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PLANNERS

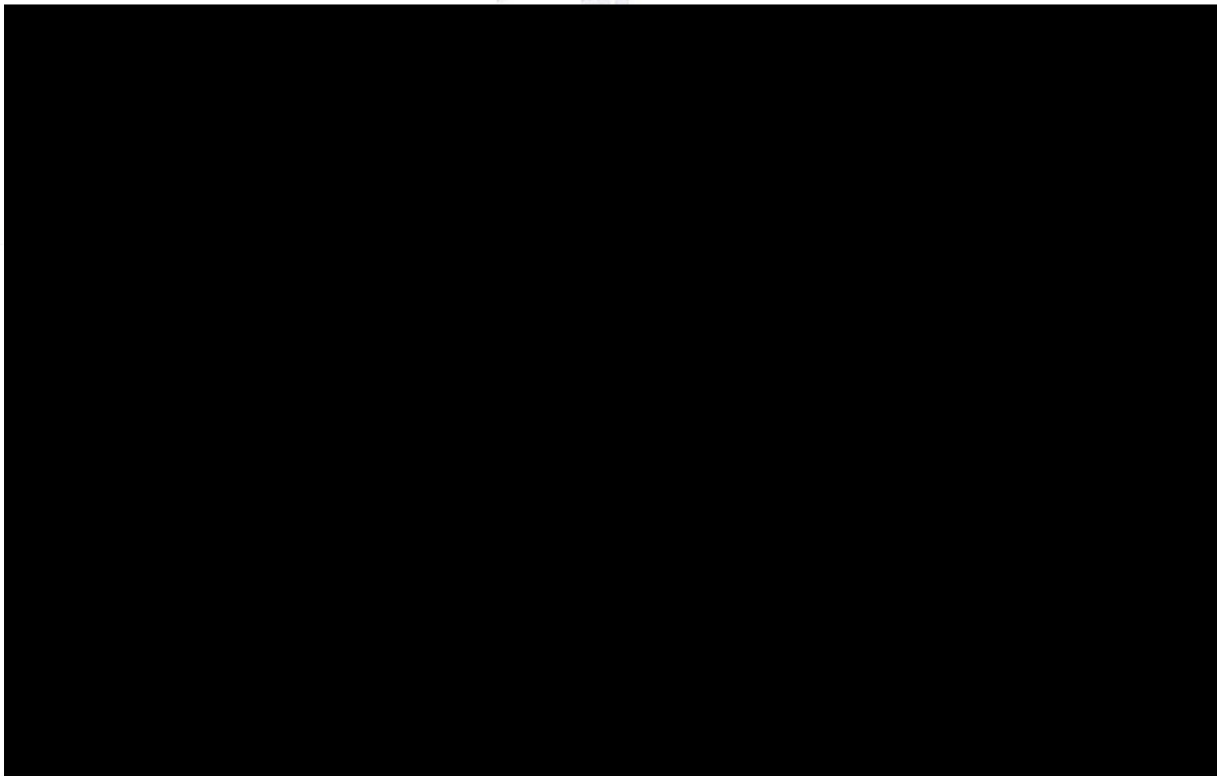
Our Reference: 10085.1 (FNDC)

14 March 2024

Resource Consents Department
Far North District Council
JB Centre
KERIKERI

Dear Sir/Madam

RE: **Proposed Subdivision at Waitemarama Gorge Road – J & B Bill Family Trustees Limited**



315 Kerikeri Road, Kerikeri
P.O. Box 372, Kerikeri 0245, New Zealand.
Email: Kerikeri@tsurvey.co.nz
denis@tsurvey.co.nz, sam@tsurvey.co.nz

Telephone: **09 4077360**
Facsimile: **09 4077322**
After Hours: Director: Denis Thomson 09 4071372
After Hours: Office Manager: Sam Lee 021 1370060

Background picture represents a New Zealand surveying trig station, used to beacon control survey marks



Office Use Only
Application Number:

APPLICATION FOR RESOURCE CONSENT OR FAST-TRACK RESOURCE CONSENT

(Or Associated Consent Pursuant to the Resource Management Act 1991 (RMA))
(If applying for a Resource Consent pursuant to Section 87AAC or 88 of the RMA, this form can be used to satisfy the requirements of Form 9)

Prior to, and during, completion of this application form, please refer to Resource Consent Guidance Notes and Schedule of Fees and Charges – both available on the Council's web page.

1. Pre-Lodgement Meeting

Have you met with a Council Resource Consent representative to discuss this application prior to lodgement? Yes / No

2. Type of Consent being applied for (more than one circle can be ticked):

- Land Use Fast Track Land Use* Subdivision Discharge
- Extension of time (s.125) Change of conditions (s.127) Change of Consent Notice (s.221(3))
- Consent under National Environmental Standard (e.g. Assessing and Managing Contaminants in Soil)
- Other (please specify) _____

*The fast track for simple land use consents is restricted to consents with a controlled activity status and requires you provide an electronic address for service.

3. Would you like to opt out of the Fast Track Process? Yes

4. Applicant Details:

Name/s:

Electronic Address for Service (E-mail):

Phone Numbers:

Postal Address:
(or alternative method of service under section 352 of the Act)



Post Code:

5. Address for Correspondence: Name and address for service and correspondence (if using an Agent write their details here).

Name/s:

Lynley Newport

Thomson Survey Ltd

Electronic Address for Service (E-mail):

lynley@tsurvey.co.nz

Phone Numbers:

Work: 09 4077360

Home:

Postal Address:
(or alternative method of service under section 352 of the Act)

PO Box 372

Kerikeri

Post Code: 0245

All correspondence will be sent by email in the first instance. Please advise us if you would prefer an alternative means of communication.

6. Details of Property Owner/s and Occupier/s: Name and Address of the Owner/Occupiers of the land to which this application relates (where there are multiple owners or occupiers please list on a separate sheet if required)

Name/s: Jason and Penelope Bill Family Trustees Limited

Property Address/ Location: P O Box 908
Kerikeri

7. Application Site Details:

Location and/or Property Street Address of the proposed activity:

Site Address/ Location: Waiotemarama Gorge Road, Hokianga

Legal Description: Section 54 and Section 55 Block VII Hokianga Survey District Val Number: _____

Certificate of Title: NA 75B/84
Please remember to attach a copy of your Certificate of Title to the application, along with relevant consent notices and/or easements and encumbrances (search copy must be less than 6 months old)

Site Visit Requirements:

Is there a locked gate or security system restricting access by Council staff? No

Is there a dog on the property? No

Please provide details of any other entry restrictions that Council staff should be aware of, e.g. health and safety, caretaker's details. **This is important to avoid a wasted trip and having to re-arrange a second visit.**

8. Description of the Proposal:

Please enter a brief description of the proposal here. Attach a detailed description of the proposed activity and drawings (to a recognized scale, e.g. 1:100) to illustrate your proposal. Please refer to Chapter 4 of the District Plan, and Guidance Notes, for further details of information requirements.

To subdivide in the Rural Production Zone to create three titles (two additional).

See attached report.

If this is an application for an Extension of Time (s.125); Change of Consent Conditions (s.127) or Change or Cancellation of Consent Notice conditions (s.221(3)), please quote relevant existing Resource Consents and Consent Notice identifiers and provide details of the change(s) or extension being sought, with reasons for requesting them.

9. Would you like to request Public Notification No

10. Other Consent required/being applied for under different legislation (more than one circle can be ticked):

- Building Consent (BC ref # if known) Regional Council Consent (ref # if known)
- National Environmental Standard consent Other (please specify)

11. National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health:

The site and proposal may be subject to the above NES. In order to determine whether regard needs to be had to the NES please answer the following (further information in regard to this NES is available on the Council's planning web pages):

Is the piece of land currently being used or has it historically ever been used for an activity or industry on the Hazardous Industries and Activities List (HAIL) yes no don't know

Is the proposed activity an activity covered by the NES? (If the activity is any of the activities listed below, then you need to tick the 'yes' circle). yes no don't know

- Subdividing land Changing the use of a piece of land
- Disturbing, removing or sampling soil Removing or replacing a fuel storage system

12. Assessment of Environmental Effects:

Every application for resource consent must be accompanied by an Assessment of Environmental Effects (AEE). This is a requirement of Schedule 4 of the Resource Management Act 1991 and an application can be rejected if an adequate AEE is not provided. The information in an AEE must be specified in sufficient detail to satisfy the purpose for which it is required. Your AEE may include additional information such as Written Approvals from adjoining property owners, or affected parties.

Please attach your AEE to this application.

13. Billing Details:

This identifies the person or entity that will be responsible for paying any invoices or receiving any refunds associated with processing this resource consent. Please also refer to Council's Fees and Charges Schedule.

Name/s: (please write all names in full)

Email:

Postal Address:

Post Code:

Phone Numbers:

Fax:

Fees Information: An instalment fee for processing this application is payable at the time of lodgement and must accompany your application in order for it to be lodged. Please note that if the instalment fee is insufficient to cover the actual and reasonable costs of work undertaken to process the application you will be required to pay any additional costs. Invoiced amounts are payable by the 20th of the month following invoice date. You may also be required to make additional payments if your application requires notification.

Declaration concerning Payment of Fees: I/we understand that the Council may charge me/us for all costs actually and reasonably incurred in processing this application. Subject to my/our rights under Sections 357B and 358 of the RMA, to object to any costs, I/we undertake to pay all and future processing costs incurred by the Council. Without limiting the Far North District Council's legal rights if any steps (including the use of debt collection agencies) are necessary to recover unpaid processing costs I/we agree to pay all costs of recovering those processing costs. If this application is made on behalf of a trust (private or family), a society (incorporated or unincorporated) or a company in signing this application I/we are binding the trust, society or company to pay all the above costs and guaranteeing to pay all the above costs in my/our personal capacity.

Name: _____ (please print)

Signature: _____ (signature of bill payer – **mandatory**) Date: 12.3.2024

14. Important Information:

Note to applicant

You must include all information required by this form. The information must be specified in sufficient detail to satisfy the purpose for which it is required.

You may apply for 2 or more resource consents that are needed for the same activity on the same form.

You must pay the charge payable to the consent authority for the resource consent application under the Resource Management Act 1991.

Fast-track application

Under the fast-track resource consent process, notice of the decision must be given within 10 working days after the date the application was first lodged with the authority, unless the applicant opts out of that process at the time of lodgement. A fast-track application may cease to be a fast-track application under section 87AAC(2) of the RMA.

Privacy Information:

Once this application is lodged with the Council it becomes public information. Please advise Council if there is sensitive information in the proposal. The information you have provided on this form is required so that your application for consent pursuant to the Resource Management Act 1991 can be processed under that Act. The information will be stored on a public register and held by the Far North District Council. The details of your application may also be made available to the public on the Council's website, www.fndc.govt.nz. These details are collected to inform the general public and community groups about all consents which have been issued through the Far North District Council.

Declaration: The information I have supplied with this application is true and complete to the best of my knowledge.

Name: _____ (Please print)

Signature: _____ (Signature)

Date: _____

(A signature is not required if the application is made by electronic means)

Checklist (please tick if information is provided)

- Payment (cheques payable to Far North District Council)
- A current Certificate of Title (Search Copy not more than 6 months old)
- Copies of any listed encumbrances, easements and/or consent notices relevant to the application
- Applicant / Agent / Property Owner / Bill Payer details provided
- Location of property and description of proposal
- Assessment of Environmental Effects
- Written Approvals / correspondence from consulted parties
- Reports from technical experts (if required)
- Copies of other relevant consents associated with this application
- Location and Site plans (land use) AND/OR
- Location and Scheme Plan (subdivision)
- Elevations / Floor plans
- Topographical / contour plans

Please refer to Chapter 4 of the District Plan for details of the information that must be provided with an application. Please also refer to the RC Checklist available on the Council's website. This contains more helpful hints as to what information needs to be shown on plans.

Only one copy of an application is required, but please note for copying and scanning purposes, documentation should be:

UNBOUND

SINGLE SIDED

NO LARGER THAN A3 in SIZE

J & P Bill Family Trustees Limited

Far North District Plan

PROPOSED SUBDIVISION

Waioitemarama Gorge Road, Omapere

PLANNING REPORT AND ASSESSMENT OF ENVIRONMENTAL EFFECTS



**Thomson Survey Ltd
Kerikeri**

1.0 INTRODUCTION

1.1 The Proposal

The applicants propose to carry out a subdivision of land at Waioitemarama Gorge Road, Opononi/Omapere end. The application site consists of two Section parcels in a single 28ha title, referenced NA75B/84 and dated February 1989.

The proposal creates new additional Lots 1 & 2 of 2.72ha and 1.52ha respectively, with Lots 3 & 4 on the Scheme to be amalgamated, to be in one title with an area of 23.825ha. The Amalgamation condition wording is showing on the face of the scheme plan and reads:

“That Lots 3 & 4 hereon are to be held in the same Certificate of Title.”

The Scheme Plan also shows areas A & B to be subject to Bush Protection covenants.

Access to all lots is off Waiotemarama Gorge Road, which forms the eastern boundary of Lots 1-3 and western boundary of Lot 4. Waiotemarama Gorge Road is Council maintained metal surface public road, generally wide and in good condition where it provides frontage to the application site.

Residential/lifestyle development is intended for Lots 1 & 2 and the Site Suitability Engineering Report consequently focuses on these two lots. The balance amalgamated Lots 3 & 4 (23.8ha), whilst unlikely to be developed for any residential use in the near future, may at some point in time support residential use. However, given that the land area is approximately 24ha, there is abundant scope for a house site somewhere within that area. It is not proposed to impose any kind of a no-build restriction on Lots 3/4.

The scheme plans are attached in Appendix 1. A Location Map is attached in Appendix 2.

1.2 Scope of this Report

This assessment and report accompanies the Resource Consent Application and is provided in accordance with Section 88 and Schedule 4 of the Resource Management Act 1991.

The application seeks consent under the District Plan for a restricted discretionary activity subdivision. The name and address of the owner of the property is contained in the Form 9 Application form.

2.0 PROPERTY DETAILS

Location:	Sections 54 & 55, Waiotemarama Gorge Road, Omapere
Legal description:	Sections 54 & 55 Blk VII Hokianga SD
Record of Title:	NA75B/84 (copy attached in Appendix 3).

3.0 SITE DESCRIPTION

3.1 Site Characteristics

The application site is in rural pasture and bush, with no buildings. The western side of Lot 3 consists of a steep hillside slope, rising up to a ridge within the adjoining Kokohuia blocks. The photograph on the title page shows the topography, looking south across the frontages of Lots 2 & 3 on the Scheme Plan.

Part of the slope and the top ridgeline area is in vegetative cover, with the upper vegetation identified as being on the periphery of the Waiotemarama Gorge Forest Protected Natural Area (PNA), and is identified as protective covenant area A on the scheme plan. The lower portions of the application site, on the west of the road, are more gently undulating and are in pasture.



View looking north from within Lot 1, towards potential house site within Lot 2 (near centre picture) and large balance Lot 3 beyond.

The eastern boundary of Lot 4 is with unformed legal 'road' that eventually links with Waitemarama Gorge Road to the south of the application site – refer to scheme plan. Not only is this legal road unformed, it would be impossible to form given the terrain and vegetative cover.

The Pakanae Stream flows south to north down slope, within the legal 'road' parcel and in places within Lot 4. The stream is in a deep vegetated gully (refer to photos later in this report). The riparian vegetation within the stream gully, where it is within Lot 4, is on the periphery of the vast Waipoua/Mataraua/ Waima Forest Tract PNA. This area is identified on the scheme plan as protective covenant area B.

The land within proposed Lots 1 and 2 is in pasture, running from the toe of the steep slope out to the road. The ground at house sites shown on the plans in the Subdivision Suitability Report supporting this application, slopes gently to moderately up to the west between 10 and 15 degrees.



Looking northwest across Lot 1, where a potential house site is centre picture, near side of trees



Looking south across land Lot 2, where a potential house site is at centre left of picture. Waitemarama Gorge Road at left of picture.

The NRC's Biodiversity Wetland maps show no wetlands present on the site. The site is zoned Rural Production in the Operative District Plan (ODP) and in the Proposed District Plan (PDP). No resource features are mapped as being present within the site in either the ODP or PDP maps. Map excerpts are attached in Appendix 4. The site is not mapped as containing any areas of high or outstanding landscape or natural character as mapped in the Regional Policy Statement (RPS) for Northland.

Neither Far North Maps, nor the NRC's on-line maps show any hazardous or industrial activity (HAIL) within the site.

The site is not shown on either the Far North Maps or NRC on-line maps as being prone to flooding. The northern eastern boundary of Lot 4, with legal "road" and stream is mapped as erosion prone. This area is all within proposed protective covenant B. The steep hill slopes within the site and all to the west of Lots 1 & 2 and road side portions of Lot 3 are also mapped as erosion prone. Future development within Lots 1 & 2 can readily avoid such areas. An excerpt from the NRC on-line maps is attached as part of Appendix 4.

The application property is mapped as having LUC classes 6 through 8 inclusive. For more information in regard the site's geology, refer to the Site Suitability Engineering Report in Appendix 5.

The site is mapped as 'kiwi present' on Far North maps. The Kokohuia Conservaton Area shares a portion of the large Lot 3's upper (western) boundary. Proposed covenant areas A & B on the Scheme Plan are areas identified as Protected Natural Areas in DoC's publications – as stated earlier. These areas are on the periphery of much larger PNA's - Waitemarama Gorge Forest PNA on the ridgeline to the west; and Waipoua/Mataraua/Waima Forest Tract PNA in the stream gully to the east.

Far North Maps does not show any historic, cultural or archaeological sites within the property's boundaries.

Relevant excerpts from on line maps are attached in Appendix 4. These include erosion prone land; Protected & Conservation areas; and ODP/PDP resource overlays (the latter confirming that outstanding landscape and Sites of Cultural Significance to Maori overlays do not extend into the application site).

3.2 Legal Interests

In 2022 the owners entered into a 17 year lease of the land (along with several of their other titles) to a third party. That party may only use the land to plant the forest on that portion of the land identified in the Annexure Schedule, and to use the forest, which is eligible as CAA's (Carbon Accounting Areas), for the purpose of receiving carbon credits under the ETS (Emission Trading Scheme) and not for any other purpose. It is proposed to amend the Annexure Schedule such that Lots 1 & 2 are removed from the lease agreement. The applicants have confirmed that this will occur.

3.3 Consent History

The site is vacant so there will be no building consent history. The site was the subject of an earlier subdivision application lodged on behalf of the applicants by Thomson Survey Ltd. RC 2220341 was withdrawn in May 2022. Relevant issues raised during the processing of that earlier subdivision, have been taken into account with this new, replacement application (which is for fewer lots).

4.0 SCHEDULE 4 – INFORMATION REQUIRED IN AN APPLICATION

Clauses 2 & 3: Information required in all applications

<i>(1) An application for a resource consent for an activity must include the following:</i>	
<i>(a) a description of the activity:</i>	Refer Sections 1.0 of this Planning Report.
<i>(b) an assessment of the actual or potential effect on the environment of the activity:</i>	Refer to Section 6.0 of this Planning Report.
<i>(b) a description of the site at which the activity is to occur:</i>	Refer to Section 3.0 of this Planning Report.
<i>(c) the full name and address of each owner or occupier of the site:</i>	This information is contained in the Form 9 attached to the application.
<i>(d) a description of any other activities that are part of the proposal to which the application relates:</i>	Refer to Section 3.0 of this Planning Report for existing activities within the site. The application is for subdivision only and there are no other activities that are part of the proposal.
<i>(e) a description of any other resource consents required for the proposal to which the application relates:</i>	Consent is only being sought for subdivision, pursuant to the Far North Operative District Plan.
<i>(f) an assessment of the activity against the matters set out in Part 2:</i>	Refer to Section 7.3 of this Planning Report.

<p><i>(g) an assessment of the activity against any relevant provisions of a document referred to in section 104(1)(b), including matters in Clause (2):</i></p> <p><i>(a) any relevant objectives, policies, or rules in a document; and</i> <i>(b) any relevant requirements, conditions, or permissions in any rules in a document; and</i> <i>(c) any other relevant requirements in a document (for example, in a national environmental standard or other regulations).</i></p>	<p>Refer to Sections 5.2, 7.1, 7.2, 7.4, 7.5 and 7.6 of this Planning Report.</p>
<p><i>(3) An application must also include any of the following that apply:</i></p>	
<p><i>(a) if any permitted activity is part of the proposal to which the application relates, a description of the permitted activity that demonstrates that it complies with the requirements, conditions, and permissions for the permitted activity (so that a resource consent is not required for that activity under section 87A(1)):</i></p> <p><i>(b) if the application is affected by section 124 or 165ZH(1)(c) (which relate to existing resource consents), an assessment of the value of the investment of the existing consent holder (for the purposes of section 104(2A)):</i></p> <p><i>(c) if the activity is to occur in an area within the scope of a planning document prepared by a customary marine title group under section 85 of the Marine and Coastal Area (Takutai Moana) Act 2011, an assessment of the activity against any resource management matters set out in that planning document (for the purposes of section 104(2B)).</i></p>	<p>The site is vacant.</p> <p>There is no existing resource consent. Not applicable.</p> <p>The site is not within an area subject to a customary marine title group. Not applicable.</p>

Clause 4: Additional information required in application for subdivision consent

<p><i>(4) An application for a subdivision consent must also include information that adequately defines the following:</i></p>	
<p><i>(a) the position of all new boundaries:</i> <i>(b) the areas of all new allotments, unless the subdivision involves a cross lease, company lease, or unit plan:</i> <i>(c) the locations and areas of new reserves to be created, including any esplanade reserves and esplanade strips:</i> <i>(d) the locations and areas of any</i></p>	<p>Refer to Scheme Plans in Appendix 1.</p>

<p>existing esplanade reserves, esplanade strips, and access strips: (e) the locations and areas of any part of the bed of a river or lake to be vested in a territorial authority under section 237A: (f) the locations and areas of any land within the coastal marine area (which is to become part of the common marine and coastal area under section 237A): (g) the locations and areas of land to be set aside as new roads.</p>	
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Clause 5: Additional information required for application for reclamation – not applicable.

Clause 6: Information required in assessment of environmental effects

<p><i>(1) An assessment of the activity's effects on the environment must include the following information:</i></p>	
<p><i>(a) if it is likely that the activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity:</i></p>	<p>Refer to Section 6.0 of this planning report. The activity will not result in any significant adverse effect on the environment.</p>
<p><i>(b) an assessment of the actual or potential effect on the environment of the activity:</i></p>	<p>Refer to Section 6.0 of this planning report.</p>
<p><i>(c) if the activity includes the use of hazardous installations, an assessment of any risks to the environment that are likely to arise from such use:</i></p>	<p>Not applicable as the application does not involve hazardous installations.</p>
<p><i>(d) if the activity includes the discharge of any contaminant, a description of— (i) the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and (ii) any possible alternative methods of discharge, including discharge into any other receiving environment:</i></p>	<p>The subdivision does not involve any discharge of contaminant.</p>
<p><i>(e) a description of the mitigation measures (including safeguards and contingency plans where relevant) to be undertaken to help prevent or reduce the actual or potential effect:</i></p>	<p>Refer to Section 6.0 of this planning report.</p>
<p><i>(f) identification of the persons affected by the activity, any consultation undertaken, and any response to the views of any person consulted:</i></p>	<p>Refer to Section 8.0 of this planning report. No affected persons are identified.</p>
<p><i>g) if the scale and significance of the activity's effects are such that</i></p>	<p>No monitoring is required as the scale and significance of effects does not warrant any.</p>

<p>monitoring is required, a description of how and by whom the effects will be monitored if the activity is approved:</p>	
<p>(h) if the activity will, or is likely to, have adverse effects that are more than minor on the exercise of a protected customary right, a description of possible alternative locations or methods for the exercise of the activity (unless written approval for the activity is given by the protected customary rights group).</p>	<p>No protected customary right is affected.</p>

Clause 7: Matters that must be addressed by assessment of environmental effects (RMA)

<p>(1) An assessment of the activity's effects on the environment must address the following matters:</p>	
<p>(a) any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects:</p>	<p>Refer to Sections 6.0 and 8.0 of this planning report and also to the assessment of objectives and policies in Sections 7.1 and 7.2.</p>
<p>(b) any physical effect on the locality, including any landscape and visual effects:</p>	<p>Refer to Section 6.0. The site has no areas of outstanding landscape or areas of natural character.</p>
<p>(c) any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity:</p>	<p>Refer to Section 6.0. The site has areas of indigenous vegetation. None of these areas and associated ecosystems will be adversely affected by the proposal.</p>
<p>(d) any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural value, or other special value, for present or future generations:</p>	<p>Refer to Section 6.0. The site is not known to contain any historical, spiritual or cultural values.</p>
<p>(e) any discharge of contaminants into the environment, including any unreasonable emission of noise, and options for the treatment and disposal of contaminants:</p>	<p>The subdivision will not result in the discharge of contaminants, nor any unreasonable emission of noise.</p>
<p>(f) any risk to the neighbourhood, the wider community, or the environment through natural hazards or hazardous installations.</p>	<p>The subdivision site is not mapped as being susceptible to flooding. There are erosion prone areas, none of which impact on land in proposed Lots 1 & 2 – the only two lots proposed for residential use. The proposal does not involve hazardous installations.</p>

5.0 ACTIVITY STATUS

5.1 Operative District Plan

The property is zoned Rural Production, with no resource overlays applying.

TABLE 13.7.2.1: MINIMUM LOT SIZES

(viii) RURAL PRODUCTION ZONE

Controlled Activity Status (Refer also to 13.7.3)	Restricted Discretionary Activity Status (Refer also to 13.8)	Discretionary Activity Status (Refer also to 13.9)
The minimum lot size is 20ha.	1. Subdivision that complies with the controlled activity standard, but is within 100m of the boundary of the Minerals Zone; 2. The minimum lot size is 12ha; or 3. A maximum of 3 lots in any subdivision, provided that the minimum lot size is 4,000m ² and there is at least 1 lot in the subdivision with a minimum lot size of 4ha, and provided further that the subdivision is of sites which existed at or prior to 28 April 2000, or which are amalgamated from titles existing at or prior to 28 April 2000; or 4. A maximum of 5 lots in a subdivision (including the parent lot) where the minimum size of the lots is 2ha, and where the subdivision is created from a site that existed at or prior to 28 April 2000; 5.....	1. The minimum lot size is 4ha; or 2. A maximum of 3 lots in any subdivision, provided that the minimum lot size is 2,000m ² and there is at least 1 lot in the subdivision with a minimum size of 4ha, and provided further that the subdivision is of sites which existed at or prior to 28 April 2000, or which are amalgamated from titles existing at or prior to 28 April 2000; or 3. A subdivision in terms of a management plan as per Rule 13.9.2 may be approved.

The title is dated 1989. The subdivision will create three new titles compliant with the requirements of option 3 of the above restricted discretionary activity options. Unfortunately the wording in the table refers to "3 lots" not titles. The subdivision amalgamates Lots 3 & 4 into one title, but nonetheless consists of four lots. It is hoped that the Council can and will realise that the outcome is exactly the same and not get bogged down in wording. I maintain the subdivision is a restricted discretionary subdivision, creating three titles, two of which are over 4000m² in area and the third over 4ha in area. In requiring the amalgamation, the Council is ensuring the result is only three properties, which is clearly the intent of option 3.

I believe it would be unreasonable of the Council to deny restricted discretionary activity status on what is simply a technicality relating to wording. Notwithstanding that, this report is written with an AEE to an appropriate level for the proposal, regardless of the category of activity the Council chooses to assign it.

Zone Rules:

The site is vacant and I have not therefore identified any zone rules relevant to the proposal.

District Wide Rules:

Chapter 12.1 Landscapes and Natural Features – the site contains no areas mapped as requiring consent to Chapter 12.1.

Chapter 12.2 Indigenous Vegetation – the proposal does not involve any clearance of indigenous vegetation.

The subdivision will not require earthworks in excess of Chapter 12.3 permitted volume and cut/fill face height thresholds.

The site is not mapped as having any coastal hazard in the ODP so rules in Chapter 12.4 in regard these hazards are not relevant. There are no residential units currently, or proposed, within 20m of the dripline of any area of trees, and no consent is sought or required pursuant to the Fire Risk to Residential Unit rule.

The site contains no mapped or scheduled archaeological, heritage or cultural features so no rules in Chapters 12.5, 12.5A or 12.5B apply.

The site's Lot 4 has a stream in proximity to its eastern boundary, in a deeply incised gully. The subdivision does not propose any development in proximity to the stream. Chapter 12.7 therefore does not apply.

Chapters 12.8 Hazardous Facilities and 12.9 Energy Efficiency are not relevant and have not been considered.

Chapter 14 is relevant as the Pakanae Stream flows near the boundary of Lot 4 which, although being amalgamated with Lot 3, is nonetheless a "lot" of less than 4ha. Legally, the stream is currently inaccessible from private land to its west. However, legally and theoretically, it is accessible from the east by way of unformed 'legal road' that links back to formed Waitemarama Gorge Road to the south of the application site.

Given the nature of the stream and land adjacent to it, if any esplanade area is proposed at all, it should be by way of strip as opposed to reserve. However, at this point in time no detailed survey work has been carried out to determine whether Pakanae Stream is in fact a qualifying water body, i.e. 3m average width. This would be an unwarranted expense prior to having certainty that consent has been granted. It is proposed that a s223 condition be imposed requiring confirmation of stream width and any need for an esplanade strip. No rule breach occurs as the applicants are willing to provide for esplanade as per the requirements of the Act and ODP, if the stream has average width exceeding 3m.

Chapter 15.1 Traffic, Parking and Access contains some rules that may be relevant. Chapter 15.1.6A Traffic Intensity relates to land uses, not subdivision and in any event the proposal will not result in any breach of any rule in this section of the ODP. Chapter 15.1.6B relates to parking. The lots are of ample size to provide for adequate parking.

Chapter 15.1.6C relates to access. The site gets access off unsealed public road (Waitemarama Gorge Road). There is no internal shared private accessway proposed. Crossings into Lots 1 & 2 are proposed in the locations indicated on Sheet 101 of the Site Suitability Engineering Report in Appendix 5. The crossings' physical formation is proposed to be to FNDC engineering standards Type 1A – Light Vehicle. It is doubtful that either crossing achieves the required sight distances for a road with an open posted speed. This technically breaches Rule 15.1.6C.1.5(a). However, the section of Waitemarama Gorge Road providing frontage to the application site has an operating speed of between 45-60kph only – requiring at the most, 70m sight distance under ODP referenced engineering standards, but only 60m

sight distance under new engineering standards – Waiootemarama Gorge Road being an extremely low volume usage road.

The other relevant rule within Chapter 15.1.6C is that relating to the standard of the Council road where it has frontage to the site. When the previous (now withdrawn) application was being assessed in 2022, the processing planner stated that “Waiootemarama Gorge Road has not been formed to the required standard in accordance with 15.1.6C.1.8(c)”. Works have since been carried out on some sections of Waiootemarama Gorge Road (by Council's roading 'authority'), including widening and cambering. I do not know if the section of the road providing frontage of the site remains sub standard, especially in light of the Council's new Engineering Standards for roads where account can now be taken of usage and low volume roads need not be formed to as high a standard as higher usage roads.

Taking a conservative approach, noting there may be potential breaches of rules in Chapter 15.1.6C, this application is written on the basis of it defaulting to **discretionary** activity category.

5.2 Proposed District Plan

The property is zoned Rural Production under the new PDP, publicly notified on 27th July 2022 and to which the Further Submission period closed in September 2023. Whilst the majority of rules in the PDP will not have legal effect until such time as the FNDC publicly notifies its decisions on submissions, there are certain rules that have been identified in the PDP as having immediate legal effect and that may therefore need to be addressed in this application and may affect the category of activity under the Act. These include:

Rules HS-R2, R5, R6 and R9 in regard to hazardous substances on scheduled sites or areas of significance to Maori, significant natural areas or a scheduled heritage resource. As the application site and proposal does not involve hazardous substances, these rules are not relevant to the proposal.

Heritage Area Overlays – N/A as none apply to the application site.

Historic Heritage rules and Schedule 2 – N/A as the site does not have any identified (scheduled) historic heritage values.

Notable Trees – N/A – no notable trees on the site.

Sites and Areas of Significance to Maori – N/A – the site does not contain any site or area of significance to Maori.

Ecosystems and Indigenous Biodiversity – Rules IB-R1 to R5 inclusive.

These rules are only relevant where proposing clearance. None is proposed.

Subdivision (specific parts) – only subdivision provisions relating to land containing Significant Natural Area or Heritage Resources have immediate legal effect. The site contains no scheduled or mapped Heritage Resources and it is not intended to subdivide under any provisions relating to Environmental Benefit (indigenous vegetation protection).

Activities on the surface of water – N/A as no such activities are proposed.

Earthworks – Only some rules and standards have legal effect. These are Rules EW-R12 and R13 and related standards EW-S3 and ES-S5 respectively. EW-R12 and associated EW-S3 relate to the requirement to abide by Accidental Discovery Protocol if carrying out earthworks and artefacts are discovered. The subdivision works will only involve the formation/upgrade of crossings required and will therefore be minimal. Any earthworks can be subject to the ADP. EW-13 and associated EW-S5 relate to ensuring Erosion and Sediment Control measures are in place during earthworks. They cite compliance with GD05. Any earthworks necessary will need to ensure appropriate Erosion and Sediment Control measures are in place during works.

Signs – N/A – signage does not form part of this application.

Orongo Bay Zone – N/A as the site is not in Orongo Bay Zone.

In summary, there are no zone rules in the PDP with immediate legal effect that affect the proposal's activity status.

6.0 ASSESSMENT OF ENVIRONMENTAL EFFECTS

The assessment of environmental effects below includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment, as required by Clause 2(3)(c) of Schedule 4 of the Act.

6.1 Allotment sizes and dimensions

All proposed lots can readily accommodate a 30m x 30m square building envelopes. Lots 1 & 2, being 2.72ha and 1.52ha respectively, are suitable as rural lifestyle lots supporting residential living. The Subdivision Suitability Report accompanying this application shows that both can support a house, with associated on site servicing.

Waiotermarama Gorge Road is a sparsely populated through-road, from SH 12 Pakanae in the north, through to SH 12 in the south at Waimamaku. The proposed new allotments are nicely situated between existing residential uses to the north and south, in a rural and bush setting. I believe the proposed allotment sizes and dimensions, and the built development that might result, is compatible with the surrounding area.

6.2 Natural and Other Hazards

The site is not subject to any coastal or flood hazard. There are, however, parts of the application site that are mapped by the Northland Regional Council as 'erosion prone'. There is no such land within proposed Lots 1 & 2 boundaries. Refer to the NRC's erosion prone map forming part of Appendix 4.

The Site Suitability Engineering Report (SSE Report) in Appendix 5 contains a section assessing hazard risk in regard future development within Lots 1 & 2 – refer Section 10 of that report.

Section 6 of that report also contains information in regard to geotechnical matters. Table 13 in Section 10 of the SSE Report provides a summary of natural hazards:

Erosion	<i>no mitigation required, less than minor effect</i>
Overland flow paths, flooding, inundation	<i>no mitigation required, less than minor effects, proposed building envelopes are well above any flood hazard potential</i>
Landslip	<i>less than minor effects, provided measures identified in the SSE Report re adopted and subject to Building Consent assessment</i>
Rockfall	<i>as above</i>

Alluvian; avulsion; unconsolidated fill; soil contamination; subsidence; fire hazard and sea level rise are all considered not applicable with no mitigation required and effects less than minor.

In summary, there is no reason pursuant to s106 of the Act, to refuse to grant this consent.

Geotechnical Assessment – refer to Section 6 of the SSE Report.

