.01	-
2.4'-DDT	0.01	mg/kg	-	-	< 0.01	-
4.4'-DDD	0.01	mg/kg	-	-	< 0.01	-
4.4'-DDE	0.01	mg/kg	-	-	< 0.01	-
4.4'-DDT	0.01	mg/kg	-	-	< 0.01	-
DDT + DDE + DDD (Total)*	0.01	mg/kg	-	-	< 0.01	-
a-BHC	0.01	mg/kg	-	-	< 0.01	-

Client Sample ID			SS06	SS07	SS08	SS09
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K20-No16404	K20-No16405	K20-No16406	K20-No16407
Date Sampled			Nov 10, 2020	Nov 10, 2020	Nov 10, 2020	Nov 10, 2020
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
Aldrin	0.01	mg/kg	-	-	< 0.01	-
b-BHC	0.01	mg/kg	-	-	< 0.01	-
Chlordanes - Total	0.01	mg/kg	-	-	< 0.01	-
cis-Chlordane	0.01	mg/kg	-	-	< 0.01	-
d-BHC	0.01	mg/kg	-	-	< 0.01	-
Dieldrin	0.01	mg/kg	-	-	< 0.01	-
Endosulfan I	0.01	mg/kg	-	-	< 0.01	-
Endosulfan II	0.01	mg/kg	-	-	< 0.01	-
Endosulfan sulphate	0.01	mg/kg	-	-	< 0.01	-
Endrin	0.01	mg/kg	-	-	< 0.01	-
Endrin aldehyde	0.01	mg/kg	-	-	< 0.01	-
Endrin ketone	0.01	mg/kg	-	-	< 0.01	-
g-BHC (Lindane)	0.01	mg/kg	-	-	< 0.01	-
Heptachlor	0.01	mg/kg	-	-	< 0.01	-
Heptachlor epoxide	0.01	mg/kg	-	-	< 0.01	-
Hexachlorobenzene	0.01	mg/kg	-	-	< 0.01	-
Methoxychlor	0.01	mg/kg	-	-	< 0.01	-
Toxaphene	0.1	mg/kg	-	-	< 0.1	-
trans-Chlordane	0.01	mg/kg	-	-	< 0.01	-
Dibutylchlorendate (surr.)	1	%	-	-	85	-
Tetrachloro-m-xylene (surr.)	1	%		-	82	-
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg		-	< 0.03	-
Acenaphthylene	0.03	mg/kg	-	-	< 0.03	-
Anthracene	0.03	mg/kg	-	-	< 0.03	-
Benz(a)anthracene	0.03	mg/kg	-	-	< 0.03	-
Benzo(a)pyrene	0.03	mg/kg	-	-	< 0.03	-
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	-	-	< 0.03	-
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	-	-	0.04	-
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	-	-	0.08	-
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	-	-	< 0.03	-
Benzo(g.h.i)perylene	0.03	mg/kg	-	-	< 0.03	-
Benzo(k)fluoranthene	0.03	mg/kg	-	-	< 0.03	-
Chrysene	0.03	mg/kg	-	-	< 0.03	-
Dibenz(a.h)anthracene	0.03	mg/kg	-	-	< 0.03	-
Fluoranthene	0.03	mg/kg	-	-	< 0.03	-
Fluorene	0.03	mg/kg	-	-	< 0.03	-
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	-	-	< 0.03	-
Naphthalene	0.1	mg/kg	-	-	< 0.1	-
Phenanthrene	0.03	mg/kg	-	-	< 0.03	-
Pyrene	0.03	mg/kg	-	-	< 0.03	-
p-Terphenyl-d14 (surr.)	1	%	-	-	67	-
2-Fluorobiphenyl (surr.)	1	%	-	-	94	-
Metals M8 (NZ MfE)						
Arsenic	2	mg/kg	-	-	21	-
Cadmium	0.4	mg/kg	-	-	< 0.4	-
Chromium	5	mg/kg	-	-	23	-
Copper	5	mg/kg	-	-	25	-
Lead	5	mg/kg	-	-	31	-

Client Sample ID			SS06	SS07	SS08	SS09
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K20-No16404	K20-No16405	K20-No16406	K20-No16407
Date Sampled			Nov 10, 2020	Nov 10, 2020	Nov 10, 2020	Nov 10, 2020
Test/Reference	LOR	Unit				
Metals M8 (NZ MfE)						
Mercury	0.1	mg/kg	-	-	0.1	-
Nickel	5	mg/kg	-	-	11	-
Zinc	5	mg/kg	-	-	79	-
Lead	5	mg/kg	25	44	-	24
% Moisture	1	%	25	32	24	39
Total Petroleum Hydrocarbons (NZ MfE 1999)						
TPH-SG C7-C9	5	mg/kg	-	-	< 5	-
TPH-SG C10-C14	10	mg/kg	-	-	< 10	-
TPH-SG C15-C36	20	mg/kg	-	-	< 20	-
TPH-SG C7-C36 (Total)	35	mg/kg	-	-	< 35	-

Client Sample ID			SS10	SS11	SS12	SS13
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K20-No16408	K20-No16409	K20-No16410	K20-No16411
Date Sampled			Nov 10, 2020	Nov 10, 2020	Nov 10, 2020	Nov 10, 2020
Test/Reference	LOR	Unit				
Metals M8 (NZ MfE)						
Lead	5	mg/kg	23	24	25	15
% Moisture	1	%	37	28	37	24

Client Sample ID			SS14	SS15	SS16	SS18
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K20-No16412	K20-No16413	K20-No16414	K20-No16416
Date Sampled			Nov 10, 2020	Nov 10, 2020	Nov 10, 2020	Nov 10, 2020
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	-	-	< 0.03	-
Acenaphthylene	0.03	mg/kg	-	-	< 0.03	-
Anthracene	0.03	mg/kg	-	-	< 0.03	-
Benz(a)anthracene	0.03	mg/kg	-	-	< 0.03	-
Benzo(a)pyrene	0.03	mg/kg	-	-	< 0.03	-
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	-	-	< 0.03	-
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	-	-	0.04	-
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	-	-	0.08	-
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	-	-	< 0.03	-
Benzo(g.h.i)perylene	0.03	mg/kg	-	-	< 0.03	-
Benzo(k)fluoranthene	0.03	mg/kg	-	-	< 0.03	-
Chrysene	0.03	mg/kg	-	-	< 0.03	-
Dibenz(a.h)anthracene	0.03	mg/kg	-	-	< 0.03	-
Fluoranthene	0.03	mg/kg	-	-	< 0.03	-
Fluorene	0.03	mg/kg	-	-	< 0.03	-
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	-	-	< 0.03	-
Naphthalene	0.1	mg/kg	-	-	< 0.1	-
Phenanthrene	0.03	mg/kg	-	-	< 0.03	-

Client Sample ID			SS14	SS15	SS16	SS18
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K20-No16412	K20-No16413	K20-No16414	K20-No16416
Date Sampled			Nov 10, 2020	Nov 10, 2020	Nov 10, 2020	Nov 10, 2020
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Pyrene	0.03	mg/kg	-	-	< 0.03	-
p-Terphenyl-d14 (surr.)	1	%	-	-	64	-
2-Fluorobiphenyl (surr.)	1	%	-	-	91	-
Metals M8 (NZ MfE)						
Arsenic	2	mg/kg	-	-	6.7	-
Cadmium	0.4	mg/kg	-	-	< 0.4	-
Chromium	5	mg/kg	-	-	15	-
Copper	5	mg/kg	-	-	17	-
Lead	5	mg/kg	-	-	22	-
Mercury	0.1	mg/kg	-	-	0.1	-
Nickel	5	mg/kg	-	-	7.8	-
Zinc	5	mg/kg	-	-	56	-
Lead	5	mg/kg	26	30	-	110
% Moisture	1	%	28	30	46	37

Client Sample ID			SS19	SS20	SS21	SS22
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K20-No16417	K20-No16418	K20-No16419	K20-No16420
Date Sampled			Nov 10, 2020	Nov 10, 2020	Nov 10, 2020	Nov 10, 2020
Test/Reference	LOR	Unit				
Metals M8 (NZ MfE)						
Lead	5	mg/kg	220	110	120	320
% Moisture	1	%	24	30	24	23

Client Sample ID			CS01	CS02	CS03	FS1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K20-No16421	K20-No16422	K20-No16423	K20-No16424
Date Sampled			Nov 10, 2020	Nov 10, 2020	Nov 10, 2020	Nov 10, 2020
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
2.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
2.4'-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
2.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
4.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
4.4'-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
4.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
DDT + DDE + DDD (Total)*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
a-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Aldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
b-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Chlordanes - Total	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
cis-Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
d-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-

Client Sample ID			CS01	CS02	CS03	FS1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K20-No16421	K20-No16422	K20-No16423	K20-No16424
Date Sampled			Nov 10, 2020	Nov 10, 2020	Nov 10, 2020	Nov 10, 2020
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Endosulfan sulphate	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Endrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Endrin aldehyde	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Endrin ketone	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
g-BHC (Lindane)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Heptachlor epoxide	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Hexachlorobenzene	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Methoxychlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Toxaphene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	-
trans-Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	-
Dibutylchlorendate (surr.)	1	%	91	76	91	-
Tetrachloro-m-xylene (surr.)	1	%	76	84	75	-
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	-	-	-	< 0.03
Acenaphthylene	0.03	mg/kg	-	-	-	< 0.03
Anthracene	0.03	mg/kg	-	-	-	< 0.03
Benz(a)anthracene	0.03	mg/kg	-	-	-	0.04
Benzo(a)pyrene	0.03	mg/kg	-	-	-	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	-	-	-	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	-	-	-	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	-	-	-	0.07
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	-	-	-	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	-	-	-	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	-	-	-	< 0.03
Chrysene	0.03	mg/kg	-	-	-	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	-	-	-	< 0.03
Fluoranthene	0.03	mg/kg	-	-	-	0.06
Fluorene	0.03	mg/kg	-	-	-	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	-	-	-	< 0.03
Naphthalene	0.1	mg/kg	-	-	-	< 0.1
Phenanthrene	0.03	mg/kg	-	-	-	0.06
Pyrene	0.03	mg/kg	-	-	-	0.09
p-Terphenyl-d14 (surr.)	1	%	-	-	-	85
2-Fluorobiphenyl (surr.)	1	%	-	-	-	109
Metals M8 (NZ MfE)						
Arsenic	2	mg/kg	4.3	6.0	11	7.8
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	8.8	8.5	23	9.4
Copper	5	mg/kg	16	7.4	16	9.0
Lead	5	mg/kg	23	16	27	19
Mercury	0.1	mg/kg	0.1	0.1	0.2	< 0.1
Nickel	5	mg/kg	< 5	< 5	11	< 5
Zinc	5	mg/kg	54	22	37	40
% Moisture	1	%	34	35	33	31

Client Sample ID			FS2	FS3
Sample Matrix			Soil	Soil
Eurofins Sample No.			K20-No16425	K20-No16426
Date Sampled			Nov 10, 2020	Nov 10, 2020
Test/Reference	LOR	Unit		
Polycyclic Aromatic Hydrocarbons (NZ MfE)				
Acenaphthene	0.03	mg/kg	< 0.03	< 0.03
Acenaphthylene	0.03	mg/kg	< 0.03	< 0.03
Anthracene	0.03	mg/kg	< 0.03	0.07
Benz(a)anthracene	0.03	mg/kg	0.08	0.17
Benzo(a)pyrene	0.03	mg/kg	0.05	0.17
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	0.07	0.22
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.09	0.24
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.10	0.25
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	0.06	0.11
Benzo(g.h.i)perylene	0.03	mg/kg	0.03	0.07
Benzo(k)fluoranthene	0.03	mg/kg	0.05	0.15
Chrysene	0.03	mg/kg	0.08	0.19
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.03	< 0.03
Fluoranthene	0.03	mg/kg	0.12	0.38
Fluorene	0.03	mg/kg	< 0.03	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.03	0.04
Naphthalene	0.1	mg/kg	< 0.1	< 0.1
Phenanthrene	0.03	mg/kg	0.06	0.18
Pyrene	0.03	mg/kg	0.14	0.36
p-Terphenyl-d14 (surr.)	1	%	77	84
2-Fluorobiphenyl (surr.)	1	%	103	111
Metals M8 (NZ MfE)				
Arsenic	2	mg/kg	14	5.0
Cadmium	0.4	mg/kg	< 0.4	< 0.4
Chromium	5	mg/kg	9.0	8.3
Copper	5	mg/kg	17	12
Lead	5	mg/kg	29	49
Mercury	0.1	mg/kg	< 0.1	0.1
Nickel	5	mg/kg	17	< 5
Zinc	5	mg/kg	79	90
% Moisture	1	%	35	28

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Organochlorine Pesticides (NZ MfE)	Auckland	Nov 13, 2020	14 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water by GCMSMS			
Polycyclic Aromatic Hydrocarbons (NZ MfE)	Auckland	Nov 16, 2020	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water by GC MSMS			
Metals M8 (NZ MfE)	Auckland	Nov 16, 2020	6 Months
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Total Petroleum Hydrocarbons (NZ MfE 1999)	Auckland	Nov 13, 2020	14 Days
- Method: LTM-ORG-2010 TRH and BTEX in Soil and Water by GC FID and PT GCMS			
% Moisture	Auckland	Nov 16, 2020	14 Days
- Method: LTM-GEN-7080 Moisture Content in Soil by Gravimetry			

eurofins | Environment Testing

NZBN: 9429046024954 web: www.eurofins.com.au email: EnviroSales@eurofins.com

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448

Company Name: ENGEO Ltd
Address: 6 Antares Place
Rosedale
Auckland New Zealand 0632

Project Name: 4 SCOTT ROAD
Project ID: 17971.000.001

Order No.:
Report #: 756021
Phone: 0011 64 9 9722 205
Fax:

Received: Nov 11, 2020 4:30 PM
Due: Nov 18, 2020
Priority: 5 Day
Contact Name: Claire Davies

Eurofins Analytical Services Manager : Swati Shahaney

Sample Detail	Asbestos - WA guidelines	HOLD	Lead	Moisture Set	Total Petroleum Hydrocarbons (NZ MfE 1999)	Organochlorine Pesticides (NZ MfE)	Metals M8 (NZ MfE)	Polycyclic Aromatic Hydrocarbons (NZ MfE)
Auckland Laboratory - IANZ# 1327		X	X	X	X	X	X	X
Christchurch Laboratory - IANZ# 1290	X							
External Laboratory								

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID							
1	SS01	Nov 10, 2020		Soil	K20-No16399			X		X	X	X
2	SS02	Nov 10, 2020		Soil	K20-No16400			X		X	X	X
3	SS03	Nov 10, 2020		Soil	K20-No16401	X		X	X			
4	SS04	Nov 10, 2020		Soil	K20-No16402			X	X	X	X	X
5	SS05	Nov 10, 2020		Soil	K20-No16403		X					
6	SS06	Nov 10, 2020		Soil	K20-No16404	X		X	X			
7	SS07	Nov 10, 2020		Soil	K20-No16405	X		X	X			
8	SS08	Nov 10, 2020		Soil	K20-No16406				X	X	X	X	X
9	SS09	Nov 10, 2020		Soil	K20-No16407	X		X	X			
10	SS10	Nov 10, 2020		Soil	K20-No16408	X		X	X			
11	SS11	Nov 10, 2020		Soil	K20-No16409	X		X	X			
12	SS12	Nov 10, 2020		Soil	K20-No16410	X		X	X			

eurofins | Environment Testing

NZBN: 9429046024954 web: www.eurofins.com.au email: EnviroSales@eurofins.com

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448

Company Name: ENGEO Ltd
Address: 6 Antares Place
Rosedale
Auckland New Zealand 0632

Project Name: 4 SCOTT ROAD
Project ID: 17971.000.001

Order No.:
Report #: 756021
Phone: 0011 64 9 9722 205
Fax:

Received: Nov 11, 2020 4:30 PM
Due: Nov 18, 2020
Priority: 5 Day
Contact Name: Claire Davies

Eurofins Analytical Services Manager : Swati Shahaney

Sample Detail						Asbestos - WA guidelines	HOLD	Lead	Moisture Set	Total Petroleum Hydrocarbons (NZ MfE 1999)	Organochlorine Pesticides (NZ MfE)	Metals M8 (NZ MfE)	Polycyclic Aromatic Hydrocarbons (NZ MfE)
Auckland Laboratory - IANZ# 1327							X	X	X	X	X	X	X
Christchurch Laboratory - IANZ# 1290						X							
External Laboratory													
13	SS13	Nov 10, 2020		Soil	K20-No16411	X		X	X				
14	SS14	Nov 10, 2020		Soil	K20-No16412	X		X	X				
15	SS15	Nov 10, 2020		Soil	K20-No16413	X		X	X				
16	SS16	Nov 10, 2020		Soil	K20-No16414				X			X	X
17	SS17	Nov 10, 2020		Soil	K20-No16415		X						
18	SS18	Nov 10, 2020		Soil	K20-No16416	X		X	X				
19	SS19	Nov 10, 2020		Soil	K20-No16417	X		X	X				
20	SS20	Nov 10, 2020		Soil	K20-No16418	X		X	X				
21	SS21	Nov 10, 2020		Soil	K20-No16419	X		X	X				
22	SS22	Nov 10, 2020		Soil	K20-No16420	X		X	X				
23	CS01	Nov 10, 2020		Soil	K20-No16421				X		X	X	
24	CS02	Nov 10, 2020		Soil	K20-No16422				X		X	X	
25	CS03	Nov 10, 2020		Soil	K20-No16423				X		X	X	
26	FS1	Nov 10, 2020		Soil	K20-No16424	X			X			X	X

eurofins | Environment Testing

NZBN: 9429046024954 web: www.eurofins.com.au email: EnviroSales@eurofins.com

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448

Company Name: ENGEO Ltd
Address: 6 Antares Place
Rosedale
Auckland New Zealand 0632

Project Name: 4 SCOTT ROAD
Project ID: 17971.000.001

Order No.:
Report #: 756021
Phone: 0011 64 9 9722 205
Fax:

Received: Nov 11, 2020 4:30 PM
Due: Nov 18, 2020
Priority: 5 Day
Contact Name: Claire Davies

Eurofins Analytical Services Manager : Swati Shahaney

Sample Detail						Asbestos - WA guidelines	HOLD	Lead	Moisture Set	Total Petroleum Hydrocarbons (NZ MfE 1999)	Organochlorine Pesticides (NZ MfE)	Metals M8 (NZ MfE)	Polycyclic Aromatic Hydrocarbons (NZ MfE)
Auckland Laboratory - IANZ# 1327							X	X	X	X	X	X	X
Christchurch Laboratory - IANZ# 1290						X							
External Laboratory													
27	FS2	Nov 10, 2020		Soil	K20-No16425	X			X			X	X
28	FS3	Nov 10, 2020		Soil	K20-No16426	X			X			X	X
29	SC01C 0.35	Nov 10, 2020		Soil	K20-No16427		X						
30	PACM1	Nov 10, 2020		Soil	K20-No16428		X						
31	CS01A	Nov 10, 2020		Soil	K20-No16429		X						
32	CS01B	Nov 10, 2020		Soil	K20-No16430		X						
33	CS01C	Nov 10, 2020		Soil	K20-No16431		X						
34	CS02A	Nov 10, 2020		Soil	K20-No16432		X						
35	CS02B	Nov 10, 2020		Soil	K20-No16433		X						
36	CS02C	Nov 10, 2020		Soil	K20-No16434		X						
37	CS03A	Nov 10, 2020		Soil	K20-No16435		X						
38	CS03B	Nov 10, 2020		Soil	K20-No16436		X						
39	CS03C	Nov 10, 2020		Soil	K20-No16437		X						
Test Counts						18	13	15	26	2	7	11	8

eurofins | Environment Testing

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram | **mg/L:** milligrams per litre | **ug/L:** micrograms per litre

ppm: Parts per million | **ppb:** Parts per billion | **%:** Percentage

org/100mL: Organisms per 100 millilitres | **NTU:** Nephelometric Turbidity Units | **MPN/100mL:** Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Organochlorine Pesticides (NZ MfE)							
2.4'-DDD	mg/kg	< 0.01			0.01	Pass	
2.4'-DDE	mg/kg	< 0.01			0.01	Pass	
2.4'-DDT	mg/kg	< 0.01			0.01	Pass	
4.4'-DDD	mg/kg	< 0.01			0.01	Pass	
4.4'-DDE	mg/kg	< 0.01			0.01	Pass	
4.4'-DDT	mg/kg	< 0.01			0.01	Pass	
a-BHC	mg/kg	< 0.01			0.01	Pass	
Aldrin	mg/kg	< 0.01			0.01	Pass	
b-BHC	mg/kg	< 0.01			0.01	Pass	
Chlordanes - Total	mg/kg	< 0.01			0.01	Pass	
cis-Chlordane	mg/kg	< 0.01			0.01	Pass	
d-BHC	mg/kg	< 0.01			0.01	Pass	
Dieldrin	mg/kg	< 0.01			0.01	Pass	
Endosulfan I	mg/kg	< 0.01			0.01	Pass	
Endosulfan II	mg/kg	< 0.01			0.01	Pass	
Endosulfan sulphate	mg/kg	< 0.01			0.01	Pass	
Endrin	mg/kg	< 0.01			0.01	Pass	
Endrin aldehyde	mg/kg	< 0.01			0.01	Pass	
Endrin ketone	mg/kg	< 0.01			0.01	Pass	
g-BHC (Lindane)	mg/kg	< 0.01			0.01	Pass	
Heptachlor	mg/kg	< 0.01			0.01	Pass	
Heptachlor epoxide	mg/kg	< 0.01			0.01	Pass	
Hexachlorobenzene	mg/kg	< 0.01			0.01	Pass	
Methoxychlor	mg/kg	< 0.01			0.01	Pass	
Toxaphene	mg/kg	< 0.1			0.1	Pass	
trans-Chlordane	mg/kg	< 0.01			0.01	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons (NZ MfE)							
Acenaphthene	mg/kg	< 0.03			0.03	Pass	
Acenaphthylene	mg/kg	< 0.03			0.03	Pass	
Anthracene	mg/kg	< 0.03			0.03	Pass	
Benz(a)anthracene	mg/kg	< 0.03			0.03	Pass	
Benzo(a)pyrene	mg/kg	< 0.03			0.03	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.03			0.03	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.03			0.03	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.03			0.03	Pass	
Chrysene	mg/kg	< 0.03			0.03	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.03			0.03	Pass	
Fluoranthene	mg/kg	< 0.03			0.03	Pass	
Fluorene	mg/kg	< 0.03			0.03	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.03			0.03	Pass	
Naphthalene	mg/kg	< 0.1			0.1	Pass	
Phenanthrene	mg/kg	< 0.03			0.03	Pass	
Pyrene	mg/kg	< 0.03			0.03	Pass	
Method Blank							
Metals M8 (NZ MfE)							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Method Blank							
Total Petroleum Hydrocarbons (NZ MfE 1999)							
TPH-SG C7-C9	mg/kg	< 5			5	Pass	
TPH-SG C10-C14	mg/kg	< 10			10	Pass	
TPH-SG C15-C36	mg/kg	< 20			20	Pass	
TPH-SG C7-C36 (Total)	mg/kg	< 35			35	Pass	
LCS - % Recovery							
Organochlorine Pesticides (NZ MfE)							
2.4'-DDD	%	94			70-130	Pass	
2.4'-DDE	%	104			70-130	Pass	
2.4'-DDT	%	86			70-130	Pass	
4.4'-DDD	%	96			70-130	Pass	
4.4'-DDE	%	108			70-130	Pass	
4.4'-DDT	%	104			70-130	Pass	
a-BHC	%	104			70-130	Pass	
Aldrin	%	102			70-130	Pass	
b-BHC	%	111			70-130	Pass	
Chlordanes - Total	%	105			70-130	Pass	
cis-Chlordane	%	110			70-130	Pass	
d-BHC	%	104			70-130	Pass	
Dieldrin	%	101			70-130	Pass	
Endosulfan I	%	113			70-130	Pass	
Endosulfan II	%	93			70-130	Pass	
Endosulfan sulphate	%	102			70-130	Pass	
Endrin	%	109			70-130	Pass	
Endrin aldehyde	%	115			70-130	Pass	
Endrin ketone	%	126			70-130	Pass	
g-BHC (Lindane)	%	102			70-130	Pass	
Heptachlor	%	109			70-130	Pass	
Heptachlor epoxide	%	102			70-130	Pass	
Hexachlorobenzene	%	104			70-130	Pass	
Methoxychlor	%	85			70-130	Pass	
trans-Chlordane	%	101			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons (NZ MfE)							
Acenaphthene	%	104			70-130	Pass	
Acenaphthylene	%	102			70-130	Pass	
Anthracene	%	81			70-130	Pass	
Benz(a)anthracene	%	102			70-130	Pass	
Benzo(a)pyrene	%	118			70-130	Pass	
Benzo(b&j)fluoranthene	%	80			70-130	Pass	
Benzo(g.h.i)perylene	%	104			70-130	Pass	
Benzo(k)fluoranthene	%	93			70-130	Pass	
Chrysene	%	108			70-130	Pass	
Dibenz(a.h)anthracene	%	83			70-130	Pass	
Fluoranthene	%	92			70-130	Pass	
Fluorene	%	99			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	80			70-130	Pass	
Naphthalene	%	103			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Phenanthrene	%	102			70-130	Pass	
Pyrene	%	94			70-130	Pass	
LCS - % Recovery							
Metals M8 (NZ MfE)							
Arsenic	%	115			80-120	Pass	
Cadmium	%	111			80-120	Pass	
Chromium	%	108			80-120	Pass	
Copper	%	108			80-120	Pass	
Lead	%	114			80-120	Pass	
Mercury	%	106			80-120	Pass	
Nickel	%	105			80-120	Pass	
Zinc	%	117			80-120	Pass	
Lead	%	103			80-120	Pass	
LCS - % Recovery							
Total Petroleum Hydrocarbons (NZ MfE 1999)							
TPH-SG C7-C9	%	126			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Organochlorine Pesticides (NZ MfE)				Result 1					
2.4'-DDT	K20-No19419	NCP	%	117			70-130	Pass	
Endrin ketone	K20-No11615	NCP	%	127			70-130	Pass	
Spike - % Recovery									
Total Petroleum Hydrocarbons (NZ MfE 1999)				Result 1					
TPH-SG C7-C9	K20-No19567	NCP	%	116			70-130	Pass	
Spike - % Recovery									
Metals M8 (NZ MfE)				Result 1					
Arsenic	K20-No16408	CP	%	97			75-125	Pass	
Cadmium	K20-No16408	CP	%	99			75-125	Pass	
Chromium	K20-No16408	CP	%	91			75-125	Pass	
Copper	K20-No16408	CP	%	88			75-125	Pass	
Lead	K20-No16408	CP	%	98			75-125	Pass	
Mercury	K20-No16408	CP	%	96			75-125	Pass	
Nickel	K20-No16408	CP	%	88			75-125	Pass	
Zinc	K20-No16408	CP	%	95			75-125	Pass	
Spike - % Recovery									
Metals M8 (NZ MfE)				Result 1					
Arsenic	K20-No16420	CP	%	103			75-125	Pass	
Cadmium	K20-No16420	CP	%	101			75-125	Pass	
Chromium	K20-No16420	CP	%	92			75-125	Pass	
Copper	K20-No16420	CP	%	94			75-125	Pass	
Lead	K20-No16420	CP	%	86			75-125	Pass	
Mercury	K20-No16420	CP	%	97			75-125	Pass	
Nickel	K20-No16420	CP	%	91			75-125	Pass	
Spike - % Recovery									
Organochlorine Pesticides (NZ MfE)				Result 1					
2.4'-DDD	K20-No16422	CP	%	105			70-130	Pass	
2.4'-DDE	K20-No16422	CP	%	123			70-130	Pass	
4.4'-DDD	K20-No16422	CP	%	98			70-130	Pass	
4.4'-DDE	K20-No16422	CP	%	120			70-130	Pass	
4.4'-DDT	K20-No16422	CP	%	117			70-130	Pass	
a-BHC	K20-No16422	CP	%	115			70-130	Pass	
Aldrin	K20-No16422	CP	%	120			70-130	Pass	
b-BHC	K20-No16422	CP	%	118			70-130	Pass	
Chlordanes - Total	K20-No16422	CP	%	107			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
cis-Chlordane	K20-No16422	CP	%	101			70-130	Pass	
d-BHC	K20-No16422	CP	%	118			70-130	Pass	
Dieldrin	K20-No16422	CP	%	109			70-130	Pass	
Endosulfan I	K20-No16422	CP	%	123			70-130	Pass	
Endosulfan II	K20-No16422	CP	%	115			70-130	Pass	
Endosulfan sulphate	K20-No16422	CP	%	119			70-130	Pass	
Endrin	K20-No16422	CP	%	110			70-130	Pass	
Endrin aldehyde	K20-No16422	CP	%	114			70-130	Pass	
g-BHC (Lindane)	K20-No16422	CP	%	83			70-130	Pass	
Heptachlor	K20-No16422	CP	%	122			70-130	Pass	
Heptachlor epoxide	K20-No16422	CP	%	96			70-130	Pass	
Hexachlorobenzene	K20-No16422	CP	%	114			70-130	Pass	
Methoxychlor	K20-No16422	CP	%	85			70-130	Pass	
trans-Chlordane	K20-No16422	CP	%	113			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1					
Acenaphthene	K20-No16422	CP	%	105			70-130	Pass	
Acenaphthylene	K20-No16422	CP	%	112			70-130	Pass	
Anthracene	K20-No16422	CP	%	96			70-130	Pass	
Benz(a)anthracene	K20-No16422	CP	%	106			70-130	Pass	
Benzo(a)pyrene	K20-No16422	CP	%	100			70-130	Pass	
Benzo(b&j)fluoranthene	K20-No16422	CP	%	91			70-130	Pass	
Benzo(g.h.i)perylene	K20-No16422	CP	%	103			70-130	Pass	
Benzo(k)fluoranthene	K20-No16422	CP	%	110			70-130	Pass	
Chrysene	K20-No16422	CP	%	110			70-130	Pass	
Dibenz(a.h)anthracene	K20-No16422	CP	%	88			70-130	Pass	
Fluoranthene	K20-No16422	CP	%	102			70-130	Pass	
Fluorene	K20-No16422	CP	%	103			70-130	Pass	
Indeno(1.2.3-cd)pyrene	K20-No16422	CP	%	85			70-130	Pass	
Naphthalene	K20-No16422	CP	%	104			70-130	Pass	
Phenanthrene	K20-No16422	CP	%	106			70-130	Pass	
Pyrene	K20-No16422	CP	%	101			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	K20-No16401	CP	%	33	34	2.0	30%	Pass	
Duplicate									
Total Petroleum Hydrocarbons (NZ MfE 1999)				Result 1	Result 2	RPD			
TPH-SG C7-C9	K20-No16402	CP	mg/kg	< 5	< 5	<1	30%	Pass	
TPH-SG C10-C14	K20-No16402	CP	mg/kg	< 10	< 10	<1	30%	Pass	
TPH-SG C15-C36	K20-No16402	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TPH-SG C7-C36 (Total)	K20-No16402	CP	mg/kg	< 35	< 35	<1	30%	Pass	
Duplicate									
Metals M8 (NZ MfE)				Result 1	Result 2	RPD			
Arsenic	K20-No16407	CP	mg/kg	6.6	6.3	4.0	30%	Pass	
Cadmium	K20-No16407	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	K20-No16407	CP	mg/kg	19	18	5.0	30%	Pass	
Copper	K20-No16407	CP	mg/kg	12	12	3.0	30%	Pass	
Lead	K20-No16407	CP	mg/kg	24	22	8.0	30%	Pass	
Mercury	K20-No16407	CP	mg/kg	0.1	0.1	8.0	30%	Pass	
Nickel	K20-No16407	CP	mg/kg	6.1	6.1	1.0	30%	Pass	
Zinc	K20-No16407	CP	mg/kg	44	40	8.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	K20-No16407	CP	%	39	37	7.0	30%	Pass	

Duplicate									
Metals M8 (NZ MfE)				Result 1	Result 2	RPD			
Arsenic	K20-No16419	CP	mg/kg	14	14	3.0	30%	Pass	
Cadmium	K20-No16419	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	K20-No16419	CP	mg/kg	21	23	11	30%	Pass	
Copper	K20-No16419	CP	mg/kg	19	21	8.0	30%	Pass	
Lead	K20-No16419	CP	mg/kg	120	120	1.0	30%	Pass	
Mercury	K20-No16419	CP	mg/kg	0.3	0.4	31	30%	Fail	Q15
Nickel	K20-No16419	CP	mg/kg	11	12	7.0	30%	Pass	
Zinc	K20-No16419	CP	mg/kg	230	230	2.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	K20-No16419	CP	%	24	24	2.0	30%	Pass	
Duplicate									
Organochlorine Pesticides (NZ MfE)				Result 1	Result 2	RPD			
2.4'-DDD	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
2.4'-DDE	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
2.4'-DDT	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
4.4'-DDD	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
4.4'-DDE	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
4.4'-DDT	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
a-BHC	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Aldrin	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
b-BHC	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Chlordanes - Total	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
cis-Chlordane	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
d-BHC	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Dieldrin	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan I	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan II	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan sulphate	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin aldehyde	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin ketone	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
g-BHC (Lindane)	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor epoxide	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Hexachlorobenzene	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Methoxychlor	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
trans-Chlordane	K20-No16421	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1	Result 2	RPD			
Acenaphthene	K20-No16421	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Acenaphthylene	K20-No16421	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Anthracene	K20-No16421	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benz(a)anthracene	K20-No16421	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(a)pyrene	K20-No16421	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(b&j)fluoranthene	K20-No16421	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(g,h,i)perylene	K20-No16421	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(k)fluoranthene	K20-No16421	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Chrysene	K20-No16421	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Dibenz(a,h)anthracene	K20-No16421	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Fluoranthene	K20-No16421	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Fluorene	K20-No16421	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Indeno(1,2,3-cd)pyrene	K20-No16421	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Naphthalene	K20-No16421	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	

Duplicate									
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1	Result 2	RPD			
Phenanthrene	K20-No16421	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Pyrene	K20-No16421	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

Swati Shahaney	Analytical Services Manager
Michael Ritchie	Senior Analyst-Organic (NZN)
Shasti Ramachandran	Senior Analyst-Metal (NZN)

Michael Ritchie
Head of Semi Volatiles (Key Technical Personnel)

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates IANZ accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

URBAN ECONOMICS

6/04/2021

To Aedifice development Ltd,

RE: Economic & Market Commentary 4 Scott Road

This report provides a brief economic and market commentary to support the possible fast-tracking of a Resource Consent application for a proposed residential development located at 4 Scott Road, Hobsonville.

The proposed development is for 425 units, comprised of 2, 3 and 4 bedroom terrace houses, and 1, 1.5, and 2 bedroom walk up apartments.

The proposed development is primarily targeting the affordable housing and first home buyer market. The majority of dwellings would fall within the s 9(2)(b)(ii) price range, however with a small number of units (around 28%) achieving a higher price of s 9(2)(b)(ii)

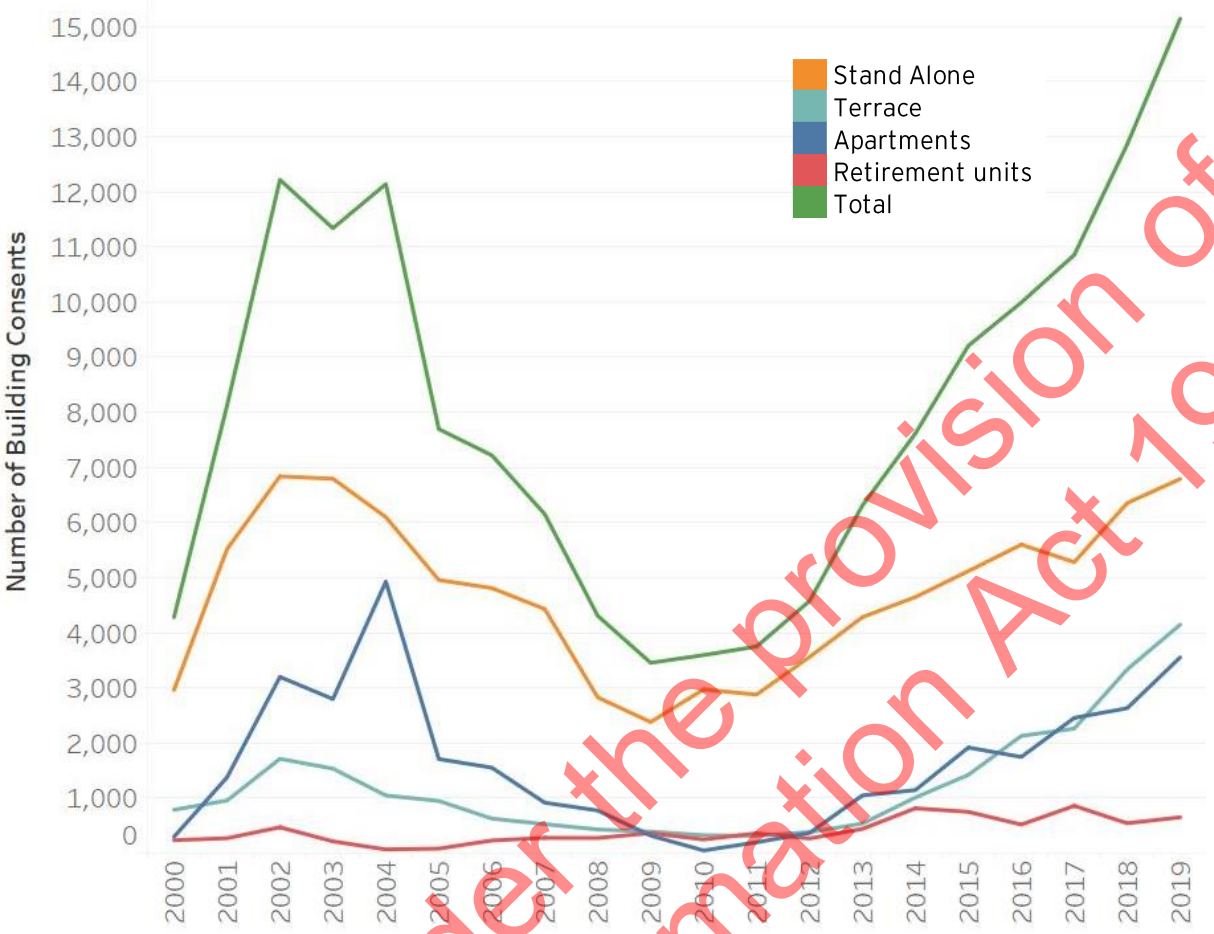
The relevant parts of the COVID-19 Recovery (Fast-track Consenting) Act 2020 are addressed as follows.