No instability issues were identified for proposed Lot 2 in regard to ground conditions. However, Lot 1 has the potential to encounter stability issues when developed. The SSE Report recommends suitable protection measures to mitigate that instability hazard, should a future building be located as shown on the plans attached to the SSE Report.

6.3 Water Supply

The site does not have access to any reticulated potable water infrastructure and therefore new lots will be reliant on roof runoff to water tanks for both potable supply and for fire fighting supply. The Council will likely impose its current standard consent notice to lots 1 & 2 in regard to the provision of potable and fire fighting supply, to apply at building consent stage.

6.4 Stormwater Disposal

Refer to section 8 of the SSE Report attached as Appendix 5 to this planning report. This identifies no breaches of either District or Regional plans. The SSE Report notes that the application is for subdivision formation only and not lot specific residential development at this stage. The report therefore uses a conservative model of probable future development – including up to 300m² potential roof area and 200m² potential driveway.

Future on lot attenuation and discharge is discussed in the SSE Report's section 8.5. The conclusion is that appropriate stormwater management is achievable for both Lots 1 & 2.

6.5 Sanitary Sewage Disposal

Refer to Section 7 of the SSE Report attached as Appendix 5 to this planning report. There are no existing wastewater systems on the site. The SSE Report focuses on Lots 1 & 2. It uses a 5 bedroom dwelling with peak occupancy of 8 people as the basis for its assessment. The selection of a wastewater treatment system will be provided by future developers at building consent stage. It is sufficient, at this stage, to show feasibility and compliance with Regional Plan domestic effluent permitted standards. The SSE Report confirms both. It recommends that to meet suitable minimum treated effluent output quality, a minimum secondary treatment system be accounted for within future developments.

The SSE Report provides an assessment of environmental effects in regard wastewater in Table 14 within Appendix C of that report.

6.6 Energy Supply & Telecommunications

Power and telecoms are not a requirement for rural subdivisions. A consent notice should be applied to Lots 1 & 2 stating that the subdivision did not require power connections and that the lot owner will be responsible for doing so, in particular to provide power supply sufficient to operate any wastewater system installed on the site that requires power to operate.

Whilst there is a power line running through the site, it is not 50kV or higher and is not part of the National Grid.

6.7 Easements for any purpose

Refer to scheme plan in Appendix 1. There are no existing easements and none proposed.

6.8 Property Access

Proposed crossings into Lots 1 & 2 are as shown on Sheet 101 of the SSE Report in Appendix 5. Waitemarama Gorge Road is unsealed Council road of reasonable width. The photo below is typical of road surface and width along the road's frontage to the application site.



The operating speed along the frontage of the application site is limited due to the alignment. The crossing points have been located to maximise sight distances, taking into account the alignment and curvature of the road (vertical and horizontal planes). Crossings

to Lots 1 & 2 will be formed to FNDC Engineering Standards Type 1A – light vehicles, noting earlier comment in regard to sight distances.

Given the extremely low volume of traffic I believe the road network can readily accommodate the additional traffic movements likely to result from the development of the lots subject to this subdivision.

6.9 Earthworks and Utilities

The SSE Report provides some commentary in regard to conceptual earthworks and methodology in its Section 6.7. This relates to future development within the lots. Subdivision siteworks do not involve any above ground utilities and earthworks will be limited to formation and/or upgrading of vehicle crossings.

6.10 Building Locations

Refer to the SSE Report attached in Appendix 5. This depicts building envelopes within Lots 1 & 2 on a conceptual basis as opposed to restricting building sites to these locations only. Both lots are able to provide physically suitable building sites. The SSE Report does not recommend any no-build areas and subsequently this AEE and Scheme Plan do not suggest or show any.

Lots 1 & 2 are not subject to inundation so minimum floor levels are not required. Both lots can provide building platforms with access to sunlight to take advantage of passive solar gain.

The balance Lots 3 & 4 amalgamated has an area of 24ha and no restrictions in regard future building locations, are proposed at this point in time. As with any building consent project, if and when any development does occur on this title, specific design details will be required to take into account ground conditions to ensure a safe and practical building location.

6.11 Preservation of heritage resources, vegetation, fauna and landscape, and land set aside for conservation purposes

The site contains none of the following items listed in Rule 13.7.3.9 of the District Plan. There are no Notable Trees (Appendix 1D of the DP); no Historic Sites, Buildings or Objects (1E); no Outstanding Natural Features or Outstanding Landscape Features (1A and 1B); and no archaeological sites (1G) or Sites of Cultural Significance to Māori (1F).

Indigenous Flora & Fauna:

There are two areas within the application site mapped as Protected Natural Areas (DoC Ecological District publications and Far North Maps Protected Natural Areas (PNA) mapping). The western area of Lot 3 contains a peripheral part of the O06/013 Waiotemarama Gorge Forest and where this is within the application site's boundaries, it is proposed to show it as protective bush covenant area A on the Scheme Plan. The other PNA is along Lot 4's eastern boundary in the proximity of the Pakanae Stream, identified as being a peripheral part of the vast O06/001 Waiapoua/Mataraura/Waima Forest PNA. Where this is within Lot 4, it is proposed to identify it as protective bush covenant area B on the Scheme Plan.

Fencing of the area identified as B is not possible given the terrain – see below photographs.



Looking downstream (north) – stream in gully



Looking upstream (south)

Similarly, the steepness and inaccessibility of proposed bush covenant A renders fencing of the covenant area impractical and physically unfeasible. What is suggested in terms of both Covenant Areas is a consent notice preventing the cutting down, damaging or destroying of the indigenous vegetation within the covenant area. Refer also to further comment later in this AEE in regard to esplanade requirements associated with the Pakanae Stream.

The Pakanae Scenic Reserve, which is also a Nga Whenua Rahui protected area, is within 500m of the property boundary but does not extend inside the property. The proposal does not adversely affect the Department of Conservation's ability to manage and administer its land, nor any other administering body, given that there is a 300m separation and an intervening property between the application site and the Nga Whenua Rahui protected area. The additional lots 1 & 2 are more than 500m distant of the Nga Whenua Rahui land.

On the western boundary of large balance Lot 3 sits the Kokohuia Conservation Area (Stewardship Area). This bounds land identified as protective covenant A on the scheme plan and DoC's ability to manage and administer the Conservation Area is unaffected by the proposed subdivision, where the proposed additional lots 1 & 2 are a considerable distance away and do not share a boundary with the Conservation Area.

The property is mapped as being within a kiwi present area. It is proposed that working dogs be allowed to remain on any lot for as long as those lots remain farmland and actively farmed (stock grazing). Such dogs must be micro chipped and under effective control whenever on the property. If and when a lot is 'retired' from productive use and utilised instead for predominantly residential living then we propose a restriction of no more than 2 dogs (whether working or domestic), to be micro-chipped, chained or locked up at night, and under effective control during the day, preferably by way of being confined to a dog proof enclosure.

Heritage Resources

There are no heritage resources within the application site.

Cultural Values

There are no Sites of Cultural Significance to Maori within the application site itself. There is a site further east but outside the property boundaries. Roughly coinciding with Outstanding Landscape, *Site of Significance to Maori MA11-36 (Te Ramaroa, described as waahi tapu; sacred escarpment)* encompasses the hill and ridgeline to the east and north east of the application site and extends back to the north, away from the application site. It does not abut, and is not within, the application site.

It is proposed to protect the Pakanae Stream and riparian margins (that lie within Lot 4) by identifying protective bush covenant B on the scheme plan and protecting the indigenous vegetation therein. It is also proposed to offer esplanade strip along Pakanae Stream edge, 20m width, if the stream meets the Act's 'qualifier' of having average width of 3m.

The nature of the proposal, its low density, and the protective measures being offered, lead me to the conclusion that this proposal will have no adverse effects on cultural values associated with the site and immediate area.

6.12 Soil

The application site contains no soils regarded as highly productive. Parts of the application site are mapped as being erosion prone. The creation of two lots to support future residential use does not impact on the life supporting capacity of soils. Development will occur outside of any area mapped as erosion prone, further ensuring minimal impact on soils from erosion.

6.13 Access to reserves and waterbodies

Lot 4, although being amalgamated with Lot 3 resulting in a title in excess of 4ha is, of itself, less than 4ha and has a potential 'qualifying' water body (Pakanae Stream) either on or within its boundary. As can be seen from the photographs earlier in this report, access to the stream is physically difficult and at this point in time, no effort has been made to measure average stream width along the length of the stream within Lot 4. It may be less than 3m average in which case the stream does not qualify as requiring esplanade. If this is the case, however, water quality remains protected by the proposed protective covenant B.

No esplanade has been shown on the Scheme Plan at this point in time because of the lack of certainty as to the stream's average width and location in relation to boundary. It is proposed that a condition be imposed at s223 stage whereby the requirement for esplanade strip must be determined as a condition of consent, and if the stream is a qualifying waterbody, with average width exceeding 3m, then the survey plan shall show a 20m wide esplanade strip and a draft esplanade strip instrument shall also be provided.

The Pakanae Stream will be given protection either through proposed protective bush covenant B, or esplanade, or both. Where "B" coincides with any esplanade strip the primary purpose of any esplanade strip instrument should be riparian vegetation protection.

In summary I do not believe the subdivision proposal adversely affects water quality.

6.14 Land use compatibility (reverse sensitivity)

This proposal subdivides 4.24ha of relatively poor quality grazing land from a 28ha property of equally poor quality grazing land. There is residential living to the north and south of the site on adjacent properties. The proposal will add two more residential units in the future and is low density and in keeping with the general character of this section of Waitemarama Gorge Road – which is one of sparse built environment in a rural and bush setting. I do not consider the creation of two additional lots will create any adverse reverse sensitivity effects in regard to productive land use.

The current proposal for the property is the land not in Lots 1 & 2 will be planted in trees, at this stage for at least 15 years. This has the potential for trees to be planted in reasonable proximity to where future dwellings may be located. However, the required buffer setback of 20m between tree line and residential unit can be readily achieved on both lots. Provided a reasonable separation/buffer is achieved between the tree line and future residential development, I do not foresee a land use incompatibility issue arising.

6.15 Other Matters

The application site is not in proximity to any airport and not in the coastal environment. There is no National Grid Corridor within or near the site.

Precedent Effects

The application will result in the number of titles provided for by restricted discretionary subdivision options. The title is older than April 2000. Granting the proposal, with conditions, will not threaten the integrity of the District Plan or cause any negative or adverse precedent effect.

Cumulative Effects

For the same reasons as outlined above, no adverse cumulative effects result from the proposed subdivision. The number of titles created is consistent with what the District Plan provides for. The site is able to accommodate two additional lots and the roading network is able to accommodate the eventual additional traffic that might result from future built development.

7.0 STATUTORY ASSESSMENT

7.1 Operative District Plan Objectives and Policies

The proposal promotes sustainable management of the natural and physical resources of the District and provides for the applicants' social and economic well being. It is an appropriate subdivision that does not compromise the life-supporting capacity of air, water, or ecosystems, and adverse effects are capable of mitigation. The lot sizes will allow for a level of density not dissimilar from that already in existence in the immediate area (Objectives 13.3.1 and 2 and Policy 13.4.14).

The sites does not contain outstanding landscapes or natural features in the coastal environment (13.3.3). The site contains no scheduled heritage resources (13.3.4).

The proposed lots are large and can accommodate on-site wastewater treatment and disposal. The lots will be reliant on on-site water catchment and supply. Stormwater management is readily achievable (Objective 13.3.5 and related Policy 13.4.8).

I am not aware of any sites of significance to Māori or cultural values associated with the site. No major earthworks are required and no indigenous vegetation clearance is envisaged or required (Objective 13.3.7 and Policy 13.4.11)

Objectives 13.3.8-13.3.10 are about ensuring subdivisions have access to adequate services and make efficient use of infrastructure. I believe the proposal is consistent with these objectives. Power and telecoms are not a requirement of rural subdivisions. The site is not near any of the National Grid (13.3.11).

The site contains areas mapped as having indigenous flora & fauna values and it is proposed to protect any within the application site by way of bush protection covenant. There are no such areas within the two proposed additional lots, all the bush being on the balance lot(s). There are no known cultural or heritage values. The site does not have outstanding natural character values, nor outstanding landscape values. It does not contain areas identified as wetland. I do not believe the subdivision will prevent adjacent land uses from continuing to operate. The site is not in the coastal environment and contains no outstanding landscape or natural features. It does include a riparian margin and this is proposed to be protected (Policies 13.4.1 & 13.4.6).

Safe and efficient access can be provided (Policies 13.4.2 and 5). The design has taken into account natural and other hazards (13.4.3) and no new above ground utilities are proposed (13.4.4).

Policies 13.4.7 (car parking contributions); 13.4.9 (bonus development); 13.4.10 (subdivision in the Conservation Zone); 13.4.12 (management plan subdivisions) are not relevant.

Policy 13.4.13 refers to s6 matters which are addressed later in this report. It also encourages some matters not already covered in other objectives and policies, such as:

- grouping development where there is least impact on natural character and its elements;
- minimising visual impact of buildings and earthworks, particularly as seen from public land and the coastal marine area;
- providing for public access to esplanade areas where required;
- where necessary provide planting of indigenous vegetation; and
- achieving hydraulic neutrality.

The proposal has had adequate regard to all of the above. The zone has no visual amenity rule so I do not consider it necessary to look at ways of minimising visual impact of buildings. The proposal does not adversely affect or remove any areas of indigenous vegetation and I see no need or justification in carrying out indigenous vegetation planting as a requirement of this subdivision proposal.

Relevant Rural Production Zone objectives and policies include:

Objectives:

8.6.3.1 To promote the sustainable management of natural and physical resources in the Rural Production Zone.

8.6.3.2 To enable the efficient use and development of the Rural Production Zone in a way that enables people and communities to provide for their social, economic, and cultural well being and for their health and safety.

8.6.3.3 To promote the maintenance and enhancement of the amenity values of the Rural Production Zone to a level that is consistent with the productive intent of the zone.

8.6.3.4 To promote the protection of significant natural values of the Rural Production Zone.

8.6.3.6 To avoid, remedy or mitigate the actual and potential conflicts between new land use activities and existing lawfully established activities (reverse sensitivity) within the Rural Production Zone and on land use activities in neighbouring zones.

8.6.3.7 To avoid remedy or mitigate the adverse effects of incompatible use or development on natural and physical resources.

8.6.3.8 To enable the efficient establishment and operation of activities and services that have a functional need to be located in rural environments.

8.6.3.9 To enable rural production activities to be undertaken in the zone.

And policies

8.6.4.1 That a wide range of activities be allowed in the Rural Production Zone, subject to the need to ensure that any adverse effects on the environment, including any reverse sensitivity effects, on the environment resulting from these activities are avoided, remedied or mitigated and are not to the detriment of rural productivity.

8.6.4.2 That standards be imposed to ensure that the off site effects of activities in the Rural Production Zone are avoided, remedied or mitigated.

8.6.4.3 That land management practices that avoid, remedy or mitigate adverse effects on natural and physical resources be encouraged.

8.6.4.4 That the type, scale and intensity of development allowed shall have regard to the maintenance and enhancement of the amenity values of the Rural Production Zone to a level that is consistent with the productive intent of the zone.

8.6.4.5 That the efficient use and development of physical and natural resources be taken into account in the implementation of the Plan.

8.6.4.7 That although a wide range of activities that promote rural productivity are appropriate in the Rural Production Zone, an underlying goal is to avoid the actual and potential adverse effects of conflicting land use activities.

8.6.4.8 That activities whose adverse effects, including reverse sensitivity effects cannot be avoided remedied or mitigated are given separation from other activities

8.6.4.9 That activities be discouraged from locating where they are sensitive to the effects of or may compromise the continued operation of lawfully established existing activities in the Rural Production zone and in neighbouring zones.

Objective 8.6.3.5 and Policy 8.6.4.6 are not considered relevant as they are solely related to Kerikeri Road.

Refer to Section 6.0 Assessment of Environmental Effects. The proposed subdivision promotes an efficient use and development of the land (Objective 8.6.3.2). Amenity values can be maintained (8.6.3.3). I do not believe there will be additional reverse sensitivity effects as a result of the proposal. The balance of the site will continue to be used for land based production of some sort and the land to be in Lots 1 & 2 does not consist of versatile or highly productive soils. The proposed development is low density and will not prevent the continued use of adjacent land for productive uses (Objectives 8.6.3.6-8.6.3.9 inclusive and Policies 8.6.4.8 and 8.6.4.9).

Policy 8.6.4.7 anticipates a wide range of activities that promote rural productivity, whilst avoiding the actual and potential adverse effects of conflicting land use activities. The proposed subdivision does not affect the continued ability of lots to continue to provide for use reliant on soils. The immediate area supports an existing range of activities, including productive use; residential; bush and forestry. I am of the view that the subdivision does not create additional land use incompatibility effects of a minor or more than minor nature.

The proposal provides for sustainable management of natural and physical resources (8.2.4.1). Off site effects can be avoided, remedied or mitigated (8.6.4.2 and 8.6.4.3). Amenity values can be maintained through the size of the lots (open space to built environment ratio) (8.6.4.4). The proposal enables the efficient use and development of natural and physical resources (8.6.4.5).

In summary, I believe the proposal to be more consistent than not with the Rural Production Zone objectives and policies.

Other relevant objectives and policies in the ODP are those relating to Indigenous Vegetation. No clearance is proposed or necessary. Consent Notice(s) is/are suggested as means of protecting flora and fauna. I believe the proposal to be consistent with the objectives and policies relating to indigenous vegetation.

7.2 Proposed District Plan

An assessment against the relevant objectives and policies in the Subdivision section of the Proposed District Plan (PDP) follows:

SUB-O1

Subdivision results in the efficient use of land, which:

- a. achieves the objectives of each relevant zone, overlays and district wide provisions;*
- b. contributes to the local character and sense of place;*
- c. avoids reverse sensitivity issues that would prevent or adversely affect activities already established on land from continuing to operate;*
- d. avoids land use patterns which would prevent land from achieving the objectives and policies of the zone in which it is located;*
- e. does not increase risk from natural hazards or risks are mitigated and existing risks reduced; and*
- f. manages adverse effects on the environment.*

SUB-O2

Subdivision provides for the:

- a. Protection of highly productive land; and
- b. Protection, restoration or enhancement of Outstanding Natural Features, Outstanding Natural Landscapes, Natural Character of the Coastal Environment, Areas of High Natural Character, Outstanding Natural Character, wetland, lake and river margins, Significant Natural Areas, Sites and Areas of Significance to Māori, and Historic Heritage.

SUB-O3 Infrastructure is planned to service the proposed subdivision and development where:

- a. there is existing infrastructure connection, infrastructure should provided in an integrated, efficient, coordinated and future-proofed manner at the time of subdivision; and
- b. where no existing connection is available infrastructure should be planned and consideration be given to connections with the wider infrastructure network.

SUB-O4

Subdivision is accessible, connected, and integrated with the surrounding environment and provides for:

- a. public open spaces;
- b. esplanade where land adjoins the coastal marine area; and
- c. esplanade where land adjoins other qualifying water bodies

The subdivision does not involve highly productive land. Ongoing productive use of adjacent land is not threatened. The subdivision contributes to local character and avoids additional reverse sensitivity issues. The proposal does not increase the risk of natural hazard and there are no adverse effects (SUB-O1). The site does not contain any highly productive land, nor any ONF's, ONL's or areas of ONC's and is not in the Coastal Environment. It does not contain any Significant Natural Areas as identified in the PDP, nor any Areas of Significance to Maori, or Historic Heritage Areas (SUB-O2). No additional infrastructure is required and there are no qualifying water bodies (SUB-03 and 04).

SUB-P1

Enable boundary adjustments that:

- a. do not alter:
 - i. the degree of non compliance with District Plan rules and standards;
 - ii. the number and location of any access; and
 - iii. the number of certificates of title; and
- b. are in accordance with the minimum lot sizes of the zone and comply with access, infrastructure and esplanade provisions.

Not relevant – application is not a boundary adjustment.

SUB-P2

Enable subdivision for the purpose of public works, infrastructure, reserves or access.

Not relevant – application does not involve public works, infrastructure, reserves or access lots.

SUB-P3

Provide for subdivision where it results in allotments that:

- a. are consistent with the purpose, characteristics and qualities of the zone;
- b. comply with the minimum allotment sizes for each zone;
- c. have an adequate size and appropriate shape to contain a building platform; and
- d. have legal and physical access.

The proposal is considered to be consistent with the purpose, characteristics and qualities of the zone, in the immediate environs; the lots are of an appropriate shape and size to contain building platforms; and have legal and physical access. The proposal does not meet the

controlled minimum lot size applying the PDP's Rural Production zone, but these lot sizes do not yet have legal effect.

SUB-P4

Manage subdivision of land as detailed in the district wide, natural environment values, historical and cultural values and hazard and risks sections of the plan

The subdivision has had regard to all the matters listed, where relevant.

SUB-P5

Manage subdivision design and layout in the General Residential, Mixed Use and Settlement zone to provide for safe, connected and accessible environments by:

- a. minimising vehicle crossings that could affect the safety and efficiency of the current and future transport network;
- b. avoid cul-de-sac development unless the site or the topography prevents future public access and connections;
- c. providing for development that encourages social interaction, neighbourhood cohesion, a sense of place and is well connected to public spaces;
- d. contributing to a well connected transport network that safeguards future roading connections; and
- e. maximising accessibility, connectivity by creating walkways, cycleways and an interconnected transport network.

Not relevant as the site is not zoned any of the zones referred to.

SUB-P6 Require infrastructure to be provided in an integrated and comprehensive manner by:

- a. demonstrating that the subdivision will be appropriately serviced and integrated with existing and planned infrastructure if available; and
- b. ensuring that the infrastructure is provided in accordance with the purpose, characteristics and qualities of the zone.

The additional lots will be reliant on on-site servicing. The site has access to Council road.

SUB- P7

Require the vesting of esplanade reserves when subdividing land adjoining the coast or other qualifying water bodies.

No Esplanade Reserve is known to be required at the time of lodging the application, however, it is suggested that the average width of the Pakanae Stream be determined at s223 stage and if esplanade is required it will be shown as esplanade strip.

SUB-P8 Avoid rural lifestyle subdivision in the Rural Production zone unless the subdivision:

- a. will protect a qualifying SNA in perpetuity and result in the SNA being added to the District Plan SNA schedule; and
- b. will not result in the loss of versatile soils for primary production activities.

The soils are not regarded as highly versatile. Bush areas within the large balance area are proposed for protective covenant but are not being put forward to be added to the PDP's SNA schedule because of the uncertainty around the PDP's content in regard to indigenous vegetation.

SUB-P9

Avoid subdivision [sic] rural lifestyle subdivision in the Rural Production zone and Rural residential subdivision in the Rural Lifestyle zone unless the development achieves the environmental outcomes required in the management plan subdivision rule.

The subdivision is not a Management Plan.

SUB-P10

To protect amenity and character by avoiding the subdivision of minor residential units from principal residential units where resultant allotments do not comply with minimum allotment size and residential density.

Not relevant. No minor residential units exist.

SUB-P11

Manage subdivision to address the effects of the activity requiring resource consent including (but not limited to) consideration of the following matters where relevant to the application:

- a. consistency with the scale, density, design and character of the environment and purpose of the zone;
- b. the location, scale and design of buildings and structures;
- c. the adequacy and capacity of available or programmed development infrastructure to accommodate the proposed activity; or the capacity of the site to cater for on-site infrastructure associated with the proposed activity;
- d. managing natural hazards;
- e. Any adverse effects on areas with historic heritage and cultural values, natural features and landscapes, natural character or indigenous biodiversity values; and
- f. any historical, spiritual, or cultural association held by tangata whenua, with regard to the matters set out in Policy TW-P6.

The above policy is of little relevance as the activity does not require resource consent under the PDP. Notwithstanding that, all of the above have been considered, to the extent considered necessary, in the layout and number of lots being proposed.

In summary I believe the proposed subdivision to be consistent with the PDP's objectives and policies in regard to subdivision.

The site is zoned Rural Production in the Proposed District Plan, and contains pockets of indigenous vegetation.

Objectives**RPROZ-O1**

The Rural Production zone is managed to ensure its availability for primary production activities and its long-term protection for current and future generations.

RPROZ-O2

The Rural Production zone is used for primary production activities, ancillary activities that support primary production and other compatible activities that have a functional need to be in a rural environment.

RPROZ-O3

Land use and subdivision in the Rural Production zone:

- a. protects highly productive land from sterilisation and enables it to be used for more productive forms of primary production;
- b. protects primary production activities from reverse sensitivity effects that may constrain their effective and efficient operation;
- c. does not compromise the use of land for farming activities, particularly on highly productive land;
- d. does not exacerbate any natural hazards; and
- e. is able to be serviced by on-site infrastructure.

RPROZ-O4

The rural character and amenity associated with a rural working environment is maintained.

The subdivision maintains rural character and amenity. The development can occur without exacerbating natural hazards and is able to be serviced with on-site infrastructure. RPROZ-O2 is written in a way that excludes any use other than primary production in the zone, yet zone rules provide for other activities as permitted activities. This is contradictory in intent. Be that as it may, low density residential use is an accepted and expected feature of the rural zone.

No soils on the application site qualify as 'highly productive land' or 'highly versatile soils'. The proposal is not considered to have minor or more than minor adverse impact on the overall productivity of the soils on the site. The subdivision does not unduly increase any risk of reverse sensitivity and does not compromise the use of nearby land for farming activities.

Policies

RPROZP1

Enable primary production activities, provided they internalise adverse effects onsite where practicable while recognising that typical adverse effects associated with primary production should be anticipated and accepted within the Rural Production zone.

This proposal does not involve an application for a primary production activity.

RPROZP2

Ensure the Rural Production zone provides for activities that require a rural location by:

- a. enabling primary production activities as the predominant land use;*
- b. enabling a range of compatible activities that support primary production activities, including ancillary activities, rural produce manufacturing, rural produce retail, visitor accommodation and home businesses.*

The proposal has minimal impact on the land's ability to support rural activities or compatible activities.

RPROZP3

Manage the establishment, design and location of new sensitive activities and other non-productive activities in the Rural Production Zone to avoid where possible, or otherwise mitigate, reverse sensitivity effects on primary production activities.

Reverse sensitivity effects have been discussed elsewhere in this report and it is considered the proposal does not unduly or significantly increase the risk of reverse sensitivity.

RPROZP4

Land use and subdivision activities are undertaken in a manner that maintains or enhances the rural character and amenity of the Rural Production zone, which includes:

- a. a predominance of primary production activities;*
- b. low density development with generally low site coverage of buildings or structures;*
- c. typical adverse effects such as odour, noise and dust associated with a rural working environment;*
and
- d. a diverse range of rural environments, rural character and amenity values throughout the District.*

I believe the proposal maintains rural character and amenity. The proposal is low density and will result in low site coverage by buildings or structures.

RPROZP5

Proposed subdivision

Avoid land use that:

- a. is incompatible with the purpose, character and amenity of the Rural Production zone;
- b. does not have a functional need to locate in the Rural Production zone and is more appropriately located in another zone;
- c. would result in the loss of productive capacity of highly productive land;
- d. would exacerbate natural hazards; and
- e. cannot provide appropriate on-site infrastructure.

Not relevant as the proposal is not a land use.

RPROZP6

Avoid subdivision that:

- a. results in the loss of highly productive land for use by farming activities;
- b. fragments land into parcel sizes that are no longer able to support farming activities, taking into account:
 1. the type of farming proposed; and
 2. whether smaller land parcels can support more productive forms of farming due to the presence of highly productive land.
- c. provides for rural lifestyle living unless there is an environmental benefit.

The subdivision does not result in the loss of highly productive land for use by farming activities as the site does not fall within the parameters of 'highly productive land'.

RPROZP7

Manage land use and subdivision to address the effects of the activity requiring resource consent, including (but not limited to) consideration of the following matters where relevant to the application:

- a. whether the proposal will increase production potential in the zone;
- b. whether the activity relies on the productive nature of the soil;
- c. consistency with the scale and character of the rural environment;
- d. location, scale and design of buildings or structures;
- e. for subdivision or non-primary production activities:
 - i. scale and compatibility with rural activities;
 - ii. potential reverse sensitivity effects on primary production activities and existing infrastructure;
 - iii. the potential for loss of highly productive land, land sterilisation or fragmentation
- f. at zone interfaces:
 - i. any setbacks, fencing, screening or landscaping required to address potential conflicts;
 - ii. the extent to which adverse effects on adjoining or surrounding sites are mitigated and internalised within the site as far as practicable;
- g. the capacity of the site to cater for on-site infrastructure associated with the proposed activity, including whether the site has access to a water source such as an irrigation network supply, dam or aquifer;
- h. the adequacy of roading infrastructure to service the proposed activity;
- i. Any adverse effects on historic heritage and cultural values, natural features and landscapes or indigenous biodiversity;
- j. Any historical, spiritual, or cultural association held by tangata whenua, with regard to the matters set out in Policy TW-P6.

As this application does not require resource consent under the PDP, the policy is of limited relevance. The proposal is of a scale and design that is consistent with the character of the zone and immediate environs. Reverse sensitivity effects are not increased.

The site is served by Council roads and can provide for on-site servicing. The site does not exhibit any historic heritage or cultural values and there will be no adverse effects on landscape values, natural character values, or indigenous biodiversity.

7.3 Part 2 Matters

5 Purpose

- (1) *The purpose of this Act is to promote the sustainable management of natural and physical resources.*
- (2) *In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while—*
 - (a) *sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
 - (b) *safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
 - (c) *avoiding, remedying, or mitigating any adverse effects of activities on the environment.*

The proposal provides for peoples' social and economic well being, and for their health and safety, while sustaining the potential of natural and physical resources, safeguarding the life-supporting capacity of air, water, soil and the ecosystems; and avoiding, remedying or mitigating adverse effects on the environment.

6 Matters of national importance

In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for the following matters of national importance:

- (a) *the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development;*
- (b) *the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development;*
- (c) *the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna;*
- (d) *the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers;*
- (e) *the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga;*
- (f) *the protection of historic heritage from inappropriate subdivision, use, and development;*
- (g) *the protection of protected customary rights;*
- (h) *the management of significant risks from natural hazards.*

The application site contains a stream with indigenous riparian margins. This area is proposed to be protected and no development is likely to occur in proximity (part (a)). The site does not contain or display any of the features, resources or values outlined in part (b). Areas of indigenous vegetation on the site identified as PNA are proposed to be protected (part (c)). Esplanade will be required if and where required (part (d)). I do not believe the proposal adversely impacts on the relationship of Maori and their culture and traditions (part (e)). The site has no historic heritage values and no protected customary rights (parts (f) and (g)). The

proposal adequately manages natural hazards and there is no significant risk identified (part (h)).

7 Other matters

In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to—

- (a) *kaitiakitanga:*
- (aa) *the ethic of stewardship:*
- (b) *the efficient use and development of natural and physical resources:*
- (ba) *the efficiency of the end use of energy:*
- (c) *the maintenance and enhancement of amenity values:*
- (d) *intrinsic values of ecosystems:*
- (e) *[Repealed]*
- (f) *maintenance and enhancement of the quality of the environment:*
- (g) *any finite characteristics of natural and physical resources:*
- (h) *the protection of the habitat of trout and salmon:*
- (i) *the effects of climate change:*
- (j) *the benefits to be derived from the use and development of renewable energy.*

Regard has been had to any relevant parts of Section 7 of the RMA, "Other Matters". These include 7(b), (c), (d) and (f). It is considered that the proposal represents efficient use and development of a site. Proposed layout, along with waste water and stormwater management, will ensure the maintenance of amenity values and the quality of the environment. The proposal has had regard to the values of ecosystems.

8 Treaty of Waitangi

In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).

The principles of the Treaty of Waitangi have been considered and it is believed that this proposed subdivision does not offend any of those principles.

In summary, it is considered that all matters under s5-8 inclusive have been adequately taken into account.

7.4 National Policy Statements

The proposal does not give offence to, and is not contrary to, the National Policy Statement for Freshwater Management.

The National Policy Statement for Highly Productive Land (NPS-HPL) is not relevant as this defines highly productive land as land with soils of LUC class 1, 2 or 3. The application site has no such soils.

The National Policy Statement for Indigenous Biodiversity has been considered in preparing this application. The subdivision is not contrary to the intent of this NPS.

7.5 National Environmental Standards (NES)

The NES for Assessing and Managing Contaminants in Soil to Protect Human Health is not considered relevant as there is no known current or historic land use that would render the land a 'piece of land' subject to that NES.

The NES for Freshwater is not relevant as no development is proposed within 100m of any area that would meet the definition of a natural inland wetland, nor in proximity to any river or stream.

7.6 Regional Policy Statement for Northland (RPS)

The RPS contains objectives and policies related to infrastructure and regional form and economic development. These are enabling in promoting sustainable management in a way that is attractive for business and investment. The proposal is consistent with these objectives and policies.

The RPS also has policies ensuring that productive land is not subject to fragmentation and/or sterilisation to the point where productive capacity is materially reduced, and that reverse sensitivity effects be avoided, remedied or mitigated.

Objective 3.6 Economic activities – reverse sensitivity and sterilisation

The viability of land and activities important for Northland's economy is protected from the negative impacts of new subdivision, use and development, with particular emphasis on either:

(a) Reverse sensitivity for existing:

(i) Primary production activities;

In regard to this subdivision, it is considered that no additional reverse sensitivity issues arise as a result. The area around the site is either in grazing or bush, with residential dwellings sparsely situated in the wider area. The proposal does not prevent or threaten the continuation of any adjacent land being used for ongoing production use.

The associated Policy to the above Objective is **Policy 5.1.1 – Planned and coordinated development.**

Subdivision, use and development should be located, designed and built in a planned and co-ordinated manner which:

(c) Recognises and addresses potential cumulative effects of subdivision, use, and development, and is based on sufficient information to allow assessment of the potential long-term effects; ...

(e) Should not result in incompatible land uses in close proximity and avoids the potential for reverse sensitivity;

(f) Ensures that plan changes and subdivision to / in a primary production zone, do not materially reduce the potential for soil-based primary production on land with highly versatile soils, or if they do, the net public benefit exceeds the reduced potential for soil-based primary production activities; and ...

Objectives and Policies in the Regional Policy Statement for Northland (RPS) provide direction when examining the subdivision of land in production zones where the soils meet the definition of 'highly versatile', the RPS states that Class I, II and III soils are 'highly versatile'. The site contains no such soils. The proposal, therefore, does not materially reduce the potential for soil-based primary production on land with highly versatile soils.

5.1.3 Policy – Avoiding the adverse effects of new use(s) and development

Avoid the adverse effects, including reverse sensitivity effects of new subdivision, use and development, particularly residential development on the following:

(a) Primary production activities in primary production zones (including within the coastal marine area);.....

The proposal does not, in my opinion, prevent the continued use of adjacent land for production use. Reverse sensitivity effects have been addressed earlier.

I believe the proposal is not contrary to any of the objectives or policies in the Regional Policy Statement for Northland.

7.7 Regional Plans

The subdivision does not result in any breaches of the Proposed Regional Plan (Appeals version).

8.0 S 95A-E & CONSULTATION

8.1 S95A Public Notification Assessment

A consent authority must follow the steps set out in s95A to determine whether to publicly notify an application for resource consent. Step 1 specifies when public notification is mandatory in certain circumstances. None of these circumstances exist. Step 2 of s95A specifies the circumstances that preclude public notification. No such circumstance exists. Step 3 of s95A must therefore be considered. This specifies that public notification is required in certain circumstances. These include:

- (a) the application is for a resource consent for 1 or more activities, and any of those activities is subject to a rule or national environmental standard that requires public notification:*
- (b) the consent authority decides, in accordance with section 95D, that the activity will have or is likely to have adverse effects on the environment that are more than minor.*

The application is not subject to a rule or national environmental standard that requires public notification. This report and AEE concludes that the activity will not have, nor is it likely to have, adverse effects on the environment that are more than minor. In summary public notification is not required pursuant to Step 3 of s95A.