The project's economic benefits and costs for people or industries affected by COVID-19 (see section 19(a)).

Historically the construction sector has followed the wider economy closely. The global financial crisis of 2008 saw an accompanying drop off in new dwellings consented. As displayed in the following figure, recovery was also particularly slow. It wasn't until 2017 that building consents recovered to the previous peak of 12,000 consented dwellings per annum last seen in 2005.

Covid-19 has forced New Zealand's borders shut. Record high immigration has dropped away to zero immigration. This is likely to result in a decline in the number of houses demanded and thus constructed, and place considerable pressure on the construction sector over the coming years.

Figure 1: Building Consents by Product Type: Auckland Region (2000 – 2019)



The proposed development would create a considerable number of jobs within the construction industry. The national 'value added per employee' for each sector has been used to estimate the full time equivalent (FTE) employment for this project. It is estimated that the construction of 425 dwellings at 4 Scott Road would generate 1,079 FTE jobs. This number can be interpreted as the number of FTE jobs created on an annualised basis, i.e., if construction takes three years and is split evenly between the years then 360 FTE jobs would be created in each year.

Figure 2: FTE Employee Estimates from Proposed Development

Product	Expenditure ($m)	FTE Employees
1 Bedroom	s 9(2)(b)(ii)	94
1.5 Bedroom		77
2 Bedroom		447
3 Bedroom		439
4 Bedroom		22
Total		**1,079**

Source: Statistics NZ, Urban Economics

Figure 3 shows the estimated national 'value added per FTE employee'. The value added per employee figures are used to estimate the FTE employees created by the construction project expenditure outlined in Figure 2. Figure 3 shows that the construction sector has a $18.5B contribution to national GDP and a workforce of 139,800 FTEs. This results in a value added of $133,000 per FTE employee.

Figure 3: Industry GDP and Value Added per Employee

Industry	Contribution to GDP ($m)	FTE Workers	Value Added Per Employee
Construction	$18,540	139,800	$133,000

Source: Statistics NZ, Urban Economics

The project's effect on the social and cultural well-being of current and future generations (see section 19(b)).

The project would provide employment and a diverse range of housing types. Most notably, the project would have a positive impact on the social and cultural well-being of current and future generations by providing affordable housing.

The following figure displays the proposed composition of the development. 38% of the proposed dwellings are Kiwibuild dwellings. These have a maximum price of s 9(2)(b)(ii) for 1 bedroom dwellings, s 9(2)(b)(ii) for a 2 bedroom dwellings and s 9(2)(b)(ii) for a 3 bedroom dwellings. Providing new, affordable dwellings up to modern building standards reduces the social pressures caused by inadequate housing.

Figure 4: Development Composition

		Price	Number	Proportion
Kiwibuild Terrace	2 bed	s 9(2)(b)(ii)	33	8%
	3 bed		38	9%
	Subtotal		71	17%
Kiwibuild Apartment	1 bed		50	12%
	1.5 bed		11	3%
	2 bed		30	7%
	Subtotal		91	21%
Open Market	1.5 bed		26	6%
	2 bed		116	27%
	3 bed		115	27%
	4 bed		6	1%
	Subtotal		263	62%
Total			425	100%

Source: Kiwibuild, BDG, Urban Economics
*indicative average

If applicable, whether the project may result in a public benefit by generating employment (see section 19(d)(i)).

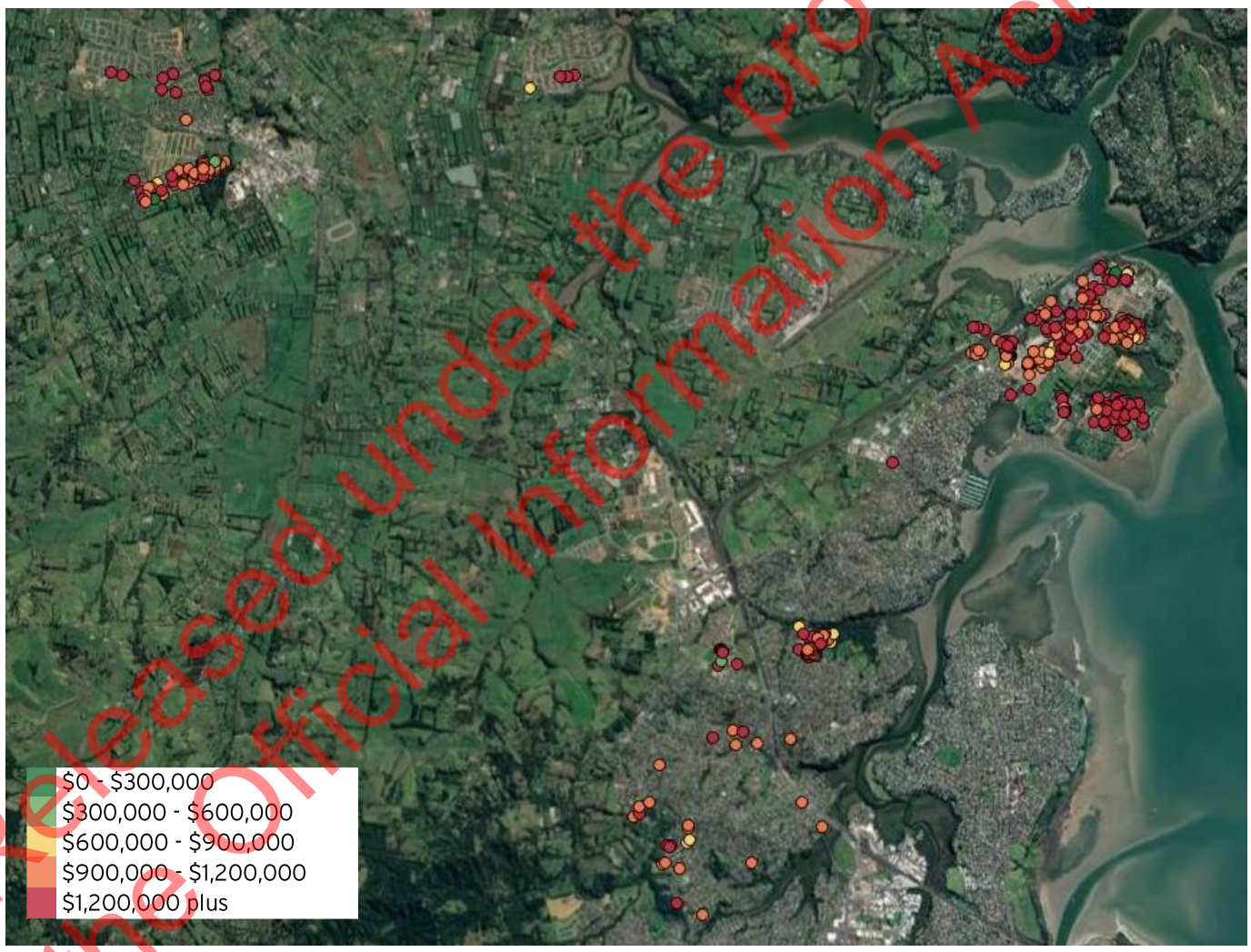
As outlined above, the project would create an estimated 1,079 FTE jobs. These jobs would be in roading, construction, landscaping, planting, land surveying, administration and support services and other related activities.

If applicable, whether the project may result in a public benefit by increasing housing supply (see section 19(d)(ii)).

The project would increase housing by supplying 425 new 1 – 4 bedroom dwellings to the market. In particular, the project would provide housing in currently undersupplied affordable price brackets.

A catchment encompassing an approximately 10km radius from the site has been constructed to analyse whether this requirement is being met. Each point represents a sale of a new dwelling over the past year.

Figure 5: Catchment Map



Source: Corelogic

The following bar graphs display residential sales for new dwellings in the catchment and the Auckland urban area for the past year. Most notably, 11% of new dwellings sold in the Auckland urban area over the past year were priced between $600,000 - $700,000. By contrast, only 7% of dwellings sold in the catchment fell into this price range. This indicates a shortage of affordable housing in the catchment.

As displayed in figure 4 above, 38% of the proposed dwellings are Kiwibuild. These dwellings have a maximum price of s 9(2)(b)(ii) for 1 bedroom dwellings, s 9(2)(b)(ii) for 2 bedroom dwellings and s 9(2)(b)(ii) for 3 bedroom dwellings. These dwellings would provide much needed supply to undersupplied s 9(2)(b)(ii) price bracket in the catchment area.

Figure 6: Catchment Dwelling Sales

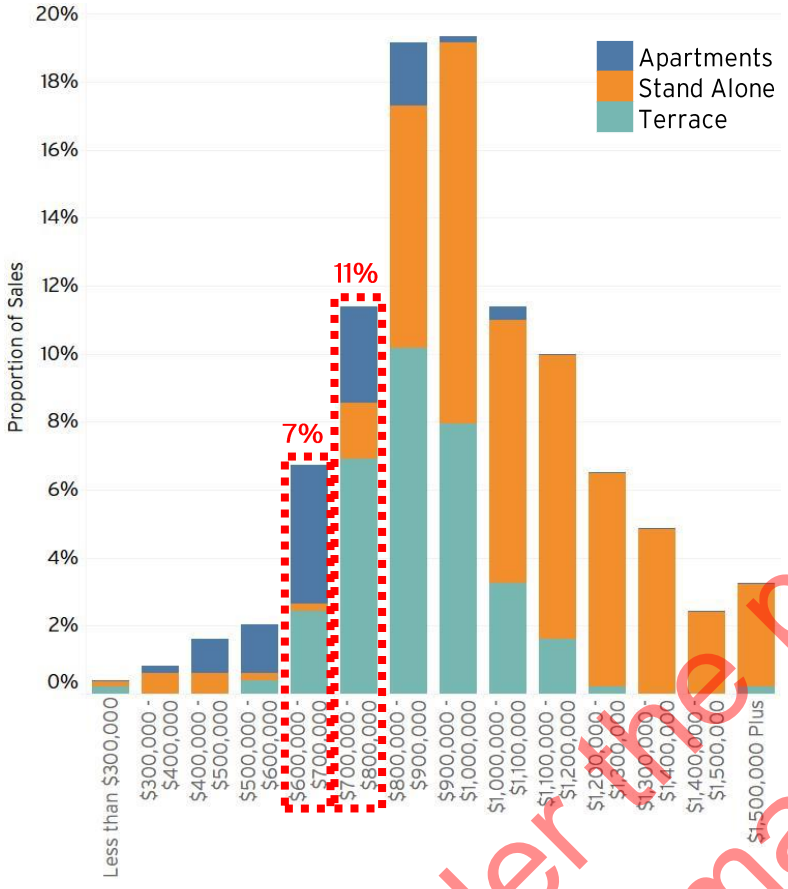


Figure 7: Auckland Urban Area Dwelling Sales

A general assessment of the project in relation to national policy statements and national environmental standards (as those terms are defined in the Resource Management Act 1991) (see section 20(3)(f)).

The NPS-UD 2020 requires planning decisions to contribute to well-functioning urban environments, which are urban environments which have (or enable) housing that is of a range, type and price that meets demand (Policy 1).

The proposal helps to achieve the NPS-UD objectives as it increases the range of housing available to the market. As outlined above, the proposal would provide additional housing within the s 9(2)(b)(ii) price bracket, which are currently undersupplied in the catchment. The proposal therefore provides housing which meets the market demand for affordable housing of the type proposed by the applicant.

Adam Thompson

ianmunro
1/111 Sylvan Avenue
Northcote
North Shore
AUCKLAND 0627

31 MARCH 2021

NICK MATTISON
CIVIX LTD
BY-EMAIL

Dear Nick

CONCEPT SUMMARY, 4 SCOTT ROAD, HOBSONVILLE

1. Thank you for asking me to provide a short summary of the concept that has been developed in collaboration with the other project consultants and BDG Architects Ltd.

2. The concept plan (dated 25 March 2021) is in my opinion a successful urban design solution for the Site. It has been arrived at over a number of design iterations and reviews that I have contributed to.

3. The key urban design characteristics of the 435-unit concept are:

   a. Retention of the key structuring elements depicted in the Scott Point Precinct Plan within the Auckland Unitary Plan: Operative in Part.

   b. Division of the Site into a series of conveniently-walkable blocks that legibly divide the Site into public 'fronts' and private 'backs'. This is derived from the design principle of a perimeter block, which in turn comes from defensible space theory. This is a fundamental building block of contemporary urban design. It also helps establish a compatible 'like with like' interface with adjoining properties east and south. The block structure integrates an existing historic dwelling that is to be retained.

   c. Sloping topography at the southern coastal edge makes placement of a preferred 'park edge' road (i.e., a road adjoining the Esplanade reserve) reasonably prohibitive. In recognition of what would instead be a public / private interface, an additional setback has been proposed that would in places double the width of the Esplanade Reserve.

d. Provision of a new public street network that integrates neighbouring sites, provides public access from Scott Road to the coast, and a rear lane-network to accommodate almost all car parking and servicing needs away from the public eye. This will ensure the streets are well-activated, attractive spaces to be in. Footpaths will for the most part not contend with vehicles reverse manoeuvring across them.

e. A mix of building typologies to promote housing choice, including a mix of 2-storey and 3-storey buildings. Housing density has been maximised at Scott Road, this being the closest to a future (potential) bus route.

f. The dwellings have been designed to individually comply with the Auckland Unitary Plan: Operative in Part spatial layout and on-site amenity standards.

4. Based on the design workshops and process undertaken, and adherence to the key outcomes identified in the Auckland Unitary Plan: Operative in Part, in my opinion the concept has been rigorously tested by the consultant team and reflects best-practice. It will result in a high-amenity, high-quality new neighbourhood on an area of land zoned for that.

5. The concept offers a convincing urban design solution to the Scott Point precinct policies. In particular, the proposal successfully demonstrates comprehensive and integrated development (5.61 policy (1)); compact walkable neighbourhoods (5.61 policy (5)); a mix of housing types and densities (5.61 policy (7)); a built form character compatible with its surrounds and the coastal setting (5.61 policies (9) and (10)); achieve excellence in built form (5.61 policy (11)); and protecting identified historic heritage values and the natural character of the coast (5.61 policies (12) and (17)).

Please feel welcome to contact me should you wish to discuss any aspect of the above further.

Yours sincerely,

IAN MUNRO
urban planner and urban designer
B.Plan (Hons); M.Plan (Hons); M.Arch [Urban Design] (Hons); M.EnvLS (Hons); M.EngSt [Transport] (Hons); MNZPI
(e) s 9(2)(a)
(m) s 9(2)(a)

Geotechnical Investigation

4 Scott Road
Hobsonville
Auckland

Submitted to:

Aedifice Development Ltd
9-11 Galatos Street
Newtown
Auckland 1140

ENGEO Limited
8 Greydene Place, Takapuna, Auckland 0622
PO Box 33-1527, Takapuna, Auckland 0740
Tel +64 9 972 2205 Fax +64 3 328 9013
www.engeo.co.nz

03.12.2020
17971.000.001_02

Contents

1 Introduction 1
2 Site Description 2
3 Background Information 3
3.1 Regional Geology 3
3.2 New Zealand Geotechnical Database (NZGD) 4
3.3 Historical Aerial Photographs 5
4 Geomorphological Assessment 5
5 Site Investigation 8
5.1 Summary of Investigation 8
5.2 Summary of Subsurface Conditions 9
5.3 Groundwater 10
5.4 Shrink-Swell Index Laboratory Testing 10
6 Geological Ground Models 11
7 Geohazard and Geotechnical Assessment 11
7.1 Slope Instability 11
7.1.1 Slope Stability Analysis 12
7.1.2 Conceptual Land Drainage Analysis 14
7.2 Coastal Regression 15
7.3 Elevated Groundwater Levels and Overland Flow 15
7.4 Expansive Soils 15
7.5 Weak or Compressible Soils 16
7.6 Liquefiable Soils 16
7.6.1 Liquefaction Analysis 16
7.7 Undocumented Fill 18
7.8 Assessment Against Section 106 of the RMA 18
8 Preliminary Geotechnical Recommendations 18
8.1 General 18
8.2 Specific Design Zone 19
8.2.1 Land Drainage for Stability 19
8.2.2 Remedial Stabilisation Options 20
8.3 Preliminary Building Foundations 20
8.3.1 Shallow Foundations 20
8.3.2 Deep Piles 21

8.4 Preliminary Geotechnical Parameters for Retaining Wall Design 21
8.5 General Site Works 21
8.5.1 Existing Overland Flow Paths 21
8.5.2 Tree Removal 22
8.5.3 Service Line Excavations 22
8.5.4 Bulk Earthworks 22
8.5.5 Preliminary Pavement Design CBR 23
8.5.6 Demolition 23
8.6 Further Work 23
9 Limitations 24

Tables

Table 1: New Zealand Geotechnical Database Investigation Data
Table 2: Measured Groundwater Levels
Table 3: Shrink-Swell Index Test Results Summary
Table 4: Geotechnical Parameters used in Stability Modelling
Table 5: Auckland Council Required Factors of Safety for Residential Development
Table 6: Slope Stability Analysis Results Summary
Table 7: Remedial Land Drainage Concept Analysis Results Summary
Table 8: Summary of Liquefaction Analysis
Table 9: Geotechnical Soil Parameters for Retaining Wall Design

Figures

Figure 1: Site Location
Figure 2: 2001 Aerial Photograph
Figure 3: Site Zones Plan

Appendices

Appendix 1: Geomorphology Plan
Appendix 2: Investigation Location Plan
Appendix 3: Machine Borehole Logs
Appendix 4: Cone Penetrometer Logs
Appendix 5: Hand Auger Logs
Appendix 6: Shrink-Swell Laboratory Results
Appendix 7: Ground Models
Appendix 8: Slope Stability Analysis Results
Appendix 9: Remedial Land Drainage Analysis Results
Appendix 10: Liquefaction Analysis Results

ENGEO Document Control:

Report Title	Geotechnical Investigation - 4 Scott Road, Hobsonville			
Project No.	17971.000.001	Doc ID	02	
Client	Aedifice Development Ltd	Client Contact	Kieran Doe (NFK)	
Distribution (PDF)	Kieran Doe (NFK)			
Date	Revision Details/Status	WP	Author	Reviewer
03.12.2020	Issued to Client	VB	LEG	HL

Executive Summary

ENGEO completed a geotechnical investigation at the request of Aedifice Development Ltd at 4 Scott Road in Hobsonville, Auckland. The development proposal has not yet been determined, however the purpose of this report is to support an application for resource consent for a future residential development at the property.

The site is largely undeveloped with the exception of two separate residential dwellings, located in the central and northern areas of the site, on relatively flat ground. The remaining landform consists of moderate to steep south and east facing slopes ranging in slope angle between 5° and 35°, between 1 m and 7 m in height. The south-western boundary consists of a gentle to steeply sloping (~5° and 30°) coastal cliff between 1 m and 5 m in height, located immediately adjacent to the inner Waitemata Harbour. Other than the presence of dense mangroves, the coastal margin is unprotected from coastal erosion processes.

Field investigations comprising shallow hand auger investigations, deep machine boreholes and Cone Penetrometer Tests (CPT) were undertaken, and a geomorphological assessment and walkover of the coastal margin was undertaken.

Historical instability was observed in the form of head scarps in several areas throughout the site, particularly in the vicinity of slope crests. Overland flow paths are located in the eastern, southern and western areas of the site, and in most places associated with incised gully features. Soil creep and debris lobes were observed around areas of historical instability and at the toe of slopes.

The investigation data indicates that the soil profile comprises layers of inorganic silts, clays and sands, and organic clay and peat (alluvial deposits) of the Puketoka Formation over depths of up to 27 m. In one location, dense inorganic sand of the East Coast Bays Formation was encountered from 16 m depth below ground level. Rock was not encountered during this investigation.

The key geotechnical constraints relative to future residential development of the site include slope instability, elevated groundwater levels and overland flow, coastal regression, expansive soils, liquefiable soils and weak and compressible soils.

Slope stability analyses indicate that the slopes at the site are susceptible to future movement under elevated groundwater conditions and seismic loads. A significant network of subsoil and counterfort drains will be required to supress groundwater levels, and geotechnical remediation measures including bulk earthworks, palisade wall or MSE wall solutions are likely to be required to support stable building platforms in areas of instability.

The coastal margin should be protected to reduce the rate of coastal regression and minimise loss of toe support. We recommend that a specialist coastal engineer is engaged to complete a design-level assessment of the coastal margin to determine the requirement for coastal protection (such as construction of a rock-revetment or sea wall).

Future building platforms in the north-eastern third of the site, away from sloping ground, are likely to be suited to conventional shallow foundations with a reduced geotechnical ultimate bearing capacity of 200 kPa. Future foundations in the remaining areas of the site will require specific engineering design following land development earthworks including geotechnical drainage and slope stabilisation structures.

1 Introduction

ENGEO Ltd was requested by Aedifice Development Ltd, on behalf of NFK Ltd, to undertake a geotechnical investigation of the property at 4 Scott Road in Hobsonville, Auckland. The purpose of this report is to support a resource consent application for a future residential subdivision development at the property. This work has been carried out in accordance with our signed agreement dated 27 October 2020.

Concept development plans have not been provided to ENGEO at the time of preparing this report, however we understand it is intended to undertake a residential subdivision at the site, with similar densities to the neighbouring developments (i.e. 50-100 lots).

We have completed the following scope:

- Review of published geotechnical and geological information relevant to the site.
- Geomorphological mapping and coastal walkover assessment.
- Field investigations comprising three machine boreholes, ten Cone Penetrometer Tests (CPT), and ten hand auger boreholes.
- One soil sample for Shrink-Swell Index laboratory testing.
- Development of a geological ground model for the site.
- Detailed slope stability analysis of four representative cross-sections.
- Site specific liquefaction analysis.
- Preparation of this report based on the findings of our investigation, including preliminary advice relating to subdivision earthworks as well as remediation concepts to address the geotechnical constraints identified. This report is intended to support an application for resource consent.

2 Site Description

The property at 4 Scott Road is 7.5 hectares in area, is located in Hobsonville, Auckland (Figure 1) and is currently largely undeveloped with the exception of a single residential house in the central northern area of the site (adjacent to Scott Road), as well as a larger residential lifestyle block in the southern area of the site containing a house, swimming pool, tennis court and sheds. The balance of the site is grassed, and densely vegetated along the south-western property boundary.

The landform significantly varies in topography across the site, although generally consists of gentle to moderate (~5°-15°) southeast, south and southwest facing slopes. The south-western property boundary forms the coastal margin where the landform connects with the western reach of the inner Waitemata Harbour. The southern part of this boundary consists of a steep to very steep (~25°-35°) coastal cliff varying in height, between 1 m and 5 m, whereas the northern part of this boundary consists of a gentle coastal cliff (<10°) below 1 m height. A tributary channel to the Inner Waitemata Harbour flows along the margin of the site, narrowing towards the north. Dense mangrove cover between 5 m and 20 m in width is present immediately adjacent to the site. However, it reduces in density in the southern third in an area of sandy beach.

ENGEO visited the site during low and high tide. At low tide the main channel appears to be a large mud-flat, and at high tide the coastal margin is fully inundated. Although the mangroves were observed to reduce wave energy, anthropogenic activity (in particular regular water taxi movements) produced low energy waves that did reach the coastal margin.

Several overland flow paths are present within the site, extending to the coastal margin to outlet to the harbour. Overland flow also extends from the north-eastern corner of the site towards the southeast into the neighbouring property (6 Scott Road). Pooled water can be seen in aerial photographs in the western corner and the north-eastern area of the site, within the mapped overland flow paths.

The site's topography and associated geomorphology is described in further detail in Section 4.

Figure 1: Site Location

Base image sourced from Near Maps. Scale as shown.

3 Background Information

3.1 Regional Geology

The site is regionally mapped by GNS Science to be underlain by alluvial soils of the Puketoka Formation, comprising pumiceous mud, sand, silt, clay, gravel and peat beds.

The alluvium is anticipated to be underlain by the East Coast Bays Formation which typically comprises residually weathered sand, silt and clay soils with alternating beds of siltstone and sandstone bedrock at depth. The mapped boundary with the East Coast Bays Formation is approximately 500 m to the west of the site.

3.2 New Zealand Geotechnical Database (NZGD)

We have reviewed the nearby subsurface investigation data available in the New Zealand Geotechnical Database with the purpose of gaining a greater understanding of the local geology.

The locations of the most relevant deep geotechnical investigation data is summarised in Table 1. These investigations are predominantly located within the 8A and 10 Scott Road properties to the east. The relevant geological data is summarised below.

Table 1: New Zealand Geotechnical Database Investigation Data

CPT / Borehole Reference	Position Relative to Site	Depth of Exploration (m)
CPT_105398	200 m east	13.30
CPT_105400	220 m east	14.80
CPT_105399	215 m east	12.70
CPT_100760	200 m east	9.52
CPT_100764	315 m east	19.07
CPT_100759	380 m east	18.75
CPT_100763	325 m east	19.73
CPT_100762	320 m east	18.93
BH_100695	315 m east	42.29
BH_100696	300 m east	24.00
BH_100697	320 m east	34.82

Alluvial deposits of the Puketoka Formation were encountered from the ground surface to between 23.0 m and 34.0 m depth, underlain by dense sand of the East Coast Bays Formation to the maximum depth of testing at 42.3 m depth below ground level.

The Puketoka Formation alluvium included peat lenses and pumiceous silt and sand layers. East Coast Bays Formation rock was not encountered in any of the boreholes reviewed

3.3 Historical Aerial Photographs

Aerial photographs available from Auckland Council GeoMaps and Retrolens dating from 1940 to 2019 have been reviewed in the context of understanding the past site use and historical landform modification. Historically, the site and surrounding area was primarily in use as horticultural / agricultural land. Relevant visible features on the site are summarised below.

1940 – 1972: The site and surrounding area is largely undeveloped and predominantly being used for agricultural purposes. Land to the west of the site is occupied by the R O Clark Limited clay pottery works. The southern coastal margin is densely vegetated, with the exception of the westernmost corner which is cleared and may form part of an access route to the adjacent pottery works, or harbour. A scarp can be identified trending northeast-southwest (although not well defined), and hummocky ground is observed in the central-western half of the site.

1972: A small area in the northern corner of the site appears to have been earthworked or stripped for landscaping.

2001: Scour in the vicinity of the western overland flow paths appears to be more prominent in this aerial photograph, with several small-scale surface scars indicative of soil ridges or creep observed at the base of the western gullies. Small isolated surface depressions / holes are present in the general vicinity of the main headscarp and the start of overland flow areas, suggesting the possible presence of subsurface tomos (subsurface erosion features), as indicated on Figure 2.

Figure 2: 2001 Aerial Photograph

4 Geomorphological Assessment

ENGEO completed a geomorphological mapping exercise at the site and the findings are presented on the Geomorphology Plan presented in Appendix 1. The site can be broadly described in three zones based on their characteristic geomorphological features. These approximate extent of the zones is shown in Figure 3, and they are referenced throughout this report.

Figure 3: Site Zones Plan

Zone 1

Zone 1 is shaded green in Figure 3, and generally occupies the north-eastern third of the site. This zone is characterised by gentle rolling slopes and relatively flat ground, with slope angles of generally less than 5°. All existing structures at the site are located within this zone, on relatively level building platforms. Overland flow paths are located in the northern area of this zone, generally within topographical depressions. These flow towards the east and extend into the neighbouring properties. There is potential for surface water ponding to occur, as was observed in the 2017 aerial photograph.

No obvious signs of slope instability were observed in this zone at the time of the site visit or in the desktop study and aerial photograph review.

Zone 2

Zone 2 is shaded orange in Figure 3, and includes the majority of the sloping land at the site. The ground slopes towards the northwest in the northern portion of the site, and towards the southwest in the western and southern portions of the site. Slope angles range from gentle to steep (~5° to 35°) with a total elevation change of up to 18 m.

The dominant geomorphological feature present within this zone (and at the site) is a headscarp trending generally northeast-southwest, indicative of historical slope instability. The headscarp is up to 5 m in height, approximately 120 m in length and currently consists of a 30° slope. The land immediately above and below the scarp is relatively flat to gently sloping. The headscarp extends towards the north and northwest, however the defining break in slope becomes less prominent as the slope gradient reduces to between 5° and 10°.

To the west and downslope of the headscarp the ground surface is undulating and hummocky, and three overland flow paths with associated incised channels intersect the slope. Circular-shaped depressions in the landform were noted at the head and on the alignment of the incised channels, and were measured to be up to 2 m deep. These are interpreted to be collapsed tomos, which are subterranean erosion tunnels formed through erosion due to groundwater flow. Through discussion with the site owner we understand subsoil drains were historically installed in some of these locations and extend to outlet into the coastal marine area. A broken, narrow-diameter pipe was identified at the base of a tomo in the central portion of this zone. Several small tributary overland flow paths were observed joining the primary incised channels.

Further west of the main headscarp, a second break in the slope consisting of an approximately 10 m high slope with an average angle of 22° descends towards the coastal margin. The ground surface at the toe of this slope is relatively flat, at an elevation of between approximately 1 m and 3 m above the coastal shoreline level.

The west-facing slopes in the central-southern area of Zone 2 are densely vegetated with large mature trees and bush cover. The crest of the slope is defined as a slope break with the land below descending steeply (~35°) towards the coastal margin. A series of large blocks and debris lobes have formed a discontinuous mid-slope bench, below which the land slopes a further 3 m to 5 m before opening out into a 10 m to 15 m wide area of broadly level ground adjacent to the site boundary (Zone 3). In some areas on these slopes, the tree roots were exposed and appear to be holding portions of the slope intact. Evidence of a small arcuate headscarp at the crest of the slope with an associated debris lobe at the toe of the slope was observed and is recorded on the Geomorphology Plan.

The southern extent of Zone 2 includes the steeply incised gully extending from the coastal margin into the site, terminating to the south-west of the existing dwelling. The gully was observed to have flowing water at the base, and is narrow at the upslope extent, widening to an open mouth adjacent to the beach with more gentle slopes to either side. Dense swampy vegetation covers the steeply sloping ground within the gully. The landform above the gully consists of grass–covered, gently sloping ground extending up to the landscaping and fencing around the in-ground swimming pool. Overland flow paths draining towards the gully were observed on all sides, and some evidence of soil creep was observed at the slope break.

Zone 3

Zone 3 is located west of Zone 2 and occupies the sloping ground at the coastal margin of the site. The coastal margin is generally orientated north-south, and is approximately 290 m in length from boundary to boundary.

Other than the mangrove shelter, the coastal cliff is unprotected and Puketoka Formation alluvium and peat is exposed in places where grass and vegetation is not present within the coastal marine area. Marine sediment comprising sand and shell fragments was also exposed at the ground surface within the coastal marine area. Remnant clay pipe fragments, and in some places what appeared to be intact pipes draining into the coastal margin, were observed along and embedded in the northern half of the coastal cliff. The clay pipe fragments are likely to be associated with the neighbouring historical clay pottery works factory. It is unclear whether the pipe fragments have been deliberately mixed with soil and placed as fill at the coastal margin, or whether coastal process have transported and deposited the material over the 150 years since the pottery work began.

Undercutting of the toe by up to 2 m was observed in discrete areas and the coastal cliff ranged in height between 1 m and 5 m, generally decreasing in height towards the north. Relatively flat ground comprising a secondary bench below the western-most slopes of Zone 2 was observed upslope of the coastal cliff in the northern half of this zone.

5 Site Investigation

5.1 Summary of Investigation

ENGEO completed a suite of subsurface investigations in the locations shown on the attached Investigation Location Plan in Appendix 2, comprising the following:

- Three machine boreholes (MBH01-MBH03) were drilled to between 21.5 m and 27.5 m below ground level using the mud-rotary technique with Standard Penetration Testing undertaken at 1.5 m intervals and shear vane testing undertaken in the end of the barrel, where possible. Standard Penetration (SPT) testing began at 9 m depth in MBH01, and at 19 m depth in MBH02 to recover continuous core and attempt to identify evidence for historical slip planes. SPT testing was undertaken from 1.5 m depth in MBH03. The overall soil consistency for cohesive soils was assessed using the tactical diagnostic field tests in accordance with the NZGS guidance.

- Ten Cone Penetrometer Tests (CPT01-CPT10) were pushed to depths ranging between 2.75 m and 23.50 m below ground level. All tests terminated on impenetrable material, inferred to be pumiceous sand layers.

- Ten hand auger boreholes (HA01-HA10) were drilled to depths ranging between 0.7 m and 5.0 m depth. Boreholes HA02, HA03, HA07 and HA10 achieved the target depth, borehole HA01 met practical refusal terminating on impenetrable fill material (remnant clay pipes), and the remaining locations terminated due to hole collapse.
- Collection of one soil sample from within the near surface soils in MBH03 for shrink-swell index laboratory testing.
- Installation of three standpipe piezometers, one at each machine borehole location.

The soils in the machine and hand auger boreholes have been logged in general accordance with the New Zealand Geotechnical Society field classification guidelines (NZGS, 2005). Detailed logs of the machine borehole, CPT and hand augers are included in Appendices 3 through 5, respectively.

5.2 Summary of Subsurface Conditions

The subsurface conditions broadly align with regional geological mapping, as well as the nearby NZGD boreholes.

Puketoka Formation soft to very stiff alluvial soils were encountered from the ground surface to depths ranging from 16.0 m to beyond 27.5 m below ground level (maximum investigation depth). The soil type, strength and organic content is layered and varies throughout the soil profile.

Inorganic cohesive soil layers generally comprised firm to very stiff silts and clays with measured shear strengths ranging between 40 kPa and 190 kPa. SPT 'N' values between 3 and 10 were recorded in these layers.

Amorphous, plastic and fibrous peat layers as well as organic clay soil was also encountered throughout the soil profile. Isolated wood fragments and fibrous rootlets generally <10 mm in diameter were recorded within these layers. The organic clay layers were typically surrounded by fibrous and amorphous peat layers.

Peat and organic layer thicknesses ranged between 0.5 m and 4.0 m. Based on their presence at all investigation locations, we have inferred that peat and organic layers are prevalent across the site. Further, amorphous peat was observed in outcrops at the coastal margin in the central-eastern area of the site.

Layers of pumiceous silt and fine sand up to 1.0 m thick were encountered at all investigation locations. Several CPT tests met practical refusal terminating on the upper layer of pumiceous sand, and several hand auger boreholes terminated within this material due to saturated granular soils resulting in hole collapse.

At 16.0 m depth in MBH03, very stiff to hard and dense silt and sand layers of the East Coast Bays Formation were encountered to the borehole termination depth of 27.5 m. This material is inorganic and SPT 'N' values of greater than 30 were recorded, with the exception of an SPT 'N' value of 18 at 24.0 m depth. East Coast Bays Formation deposits were also encountered in the machine boreholes drilled at 10 Scott Road to the east (NZGD BH_100695, BH_100696 and BH_100697) below 22.0 m depth.

Rock was not encountered at any of the investigation locations. No obvious shear planes or slickenside surfaces indicative of historic slip surfaces were identified in the machine boreholes.

5.3 Groundwater

Standing groundwater levels were recorded by dip testing the hand auger boreholes at the completion of drilling, and the piezometers installed in the machine boreholes two weeks following drilling.

The groundwater levels recorded across the site are presented in Table 2, and are presented on the borehole records where encountered.

The results indicate that perched groundwater is likely to be present within the upper 3.0 m of the soil profile in the elevated areas of the site, approaching surface level in the vicinity of the overland flow paths and near the toes of the slopes. A deep, prevailing groundwater surface is likely to be present at depths below 7.0 m relative to the elevated eastern portions of the site, approaching Mean High Water Spring (MHWS) level at the coastal margin.

Table 2: Measured Groundwater Levels

Investigation Reference	Depth (m, bgl)	Investigation Reference	Depth (m, bgl)	Investigation Reference	Depth (m, bgl)
HA01	-	MBH01	7.2[1]	CPT01	2.0
HA02	1.5	MBH02	0.9[1]	CPT02	-
HA03	3.5	MBH03	8.1[1]	CPT03	3.0
HA04	-			CPT04	1.0
HA05	0.8			CPT05	-
HA06	4.1			CPT06	2.5
HA07	3.2			CPT07	-
HA08	2.7			CPT08	2.0
HA09	3.2			CPT09	-
HA10	0.8			CPT10	-

[1] The machine boreholes were dipped two weeks following drilling on 24 November 2020.

5.4 Shrink-Swell Index Laboratory Testing

One representative soil sample was selected for Shrink-Swell Index testing in accordance with AS 1289: Test 7.1.1 from the near surface silty clay soil at the site. The results of the Shrink-Swell Index test are shown in Table 3 with results discussed in Section 7.4. Full results are presented in Appendix 6.

Table 3: Shrink-Swell Index Test Results Summary

Sample ID	Sample Depth (m)	As Received Moisture Content (%)	Shrink – Swell Index (%)
SS01	0.5-1.0	35	2.6

6 Geological Ground Models

Four interpretive cross-sections, referenced as Section A-A' through to D-D', have been generated using the Auckland Council GeoMaps contours through representative and / or critical sections of the site to establish an understanding of the landform. The locations of the cross sections are shown on the Investigation Location Plan.

All four cross-sections have been used to support the site-specific slope stability analysis. Two of the cross-sections have been selected for detailed ground model development as they represent the typical geological settings at the site, one including historical land movement, and the other extending beyond the legal property boundary through the site's coastal margin. Graphical ground models for Sections A-A' and C-C' are presented in Appendix 7.

- Section A-A' is orientated northwest-southeast and extends from boundary to boundary. This section was chosen as it runs perpendicular to the prevailing slope direction, and captures the main geomorphological instability feature at the site.
- Section C-C' is a representative section through a steeper and higher portions of the southwest-facing slope where historical land movement has occurred, and also extends into the coastal marine area. The section location was chosen to demonstrate the interpreted ground conditions beneath the site as well as the coastal marine area.

7 Geohazard and Geotechnical Assessment

Based on our initial assessment we consider the following to be primary hazards at the site in relation to future residential subdivision:

- Slope instability.
- Coastal regression.
- Elevated groundwater levels and overland flow.
- Expansive soils.
- Weak or compressible soils.
- Liquefiable soils.
- Undocumented fill.

These are discussed in detail in the following sections.

7.1 Slope Instability

The site is bounded by unprotected, moderately steep coastal slopes to the south and west, and a low energy tidal mudflat and channel at the toe. Although the rate of toe erosion at this site is low (improved by the presence of mangroves), it is an active process and will continue to remove toe support for the slopes over time. Evidence of undercutting at the coastal margin was observed during our site walkover and the geomorphology of the landform indicates that surface water flows associated with the overland flow paths at the site have accelerated erosion and scour within the gullies.

Dense vegetation established across the steep slopes is serving to enhance their stability, and should be retained where possible as part of a future development. Decommissioning the overland flow paths and limiting the surface water and stormwater discharge onto the slopes will also serve to reduce the rate of slope erosion in the long term.

Without specific geotechnical assessment and remediation design, buildings and associated structures located within Zones 2 and 3 may subject to periodic instability over the design life of future developments.

7.1.1 Slope Stability Analysis

Soil creep typically occurs within the upper metre of the soil profile, and is generally a function of over-steepened slope angles (>14°) in conjunction with high groundwater levels. Soil creep was observed in the general vicinity of slope crests and incised gullies where overland flow is present. Soil creep will continue to occur in the foreseeable future across the site.

Circular or rotational failures observed at this site have occurred at two distinct scales – small-scale shallow failures, and large-scale deeper failures. Small-scale failures have created localised headscarps with small debris mounds, while large-scale failures have formed the dominant head-scarp and hummocky ground in the western half of the site.

Slope instability is a function of slope angles, groundwater levels and changes in slope loading (e.g. removal of toe support). We consider small-scale circular failures around slope crests to be likely to continue to occur in the foreseeable future as overland flow and natural gully regression processes continue. Larger-scale failures are likely to have been driven by external triggering mechanisms such as seismic loading. Both small-scale and large-scale circular failures have been considered in the slope stability analysis.

In order to assess the stability and geotechnical suitability of the site for future residential development, four representative cross-sections were analysed, Section A-A' through to D-D'. The analyses incorporated the existing unsupported slope geometry, and geotechnical parameters and soil conditions derived from the investigation data together with our experience at similar sites in the area. Groundwater conditions were determined based on measured standing water levels within the hand auger and machine boreholes.

A conceptual post-development model was also analysed for each section to assess the sensitivity of the models to groundwater controls.

The geotechnical parameters used for these analyses are presented in Table 4.

Table 4: Geotechnical Parameters used in Stability Modelling

Material	Strength Type	Unit Weight (kN/m^3)	Cohesion (c)	Angle of Friction (ϕ)°
Inorganic Silts and Clays	Mohr Coulomb	17	3	27
Pumiceous Sand	Mohr Coulomb	17	0	34
Organic Clay and Peat	Mohr Coulomb	17	1	27
East Coast Bays Formation Soil	Mohr Coulomb	18	1	35

Material	Strength Type	Unit Weight (kN/m³)	Cohesion (c)	Angle of Friction (ϕ)°
Undrained Inorganic Silts and Clays	Undrained[1]	17	66	-
Undrained Organic Clay and Peat	Undrained[1]	17	48	-

[1] Undrained parameters used in the seismic case only.

Slope stability analysis has been undertaken using the computer modelling software package SLIDE 8.0, produced by Rocscience Limited, utilising the GLE / Morgenstern Price method for circular failure mechanisms to assess global slope instability.

The following three conditions were considered to assess the stability of the slope:

- Static Condition (Normal – based on site observations).
- Transient Condition (with elevated 'worst credible' groundwater profile) – the groundwater was modelled within the near surface soils and saturating the slope.
- Seismic Condition – a seismic coefficient of 0.10 was used to model the behaviour of the slope during a 1 in 150 year seismic event under static conditions.

The Factor of Safety (FoS) is a ratio of the forces resisting failure to the forces driving the slope toward failure.

Factor of Safety = Resisting Forces / Driving Forces

A Factor of Safety in excess of 1.0 is generally considered to be stable, while a FoS of less than one is considered unstable. The following FoS are required for new structures in accordance with the requirements of the Auckland Council Code of Practice for Land Development and Subdivision (Table 5).

Table 5: Auckland Council Required Factors of Safety for Residential Development

Conditions	Factor of Safety Required
Normal groundwater condition (Static)	1.5
Extreme (worst credible) groundwater condition (Transient)	1.3
Seismic condition with 150 year event (Seismic)	1.2

A summary of the results are shown in Table 6, and the full stability results are presented in Appendix 8. The geomorphological zones and site boundaries are shown on the outputs together with all failure surfaces below the minimum required Factor of Safety for the assessed case.

Table 6: Slope Stability Analysis Results Summary

Section	Condition		
	Static	Transient	Seismic
A-A’	1.47	0.67	1.55
B-B’	1.63	1.07	1.21
C-C’	1.46	0.98	1.37
D-D’	1.93	1.20	1.42

The results show that sections B-B’ and D-D’ under static conditions, and all sections under seismic conditions, achieved the required FoS for the existing landform. Cross sections A-A’ and C-C’ under static conditions, and section B-B’ under seismic conditions, did not meet the minimum required FoS. Small-scale circular failures with unacceptable FoS were identified and generally limited to the crest of slopes under static conditions. In contrast, larger failure surfaces with unacceptable FoS were identified under seismic conditions in cross-section B-B’, extending through the overall slope. These failure surfaces are shown on the slope stability outputs (Appendix 8).

The slope stability analysis results demonstrate that the slopes at the site are susceptible to failure under transient conditions (elevated groundwater levels). Failure surfaces with unacceptable FoS are typically small-scale and located in the general vicinity of the slope crest, as well as occurring on the slope face in the steepest portions of the slope.

7.1.2 Conceptual Land Drainage Analysis

We have undertaken a conceptual post-development stability analysis modelling a drained slope for each section to assess the depths to which groundwater needs to be suppressed in order to achieve acceptable Factors of Safety. Groundwater levels in the elevated portions of the models are required to be 4 m below ground level, rising to approximately 2 m depth at the base of the slope.

The conceptual land drainage analyses achieved Factors of Safety in excess of 1.50 for all sections, above what is required by Auckland Council. A summary of the analysis results are presented in Table 7, and full stability outputs are presented in Appendix 9.

Table 7: Remedial Land Drainage Concept Analysis Results Summary

Section	Remedial Conceptual Drainage Results
A-A’	1.58
B-B’	1.64
C-C’	1.70
D-D’	2.22

7.2 Coastal Regression

The assessed average rate of coastline regression for soft cliffs in the Auckland region of 10 m over 100 years is a realistic assumption at this site. Erosion of land at the toe of the slope is a relatively slow process, as the marine environment in the inner Waitemata Harbour, in conjunction with the established mangrove protection, is relatively low energy. Conversely, soils exposed in the cliffs, and deposited as slump debris are weak and easily disturbed and regression of the coastal cliffs will continue to occur.

7.3 Elevated Groundwater Levels and Overland Flow

Several overland flow paths are present throughout the site and several historical drainage channels were observed in the general vicinity of mapped overland flow paths. Narrow and deep tomos up to 2 m depth were observed in association with the historic drainage channels and swampy ground was generally present in the areas of overland flow.

The measured groundwater levels varied throughout the site, but were generally recorded at shallower depths (i.e. within 1 m of the ground surface) adjacent to overland flow paths, at the toe of slopes and near the coastal margin.

Scour from overland flow was noted within incised gullies at the site, and overland flow has contributed to the concentration and elevation of groundwater levels throughout the Zone 2 and 3 areas.

As the site is largely undeveloped, surface water has been allowed to discharge freely onto the slopes via the established overland flow paths which contributes to soil saturation and can trigger slope instability.

7.4 Expansive Soils

Expansive clay and silt soils are common in the Auckland area and have the tendency to shrink and swell, particularly with seasonal fluctuations of soil water content. This behaviour has implications for foundation design and surface structures, and will need to be addressed during foundation design. We note that silt and clay rich soils were encountered across the majority of the site.

Based on our visual and laboratory assessment of the soils encountered on-site, the assessed preliminary Expansive Site Class for this site is ‘M-Moderately Expansive’ in accordance with AS 2870. Accordingly, foundations will need to be specifically designed to meet the objectives of the Expansive Site Class, and the associated characteristic surface movement of up to 40 mm.

The expansive soils site class should be readdressed in the Geotechnical Completion Report following completion of the subdivision earthworks.

7.5 Weak or Compressible Soils

Puketoka Formation alluvium is known to contain lenses of weak clays, organic soils and peat, or otherwise compressible strata that can be susceptible to consolidation settlement under fill and building loads.

The Puketoka Formation soils identified in this investigation comprise clays and clayey silts with shear strengths ranging from 32 kPa to greater than 200 kPa, with a layer of silty sand encountered in the lower portions of some boreholes. Persistent organic clay and peat layers were identified in the investigation, and these have potential to compress under future building and fill loads.

Static settlements likely to occur under future building and fill loads at this site may be as a result of immediate settlement and primary consolidation. The time required for settlement to occur for each of these components is dependent on the settlement mechanisms:

- Elastic settlement generally occurs immediately after construction is complete.
- The time required to complete primary consolidation is dependent on the soil properties, layer thickness and groundwater conditions. Typically, primary consolidation occurs on a logarithmic time scale (magnitude of settlement decreasing with time), and may be as long as several decades to achieve 100% consolidation.

A site specific static settlement analysis should be completed when the building development concept is determined to support the detailed earthworks (particularly if significant filling is proposed) and building foundation design.

7.6 Liquefiable Soils

Soil liquefaction results from loss of strength of saturated soils during cyclic loading, such as imposed by earthquakes. Soils most susceptible to liquefaction are clean, loose, saturated, uniformly graded fine-grained cohesionless materials. Empirical evidence indicates that loose to medium dense gravels, sands, silty sands, low-plasticity silts, and some low-plasticity clays are also potentially liquefiable.

Although predominantly cohesive soils were encountered at the site, saturated loose silty sand layers were identified that may be potentially liquefiable.

7.6.1 Liquefaction Analysis

We have assessed the likelihood of liquefaction triggering and post-liquefaction induced vertical settlement occurring at the site using data obtained from the ten CPT's advanced at the site.

The following methods and parameters were utilised for the CPT based analysis:

- A ULS and SLS PGA of 0.15 g and 0.04 g respectively have been adopted based on MBIE / NZGS Module 1 (2016) using Importance Level 2 structures, and the $C_{0,1000}$ value for Auckland from NZTA Bridge Manual (2016) Table 6A.1. The effective earthquake magnitude can be taken as 5.9.
- Liquefaction triggering method utilised was Boulanger and Idriss (2014) as prescribed by MBIE and a threshold probability of liquefaction (P_L) of 15%.
- A groundwater depth of 1 m based on the encountered groundwater level within the CPT testing. We have conservatively adopted an elevated groundwater level to be representative of a winter high groundwater level.

- We have not accounted for any additional fill loading or cut earthworks proposed as a part of this development.
- A soil behaviour type index (I_c) cut-off value of 2.6 to differentiate between susceptible and non-susceptible to liquefaction soils for the CPT analysis.
- The Zhang, Robertson, and Brachman (2002) procedure for estimating volumetric strain and vertical settlement for the CPT analysis.

We have calculated Liquefaction Severity Numbers (LSN's) and the Liquefaction Potential Index (LPI) using ULS ground motions.

Table 8 presents the results of our liquefaction analysis under the assessed loading cases. The full results are presented in Appendix 10.

Table 8: Summary of Liquefaction Analysis

CPT Reference	Design Case and Calculated Settlements	
	ULS M5.9, 0.12 g	SLS M5.9, 0.03 g
CPT01	< 5 mm (LSN = < 2, LPI = < 1)	Negligible
CPT02	< 5 mm (LSN = < 2, LPI = < 1)	
CPT03	< 5 mm (LSN = < 4, LPI = < 1)	
CPT04	< 10 mm (LSN = < 3, LPI = < 1)	
CPT05	< 10 mm (LSN = < 3, LPI = < 1)	
CPT06	210 mm *(<5 mm upper 10 m)* (LSN = < 5, LPI = < 5)	
CPT07	Negligible (LSN = <1, LPI = < 1)	
CPT08	Negligible (LSN = 0, LPI = < 1)	
CPT09	< 5 mm (LSN = < 3, LPI = < 1)	
CPT10	< 10 mm (LSN = < 7, LPI = < 1)	

Our analysis indicates that liquefaction is generally not triggered at SLS or ULS levels of shaking in the upper 10 m from the design groundwater depth. Up to 210 mm of vertical settlement calculated under ULS conditions in CPT06 was within very soft to soft sandy silt / clayey silt layers between 9 m and 22 m depth. However, the Liquefaction Potential Index (LPI) and Liquefaction Severity Number (LSN) calculated for this zone indicates that the liquefaction risk is low and little to no surface expression of liquefaction is expected due to the thick (up to 9 m) non-liquefiable crust.

Due to the resulting LPI and LSN values, as well as the lack of clean sand layers observed within the machine boreholes, the calculated vertical settlements under ULS conditions for CPT06 are in our opinion likely to be an overestimation.

7.7 Undocumented Fill

Pre-existing undocumented fill was observed at the surface along the coastal margin and in borehole HA01 to at least 0.8 m depth. This investigation refused on impenetrable blocky fill material comprising clay pipe debris.

Pre-existing undocumented fill within areas of residential development will need to be removed during subdivision earthworks and replaced with engineered fill material if it is to support future foundations and subdivision infrastructure.

Given the limited coverage of this investigation, it is possible that further deposits of pre-existing fill are present elsewhere at the site. Following site clearance earthworks, the geotechnical engineer should evaluate the stripped subgrade across the site and determine the extent and nature of any pre-existing fill exposed and determine if the fill material is suitable for use, or advise if undercutting and replacement with engineered fill is required.

7.8 Assessment Against Section 106 of the RMA

We do not consider future residential development to be presently subject to significant subsidence, falling debris, or inundation by soil or rock in accordance with the provision of Section 106 of the Resource Management Act 1991.

As discussed herein, based on our site observations and slope stability assessment, the slopes are susceptible to future instability if not mitigated, particularly following rainfall events where groundwater levels are elevated and slopes can become saturated. Accordingly, we have recommended further consideration in regards to future earthworks, drainage and retention structures.

Provided that these recommendations are followed, and site-specific slope stability and consolidation settlement analyses are undertaken to support a future development scheme, we do not consider that future residential use of the land is likely to accelerate, worsen, or result in material damage to the land.

8 Preliminary Geotechnical Recommendations

8.1 General

Based on our site observations, investigations and analysis we consider the site to be geotechnically suitable for proposed future residential development provided the following recommendations are adopted and the subdivision is designed accordingly.

The primary geotechnical concern at the site is assessed to be the long-term stability of the southern and western slopes in Zones 2 and 3, which are collectively referred to as the Specific Design Zone. In order to stabilise future building platforms within the Specific Design Zone, specifically engineered remedial stabilisation solutions and significant earthworks and design will be required. Remedial solutions for future development within are outlined in Section 8.2.

The land within Zone 1 is sufficiently set back from the assessed geotechnical and geological hazards at the site. As such, we anticipate that earthworks within this zone will comprise minor cuts and fills associated with formation of building platforms and new roads, and installation of associated subdivision infrastructure.

In addition to the identified slope instability risk, other geotechnical concerns at the site include coastal regression, elevated groundwater conditions and overland flow, total and differential consolidation settlement and the presence of expansive soils.

8.2 Specific Design Zone

The Specific Design Zone incorporates the land located within Zones 2 and 3 shown in Figure 3. Evidence of historical instability was noted in this area and the slope stability analysis indicates that these slopes are susceptible to instability under elevated groundwater conditions. The presence of overland flow paths and swampy ground in this area indicates that the probability of occurrence, particularly throughout the wetter seasons, of the slopes experiencing elevated groundwater conditions is several times per year.

Without mitigation, we anticipate that the slopes throughout the geotechnical design zone will continue to erode and move episodically.

Remedial solutions to improve the stability of the slopes, as well as the rate of regression along the coastal margin, may include installation of land drainage, remedial earthworks (e.g. slope benching, and construction of shear keys and / or batter slopes), or installation of in-ground palisade walls and other specifically designed retaining walls.

We recommend that a specialist coastal engineer is engaged to complete a design-level assessment of the coastal margin to determine the requirement for coastal protection (such as construction of a rock-revetment or sea wall). If coastal protection is not implemented, regression over the subdivision design life (100 years) may extend up to 10 m inland of the coastal margin.

Developments proposed within the Specific Design Zone will required further specific assessment for foundation design, earthworks and retention measures following confirmation of the development scheme. Further, the Specific Design Zone should be prioritised when determining the sequence of earthworks and construction.

8.2.1 Land Drainage for Stability

The slope stability analyses indicate that minimum factors of safety are not met under elevated groundwater conditions (fully saturated slope). Remedial land drainage was preliminary assessed which demonstrated that if the groundwater level is suppressed and controlled to 4 m depth below current ground level, acceptable Factors of Safety are met.

As such, we recommend that as a minimum a network of subsoil and counterfort drains are installed across the Specific Design Zone to minimise the potential for saturation of the slopes during periods of prolonged rainfall. The final locations, depths and construction requirements for all subsoil drains will be confirmed at the detailed design stage when the subdivision and earthworks development concepts are progressed.

8.2.2 Remedial Stabilisation Options

Shear Keys

Construction of shear keys at the toes of slopes is an earthworks solution that effectively creates a reinforced block of earth to a depth that intercepts unacceptable failure surfaces. The location, extent and suitability of this solution should be determined once the subdivision and earthworks schemes have been developed.

Due to the relatively significant volume of organic clay layers at the site, it is likely that imported fill will be required to construct the shear keys and associated bulk earthworks, and a significant volume of material will be cut to waste. Further, excavations to form the shear keys are likely to extend below the groundwater table and temporary dewatering measures may be required during construction.

Palisade Walls

Palisade walls (in-ground retaining walls) are considered to be an appropriate solution to stabilise the slopes at the site. The location and extent of the walls should be determined once the development concept has been progressed, and detailed design can be undertaken.

Due to the absence of rock over 27 m depth, there is potential that deep and closely spaced piling would be required as there is no rock layer to socket the base of the piles into. Shallow groundwater levels and the presence of saturated sand layers indicate that dewatering and casing of the piles may be required if traditional bored methods are used. Palisade walls installed through continuous flight auger (CFA) methods have had success for similar geological settings at other developments nearby.

MSE Walls

Alternative earthworks and retaining wall solutions for the site may include Mechanically Stabilised Earth (MSE) walls incorporating bulk fills stabilised by geogrid, which can be incorporated into the earthworks design and can include ‘green faces’ which is aesthetically pleasing in stream or coastal settings. These require substantial earthworks support to create foundations suitable for the associated fill loads, and are often designed in conjunction with conventional shear key and drainage networks.

8.3 Preliminary Building Foundations

8.3.1 Shallow Foundations

Based on the results of our investigation, and the assumption that future development will be involve residential structures, we consider shallow foundations to be suitable for new foundations that are located away from instability areas.

Due to the presence of compressible organic soils at site, a reduced geotechnical ultimate bearing capacity of 200 kPa can preliminarily be adopted for design of shallow rigid concrete slab foundations, bearing within the native soils below any topsoil. Footing and foundation depths can be reassessed following confirmation of the site earthworks plans.

Further specific site investigation and design modifications should be carried out for all buildings having loads greater than 200 kPa.

8.3.2 Deep Piles

If required, deep piled foundations should be specifically designed to meet future performance objectives of slope stability, liquefaction and compressible soils. Due to the presence of shallow groundwater and saturated sand layers, bored piles that extend below the groundwater table may require dewatering, and / or casing to prevent necking or collapse of the pile holes.

Driven piles may experience difficulty advancing through the pumiceous sand layers and any large wood fragments (>100 mm in diameter) which are likely to be present within 3 m of the ground surface.

8.4 Preliminary Geotechnical Parameters for Retaining Wall Design

Based on the site topography, we anticipate retaining walls will be required in future residential developments to facilitate proposed building platforms.

For the purpose of carrying out preliminary design of retaining walls up to 2 m height located within Zone 1, the following soil parameters may be used. Future walls will retain native Puketoka Formation soils or engineered fill. A summary of the soil parameters is provided in Table 9.

Table 9: Geotechnical Soil Parameters for Retaining Wall Design

Material Type	Unit Weight γ (kN/m^3)	Friction Angle ϕ' (degrees)	Effective Cohesion (c' kPa)	Undrained Shear Strength (Su kPa)
Retained Native Puketoka Formation Soil	17	27	3	40
Retained Engineered Clay Fill	18	30	5	100

These retaining wall parameters are not suitable for use in the design of slope stabilisation structures, or for design of walls within the Specific Design Zone.

Retaining wall drainage trenches should be backfilled to within 200 mm of the ground surface over their length with tamped, free draining granular material. The top 200 mm of backfill should be capped with native clay soil that is relatively impermeable, so as to not facilitate the flow of surface water into the wall backfill.

8.5 General Site Works

8.5.1 Existing Overland Flow Paths

The existing overland flow paths at the site serve to direct surface water and irrigation runoff to the sloped margins of the site, where scour has exacerbated regression of the slopes at those locations.

If earthworks and land development are proposed within the Specific Design Zone, all overland flow paths will need to be mucked out to expose inorganic native soil, drained via a 160 mm diameter perforated highway grade novacoil pipe in geotextile-wrapped TNZ F2 drainage bedding, and capped with site-won clay fill or other approved engineered fill up to finished ground level. The drains should either connect to the proposed stormwater infrastructure at the site if levels permit, or discharge to the toe of the boundary slopes via a geotechnical engineer approved outlet structure (e.g. PVC flume).

8.5.2 Tree Removal

If vegetation removal is proposed, it is essential the geotechnical engineer is contacted for guidance. Mature trees established on the slopes throughout the site involve extensive root systems and may be detrimental to the stability of the surficial soils if removed.

Where trees are to be removed within developed areas, it is important that all tree stumps and large roots (greater than thumb-size) are completely removed from the building platform and the immediate surroundings. Where individual holes are created they may be filled with compacted hardfill to certifiable standards. Where large areas are to be cleared of vegetation the most effective approach would be to undercut the affected area to remove the large root systems and replace with engineered fill to design levels as required.

8.5.3 Service Line Excavations

For excavation of service trenches up to 3 m depth below existing ground, organic soils including clay and peat layers are likely to be encountered, as well as pumiceous sand layers. The groundwater level varies across the site, however in some investigation locations the groundwater level is present within the upper 1 m of the soil profile. Accordingly, organic material may be encountered in trench excavations and may require removal and replacement with engineered back-fill. Dewatering of excavations may also be required.

We do not anticipate specific rock excavation machinery to be required for typical service trench excavations. Due to the presence of pumiceous sand layers within 3 m of the ground surface, it should be noted that if new services are to be thrust / directionally drilled a specialist drilling contractor should be contacted for guidance to determine the suitability of the method through these soils.

8.5.4 Bulk Earthworks

Following removal of all topsoil and pre-existing fill (where required), the native soils at the site likely to be affected by cut and fill earthworks will comprise both inorganic and organic clays and silts, and pumiceous sands layers of the Puketoka Formation. The inorganic soils are generally suitable for handling and compaction using conventional earthworks plant, but may be wet of optimum and accordingly some conditioning may be required prior to placement as structural fill. However, this material will require careful sorting and separating from the organic layers at the site, which are not suitable for use in bulk earthworks. The organic material was encountered in all test locations over variable depths, and will almost certainly be encountered during cut earthworks at the site.

All filling should be completed in accordance with NZS 4431 and under the observation of the certifying geotechnical engineer. Where fill is to be placed on sloping ground, the ground must be benched to receive fill to minimise the risk of a preferential shear surface developing at the fill / native interface. Where groundwater springs and seepage are encountered in fill areas, geotechnical underfill drainage will be required to collect the water and direct it to the stormwater system or an approved outlet structure.

Where fill is to be placed adjacent to the northern and western slopes, specific slope stability analyses will be required to support retaining wall design. All retaining walls adjacent to these slopes will be designed to support the fill and new building loads, and to intercept slip surfaces having unacceptable Factors of Safety that may encroach into the development area. These analyses are best completed at the detailed design stage of the project when earthworks design levels are better understood, the retaining wall locations are determined, and supplementary deep investigations can be advanced as required.

8.5.5 Preliminary Pavement Design CBR

Organic soils are likely to be present beneath future roads at the site. At the current ground levels, based on the investigation findings, future pavement design may adopt a preliminary CBR of 2% for native soils.

Removal of all organic material from within future road corridors may not be feasible due to its extent throughout the site. Localised undercuts and subgrade improvement (e.g. placement of geogrid reinforcement) may be required to bridge weak / organic soil layers during construction, as well as increase the design CBR.

A series of Scala penetrometer testing should be undertaken within proposed future road corridors to further assess the design CBR for future roading and pavements.

8.5.6 Demolition

It is essential that all foundations and building debris from demolition of the existing buildings and retaining walls are completely removed from within the extent of works prior to earthworks commencing. Any septic tanks and related infrastructure associated with the main dwelling in the southern area of the site should be decommissioned and removed completely.

Where foundations are removed below final ground level they will need to be backfilled with approved hardfill (e.g. GAP65 or similar approved product) compacted in maximum 200 mm thick layers to ensure a consistent subgrade.

If any existing services are to be decommissioned, the abandoned lines should be fully removed or backfilled with grout to avoid creating preferential groundwater flow paths. All trench backfill will also need to be removed and replaced with engineer certified fill in the vicinity of the proposed dwellings in order to avoid the need for pipe bridging piles, which may also trigger a requirement for additional ground investigation.

Any existing fill uncovered by site clearing work should be inspected by us to confirm its suitability to remain on-site. A provisional allowance should be included in the construction scope for undercut and removal of existing fill associated with the existing structures and landscaping.

8.6 Further Work

ENGEO should be given the opportunity to provide input into the detailed design of the proposed earthworks and retaining walls for the development prior to an application for Building Consent to ensure that the ground conditions are appropriately incorporated into the design. It may be beneficial to undertake a supplementary geotechnical investigation at that stage to substantiate the subsurface data to inform the design, as confirmation of the depth to hard strata may contribute to reducing conservative assumptions in the ground model as well as determine practicable and economic construction solutions.

9 Limitations

i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Aedifice Development Ltd, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.

ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.

iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

iv. This Limitation should be read in conjunction with the Engineering NZ / ACENZ Standard Terms of Engagement.

v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (09) 972 2205 if you require any further information.

Report prepared by

Olivia Ellis-Garland
Engineering Geologist

Report reviewed by

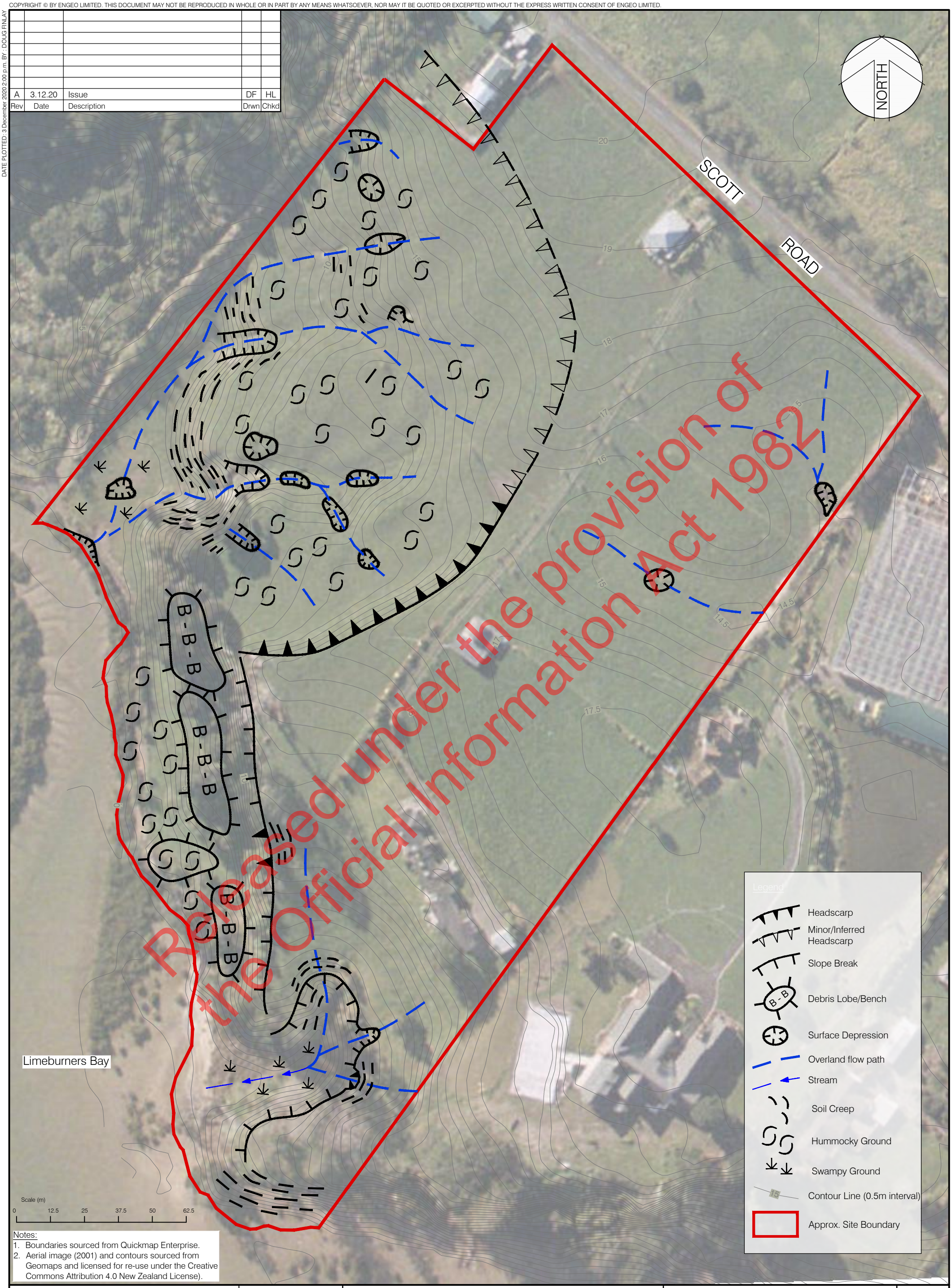
Heather Lyons, CMEngNZ (PEngGeol)
Associate Engineering Geologist

APPENDIX 1:

Geomorphology Plan

DATE PLOTTED: 3 December 2020 2:00 p.m. BY : DOUG FINLAY

Rev	Date	Description	Drwn	Chkd
A	3.12.20	Issue	DF	HL



Notes:
1. Boundaries sourced from Quickmap Enterprise.
2. Aerial image (2001) and contours sourced from Geomaps and licensed for re-use under the Creative Commons Attribution 4.0 New Zealand License).

ENGEO

Auckland Office
8 Greydene Place
Takapuna 0622, Auckland
Tel: 09 972 2205,
www.engeo.co.nz

Title: GEOMORPHOLOGY PLAN

Client: Aedifice Development Limited

Project: 4 Scott Road, Hobsonville, Auckland

Proj No: 17971.000.001

Designed: LEG
Drawn: DF
Checked: HL
Date: 3.12.20
Scale: 1:1250

Appendix: 1
Size: A3
Rev: A

CAD File: Z:\Drafting\17001 to 18000\17971 - 4 Scott Road, Auckland\17971-Geomorph-4ScottRd-1120.dwg
XREF's:

ORIGINAL SHEET PRINTED IN COLOUR

APPENDIX 2:

Investigation Location Plan

Legend

- Site Boundary
- Machine Boreholes
- CPTs
- Hand Augers

30 m

ENGEO

Produced by Evalu8.earth

Title: Investigation Location Plan

Client: Aedifice Development Ltd		Figure No: 2
Project: 4 Scott Road	Drawn: LEG	Size: A4
Date: 19-11-202	Checked: HL	
Proj No: 17971.000.001		Version: 1

ENGEO
Celebrating 10 YEARS IN NZ

APPENDIX 3:

Machine Borehole Logs

LOG OF BORING MBH01

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland
17971.000.001

Client : Aedifice Development Ltd
Date : 09/11/2020
Hole Depth : 21.45 m
Drilling Method : Mud Rotary
Drilling Contractor : Prodrill Ltd

Core Diameter : 83 mm
Energy Transfer Ratio : 82.7 %
Logged By/Reviewed By : NM / LEG
Latitude : -36.802849
Longitude : 174.654107

Depth (m BGL)	Material	Sample Type	USCS Symbol	DESCRIPTION	Log Symbol	Elevation (mRL)	Water Level	Moisture	Consistency/ Density Index	SPT N-Value	Torvane Shear (kPa)	Total Core Recovery (%)	Notes
0.0	T		OL	TOPSOIL.				D	N/A				
	FILL		ML	Clayey SILT with minor organics and trace fine gravel. Grey with light brown and dark brown streaks. Low plasticity. [FILL]		11			VSt				
	NR	NR		CORE LOSS.	NR				St-VSt				
0.5	PUKETOKA FORMATION		ML	Clayey SILT with trace fine gravel and fine to medium pumiceous sand; light grey. Low plasticity.					St-VSt		109/65		
1.0								M			62/26		
			ML	SILT with some clay and fine sand; whiteish light grey. Low plasticity.		10			St				
1.5			ML	Fine sandy SILT; whiteish light grey. Low plasticity.					St-VSt		101/12		
			SW	Silty pumiceous fine SAND; whiteish light grey. Poorly graded.		9		W	F				
2.0				Iron staining encountered from 2.35 m depth.									
2.5											27/4		
		NR		CORE LOSS.	NR				N/A				
3.0			PT	Fibrous to amorphous PEAT; black.		8		S	St		79/13		
3.5			OH	Organic CLAY; black. High plasticity.					St				
4.0			PT	Fibrous PEAT; black.		7		M	St				
		NR		CORE LOSS.	NR				St		80/16		
4.5			OH	Organic CLAY; black. High plasticity.					St				
			CH	CLAY with some organics; dark grey with black streaks. High plasticity.					St				
5.0						6							

Machine borehole met target depth at 21.45 m.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; T = Topsoil.

Groundwater was dipped at 7.18 m on 24/11/2020

GEOTECH MACHINE BORING 20201117_MBH01-03_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF BORING MBH01

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland
17971.000.001

Client : Aedifice Development Ltd
Date : 09/11/2020
Hole Depth : 21.45 m
Drilling Method : Mud Rotary
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio : 82.7 %
Logged By/Reviewed By : NM / LEG
Latitude : -36.802849
Longitude : 174.654107

Depth (m BGL)	Material	Sample Type	USCS Symbol	DESCRIPTION	Log Symbol	Elevation (mRL)	Water Level	Moisture	Consistency/ Density Index	SPT N-Value	Torvane Shear (kPa)	Total Core Recovery (%)	Notes
5.5	PUKETOKA FORMATION		CH	CLAY with some organics; dark grey with black streaks. High plasticity. Becomes brownish grey with black streaks from 5.35 m depth.					St				
		NR		CORE LOSS.	NR			M	St		55/18		
6.0			CH	CLAY with some organics (amorphous with minor fibrous); brownish grey with black streaks. High plasticity.		5			St				
6.5			CH	Silty CLAY with some organics; dark grey. High plasticity.				W	S-F				
			SW	Fine SAND with some silt; brownish grey. Uniformly graded.					L				
			ML						St				
			SW	SILT with trace sand and minor clay organic; blackish brown. Low plasticity.					MD				
7.0			OL	Silty fine pumiceous SAND; brownish white. Uniformly graded. Becomes greyish brown SAND with some silt at 6.95 m depth.		4							
7.5				Organic SILT; black. Low plasticity.				S	VSt		104/19		
			SW	Silty fine SAND; brownish white. Well graded.					MD				
			OL	Organic SILT; black. Low plasticity.					St				
8.0			CH	CLAY; dark grey. High plasticity. Becomes greyish brown with black streaks and stiff from 8.1 m depth.		3							
8.5									F				
9.0				Encountered some fibrous organics from 9.0 m depth. Encountered piece of wood (5 cm x 2 cm x 2 cm) at 9.17 m depth.		2		W		1/1//0/0/0/1 N=1			
			ML	Fine sandy SILT; greyish brown. Low plasticity (friable).					F		45/16		
9.5		NR		CORE LOSS.	NR				N/A				
10.0			ML	Silty pumiceous fine SAND; white. Low plasticity (friable).		1		S	VL				

Machine borehole met target depth at 21.45 m.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; T = Topsoil.

Groundwater was dipped at 7.18 m on 24/11/2020

GEOTECH MACHINE BORING 20201117_MBH01-03_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF BORING MBH01

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland
17971.000.001

Client : Aedifice Development Ltd
Date : 09/11/2020
Hole Depth : 21.45 m
Drilling Method : Mud Rotary
Drilling Contractor : Prodrill Ltd

Core Diameter : 83 mm
Energy Transfer Ratio : 82.7 %
Logged By/Reviewed By : NM / LEG
Latitude : -36.802849
Longitude : 174.654107

Depth (m BGL)	Material	Sample Type	USCS Symbol	DESCRIPTION	Log Symbol	Elevation (mRL)	Water Level	Moisture	Consistency/ Density Index	SPT N-Value	Torvane Shear (kPa)	Total Core Recovery (%)	Notes
10.5	PUKETOKA FORMATION		CH	Silty CLAY; brownish grey. High plasticity.				S	VL		UTP		
				Becomes greenish grey from 10.8 m depth.						0/0//0/0/0/0 N=0			
11.0									F-St				
				Becomes soft from 11.2 m depth.		0		M					
11.5			CH	Silty CLAY with some amorphous organics; dark grey. High plasticity.					VS				
			SW	Silty fine SAND; dark brown. Well graded.					VL				
			OH	Organic CLAY; black. High plasticity.				W	St-VSt				
12.0			SW	Silty pumiceous fine SAND; greyish white. Well graded.				S	VL				
			SW						VL				
			OL	Fine SAND with trace organics; dark brown to black. Well graded.		-1							
				Organic SILT; black. Low plasticity.					VSt		117/17		
12.5										0/1//0/1/0/0 N=1			
			OH	Organic CLAY; black. High plasticity.					F				
13.0			OL	Organic SILT; black. Low plasticity.		-2			St				
13.5											122/22		
			CH	Silty CLAY with minor organics; dark brownish grey with black streaks.				M		0/0//0/0/0/0 N=0			
14.0						-3			VSt				
14.5													
15.0			OL	Organic SILT; black. Low plasticity.		-4					69/17		
									F-St	0/0//0/0/0/0 N=0			
15.5													

Machine borehole met target depth at 21.45 m.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; T = Topsoil.