Step 4 of s95A states that the consent authority is to determine if there are any special circumstances under which public notification may be warranted. Such circumstances are not defined. I do not consider any such circumstances exist.

8.2 S95B Limited Notification Assessment

A consent authority must follow the steps set out in s95B to determine whether to give limited notification of an application for a resource consent, if the application is not publicly notified pursuant to s95A. Step 1 identifies certain affected groups and affected persons that must be notified. No affected group of persons as listed in s95B exist in this instance.

Step 2 of s95B specifies the circumstances that preclude limited notification. Neither circumstance exists and Step 3 of s95B must be considered. This specifies that certain other affected persons must be notified, specifically:

- (7) *In the case of a boundary activity, determine in accordance with section 95E whether an owner of an allotment with an infringed boundary is an affected person.*
- (8) *In the case of any other activity, determine whether a person is an affected person in accordance with section 95E.*

The application is not for a boundary activity. The s95E assessment below concludes that there are no affected persons to be notified.

Step 4 of s95B states that the consent authority is to determine if there are any special circumstances under which limited notification may be warranted. Such circumstances are not defined. I do not consider any such circumstances exist.

8.3 S95D Level of Adverse Effects

The AEE in this report assesses effects on the environment and concludes that these will be no more than minor.

8.4 S95E Affected Persons

A person is an 'affected person' if the consent authority decides that the activity's adverse effects on the person are minor or more than minor (but are not less than minor). A person is not an affected person if they have provided written approval for the proposed activity.

The activity is, in my opinion, a restricted discretionary subdivision and becomes a discretionary activity only because of potential shortfall in meeting all rules in regard to access. The proposal is consistent with the objectives and policies of both the Operative and Proposed District Plan. The density level proposed is low and development within sites can be internalised so as not to generate adverse effects on adjacent properties. I have not identified any adjacent properties as 'affected persons'.

The site does not contain any heritage or cultural sites or values. There are areas of indigenous vegetation within in the site identified as part of PNA's and these are proposed to be protected from being cut down, damaged or destroyed. Dog ownership is also proposed to be restricted in terms of number and means of control. No pre lodgement consultation has been considered necessary with tangata whenua, Heritage NZ, or Department of

Conservation. The site is not accessed off state highway and consultation with (NZTA) Waka Kotahi has not been necessary.

I do not believe there to be any adjacent properties affected in a minor or more than minor and have therefore not identified any affected persons.

9.0 SECTION 104D GATEWAY TEST

In the event that the Council cannot bring itself to accept the category of activity put forward in this application and consider it a non-complying activity, the following assessment pursuant to s104D is offered.

104D Particular restrictions for non-complying activities

(1) Despite any decision made for the purpose of section 95A(2)(a) in relation to adverse effects, a consent authority may grant a resource consent for a non-complying activity only if it is satisfied that either—

(a) the adverse effects of the activity on the environment (other than any effect to which section 104(3)(a)(ii) applies) will be minor; or

(b) the application is for an activity that will not be contrary to the objectives and policies of—

(i) the relevant plan, if there is a plan but no proposed plan in respect of the activity; or

(ii) the relevant proposed plan, if there is a proposed plan but no relevant plan in respect of the activity; or

(iii) both the relevant plan and the relevant proposed plan, if there is both a plan and a proposed plan in respect of the activity.

In regard to the above, I am of the opinion that the subdivision will achieve a sustainable result and efficient use of the land. I believe that adverse effects on the wider environment will be less than minor. I believe the proposal is not contrary to the objectives and policies in the Operative or Proposed Plans. I consider both arms of the 104D thresholds to be satisfied to enable the granting of this consent.

10.0 CONCLUSION

The site is considered suitable for the proposed subdivision, and effects on the wider environment are no more than minor. There is no District Plan rule or national environmental standard that requires the proposal to be publicly notified. No special circumstances have been identified that would suggest public notification is required. No affected persons are identified.

I consider the proposal to be consistent with both the Operative and Proposed District Plans' objectives and policies, relevant national and regional policy statements and plans, and Part 2 of the Act.

It is requested that the Council give favourable consideration to this application and grant approval, on a non notified basis.



Signed
Lynley Newport
Senior Planner
THOMSON SURVEY LTD

Dated

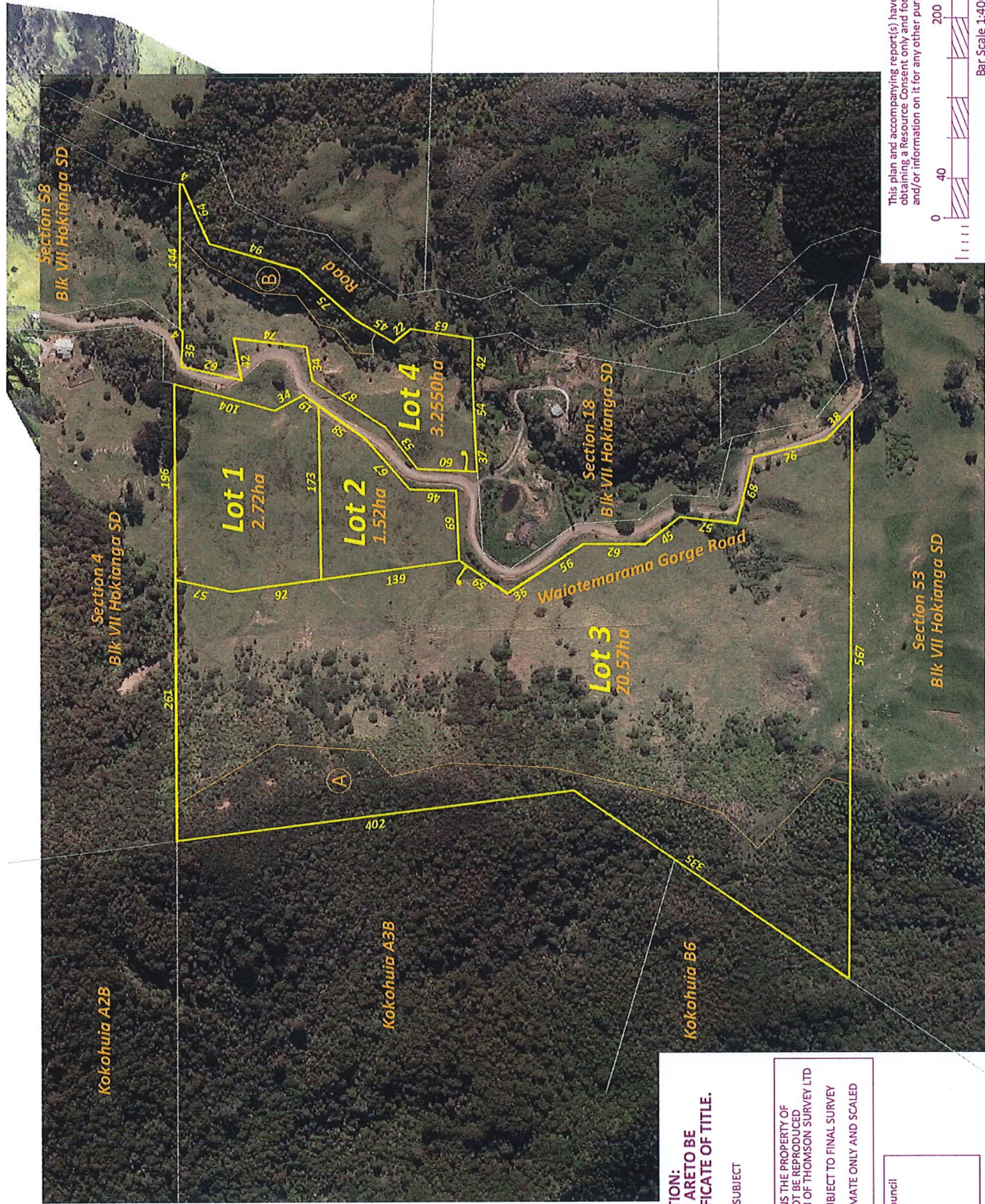
14th March 2024

10.0 LIST OF APPENDICES

- | | |
|-------------------|--|
| Appendix 1 | Scheme Plan(s) |
| Appendix 2 | Locality Plan |
| Appendix 3 | Record of Title & relevant instruments |
| Appendix 4 | Map Excerpts |
| Appendix 5 | Site Suitability Engineering Report |

Appendix 1

Scheme Plan(s)



This plan and accompanying report(s) have been prepared for the purpose of obtaining a Resource Consent only and for no other purpose. Use of this plan and/or information on it for any other purpose is at the user's risk.



AMALGAMATION CONDITION:
THAT LOTS 3 & 4 HEREOF ARE TO BE HELD IN THE SAME CERTIFICATE OF TITLE.

AREAS MARKED (A) (B) TO BE SUBJECT TO BUSH PROTECTION COVENANTS

THIS DRAWING AND DESIGN REMAINS THE PROPERTY OF THOMSON SURVEY LTD AND MAY NOT BE REPRODUCED WITHOUT THE WRITTEN PERMISSION OF THOMSON SURVEY LTD
 AREAS AND MEASUREMENTS ARE SUBJECT TO FINAL SURVEY
 TOPOGRAPHICAL DETAILS APPROXIMATE ONLY AND SCALED FROM AERIAL PHOTOGRAPHY

Local Authority: Far North District Council
 Computed in: NZ758/84
 Total Area: 28.0650ha
 Zoning: Rural Production
 Resource features: NIL



315 Kerikeri Rd
 P.O. Box 372, Kerikeri
 Email: kerikeri@tsurvey.co.nz
 Ph: (09) 4077360
 www.tsurvey.co.nz

Registered Land Surveyors, Planners & Land Development Consultants

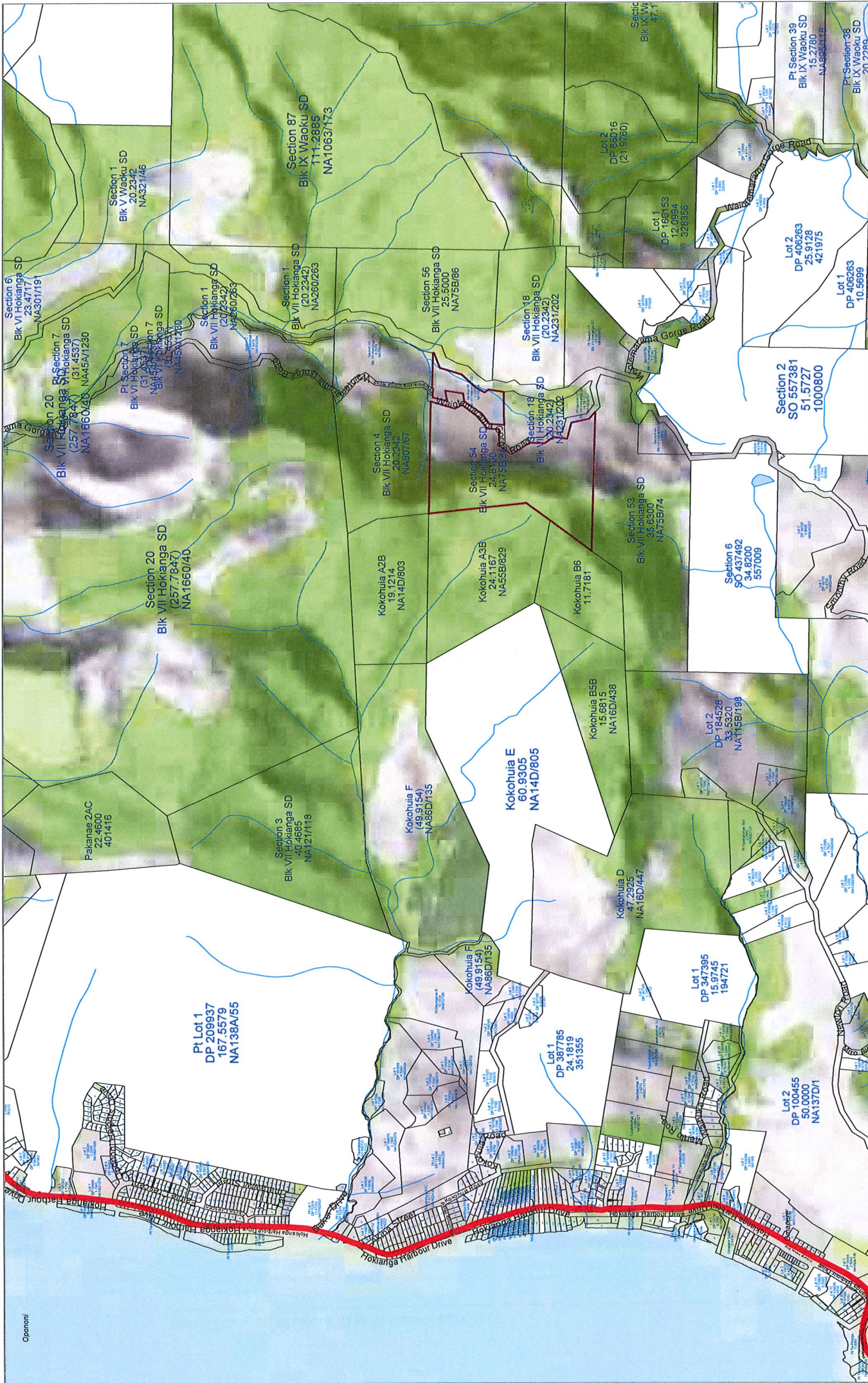
**PROPOSED SUBDIVISION OF
 SECTIONS 54 & 55 BLK VII HOKIANGA SD**
 WAIOTEMARAMA GORGE ROAD, OMAPERE
 PREPARED FOR: BILL

Survey	Name	Date	ORIGINAL SCALE	SHEET SIZE
Design				
Drawn	KY	17.08.21	1:4000	A3
Approved				
Rev	KY	17.05.23		
10085 Scheme 20230517				

Surveyors Ref. No: 10085
 Sheet 1 of 1

Appendix 2

Locality Plan

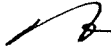


Any person wishing to rely on the information shown on this map must independently verify the information
 Topographical and Cadastral map derived from LINZ data. Printed: 31-Jan-2024 04:23.
 Scale 1:20000



**RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy**




R. W. Muir
Registrar-General
of Land

Identifier NA75B/84
Land Registration District North Auckland
Date Issued 03 February 1989

Prior References
NAPR79/35

Estate	Fee Simple
Area	28.0650 hectares more or less
Legal Description	Section 54-55 Block VII Hokianga Survey District

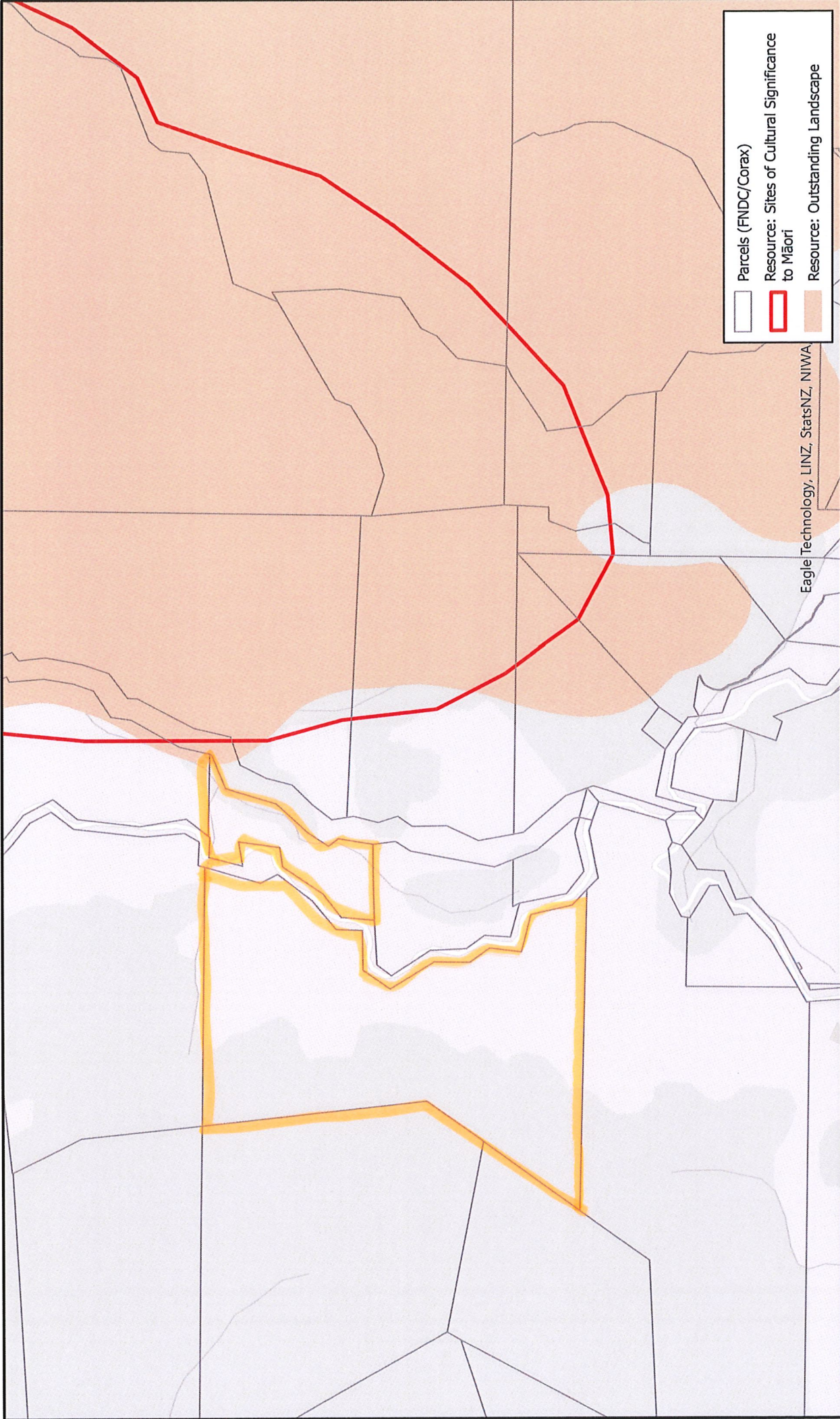
Registered Owners
Jason and Penelope Bill Family Trustees Limited




Interests

Subject to Section 8 Mining Act 1971
Subject to Section 5 Coal Mines Act 1979
12119664.5 Mortgage to ASB Bank Limited - 2.6.2021 at 2:09 pm
12472524.1 Lease Term From 27.5.2022 to 30.6.2039 Record of Title 1076634 issued - 15.6.2022 at 7:11 am

Appendix 4

Map Excerpts



-  Parcels (FNDC/Corax)
-  Resource: Sites of Cultural Significance to Māori
-  Resource: Outstanding Landscape

Eagle Technology, LINZ, StatsNZ, NIWA



Projection NZTM2000. Datum NZGD2000. Scale: 1:9,028

DISCLAIMER:
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Far North Maps



Far North Proposed District Plan

Search for an address...

Far North District Council Proposed District Plan

[View Proposed District Plan](#)

Clause 16 amendments to the Proposed District Plan
25 Jan 2024

[See more news and updates](#)

Map Tools

- High Natural Character
- Outstanding Natural Character
- Designations
- Natural Hazards and Risks Overlays
 - River Flood Hazard Zone (100 Year ARI Event)
 - River Flood Hazard Zone (10 Year ARI Event)
 - Coastal Flood (Zone 3: 100 Year + Rapid Sea Level Rise Scenario)
 - Coastal Flood (Zone 2: 100 Year Scenario)
 - Coastal Flood (Zone 1: 50 Year Scenario)
 - Coastal Erosion (Zone 3: 100 Year + Rapid Sea Level Rise Scenario)
 - Coastal Erosion (Zone 2: 100 Year Scenario)
 - Coastal Erosion (Zone 1: 50 Year Scenario)

Transparency

Basemaps

- Aerial
- Light Canvas

Measure

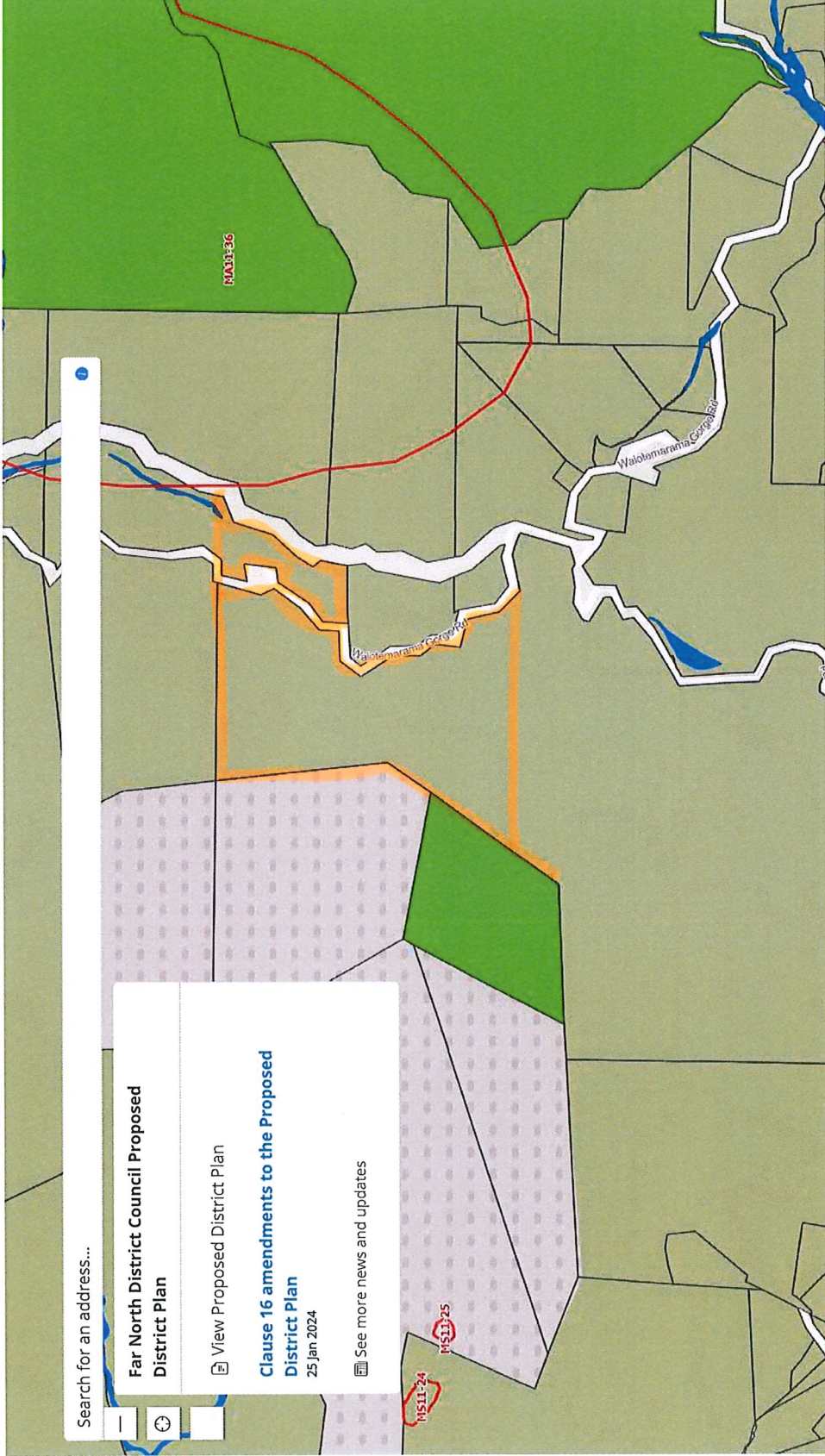
- Draw
- Text
- Print

Legend

Help

0.3 km

Far North Proposed District Plan



0.3 km

Far North Proposed District Plan

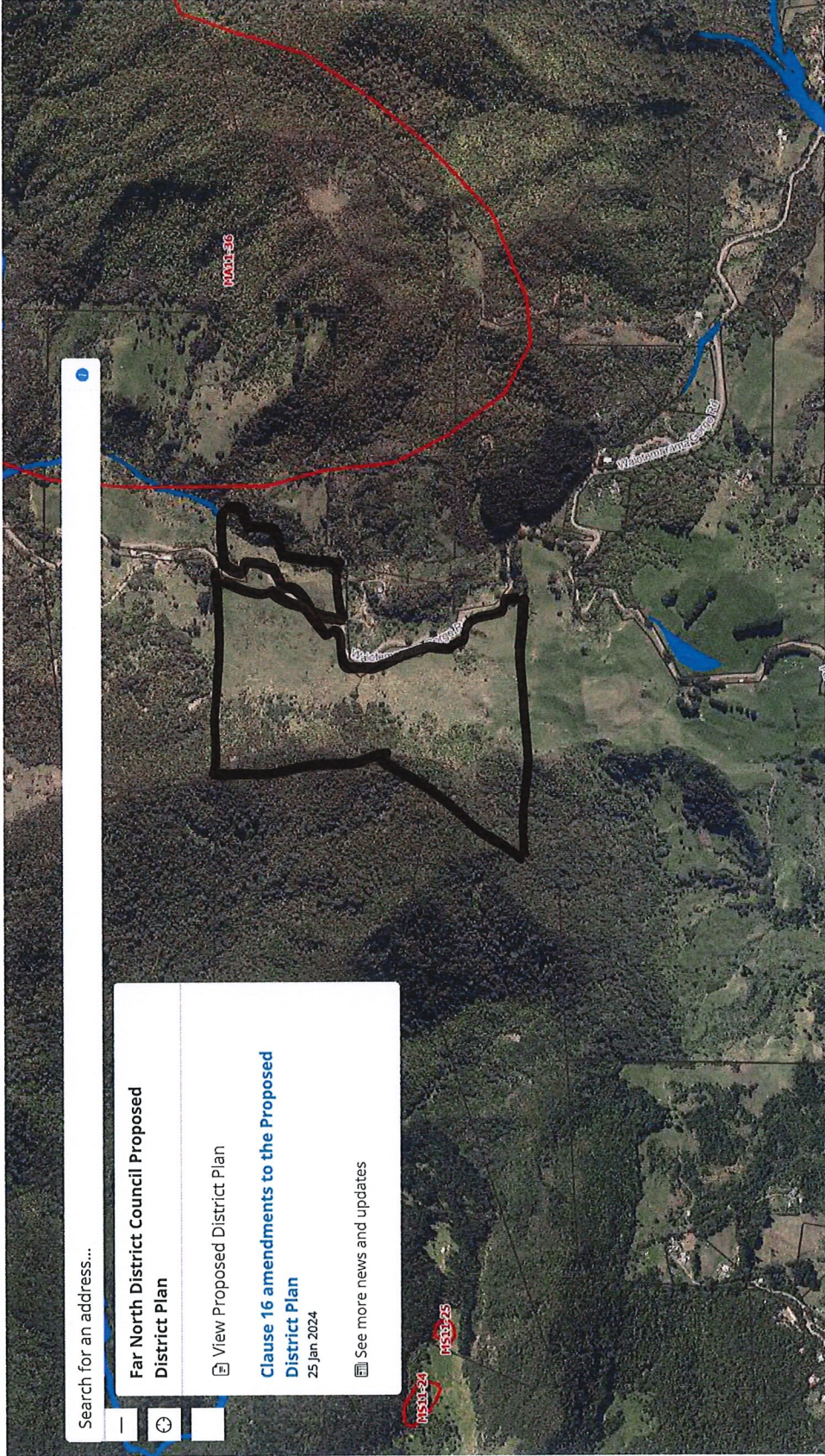
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25 Jan 2024

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Map Tools

- Precincts
- Natural Environments
- Overlays
- Designations
- Natural Hazards and Risks
 - River Flood Hazard Zone (100 Year ARI Event)
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 - Coastal Erosion (Zone 2: 100 Year Scenario)
 - Coastal Erosion (Zone 1: 50 Year Scenario)

Transparency

Basemaps

- Aerial
- Light
- Canvas

Measure

Draw

Text

Print

Legend

Help

0.3 km



Lot 1

Lot 2

Lot 3
Lot 4

Legend

-  Vehicles on Beaches
-  Erosion Prone Land

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Appendix 5
Site Suitability Engineering
Report



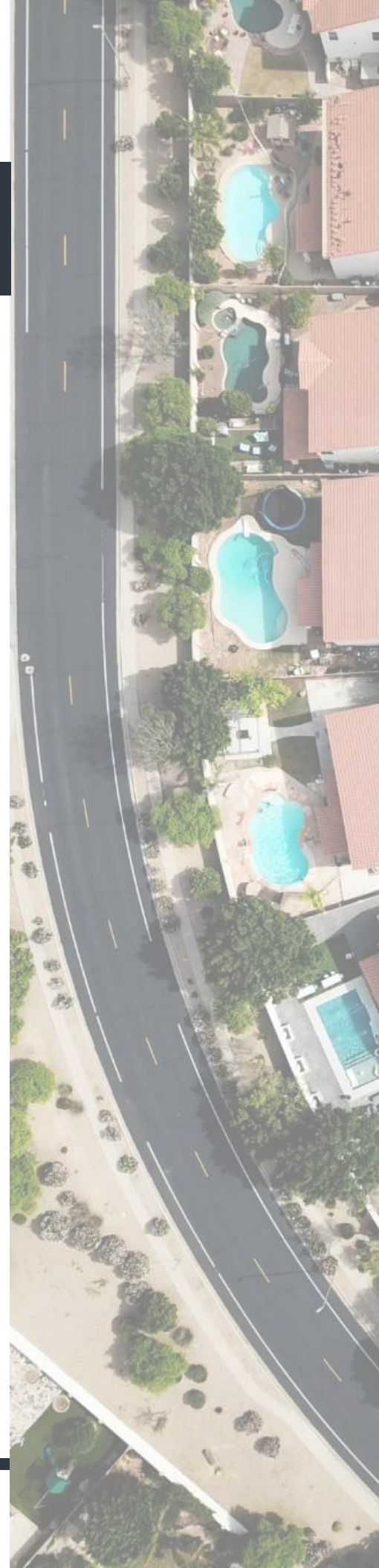
geologix
consulting engineers

SITE SUITABILITY ENGINEERING REPORT

LAND OFF WAIOTEMARAMA GORGE
ROAD, OMAPERE
(SECTION 54 BLK VII HOKIANGA SD &
SECTION 55 BLK VII HOKIANGA SD)

J & P BILL FAMILY TRUST

**C0021-S-03
MARCH 2024
REVISION 1**





DOCUMENT MANAGEMENT

Document Title Site Suitability Engineering Report

Site Reference Land off Waiotemarama Gorge Road, Omapere

Client J & P Bill Family Trust

Geologix Reference C0021-S-03

Issue Date March 2024

Revision 01

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Managing Director, CPEng, CMEngNZ, CEnvP, MPhys (Hons)

File Reference

Signer ID: BVJRNOBNO9...

logix Files\SynologyDrive\Projects\C0000-C0099\Waiotemarama
Suitability Report for Thomson Survey\C0021-S-03-R02.docx

REVISION HISTORY

Date	Issue	Prepared	Approved
January 2024	First Issue	GC, RL	EC
March 2024	Second Issue – Following comments	EC	EC

C0021-S-02

Land off Waiotemarama Gorge Road,
Omapere (Section 54 BLK VII Hokianga SD
& Section 55 BLK VII Hokianga SD)

1



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1 INTRODUCTION

This Site Suitability Engineering Report has been prepared by Geologix Consulting Engineers Ltd (Geologix) for J & P Bill Family Trust as our Client in accordance with our standard short form agreement and general terms and conditions of engagement.

Our scope of works has been undertaken to assist with Resource Consent application in relation to the proposed subdivision and amalgamation of rural properties off Waitotemarama Gorge Road, Omapere, legally described as Section 54 Blk VII Hokianga SD & Section 55 Blk VII Hokianga SD, the 'site'. Specifically, this assessment addresses engineering elements of natural hazards, geotechnical, wastewater and stormwater requirements to provide safe and stable building platforms with less than minor effects on the environment as a result of the proposed activities outlined below.

We have previously provided the following reports for the other proposed lots from the initial proposed subdivision:

- Site Suitability Engineering Report, Land Off Waitotemarama Gorge Road, Omapere (SECTION 20 BLK VII HOKIANGA SD), dated October 2023, Rev 1, Ref No. C0021-S-02.
- Wastewater Site Suitability Engineering Report, Six Sites Along Waitotemarama Gorge Road, Omapere, dated October 2021, Rev 1, Ref No. C0021-S-01-R01.

1.1 Proposal

A proposed scheme plan was presented to Geologix at the time of writing, prepared by Thomson Survey Ltd¹ and reproduced as Drawing No. 100 within Appendix A. It is understood the Client proposes to subdivide the site to create two new rural residential lots and amalgamate the existing lot and the balance lot into one certificate of title as outlined in Table 1. Amendments to the referenced scheme plan may require an update to the recommendations of this report which are based on conservative, typical rural residential development concepts.

Table 1: Summary of Proposed Scheme

Proposed Lots	Size Range	Purpose
1 & 2	1.52 – 2.72 ha	New residential
3 & 4	3.2550 ha - 20.57 ha	Amalgamation of balance lot and existing lot

Sites can be accessed from Waitotemarama Gorge Road. A specific traffic engineering assessment is outside the scope of this report.

¹ Thomson Survey Ltd, Scheme Plan, Ref. 10085, dated 17.05.23.



2 DESKTOP APPRAISAL

The sites are located to the east of Omapere Township, formed over two different parent titles legally described as Section 54 Block VII Hokianga SD, covering 24.81 ha and Section 55 Block VII Hokianga SD, covering 3.255 ha. The sites are mostly utilised as rural pasture and dense bush with no existing structures.

The proposed residential Lot 1 and Lot 2 subject to this assessment, which eastern boundaries roughly follow Waiotemarama Gorge Road. The western boundary of proposed Lot 1 and Lot 2, adjoins the proposed balance lot, Lot 3, which raises steeply over a 100 to 200m high hill slope, between approximately to 18° to 45°. The ground at the proposed Lot 1 and Lot 2 building platforms slopes gently to moderately up to the west between approximately 10° to 15°.

In the surrounding local area, similar large rural residential and farming properties occupy the landscape with occasional single dwelling developments.

2.1 Existing Reticulated Networks

Far North District Council (FNDC) GIS mapping² indicates that no existing 3 water infrastructure or reticulated networks are present within Waiotemarama Gorge Road at this location or the site boundaries. This report has been prepared with the goal of the subdivision being self-sufficient for the purpose of wastewater, stormwater, and potable water management.

2.2 Geological Setting

Available geological mapping³ undifferentiated Tangihua Complex geology of the Northland Allochthon Formation parent rock. The Northland Allochthon parent rock is described as mainly basalt pillow lava, with subvolcanic intrusives of basalt, dolerite, and gabbro. Greenschist metamorphism close to intrusives and with extensive zeolitisation. The strata is typical of the steep and hilly land terrain and is delineated on all sides by the Maungataniwha Thrust fault which has lifted the local hilly terrain through seismic activity.

Proposed building envelopes are expected to generally include northland allochthon residual soils which commonly include a relatively thin clayey soil mantle overlying mostly impermeable weathered parent rock resulting in the wetter surface horizon. Typically, these soils are known for poor drainage performance for wastewater disposal evident across the majority of proposed residential sites during our fieldworks.

² Source: FNDC Water Services GIS,

<https://fndc.maps.arcgis.com/apps/webappviewer/index.html?id=9b351ce681e34ec29443ae1a6468cc2c>

³ Geological & Nuclear Science, 1:250,000 scale Geological Map, Sheet 2, Whangarei, 2009.