Groundwater was dipped at 7.18 m on 24/11/2020

GEOTECH MACHINE BORING 20201117_MBH01-03_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF BORING MBH01

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland
17971.000.001

Client : Aedifice Development Ltd
Date : 09/11/2020
Hole Depth : 21.45 m
Drilling Method : Mud Rotary
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio : 82.7 %
Logged By/Reviewed By : NM / LEG
Latitude : -36.802849
Longitude : 174.654107

Depth (m BGL)	Material	Sample Type	USCS Symbol	DESCRIPTION	Log Symbol	Elevation (mRL)	Water Level	Moisture	Consistency/ Density Index	SPT N-Value	Torvane Shear (kPa)	Total Core Recovery (%)	Notes
16.0	PUKETOKA FORMATION		OL	Organic SILT; black. Low plasticity.					F-St				
			OL	Organic SILT with some wood debris; black. Low plasticity.		-5			F-St				
16.5				Encountered wood fragements between 16.3 and 16.6 m depth.					F-St				
			OL	Organic SILT with occasional wood fragments; black. Low plasticity.		-6		M	F-St	1/1//1/1/2/3 N=7			
17.0			OH	Organic CLAY; black. High plasticity.					St				
17.5				Encountered 20 mm thick layer of fibrous PEAT at 17.6 m depth.									
				Encountered 100 mm layer of fibrous PEAT at 17.8 m depth.									
18.0			CH	Encountered 50 mm layer of fibrous PEAT at 17.92 m depth.					VSt		119/6		
			SW	Silty CLAY; brownish grey. High plasticity.		-7				1/1//3/2/2/2 N=9			
18.5				Silty fine SAND; dark brown. Well graded.					L				
			OL	Organic SILT with minor woody debris. Low plasticity.		-8		W	St				
19.0			ML	Pumiceous SILT; whiteish grey. Low plasticity.							UTP		
19.5				Becomes saturated from 19.65 m depth.						4/1//0/1/2/16 N=19			
						-9		S	H				
20.0													
20.5			ML	Fine sandy SILT; light grey.									

Machine borehole met target depth at 21.45 m.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; T = Topsoil.

Groundwater was dipped at 7.18 m on 24/11/2020

GEOTECH MACHINE BORING 20201117_MBH01-03_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF BORING MBH01

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland
17971.000.001

Client : Aedifice Development Ltd
Date : 09/11/2020
Hole Depth : 21.45 m
Drilling Method : Mud Rotary
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio : 82.7 %
Logged By/Reviewed By : NM / LEG
Latitude : -36.802849
Longitude : 174.654107

Depth (m BGL)	Material	Sample Type	USCS Symbol	DESCRIPTION	Log Symbol	Elevation (mRL)	Water Level	Moisture	Consistency/ Density Index	SPT N-Value	Torvane Shear (kPa)	Total Core Recovery (%)	Notes
21.0			OH	Organic CLAY; black. High plasticity.					MD / F		47/10	25 50 75	
			CH	CLAY; brownish grey. High plasticity.		-10		M	VSt-H	2/1/1/2/2/2 N=7			

End of Hole Depth: 21.45 m
Termination: Target depth

Machine borehole met target depth at 21.45 m.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; T = Topsoil.

Groundwater was dipped at 7.18 m on 24/11/2020

GEOTECH MACHINE BORING 20201117_MBH01-03_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF BORING MBH02

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland
17971.000.001

Client : Aedifice Development Ltd
Date : 10/11/2020
Hole Depth : 22.95 m
Drilling Method : Mud Rotary
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio : 82.7 %
Logged By/Reviewed By : JC/SF / LEG
Latitude : -36.802019
Longitude : 174.654694

Depth (m BGL)	Material	Sample Type	USCS Symbol	DESCRIPTION	Log Symbol	Elevation (mRL)	Water Level	Moisture	Consistency/ Density Index	SPT N-Value	Torvane Shear (kPa)	Total Core Recovery (%)	Notes
0.0	T		OL	TOPSOIL.					N/A				
0.5			ML	Clayey SILT with minor fine sand; light grey. Low plasticity.		16			S-F				
			ML	Fine sandy SILT; light grey. Low plasticity.			▼	M	F-St				
1.0			ML	Fine sandy SILT; light grey. Low plasticity. Sand, poorly graded.					VS-S				
									S-F				
1.5						15							
2.0									F-St				
2.5						14		L					
3.0			PT	Amorphous PEAT; dark greyish brown.					VS				
			ML	Fine sandy SILT; light grey. Friable, pumiceous.				L					
3.5						13			F-St				
4.0			PT	Amorphous PEAT; black.					S-F				
4.5						12					31/6		
			OH	Organic CLAY; dark greyish brown. High plasticity.					S-F				
5.0													

Machine borehole met target depth at 22.95 m.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; T = Topsoil.

Groundwater was dipped at 0.87 m on 24/11/2020

GEOTECH MACHINE BORING 20201117_MBH01-03_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF BORING MBH02

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland
17971.000.001

Client : Aedifice Development Ltd
Date : 10/11/2020
Hole Depth : 22.95 m
Drilling Method : Mud Rotary
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio : 82.7 %
Logged By/Reviewed By : JC/SF / LEG
Latitude : -36.802019
Longitude : 174.654694

Depth (m BGL)	Material	Sample Type	USCS Symbol	DESCRIPTION	Log Symbol	Elevation (mRL)	Water Level	Moisture	Consistency/ Density Index	SPT N-Value	Torvane Shear (kPa)	Total Core Recovery (%) 25 50 75	Notes
5.5			CH	Silty CLAY; grey with dark brown streaks. High plasticity.		11			F				
6.0			OH	Organic silty CLAY; dark brown. High plasticity.					S		47/9		
6.5			SW	Silty fine to medium SAND; brownish grey with dark brown streaks. Well graded, sub-rounded to sub-angular.		10			L				
			PT	Amorphous PEAT; black.					F				
7.0			ML	Fine sandy SILT; grey with dark brown streaks.					F				
7.5			CH	Silty CLAY with minor organics and trace wood fragments; greyish brown. High plasticity.		9			S				
8.0				Becomes brownish grey with dark brown mottles from 7.95 m depth.									
8.5				Becomes brown from 8.4 m.		8							
			ML	SILT with trace wood fragments and organic fibres; brownish grey. Low plasticity.					F-St				
9.0			ML	SILT with trace fine sand; light grey with brown mottles. Friable.					F-St				
			PT	Amorphous PEAT; black.					F-St				
			OH	Organic CLAY; dark brown. Low to high plasticity. Becomes lower plasticity and liquefiable from 9.3 m depth.					VS				
9.5				Becomes black from 9.5 m depth.		7							
			ML	SILT with minor fine sand and trace organics; light brown with black and dark brown mottles. Friable.					S				
10.0			PT	Amorphous PEAT; black.					VSt				

Machine borehole met target depth at 22.95 m.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; T = Topsoil.

Groundwater was dipped at 0.87 m on 24/11/2020

GEOTECH MACHINE BORING 20201117_MBH01-03_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF BORING MBH02

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland
17971.000.001

Client : Aedifice Development Ltd
Date : 10/11/2020
Hole Depth : 22.95 m
Drilling Method : Mud Rotary
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio : 82.7 %
Logged By/Reviewed By : JC/SF / LEG
Latitude : -36.802019
Longitude : 174.654694

Depth (m BGL)	Material	Sample Type	USCS Symbol	DESCRIPTION	Log Symbol	Elevation (mRL)	Water Level	Moisture	Consistency/ Density Index	SPT N-Value	Torvane Shear (kPa)	Total Core Recovery (%) 25 50 75	Notes
10.5			PT	Amorphous PEAT; black.		6							
11.0									VSt		156/34		
11.5						5							
12.0			CH	CLAY with trace organics; dark brown with black mottles. High plasticity.							125/31		
12.5				Becomes brownish grey from 12.4 m depth.		4			VSt				
				Becomes grey from 12.9 m depth.									
13.0			CH	CLAY with trace organics; light grey with black mottles. Low plasticity.					St				
13.5						3					62/31		
14.0			CH	CLAY with trace organics; light greyish brown with black mottles. High plasticity.				M					
14.5						2			F				
15.0											48/23		
15.5			OH	Organic CLAY; black. High plasticity.		1			F				

Machine borehole met target depth at 22.95 m.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; T = Topsoil.

Groundwater was dipped at 0.87 m on 24/11/2020

GEOTECH MACHINE BORING 20201117_MBH01-03_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF BORING MBH02

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland
17971.000.001

Client : Aedifice Development Ltd
Date : 10/11/2020
Hole Depth : 22.95 m
Drilling Method : Mud Rotary
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio : 82.7 %
Logged By/Reviewed By : JC/SF / LEG
Latitude : -36.802019
Longitude : 174.654694

Depth (m BGL)	Material	Sample Type	USCS Symbol	DESCRIPTION	Log Symbol	Elevation (mRL)	Water Level	Moisture	Consistency/ Density Index	SPT N-Value	Torvane Shear (kPa)	Total Core Recovery (%)	Notes
16.0			OH	Organic CLAY; black. High plasticity.					F				
			PT	Encountered 0.1 m organic wood layer at 15.8 m depth.									
				Firm PEAT; black.					F				
			PT	Fibrous PEAT; black.					F				
16.5			PT	Encountered 0.1 m organic wood layer at 16.4 m depth.		0							
				Fibrous PEAT; reddish brown with organic partially decomposed roots.					F				
17.0			OH	Organic CLAY with partially decomposed rootlets; reddish brown with black mottles. High plasticity.					F				
			PT	Amorphous PEAT; dark brown with black mottles.					F				
17.5			OH	Organic CLAY with organic decomposed rootlets; light grey. High plasticity.		-1			F				
				Becomes dark brown from 17.8 m depth.									
			PT	Spongy PEAT; dark brown.					St		72/12		
18.0			ML	Fine sandy SILT; light greyish brown with black mottles. Low plasticity.				M					
18.5						-2			St				
			PT	Fibrous PEAT; black.					F				
19.0			ML	Encountered some carbonaceous clasts at 18.9 m depth.									
				Pumiceous SILT; light grey. Low plasticity.					F				
19.5						-3							
			ML	Clayey SILT; dark brown with black mottles. Low plasticity.					F				
20.0			ML	Clayey pumiceous SILT; light grey. High plasticity.					F				
20.5						-4							

Machine borehole met target depth at 22.95 m.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; T = Topsoil.

Groundwater was dipped at 0.87 m on 24/11/2020

GEOTECH MACHINE BORING 20201117_MBH01-03_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF BORING MBH02

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland
17971.000.001

Client : Aedifice Development Ltd
Date : 10/11/2020
Hole Depth : 22.95 m
Drilling Method : Mud Rotary
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio : 82.7 %
Logged By/Reviewed By : JC/SF / LEG
Latitude : -36.802019
Longitude : 174.654694

Depth (m BGL)	Material	Sample Type	USCS Symbol	DESCRIPTION	Log Symbol	Elevation (mRL)	Water Level	Moisture	Consistency/ Density Index	SPT N-Value	Torvane Shear (kPa)	Total Core Recovery (%)	Notes
21.0			ML	Clayey pumiceous SILT; light grey. High plasticity.					F				
			ML	Clayey SILT with pumiceous fine sand; light grey with black mottles and white speckles. Low plasticity.						0/1//1/1/2/2 N=6			
21.5						-5							
								M	St-VSt				
22.0													
22.5				Encountered some organics from 22.5 m depth.		-6				2/2//3/4/4/4 N=15	147/65		
				End of Hole Depth: 22.95 m Termination: Target depth									

Machine borehole met target depth at 22.95 m.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; T = Topsoil.

Groundwater was dipped at 0.87 m on 24/11/2020

LOG OF BORING MBH03

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland
17971.000.001

Client : Aedifice Development Ltd
Date : 11/11/2020
Hole Depth : 27.45 m
Drilling Method : Mud Rotary
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio : 82.7 %
Logged By/Reviewed By : SF / LEG
Latitude : -36.801688
Longitude : 174.654191

Depth (m BGL)	Material	Sample Type	USCS Symbol	DESCRIPTION	Log Symbol	Elevation (mRL)	Water Level	Moisture	Consistency/ Density Index	SPT N-Value	Torvane Shear (kPa)	Total Core Recovery (%)	Notes
0.0	TS		OL	TOPSOIL.					VS				
	PUKETOKA FORMATION		CH	Silty CLAY; light greyish brown. High plasticity.		9			F				
0.5				PUSH TUBE SAMPLE					N/A		200+		
1.0			CH	CLAY; dark brown with black mottles. High plasticity. Becomes light greyish brown with dark brown and black mottles.		8			St		88/44		
2.0			ML	Fine sandy SILT; light greyish brown with black mottles. Low plasticity.		7			F				
2.5			PT	Amorphous PEAT; black.				M	F				
			SP	Silty fine SAND; light greyish brown with black mottles. Poorly graded.					L				
3.0			CH	Silty CLAY; dark brown with black mottles. High plasticity.		6			S	1/1//1/1/1/1 N=4	UTP		
			CH	CLAY; greenish grey with black mottles. High plasticity.									
3.5			CH	CLAY with organics; light greyish brown with dark brown mottles. High plasticity.									
			SP	Silty fine SAND; light greyish brown with dark brown mottles. Poorly graded.		5			D				
4.0			CH	CLAY; light greyish brown. High plasticity.					F				
			SP	Silty pumiceous fine SAND; white with light greyish brown mottles. Poorly graded.					MD				
4.5			CH	Organic CLAY; dark brown with black mottles. High plasticity.					VS	0/0//0/0/0/0 N=0			
5.0			ML	Pumiceous SILT; light greyish brown with dark		4		W	F				

Machine borehole met target depth at 27.45 m.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; TS = Topsoil.

Groundwater was dipped at 8.10 m on 24/11/2020

GEOTECH MACHINE BORING 20201117_MBH01-03_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF BORING MBH03

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland
17971.000.001

Client : Aedifice Development Ltd
Date : 11/11/2020
Hole Depth : 27.45 m
Drilling Method : Mud Rotary
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio : 82.7 %
Logged By/Reviewed By : SF / LEG
Latitude : -36.801688
Longitude : 174.654191

Depth (m BGL)	Material	Sample Type	USCS Symbol	DESCRIPTION	Log Symbol	Elevation (mRL)	Water Level	Moisture	Consistency/ Density Index	SPT N-Value	Torvane Shear (kPa)	Total Core Recovery (%)	Notes
5.5	PUKETOKA FORMATION		CH	brown mottles. Low plasticity. Organic CLAY; black. High plasticity.					F				
			PT	Amorphous PEAT; black. High plasticity.									
6.0						3			St	1/0//1/0/1/1 N=3	91/1		
6.5			CH	Organic CLAY; dark brown with black and light greyish brown mottles. High plasticity.									
7.0						2			St				
								M					
7.5											88/29		
			PT	Plastic to Fibrous PEAT; black. High plasticity.					St	0/0//1/2/2/3 N=7			
8.0				Encountered wood fragments between 7.95 and 8.2 m depth.		1	▼		N/A				
									F				
			OH	Organic CLAY; black. High plasticity.					S				
8.5			CH	Silty CLAY; light grey with black mottles. High plasticity.									
9.0						0				1/1//2/1/2/3 N=8	147/41		
9.5								W	St-VSt				
10.0						-1		M					

Machine borehole met target depth at 27.45 m.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; TS = Topsoil.

Groundwater was dipped at 8.10 m on 24/11/2020

GEOTECH MACHINE BORING 20201117_MBH01-03_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF BORING MBH03

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland
17971.000.001

Client : Aedifice Development Ltd
Date : 11/11/2020
Hole Depth : 27.45 m
Drilling Method : Mud Rotary
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio : 82.7 %
Logged By/Reviewed By : SF / LEG
Latitude : -36.801688
Longitude : 174.654191

Depth (m BGL)	Material	Sample Type	USCS Symbol	DESCRIPTION	Log Symbol	Elevation (mRL)	Water Level	Moisture	Consistency/ Density Index	SPT N-Value	Torvane Shear (kPa)	Total Core Recovery (%)	Notes
10.5	PUKETOKA FORMATION		CH	Silty CLAY; light grey with black mottles. High plasticity.						1/2//2/2/3/3 N=10	88/29		
11.0						-2			St-VSt				
11.5			ML	Clayey SILT; light grey. Low plasticity.					F				
12.0			ML	Fine sandy SILT; light grey. Low plasticity.		-3				1/1//2/2/2/2 N=8	106/29		
12.5									VSt				
13.0						-4		M					
13.5			ML	Fine sandy SILT; light grey with green clasts. Low plasticity.						1/2//2/2/2/3 N=9	UTP		
14.0						-5							
14.5									VSt-H				
15.0						-6				1/1//1/1/2/2 N=6	117/29		
15.5													

Machine borehole met target depth at 27.45 m.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; TS = Topsoil.

Groundwater was dipped at 8.10 m on 24/11/2020

GEOTECH MACHINE BORING 20201117_MBH01-03_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF BORING MBH03

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland
17971.000.001

Client : Aedifice Development Ltd
Date : 11/11/2020
Hole Depth : 27.45 m
Drilling Method : Mud Rotary
Drilling Contractor : Prodrill Ltd

Core Diameter : 83 mm
Energy Transfer Ratio : 82.7 %
Logged By/Reviewed By : SF / LEG
Latitude : -36.801688
Longitude : 174.654191

Depth (m BGL)	Material	Sample Type	USCS Symbol	DESCRIPTION	Log Symbol	Elevation (mRL)	Water Level	Moisture	Consistency/ Density Index	SPT N-Value	Torvane Shear (kPa)	Total Core Recovery (%)	Notes
16.0	EAST COAST BAYS FORMATION		ML	Fine sandy SILT; light grey with green clasts. Low plasticity.					VSt-H				
			ML	Fine sandy SILT; dark grey. Low plasticity.		-7			St		88/26		
16.5				Carbonaceous organics at 16.6 m depth..						2/3//5/7/8/10 N=30			
			ML	Fine sandy SILT; dark grey. Low plasticity.		-8			VSt				
17.0													
17.5			SP	Silty fine SAND; grey. Poorly graded.		-9		M	D	4/5//6/7/8/11 N=32			
18.0													
18.5			ML	Sandy SILT; dark grey. Low plasticity.		-10			St				
19.0			ML	SILT with some fine sand; dark grey. Low plasticity.					St	3/6//6/7/12/12 N=37			
19.5						-11							
20.0			ML	SILT; dark grey. Low plasticity.					VSt				
20.5			SP	Silty SAND; dark grey. Poorly graded.					D				

Machine borehole met target depth at 27.45 m.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; TS = Topsoil.

Groundwater was dipped at 8.10 m on 24/11/2020

GEOTECH MACHINE BORING 20201117_MBH01-03_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF BORING MBH03

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland
17971.000.001

Client : Aedifice Development Ltd
Date : 11/11/2020
Hole Depth : 27.45 m
Drilling Method : Mud Rotary
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio : 82.7 %
Logged By/Reviewed By : SF / LEG
Latitude : -36.801688
Longitude : 174.654191

Depth (m BGL)	Material	Sample Type	USCS Symbol	DESCRIPTION	Log Symbol	Elevation (mRL)	Water Level	Moisture	Consistency/ Density Index	SPT N-Value	Torvane Shear (kPa)	Total Core Recovery (%)	Notes
21.0	EAST COAST BAYS FORMATION		SP	Silty SAND; dark grey. Poorly graded.		-12			D	4/5//5/7/9/11 N=32			
21.5													
22.0						-13							
22.5										4/4//6/10/8/10 N=34			
23.0			ML	Sandy SILT; dark grey. Low plasticity.		-14		M					
23.5													
24.0						-15				3/3//3/4/5/6 N=18			
24.5									St				
25.0						-16							
25.5										4/5//6/8/10/10 N=34			
26.0													

Machine borehole met target depth at 27.45 m.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; TS = Topsoil.

Groundwater was dipped at 8.10 m on 24/11/2020

GEOTECH MACHINE BORING 20201117_MBH01-03_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF BORING MBH03

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland
17971.000.001

Client : Aedifice Development Ltd
Date : 11/11/2020
Hole Depth : 27.45 m
Drilling Method : Mud Rotary
Drilling Contractor : Prodrill Ltd
Core Diameter : 83 mm
Energy Transfer Ratio : 82.7 %
Logged By/Reviewed By : SF / LEG
Latitude : -36.801688
Longitude : 174.654191

Depth (m BGL)	Material	Sample Type	USCS Symbol	DESCRIPTION	Log Symbol	Elevation (mRL)	Water Level	Moisture	Consistency/ Density Index	SPT N-Value	Torvane Shear (kPa)	Total Core Recovery (%) 25 50 75	Notes
26.5	EAST COAST BAYS FORMATION		ML	Sandy SILT; dark grey. Low plasticity.		-17		M	St	5/7/10/11/15/19 for 15 mm N=50+			
27.0						-18							

End of Hole Depth: 27.45 m
Termination: Target depth

Machine borehole met target depth at 27.45 m.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; TS = Topsoil.

Groundwater was dipped at 8.10 m on 24/11/2020

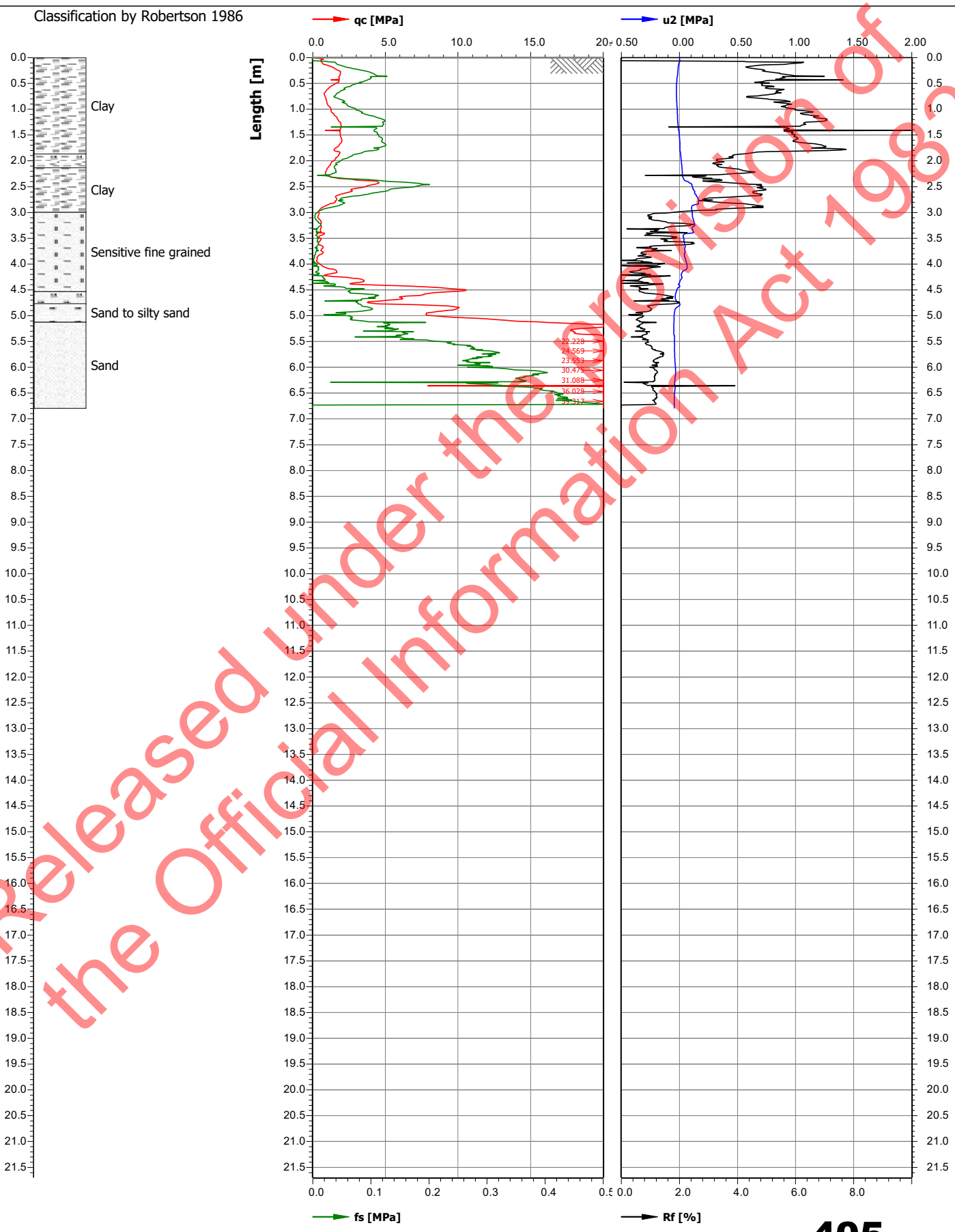
GEOTECH MACHINE BORING 20201117_MBH01-03_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

APPENDIX 4:

Cone Penetrometer Logs

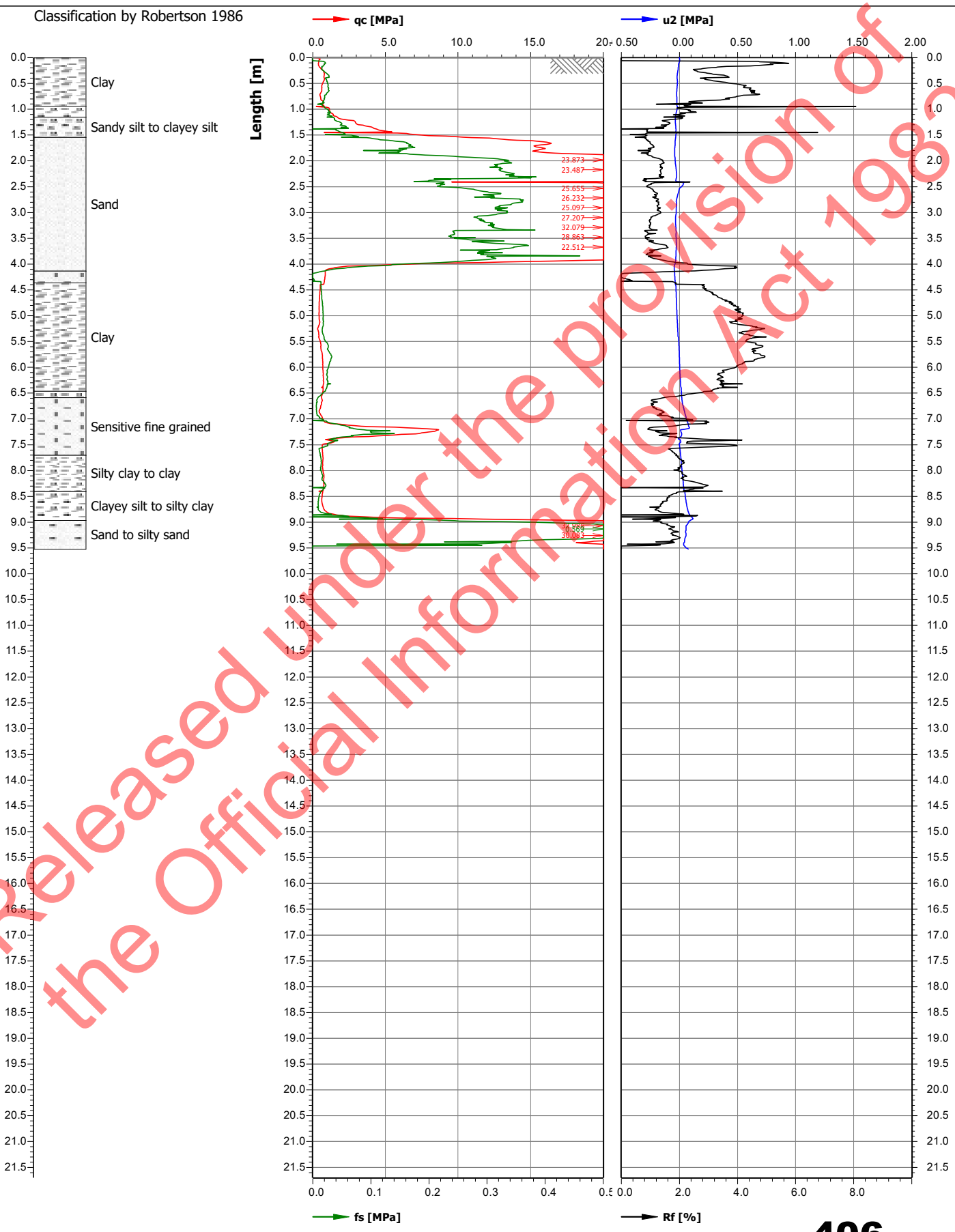
PRO-DRILL SPECIALIST DRILLING ENGINEERS	Project name: Engeo4ScottRoad	Date investigation: 10/11/2020	
	Test name: CPT01	Cone name: S10CFIIP.1920	
Test location name	Client: ENGEO	Net surface area quotient of ...: 0.800/0.000	Nominal surface area of cone...: 10.0/150.0
X coordinate [m]/Y coordinat...: 0.00/0.00	Project contractors	Fig. no.:	
Z value [m]: 0.00	Project engineer	Scale: 1:100	Page: 1/1
Remarks1			

Classification by Robertson 1986



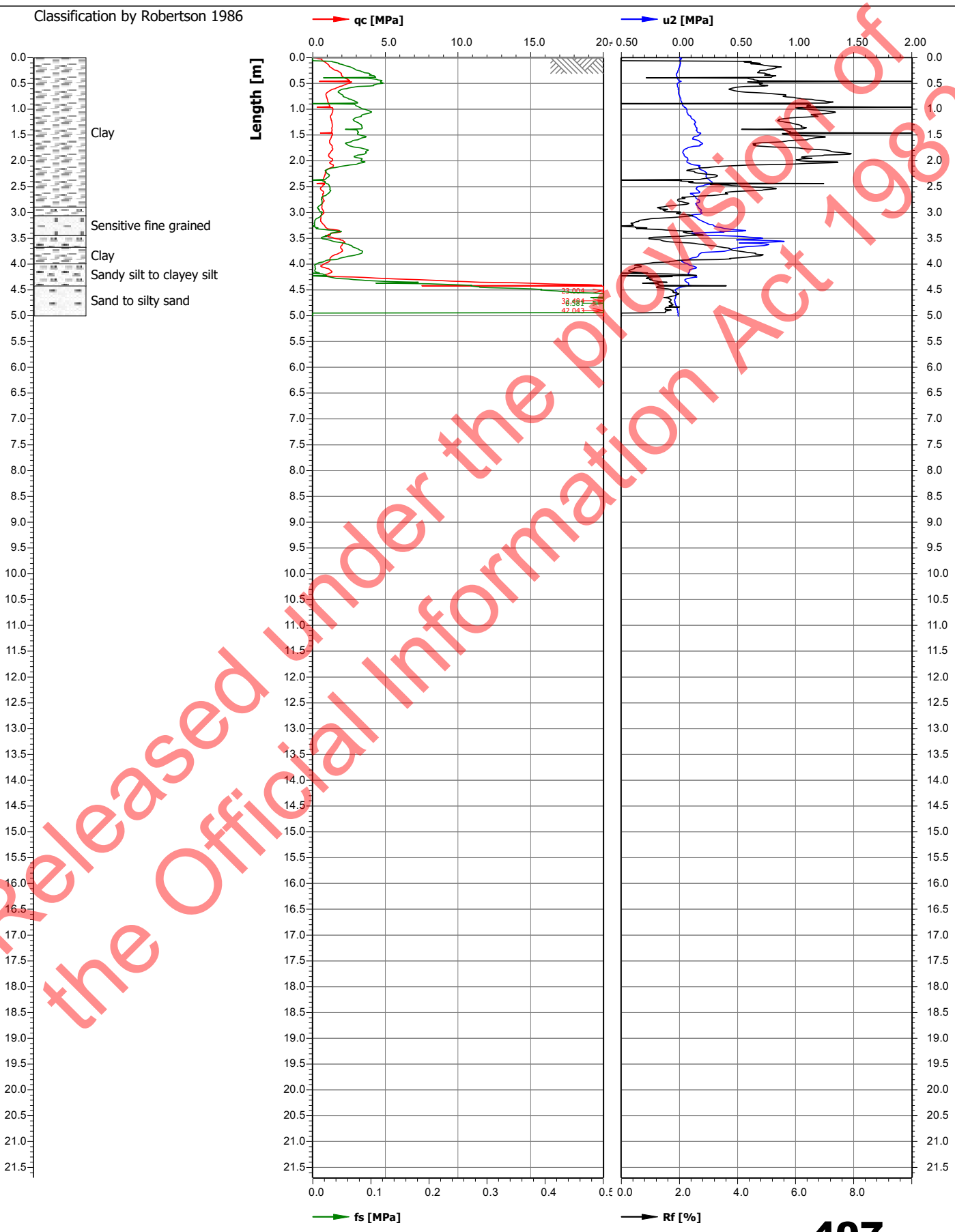
PRO-DRILL SPECIALIST DRILLING ENGINEERS	Project name: Engeo4ScottRoad	Date investigation: 10/11/2020	
	Test name: CPT02	Cone name: S10CFIIP.1920	
Test location name	Client: ENGEO	Net surface area quotient of ...: 0.800/0.000	Nominal surface area of cone...: 10.0/150.0
X coordinate [m]/Y coordinat...: 0.00/0.00	Project contractors	Fig. no.:	
Z value [m]: 0.00	Project engineer	Scale: 1:100	Page: 1/1
Remarks1			

Classification by Robertson 1986



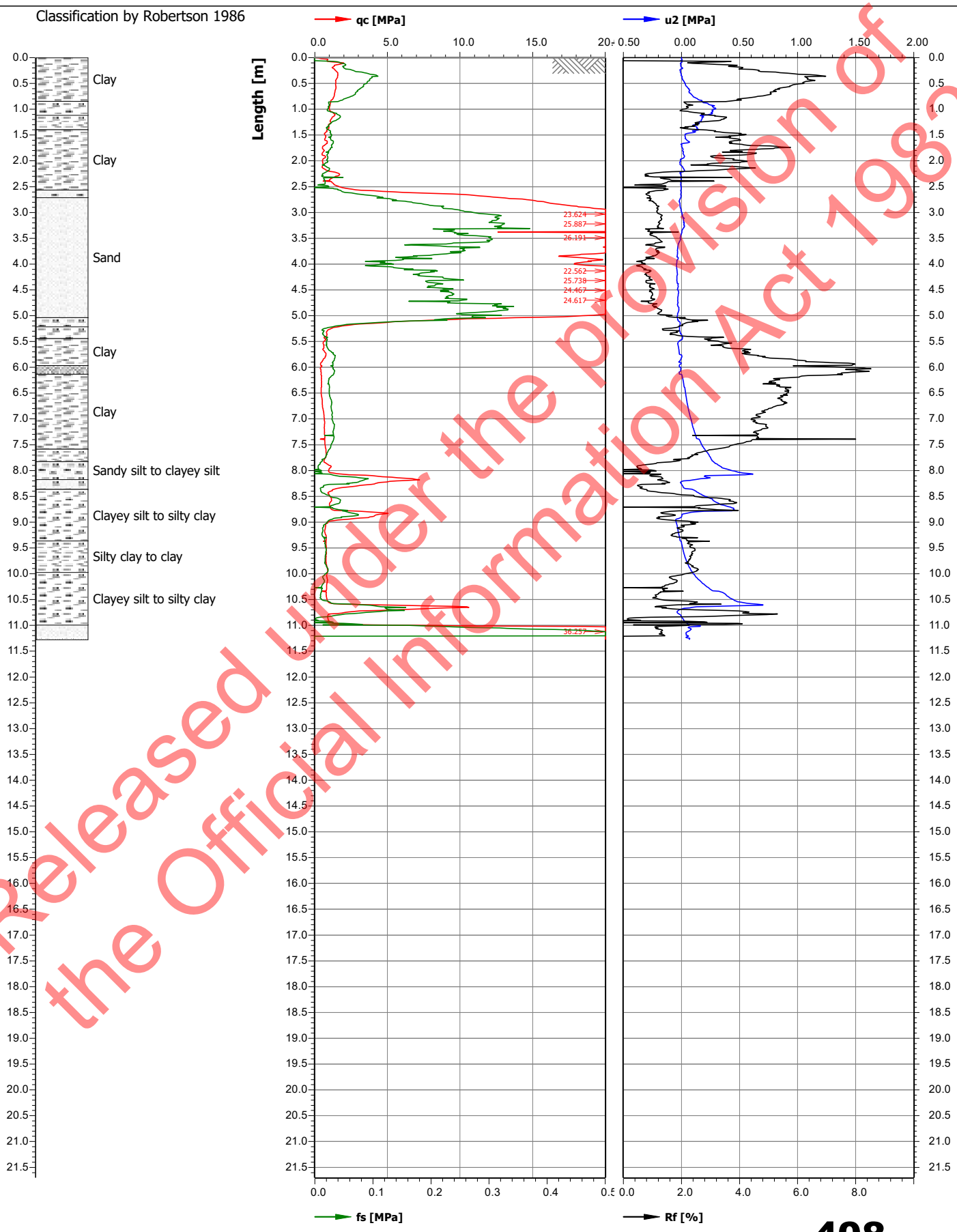
PRO-DRILL SPECIALIST DRILLING ENGINEERS	Project name: Engeo4ScottRoad	Date investigation: 10/11/2020	
	Test name: CPT03	Cone name: S10CFIIP.1920	
Test location name:	Client: ENGEO	Net surface area quotient of ...: 0.800/0.000	Nominal surface area of cone...: 10.0/150.0
X coordinate [m]/Y coordinat...: 0.00/0.00	Project contractors:	Fig. no.:	
Z value [m]: 0.00	Project engineer:	Scale: 1:100	Page: 1/1
Remarks1:			