2.3 Existing Geotechnical Information

Existing subdivision and/ or Building Consent ground investigations were not made available to Geologix at the time of writing. Additionally, a review of available GIS databases, including the New Zealand Geotechnical Database⁴ (NZGD) did not indicate borehole records within 500 m of the site.

3 SURFACE WATER FEATURES AND OVERLAND FLOWPATHS

During our site walkover and desktop appraisal of the supplied topographic data, Geologix have developed an understanding of the surface water features and overland flow paths influencing the site. The developed understanding summarised in the following sections is shown schematically on Drawing No. 100 with associated off-set requirements.

3.1 Surface Water Features

Surface water features are detailed below. The CMA is not identified within 500 m of the property.

3.2 Springs

The local geology to the site is a complex metamorphosed unit and it is generally expected that most of the steep erosion gullies and overland flow paths source from springs within or close to the site boundaries.

3.3 Ponds

The walkover survey confirmed that there is a small farm pond within the boundary of proposed lot 2.

3.4 Rivers and Streams

In general, Waiotemarama Gorge Road follows a small valley containing the Pakanae Stream. Adjacent to the site the stream is contained within a steep sided erosion gully. The stream is attributed from the east and west by many small streams from the surrounding hills and flows to the north where it discharges to the Awapokanui Stream in the lower reaches of Waiotemarama Gorge Road.

3.5 Overland Flow Paths

From the available LiDAR survey, clearly defined overland flow paths are present within the site boundaries. Many overland flow paths are present across the sites with the proposed lots formed upon flatter areas, spur ridgelines and higher ground delineated by surrounding

⁴ <https://www.nzgd.org.nz/>

overland flow paths. Overland flow paths are indicated on drawings within Appendix A and mitigated against, where applicable in our concept designs.

3.6 Sensitive Receptors

No evidence of sensitive receptors such as wetlands were recorded during our site walkover survey. However, this may require confirmation by a suitably qualified expert. The site is not located within 500 m of the CMA.

4 SITE WALKOVER SURVEY

Our visual walkover survey confirmed:

- Topography is in generally in accordance with that outlined in Section 2 and the available LiDAR dataset.
- Proposed Lots 1 and 2 are west of Waiotemarama Gorge Road and bound in all other directions by similar pasture and bush.
- Both lots were vegetated with short grass at the time of the investigation.
- Parts of Lot 1 and Lot 2 ground surfaces were sodden during our walkover survey undertaken in wintertime.
- No existing structures area present across the site, including retaining walls.

5 GROUND INVESTIGATION

A site-specific walkover survey and intrusive ground investigation was undertaken by Geologix on 26th and 27th September 2023. The ground investigation was scoped to confirm the findings of the above information and to provide parameters for wastewater and geotechnical assessment. The ground investigation comprised:

- Six hand augured boreholes designated HA07 and HA12 within the proposed preliminary building platforms of Lot 1 and Lot 2, to depths ranging from 1.4m (refusal depth) and 3.0m (targeted termination depth).
- Dynamic Cone Penetrometer (DCP) or Scala tests were carried out at bases of hand augers to determine soil strengths at depths down to 4.9m to 5.0m below existing ground level.
- On the day of our site investigation, groundwater was measured in our boreholes at the end of the day. Groundwater depths refer to investigation summary table below.

Arisings recovered from the exploratory boreholes were logged by a suitably qualified geotechnical engineering professional in general accordance with New Zealand Geotechnical



Society guidelines⁵. Engineering borehole logs are presented as Appendix B to this report and approximate borehole positions recorded on Drawing No. 101 within Appendix A.

Strata identified during the ground investigation can be summarised as follows:

- **Topsoil to depths of 0.3 - 0.5 m bgl.** The overlying topsoil was described as a grassed topsoil comprising organic silt, dark brownish black and moist with low plasticity, with some traces of rootlets.
- **Northland Allochthon Residual Soil to depths to >5.0 m bgl.** Under the topsoil layer, Northland Allochthon residual soils were present which comprised a mixed stratum of mostly clayey silt and silty clay, with minor mixtures of sand and occasional gravel. These residual soils are generally low plasticity. They are usually brown, brown mottled orange and dark brown in colour.

In-situ field vane tests suggest these residual soils are generally stiff to very stiff, with corrected vane shear strengths ranging from 65kPa to Unable to Penetrate (UTP). DCP tests were carried out after hand auger refusal depths and generally returned >4 blows per 100mm penetration between 1.8m to 3.7m bgl, which are inferred to be harder residual soils. DCP tests have not reached a dense layer with >20 blows per 100mm penetration before the 5m bgl termination depth, indicating a completely weathered rock layer has not reached in the upper 5m of the soil column.

A summary of ground investigation data is presented below as Table 2.

Table 2: Summary of Ground Investigation

Hole ID	Lot	Hole Depth	Topsoil Depth	Fill Depth	Ground water ⁶ Depth	Depth to Hard Residual Soil	Depth to CW Parent Rock ⁷	Wastewater Category
HA07	1	1.8 m	0.3 m	NE	1.5 m	1.8 m	NE	6 – slow draining
HA08	1	2.4 m	0.3 m	NE	1.6 m	2.4 m	NE	6 – slow draining
HA09	1	2.1 m	0.3 m	NE	0.2 m	2.1 m	NE	6 – slow draining
HA10	2	3.0 m	0.3 m	NE	NE	3.7 m	NE	6 – slow draining
HA11	2	1.7 m	0.3 m	NE	0.5 m	2.1 m	NE	6 – slow draining
HA12	2	2.1 m	0.5 m	NE	NE	2.1 m	NE	6 – slow draining

⁵ New Zealand Geotechnical Society, *Field Description of Soil and Rock*, 2005.

⁶ Groundwater measurements taken on day of drilling.

⁷ Taken as 20+ blows per 100mm DCP penetration



6 GEOTECHNICAL ASSESSMENT

Geotechnical design parameters are presented in Table 3 below. They have been developed based on our ground investigation, the results of in-situ testing and experience with similar materials.

Table 3: Geotechnical Effective Stress Parameters

Geological Unit	Unit Weight, kN/m ³	Effective Friction Angle, °	Effective Cohesion, kPa	Undrained Shear Strength, kPa
Northland Allochthon Residual Soil	18	28	5	60
Northland Allochthon Hard Residual Soil	18	34	5	80

6.1 Seismic Hazard

New Zealand Standard NZS1170.5:2004 Clause 2.1.4 specifies that to meet the requirements of the New Zealand Building Code, design of structures is to allow for two earthquake scenarios:

1. *Ultimate Limit State (ULS) shall provide for... “avoidance of collapse of the structural system...or loss of support to parts... damage to non-structural systems necessary for emergency building evacuation that renders them inoperable”.*
2. *Serviceability Limit State (SLS) are to avoid damage to... “the structure and non-structural components that would prevent the structure from being used as originally intended without repair after the SLS earthquake...”.*

The seismic hazard in terms of Peak Ground Acceleration (PGA) has been assessed based on the NZGS Module 1⁹.

Table 4 presents the return periods for earthquakes with ULS and SLS ‘unweighted’ PGAs and design earthquake loads for the corresponding magnitude. The PGAs were determined using building Importance Level (IL) 2, defined by NZS1170.5:2004. Reference should be made to the structural designer’s assessment for the final determination of building importance level.

Table 4: Summary of Seismic Hazard Parameters

Limit State	Effective Magnitude	Return Period (years)	Unweighted PGA	Horizontal Coefficient ¹ , K _h
-------------	---------------------	-----------------------	----------------	--

⁹ New Zealand Geotechnical Society, Earthquake Geotechnical Engineering Practice, Module 1, November 2021, Appendix A, Table A1.



ULS	6.5	500	0.19 g	0.1273 g
SLS	5.8	25	0.03 g	

$K_n = PGA \times 0.67$ for slope stability analysis to represent pseudo static conditions.

6.2 Site Stability

At the time of writing, no obvious indications of major deep-seated instability were identified over the proposed lots and the risk of such deep-seated instability developing as a result of the development proposal is low. We have carried out desktop study of historical aerial photos on Retrolens and have not found obvious signs of major landslides in the area. Additionally, no buried topsoil was encountered in any of our hand augered holes. No evident dislodged large rocks or boulders have been observed.

The steep hill is covered with moderate vegetation, with local minor exposed soil faces. These exposed soil faces along with terraced and hummocky grounds across the proposed building platforms and surrounding land, indicating evident shallow instability risks and long term soil creep.

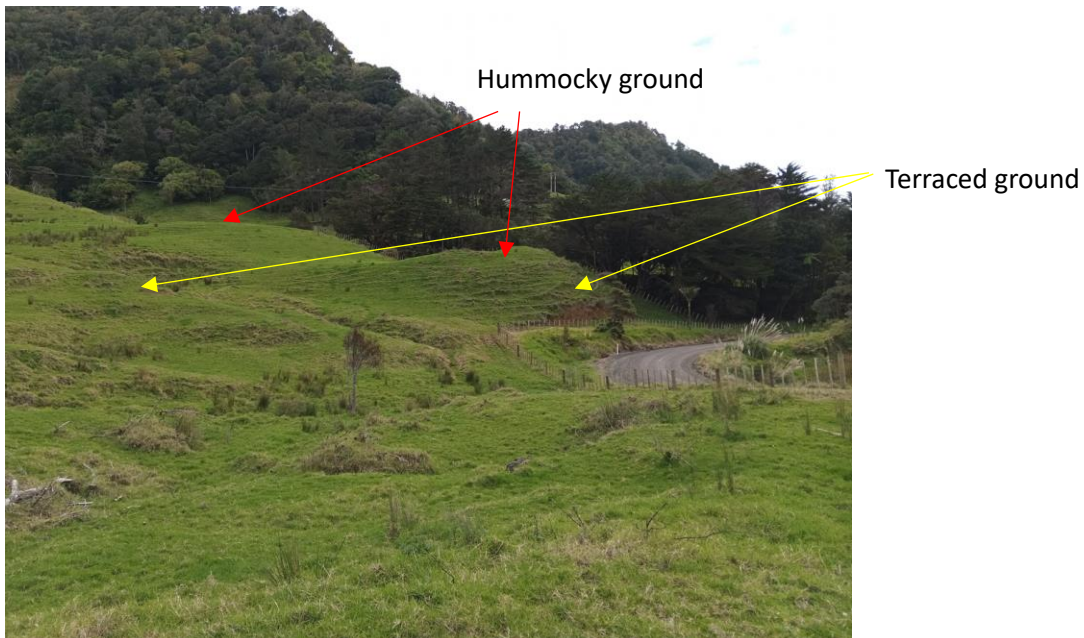


Figure 1 Lot 1 area in front of the bushline.

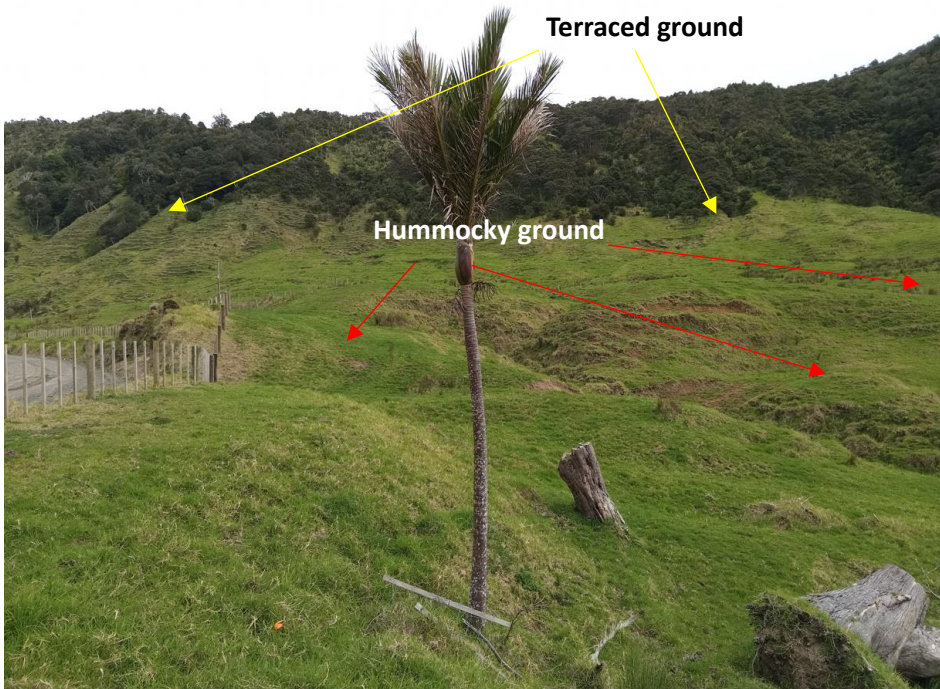


Figure 2 From Lot 2 proposed dwelling area looking uphill to the west.

Within the scope of this ground investigation Geologix have undertaken computer modelled slope stability analysis through two critical sections axis of the site topography through the proposed house locations listed below.

- **Section A** aligned through the proposed lot 1 house site and adjacent steep slope.
- **Section B** aligned through the proposed lot 2 house site and adjacent steep slope.

The slope was analysed within propriety software Slide 2 Version 9.02, developed by RocScience Inc. Fitting this scenario, non-circular surface option with GLE/Morgenstern-Price method was selected.

The purpose of the stability assessment was to:

- Ensure the proposed development concepts are feasible.
- Provide a working, accurate ground model in relation to site stability refined according to observed conditions and the results of this ground investigation.
- Develop a concept development engineering solution with any specific geotechnical stability requirements or building restriction lines.

The stability analysis process was undertaken by calibrating the model to observed conditions, refining the ground investigation data to develop the soil parameters presented in Table 3 and applying them to the proposed condition.

Limit equilibrium stability analysis was adopted in the analysis to express the results as a Factor of Safety (FS). When FS = 1.0, the represented mechanism is in equilibrium with the disturbing, active forces equal to the resisting, stabilising forces. A lower FS indicates that instability could occur under the modelled scenario whereas a higher FS demonstrates a margin of safety in respect of stability. Minimum FS criteria have been developed for use in residential development by Auckland Councils which are widely adopted in the Far North region. Modelling three separate event scenarios the accepted minimum FS are summarised as follows:

- Minimum FS = 1.5 for static, normal groundwater conditions.
- Minimum FS = 1.3 for elevated groundwater conditions (storm events).
- Minimum FS = 1.0 for dynamic, seismic events.

6.2.1 Stability Analysis Results

Slope stability analysis results are presented in the appendices and summarised below as .

Table 5: Summary of Stability Analysis Results

Profile	Scenario	Global Min FoS	Development Footprint (min FoS)	Result within Development Footprint
Existing	Static, normal groundwater ¹	1.91	>1.5	Pass
	Static, elevated groundwater ²	1.18	<1.3	Fail
	Seismic ULS ³	1.45	>1.0	Pass
Proposed	Static, normal groundwater	1.91	>1.5	Pass
	Static, elevated groundwater	1.19	>1.3	Pass with support
	Seismic ULS	1.53	>1.0	Pass
Existing	Static, normal groundwater	1.71	>1.5	Pass
	Static, elevated groundwater	1.55	>1.3	Pass
	Seismic ULS	1.37	>1.0	Pass
Proposed	Static, normal groundwater	1.71	>1.5	Pass
	Static, elevated groundwater	1.55	>1.3	Pass
	Seismic	1.37	>1.0	Pass

1. Static, normal groundwater minimum FS = 1.5

2. Static, elevated groundwater minimum FS = 1.3

3. Dynamic, seismic conditions minimum FS = 1.0

6.2.2 Stability Analysis Conclusions

The developed slope stability model is considered to be a reasonable representation of the observed conditions on site.



The expected effects of subdivision and future residential dwellings to the existing slope stability are minor, subject to review of earthworks during Building Consent stage.

No ground investigation data is available for the steep hill. We have assumed the strata profile based on our site observations of exposed soil faces in the local area with a potential thin veneer of shallow residual and/ or colluvial material. Thicker colluvial or residual soils, i.e. >0.5 to 1.0 m is unlikely to remain on such steep slope angles. However, it must be appreciated that ground conditions may differ from those assumed and further specific geotechnical investigation is required at the Building Consent stage.

From the above analysis, we consider deep seated instability risks within less weathered rock layers are less likely, whereas shallow slips through the upper residual soil layers are possible. Natural hazards of slippage and falling debris is defined by the Building Act 2004 and as such, protection of a future dwelling is required which may be analysed and designed at the Building Consent stage.

Proposed Lot 1

Slope stability modelling indicates that shallow residual soils are prone to instability as translational movement with a slip base occurring at the interface of soil and rock. Potential failure planes extend into the proposed platform under the elevated groundwater scenario. Suitable protection measures to mitigate the instability hazard are outlined in Section 6.2.3 below.

Proposed Lot 2

No failure planes under required Factors of Safety were observed through the proposed building platform under the analysed scenarios.

6.2.3 Stability Controls

The proposed Lot 1 and Lot 2 house sites are approximately 30m away from the foot of the steep hill. It is expected the majority of the kinetic energy of any smaller dislodged rock/boulders would be dissipated through bush vegetation over the flatter section at the base of hill before reaching the proposed house sites. Residential development is considered suitable provided the following recommendations and options are adopted to mitigate the above-mentioned land instability and debris inundation risks during detailed design at Building Consent stage:

- **No major excavations at toe of slopes.** Due to the proposed dwelling locations at the toe of steep slope, major excavations may reduce the stability of the existing slope. Excavations over 0.5m shall be subject to assessment by a professional geotechnical engineer familiar with the contents of this report and with further, site specific analysis.

- **Installation of debris fences.** Above the building location, it is recommended that a specifically engineered debris fence is installed to catch or slow down dislodged rock/boulders before reaching the proposed dwelling location.
- **Lot 1 Upslope soldier piles.** The slope stability analysis indicates that the proposed development within lot 1 will require protection to negate a Section 72 notice under the Building Act 2004 for potential natural hazards comprising slippage from above, entering the building site.

It is recommended that soldier piles subject to specific engineering design at the Building Consent stage are installed above the proposed dwelling. Soldier piles to resist slope instability should be designed according to the following minimum geotechnical design criteria within Table 6. However, these should be taken as absolute minimums and the elements may have an additional requirement based on the retaining wall models developed in specific engineering design. The location of proposed soldier pile walls are provided on drawings in Appendix A. It is also important to note the values below do not represent vertical member flexural strengths and provide the minimum stabilising shear force to mitigate the landslide hazard.

Amendments to the concept development plans may require an amendment to these parameters. It is recommended that these are reviewed once development concepts are finalised.

Table 6 Summary of Minimum Retaining Wall Design Parameters

Wall	Minimum Embedment	Minimum Stabilising Shear Force ¹
Soldier Pile Wall (Section AA', Lot 1)	8m	60

1. Stabilising shear forces, not structural section shear capacity

6.3 Soil Expansivity

Clay soil may undergo appreciable volume change in response to changes in moisture content and be classed as expansive. The reactivity and the typical range of movement that can be expected from potentially expansive soils underlying any given building site depends on the amount of clay present, the clay mineral type, and the proportion, depth, and distribution of clay throughout the soil profile. Clay soils typically have a high porosity and low permeability causing moisture changes to occur slowly and produce swelling upon wetting and shrinkage upon drying. Apart from seasonal moisture changes (wet winters and dry summers) other factors that can influence soil moisture content include:

- Influence of garden watering and site drainage.
- The presence of mature vegetation.
- Initial soil moisture conditions at the time of construction.

Based on our experience and lab results of similar soils, for design of residential dwelling foundation, site subsoil shall design for minimum Highly Expansive, or Expansive Soil Class H, as per New Zealand Building Code. In accordance with New Zealand Building Code¹¹, Class H or Highly Expansive soils typically have a soil stability index (I_{ss}) range of 3.8 to 6.5% and a 500-year design characteristic surface movement return (y_s) of 78 mm. A quantification of the expansive soil class assumptions can be made by geotechnical laboratory analysis.

6.4 Liquefaction Potential

Liquefaction occurs when excess pore pressures are generated within loose, saturated, and generally cohesionless soils (typically sands and silty sands with <30 % fines content) during earthquake shaking. The resulting high pore pressures can cause the soils to undergo a partial to complete loss of strength. This can result in settlement and/ or horizontal movement (lateral spread) of the soil mass.

The Geologix ground investigation indicates the site to be predominantly underlain by fine-grained and non-dilative Northland Allochthon residual soils. Based on the materials strength and consistency, and our experience with these materials, there is no liquefaction potential/ risk in a design level earthquake event.

6.5 Settlement Risk

The underlying stiff to hard natural residual soils and rocks are not overly sensitive to settlement from minor change of overburden pressure. Settlement risks are to be reassessed once detailed architectural or earthworks plans are available.

6.6 Conceptual Foundations

It is considered that a timber pole foundation is suitable for the proposed lots 1 and 2 for future dwellings adopting bored and cast-in-place piles provided the stability control measures are installed as recommended by this report. This recommendation is considered suitable provided the above geotechnical stability control measures are designed by a suitably qualified professional and monitored during construction.

All piles should be taken down to Northland Allochthon very stiff to hard residual soils to terminate a minimum of 3B (3x pile diameter into the strata) and designed for soil creep over the depth of residual soils. It is recommended that the foundation solution is subject to specific engineering design by a professional structural engineer, adopting the parameters outlined in Table 7 for deep end-bearing piles and ignoring skin friction within the residual Northland Allochthon soil strata.

¹¹ <https://www.building.govt.nz/assets/Uploads/building-code-compliance/b-stability/b1-structure/asvm/b1-structure-1st-edition-amendment-21.pdf>



Table 7 Deep Piled Foundation Geotechnical Parameters

Strata	Geotechnical Design Parameters	
Very stiff to hard	Ultimate end-bearing capacity ¹	540 kPa
Northland	ULS design end-bearing capacity ²	270 kPa
Allochthon Residual Soils	SLS design end-bearing capacity	180 kPa
	Ultimate skin friction ^{1,3}	36 kPa
	ULS design skin friction ²	18 kPa
	SLS design skin friction	12 kPa

1. Based conservatively on $S_u = 60$ kPa from available data.
2. Adopting a geotechnical strength reduction factor of 0.5.
3. Adopting $S_u * \alpha$. With α determined from Figure 5 of NZBC B1/VM4.

If groundwater is encountered within the pile holes, tremie concrete pour methodology will most likely be required to displace groundwater and an allowance should be made for this by the Contractor.

6.7 Conceptual Earthworks and Methodology

It is recommended that all proposed excavations and fills at the site are retained by specifically engineered retaining walls subject to design at the building consent stage. Any permanent earthworks and batter slopes shall be subject to specific engineering assessment at Building Consent stage.

6.7.1 Temporary Works

To reduce the risk of temporary excavation instability, it is recommended that unsupported excavations have a maximum vertical height of 1.0 m. Temporary unsupported excavations above this height shall be battered at 1V:1H or 45°. It is expected that the above temporary works can be undertaken within the property boundaries.

Temporary excavations should not be left unsupported for a long period of time. Poles must be installed and backfilled against the excavated face immediately to ensure the slopes are not left unsupported.

Any retaining walls which require toe cuts to the very steep slope shall be constructed with a top-down construction methodology subject to specific engineering assessment at the building consent stage.

Temporary batters should be covered with polythene sheets secured to the surface with pins or batons to prevent saturation. All works within proximity to excavations should be undertaken in accordance with Occupational Health and Safety regulations. In addition, it is recommended that all earthworks are conducted in periods of fine weather within the typical October to April earthwork season. Consent conditions commonly prescribe working restrictions.



6.7.2 Fills

Due to the steep slope and the instability risks analysed, fill should be kept to a minimum. It is recommended that suitable selected GAP hard fill or certified earth filling is adopted at the site with fill batter slopes not exceeding 1V:3H or 18 °.

It is recommended that proposed fills are subject to a specific engineering specification including compaction standards and construction monitoring at regular lift intervals (maximum 0.5 m).

In addition, any unsuitable and/ or deleterious materials such as organic pockets, nonengineered fill, relic foundations and/ or concrete hard standing and locally weaker spots ($S_u < 60$ kPa) shall be cut to waste and not adopted for filling.

7 WASTEWATER ASSESSMENT

The scope of this wastewater assessment comprises a ground investigation and concept design of a suitable system to cater for probable future rural residential development.

Relevant design guideline documents adopted include:

- Auckland Council, Technical Publication 58, On-site Wastewater Systems: Design and Management Manual, 2004.
- NZS1547:2012, On-site Domestic Wastewater Management.

7.1 Existing Wastewater Systems

No existing on-site wastewater systems were observed during our walkover survey and are not expected within the proposed lot boundaries.

7.2 Concept Future Development and Wastewater Generation Volume

The concept rural residential developments within this report assume that the proposed new lot may comprise up to a five-bedroom dwelling with a peak occupancy of eight people¹⁴. This considers the uncertainty of potential future Building Consent design. The number of usable bedrooms within a residential dwelling must consider that proposed offices, studies, gyms, or other similar spaces may be considered a potential bedroom by the Consent Authority.

In lieu of potable water infrastructure servicing the site, roof rainwater collection within on-lot tanks has been assumed for this assessment. The design water volume for roof water tank

¹⁴ TP58 Table 6.1.



supply is estimated at 160 litres/ person/ day¹⁵. This assumes standard water saving fixtures¹⁶ being installed within the proposed future developments. This should be reviewed for each proposed lot at the Building Consent stage within a development specific wastewater design by a suitably qualified professional.

For the concept wastewater design a total daily wastewater generation of 1,280 litres/ day is anticipated per proposed lot.

7.3 Treatment Standard and System

Selection of a wastewater treatment system will be provided by future developers at Building Consent stage. This will be a function of a refined design peak occupancy according to final development plans. No specific treatment system design restrictions and manufacturers are currently in place. Future developers will be required to elect a treatment system and provide system specifications at Building Consent.

It is recommended that to meet suitable minimum treated effluent output quality, secondary treatment systems are accounted for within future developments. Secondary treatment has been elected to provide compliance as a permitted activity of the proposed Northland Regional Plan considering the site topography.

In Building Consent design, considering final disposal field topography and proximity to controlling site features, a higher treated effluent output standard such as UV disinfection to tertiary quality may be required.

7.4 Soil Loading Rate

Based on the results of the ground investigation, conservatively the shallow soils are inferred to meet the drainage characteristics of TP58 Category 6, sandy clay, non-swelling clay and silty clay – slowly draining. This correlates to NZS1547 Category 5, poorly drained described as light clays. For a typical PCDI system, a Soil Loading Rate (SLR) of 3 mm/ day is recommended within NZS1547 Table 5.2 and TP58 Table 9.2.

To achieve the above SLR, technical guidance documents require the following compliance within the final design.

- 100 to 150 mm minimum depth of good quality topsoil (NZS1547 Table M1, note 1) to slow the soakage and assist with nutrient reduction.
- Minimum 50 % reserve disposal field area (TP58 Table 9.2, note 3) to enact 3 mm/ day over 2 mm/ day SLR.

¹⁵ TP58 Table 6.2, AS/ NZS 1547:2012 Table H3.

¹⁶ Low water consumption dishwashers and no garbage grinders.

7.5 Concept Land Disposal System

To provide even distribution, evapotranspiration assistance and to minimise effluent runoff it is recommended that suitably treated effluent is conveyed to land disposal via Pressure Compensating Dripper Irrigation (PCDI) systems, a commonplace method of wastewater disposal.

The proposed PCDI systems may be surface laid, covered with minimum 150 mm mulch and planted with specific evapotranspiration species to provide a minimum of 80 % species canopy cover. Alternatively, lines could be subsurface laid to topsoil with minimum 200 mm thickness and planted with lawn grass. Clean, inert site-won topsoil sourced during development from building and/ or driveways footprints may be used in the land disposal system to increase minimum thicknesses.

Specific requirements of a concept land disposal system to be confirmed during Building Consent include the following.

Table 8: Disposal Field Design Criteria

Design Criteria	Site Conditions and Compliance
Topography at the disposal areas shall not exceed 25 °. Exceedances will require a Discharge Consent.	Concept design complies, refer Drawing No 400.
On shallower slopes >10 ° compliance with Northland Regional Plan (NRP) rule C.6.1.3(6) is required.	Concept design complies, proposed wastewater disposal fields are proposed on land > 10 ° and include cut-off drains.
On all terrain irrigation lines should be laid along contours.	Concept design complies, refer Drawing No 400.
Disposal system situated no closer than 600 mm (vertically) from the winter groundwater table for secondary treated effluent.	Concept design complies, final design may require a slight raising of the disposal fields to achieve offset.
Separation from surface water features such as stormwater flow paths (including road and kerb channels), rivers, lakes, ponds, dams, and natural wetlands according to Table 9, Appendix B of the NRP.	Concept design complies. Wastewater disposal fields can be designed to accommodate setbacks from on-site and adjacent surface water features.

7.5.1 Concept Disposal Field Sizing

The sizing of wastewater system disposal areas is a function of the design peak flow volumes, the SLR and topographic relief. For each proposed lot a concept primary and reserve disposal field is required as follows, to be refined at the Building Consent stage. The recommendations below are presented on Drawing No. 400.

- **Concept Primary Disposal Field.** A minimum PCDI primary disposal field of 427 m² laid parallel to the natural contours.
- **Concept Reserve Disposal Field.** A minimum reserve disposal field equivalent to 30 % of the primary disposal field is required under NRP rule C.6.1.3(9)(b) for secondary or



tertiary treatment systems. The concept design has been increased to 50 % to accommodate note 3 of TP58 Table 9.2. It is recommended each proposed lot provides a 214 m² reserve disposal area to be laid parallel to the natural contours.

Concept disposal field locations require the provision of surface water cut-off drains to meet the provisions of NRP rule C.6.1.3.

Disposal fields discharging secondary treated effluent are to be set at the 20-year ARI (5 % AEP) flood inundation height to comply with the above NRP rule. Flood hazard potential has not been identified within the site boundaries and as such the site can provide freeboard above the 1 % AEP flood height to comply with this rule.

7.6 Summary of Concept Wastewater Design

Based on the above concept design assumptions a summary of the concept wastewater design is presented as Table 9 and presented schematically upon Drawing No. 400 within Appendix A. It is recommended that each lot is subject to Building Consent specific review and design amendment according to final development plans by a suitably qualified professional.

The concept design has been prepared with no Discharge Consent requirement. These requirements should be reviewed at the Building Consent stage and may be subject to an alternative solution.

Table 9: Concept Wastewater Design Summary

Design Element	Specification
Concept development	Five-bedroom, peak occupancy of 8 (per lot)
Concept Design generation volume	160 litres/ person/ day – 1,280 litres/ day/ lot
Water saving measures	Standard. Combined use of 11 litre flush cisterns, automatic washing machine & dishwasher, no garbage grinder ¹
Water meter required?	No
Min. Treatment Quality	Secondary
Soil Drainage Category	TP58 Category 6, NZS1547 Category 5
Soil Loading Rate	3 mm/ day
Concept primary disposal field size	Surface/ subsurface laid PCDI, min. 427 m ²
Concept reserve disposal field size	Surface/ subsurface laid PCDI, min. 50 %, or 214 m ²
Concept Disposal Field Level	Sited above 5 % AEP event. Raising to achieve 600 mm offset to groundwater.
Dosing Method	Pump with high water level visual and audible alarm. Minimum 24-hour emergency storage volume.
Concept Stormwater Control	Divert surface/ stormwater drains away from disposal fields. Contour drains not required. Stormwater management discharges downslope of all disposal fields.

1. Unless further water saving measures are included.



7.7 Assessment of Environmental Effects

An Assessment of Environmental Effects (AEE) is required to address two aspects of wastewater disposal. These include the effect of treated wastewater disposal for an individual lot and the cumulative or combined effect of multiple lots discharging treated wastewater to land as a result of subdivision.

The scale of final development is unknown at the time of writing and building areas, impervious areas including driveways, ancillary buildings, landscaped gardens, and swimming pools may reduce the overall area for on-site wastewater disposal. For the purpose of this report the above features are likely to be included within a designated 30 x 30 m square building site area as required by FNDC District Plan Rule 13.7.2.2.

It is recommended that the AEE is reviewed at the time of Building Consent once specific development plans, final disposal field locations and treatment systems are established. The TP58 guideline document provides a detailed AEE for Building Consent application. Based on the proposed scheme plan, ground investigation, walkover inspection and Drawing No. 400, a site-specific AEE is presented as Appendix C to demonstrate the proposed wastewater disposal concept will have a less than minor effect on the environment.

8 STORMWATER ASSESSMENT

Increased storm water runoff occurs as pervious surfaces such as pasture are converted to impervious features such as future roof, driveway and/ or internal Right of Ways.

8.1 Regulatory Requirements

Stormwater management for the proposed activity is controlled by the FNDC Operative District Plan¹⁷ and NRC Proposed Regional Plan¹⁸. The requirement for subdivision and probable future development under these legislations is summarised below.

8.1.1 Regional Provisions

The Proposed Regional Plan states the diversion and discharge of stormwater into water or onto or into land where it may enter water from an impervious area or by way of a stormwater collection system, is a permitted activity, provided the criteria of Rule C.6.4.2(1) to (8) are met. The proposed activity is considered to meet the requirements of a Permitted Activity. Assessment of the consent status is summarised in Section 8.7.2 and in full within Appendix C.

¹⁷ <https://www.fndc.govt.nz/Your-Council/District-Plan/Operative-plan>

¹⁸ Proposed Regional Plan for Northland July 2021 – Appeals Version

8.1.2 District Wide Provisions

Subdivision activity and provisions for probable future development within both urban and rural environments is controlled by District Plan Rule 13.7.3.4.

8.1.3 Environmental Zone Provisions

Permitted activity status within the rural production zone is determined by Rule 8.6.5.1.3 which is presented below.

The maximum proportion of the gross site area covered by buildings and other impermeable surfaces shall be 15 %.

8.2 Impervious Surfaces and Activity Status

The proposed activity has been assessed as a Permitted Activity in accordance with rules outlined by Sections 8.1.1 to 8.1.3. A summary of this is provided as Table 10 below which have been developed from our observations and AutoCAD drawings in lieu of specific survey. For the proposed lot, this has been taken as conceptual, maximum probable development of typical rural residential scenarios. Refer Section 8.3.

Table 10: Summary of Impervious Surfaces

Surface	Proposed Lot 1		Proposed Lot 2		Proposed Lot 3 & 4	
Existing Condition	NA				(280,650 m²)	
Roof					0 m ²	0 %
Driveway					0 m ²	0 %
Right of Way					0 m ²	0 %
Total impervious					0 m ²	0 %
Proposed Condition	(27,200 m²)		(15,200 m²)		(238,250 m²)	
Roof (Concept)	300 m ²	1.10 %	300 m ²	1.97 %	0 m ²	0 %
Driveway (Concept)	200 m ²	0.74 %	200 m ²	1.32 %	0 m ²	0 %
Right of Way	0 m ²	0 %	0 m ²	0 %	0 m ²	0 %
Total	500 m ²	1.84 %	500 m ²	3.29 %	0 m ²	0 %
Activity Status	Permitted		Permitted		Permitted	

8.3 Stormwater Management Concept

Based on the assessment within Table 10, the proposed development meets the provisions of a Permitted Activity. The stormwater management concept considered in this report has been prepared to meet the requirements of the local and regional consent authorities considering the design storm event as follows:

- Probable Future Development (Lots 1 and 2).** The proposed application includes subdivision formation only and not lot specific residential development at this stage. As such a conservative model of probable future on-lot development has been developed for this assessment considering variation of scale in typical rural residential development. The probable future on-lot development concept includes up to 300 m² potential roof



area and up to 200 m² potential driveway or parking areas. No RoW areas are expected to be accounted for within the application.

To comply with the NRC Proposed Regional Plan Rule C6.4.2(2) and FNDC Engineering Standards Table 4-1 for a site with no immediate flood control, it is recommended future impermeable surfaces are attenuated to 80 % of the pre-development peak run-off condition for the design storm event which has been designated as the 50 and 20 % Annual Exceedance Probability (AEP) scenarios. Control to the 10 % AEP event is considered less conservative than the above.

- **Subdivision Development.** No additional impervious surfaces are expected to form the subdivision outside of new vehicle crossings. Increased runoff from subdivision development is not expected and additional attenuation is not proposed to avoid an adverse environmental effect.

8.4 Design Storm Event

This assessment has been modelled to provide stormwater attenuation up to and including 80 % of the pre-development condition for the 50 and 20 % AEP storm events which is recommended for the site including any future activities to comply with FNDC Engineering Standard Table 4-1. This provides additional conservatism over the 10% AEP predevelopment model to comply with NRP Rule C6.4.2(2). Attenuation modelling under this scenario avoids exacerbating downstream flooding.

Correctly sized discharge devices have adopted the 1 % AEP event to reduce scour and erosion at discharge locations which may otherwise result in concentrated discharge.

Relevant design rainfall intensity and depths have been ascertained for the site location from the NIWA HIRDS meteorological model¹⁹. NIWA provides guidelines for modelling the effects of potential climate change effects of rainfall intensity increase by applying a potential change factor to historical data. This report has adopted potential change factors to account for a 2.1°C climate change increase scenario. NIWA HIRDS and climate change factor data is presented in full within Appendix D.

8.5 Concept Attenuation Model

As detailed above, it is recommended that future residential developments provide on-lot stormwater attenuation for all impervious surface areas to the pre-development peak runoff condition. This is achievable by installing specifically sized low-flow orifices into the roof runoff attenuation tank. A typical schematic retention/ detention tank arrangement detail is presented as Drawing No. 410 within Appendix A.

¹⁹ NIWA High Intensity Rainfall Data System, <https://hirds.niwa.co.nz>.

The concept design presented in this report should be subject to verification and an updated design at Building Consent stage once final development plans are available. This is typically applied as a notice to the applicable titles.

The rational method has been adopted by Geologix with run-off coefficients as published by Auckland Council TP108²⁰ and FNDC Engineering Standards²¹ to provide a suitable attenuation design to limit post development peak flows to 80 % of pre-development conditions.

Calculations to support the concept design are presented as Appendix D to this report. A summary of the concept stormwater attenuation design is presented as Table 11.

Table 11: Probable Future Development Attenuation Concept

Design Parameter	50 % AEP	20 % AEP	10 % AEP	1 % AEP
Proposed Lots 1 & 2				
Regulatory Compliance	FNDC Engineering Standards		NRC Proposed Regional Plan	
Pre-development peak flow	6.56 l/s	8.57 l/s	10.05 l/s	
80 % pre-development peak flow	5.25 l/s	6.86 l/s	NA	
Post-development peak flow	8.89 l/s	11.62 l/s	13.62 l/s	
Total Storage Volume Required	5445 litres	7140 litres	5378 litres	
Concept	Adopt attenuation to 80 % of pre-development condition for 20 % AEP storm as critical condition. Assuming 1 x 25,000 litre tank, install 10 mm orifice 0.74 m below overflow.			

NA – Not considered for this application

8.5.1 On-Lot Discharge

The direct discharge of water tank overflow in a concentrated manner can cause scour and erosion in addition to excessive saturation of shallow soils. It is recommended that overflow from future rainwater detention tanks is conveyed in sealed pipes to a designated discharge point downslope of proposed building footprints and wastewater disposal fields. A concept design accommodating this is presented within Appendix A on Drawing No. 400.

It is recommended that conceptually sized dispersion devices are subject to specific assessment at the Building Consent stage once final development plans are available. Typical rural residential developments construct either above or below ground discharge dispersion pipes. Feeding pipes can be either buried or pinned to the surface as desired. It is recommended that all pipes are designed to accommodate the 1 % AEP storm event peak flows from the attenuation tank and including minimum 100 mm dia. PVC piping.

²⁰ Auckland Regional Council Technical Publication 108, Guidelines for stormwater runoff modelling in the Auckland Region, April 1999.

²¹ FNDC Engineering Standards 2021, Version 0.6, Issued May 2023.



Concept sizing of future dispersion pipe or trench is presented as Table 12. Calculations to derive this are presented within Appendix D, based on the NIWA HIRDS Depth-Duration data. Typical details of these options are presented within Appendix A as Drawing No. 411.

Table 12: Summary of Concept Dispersion Devices

Concept Impervious Area to Tank	Dispersion Pipe/ Trench Length	Concept
Proposed Lot 1 & 2		
500 m ²	8.4 m	Above ground dispersion device or in-ground dispersion trench.

8.6 Stormwater Quality

The proposed application is for a rural residential subdivision. The key contaminant risks in this setting include:

- Sediments and minor contaminants washed from impervious surfaces.
- Leaf matter, grass, and other organic debris.

Stormwater treatment requirements are minor to maintain good quality stormwater discharge. Stormwater quality will be provided by:

- Leaf guards on roof guttering/ first flush devices on roof guttering and downpipes.
- Rainwater tank for potable use onsite only to be filled by roof runoff.
- Room for sedimentation (minimum 150 mm according to Auckland Council GD01) within the base of the stormwater attenuation pond and roof runoff tanks as dead storage volume.
- Stormwater discharges directed towards roading swale drains where possible.
- Grassed swale drains from rainwater inception (road surfaces) to discharge point.

The risk of other contaminants being discharged out of the site boundaries (hydrocarbons, metals etc.) as a result of the proposed activities once stormwater has been processed through the above measures that will affect the downstream water quality is considered low.

8.7 Assessment Criteria and Consent Status

8.7.1 District Plan

The proposed activity has been assessed as a **Restricted Discretionary Activity** according to District Plan Chapter 13.7.2.

8.7.2 Regional Plan

The proposed activity is determined to meet the requirements of a **Permitted Activity** according to the provisions of Proposed Regional Plan Rule C.6.4.2. Assessment criteria are presented in full within Appendix C.

9 POTABLE WATER & FIRE FIGHTING

In the absence of reticulated potable water infrastructure it is recommended that roof runoff water tanks are adopted for potable water supply with appropriate filtration and UV disinfection at point of use. The volume of potable water supply on each lot should consider the required stormwater detention volume identified within the concept design and refined during Building Consent. A second tank may be required for sufficient potable water volumes and is commonly adopted in rural residential development.

The absence of potable water infrastructure and fire hydrants requires provision of the on-lot roof water supply tanks to be used for firefighting purposes. Specific analysis and calculation for firefighting is outside the scope of this report and may require specialist input. Supply for firefighting should be made in accordance with SNZ PAS4509:2008 at the Building Consent stage.

10 NATURAL HAZARD ASSESSMENT

To satisfy the Resource Management Act, 1991 the proposed subdivision must plan for and manage the risk from natural hazards to reduce the potential adverse effects to less than minor. Regulatory assessment of natural hazards at the site location are managed under the jurisdiction of the FNDC District Plan²², Northland Regional Council (NRC) Proposed Regional Plan for Northland²³ and Regional Water and Soil Plan for Northland. Following our ground investigation, the Geologix GIR and considering the measures presented in this report, a summary of the proposed activities against defined natural hazards is presented as Table 13.

Table 13: Summary of Natural Hazards

Natural Hazard	Applicability	Mitigation & Effect on Environment
Erosion	NA	No mitigation required, less than minor.
Overland flow paths, flooding, inundation	NA	No mitigation required, less than minor, proposed building envelopes are well above the flood hazard potential.
Landslip	NA	Less than minor provided measures identified by this report are adopted and subject to Building Consent assessment.

²² Operative District Plan Rule 13.7.3.2.

²³ Proposed Regional Plan for Northland, Appeals Version, July 2021, Chapter D.6.



Rockfall	NA	Less than minor provided measures identified by this report are adopted and subject to Building Consent assessment.
Alluvion	NA	No mitigation required, less than minor.
Avulsion	NA	No mitigation required, less than minor.
Unconsolidated fill	NA	No mitigation required, less than minor.
Soil contamination	NA	No mitigation required, less than minor.
Subsidence	NA	No mitigation required, less than minor.
Fire hazard	NA	No mitigation required, less than minor.
Sea level rise	NA	No mitigation required, less than minor.

NA – Not Applicable.

11 LIMITATIONS

This report has been prepared for J & P Bill Family Trust as our Client. It may be relied upon by our Client and their appointed Consultants, Contractors and for the purpose of Consent as outlined by the specific objectives in this report. This report and associated recommendations, conclusions or intellectual property is not to be relied upon by any other party for any purpose unless agreed in writing by Geologix Consulting Engineers Ltd and our Client. In any case the reliance by any other party for any other purpose shall be at such parties' sole risk and no reliability is provided by Geologix Consulting Engineers Ltd.

The opinions and recommendations of this report are based on plans, specifications and reports provided to us at the time of writing, as referenced. Any changes, additions or amendments to the project scope and referenced documents may require an amendment to this report and Geologix Consulting Engineers should be consulted. Geologix Consulting Engineers Ltd reserve the right to review this report and accompanying plans.

The recommendations and opinions in this report are based on arisings extracted from exploratory boreholes at discrete locations and any available existing borehole records. The nature and continuity of subsurface conditions, interpretation of ground condition and models away from these specific ground investigation locations are inferred. It must be appreciated that the actual conditions may vary from the assumed ground model. Differences from the encountered ground conditions during subdivision construction may require an amendment to the recommendations of this report.



geologix
consulting engineers

APPENDIX A

Drawings

GENERAL NOTES

1. DRAWING REPRODUCED FROM THOMSON SURVEY LTD REF.10085, DATED 17.05.23.
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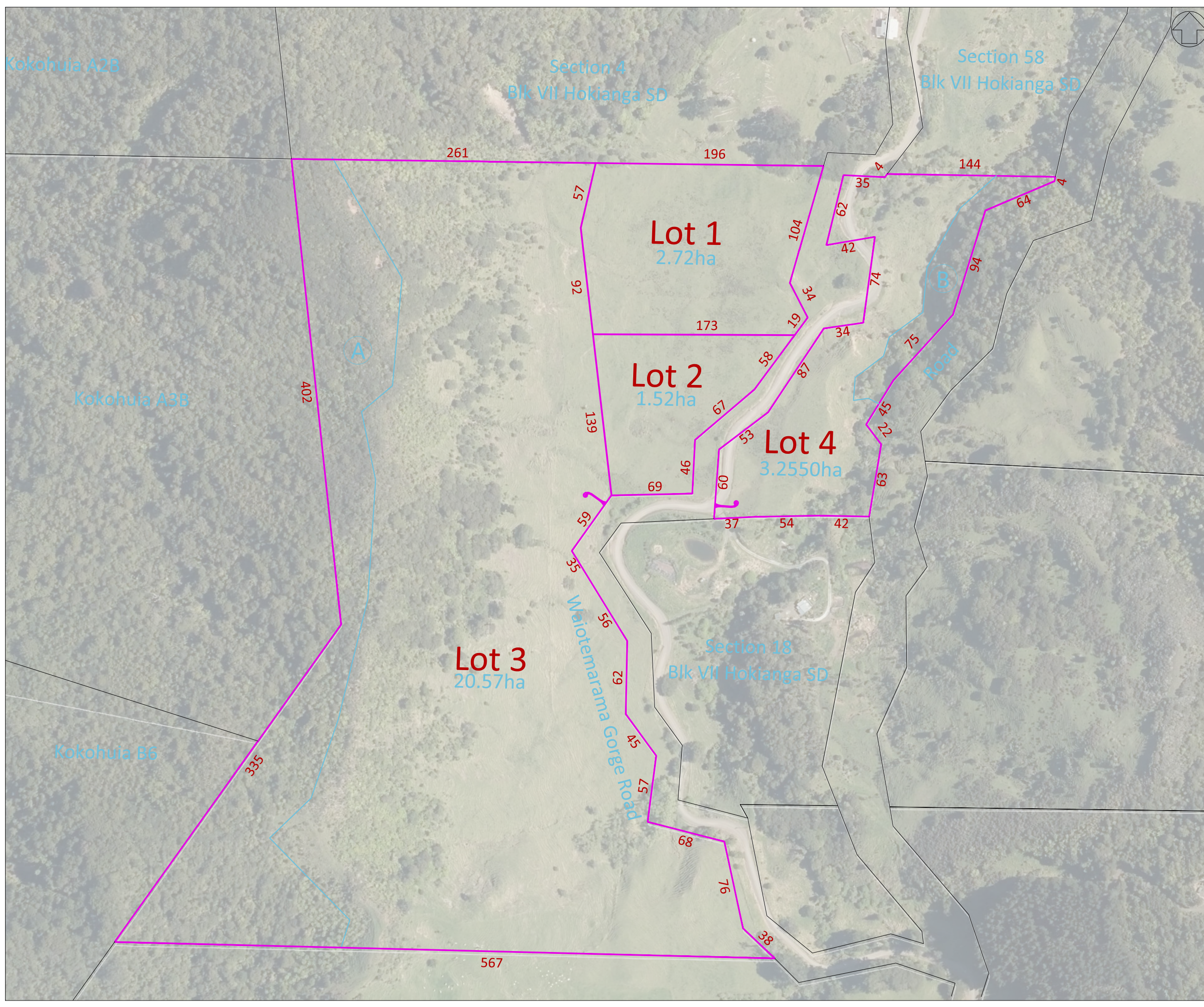
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 OMAPERE
 SECTION 54 BLOCK VII HOKIANGA SD**

Project C0021	Drawn By GC
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Client
JASON AND PENNY BILL

Sheet Title
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


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 PROPOSED BUILDING SHAPE FACTOR



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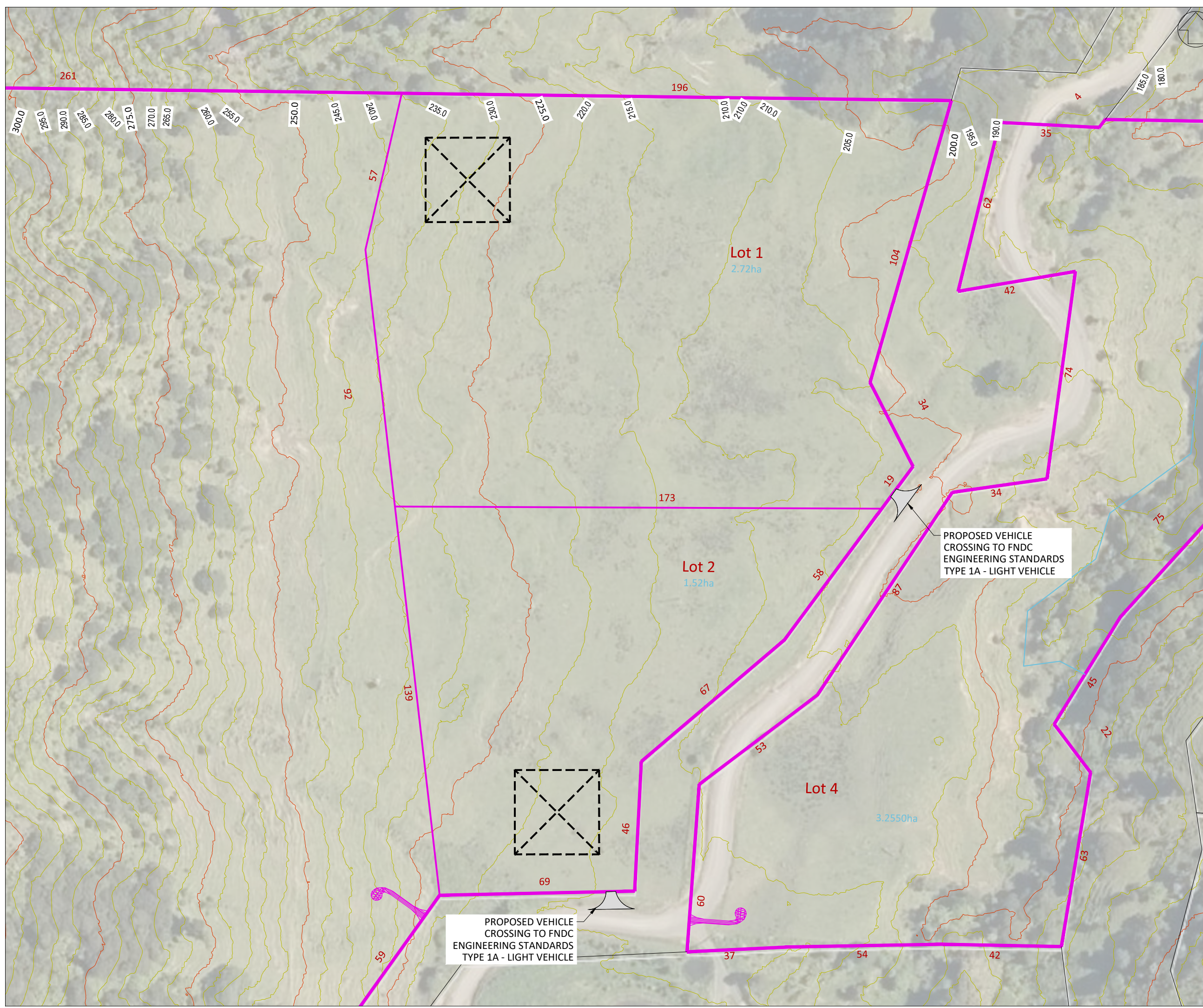
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PROPOSED ACCESSWAY PLAN

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PROPOSED VEHICLE CROSSING TO FNDC ENGINEERING STANDARDS TYPE 1A - LIGHT VEHICLE


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 GEOLOGIX HAND AUGER & DYNAMIC CONE PENETROMETER - JULY 2023

 GEOLOGIX HAND AUGER - SEPTEMBER 2021



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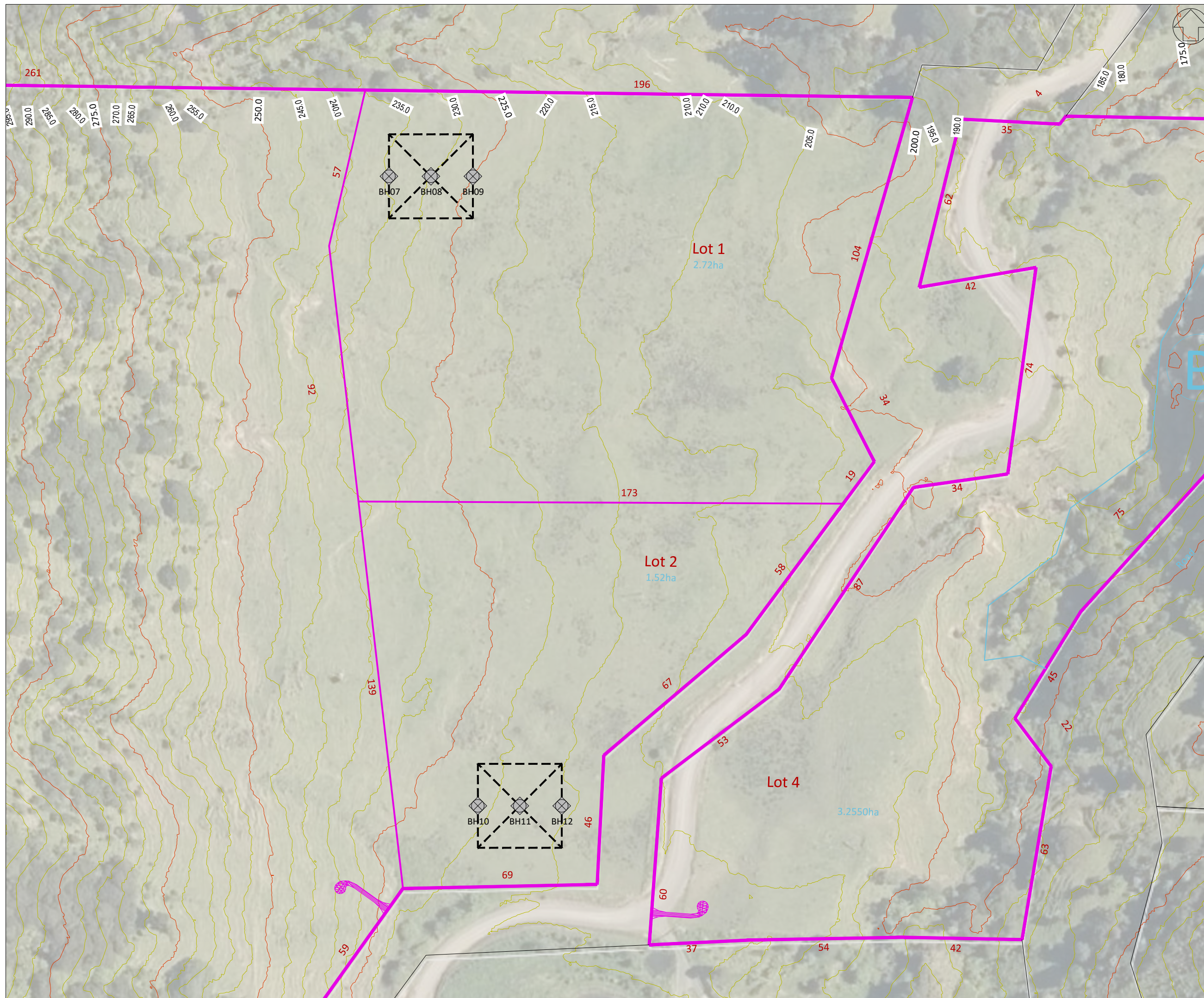
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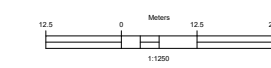
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- PROPOSED BUILDING SHAPE FACTOR
- GEOLOGIX HAND AUGER & DYNAMIC CONE PENETROMETER - JULY 2023
- GEOLOGIX HAND AUGER - SEPTEMBER 2021
- EXISTING OVERLAND FLOW PATH
- PROPOSED TANK WITH DISPERSION DEVICE
- CONCEPT WASTEWATER PRIMARY DISPOSAL FIELD 427m²
- CONCEPT WASTEWATER RESERVE DISPOSAL FIELD 214 m² (50%)
- WASTEWATER FIELD CUT OFF DRAIN



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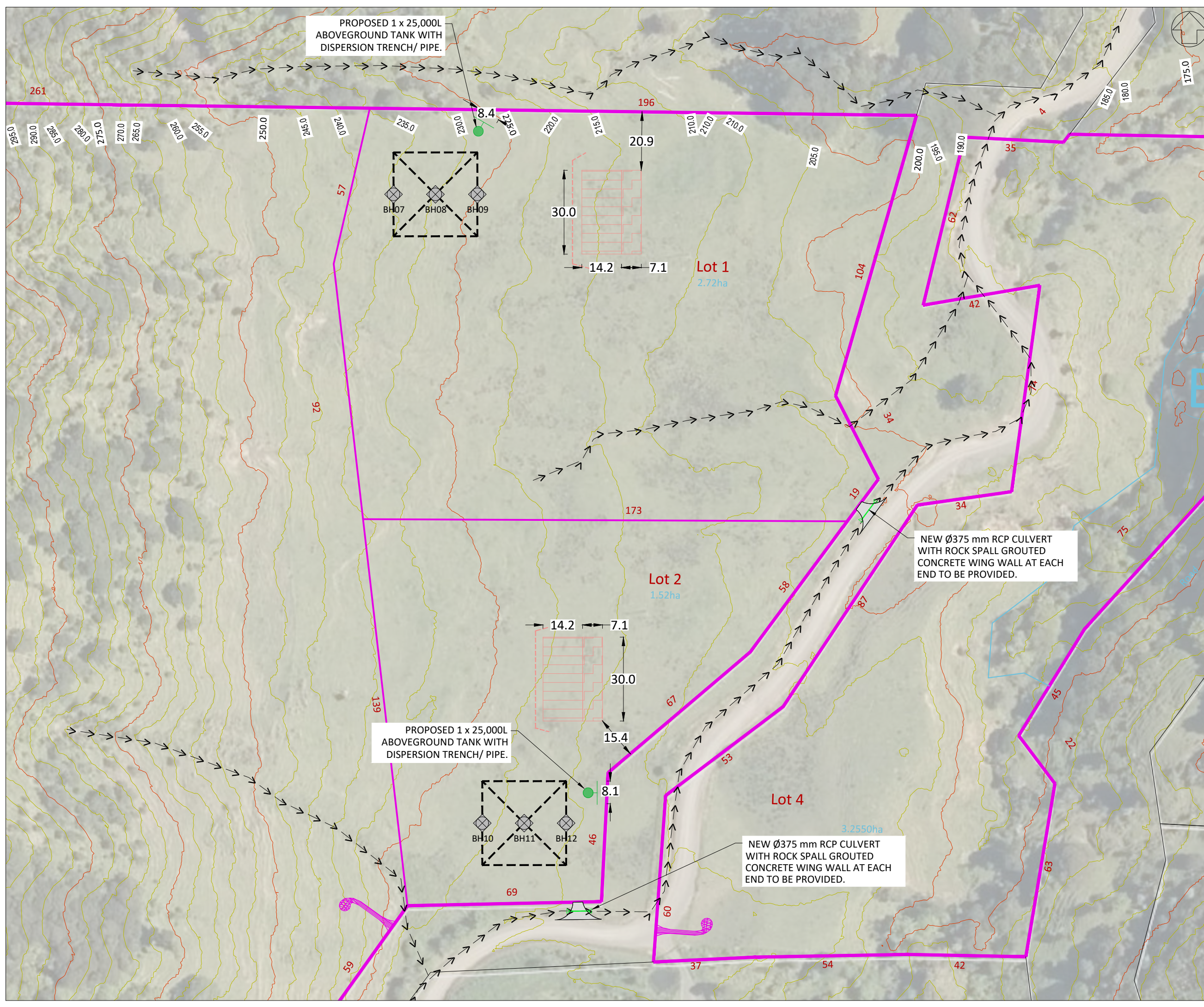
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3 WATERS PLAN

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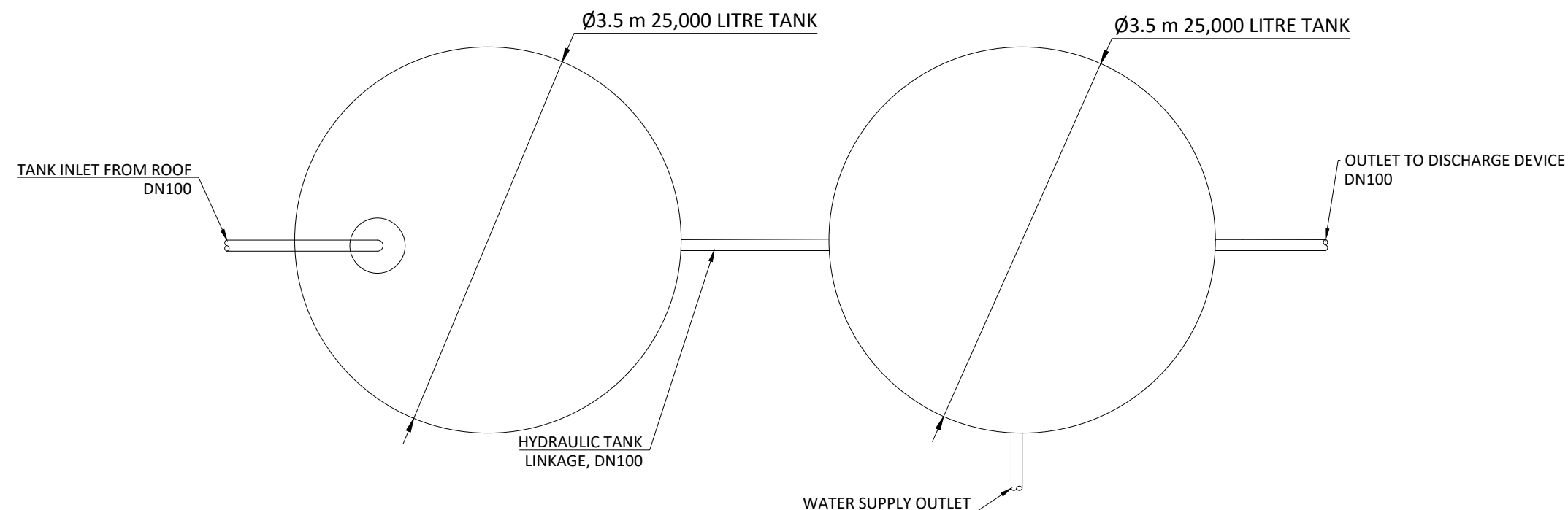
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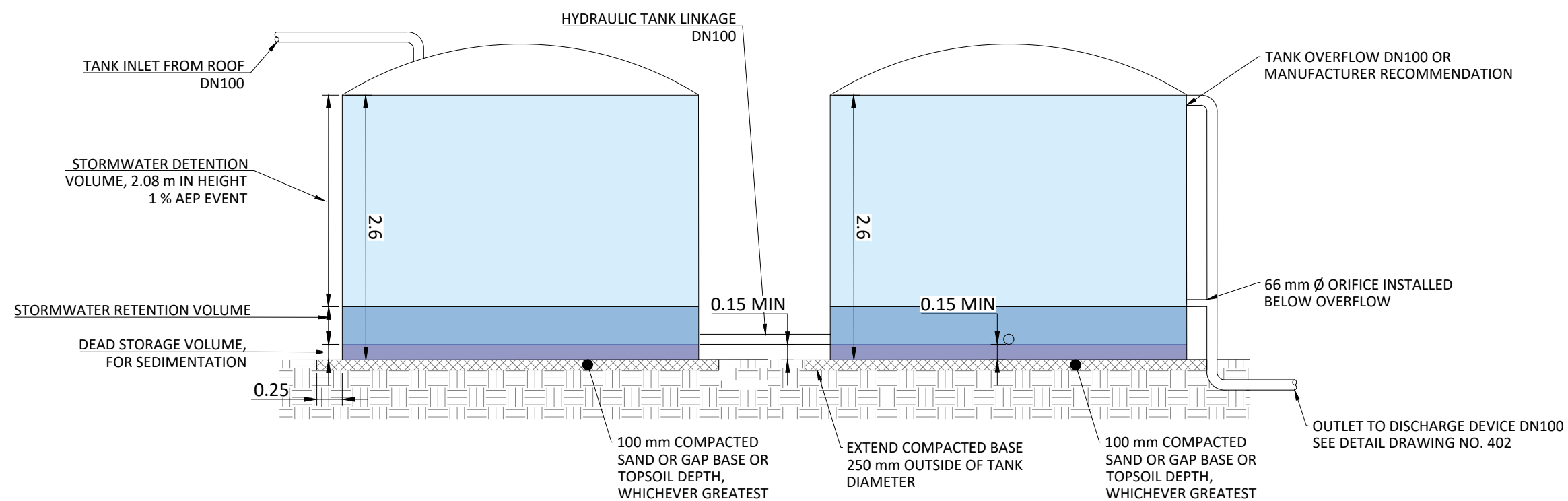
PROPOSED TANK PLAN VIEW

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PROPOSED TANK SIDE VIEW

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Sheet Title
TYPICAL WATER TANK DETIAL

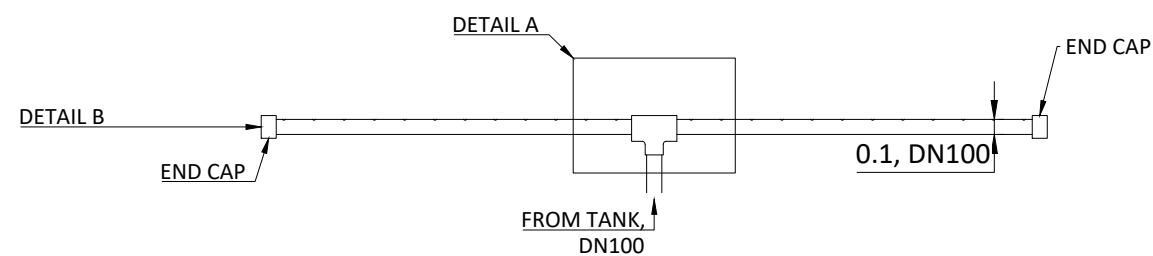
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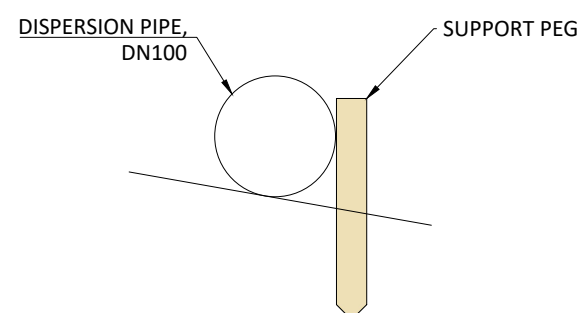
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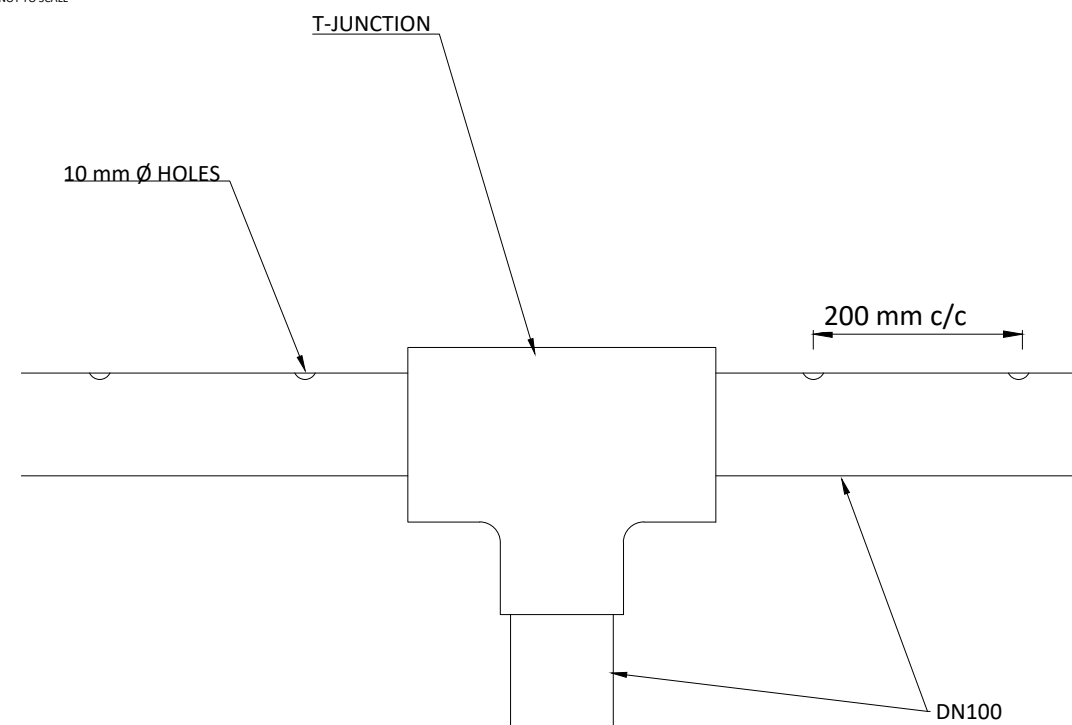
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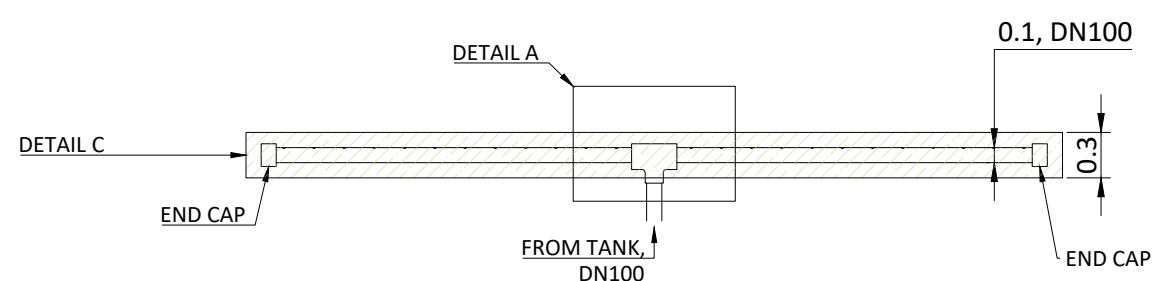
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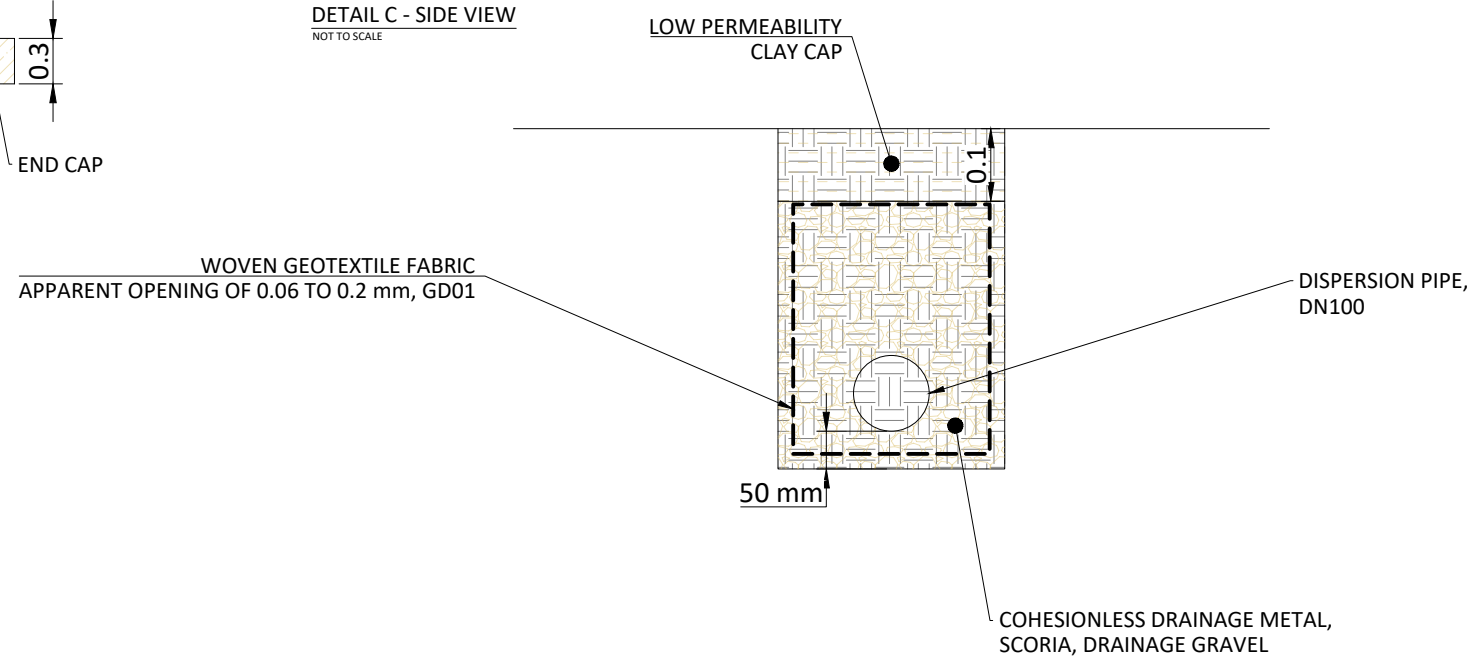
OPTION 2: DISPERSION VIA BELOW GROUND TRENCH

NOT TO SCALE



DETAIL C - SIDE VIEW

NOT TO SCALE



Revision	Issue	Date
A	CONSENT	13/10/2023



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TYPICAL DISPERSION TRENCH DETAIL

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411

GENERAL NOTES

1. DRAWING REPRODUCED FROM THOMSON SURVEY LTD REF.10085, DATED 17.05.23.
2. CONTOURS AT 5.0 m INTERVALS.
3. TOPOGRAPHIC SURVEY DATA IS CAPTURED FROM LINZ SERVICE DATABASE.
4. LEVELS ARE IN TERMS OF NZVD 2016.
5. FOR INDICATION ONLY, NOT FOR CONSTRUCTION.
6. FEATURES PRESENTED ARE INDICATIVE AND HAVE NOT BEEN VERIFIED.
7. DO NOT SCALE FROM THIS DRAWING.