Classification by Robertson 1986



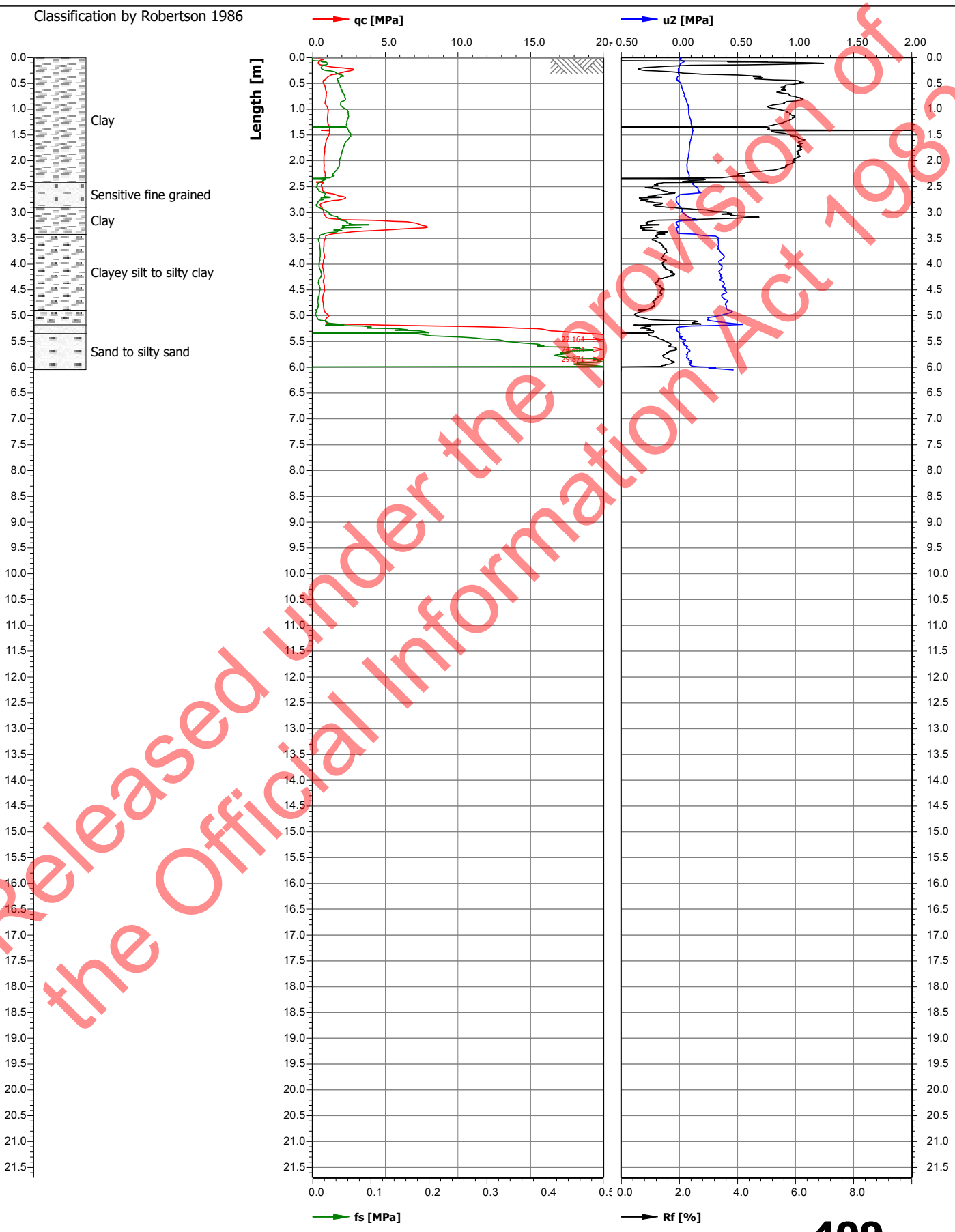
PRO-DRILL SPECIALIST DRILLING ENGINEERS	Project name: Engeo4ScottRoad	Date investigation: 10/11/2020	
	Test name: CPT04	Cone name: S10CFIIP.1920	
Test location name	Client: ENGEO	Net surface area quotient of ...: 0.800/0.000	Nominal surface area of cone...: 10.0/150.0
X coordinate [m]/Y coordinat...: 0.00/0.00	Project contractors	Fig. no.:	
Z value [m]: 0.00	Project engineer	Scale: 1:100	Page: 1/1
Remarks1			

Classification by Robertson 1986



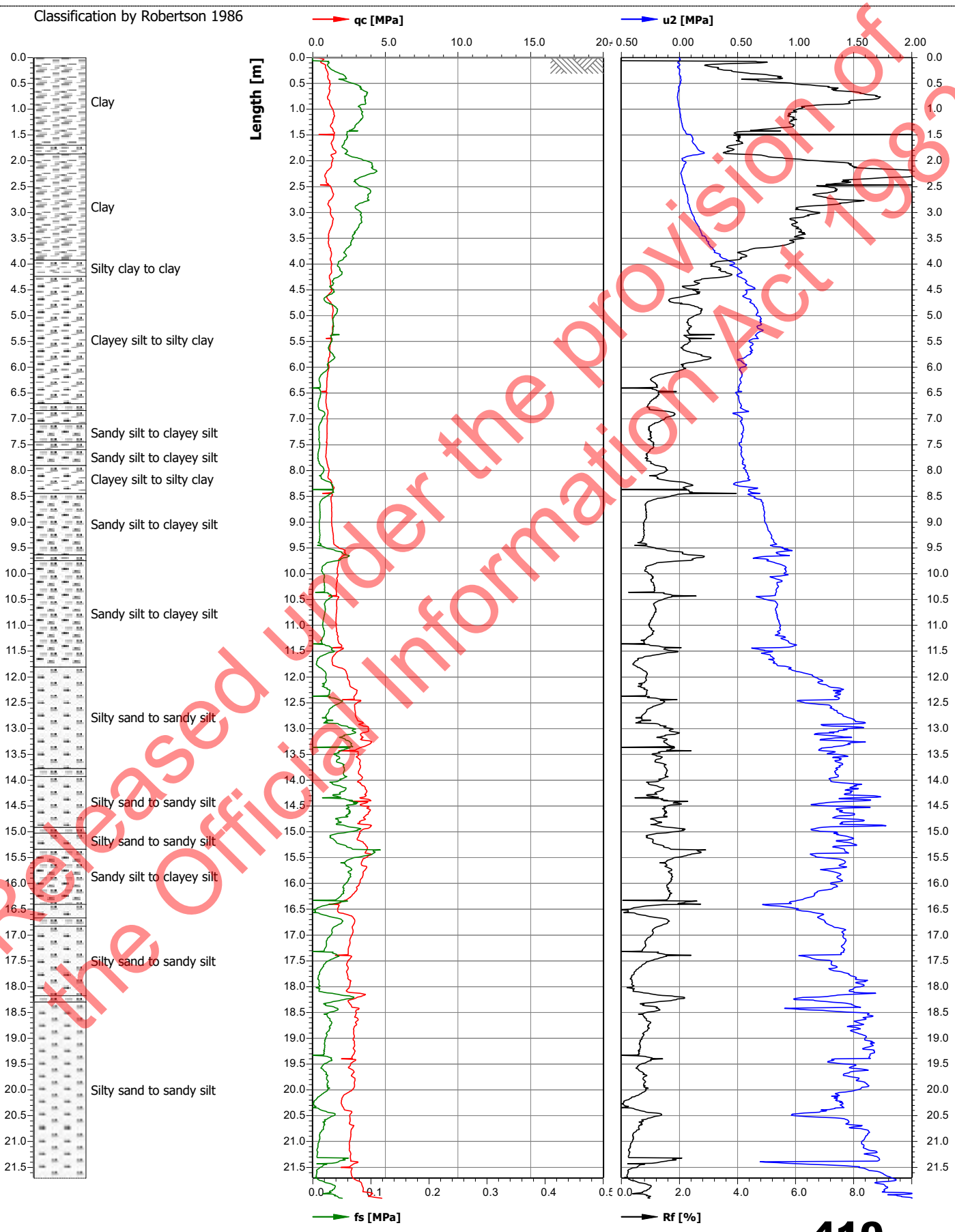
PRO-DRILL SPECIALIST DRILLING ENGINEERS	Project name: Engeo4ScottRoad	Date investigation: 10/11/2020	
	Test name: CPT05	Cone name: S10CFIIP.1920	
Test location name:	Client: ENGEO	Net surface area quotient of ...: 0.800/0.000	Nominal surface area of cone...: 10.0/150.0
X coordinate [m]/Y coordinat...: 0.00/0.00	Project contractors:	Fig. no.:	
Z value [m]: 0.00	Project engineer:	Scale: 1:100	Page: 1/1
Remarks1:			

Classification by Robertson 1986



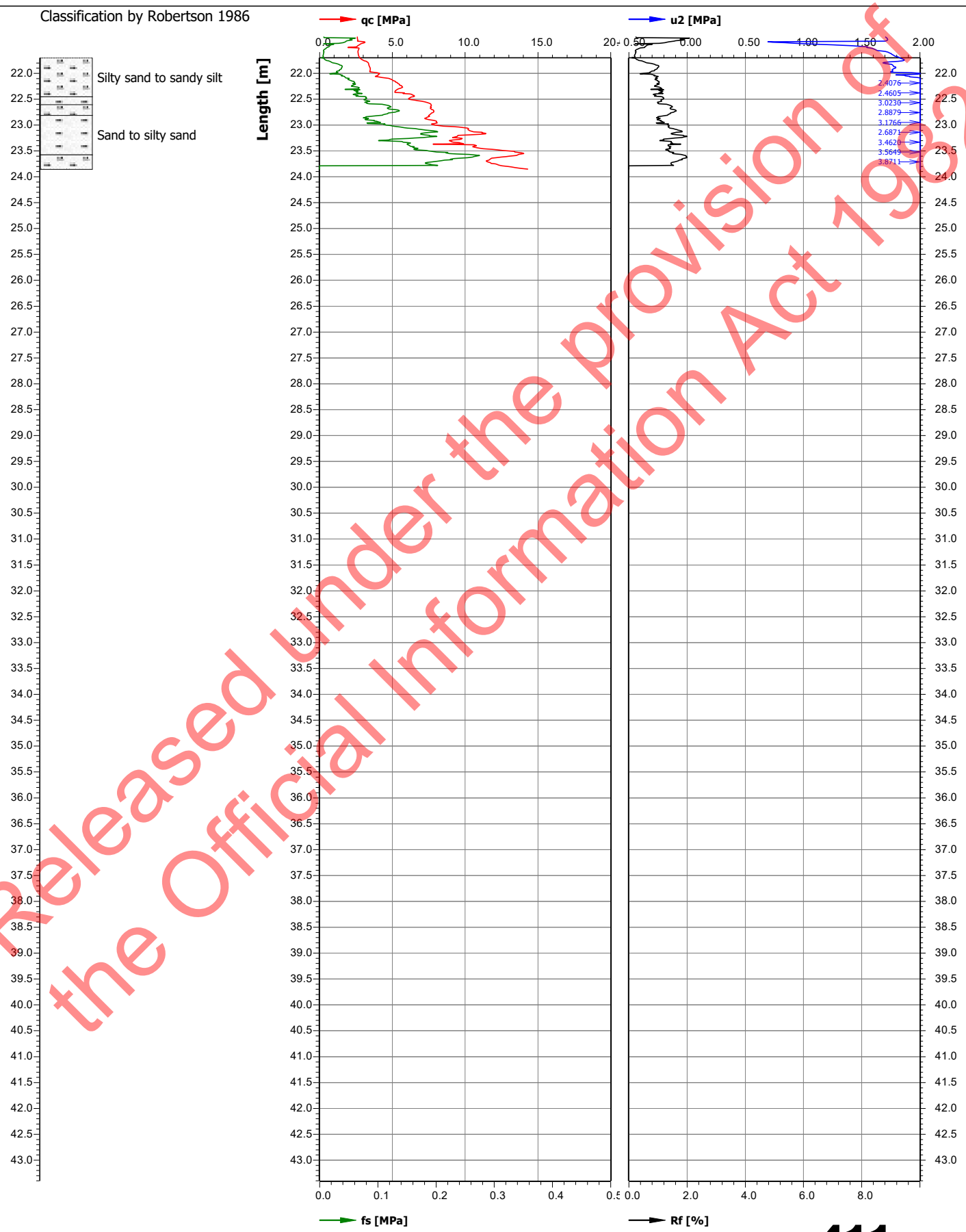
PRO-DRILL SPECIALIST DRILLING ENGINEERS	Project name: Engeo4ScottRoad	Date investigation: 10/11/2020	
	Test name: CPT06	Cone name: S10CFIIP.1920	
Test location name	Client: ENGEO	Net surface area quotient of ...: 0.800/0.000	Nominal surface area of cone...: 10.0/150.0
X coordinate [m]/Y coordinat...: 0.00/0.00	Project contractors	Fig. no.:	
Z value [m]: 0.00	Project engineer	Scale: 1:100	Page: 1/2
Remarks1			

Classification by Robertson 1986



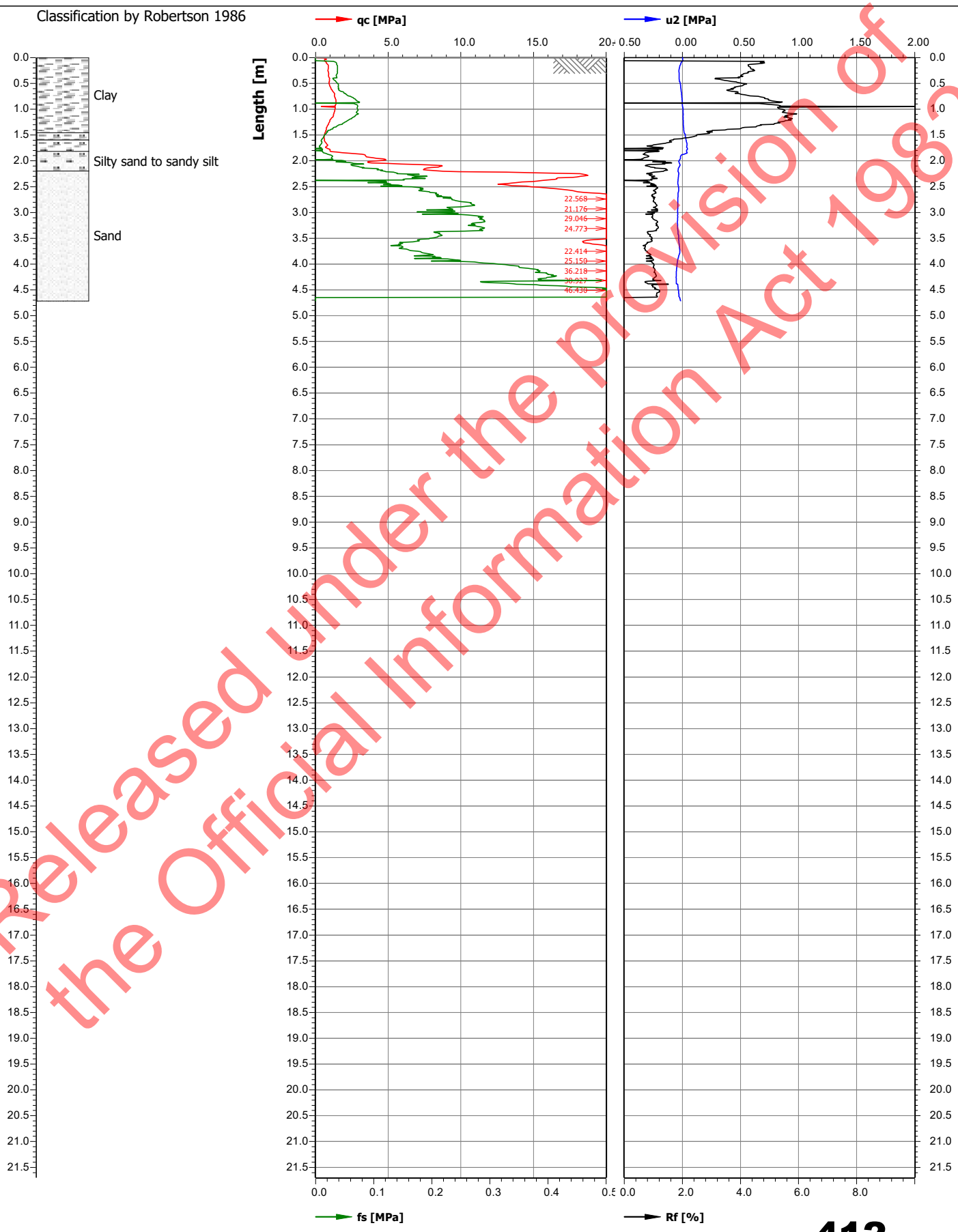
PRO-DRILL SPECIALIST DRILLING ENGINEERS	Project name: Engeo4ScottRoad	Date investigation: 10/11/2020	
	Test name: CPT06	Cone name: S10CFIIP.1920	
Test location name	Client: ENGEO	Net surface area quotient of ...: 0.800/0.000	Nominal surface area of cone...: 10.0/150.0
X coordinate [m]/Y coordinat...: 0.00/0.00	Project contractors	Fig. no.:	
Z value [m]: 0.00	Project engineer	Scale: 1:100	Page: 2/2
Remarks1			

Classification by Robertson 1986



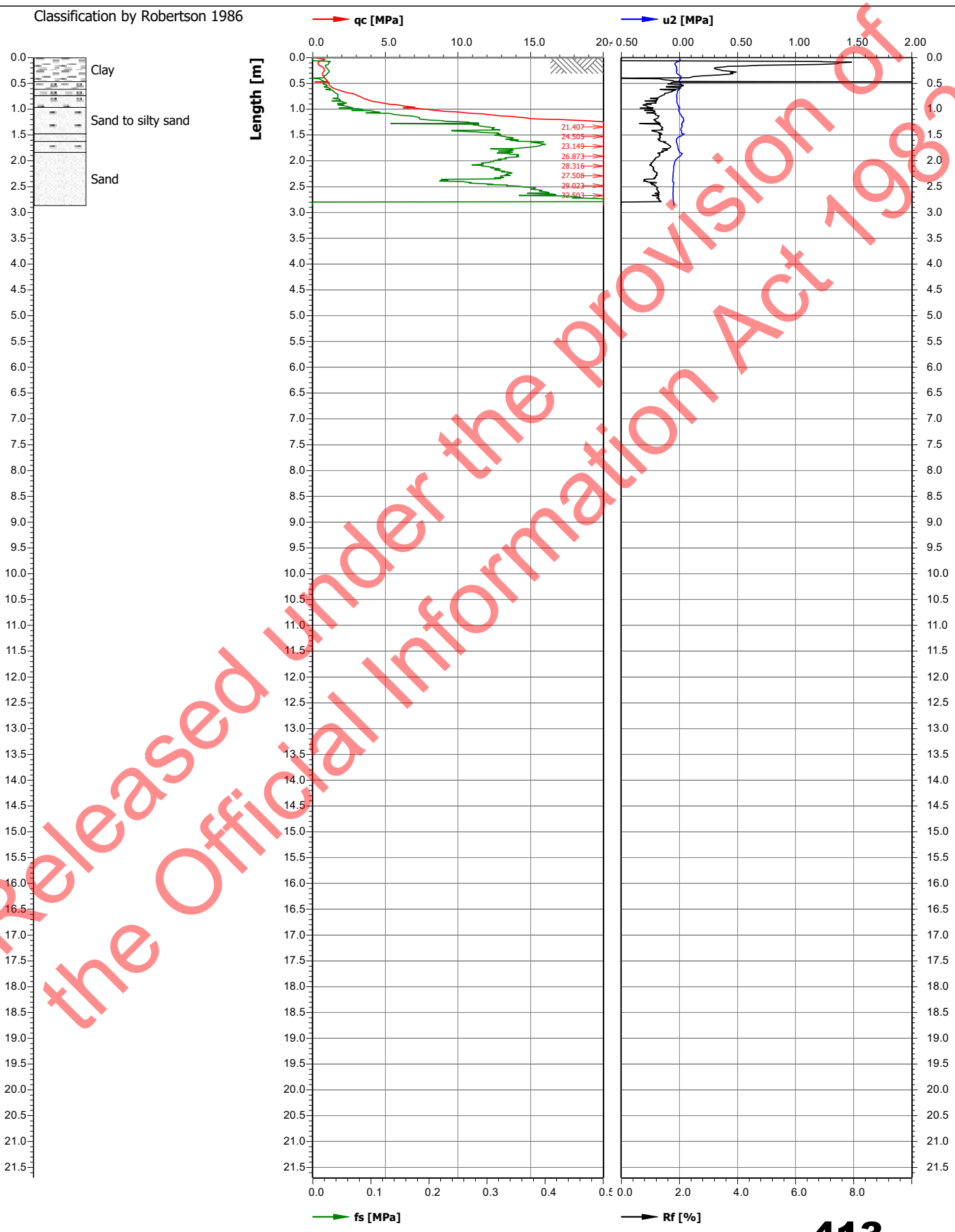
PRO-DRILL SPECIALIST DRILLING ENGINEERS	Project name: Engeo4ScottRoad	Date investigation: 10/11/2020	
	Test name: CPT07	Cone name: S10CFIIP.1920	
Test location name	Client: ENGEO	Net surface area quotient of ...: 0.800/0.000	Nominal surface area of cone...: 10.0/150.0
X coordinate [m]/Y coordinat...: 0.00/0.00	Project contractors	Fig. no.:	
Z value [m]: 0.00	Project engineer	Scale: 1:100	Page: 1/1
Remarks1			

Classification by Robertson 1986



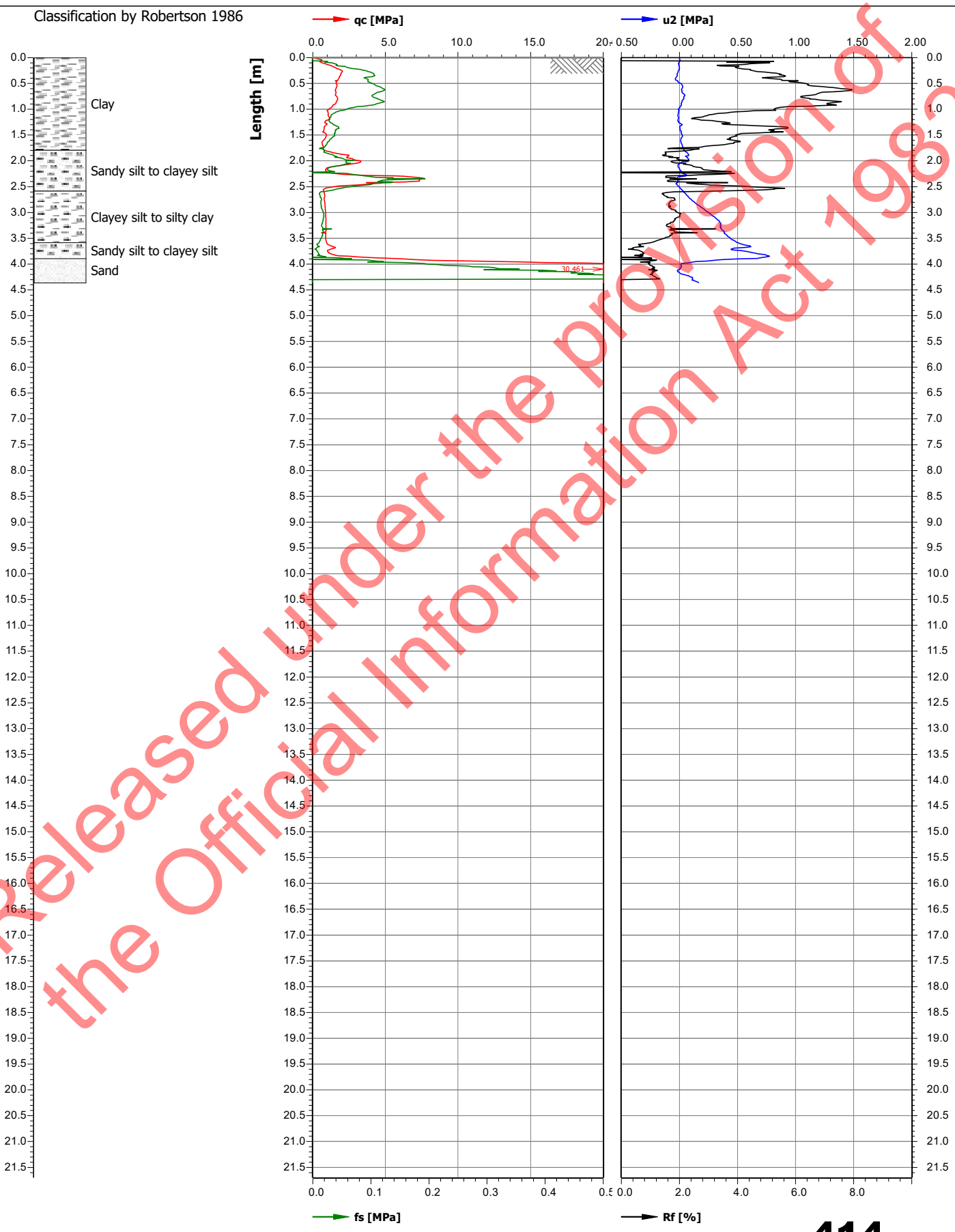
PRO-DRILL SPECIALIST DRILLING ENGINEERS	Project name: Engeo4ScottRoad	Date investigation: 10/11/2020	
	Test name: CPT08	Cone name: S10CFIIP.1920	
Test location name	Client: ENGEO	Net surface area quotient of ...: 0.800/0.000	Nominal surface area of cone...: 10.0/150.0
X coordinate [m]/Y coordinat...: 0.00/0.00	Project contractors	Fig. no.:	
Z value [m]: 0.00	Project engineer	Scale: 1:100	Page: 1/1
Remarks1			

Classification by Robertson 1986



PRO-DRILL SPECIALIST DRILLING ENGINEERS	Project name: Engeo4ScottRoad	Date investigation: 10/11/2020	
	Test name: CPT09	Cone name: S10CFIIP.1920	
Test location name	Client: ENGEO	Net surface area quotient of ...: 0.800/0.000	Nominal surface area of cone...: 10.0/150.0
X coordinate [m]/Y coordinat...: 0.00/0.00	Project contractors	Fig. no.:	
Z value [m]: 0.00	Project engineer	Scale: 1:100	Page: 1/1
Remarks1			

Classification by Robertson 1986



PRO-DRILL SPECIALIST DRILLING ENGINEERS	Project name: Engeo4ScottRoad	Date investigation: 10/11/2020	
	Test name: CPT10	Cone name: S10CFIIP.1920	
Test location name	Client: ENGEO	Net surface area quotient of ...: 0.800/0.000	Nominal surface area of cone...: 10.0/150.0
X coordinate [m]/Y coordinat...: 0.00/0.00	Project contractors	Fig. no.:	
Z value [m]: 0.00	Project engineer	Scale: 1:100	Page: 1/1
Remarks1			

Classification by Robertson 1986

APPENDIX 5:

Hand Auger Logs

LOG OF HAND AUGER HA01

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland

Client : Aedifice Development Ltd
Client Ref. : 17971.000.001
Date : 10/11/2020
Hole Depth : 0.8 m
Hole Diameter : 50 mm

Shear Vane No : 1858
Logged By : DO
Reviewed By : LEG
Latitude : -36.801835
Longitude : 174.653584

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
0	T	OL	TOPSOIL.					N/A		
0.5	FILL	SP	Silty fine to coarse SAND with trace fragments of clay pipe; dark grey to black. Sub-rounded to sub-angular. Poorly graded. [FILL] Encountered void between 0.4 - 0.65 m depth.				M	H	UTP	
			End of Hole Depth: 0.8 m Termination Condition: Practical refusal							

1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0

Hand auger met practical refusal at 0.8 m depth on inferred fill.
Standing groundwater was not encountered
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; T = Topsoil, UTP = Unable to penetrate.

GEOTECH HAND AUGER - NO SCALA 20201113_HA01-10_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF HAND AUGER HA02

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland

Client : Aedifice Development Ltd
Client Ref. : 17971.000.001
Date : 10/11/2020
Hole Depth : 5 m
Hole Diameter : 50 mm

Shear Vane No : 1858
Logged By : DO
Reviewed By : LEG
Latitude : -36.801894
Longitude : 174.653708

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
0.0	PUKETOKA FORMATION	CH	Silty CLAY with trace fine to medium sand; light grey with orange mottles and occasional black speckles (dark grey in top 0.3 m). High plasticity.		2		M	St-VSt	74/19 74/29 51/16	
1.0		SW	Silty fine pumiceous SAND; light grey. Sub-rounded to rounded. Well graded.					MD	118/42	
1.2		CH	Silty CLAY; light reddish grey. High plasticity.			▼		St	N/A	
1.5		PT	Amorphous PEAT; black.		1		W	F-St	32/13 77/19 77/22	
2.5			No recovery (inferred peat).					St	83/19	
2.7		CH	Silty organic CLAY; dark grey with black mottles and streaks. High plasticity.		0		S	St-VSt	166/48 51/24 80/32 152/70	
4.0		CH	Silty CLAY; blueish grey. High plasticity.		-1			St-VSt	147/64 154/70 93/48	
5.0			End of Hole Depth: 5 m Termination Condition: Target depth		-2					

Hand auger met target depth at 5 m.
Dip test showed standing water at 1.5 m bgl.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed.

GEOTECH HAND AUGER - NO SCALA 20201113_HA01-10_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF HAND AUGER HA03

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland

Client : Aedifice Development Ltd
Client Ref. : 17971.000.001
Date : 10/11/2020
Hole Depth : 5 m
Hole Diameter : 50 mm

Shear Vane No : 1858
Logged By : DO
Reviewed By : LEG
Latitude : -36.80204
Longitude : 174.653944

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
0.0	T	OL	TOPSOIL.					N/A		
0.5	PUKETOKA FORMATION	CH	Silty CLAY with trace fine sand; light grey with dark orange and black streaks and mottles. High plasticity.				M	VSt	150/58 109/35	
1.0		CH	Silty CLAY with minor fine to medium sand; light grey with orange mottles. High plasticity.		10			VSt	120/32	
1.5		SW	Silty fine to medium SAND; light grey with dark orange mottles and streaks, and occasional black streaks. Sub-rounded to rounded. Well graded.					L-MD		
2.0		PT	Amorphous PEAT; black.		9			St	56/13	
2.5		OH	Silty organic CLAY; black and dark grey. High plasticity.				W	St	58/19 54/22	
3.0		CH	Silty CLAY; blueish grey. High plasticity.		8			St	67/32	
3.5		OH	Silty organic CLAY; black and dark grey. High plasticity.			▼		F-St	61/26 40/16	
4.0		ML	Fine to medium sandy SILT; dark grey. Low plasticity.		7		S	VSt	166/35 109/32	
4.5		PT	Plastic fibrous PEAT with wood and root inclusions; black.					St	67/32	
5.0		OH	Silty organic CLAY; black and dark grey. High plasticity.		6			St	54/26 58/32	
			End of Hole Depth: 5 m Termination Condition: Target depth							

Hand auger met target depth at 5 m.
Dip test showed standing water at 3.5 m bgl.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; T = Topsoil.

GEOTECH HAND AUGER - NO SCALA 20201113_HA01-10_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF HAND AUGER HA04

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland

Client : Aedifice Development Ltd
Client Ref. : 17971.000.001
Date : 10/11/2020
Hole Depth : 1.2 m
Hole Diameter : 50 mm

Shear Vane No : 1858
Logged By : DO
Reviewed By : LEG
Latitude : -36.802272
Longitude : 174.654295

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
0.0	PUKETOKA FORMATION	ML	Clayey SILT with trace fine sand and rootlets; dark grey with light grey mottles. Low plasticity. Encountered fine to medium sand between 0.3 - 0.4 m depth.				W	St-VSt	77/19	
0.5		ML	Fine to medium sandy SILT; light grey with occasional dark grey streaks. Low plasticity.					VSt-H	157/48	
1.0		SW	Silty fine to medium pumiceous SAND; light grey to off-white with trace black speckles. Sub-rounded to rounded. Poorly graded.		12		M	MD		
			End of Hole Depth: 1.2 m Termination Condition: Practical refusal							

Hand auger met practical refusal at 1.2 m depth on hard material (pumiceous sand).
Standing groundwater was not encountered
Surface elevation data from Auckland Council Geomaps.

GEOTECH HAND AUGER - NO SCALA 20201113_HA01-10_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF HAND AUGER HA05

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland

Client : Aedifice Development Ltd
Client Ref. : 17971.000.001
Date : 10/11/2020
Hole Depth : 3.7 m
Hole Diameter : 50 mm

Shear Vane No : 1858
Logged By : DO
Reviewed By : LEG
Latitude : -36.803772
Longitude : 174.653711

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
0.0	MARINE SEDIMENT	SW	Fine to medium SAND; dark brown. Rounded to sub-angular. Well graded.		1		M			
0.5			Becomes grey from 0.7 m depth.			▼	W			
1.0			Becomes dark grey to black from 1.0 m depth.		0			N/A		
1.5										
2.0			Poor recovery from 1.4 to 2.0 m depth; becomes black from 2.0 m depth.				S			
2.5	PUKETOKA FORMATION	OH	Amorphous PEAT; black.		-1				128/51	
									141/54	
3.0			Encountered occasional wood fragments between 2.8 - 3.2 m depth.					St-VSt	83/26	
									118/35	
3.5					-2				109/32	
			End of Hole Depth: 3.7 m Termination Condition: Practical refusal							
4.0										
4.5										
5.0										

Hand auger met practical refusal at 3.7 m depth due to poor recovery (washed out).
Dip test showed standing water at 0.8 m bgl.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed.

GEOTECH HAND AUGER - NO SCALA 20201113_HA01-10_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF HAND AUGER HA06

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland

Client : Aedifice Development Ltd
Client Ref. : 17971.000.001
Date : 10/11/2020
Hole Depth : 4.5 m
Hole Diameter : 50 mm

Shear Vane No : 1858
Logged By : DO
Reviewed By : LEG
Latitude : -36.803571
Longitude : 174.654138

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
	T	OL	TOPSOIL.					N/A		
0.5	PUKETOKA FORMATION	ML	Clayey SILT with trace fine to medium sand and rootlets; dark grey with light orange streaks and mottles, occasional dark orange and black speckles. Low plasticity.		7			VSt	176/58 157/51	
1.0		CH	Silty CLAY with trace fine sand; dark grey with occasional; dark orange mottles. High plasticity.					H	118/48	
1.5		CH	Silty CLAY; light grey with orange and brown mottles and occasional black speckles. High plasticity.		6			VSt-H	UTP 141/45	
		ML	Fine to medium sandy SILT; dark grey with light pink mottles. Low plasticity.				M	VSt	144/35	
2.0		PT	Plastic PEAT; black.					S		
		SW	Silty fine to medium SAND; light grey and light pink. Sub-rounded to rounded. Well graded.					MD	UTP	
		PT	Plastic PEAT; black.					S		
2.5		CH	Silty CLAY; dark brownish grey with occasional black streaks. High plasticity.		5			VSt	118/51 138/54	
3.0		PT	Plastic PEAT; black.					St	86/37	
		CH	Silty CLAY; dark brownish grey with occasional black streaks. High plasticity.					VSt		
3.5		ML	Fine to medium sandy SILT; light grey with dark brownish grey mottles. Low plasticity. Sand: sub-rounded to rounded, well graded.		4			H	128/42	
		CH	Silty CLAY; dark brownish grey. High plasticity.					H		
4.0		SW	Silty fine to medium SAND; light grey with light brown mottles and occasional black streaks. Sub-rounded to rounded. Well graded. Poor recovery from 4.1 m depth.			▼	S	MD		
4.5			End of Hole Depth: 4.5 m Termination Condition: Practical refusal		3					
5.0										

Hand auger met practical refusal at 4.5 m depth due to poor recovery.
Dip test showed standing water at 4.1 m bgl.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; T = Topsoil, UTP = Unable to penetrate.

GEOTECH HAND AUGER - NO SCALA 20201113_HA01-10_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF HAND AUGER HA07

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland

Client : Aedifice Development Ltd
Client Ref. : 17971.000.001
Date : 10/11/2020
Hole Depth : 5 m
Hole Diameter : 50 mm

Shear Vane No : 1858
Logged By : DO
Reviewed By : LEG
Latitude : -36.802705
Longitude : 174.654749

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
0	T	OL	TOPSOIL.					N/A		
	PUKETOKA FORMATION	ML	Clayey SILT with trace fine to medium sand; brownish orange with black mottles. Low plasticity.					VSt	189/64	
0.5		ML	Fine to medium sandy SILT with trace coarse sand; light orange brown with dark orange and black mottles. Low plasticity.		15			VSt	177/48	
1.0		CH	Silty CLAY with trace fine sand; light grey with dark orange mottles and black streaks. High plasticity.				M	St-H	114/51 80/38	
1.5					14				86/42	
2.0		CH	Silty CLAY with minor fine sand; intermixed grey and orange with pink streaks and mottles. High plasticity. Becomes white at 2.3 m depth.					St-VSt	200+ 150/58 99/38	
2.5					13		W			
3.0		SW	Silty fine to medium pumiceous SAND with trace coarse sand; white, pink and orange with black streaks. Sub-rounded to rounded. Well graded.					MD	99/32 154/48	
		CH	Silty CLAY with trace fine to medium sand; very light brownish grey to white. High plasticity.			▼		F	45/16	
3.5			No recovery.		12			N/A		
4.0		SW	Silty fine SAND; light grey. Rounded. Poorly graded.				S	MD		
			No recovery.					N/A		
4.5		SW	Silty fine SAND; light grey. Rounded. Poorly graded.		11			MD		
			No recovery.					N/A		
5.0		SW	Silty fine SAND; light grey. Rounded. Poorly graded.					MD		
			End of Hole Depth: 5 m Termination Condition: Target depth							

Hand auger met target depth at 5 m.
Dip test showed standing water at 3.2 m bgl.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; T = Topsoil.