A	CONSENT	13/10/2023
Revision	Issue	Date



AUCKLAND | NORTHLAND

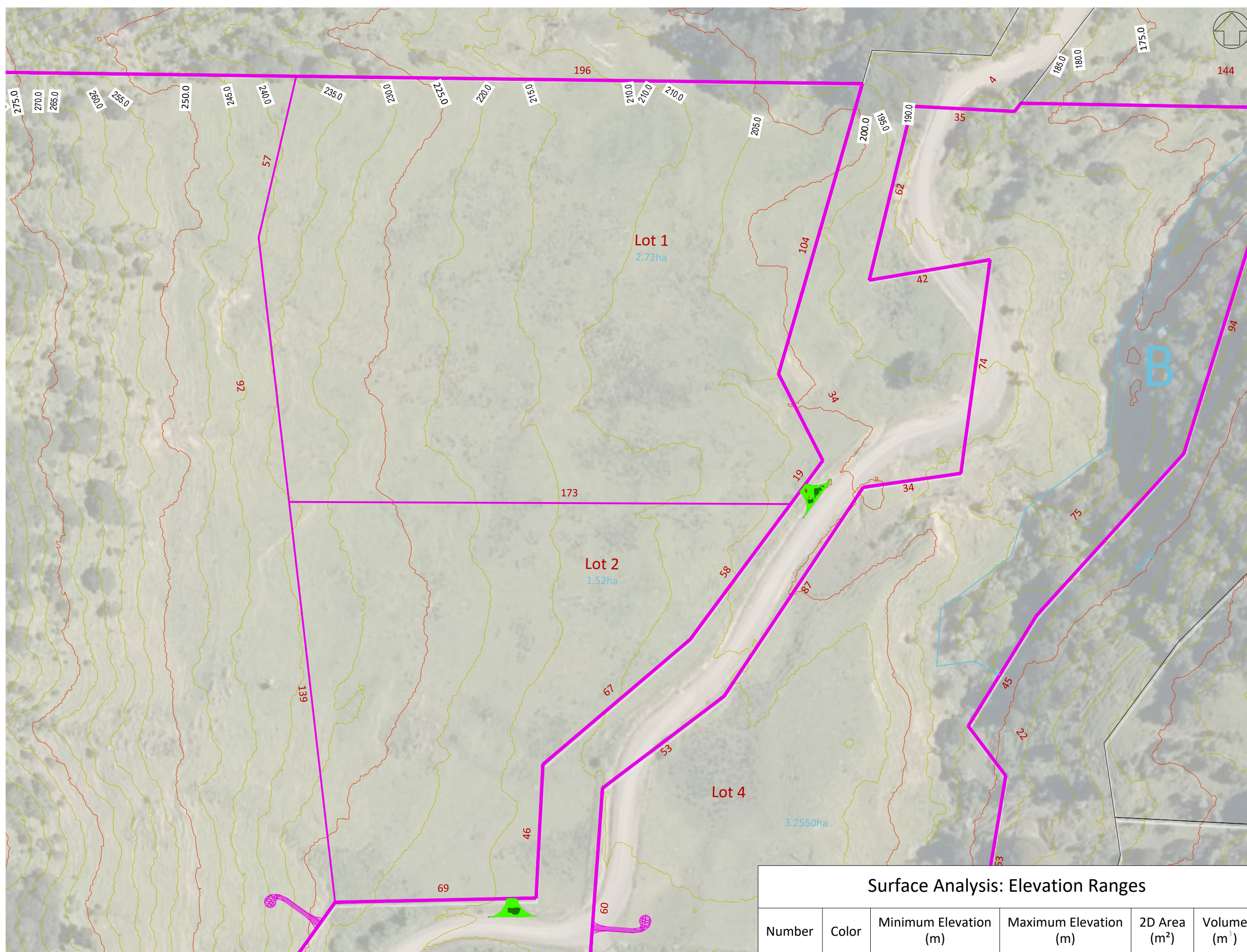
Project Name and Address
**WAIOTEMARAMA GORGE ROAD,
 OMAPERE
 SECTION 54 BLOCK VII HOKIANGA SD**

Project **C0021** Drawn By **GC**

Client
JASON AND PENNY BILL

Sheet Title
EARTHWORKS PLAN

Sheet
600



Number	Color	Minimum Elevation (m)	Maximum Elevation (m)	2D Area (m ²)	Volume (m ³)
1	Red	-1.000	-0.500	1.2	0.0
2	Light Green	-0.500	0.000	68.4	18.5
3	Dark Green	0.000	0.500	14.7	1.7

Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Earthwork Calcs	1.000	1.000	84.21sq.m	18.54 Cu. M.	1.75 Cu. M.	16.80 Cu. M.<Cut>
Totals			84.21sq.m	18.54 Cu. M.	1.75 Cu. M.	16.80 Cu. M.<Cut>

FILE PATH: Z:\Projects\C000-C009\Waiotemarama Gorge Road_Opnomi - C002107 - Technical & Drawings\For Thomson Survey\C0021-5-03.dwg; C0021-5-03.dwg

PLOTTED: 13/10/2023



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APPENDIX B

Engineering Borehole Records

INVESTIGATION LOG

HOLE NO.:
HA07

CLIENT: Jason and Penny Bill
PROJECT: Six sites along Waitemarama Gorge Road

JOB NO.:
C0021

SITE LOCATION: Adjacent to Waitemarama Gorge Road & Smoothy Road
CO-ORDINATES:

START DATE: 26/09/2023
END DATE: 26/09/2023

CONTRACTOR: Internal RIG: Hand tools

ELEVATION: Ground
DRILLER: TW LW

LOGGED BY: TW

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER (Blows / 100mm)		VANE SHEAR STRENGTH (kPa) Vane: 3467				WATER								
				2	4	6	8	10	12		14	16	18	50	100	150	200	Values
TOPSOIL comprising organic SILT; trace rootlets; dark brown; moist; low plasticity.		0.2	TS														99	
Silty CLAY; brown mottled orange and grey. Moist; low plasticity.		0.4	TS														45	
		0.6	TS														65	
		0.8	TS														45	
SILT, with trace sand; brown and grey. Moist; low plasticity.		1.0	TS														198+	
		1.2	TS														-	
1.3m: With minor silt, with trace gravel. Gravel, fine.		1.4	TS														198+	
1.5m: Minor gravels present.		1.6	TS														-	
End Of Hole: 1.75m		1.8	TS														198+	
		2.0	TS														-	
		2.2	TS														UTP	
		2.4	TS														-	
		2.6	TS														-	
		2.8	TS														-	
		3.0	TS														-	
		3.2	TS														-	
		3.4	TS														-	
		3.6	TS														-	
		3.8	TS														-	
		4.0	TS														-	
		4.2	TS														-	
		4.4	TS														-	
		4.6	TS														-	
		4.8	TS														-	
		5.0	TS														-	

27/09/2023

PHOTO(S)



REMARKS

- Hand auger terminated at 1.75m bgl due to dense strata.
- Continued with DCP to target depth of 5.0m bgl.
- Groundwater encountered at 1.48m bgl at the time of drilling.

WATER

- ▼ Standing Water Level
- ▽ Out flow
- ↖ In flow

INVESTIGATION TYPE

- Hand Auger
- Test Pit

INVESTIGATION LOG

HOLE NO.:
HA09

CLIENT: Jason and Penny Bill
PROJECT: Six sites along Waitotemarama Gorge Road

JOB NO.:
C0021

SITE LOCATION: Adjacent to Waitotemarama Gorge Road & Smoothy Road
CO-ORDINATES:

START DATE: 26/09/2023
END DATE: 26/09/2023

CONTRACTOR: Internal RIG: Hand tools

ELEVATION: Ground
DRILLER: TW LW

LOGGED BY: TW

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER (Blows / 100mm)										VANE SHEAR STRENGTH (kPa) Vane: 3467				WATER		
				2	4	6	8	10	12	14	16	18	50	100	150	200	Values			
TOPSOIL comprising organic SILT; dark brown; moist; low plasticity.		0.2	TS																	
Clayey SILT; brown and grey. Moist; low plasticity.		0.4	TS																	
SILT, with trace sand; brown. Moist to wet; low plasticity.		0.6	TS																	
1.1m: Wet.		0.8	TS																	
SILT, with trace clay and sand; brown. Wet.		1.0	TS																	
1.6m: With trace gravel. Gravel, angular.		1.2	TS																	
1.8m: Wet to saturated.		1.4	TS																	
End Of Hole: 5.00m		1.6	TS																	
		1.8	TS																	
		2.0	TS																	
		2.2	TS																	
		2.4	TS																	
		2.6	TS																	
		2.8	TS																	
		3.0	TS																	
		3.2	TS																	
		3.4	TS																	
		3.6	TS																	
		3.8	TS																	
		4.0	TS																	
		4.2	TS																	
		4.4	TS																	
		4.6	TS																	
		4.8	TS																	
		5.0	TS																	

PHOTO(S)



REMARKS

- Hand auger terminated at 2.1m bgl due to dense strata.
- Continued with DCP to target depth of 5.0m bgl.
- Groundwater encountered at 0.2m bgl at the time of drilling.

WATER

- ▼ Standing Water Level
- ▽ Out flow
- ↖ In flow

INVESTIGATION TYPE

- Hand Auger
- Test Pit



INVESTIGATION LOG

HOLE NO.:
HA10

CLIENT: Jason and Penny Bill
PROJECT: Six sites along Waitemarama Gorge Road

JOB NO.:
C0021

SITE LOCATION: Adjacent to Waitemarama Gorge Road & Smoothy Road
CO-ORDINATES:

START DATE: 27/09/2023
END DATE: 27/09/2023

CONTRACTOR: Internal RIG: Hand tools

ELEVATION: Ground
DRILLER: TW LW

LOGGED BY: TW

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER (Blows / 100mm)						VANE SHEAR STRENGTH (kPa) Vane: 3467				WATER			
				2	4	6	8	10	12	14	16	18	50		100	150	200
TOPSOIL comprising organic SILT; trace rootlets; dark brown; moist; low plasticity.		0.2	TS												126		Groundwater Not Encountered
Clayey SILT; brown and grey mottled orange. Moist; low plasticity. 0.5m: With trace gravel. Gravel, fine, angular. 0.8m: Becoming brown and grey, gravels absent.		0.4	TS												52		
		0.6	TS												UTP	-	
1.3m: Minor sand present. 1.5m: Becoming wet.		0.8	TS												115		
		1.0	TS												43		
	1.2	TS													135		
	1.4	TS													35		
	1.6	TS													106		
	1.8	TS													34		
	2.0	TS													128		
	2.2	TS													43		
SILT; brown . Wet to saturated; low plasticity.		2.4	TS												156		
Sandy SILT, with minor gravel; greyish blue. Wet; low plasticity; gravel, fine.		2.6	TS												30		
		2.8	TS												177		
End Of Hole: 5.00m		3.0	TS												43		
		3.2	3												UTP	-	
	3.4	3													-		
	3.6	3													-		
	3.8	3													-		
	4.0	5													-		
	4.2	8													-		
	4.4	9													-		
	4.6	9													-		
	4.8	9													-		
	5.0	8													-		

PHOTO(S)

REMARKS

- Hand auger completed at target depth 3.0m bgl.
- Continued with DCP to target depth of 5.0m bgl.
- Groundwater not encountered at the time of drilling.

WATER

- ▼ Standing Water Level
- ▽ Out flow
- ↖ In flow

INVESTIGATION TYPE

- Hand Auger
- Test Pit

INVESTIGATION LOG

HOLE NO.:
HA12

CLIENT: Jason and Penny Bill
PROJECT: Six sites along Waitemarama Gorge Road

JOB NO.:
C0021

SITE LOCATION: Adjacent to Waitemarama Gorge Road & Smoothy Road
CO-ORDINATES:

START DATE: 27/09/2023
END DATE: 27/09/2023

CONTRACTOR: Internal RIG: Hand tools

ELEVATION: Ground
DRILLER: TW LW

LOGGED BY: TW

MATERIAL DESCRIPTION <small>(See Classification & Symbology sheet for details)</small>	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER <small>(Blows / 100mm)</small>		VANE SHEAR STRENGTH <small>(kPa)</small> <small>Vane: 3467</small>				WATER								
				2	4	6	8	10	12		14	16	18	50	100	150	200	Values
TOPSOIL comprising organic SILT; trace rootlets; dark brown; moist; low plasticity.		0.2	TS														108	
		0.4	TS														50	
Clayey SILT; brown. Moist; low plasticity.		0.6	TS														96	
Silty CLAY; brown. Moist to wet; high plasticity.		0.8	TS														43	
0.9m: Wet to saturated.		1.0	TS														67	
		1.2	TS														35	
1.3m: Saturated.		1.4	TS														82	
1.5m: With trace gravel.		1.6	TS														18	
		1.8	TS														128	
1.9m: With minor gravel.		2.0	TS														24	
End Of Hole: 5.00m		2.2															177	
		2.4															21	
		2.6															UTP	
		2.8															-	
		3.0																
		3.2																
		3.4																
		3.6																
		3.8																
		4.0																
		4.2																
		4.4																
		4.6																
		4.8																
		5.0																

Groundwater Not Encountered

PHOTO(S)



REMARKS

- Hand auger terminated at 2.1m bgl due to dense strata.
- Continued with DCP to target depth of 5.0m bgl.
- Groundwater not encountered at the time of drilling.

WATER

- Standing Water Level
- Out flow
- In flow

INVESTIGATION TYPE

- Hand Auger
- Test Pit



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APPENDIX C

Assessment of Environmental Effects and Assessment Criteria



Table 14: Wastewater Assessment of Environmental Effects

Item	NRC Separation Requirement ²	FNDC Separation Requirement	Site Assessment ³
Individual System Effects			
Flood plains	Above 5 % AEP	NR	Complies. Disposal field well above mapped flood hazard.
Stormwater flowpath ⁴	5 m	NR	Complies.
Surface water feature ⁵	15 m	15 m, increased to 30 m in certain conditions	Complies.
Coastal Marine Area	15 m	30 m	Complies.
Existing water supply bore.	20 m	NR	Complies.
Property boundary	1.5 m	1.5	Complies. Including proposed subdivision boundaries.
Winter groundwater table	0.6 m	0.6 m	Complies. Disposal fields may require raising by up to 400 mm.
Topography			Complies, >10 ° and <25 °.
Cut off drain required?			Yes. Provided on Drawing No. 400.
Discharge Consent Required?			No.
	TP58	NZS1547	
Cumulative Effects			
Biological Oxygen Demand		≤20 g/m ³	Complies – secondary treatment.
Total Suspended Solids		≤30 g/m ³	Complies – secondary treatment.
Total Nitrogen	10 – 30 g/m ³	15 – 75 g/m ³	Complies – secondary treatment.
Phosphorous	NR	4 – 10 g/m ³	Complies – secondary treatment.
Ammonia	NR	Negligible	Complies – secondary treatment.
Nitrites/ Nitrates	NR	15 – 45 g/m ³	Complies – secondary treatment.
Conclusion: Effects are less than minor on the environment.			
1. AEE based on proposed secondary treated effluent.			
2. Northland Regional Plan Table 9.			
3. Based on the recommendations of this report and Drawing No. 400.			
4. Including any formed road with kerb and channel, and water-table drain that is down-slope of the disposal area.			
5. River, lake, stream, pond, dam, or natural wetland.			
AEP Annual Exceedance Probability.			
NR No Requirement.			



Table 15: Proposed Northland Regional Plan Stormwater Assessment Criteria, to rule C.6.4.2

Assessment Criteria	Comments
1) the discharge or diversion is not from: a) a public stormwater network, or b) a high-risk industrial or trade premises	Complies.
2) the diversion and discharge does not cause or increase flooding of land on another property in a storm event of up to and including a 10 percent annual exceedance probability, or flooding of buildings on another property in a storm event of up to and including a one percent annual exceedance probability	Complies, attenuation to 80 % of pre development level for 20 % AEP event more conservative than pre development of the 10 % AEP event.
3) where the diversion or discharge is from a hazardous substance storage or handling area: a) the stormwater collection system is designed and operated to prevent hazardous substances stored or used on the site from entering the stormwater system, or b) there is a secondary containment system in place to intercept any spillage of hazardous substances and either discharges that spillage to a trade waste system or stores it for removal and treatment, or c) if the stormwater contains oil contaminants, the stormwater is passed through a stormwater treatment system designed in accordance with the Environmental Guidelines for Water Discharges from Petroleum Industry Sites in New Zealand (Ministry for the Environment, 1998) prior to discharge	Complies. Site is residential.
4) where the diversion or discharge is from an industrial or trade premises: a) the stormwater collection system is designed and operated to prevent any contaminants stored or used on the site, other than those already controlled by condition 3) above, from entering stormwater unless the stormwater is discharged through a stormwater treatment system, and b) any process water or liquid waste stream on the site is bunded, or otherwise contained, within an area of sufficient capacity to provide secondary containment equivalent to 100 percent of the quantity of any process water or liquid waste that has the potential to spill into a stormwater collection system, in order to prevent trade waste entering the stormwater collection system	Complies. Site is residential.
5) the diversion or discharge is not into potentially contaminated land, or onto potentially contaminated land that is not covered by an impervious area	Complies.
6) the diversion and discharge does not cause permanent scouring or erosion of the bed of a water body at the point of discharge	Complies, specifically sized discharge devices are provided from all on-lot devices.
7) the discharge does not contain more than 15 milligrams per litre of total petroleum hydrocarbons	Complies. Site is residential.
8) the discharge does not cause any of the following effects in the receiving waters beyond the zone of reasonable mixing: a) the production of conspicuous oil or grease films, scums, or foams, of floatable or suspended materials, or b) a conspicuous change in the colour or visual clarity, or c) an emission of objectionable odour, or d) the rendering of fresh water unsuitable for consumption by farm animals, or 163	Complies.



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e) the rendering of fresh water taken from a mapped priority drinking water abstraction point (refer I Maps | Ngā mahere matawhenua) unsuitable for human consumption after existing treatment.



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APPENDIX D

Stormwater Calculations

Project Ref:	C0021	STORMWATER ATTENUATION TANK DESIGN	50 % AEP STORM EVENT, 80 % OF PRE DEVELOPMENT	
Project Address:	WAIOTEMARAMA GORGE ROAD			
Design Case:	CONCEPT FUTURE DEVELOPMENT			
Date:	13 October 2023 REV 1			

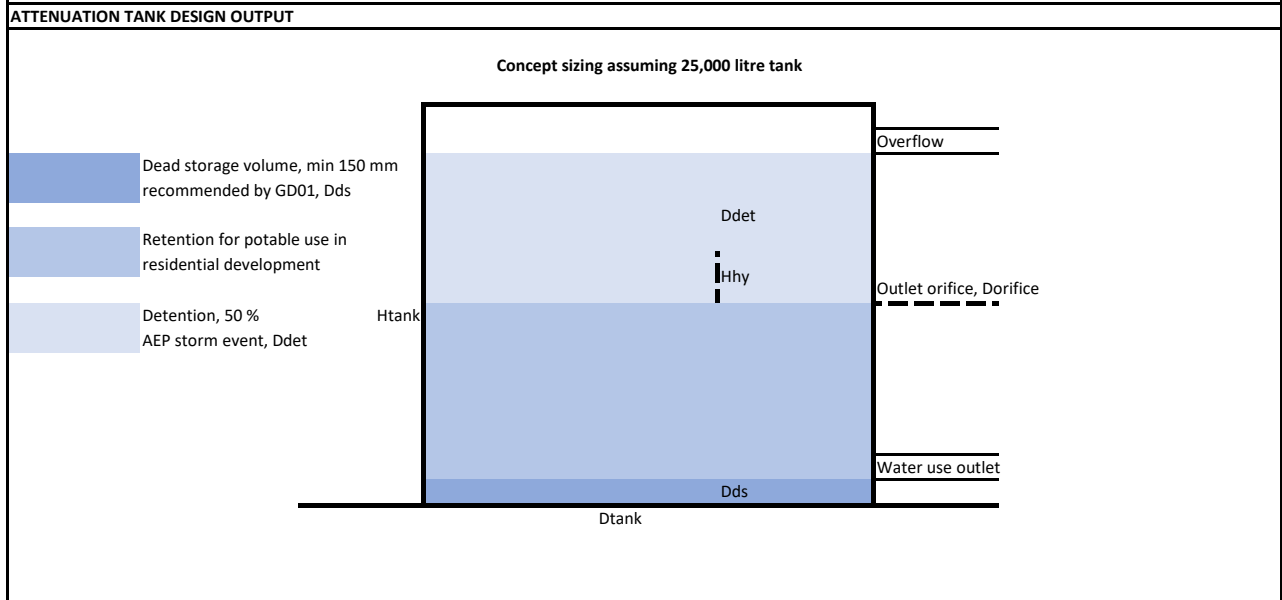
ATTENUATION DESIGN PROVIDED IN ACCORDANCE WITH NEW ZEALAND BUILDING CODE E1 FOR THE RATIONALE METHOD ACCOUNTING FOR THE EFFECTS OF PREDICTED 2.1 DEGREE CLIMATE CHANGE. RESIDENTIAL DEVELOPMENT AREAS ARE BASED ON EXISTING SURVEY DATA.
 RUNOFF COEFFICIENTS DETERMINED FROM FNDC ENGINEERING STANDARDS 2023 TABLE 4-3.

PREDEVELOPMENT SCENARIO				POST DEVELOPMENT SCENARIO			
ITEM	AREA, A, m ²	COEFFICIENT, C	RUNOFF, l/s	ITEM	AREA, A, m ²	COEFFICIENT, C	RUNOFF, l/s
IMPERVIOUS A	0	0	0.00	TO TANK	300	0.96	5.64
IMPERVIOUS B	0	0	0.00	OFFSET	200	0.83	3.25
IMPERVIOUS C	0	0	0.00	PERVIOUS	0	0.67	0.00
EX. PERVIOUS	500	0.67	6.56	EX. CONSENTED	0	0.96	0.00
TOTAL	500	TYPE D	6.56	TOTAL	500	TYPE D	8.89


PRE DEVELOPMENT RUNOFF			
50 % AEP RAINFALL INTENSITY, 10 MIN, l, mm/hr	56.1	mm/hr	* CLIMATE CHANGE FACTOR CALCULATED IN ACCORDANCE WITH NIWA HIRDS RECOMMENDATIONS. HISTORIC RAINFALL INTENSITY, 10 MINUTES IS MULTIPLIED BY POTENTIAL CLIMATE CHANGE FACTORS. NIWA RECOMMENDS THAT FOR 10 MINUTE TO 1 HOUR ADOPT THE 1 HR FACTOR.
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	25.62	%	
50 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	70.47	mm/hr	
50 % AEP PRE DEVELOPMENT PEAK FLOW	6.56	l/s	
80 % OF PRE DEVELOPMENT PEAK FLOW	5.25	l/s	

INCREASED POST DEVELOPMENT RUNOFF, 50 % AEP WITH CLIMATE CHANGE PROJECTION OF 2.1 DEGREES							
TIME, min	INTENSITY, mm/hr	CC FACTOR	CC INTENSITY, mm/hr	RUNOFF, Q, l/s	Allowable flow, l/s	Difference, l/s	Required Storage, litres
10	56.10	1.2562	70.47	8.89	2.00	6.89	4134
20	39.20	1.2562	49.24	6.21	2.00	4.21	5056
30	31.70	1.2562	39.82	5.02	2.00	3.03	5445
60	21.80	1.2562	27.39	3.45	2.00	1.46	5245
120	14.80	1.2457	18.44	2.33	2.00	0.33	2364
360	7.83	1.2058	9.44	1.19	2.00	No Att. Req.	0
720	5.13	1.1785	6.05	0.76	2.00	No Att. Req.	0
1440	3.30	1.1512	3.80	0.48	2.00	No Att. Req.	0
2880	2.08	1.1281	2.35	0.30	2.00	No Att. Req.	0
4320	1.57	1.1155	1.75	0.22	2.00	No Att. Req.	0

NOTE: ALLOWABLE FLOW PROVIDES FOR ANY OFFSET ARISING FROM FLOWS NOT DIRECTLY DISCHARGING TO TANK



SPECIFICATION		NOTES:
TOTAL STORAGE REQUIRED	5,445 m ³	
TANK HEIGHT, Htank	2.6 m	Concept sizing assuming 25,000 litre tank
TANK DIAMETER, Dtank	3.5 m	No. of Tanks 1
TANK AREA, Atank	9.62 m ²	Single tank area
TANK MAX STORAGE VOLUME, Vtank	25015 litres	
REQUIRED STORAGE HEIGHT, Ddet	0.57 m	Below overflow
DEAD STORAGE VOLUME, Dds	0.15 m	GD01 recommended minimum
TOTAL WATER DEPTH REQUIRED	0.72 m	
AVERAGE DISCHARGE RATE, Qavg	0.00006 m ³ /s	
AVERAGE HYDRAULIC HEAD, Hhy	0.28 m	
AREA OF ORIFICE, Aorifice	4.31E-05 m ²	
ORIFICE DIAMETER, Dorifice	7 mm	Minimum 10 mm diameter
VELOCITY AT ORIFICE	3.33 m/s	
ACHIEVABLE STORAGE OF SURFACES TO TANK IN 24 HOURS	51364 litres/ 24hrs	
AREA TO TANK CAN SERVICE ATTENUATION?	YES	

Project Ref:	C0021	STORMWATER ATTENUATION TANK DESIGN	
Project Address:	WAIOTEMARAMA GORGE ROAD		
Design Case:	CONCEPT FUTURE DEVELOPMENT		
Date:	13 October 2023 REV 1		
		20 % AEP STORM EVENT, 80 % OF PRE DEVELOPMENT	

ATTENUATION DESIGN PROVIDED IN ACCORDANCE WITH NEW ZEALAND BUILDING CODE E1 FOR THE RATIONALE METHOD ACCOUNTING FOR THE EFFECTS OF PREDICTED 2.1 DEGREE CLIMATE CHANGE. RESIDENTIAL DEVELOPMENT AREAS ARE BASED ON EXISTING SURVEY DATA. RUNOFF COEFFICIENTS DETERMINED FROM FNDC ENGINEERING STANDARDS 2023 TABLE 4-3.

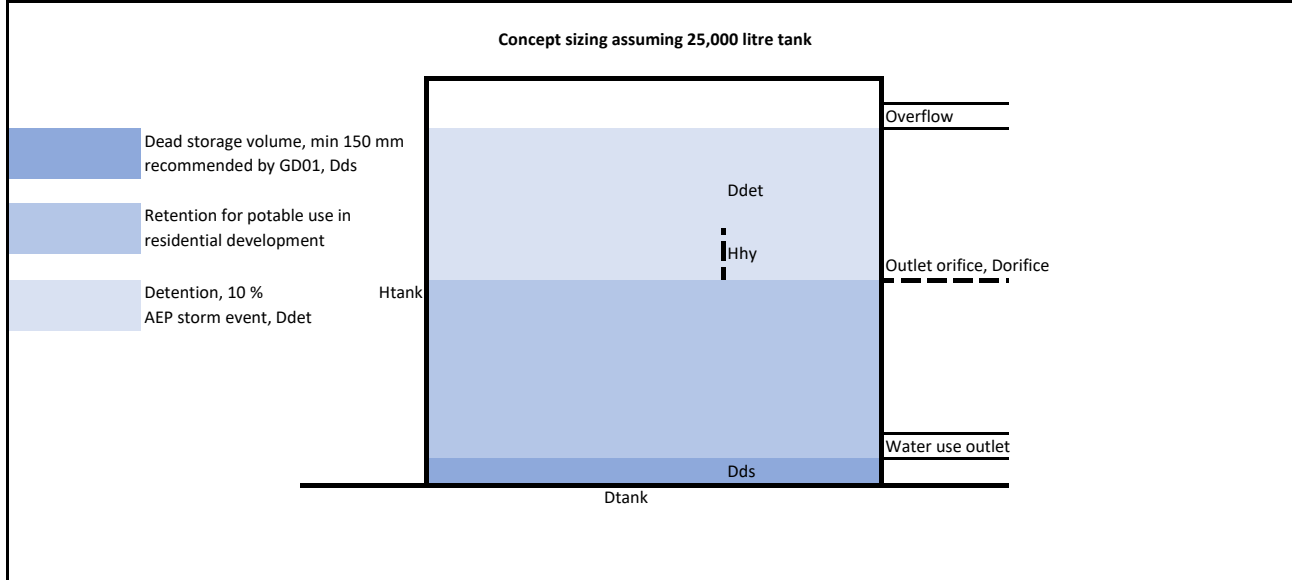
PREDEVELOPMENT SCENARIO				POST DEVELOPMENT SCENARIO			
ITEM	AREA, A, m ²	COEFFICIENT, C	RUNOFF, l/s	ITEM	AREA, A, m ²	COEFFICIENT, C	RUNOFF, l/s
IMPERVIOUS A	0	0	0.00	TO TANK	300	0.96	7.37
IMPERVIOUS B	0	0	0.00	OFFSET	200	0.83	4.25
IMPERVIOUS C	0	0	0.00	PERVIOUS	0	0.67	0.00
EX. PERVIOUS	500	0.67	8.57	EX. CONSENTED	0	0.96	0.00
TOTAL	500	TYPE D	8.57	TOTAL	500	TYPE D	11.62

PRE DEVELOPMENT RUNOFF			
20 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	72.6	mm/hr	* CLIMATE CHANGE FACTOR CALCULATED IN ACCORDANCE WITH NIWA
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	26.88	%	HIRDS RECOMMENDATIONS. HISTORIC RAINFALL INTENSITY, 10 MINUTES
20 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	92.1	mm/hr	IS MULTIPLIED BY POTENTIAL CLIMATE CHANGE FACTORS. NIWA
20 % AEP PRE DEVELOPMENT PEAK FLOW	8.57	l/s	RECOMMENDS THAT FOR 10 MINUTE TO 1 HOUR ADOPT THE 1 HR
80 % OF PRE DEVELOPMENT PEAK FLOW	6.86	l/s	FACTOR.