GEOTECH HAND AUGER - NO SCALA 20201113_HA01-10_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF HAND AUGER HA08

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland

Client : Aedifice Development Ltd
Client Ref. : 17971.000.001
Date : 10/11/2020
Hole Depth : 4.5 m
Hole Diameter : 50 mm

Shear Vane No : 1858
Logged By : DO
Reviewed By : LEG
Latitude : -36.80363
Longitude : 174.654426

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
0	T	OL	TOPSOIL.					N/A		
	PUKETOKA FORMATION	SW	Silty fine to medium SAND; light grey with orange mottles. Sub-rounded to rounded. Poorly graded.				M	MD		
0.5		PT	Plastic PEAT; black.					St		
		CH	Silty CLAY with trace fine sand; dark grey with occasional black streaks. High plasticity.					St	93/45	
1.0					6				96/51	
		CH	Silty CLAY; light grey with occasional orange mottles and dark grey streaks. High plasticity.						96/45	
1.5							W		99/54	
								St	74/38	
2.0					5				70/38	
		ML	Fine to medium sandy SILT; dark grey with occasional orange mottles. Low plasticity.					St	67/32	
2.5		SW	Silty fine to medium SAND; dark grey. Sub-rounded to rounded. Poorly graded.			▼		MD		
		PT	Amorphous PEAT; black.					St	99/45	
3.0					4					
		SW	Silty fine to medium SAND; dark grey. Sub-rounded to rounded. Poorly graded. No recovery (washed out).					MD		
3.5							S			
4.0					3			L		
4.5			End of Hole Depth: 4.5 m Termination Condition: Practical refusal							
5.0										

Hand auger met practical refusal at 4.5 m depth due to poor recovery.
Dip test showed standing water at 2.7 m bgl.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; T = Topsoil.

GEOTECH HAND AUGER - NO SCALA 20201113_HA01-10_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF HAND AUGER HA09

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland

Client : Aedifice Development Ltd
Client Ref. : 17971.000.001
Date : 10/11/2020
Hole Depth : 4 m
Hole Diameter : 50 mm

Shear Vane No : 1858
Logged By : DO
Reviewed By : LEG
Latitude : -36.802273
Longitude : 174.655198

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
0.0	T	OL	TOPSOIL.					N/A		
0.5	PUKETOKA FORMATION	ML	Clayey SILT with trace fine to medium sand; brownish orange with black mottles. Low plasticity. Becomes light greyish brown with pink streaks from 0.5 m depth.		16		M	St-VSt	112/48 141/61 96/42	
1.0		CH	Silty CLAY with trace fine sand; light orange and grey with dark brown streaks. High plasticity.					VSt	106/45	
1.5		CH	Silty CLAY with minor fine sand; light grey with pink and occasional orange streaks. High plasticity. Becomes light greyish orange from 2.0 m depth.		15			St-H	80/45 144/64 112/32	
2.0										
2.5		SW	Silty fine to medium SAND; light grey with occasional black speckles. Sub-rounded to rounded. Poorly graded.		14		W	MD	200+	
3.0						▼				
3.5			No recovery.		13		S	L		
4.0		SW	Silty fine SAND; light grey. Rounded. Poorly graded.					MD		
4.5			End of Hole Depth: 4 m Termination Condition: Practical refusal							
5.0										

Hand auger met practical refusal at 4 m depth due to poor recovery.
Dip test showed standing water at 3.2 m bgl.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; T = Topsoil.

GEOTECH HAND AUGER - NO SCALA 20201113_HA01-10_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

LOG OF HAND AUGER HA10

Geotechnical Investigation
4 Scott Road
Hobsonville, Auckland

Client : Aedifice Development Ltd
Client Ref. : 17971.000.001
Date : 10/11/2020
Hole Depth : 2 m
Hole Diameter : 50 mm

Shear Vane No : 1858
Logged By : DO
Reviewed By : LEG
Latitude : -36.802474
Longitude : 174.653467

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
0.0	PUKETOKA FORMATION	CH	Silty CLAY with trace fine sand; light grey with orangle mottles nad occasional black speckles. High plasticity.		2	▼	W	St	62/16 67/24	
1.0		OH	Silty organic CLAY; black and dark grey. High plasticity.				S	F St-VSt	35/13 88/32 99/38 152/53	
1.5					1					
2.0			End of Hole Depth: 2 m Termination Condition: Practical refusal							

Hand auger met practical refusal at 2 m depth due to poor recovery.
Dip test showed standing water at 0.8 m bgl.
Surface elevation data from Auckland Council Geomaps.
N/A = Not assessed; T = Topsoil.

GEOTECH HAND AUGER - NO SCALA 20201113_HA01-10_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/12/20

APPENDIX 6:

Shrink-Swell Laboratory Results

Shrink – Swell Index Testing Results

Project Name	4 Scott Road, Hobsonville		
ENGEO Reference	17971.000.001		
Testing Conducted by	LA		
Date Samples Received	11/11/2020	**Date Test Started**	18/11/2020
Tests and Standards used	Water Content	NZS4402:1986:Test 2.1	
	Sampling *in situ* Density	NZS4402:1986:Test 5.1.3	
	Shrink - Swell Index	AS1289:Test 7.1.1 - 2003	
Sample ID	SS01		
Sample Depth (m)	0.5 – 1.0		
Soil Description*	Clayey SILT with trace sand; light grey with orange streaks. Low plasticity		
Initial Water Content (Swell Sample)	35%		
Estimated Percentage of inert inclusions	<5%		
Extent of Crumbling	Minor		
Extent of Shrinkage Cracking	Minor		
Swelling Strain	0.4		
Shrinkage Strain	4.5		
Shrink-Swell Index	**2.6**		

*Logged in accordance with NZGS Field Description of Soil and Rock, 2005.
For full log description, refer to relevant report appendix.

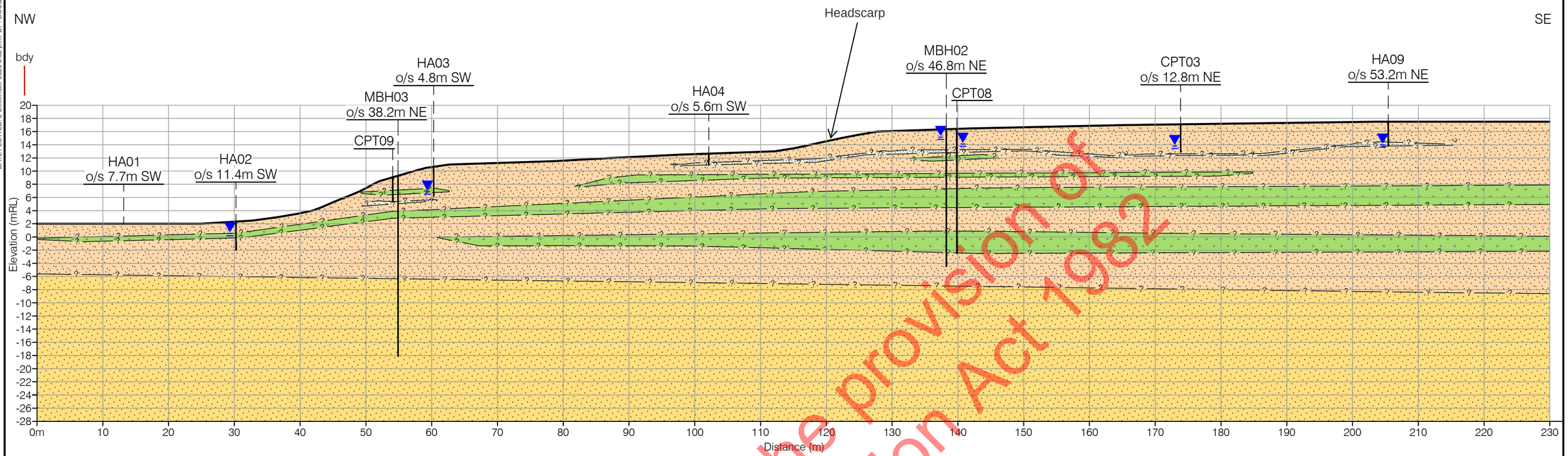
All testing was carried out in general accordance with stated New Zealand and Australian Standards, however, ENGEO does not currently hold ISO9001 Accreditation for lab testing.

ENGEO
Celebrating 10 YEARS IN NZ

APPENDIX 7:

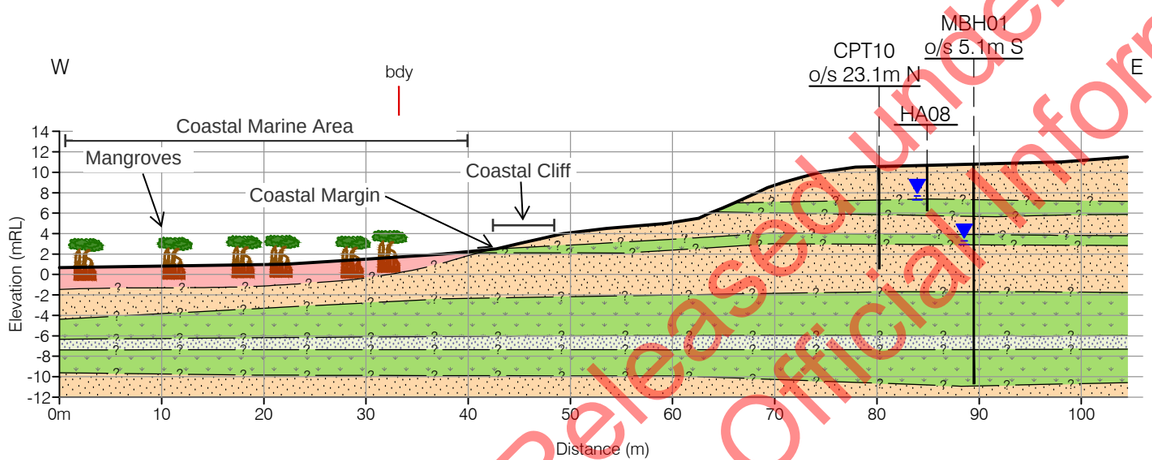
Ground Models

DATE PLOTTED: 2 December 2020 3:32 p.m. BY: DOUG FINLAY



CROSS SECTION A-A'

SCALE 1:600



CROSS SECTION C-C'

SCALE 1:600

Legend

- Puketoka Formation Pumiceous Sand
- Puketoka Formation Peat and Organic Clay
- Puketoka Formation Inorganic Silt and Clay Layers
- East Coast Bays Formation
- Marine Sediment
- Inferred
- Mangrove
- Measured Groundwater Level

Rev	Date	Description	Drwn	Chkd
A	2.12.20	Issue	DF	HL

CAD File: Z:\Drafting\17001 to 18000\17971 - 4 Scott Road, Auckland\17971-Xsecs-4ScottRd-1120.dwg
XREF's:

ENGEO
Auckland Office
8 Greydene Place
Takapuna 0622
Auckland
Tel: 09 972 2205
www.engeo.co.nz

Title: GEOLOGICAL GROUND MODELS

Client: Aedifice Development Limited

Project: 4 Scott Road, Hobsonville, Auckland

Proj No: 17971.000.001

Designed: LEG
Drawn: DF
Checked: HL
Date: 2.12.20
Scale: 1:600

Appendix: 7
Size: A3
Rev: A

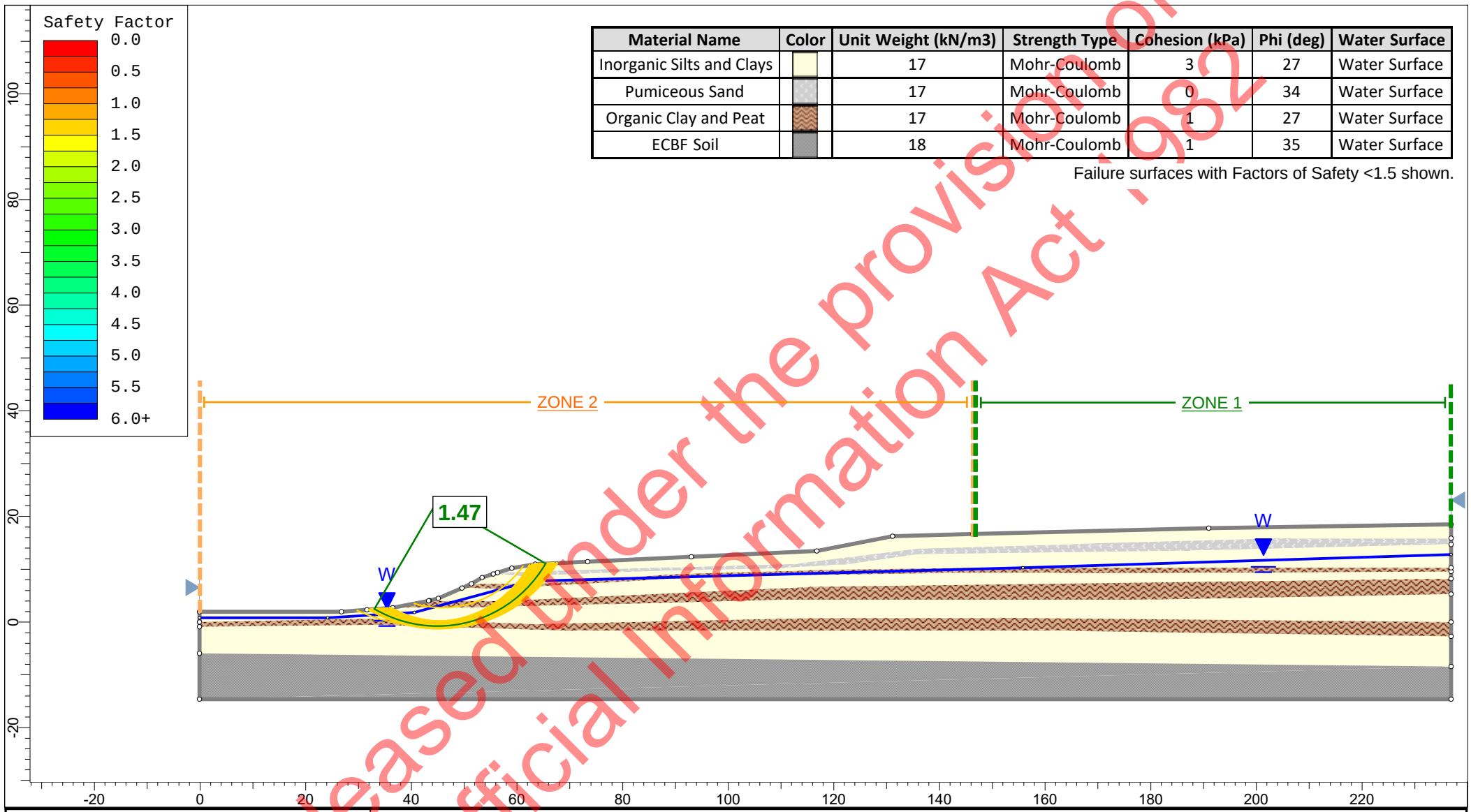
OPTIMISED FOR BEING PRINTED IN COLOUR

APPENDIX 8:

Slope Stability Analysis Results

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface
Inorganic Silts and Clays		17	Mohr-Coulomb	3	27	Water Surface
Pumiceous Sand		17	Mohr-Coulomb	0	34	Water Surface
Organic Clay and Peat		17	Mohr-Coulomb	1	27	Water Surface
ECBF Soil		18	Mohr-Coulomb	1	35	Water Surface

Failure surfaces with Factors of Safety <1.5 shown.

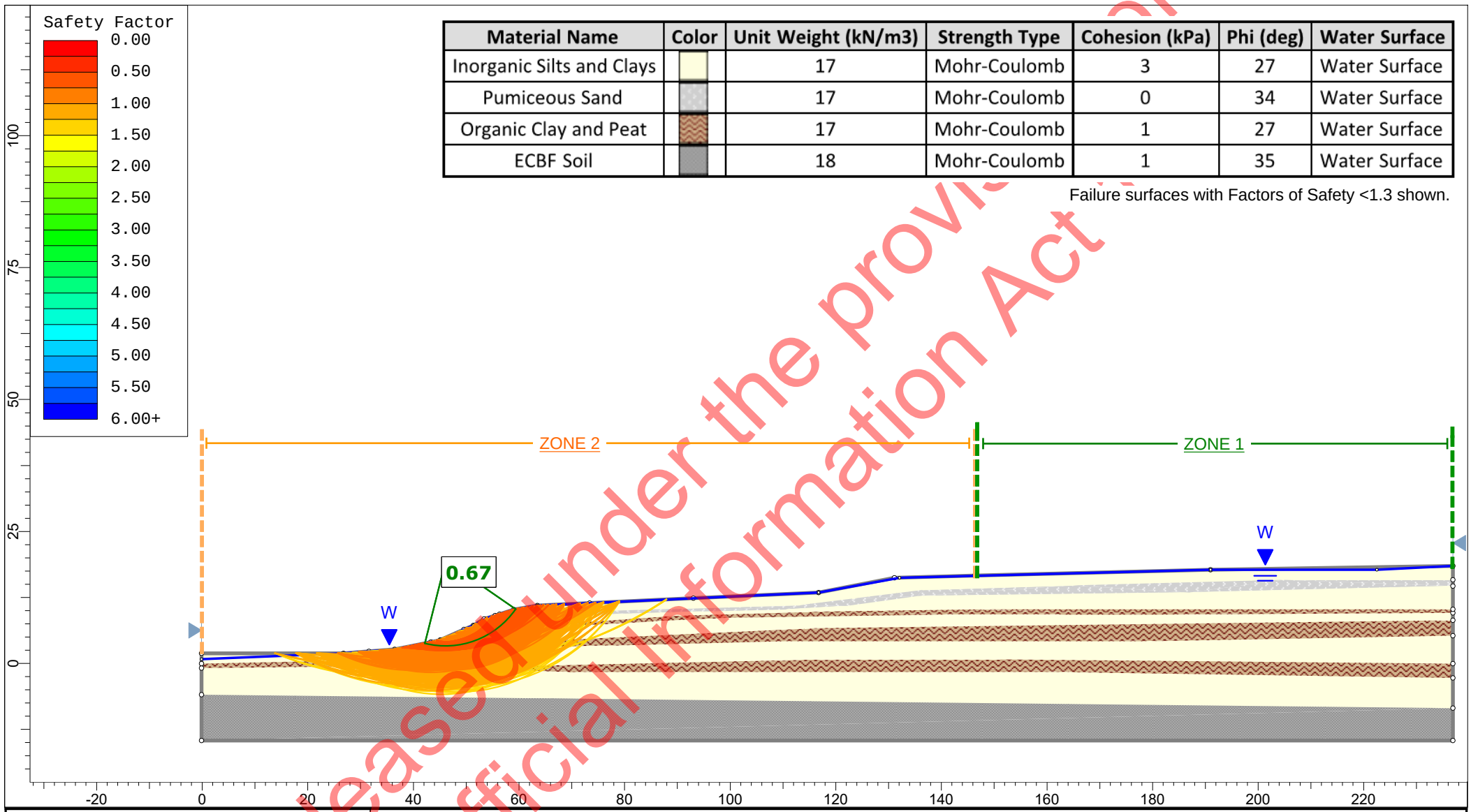


ENGEO	Project	Slope Stability Analysis	
	Section Location	Section A-A'	Scenario: Static
	Drawn By	LEG	Company: ENGEO Ltd
	Date	November 2020	Project Number: 17971.000.001

SLIDEINTERPRET 9.010

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface
Inorganic Silts and Clays		17	Mohr-Coulomb	3	27	Water Surface
Pumiceous Sand		17	Mohr-Coulomb	0	34	Water Surface
Organic Clay and Peat		17	Mohr-Coulomb	1	27	Water Surface
ECBF Soil		18	Mohr-Coulomb	1	35	Water Surface

Failure surfaces with Factors of Safety <1.3 shown.

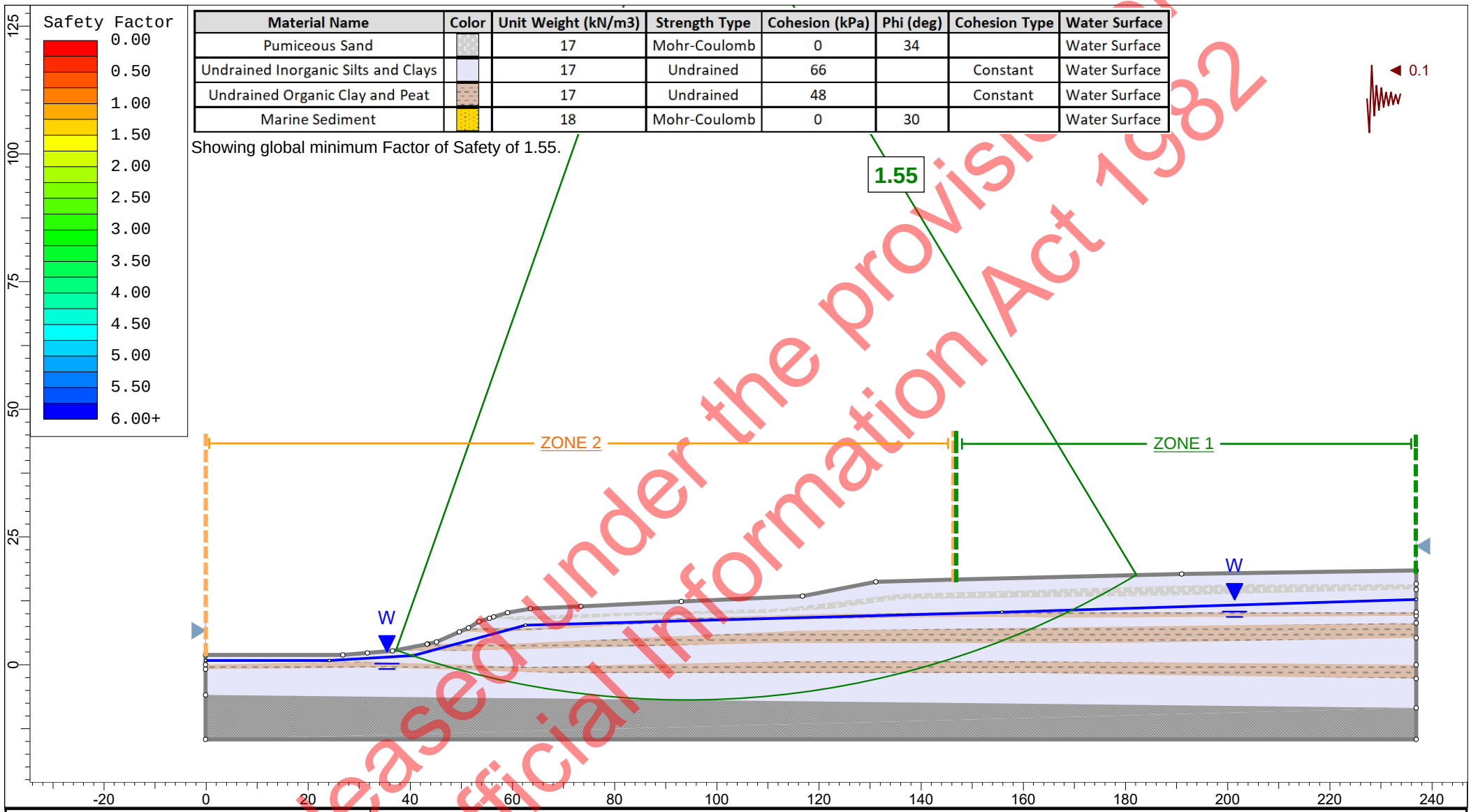


Project	Slope Stability Analysis		
Section Location	Section A-A'	Scenario	Transient
Drawn By	LEG	Company	ENGEO Ltd
Date	November 2020	Project Number	17971.000.001

SLIDEINTERPRET 9.010

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Cohesion Type	Water Surface
Pumiceous Sand		17	Mohr-Coulomb	0	34		Water Surface
Undrained Inorganic Silts and Clays		17	Undrained	66		Constant	Water Surface
Undrained Organic Clay and Peat		17	Undrained	48		Constant	Water Surface
Marine Sediment		18	Mohr-Coulomb	0	30		Water Surface

Showing global minimum Factor of Safety of 1.55.



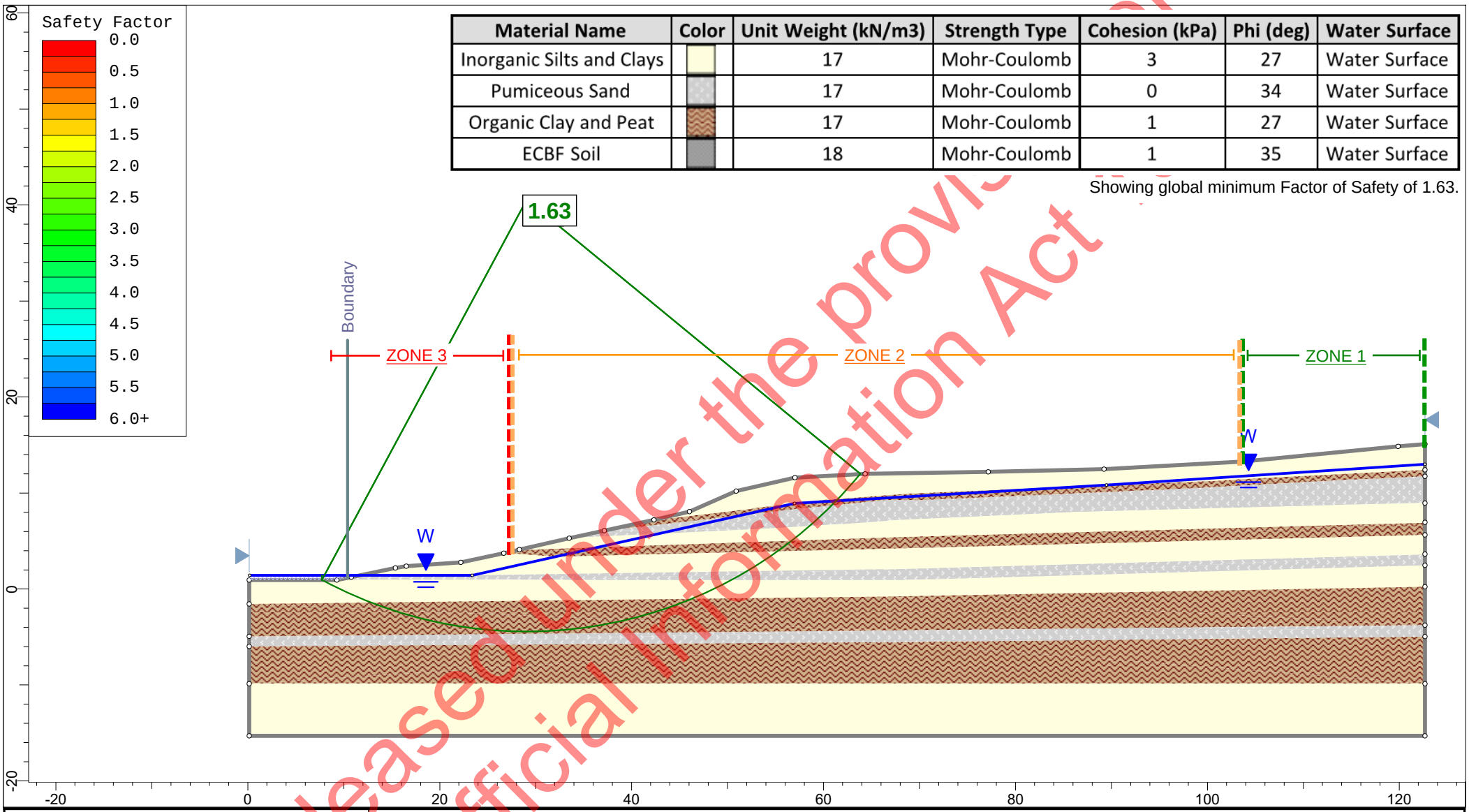
ENGEO

SLIDEINTERPRET 9.010

Project	Slope Stability Analysis		
Section Location	Section A-A'	Scenario	Seismic
Drawn By	LEG	Company	ENGEO Ltd
Date	November 2020	Project Number	17971.000.001

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface
Inorganic Silts and Clays		17	Mohr-Coulomb	3	27	Water Surface
Pumiceous Sand		17	Mohr-Coulomb	0	34	Water Surface
Organic Clay and Peat		17	Mohr-Coulomb	1	27	Water Surface
ECBF Soil		18	Mohr-Coulomb	1	35	Water Surface

Showing global minimum Factor of Safety of 1.63.

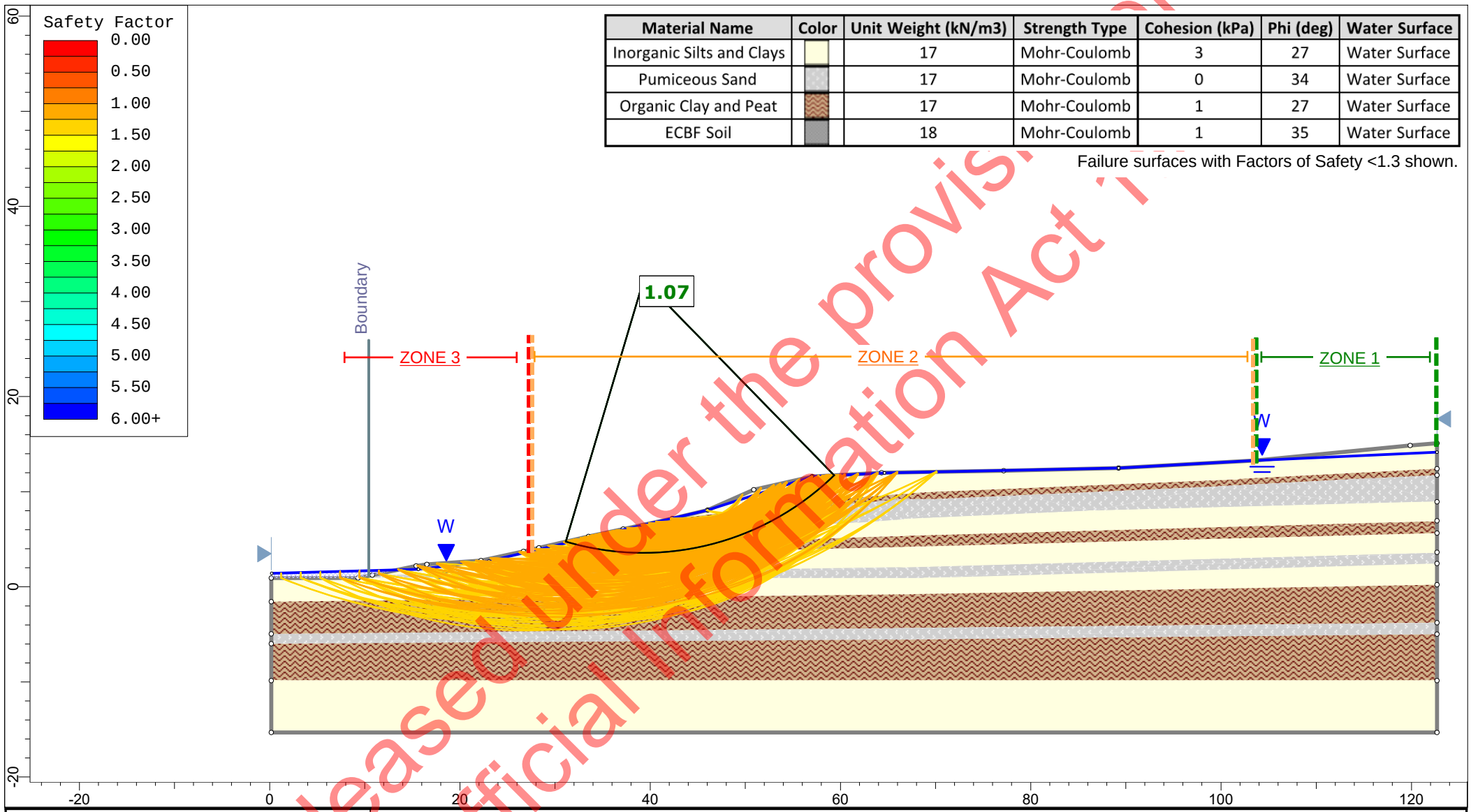


Project	Slope Stability Analysis		
Section Location	Section B-B'	Scenario	Static
Drawn By	LEG	Company	ENGEO Ltd
Date	November 2020	Project Number	17971.000.001

SLIDEINTERPRET 9.010

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface
Inorganic Silts and Clays		17	Mohr-Coulomb	3	27	Water Surface
Pumiceous Sand		17	Mohr-Coulomb	0	34	Water Surface
Organic Clay and Peat		17	Mohr-Coulomb	1	27	Water Surface
ECBF Soil		18	Mohr-Coulomb	1	35	Water Surface

Failure surfaces with Factors of Safety <1.3 shown.

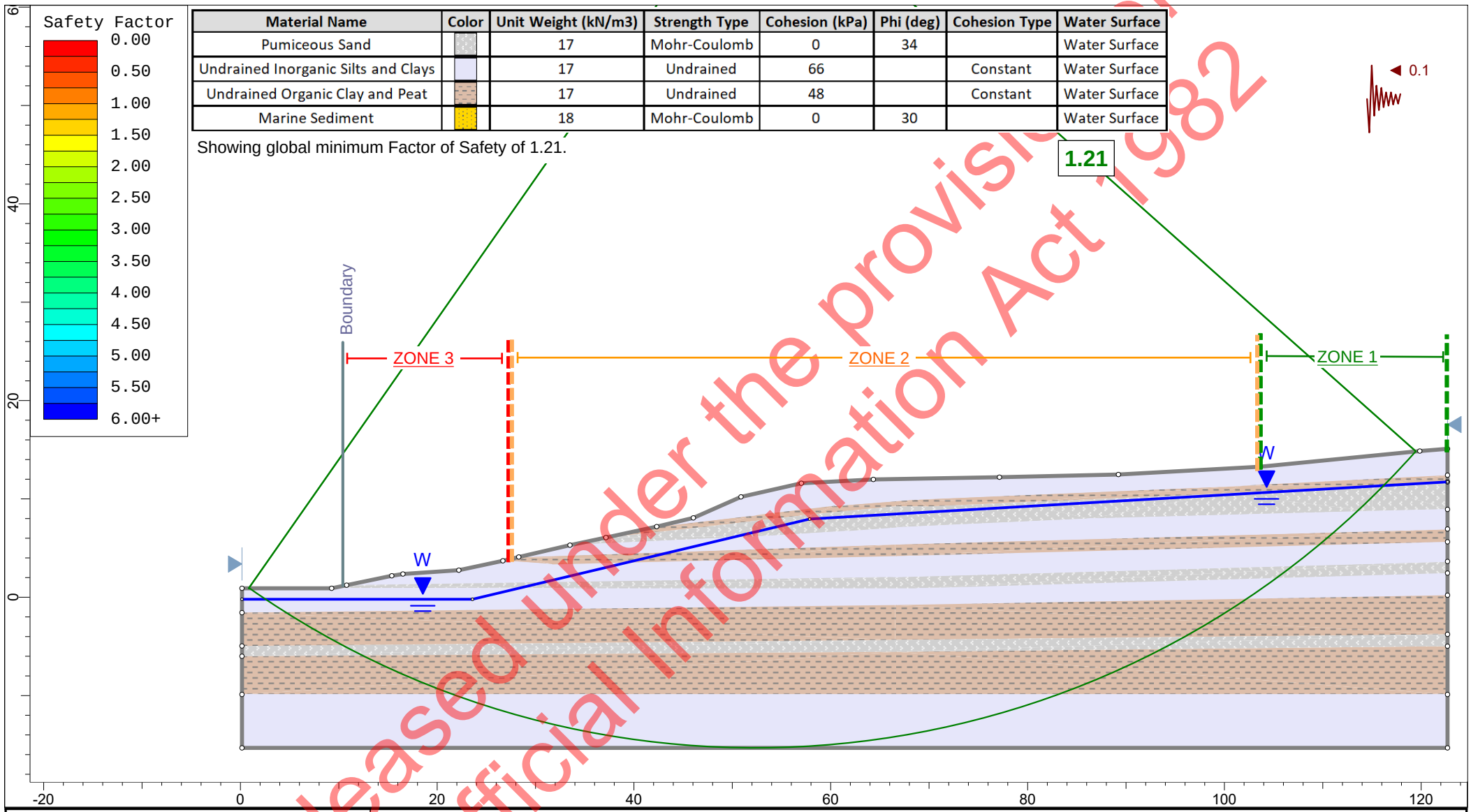


Project	Slope Stability Analysis		
Section Location	Section B-B'	Scenario	Transient
Drawn By	LEG	Company	ENGEO Ltd
Date	November 2020	Project Number	17971.000.001

SLIDEINTERPRET 9.010

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Cohesion Type	Water Surface
Pumiceous Sand		17	Mohr-Coulomb	0	34		Water Surface
Undrained Inorganic Silts and Clays		17	Undrained	66		Constant	Water Surface
Undrained Organic Clay and Peat		17	Undrained	48		Constant	Water Surface
Marine Sediment		18	Mohr-Coulomb	0	30		Water Surface

Showing global minimum Factor of Safety of 1.21.

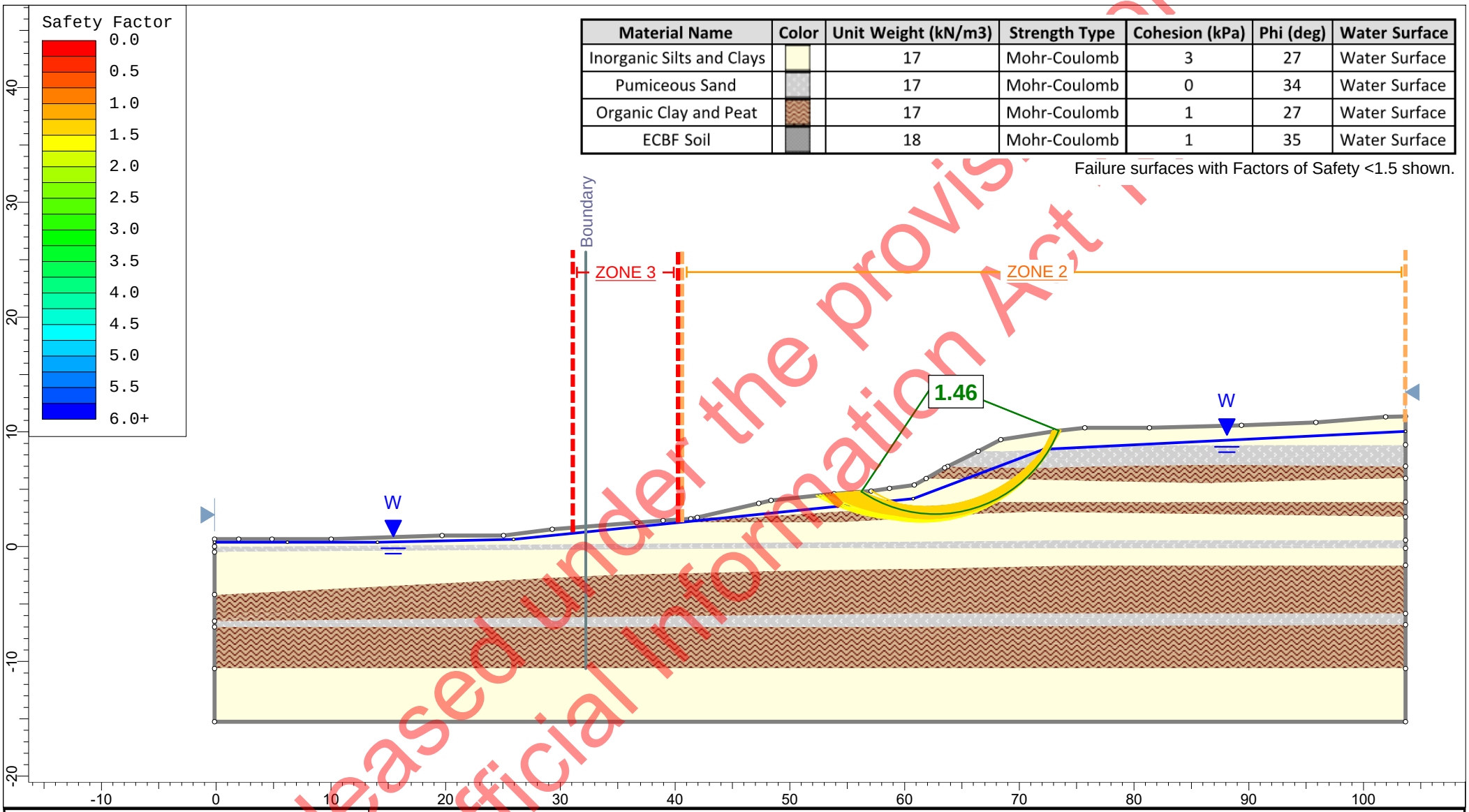


Project	Slope Stability Analysis		
Section Location	Section B-B'	Scenario	Seismic
Drawn By	LEG	Company	ENGEO Ltd
Date	November 2020	Project Number	17971.000.001

SLIDEINTERPRET 9.010

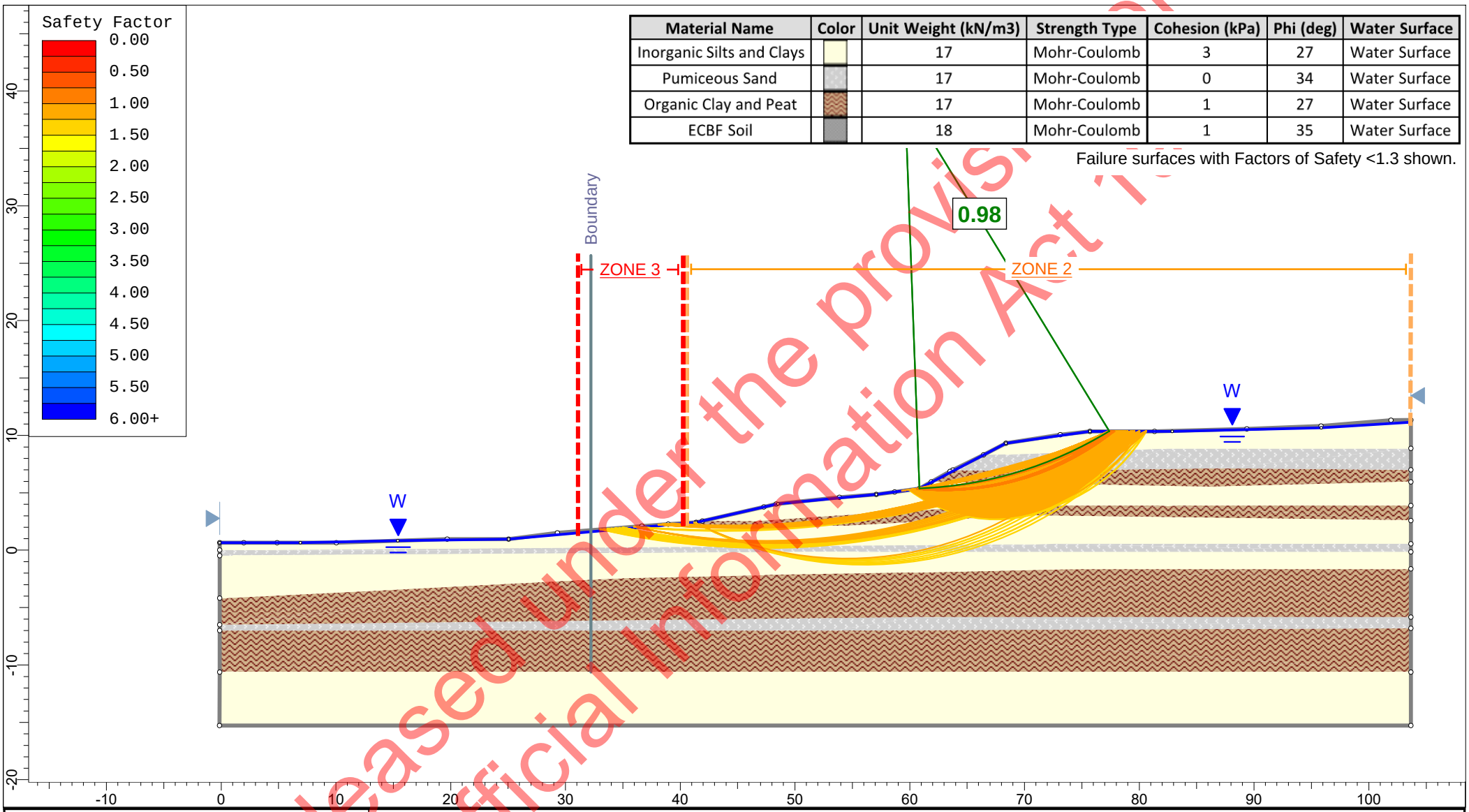
Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface
Inorganic Silts and Clays		17	Mohr-Coulomb	3	27	Water Surface
Pumiceous Sand		17	Mohr-Coulomb	0	34	Water Surface
Organic Clay and Peat		17	Mohr-Coulomb	1	27	Water Surface
ECBF Soil		18	Mohr-Coulomb	1	35	Water Surface

Failure surfaces with Factors of Safety <1.5 shown.



Project	Slope Stability Analysis		
ection Location	Section C-C'	Scenario	Static
Drawn By	LEG	Company	ENGEO Ltd
Date	November 2020	Project Number	17971.000.001

SLIDEINTERPRET 9.010



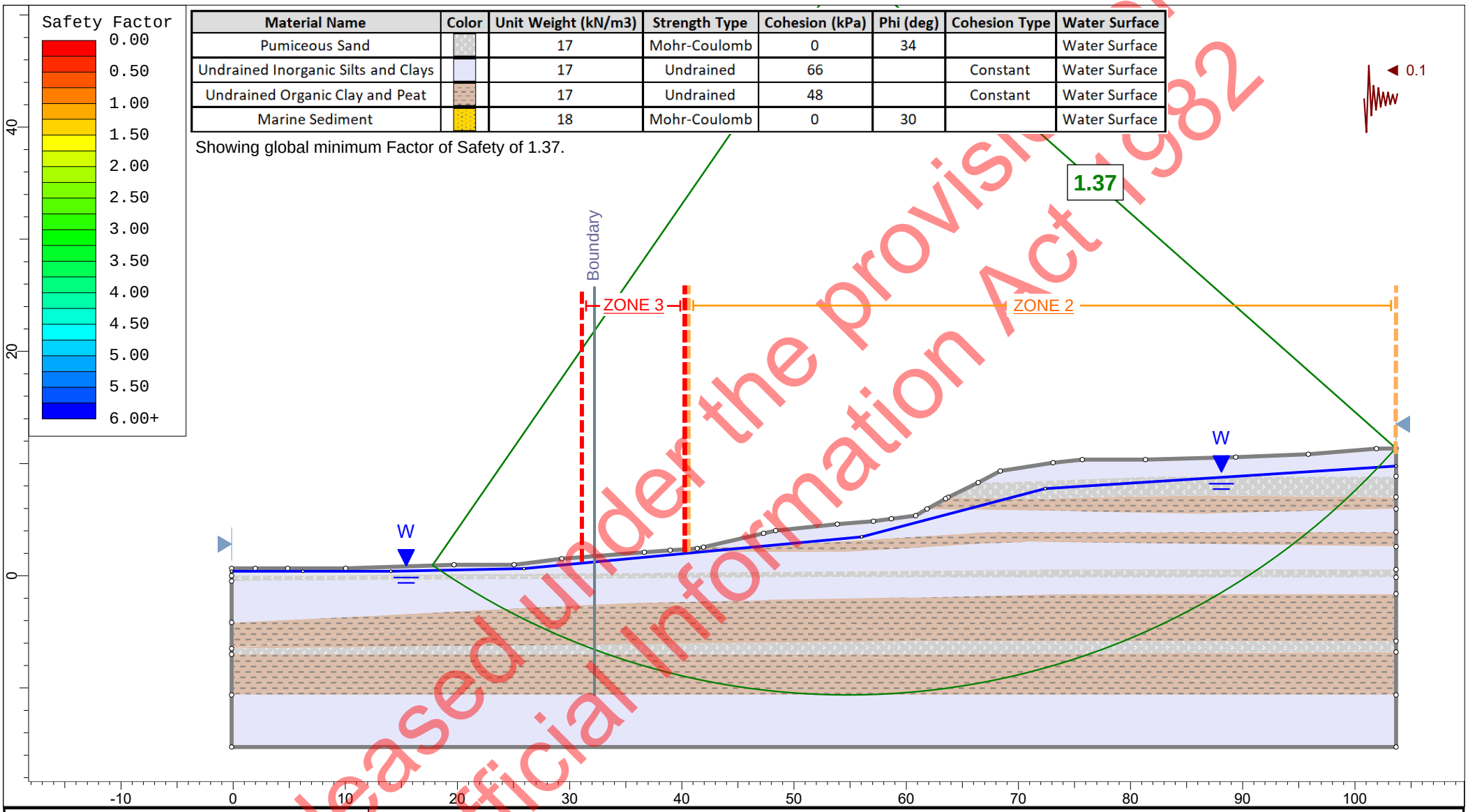
ENGEO

SLIDEINTERPRET 9.010

Project	Slope Stability Analysis		
Section Location	Section C-C'	Scenario	Transient
Drawn By	LEG	Company	ENGEO Ltd
Date	November 2020	Project Number	17971.000.001

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Cohesion Type	Water Surface
Pumiceous Sand		17	Mohr-Coulomb	0	34		Water Surface
Undrained Inorganic Silts and Clays		17	Undrained	66		Constant	Water Surface
Undrained Organic Clay and Peat		17	Undrained	48		Constant	Water Surface
Marine Sediment		18	Mohr-Coulomb	0	30		Water Surface

Showing global minimum Factor of Safety of 1.37.

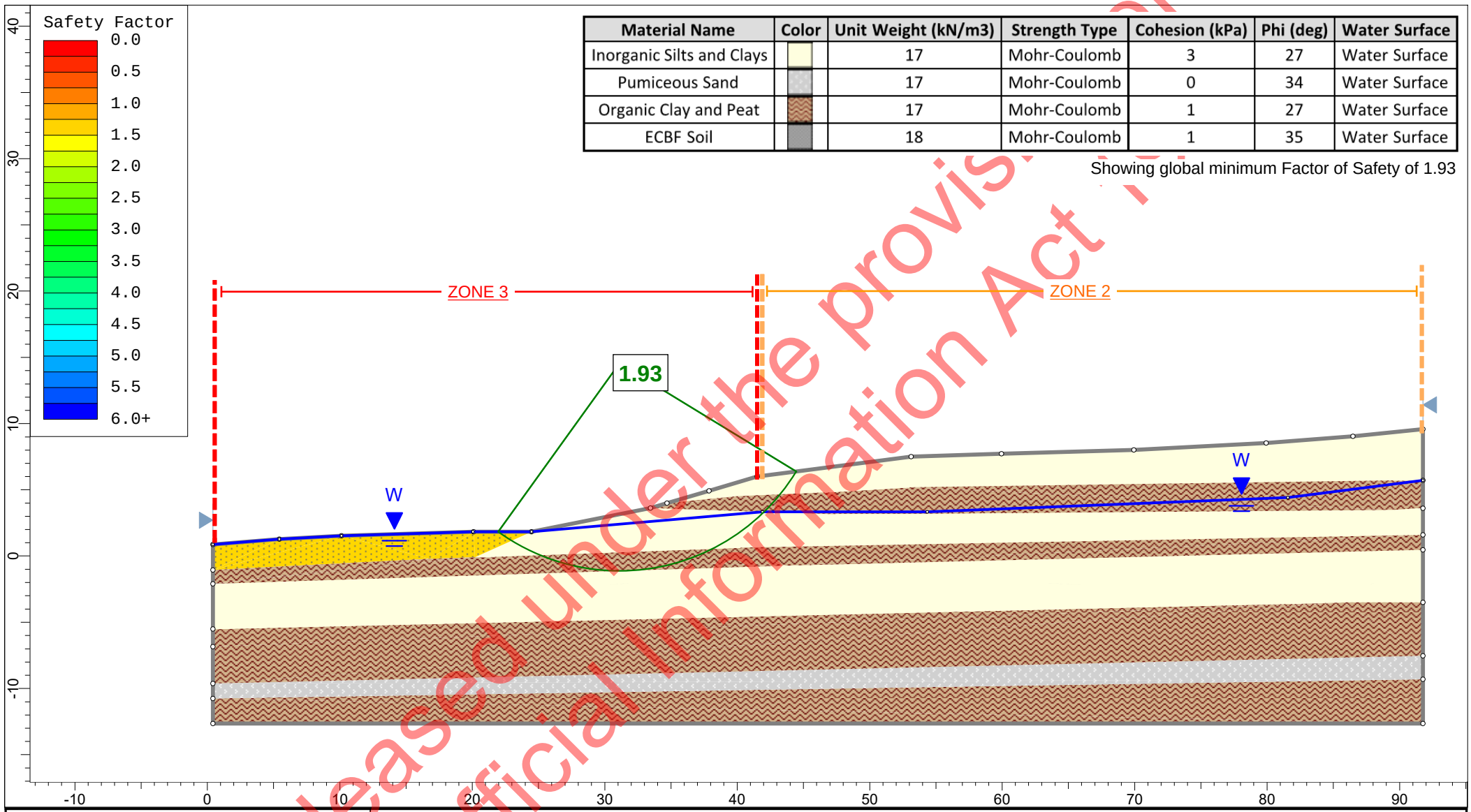


Project	Slope Stability Analysis		
Section Location	Section C-C'	Scenario	Seismic
Drawn By	LEG	Company	ENGEO Ltd
Date	November 2020	Project Number	17971.000.001

SLIDEINTERPRET 9.010

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface
Inorganic Silts and Clays		17	Mohr-Coulomb	3	27	Water Surface
Pumiceous Sand		17	Mohr-Coulomb	0	34	Water Surface
Organic Clay and Peat		17	Mohr-Coulomb	1	27	Water Surface
ECBF Soil		18	Mohr-Coulomb	1	35	Water Surface

Showing global minimum Factor of Safety of 1.93

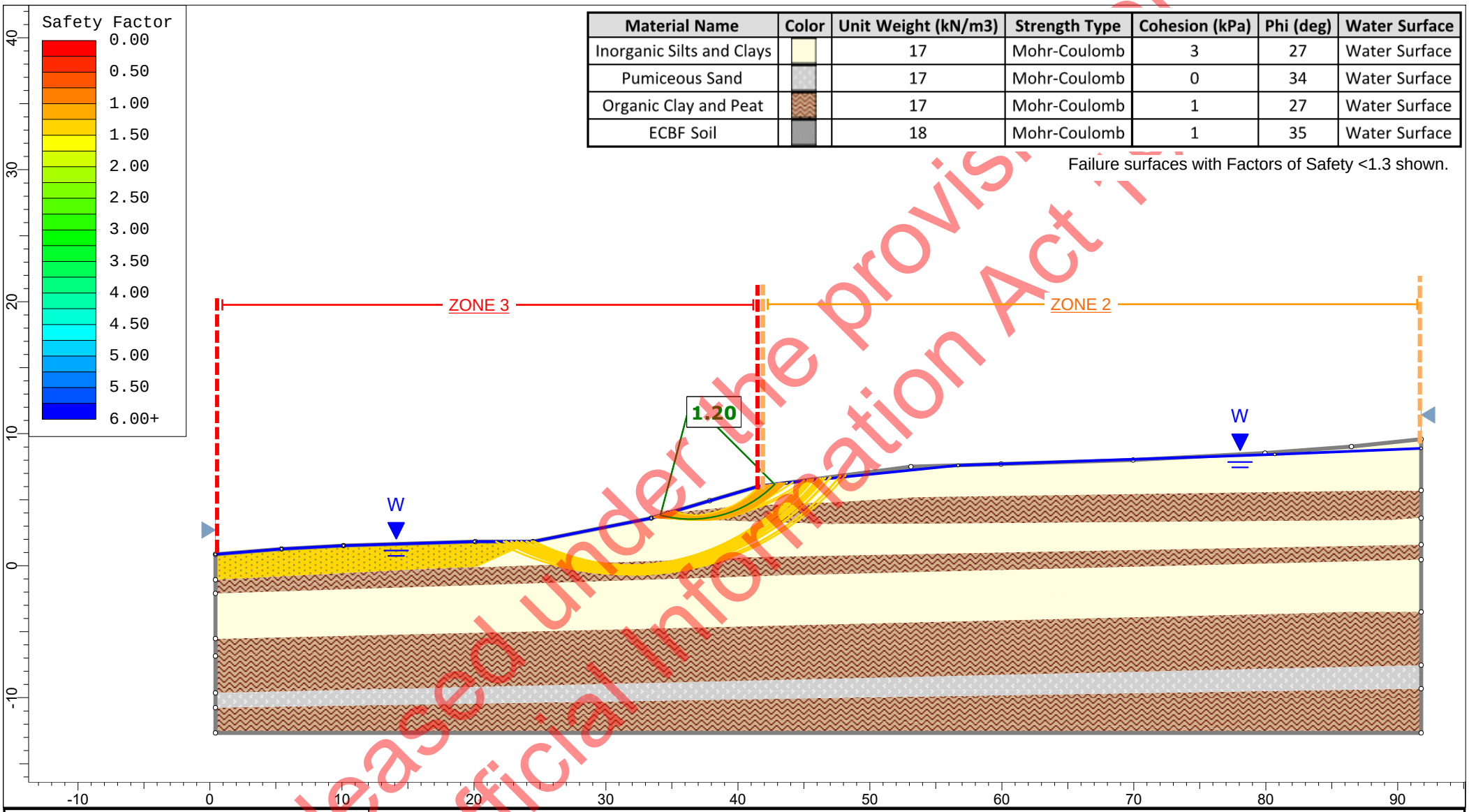


Project	Slope Stability Analysis		
Section Location	Section D-D'	Scenario	Static
Drawn By	LEG	Company	ENGEO Ltd
Date	November 2020	Project Number	17971.000.001

SLIDEINTERPRET 9.010

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface
Inorganic Silts and Clays		17	Mohr-Coulomb	3	27	Water Surface
Pumiceous Sand		17	Mohr-Coulomb	0	34	Water Surface
Organic Clay and Peat		17	Mohr-Coulomb	1	27	Water Surface
ECBF Soil		18	Mohr-Coulomb	1	35	Water Surface

Failure surfaces with Factors of Safety <1.3 shown.

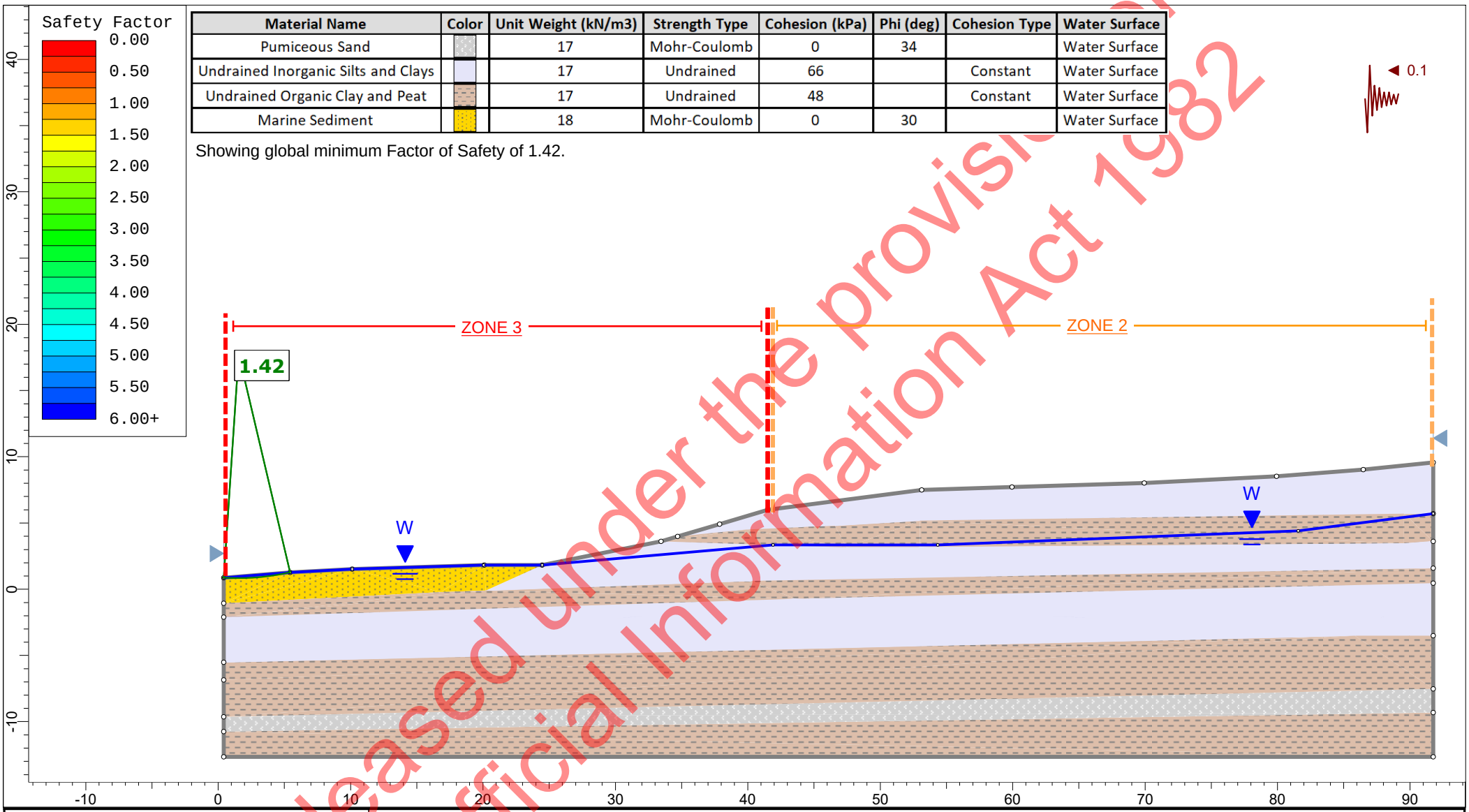


Project	Slope Stability Analysis		
Section Location	Section D-D'	Scenario	Transient
Drawn By	LEG	Company	ENGEO Ltd
Date	November 2020	Project Number	17971.000.001

SLIDEINTERPRET 9.010

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Cohesion Type	Water Surface
Pumiceous Sand		17	Mohr-Coulomb	0	34		Water Surface
Undrained Inorganic Silts and Clays		17	Undrained	66		Constant	Water Surface
Undrained Organic Clay and Peat		17	Undrained	48		Constant	Water Surface
Marine Sediment		18	Mohr-Coulomb	0	30		Water Surface

Showing global minimum Factor of Safety of 1.42.



Project	Slope Stability Analysis		
Section Location	Section D-D'	Scenario	Seismic
Drawn By	LEG	Company	ENGEO Ltd
Date	November 2020	Project Number	17971.000.001

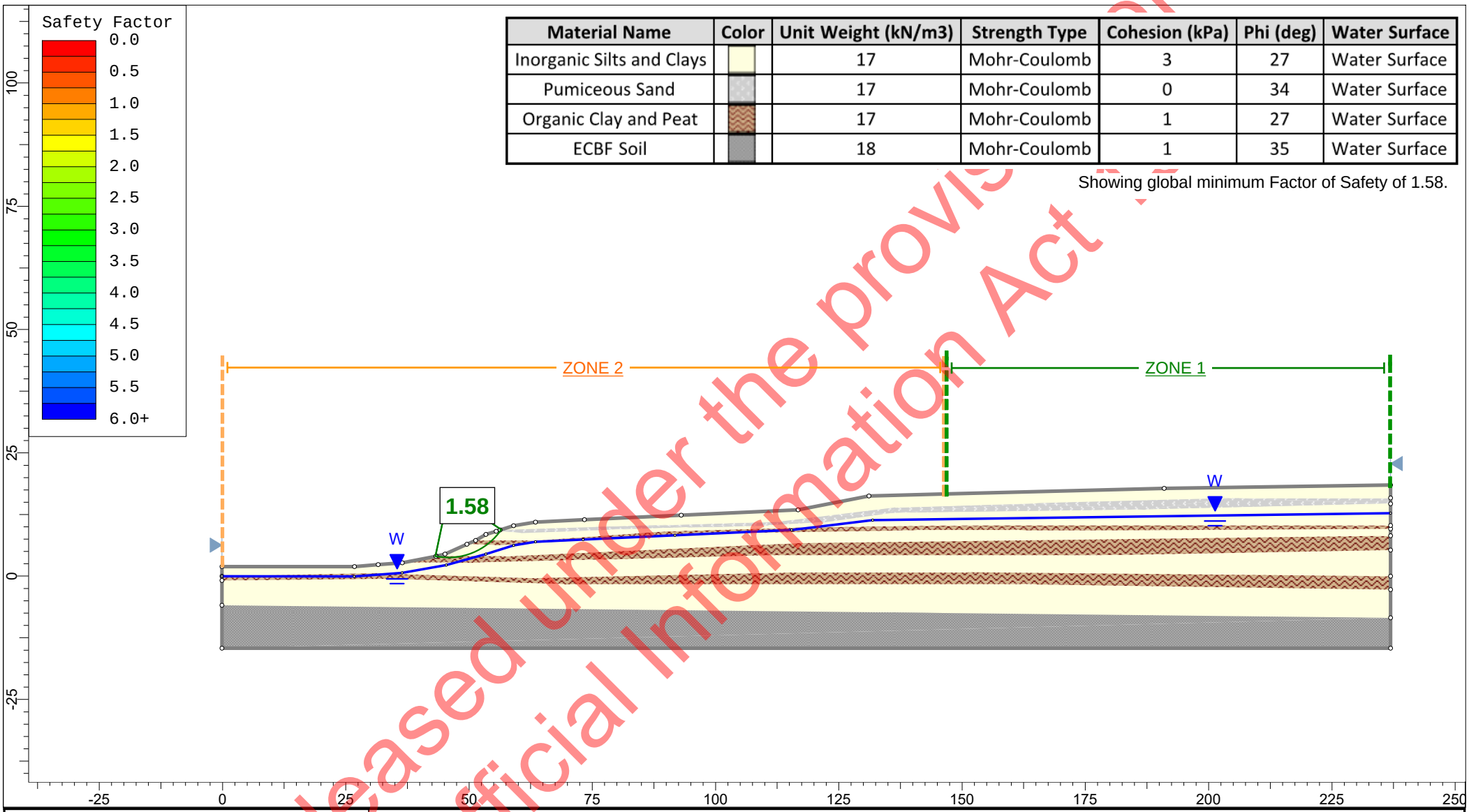
SLIDEINTERPRET 9.010

APPENDIX 9:

Remedial Land Drainage Analysis Results

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface
Inorganic Silts and Clays		17	Mohr-Coulomb	3	27	Water Surface
Pumiceous Sand		17	Mohr-Coulomb	0	34	Water Surface
Organic Clay and Peat		17	Mohr-Coulomb	1	27	Water Surface
ECBF Soil		18	Mohr-Coulomb	1	35	Water Surface

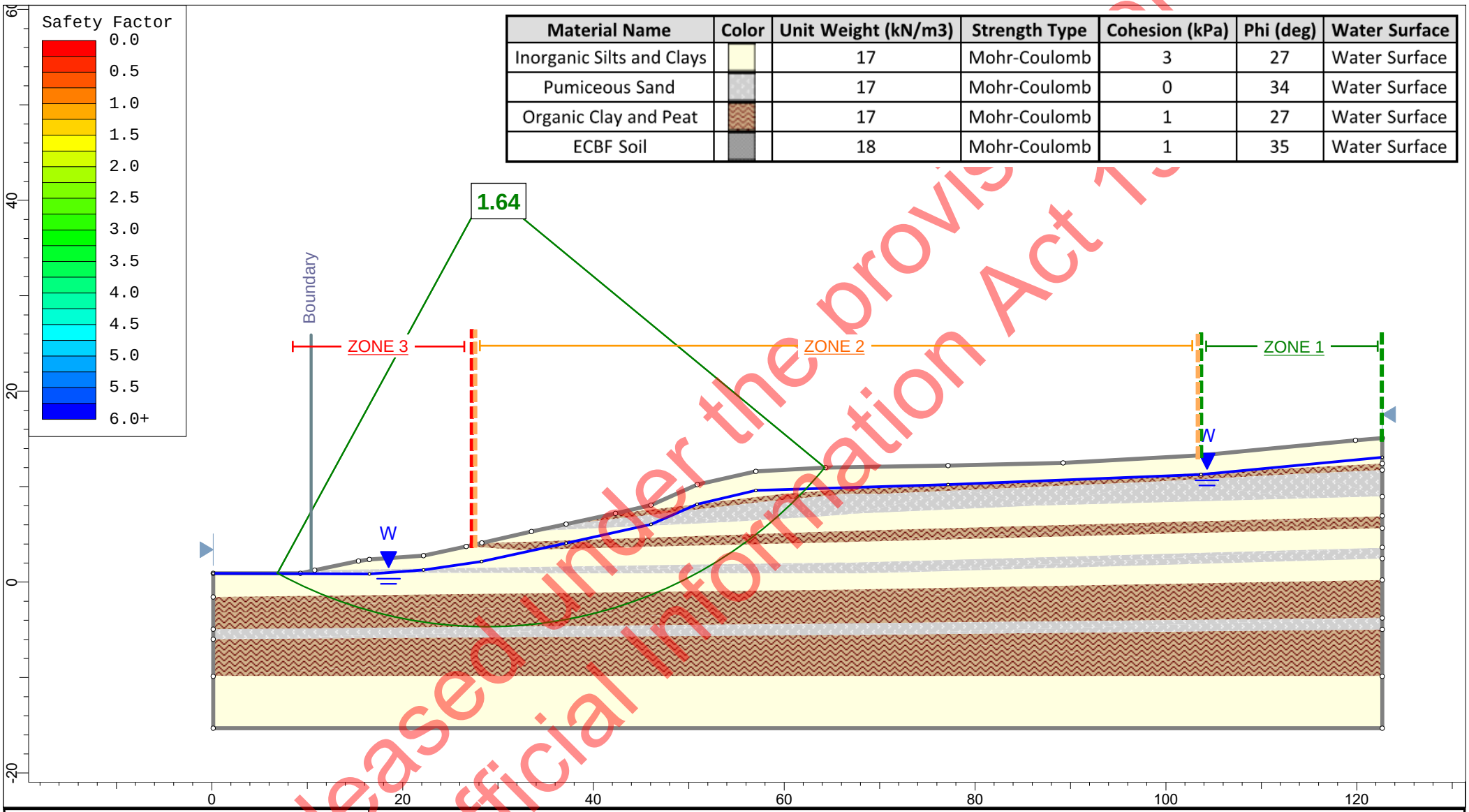
Showing global minimum Factor of Safety of 1.58.