INCREASED POST DEVELOPMENT RUNOFF, 10 % AEP WITH CLIMATE CHANGE PROJECTION OF 2.1 DEGREES							
TIME, min	INTENSITY, mm/hr	CC FACTOR	CC INTENSITY, mm/hr	RUNOFF, Q, l/s	Allowable flow, l/s	Difference, l/s	Required Storage, litres
10	72.60	1.2688	92.11	11.62	2.61	9.01	5404
20	50.80	1.2688	64.46	8.13	2.61	5.52	6622
30	41.10	1.2688	52.15	6.58	2.61	3.97	7140
60	28.30	1.2688	35.91	4.53	2.61	1.92	6906
120	19.30	1.2583	24.29	3.06	2.61	0.45	3260
360	10.20	1.2205	12.45	1.57	2.61	No Att. Req.	0
720	6.71	1.1932	8.01	1.01	2.61	No Att. Req.	0
1440	4.32	1.1638	5.03	0.63	2.61	No Att. Req.	0
2880	2.73	1.1407	3.11	0.39	2.61	No Att. Req.	0
4320	2.06	1.1302	2.33	0.29	2.61	No Att. Req.	0


NOTE: ALLOWABLE FLOW PROVIDES FOR ANY OFFSET ARISING FROM FLOWS NOT DIRECTLY DISCHARGING TO TANK

ATTENUATION TANK DESIGN OUTPUT



SPECIFICATION

TOTAL STORAGE REQUIRED	7.140 m ³	
TANK HEIGHT, H_{tank}	2.6 m	Concept sizing assuming 25,000 litre tank
TANK DIAMETER, D_{tank}	3.5 m	No. of Tanks 1
TANK AREA, A_{tank}	9.62 m ²	Single tank area
TANK MAX STORAGE VOLUME, V_{tank}	25015 litres	
REQUIRED STORAGE HEIGHT, D_{det}	0.74 m	Below overflow
DEAD STORAGE VOLUME, D_{ds}	0.15 m	GD01 recommended minimum
TOTAL WATER DEPTH REQUIRED	0.89 m	
AVERAGE DISCHARGE RATE, Q_{avg}	0.00008 m ³ /s	
AVERAGE HYDRAULIC HEAD, H_{hy}	0.37 m	
AREA OF ORIFICE, $A_{orifice}$	4.94E-05 m ²	
ORIFICE DIAMETER, $D_{orifice}$	8 mm	Minimum 10 mm diameter
VELOCITY AT ORIFICE	3.82 m/s	
ACHIEVABLE STORAGE OF SURFACES	67735 litres/ 24hrs	
AREA TO TANK CAN SERVICE ATTENUATION?	YES	

Project Ref:	IC0021	STORMWATER ATTENUATION TANK DESIGN	
Project Address:	WAIOTEMARAMA GORGE ROAD		
Design Case:	CONCEPT FUTURE DEVELOPMENT		
Date:	13 October 2023 REV 1		

ATTENUATION DESIGN PROVIDED IN ACCORDANCE WITH NEW ZEALAND BUILDING CODE E1 FOR THE RATIONALE METHOD ACCOUNTING FOR THE EFFECTS OF PREDICTED 2.1 DEGREE CLIMATE CHANGE. RESIDENTIAL DEVELOPMENT AREAS ARE BASED ON EXISTING SURVEY DATA.

RUNOFF COEFFICIENTS DETERMINED FROM FNDC ENGINEERING STANDARDS 2023 TABLE 4-3.

PREDEVELOPMENT SCENARIO				POST DEVELOPMENT SCENARIO			
ITEM	AREA, A, m ²	COEFFICIENT, C	RUNOFF, l/s	ITEM	AREA, A, m ²	COEFFICIENT, C	RUNOFF, l/s
IMPERVIOUS A	0	0	0.00	TO TANK	300	0.96	8.64
IMPERVIOUS B	0	0	0.00	OFFSET	200	0.83	4.98
IMPERVIOUS C	0	0	0.00	PERVIOUS	0	0.67	0.00
EX. PERVIOUS	500	0.67	10.05	EX. CONSENTED	0	0.96	0.00
TOTAL	500	TYPE D	10.05	TOTAL	500	TYPE D	13.62

PRE DEVELOPMENT RUNOFF

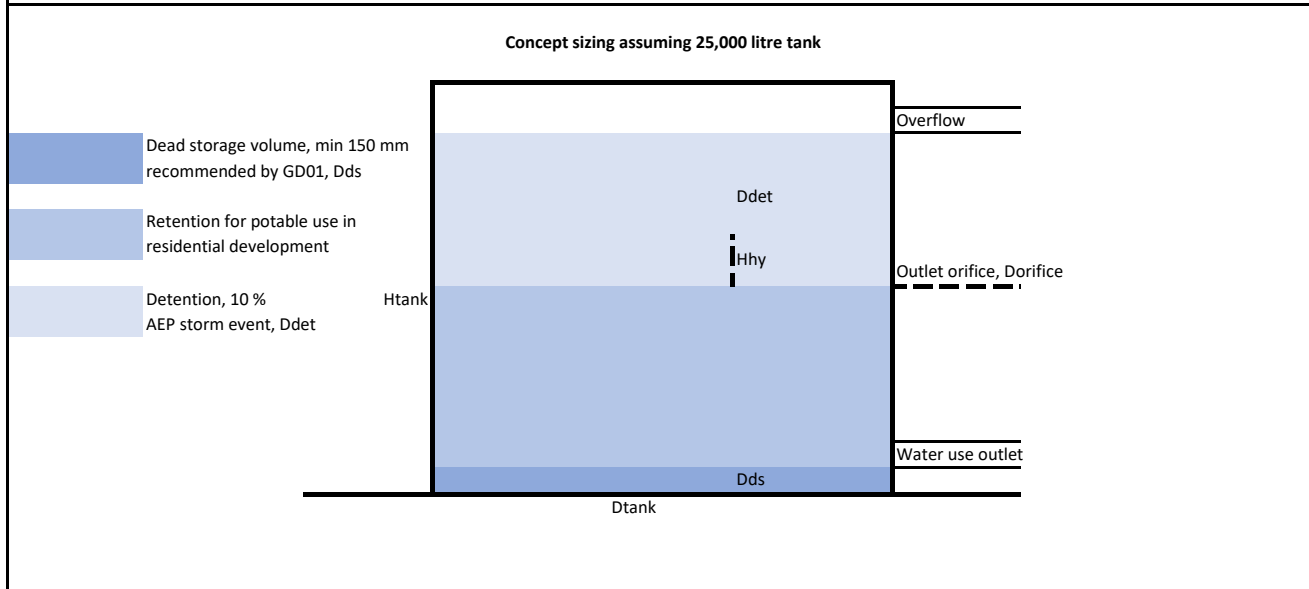
10 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	84.7	mm/hr	* CLIMATE CHANGE FACTOR CALCULATED IN ACCORDANCE WITH NIWA HIRDS RECOMMENDATIONS. HISTORIC RAINFALL INTENSITY, 10 MINUTES IS MULTIPLIED BY POTENTIAL CLIMATE CHANGE FACTORS. NIWA RECOMMENDS THAT FOR 10 MINUTE TO 1 HOUR ADOPT 1 HR FACTOR
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	27.51	%	
10 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	108.0	mm/hr	
10 % AEP PRE DEVELOPMENT PEAK FLOW	10.05	l/s	

INCREASED POST DEVELOPMENT RUNOFF, 10 % AEP WITH CLIMATE CHANGE PROJECTION OF 2.1 DEGREES

TIME, min	INTENSITY, mm/hr	CC FACTOR	CC INTENSITY, mm/hr	RUNOFF, Q, l/s	Allowable flow, l/s	Difference, l/s	Required Storage, litres
10	84.70	1.2751	108.00	13.62	5.07	8.55	5130
20	59.40	1.2751	75.74	9.55	5.07	4.48	5378
30	48.10	1.2751	61.33	7.73	5.07	2.66	4796
60	33.20	1.2751	42.33	5.34	5.07	0.27	967
120	22.70	1.2646	28.71	3.62	5.07	No Att. Req.	0
360	12.00	1.2268	14.72	1.86	5.07	No Att. Req.	0
720	7.89	1.1995	9.46	1.19	5.07	No Att. Req.	0
1440	5.09	1.1701	5.96	0.75	5.07	No Att. Req.	0
2880	3.22	1.147	3.69	0.47	5.07	No Att. Req.	0
4320	2.44	1.1365	2.77	0.35	5.07	No Att. Req.	0


NOTE: ALLOWABLE FLOW PROVIDES FOR ANY OFFSET ARISING FROM FLOWS NOT DIRECTLY DISCHARGING TO TANK

ATTENUATION TANK DESIGN OUTPUT



SPECIFICATION

TOTAL STORAGE REQUIRED	5.378 m ³	
TANK HEIGHT, Htank	2.6 m	Concept sizing assuming 25,000 litre tank
TANK DIAMETER, Dtank	3.5 m	No. of Tanks 1
TANK AREA, Atank	9.62 m ²	Single tank area
TANK MAX STORAGE VOLUME, Vtank	25015 litres	
REQUIRED STORAGE HEIGHT, Ddet	0.56 m	Below overflow
DEAD STORAGE VOLUME, Dds	0.15 m	GD01 recommended minimum
TOTAL WATER DEPTH REQUIRED	0.71 m	
AVERAGE DISCHARGE RATE, Qavg	0.00006 m ³ /s	
AVERAGE HYDRAULIC HEAD, Hhy	0.28 m	
AREA OF ORIFICE, Aorifice	4.29E-05 m ²	
ORIFICE DIAMETER, Dorifice	7 mm	Minimum 10 mm diameter
VELOCITY AT ORIFICE	3.31 m/s	
ACHIEVABLE STORAGE OF SURFACES	80023 litres/ 24hrs	
AREA TO TANK CAN SERVICE ATTENUATION?	YES	

Project Ref:	C0021	STORMWATER DISPERSION PIPE/ TRENCH	
Project Address:	WAIOTEMARAMA GORGE ROAD		
Design Case:	CONCEPT FUTURE DEVELOPMENT	WEIGHTED RUNOFF	
Date:	13 October 2023		

TP108 Worksheet 1 - Runoff curve number & Initial Abstraction

Soil Class	Cover description	Curve Number, CN	Area	Product of CN * Area
TYPE D	TO TANK	98	300	29400
TYPE D	OFFSET	89	200	17800
TYPE D	PERVIOUS	80	0	0
TYPE D	EX. CONSENTED	98	0	0
		Total	500	47200
		Total Pervious	0 m2	
		Total Impervious	500 m2	
		Weighted Runoff, CN	94.4	
		Weighted Initial Abstraction, Ia	0.0 mm	

TP108, FIGURE 5.1

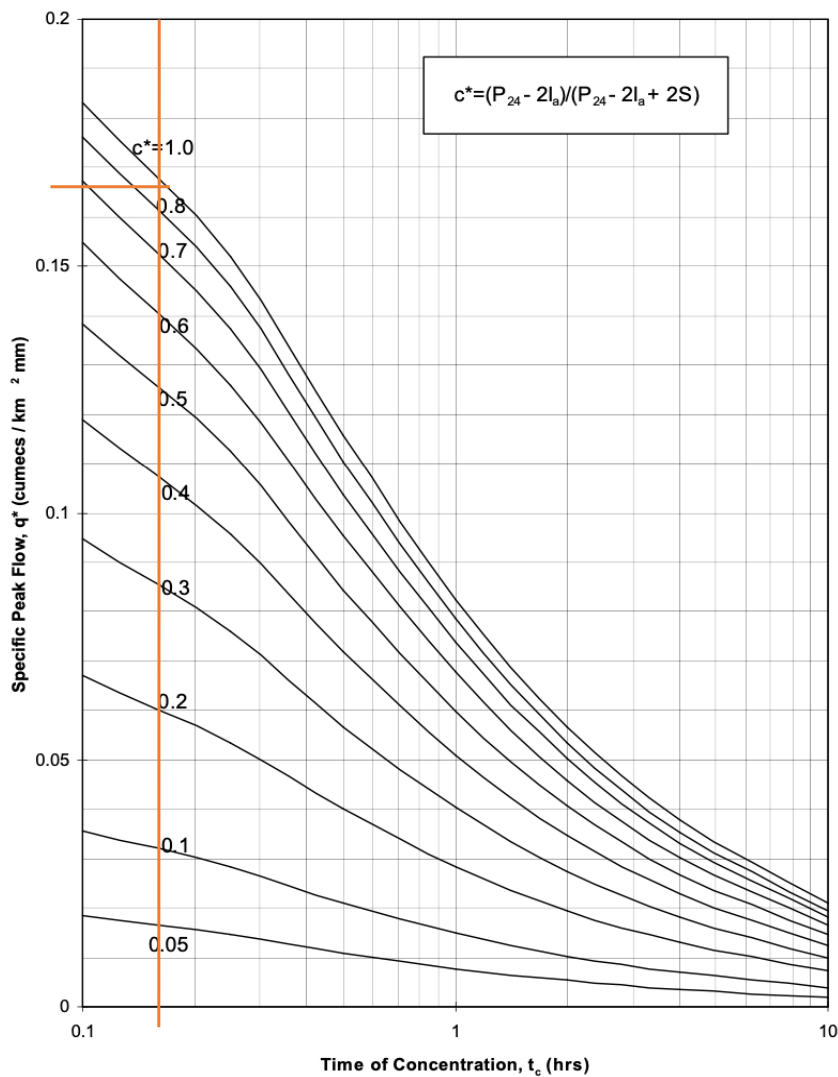



Figure 5.1 - Specific Peak Flow Rate

Project Ref:	C0021	STORMWATER DISPERSION PIPE/ TRENCH DISCHARGE DEVICE - LEVEL SPREADER OR TRENCH	
Project Address:	WAIOTEMARAMA GORGE ROAD		
Design Case:	CONCEPT FUTURE DEVELOPMENT		
Date:	13 October 2023 REV 1		

DESIGN BASED ON REFERENCED DEVELOPMENT PLANS TO PROVIDE A MINIMUM LENGTH OF ABOVE OR BELOW GROUND STORMWATER TANK OVERFLOW DISCHARGE DISPERSION DEVICE. IN GENERAL ACCORDANCE WITH TP108 GRAPHICAL METHOD BASED ON NIWA HIRDS DEPTH-DURATION DATA AND ACCOUNTING FOR THE PROVISION OF CLIMATE CHANGE.

DESIGN STORM EVENT **1%** AEP EVENT

ESTIMATE DESIGN RAINFALL DEPTH, P24

RAINFALL DEPTH	24 HR DURATION	1%	188 mm
CLIMATE CHANGE FACTOR	2.1 DEGREE INCREASE, 24 HR	1%	8.6 %
RAINFALL DEPTH WITH CC, P24			204.2 mm

ESTIMATE DETENTION VOLUME, TP108 GRAPHICAL METHOD


PEAK FLOW RATE, $q_p = q^* \times A \times P_{24}$

WHERE,
 q^* = SPECIFIC PEAK FLOW RATE (l/s)
 P_{24} = 24 HR DESIGN RAINFALL DEPTH (mm)
 A = CATCHMENT AREA TO BE MITIGATED (m²)

CURVE NUMBER, CN (WEIGHTED)	94	See summary table.
INITIAL ABSTRACTION, I_a	0.00 mm	As TP108, adopt 0 mm impervious, 5 mm pervious, value adopted is weighted
MITIGATION AREA, A_m	500 m ²	Impervious areas within this design
SOIL STORAGE, S	15.1 mm	
RUNOFF INDEX, C^*	0.87 mm	
TIME OF CONCENTRATION, t_c	0.167 hrs	
SPECIFIC PEAK FLOWRATE, q^*	0.166	TP108, Figure 5.1, see next page.
PEAK FLOWRATE, q_p	16.95 l/s	
RUNOFF DEPTH, Q_{24}	190.1 mm	
RUNOFF VOLUME, V_{24}	95068 litres	

CONSTRUCTION OF DISPERSION ABOVE GROUND PIPE OR PIPE WITHIN TRENCH

DIA. OF ORIFICE, D	10 mm
AREA OF ORIFICE, A	78.54 mm ²
DESIGN VELOCITY, D_v	5.09 m/s
NUMBER OF ORIFICES	43 No.
ORIFICE INTERVALS, C/C	200 mm
DISPERSION PIPE LENGTH	8.4 m

Project Ref:	C0021	STORMWATER ATTENUATION TANK DESIGN	
Project Address:	WAIOTEMARAMA GORGE ROAD		
Design Case:	CONCEPT FUTURE DEVELOPMENT	CLIMATE CHANGE FACTORS	
Date:	13 October 2023	REV 1	

CLIMATE CHANGE PROJECTIONS

REPRODUCED FROM NIWA HIRDS, <https://niwa.co.nz/information-services/hirds/help>

Duration/ARI	2 yr	5 yr	10 yr	20 yr	30 yr	40 yr	50 yr	60 yr	80 yr	100 yr
1 hour	12.2	12.8	13.1	13.3	13.4	13.4	13.5	13.5	13.6	13.6
2 hours	11.7	12.3	12.6	12.8	12.9	12.9	13	13	13.1	13.1
6 hours	9.8	10.5	10.8	11.1	11.2	11.3	11.3	11.4	11.4	11.5
12 hours	8.5	9.2	9.5	9.7	9.8	9.9	9.9	10	10	10.1
24 hours	7.2	7.8	8.1	8.2	8.3	8.4	8.4	8.5	8.5	8.6
48 hours	6.1	6.7	7	7.2	7.3	7.3	7.4	7.4	7.5	7.5
72 hours	5.5	6.2	6.5	6.6	6.7	6.8	6.8	6.9	6.9	6.9
96 hours	5.1	5.7	6	6.2	6.3	6.3	6.4	6.4	6.4	6.5
120 hours	4.8	5.4	5.7	5.8	5.9	6	6	6	6.1	6.1

HIRDS V4 Intensity-Duration-Frequency Results

Site name: waiotemarama gorge road

Coordinate system: WGS84

Longitude: 173.4261

Latitude: -35.5266

DDF Mode Parameters: c d e f g h i

Values: 0.00247304 0.4523835 -0.0121567 -0.00090973 0.25186548 -0.0110854 2.9914247

Example: Duration (hrs) ARI (yrs) x y Rainfall Rate (mm/hr) 7.840310188

Rainfall intensities (mm/hr) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	51.3	35.8	28.9	19.9	13.5	7.14	4.67	3.19	1.4	1.2	0.99	
2	0.5	56.8	39.2	31.7	21.8	14.8	7.83	5.13	3.3	2.1	1.6	1.3	1.09
5	0.2	72.8	50.8	41.1	28.3	19.3	10.2	6.71	4.3	2.7	2.1	1.7	1.44
10	0.1	84.7	59.4	48.1	33.2	22.7	12	7.89	5.1	3.2	2.4	2	1.7
20	0.05	97.1	68.2	55.2	38.2	26.1	13.9	9.12	5.9	3.7	2.8	2.3	1.97
30	0.033	105	73.4	59.4	41.1	28.1	15	9.85	6.4	4	3.1	2.5	2.13
40	0.025	110	77.1	62.5	43.3	29.6	15.8	10.4	6.7	4.3	3.2	2.6	2.25
50	0.02	114	80.1	64.9	44.9	30.8	16.4	10.8	7	4.4	3.4	2.8	2.34
60	0.017	117	82.5	66.9	46.3	31.7	16.9	11.1	7.2	4.6	3.5	2.8	2.42
80	0.013	123	86.3	70	48.5	33.2	17.7	11.7	7.6	4.8	3.6	3	2.54
100	0.01	127	89.2	72.4	50.2	34.4	18.4	12.1	7.8	5	3.8	3.1	2.64
250	0.004	144	103	82.1	57	38.2	21	13.8	9	5.7	4.3	3.6	3.03

Intensity standard error (mm/hr) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	6.6	4.1	3.1	2.2	1.5	0.92	0.69	0.3	0.2	0.1	0.1	0.09
2	0.5	7.3	4.5	3.4	2.4	1.7	1	0.75	0.3	0.2	0.2	0.1	0.1
5	0.2	10	6.5	4.8	3.4	2.3	1.4	0.90	0.4	0.3	0.2	0.2	0.14
10	0.1	13	8.6	6.3	4.3	3	1.7	1.2	0.5	0.3	0.3	0.2	0.17
20	0.05	16	11	8.3	5.6	3.8	2.1	1.5	0.6	0.4	0.3	0.3	0.22
30	0.033	19	13	9.8	6.5	4.4	2.5	1.7	0.7	0.5	0.4	0.3	0.25
40	0.025	21	15	11	7.2	4.8	2.7	1.9	0.8	0.5	0.4	0.3	0.27
50	0.02	23	16	12	7.8	5.2	2.9	2.1	0.9	0.6	0.4	0.3	0.29
60	0.017	24	17	13	8.3	5.5	3.1	2.1	0.9	0.6	0.4	0.4	0.31
80	0.013	27	19	14	9.2	6.1	3.5	2.4	1	0.6	0.5	0.4	0.34
100	0.01	29	21	16	10	6.6	3.7	2.5	1.1	0.7	0.5	0.4	0.37
250	0.004	40	29	22	14	8.9	5.1	3.5	1.5	0.9	0.7	0.6	0.49

Rainfall intensities (mm/hr) :: RCP2.6 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	54.9	38.4	31	21.3	14.4	7.53	4.89	3.1	2	1.5	1.2	1.02
2	0.5	60.2	42.1	34	23.4	15.9	8.29	5.39	3.4	2.2	1.6	1.3	1.12
5	0.2	78.1	54.7	44.2	30.5	20.7	10.9	7.07	4.5	2.8	2.1	1.7	1.48
10	0.1	91.3	64	51.8	35.7	24.3	12.8	8.94	5.3	3.4	2.5	2.1	1.75
20	0.05	105	73.5	59.5	41.2	28	14.8	9.64	6.2	3.9	2.9	2.4	2.03
30	0.033	113	79.2	64.1	44.4	30.3	16	10.4	6.7	4.2	3.2	2.6	2.21
40	0.025	118	83.2	67.4	46.7	31.9	16.8	11	7.1	4.4	3.4	2.7	2.33
50	0.02	123	86.5	70.1	48.5	33.1	17.5	11.4	7.3	4.6	3.5	2.9	2.43
60	0.017	127	89	72.2	50	34.1	18.1	11.8	7.6	4.8	3.6	2.9	2.51
80	0.013	132	93.2	75.6	52.4	35.8	18.9	12.4	7.9	5	3.8	3.1	2.63
100	0.01	137	96.4	78.2	54.2	37	19.6	12.8	8.2	5.2	3.9	3.2	2.73
250	0.004	155	109	88.7	61.6	42.2	22.4	14.7	9.4	6	4.5	3.7	3.14

Rainfall intensities (mm/hr) :: RCP2.6 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	54.9	38.4	31	21.3	14.4	7.53	4.89	3.1	2	1.5	1.2	1.02
2	0.5	60.2	42.1	34	23.4	15.9	8.29	5.39	3.4	2.2	1.6	1.3	1.12
5	0.2	78.1	54.7	44.2	30.5	20.7	10.9	7.07	4.5	2.8	2.1	1.7	1.48
10	0.1	91.3	64	51.8	35.7	24.3	12.8	8.94	5.3	3.4	2.5	2.1	1.75
20	0.05	105	73.5	59.5	41.2	28	14.8	9.64	6.2	3.9	2.9	2.4	2.03
30	0.033	113	79.2	64.1	44.4	30.3	16	10.4	6.7	4.2	3.2	2.6	2.21
40	0.025	118	83.2	67.4	46.7	31.9	16.8	11	7.1	4.4	3.4	2.7	2.33
50	0.02	123	86.5	70.1	48.5	33.1	17.5	11.4	7.3	4.6	3.5	2.9	2.43
60	0.017	127	89	72.2	50	34.1	18.1	11.8	7.6	4.8	3.6	2.9	2.51
80	0.013	132	93.2	75.6	52.4	35.8	18.9	12.4	7.9	5	3.8	3.1	2.63
100	0.01	137	96.4	78.2	54.2	37	19.6	12.8	8.2	5.2	3.9	3.2	2.73
250	0.004	155	109	88.7	61.6	42.2	22.4	14.7	9.4	6	4.5	3.7	3.14

Rainfall intensities (mm/hr) :: RCP4.5 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	55.9	39	31.5	21.7	14.7	7.63	4.95	3.2	2	1.5	1.2	1.02
2	0.5	61.2	42.8	34.5	23.8	16.1	8.4	5.45	3.5	2.2	1.6	1.3	1.13
5	0.2	79.5	55.6	45	31	21.1	11	7.17	4.6	2.9	2.2	1.8	1.49
10	0.1	92.9	65.1	52.7	36.4	24.8	13	8.45	5.4	3.4	2.6	2.1	1.77
20	0.05	107	74.9	60.6	41.9	28.5	15	9.77	6.3	4.1	3	2.4	2.05
30	0.033	115	80.7	65.3	45.2	30.8	16.2	10.6	6.8	4.3	3.2	2.6	2.22
40	0.025	121	84.8	68.7	47.6	32.4	17.1	11.1	7.1	4.5	3.4	2.8	2.35
50	0.02	125	88.1	71.4	49.4	33.7	17.8	11.6	7.4	4.7	3.5	2.9	2.45
60	0.017	129	90.7	73.5	50.9	34.8	18.3	12	7.7	4.8	3.6	3	2.53
80	0.013	135	95	77	53.4	36.4	19.2	12.6	8	5.1	3.8	3.1	2.66
100	0.01	140	98.2	79.6	55.2	37.7	19.9	13	8.3	5.3	4	3.2	2.76
250	0.004	158	111	90.4	62.8	43	22.7	14.9	9.6	6	4.6	3.7	3.17

Rainfall intensities (mm/hr) :: RCP4.5 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	58.7	41	33.1	22.8	15.4	7.95	5.12	3.3	2	1.5	1.2	1.04
2	0.5	64.4	45	36.4	25	16.9	8.76	5.66	3.6	2.2	1.7	1.4	1.15
5	0.2	83.8	58.7	47.5	32.7	22.2	11.5	7.46	4.7	3	2.2	1.8	1.53
10	0.1	98.2	68.8	55.7	38.4	26.1	13.6	8.8	5.6	3.5	2.6	2.1	1.81
20	0.05	113	79.1	64.1	44.3	30.1	15.7	10.2	6.5	4.1	3.1	2.5	2.11
30	0.033	121	85.3	69.1	47.8	32.5	17	11	7	4.4	3.3	2.7	2.28
40	0.025	128	89.7	72.6	50.3	34.2	17.9	11.6	7.4	4.6	3.5	2.8	2.41
50	0.02	133	93.2	75.5	52.3	35.6	18.6	12.1	7.7	4.8	3.6	3	2.51
60	0.017	136	95.9	77.8	53.9	36.7	19.2	12.5	8	5	3.8	3.1	2.6
80	0.013	143	100	81.5	56.5	38.5	20.2	13.1	8.3	5.2	3.9	3.2	2.73
100	0.01	148	104	84.3	58.4	39.8	20.9	13.6	8.5	4.1	3.3	2.83	
250	0.004	167	118	95.7	66.4	45.4	23.9	15.5	9.9	6.2	4.7	3.8	3.26

Rainfall intensities (mm/hr) :: RCP6.0 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	55.5	38.7	31.3	21.5	14.6	7.59	4.92	3.1	2	1.5	1.2	1.02
2	0.5	60.8	42.5	34.3	23.6	16	8.36	5.42	3.5	2.2	1.6	1.3	1.13
5	0.2	78.9	55.2	44.7	30.8	20.9	11	7.13	4.6				

HIRDS V4 Depth-Duration-Frequency Results

Site name: waiotemarama gorge road

Coordinate system: WGS84

Longitude: 173.4261

Latitude: -35.5266

DDF Model

Parameters: c d e f g h i
 Values: 0.00247304 0.4523835 -0.0121567 -0.00090973 0.25186548 -0.0110854 2.99142
 Example: Duration (hrs) ARI (yrs) x k V Rainfall Depth (mm)
 24 100 3.17805383 4.60014923 188.1674445

Rainfall depths (mm) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	8.56	11.9	14.5	19.9	27.1	42.8	56	72	91	103	112	119
2	0.5	9.36	13.1	15.8	21.7	29.7	47	61.5	79	100	115	123	131
5	0.2	12.1	16.9	20.5	28.3	38.6	61.4	80.5	104	131	149	162	172
10	0.1	14.1	19.8	24	33.2	45.3	72.1	94.7	122	154	175	191	204
20	0.05	16.2	22.7	27.6	38.2	52.2	83.2	109	141	179	203	221	236
30	0.033	17.4	24.5	29.7	41.1	56.3	89.9	118	153	194	220	240	256
40	0.025	18.3	25.7	31.3	43.3	59.2	94.6	125	161	204	232	253	270
50	0.02	19	26.7	32.4	44.9	61.5	98.4	130	168	213	242	264	281
60	0.017	19.6	27.5	33.4	46.3	63.4	101	134	173	219	250	272	290
80	0.013	20.4	28.8	35	48.5	66.4	106	140	182	230	262	286	305
100	0.01	21.1	29.7	36.2	50.2	68.8	110	145	188	239	272	297	316
250	0.004	23.9	33.7	41.1	57	78.3	126	166	216	274	312	341	364

Depth standard error (mm) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	1.1	1.5	1.5	2.2	3.1	5.9	8.2	6.4	8.1	8.9	9.6	10
2	0.5	1.2	1.6	1.7	2.4	3.4	6.5	9	7.1	8.9	9.9	11	12
5	0.2	1.6	2.2	2.4	3.4	4.6	8.8	12	9.8	12	14	15	16
10	0.1	2.1	2.8	3.2	4.3	5.8	11	15	12	15	17	18	20
20	0.05	2.6	3.6	4.3	5.6	7.3	13	18	15	19	22	23	26
30	0.033	3	4.1	5	6.5	8.4	15	20	17	21	25	27	29
40	0.025	3.3	4.5	5.6	7.3	9.3	16	22	19	24	27	29	32
50	0.02	3.6	4.9	6.1	7.9	10	18	24	20	25	29	32	35
60	0.017	3.8	5.2	6.5	8.5	11	19	25	22	27	31	34	37
80	0.013	4.2	5.8	7.2	9.5	12	20	28	24	30	34	37	41
100	0.01	4.5	6.3	7.9	10	13	22	30	25	32	37	40	44
250	0.004	6.2	8.7	11	15	18	29	40	34	43	49	54	59

Rainfall depths (mm) :: RCP2.6 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.16	12.8	15.5	21.3	28.9	45.2	58.7	75	94	106	115	122
2	0.5	10	14	17	23.4	31.7	49.7	64.6	83	103	117	127	135
5	0.2	13	18.2	22.1	30.5	41.4	65.2	84.9	109	136	154	167	178
10	0.1	15.2	21.3	25.8	35.7	48.7	76.7	100	128	161	182	198	210
20	0.05	17.5	24.5	29.8	41.2	56.1	88.6	116	148	186	211	230	244
30	0.033	18.8	26.4	32.1	44.4	60.5	95.8	125	160	202	229	249	265
40	0.025	19.7	27.7	33.7	46.7	63.7	101	132	169	213	242	263	280
50	0.02	20.5	28.8	35	48.5	66.2	105	137	176	222	251	274	291
60	0.017	21.1	29.7	36.1	50	68.3	108	142	182	229	260	283	301
80	0.013	22.1	31.1	37.8	52.4	71.6	114	149	191	241	273	297	316
100	0.01	22.8	32.1	39.1	54.2	74.1	118	154	198	249	283	308	328
250	0.004	25.8	36.4	44.4	61.6	84.4	134	176	226	286	325	354	377

Rainfall depths (mm) :: RCP2.6 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.16	12.8	15.5	21.3	28.9	45.2	58.7	75	94	106	115	122
2	0.5	10	14	17	23.4	31.7	49.7	64.6	83	103	117	127	135
5	0.2	13	18.2	22.1	30.5	41.4	65.2	84.9	109	136	154	167	178
10	0.1	15.2	21.3	25.8	35.7	48.7	76.7	100	128	161	182	198	210
20	0.05	17.5	24.5	29.8	41.2	56.1	88.6	116	148	186	211	230	244
30	0.033	18.8	26.4	32.1	44.4	60.5	95.8	125	160	202	229	249	265
40	0.025	19.7	27.7	33.7	46.7	63.7	101	132	169	213	242	263	280
50	0.02	20.5	28.8	35	48.5	66.2	105	137	176	222	251	274	291
60	0.017	21.1	29.7	36.1	50	68.3	108	142	182	229	260	283	301
80	0.013	22.1	31.1	37.8	52.4	71.6	114	149	191	241	273	297	316
100	0.01	22.8	32.1	39.1	54.2	74.1	118	154	198	249	283	308	328
250	0.004	25.8	36.4	44.4	61.6	84.4	134	176	226	286	325	354	377

Rainfall depths (mm) :: RCP4.5 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.31	13	15.7	21.7	29.3	45.8	59.4	76	95	107	116	123
2	0.5	10.2	14.3	17.3	23.8	32.2	50.4	65.4	83	104	118	128	135
5	0.2	13.2	18.5	22.5	31	42.2	66.2	86	110	137	155	169	179
10	0.1	15.5	21.7	26.4	36.4	49.5	77.9	101	130	162	184	200	212
20	0.05	17.8	25.9	32.9	45.9	61.9	93.9	121	150	182	206	224	246
30	0.033	19.1	26.9	32.7	45.2	61.6	97.3	127	162	204	231	251	267
40	0.025	20.1	28.3	34.4	47.6	64.9	103	134	171	215	244	265	282
50	0.02	20.9	29.4	35.7	49.4	67.4	107	139	178	224	254	276	294
60	0.017	21.5	30.2	36.8	50.9	69.5	110	144	184	231	262	285	303
80	0.013	22.5	31.7	38.5	53.4	72.9	115	151	193	241	275	299	319
100	0.01	23.3	32.7	39.8	55.2	75.4	120	156	200	252	286	311	331
250	0.004	26.3	37.1	45.2	62.8	85.9	136	179	229	289	328	357	380

Rainfall depths (mm) :: RCP4.5 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.79	13.7	16.5	22.8	30.7	47.7	61.5	78	97	109	118	125
2	0.5	10.7	15	18.2	25	33.9	52.6	67.9	86	107	121	130	138
5	0.2	14	19.6	23.7	32.7	44.4	69.2	89.5	114	142	160	173	184
10	0.1	16.4	22.9	27.8	38.4	52.2	81.5	106	134	168	189	205	218
20	0.05	18.8	26.4	32	44.3	60.2	94.4	122	155	194	219	238	253
30	0.033	20.2	28.4	34.5	47.8	65	102	132	168	213	238	256	271
40	0.025	21.3	29.9	36.3	50.3	68.5	108	140	177	222	251	272	290
50	0.02	22.1	31.1	37.7	52.3	71.2	112	145	185	232	262	284	302
60	0.017	22.7	32	38.9	53.9	73.4	115	150	191	239	270	293	311
80	0.013	23.8	33.5	40.7	56.5	77	121	157	200	251	284	308	328
100	0.01	24.6	34.6	42.1	58.4	79.7	126	163	208	261	295	320	340
250	0.004	27.9	39.3	47.8	66.4	90.7	143	185	238	299	338	368	391

Rainfall depths (mm) :: RCP6.0 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.25	12.9	15.6	21.5	29.1	45.6	59.1	75	94	106	115	123
2	0.5	10.1	14.2	17.2	23.6	32	50.1	65.3	83	104	117	127	135
5	0.2	13.2	18.4	22.3	30.8	41.9	65.8	85.6	109	137	155	168	179
10	0.1	15.4	21.6	26.2	36.1	49.2	77.4	101	129	162	183	199	211
20	0.05	17.7	24.8	30.1	41.6	56.7	89.5	117	149	188	212	231	245
30	0.033	19	26.7	32.4	44.9	61.2	96.7	126	161	203	230	250	266
40	0.025	20	28.1	34.1	47.2	64.4	102	132	170	213	238	256	271
50	0.02	20.7	29.1	35.4	49.1	67	106	138	177	222	253	275	293
60	0.017	21.3	30	36.5	50.6	69	109	143	183	230	261	284	302
80	0.013	22.3	31.4	38.2	53	72.4	115	150	192	242	274	298	318
100	0.01	23.1	32.5	39.5	54.8	74.9	119	155	199	251	285	310	330
250	0.004	26.1	36.9	44.9	62.3	85.3	136	178	228	288	327	356	379