Project	Slope Stability Analysis		
Section Location	Section A-A'	Scenario	Conceptual Drainage
Drawn By	LEG	Company	ENGEO Ltd
Date	November 2020	Project Number	17971.000.001

SLIDEINTERPRET 9.010

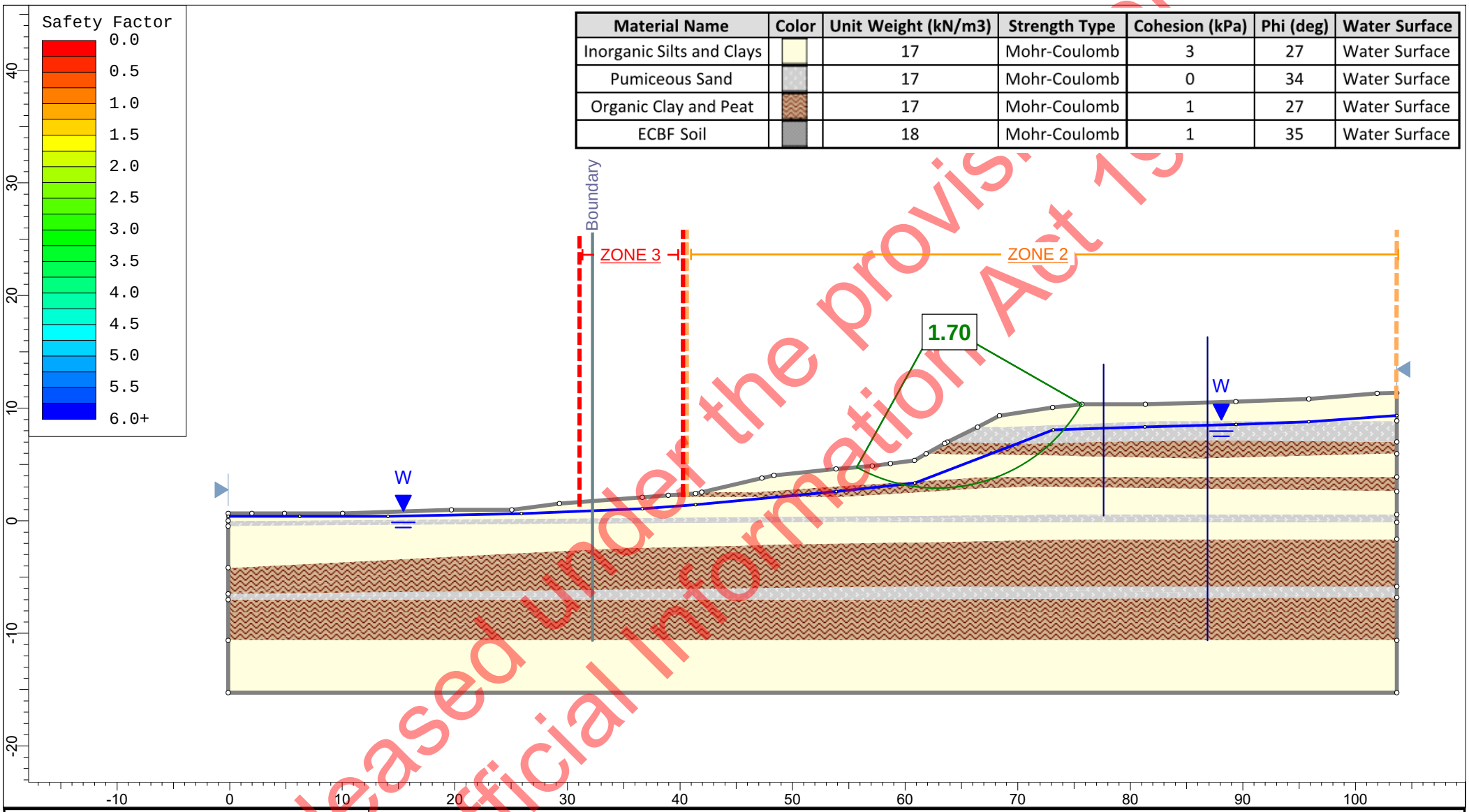
Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface
Inorganic Silts and Clays		17	Mohr-Coulomb	3	27	Water Surface
Pumiceous Sand		17	Mohr-Coulomb	0	34	Water Surface
Organic Clay and Peat		17	Mohr-Coulomb	1	27	Water Surface
ECBF Soil		18	Mohr-Coulomb	1	35	Water Surface



Project	Slope Stability Analysis		
Section Location	Section B-B'	Scenario	Conceptual Drainage
Drawn By	LEG	Company	ENGEO Ltd
Date	November 2020	Project Number	17971.000.001

SLIDEINTERPRET 9.010

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface
Inorganic Silts and Clays		17	Mohr-Coulomb	3	27	Water Surface
Pumiceous Sand		17	Mohr-Coulomb	0	34	Water Surface
Organic Clay and Peat		17	Mohr-Coulomb	1	27	Water Surface
ECBF Soil		18	Mohr-Coulomb	1	35	Water Surface

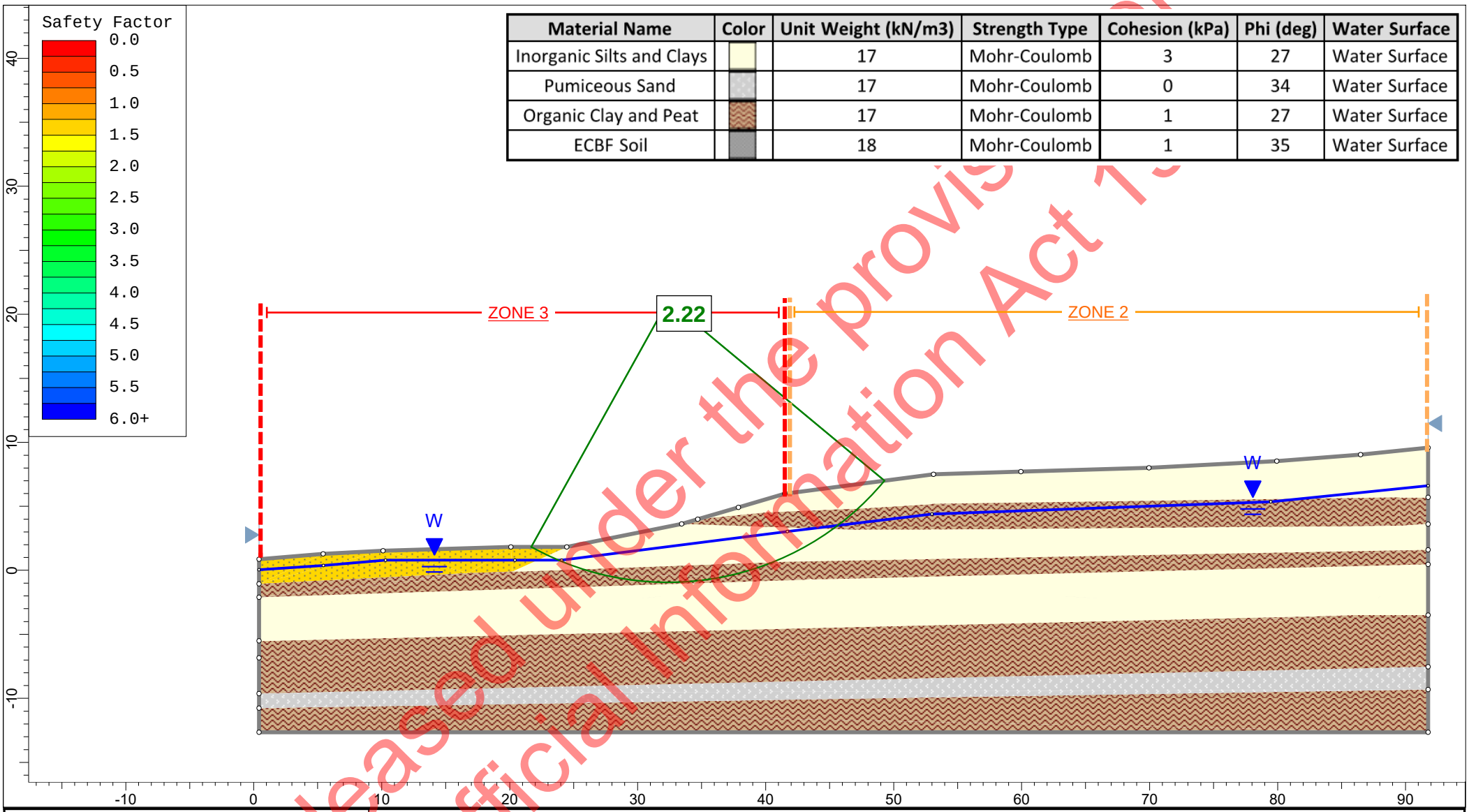


ENGEO

SLIDEINTERPRET 9.010

Project	Slope Stability Analysis		
Section Location	Section C-C'	Scenario	Conceptual Drainage
Drawn By	LEG	Company	ENGEO Ltd
Date	November 2020	Project Number	17971.000.001

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface
Inorganic Silts and Clays		17	Mohr-Coulomb	3	27	Water Surface
Pumiceous Sand		17	Mohr-Coulomb	0	34	Water Surface
Organic Clay and Peat		17	Mohr-Coulomb	1	27	Water Surface
ECBF Soil		18	Mohr-Coulomb	1	35	Water Surface



Project	Slope Stability Analysis		
Section Location	Section D-D'	Scenario	Conceptual Drainage
Drawn By	LEG	Company	ENGEO Ltd
Date	November 2020	Project Number	17971.000.001

SLIDEINTERPRET 9.010

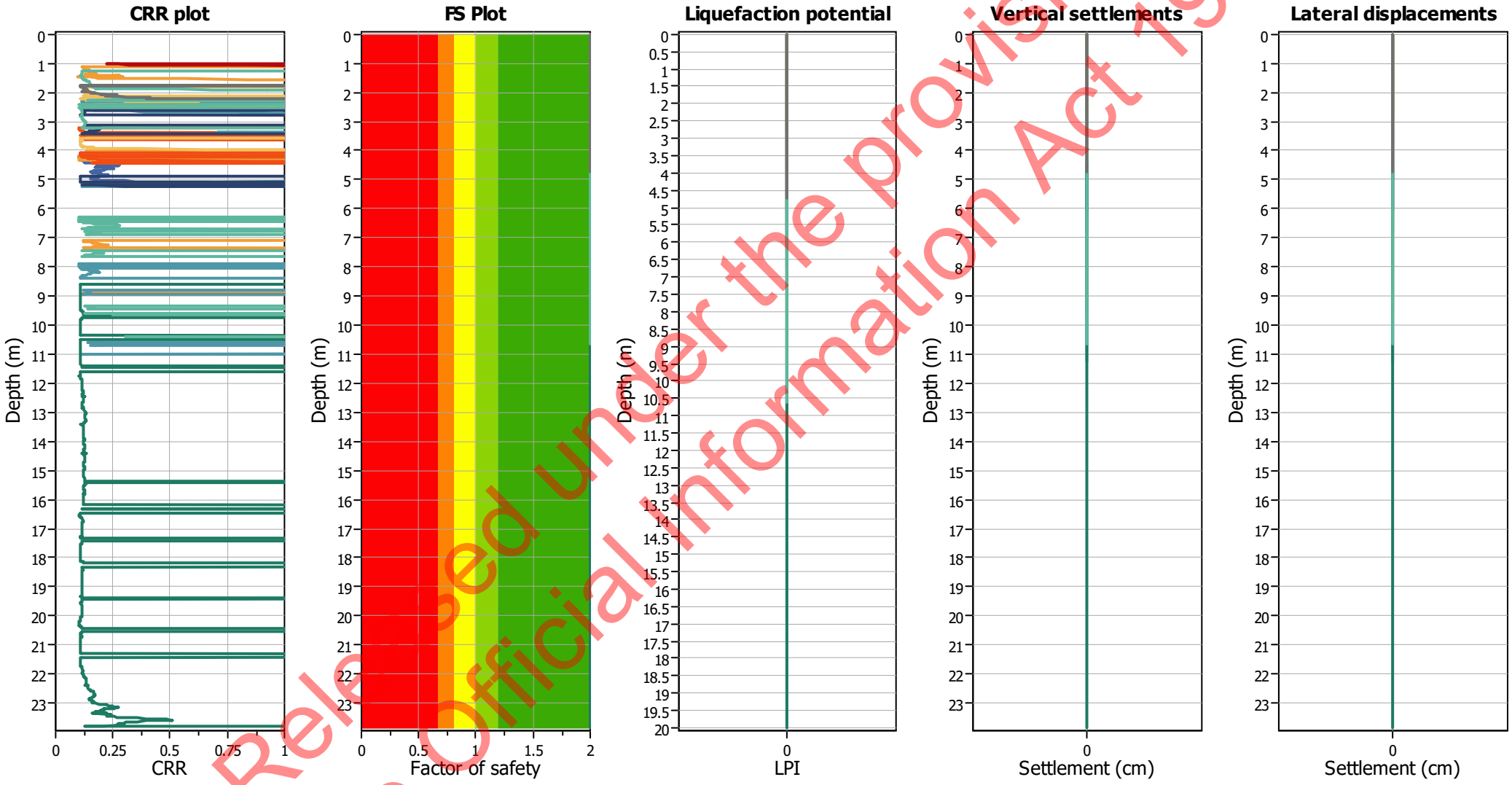
APPENDIX 10:

Liquefaction Analysis Results

ENGEO Ltd
Auckland, New Zealand
+64 9 972 2205
www.engeo.co.nz

Project: 17971.000.001

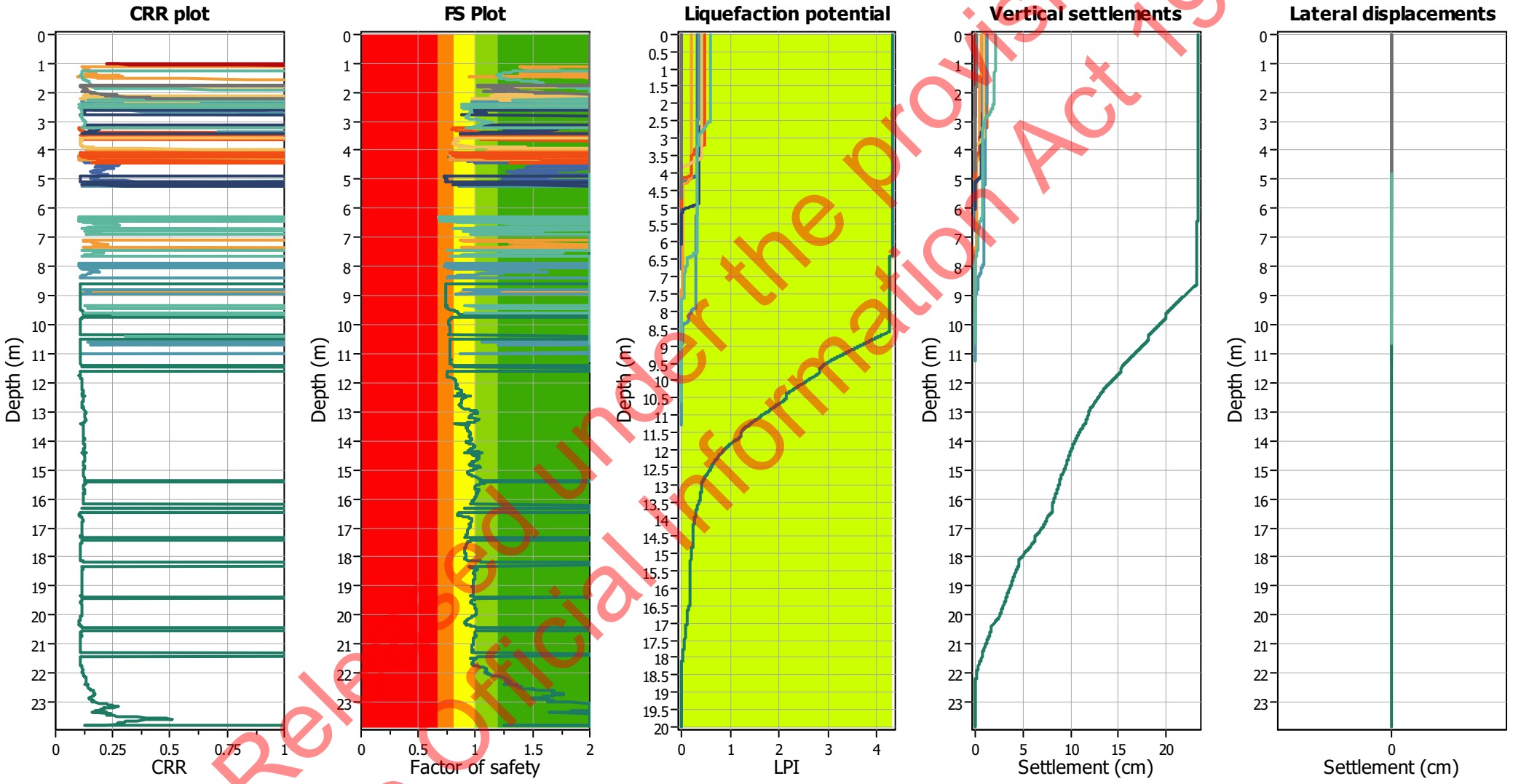
Overlay Cyclic Liquefaction Plots



ENGEO Ltd
Auckland, New Zealand
+64 9 972 2205
www.engeo.co.nz

Project: 17971.000.001

Overlay Cyclic Liquefaction Plots



ENGEO Ltd
Auckland, New Zealand
+64 9 972 2205
www.engeo.co.nz

Project title : 17971.000.001

Location : 4 Scott Road, Hobsonville, Auckland

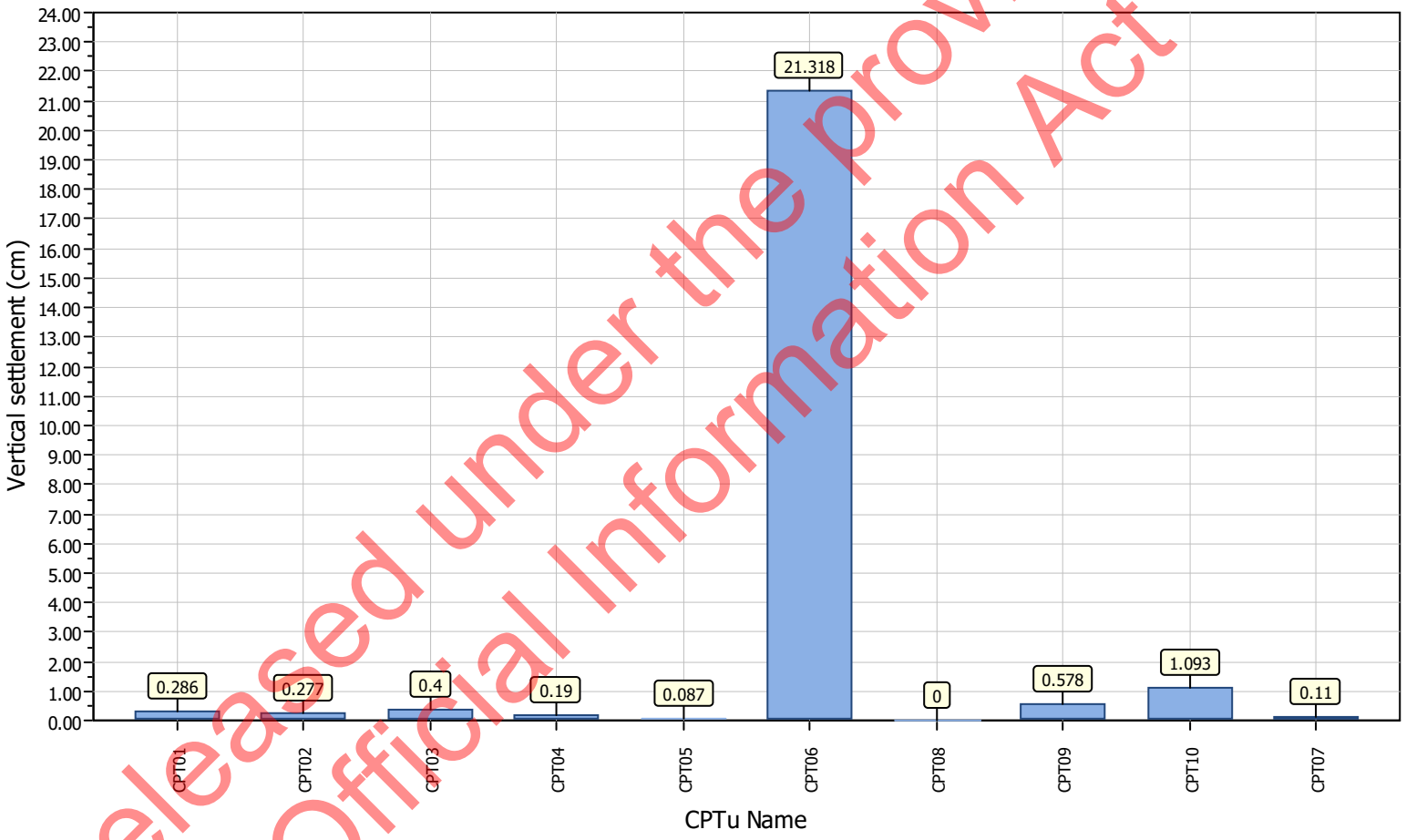
Overall vertical settlements report

ENGEO Ltd
Auckland, New Zealand
+64 9 972 2205
www.engeo.co.nz

Project title : 17971.000.001

Location : 4 Scott Road, Hobsonville, Auckland

Overall vertical settlements report

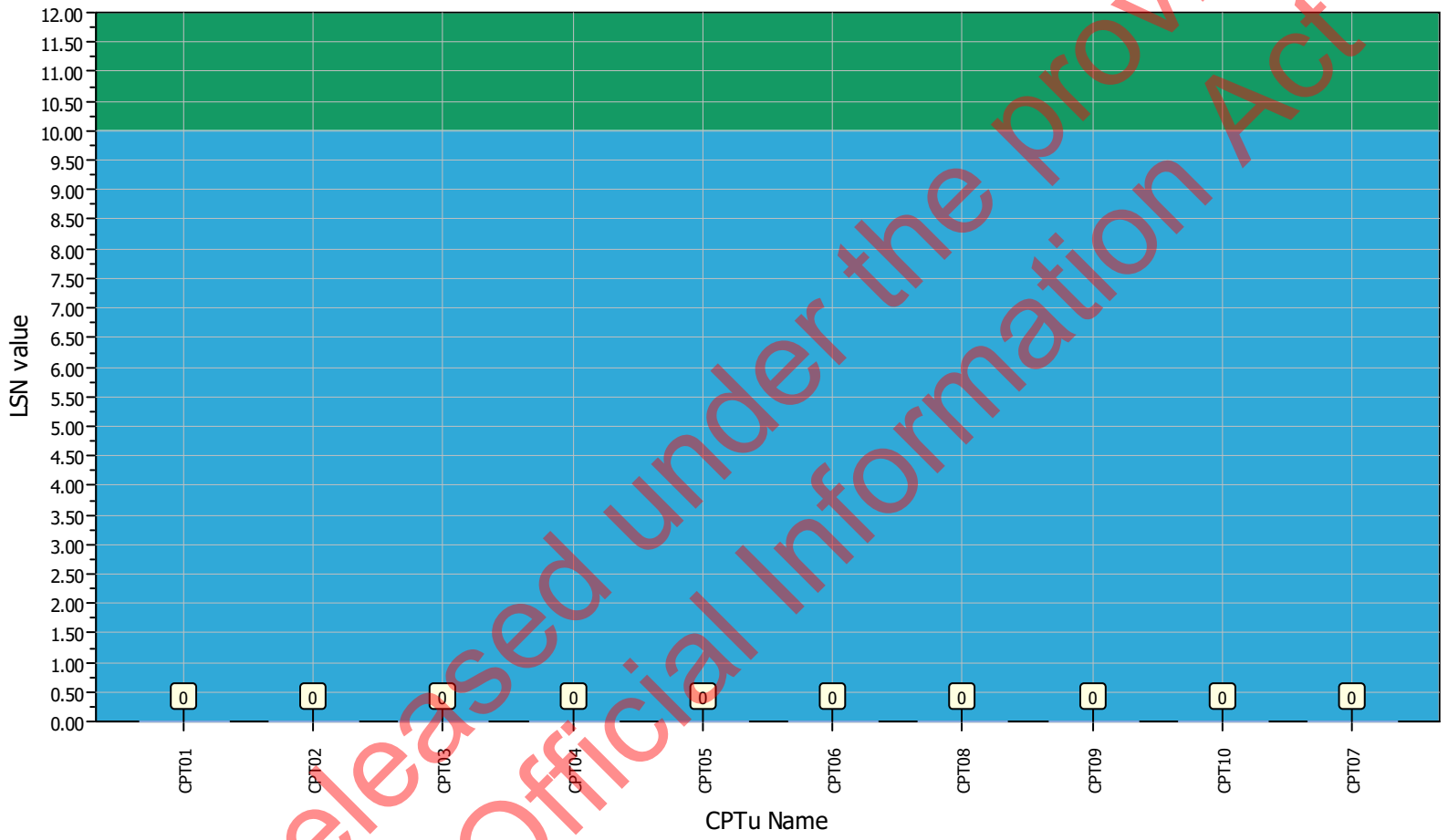


ENGEO Ltd
Auckland, New Zealand
+64 9 972 2205
www.engeo.co.nz

Project title : 17971.000.001

Location : 4 Scott Road, Hobsonville, Auckland

Overall Liquefaction Severity Number report



LSN color scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

Basic statistics

Total CPT number: 10

100% little liquefaction

0% minor liquefaction

0% moderate liquefaction

0% moderate to major liquefaction

0% major liquefaction

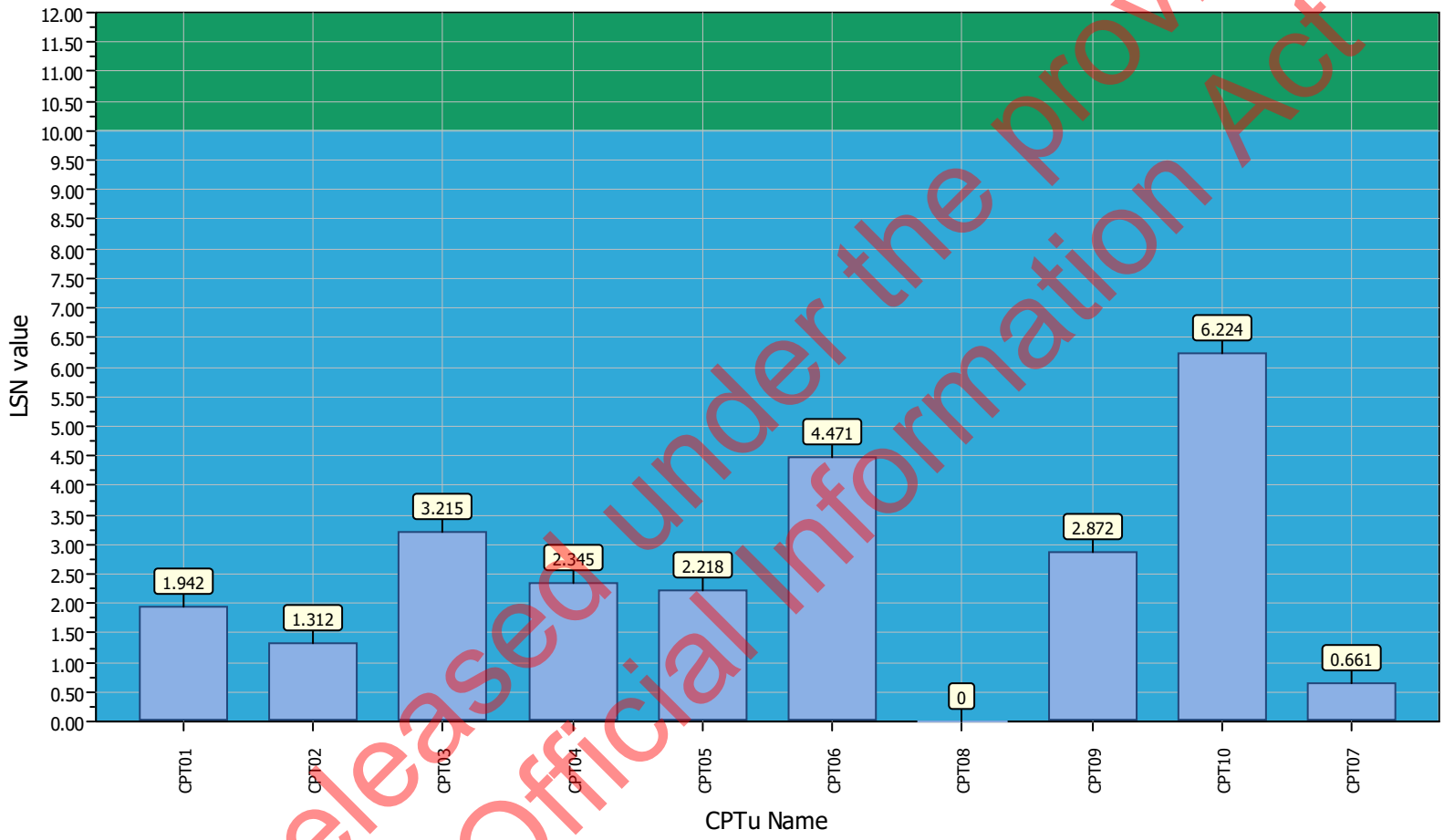
0% severe liquefaction

ENGEO Ltd
Auckland, New Zealand
+64 9 972 2205
www.engeo.co.nz

Project title : 17971.000.001

Location : 4 Scott Road, Hobsonville, Auckland

Overall Liquefaction Severity Number report



LSN color scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

Basic statistics

Total CPT number: 10

100% little liquefaction

0% minor liquefaction

0% moderate liquefaction

0% moderate to major liquefaction

0% major liquefaction

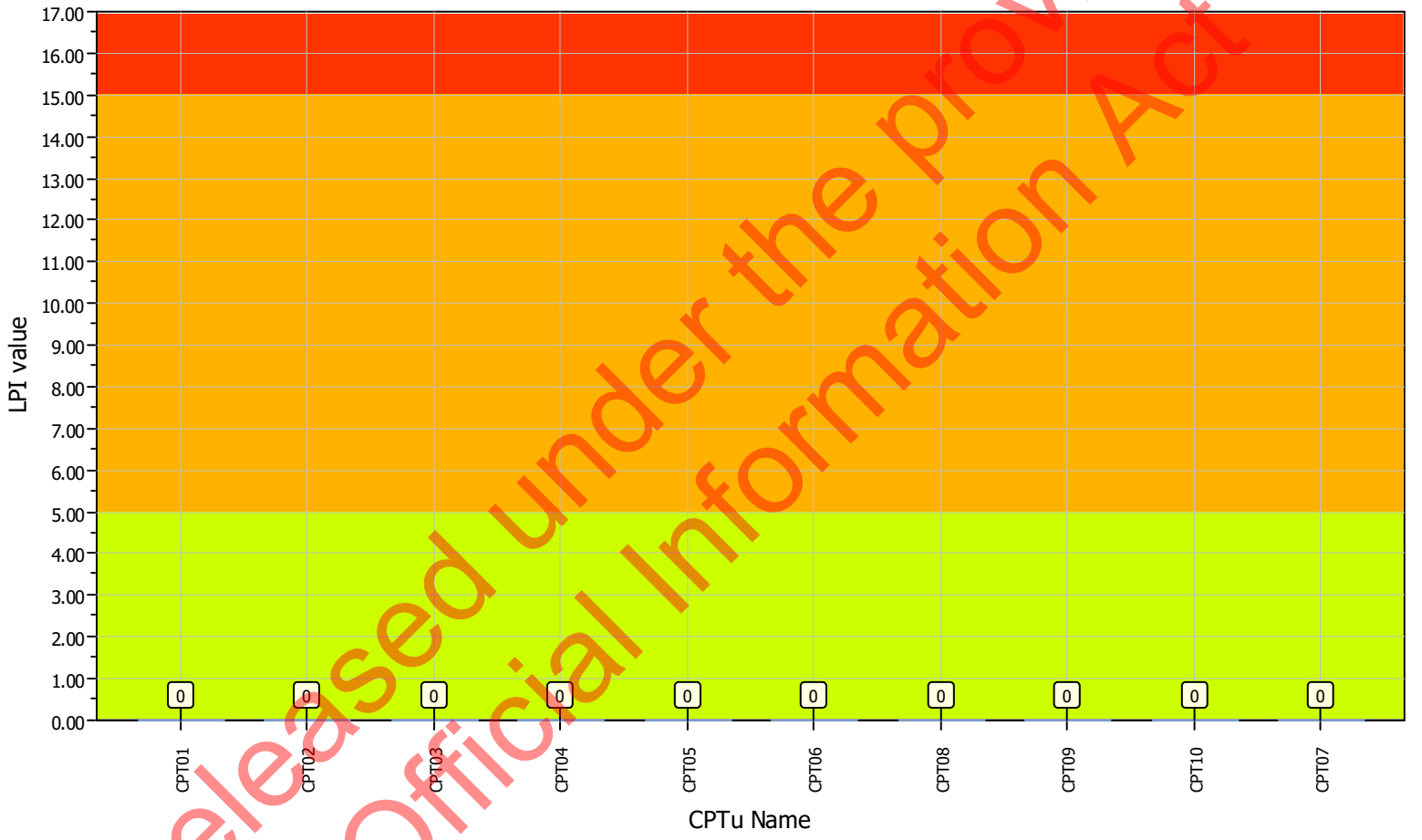
0% severe liquefaction

ENGEO Ltd
Auckland, New Zealand
+64 9 972 2205
www.engeo.co.nz

Project title : 17971.000.001

Location : 4 Scott Road, Hobsonville, Auckland

Overall Liquefaction Potential Index report



LPI color scheme

- Very high risk
- High risk
- Low risk

Basic statistics

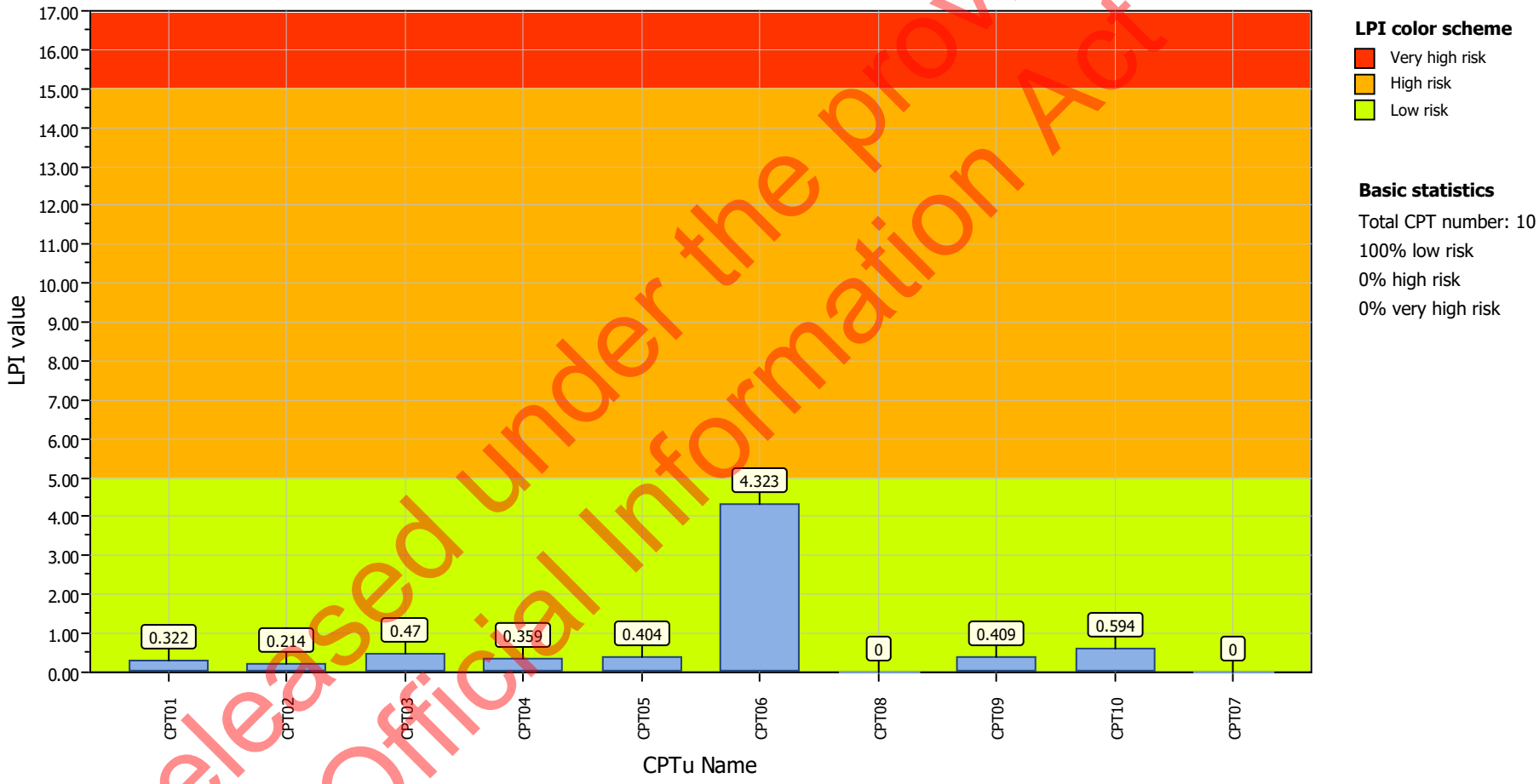
Total CPT number: 10
100% low risk
0% high risk
0% very high risk

ENGEO Ltd
Auckland, New Zealand
+64 9 972 2205
www.engeo.co.nz

Project title : 17971.000.001

Location : 4 Scott Road, Hobsonville, Auckland

Overall Liquefaction Potential Index report



LPI color scheme

- Very high risk
- High risk
- Low risk

Basic statistics

Total CPT number: 10
100% low risk
0% high risk
0% very high risk

MEMO

Oxcon Ltd

To: Nathan Treloar (NT) NFK

From: Greg Dewe (GD) Oxcon Ltd

CC: Nick Denham (ND) Oxcon, Kieran Doe (KD) NFK, Dave Seymour (DS) NFK, Francois Beziac (FB) NFK, Lorenzo Canal (LC) Urban Solutions

Date: 4th December 2020

Re: Abatement Notice for 119 Brice McLaren Road Henderson

This memo serves to provide a summary of the circumstances and actions taking on receipt of Abatement Notice ABT21507726, dated 20th August 2020 in respect of the development at 119 Bruce McLaren Road, Henderson.

Summary of events

Auckland Council a site inspection at 119 Bruce McLaren Road Henderson on the 20th August 2020. The registered owners of this property were apparently sent a letter and abatement notice, dated 20/08/2020, requiring action to be taken regarding erosion and sediment control. This letter was addressed to Bruce McLaren Road Limited, c/- Lockhart O'Shea.

A copy of the letter and abatement notice was received by Kieran Doe of NFK via email on 3rd September stating records showed Kieran Doe was the contact person for the building consent, and attached a copy of the abatement notice and accompanying letter for information. The abatement notice required rectification of the required actions by the 8th September 2020.

The email was forwarded to Dave Seymour of NFK on the 4th September 2020, to address with the contractor, in his capacity as NFK Operations Manager. Dave immediately passed it onto Aardvark Contractors in their capacity as main contractor for the development works, to advise when the required actions had been completed.

Aithagoni Balavardhan of Aardvark, in his capacity as Project Manager for Aardvark Contractors, responded to Dave Seymour on the 4th September, within 5 hours of receipt of the email, with photographic evidence of the actions being completed.

Aithagoni Balavardhan of Aardvark, in his capacity as Project Manager for Aardvark Contractors, responded to Marie Meredith of Auckland Council on the 9th September, with the photographic evidence of the actions being completed by the 4th September.

No further correspondence was received by NFK to date in regards to the Abatement Notice ABT21507726.

Details of the Abatement Notice

The letter (issued along with the Abatement Notice) dated 20/08/20 states "*Some erosion and sediment controls were present, but they were insufficient*". Photos included in the letter show the grass verge outside of the site immediately following installation of watermain works being exposed topsoil, and some minor tracking of sediment in the road corridor (see below).

The abatement notice includes the following action.

Undertake The Following Action:	By Date:
The Auckland Council gives notice that you must undertake the following action: Install appropriate sediment and erosion controls in accordance with the Auckland Unitary Plan (Operative in Part) and Guidance for Erosion & Sediment Control (GD05).	08/09/2020

We understand that the inspection was taken from the road side, without the inspector making contact with the Site Manager. We understand this was due to the Covid-19 protocols in place at the time. As a result, neither the Main Contractor, or Developer was aware of the inspection or actions required until receipt of the letter and notice until received via email on 3rd September 2020.

Circumstance of the site at time of inspection

The main contractor had just completed the laying of a new public watermain along the edge of the footpath within the grass verge. As a result, the stabilized temp crossing had been removed. Backfilling of the trench had been completed, but the full reinstatement of the crossing and topsoiling was yet to be completed. As you can see from the photos, the weather was particularly inclement at the time of the inspection, resulting in ponding water within the crossing location and grass verge.

Actions taken prior to receipt of the Abatement Notice (via email) on 3rd September 2020

As part of the planned works following on from the water main installation, the Main Contractor proceeded as per the development plans to replace the footpath and install the permanent vehicle crossing. This work was completed during the week commencing 24th August 2020. As you can see from the following photos (which were provided to NFK on the 4th September 2020 – 1 day after received the letter and notice until received via email on 3rd September 2020.

In support of our claim that this situation identified by the inspection on the 20th August 2020 was of a very temporary nature, we provide the following extract from the subsequent full inspection by Auckland Council on the 26th August 2020 (3 working days after the inspection which lead to the abatement notice), whereby the project received a Fully Compliant rating.

Site Observation Record
Compliance Monitoring

Auckland Council
Te Kaunihera o Tāmaki Makaurau

Consent details			
Officer	Sunal Jamnadas	Visit Date	26/08/2020
Street Address	119 Burce McLaren Road	Time	3:35 p.m.
Consent Number	LUC60342970		
Consent Holder (or relevant person contacted)	-		

Rating Key:		Overall Rating:
1 =	Fully compliant	1
2 =	Evidence of minor effect(s) or potential for minor effect(s), including missing information. Enforcement action will be considered for on-going level 2 non-compliance.	
3 =	Evidence of moderate effect(s) or potential for moderate effect(s). Enforcement action will be considered for level 3 non-compliance	
4 =	Evidence of major effect(s). Enforcement action likely.	

Summary

We trust the above provides adequate response to the query raised by Auckland Council, as to the background of the abatement notice, and the prompt and appropriate response shown by NFK and the main contractor Aardvark Contractors. NFK received the letter and notice from Auckland Council on the 3rd September 2020 and had already rectified the issues raised and provided photographic evidence of rectification by the 4th September. Since providing this information to Auckland Council, NFK have not received any further feedback or advice.