Rainfall depths (mm) :: RCP6.0 for the period 2081-2100

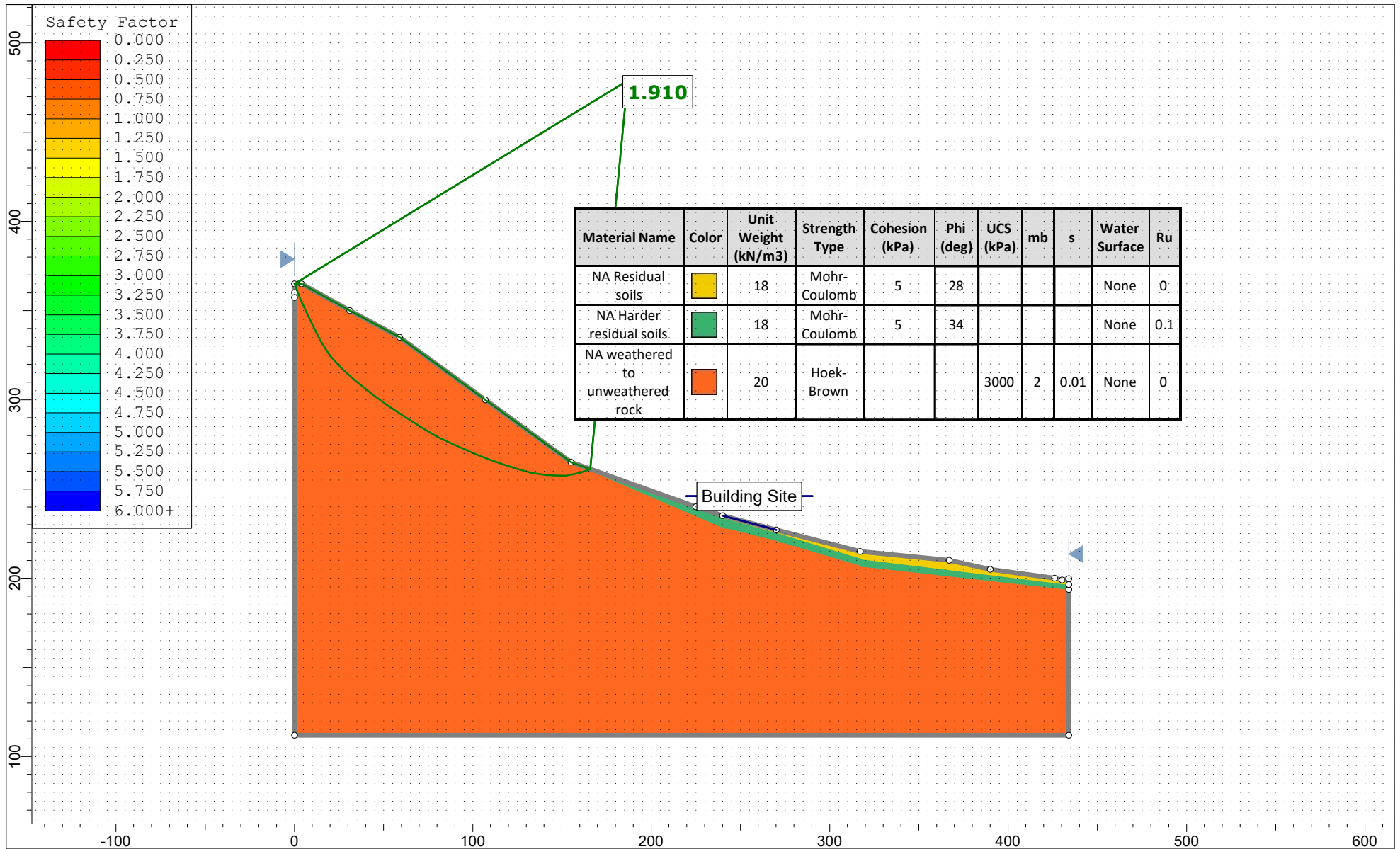
ARI	AEP	10m	20m	30m	1h
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APPENDIX E

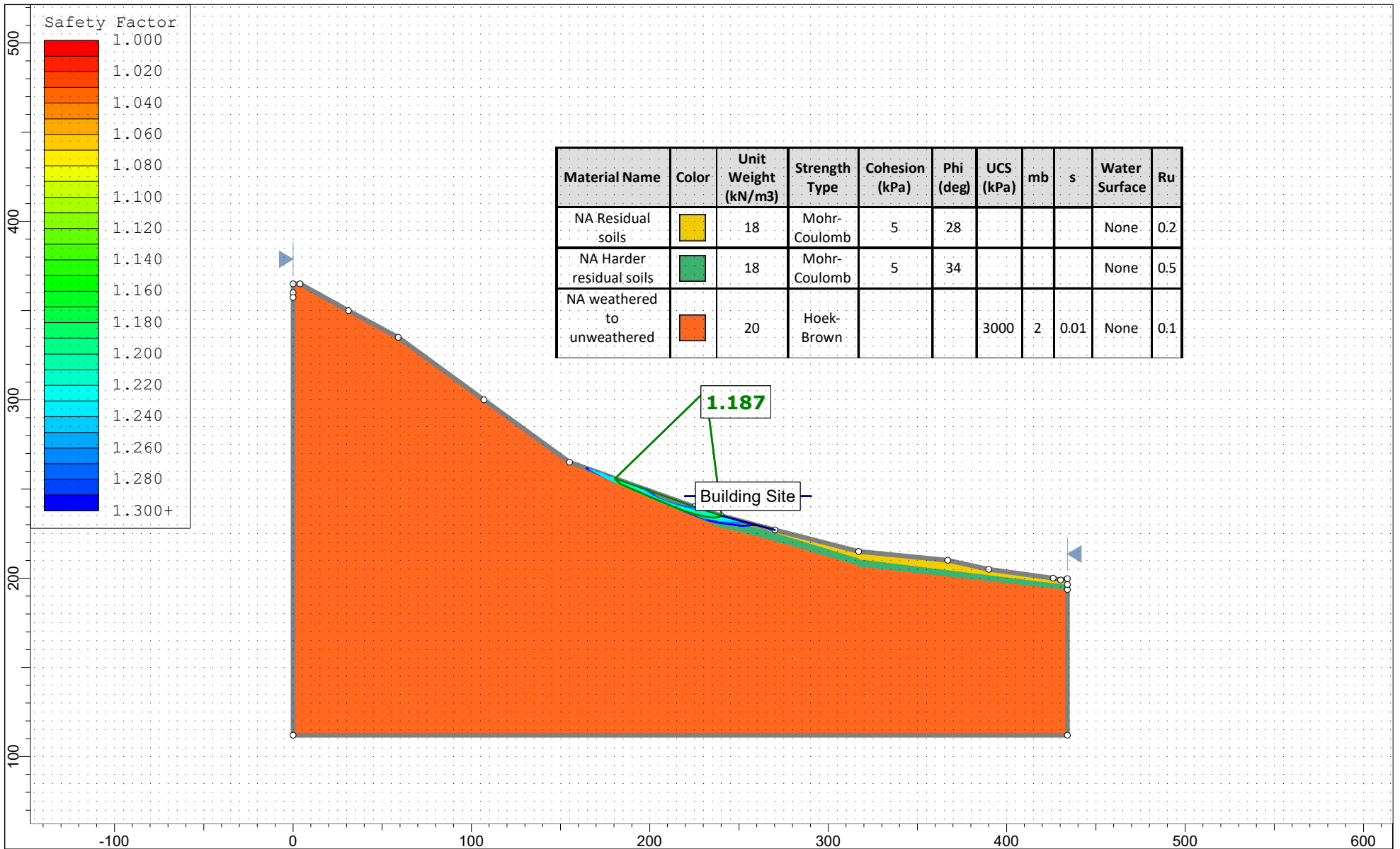
Slope Stability Models



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SLIDEINTERPRET 9.027

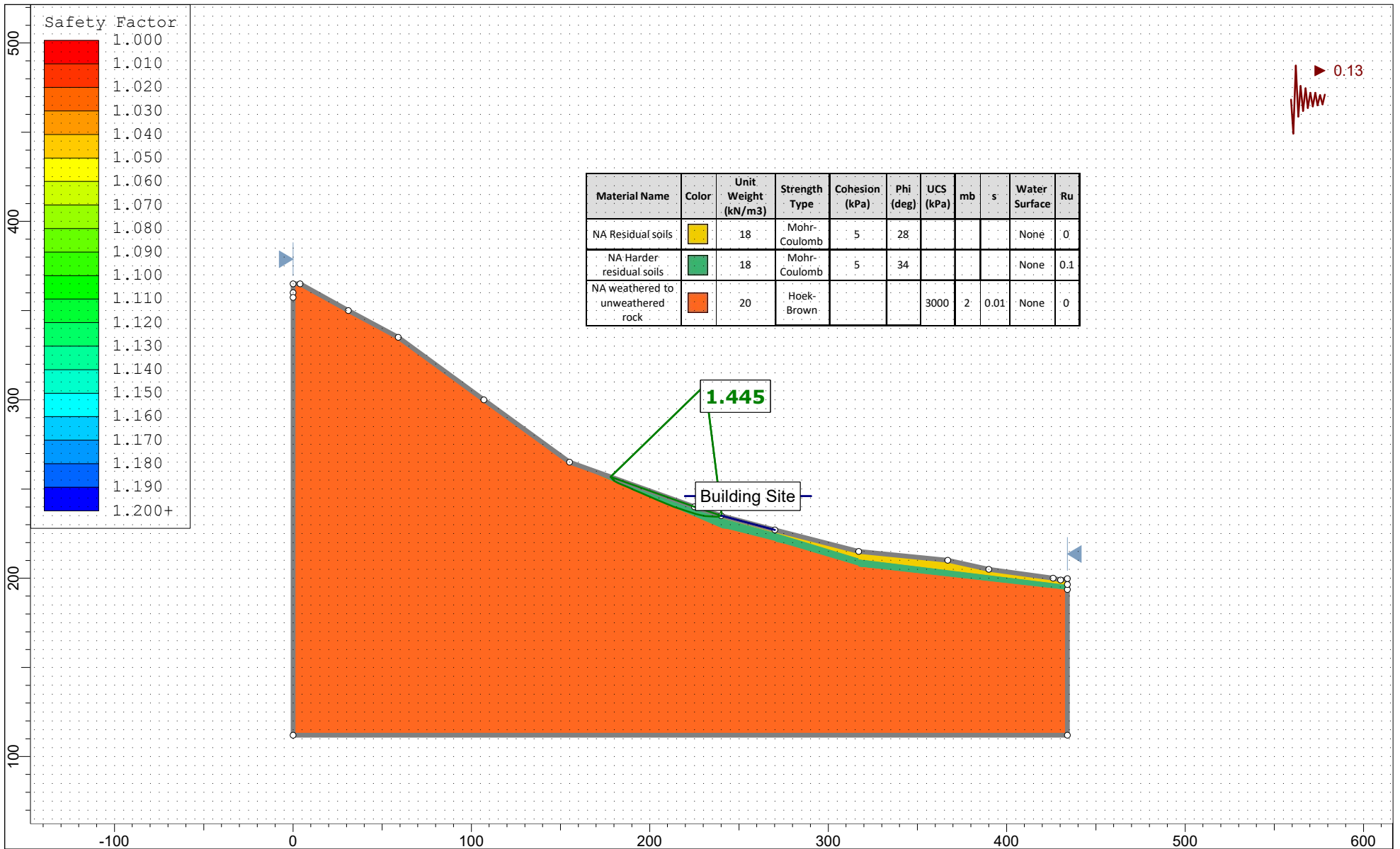
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Group	Existing Condition	Scenario	normal gw
Drawn By	RL	Company	Geologix Consulting Engineers Limited
Date	9/01/2024	File Name	lot 1.slmd



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SLIDEINTERPRET 9.027

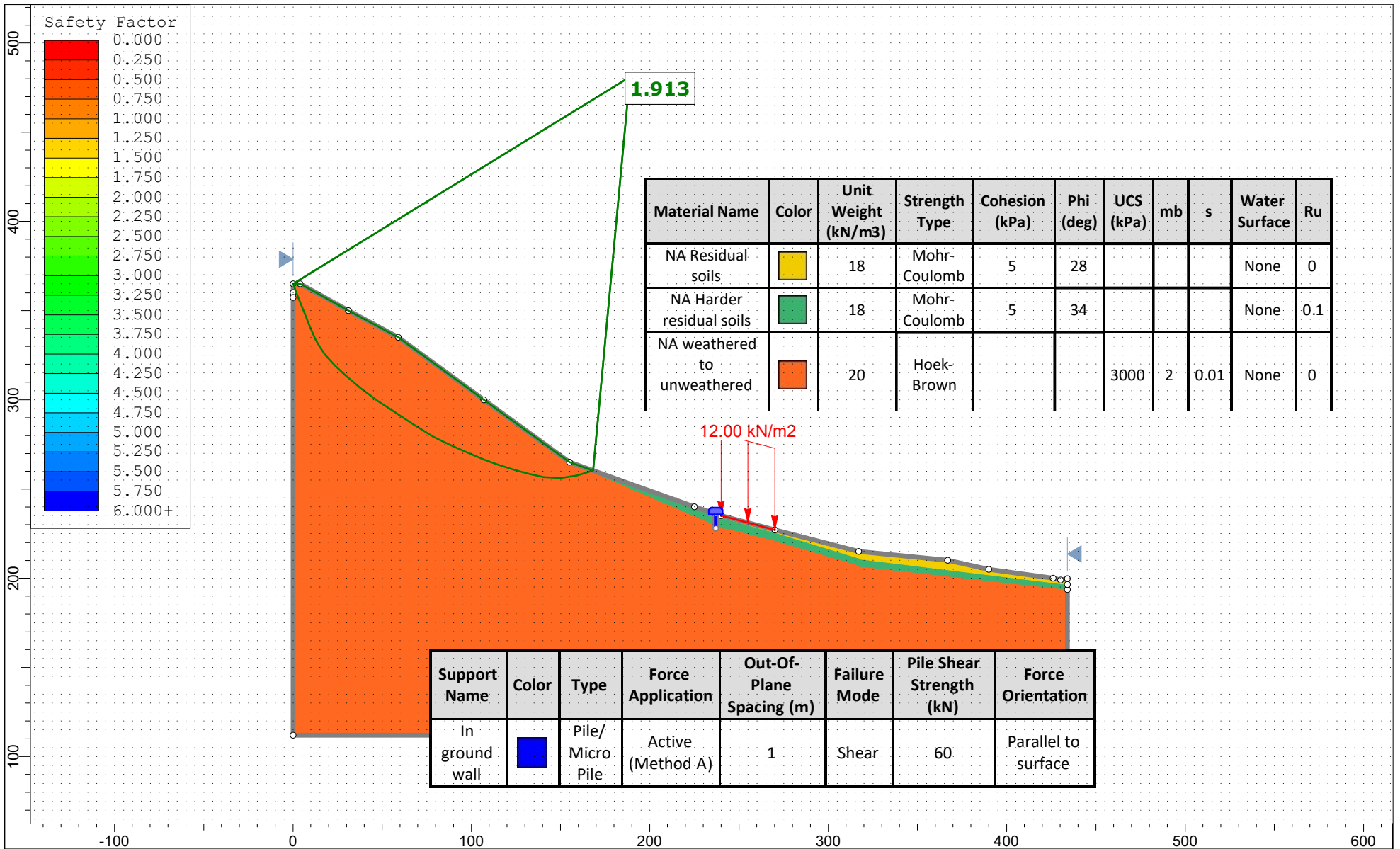
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Group	Existing Condition	Scenario	elevated gw
Drawn By	RL	Company	Geologix Consulting Engineers Limited
Date	9/01/2024	File Name	lot 1.sldm



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SLIDEINTERPRET 9.027

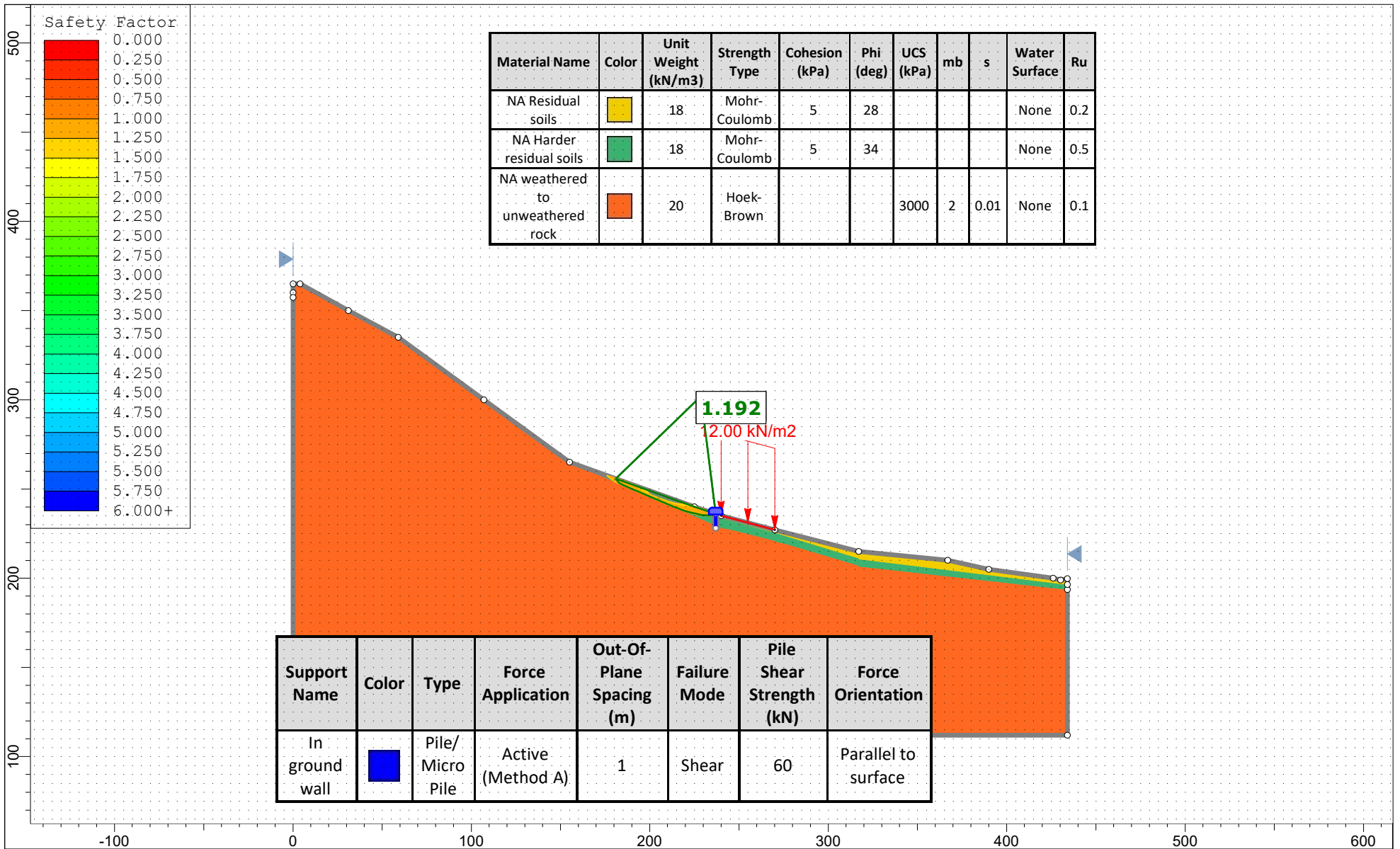
Project	C0021 - Lot 1 -AA		
Group	Existing Condition	Scenario	seismic
Drawn By	RL	Company	Geologix Consulting Engineers Limited
Date	9/01/2024	File Name	lot 1.sldm



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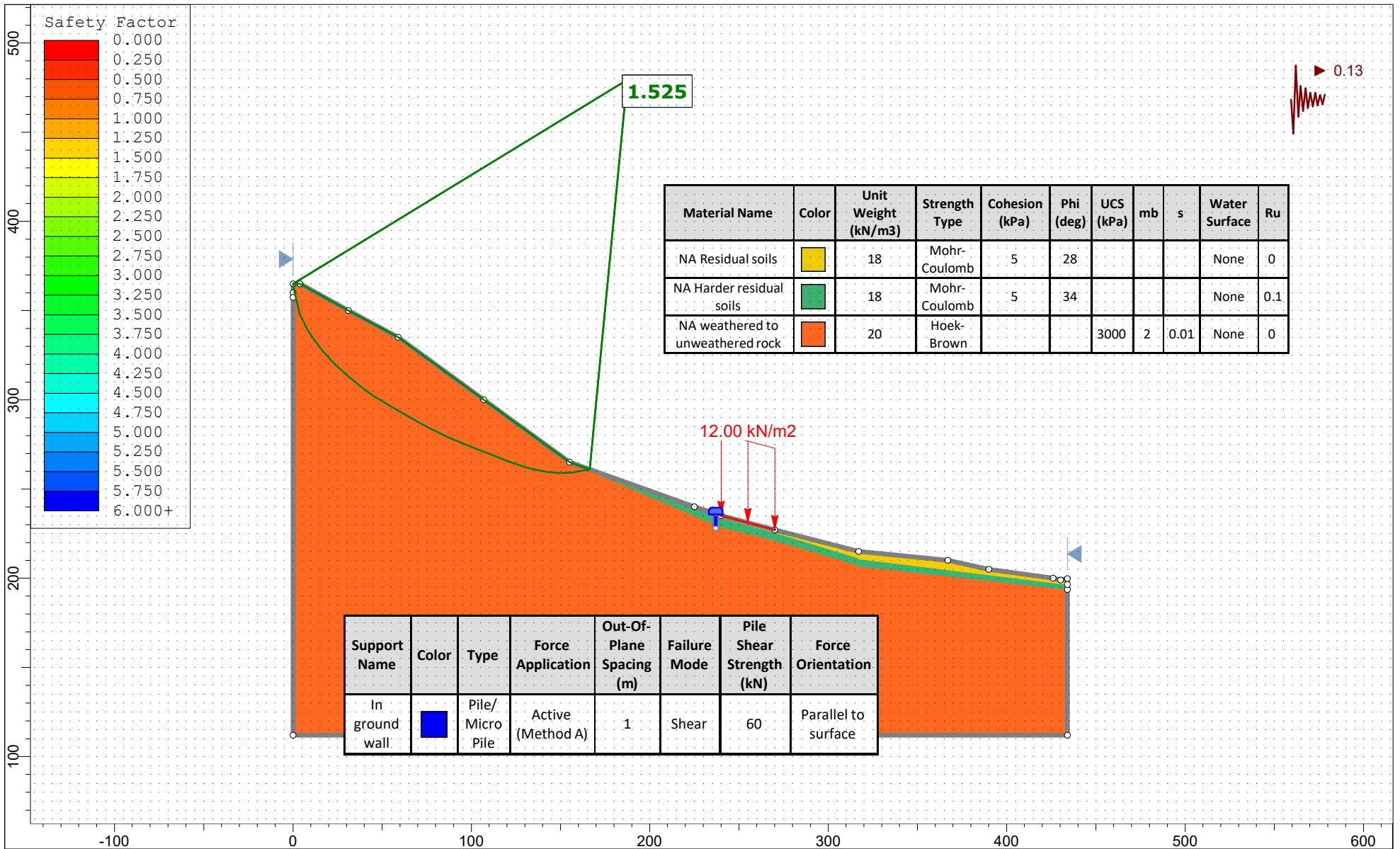
SLIDEINTERPRET 9.027

Project	C0021 - Lot 1 -AA'		
Group	Proposed Condition	Scenario	normal gw
Drawn By	RL	Company	Geologix Consulting Engineers Limited
Date	9/01/2024	File Name	lot 1.sldm



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Project	C0021 - Lot 1 -AA'		
Group	Proposed Condition	Scenario	elevated gw
Drawn By	RL	Company	Geologix Consulting Engineers Limited
Date	9/01/2024	File Name	lot 1.sldm



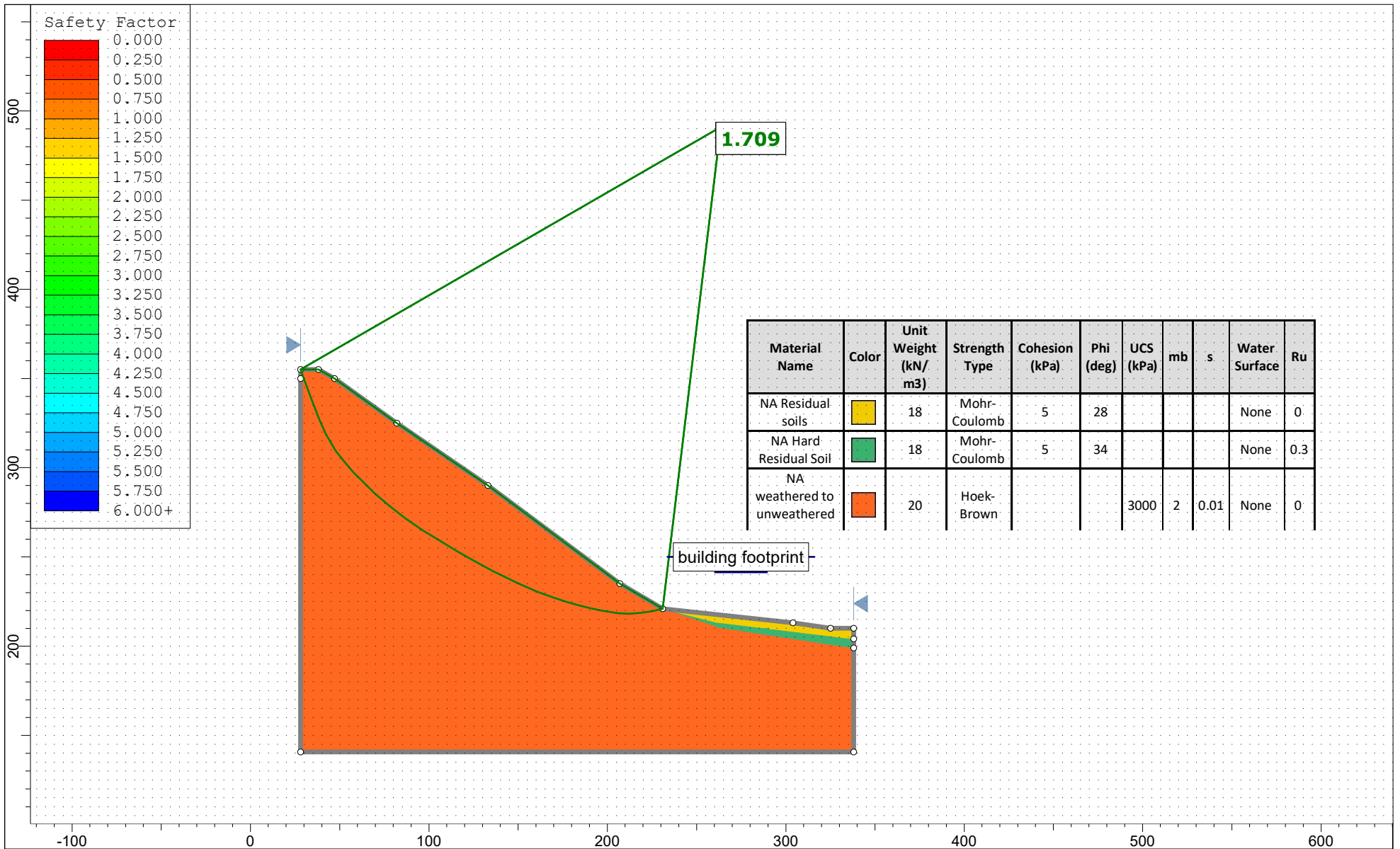
Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	UCS (kPa)	mb	s	Water Surface	Ru
NA Residual soils	Yellow	18	Mohr-Coulomb	5	28				None	0
NA Harder residual soils	Green	18	Mohr-Coulomb	5	34				None	0.1
NA weathered to unweathered rock	Orange	20	Hoek-Brown			3000	2	0.01	None	0

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (m)	Failure Mode	Pile Shear Strength (kN)	Force Orientation
In ground wall	Blue	Pile/ Micro Pile	Active (Method A)	1	Shear	60	Parallel to surface



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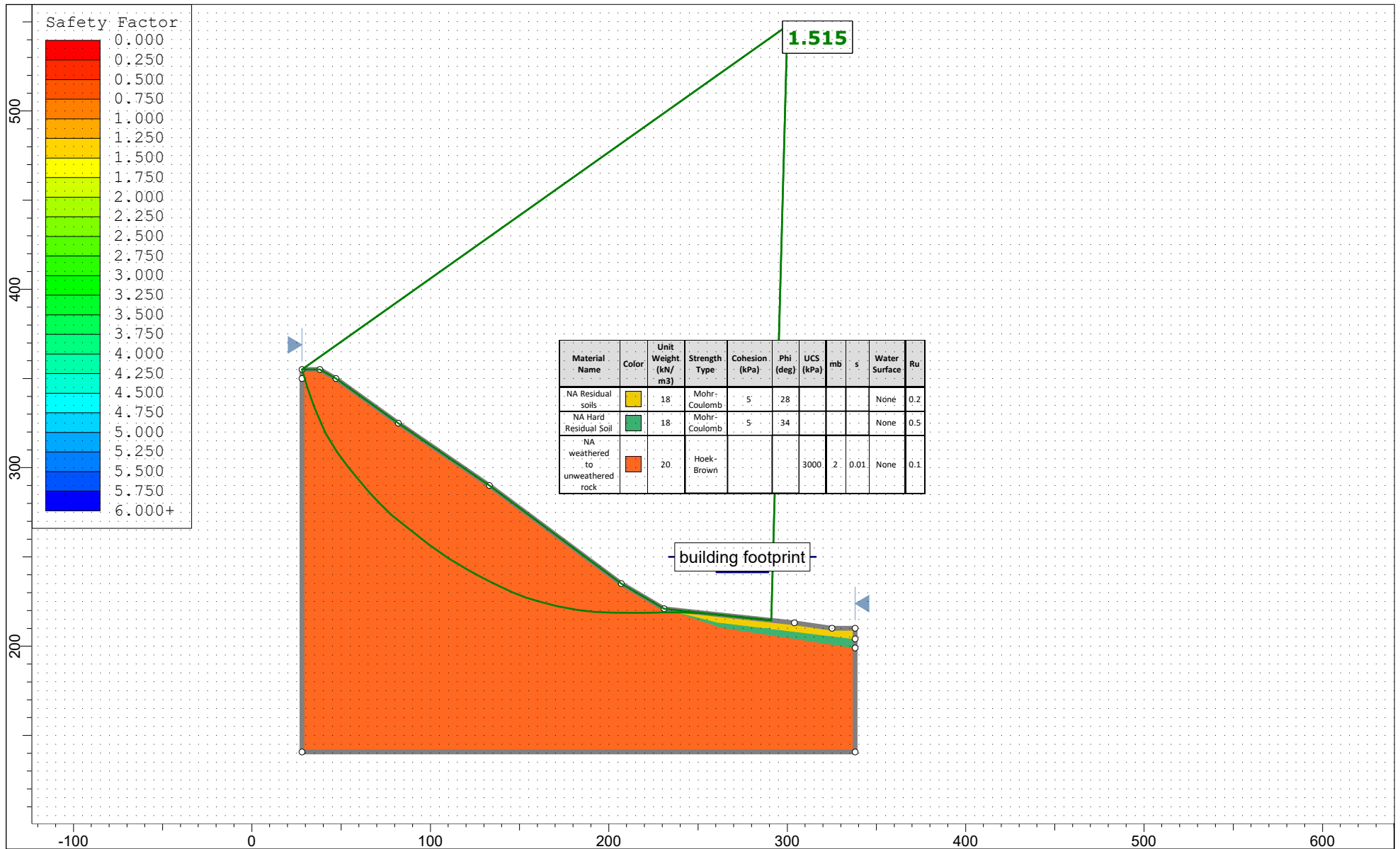
Project	C0021-Lot 1-AA		
Group	Proposed Condition	Scenario	seismic
Drawn By	RL	Company	Geologix Consulting Engineers Limited
Date	9/01/2024	File Name	lot 1.sldm




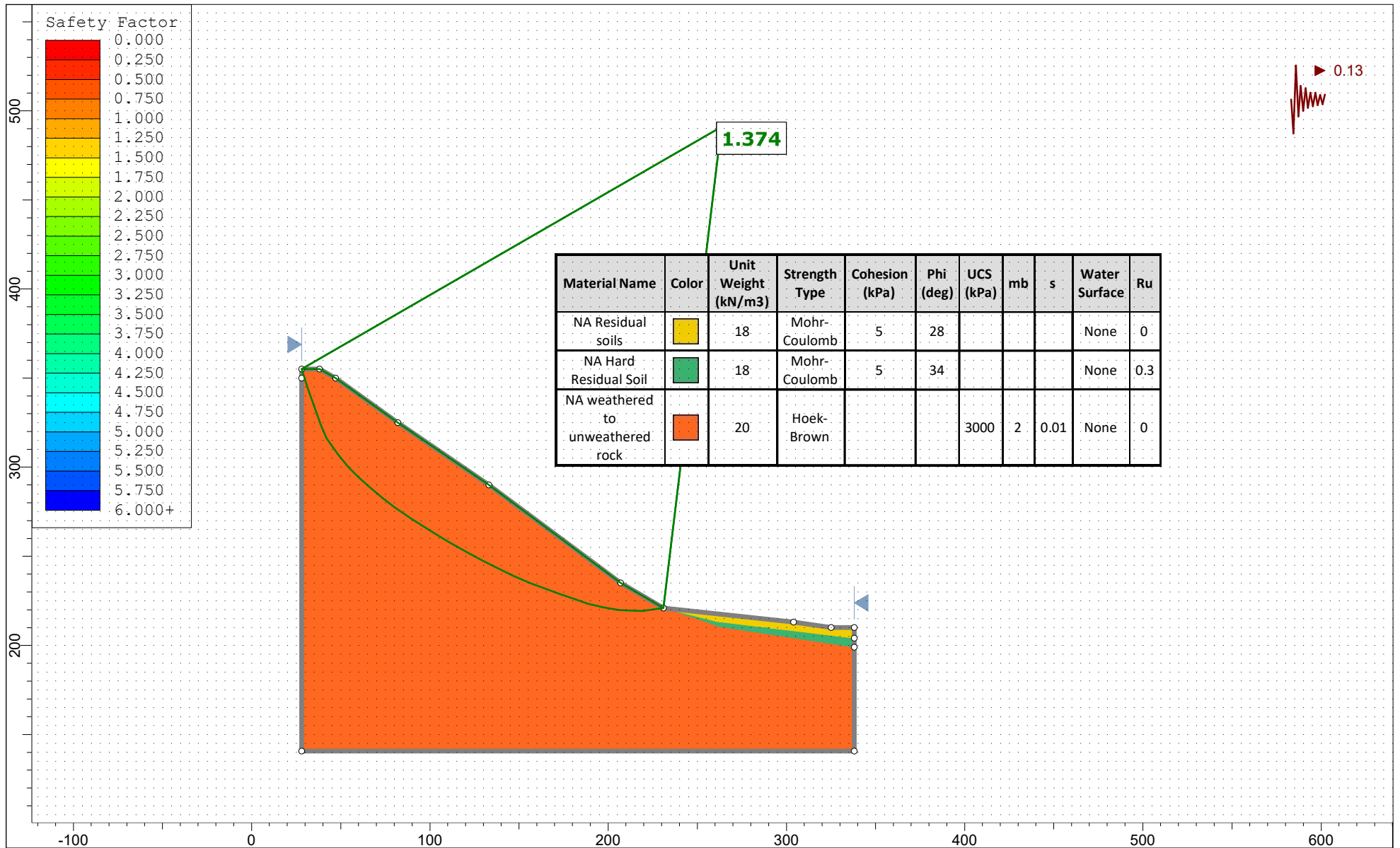
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Project	C0021_Lot2_BB'		
Group	Existing Condition	Scenario	normal gw
Drawn By	RL	Company	Geologix Consulting Engineers Lt
Date	20/12/2023	File Name	

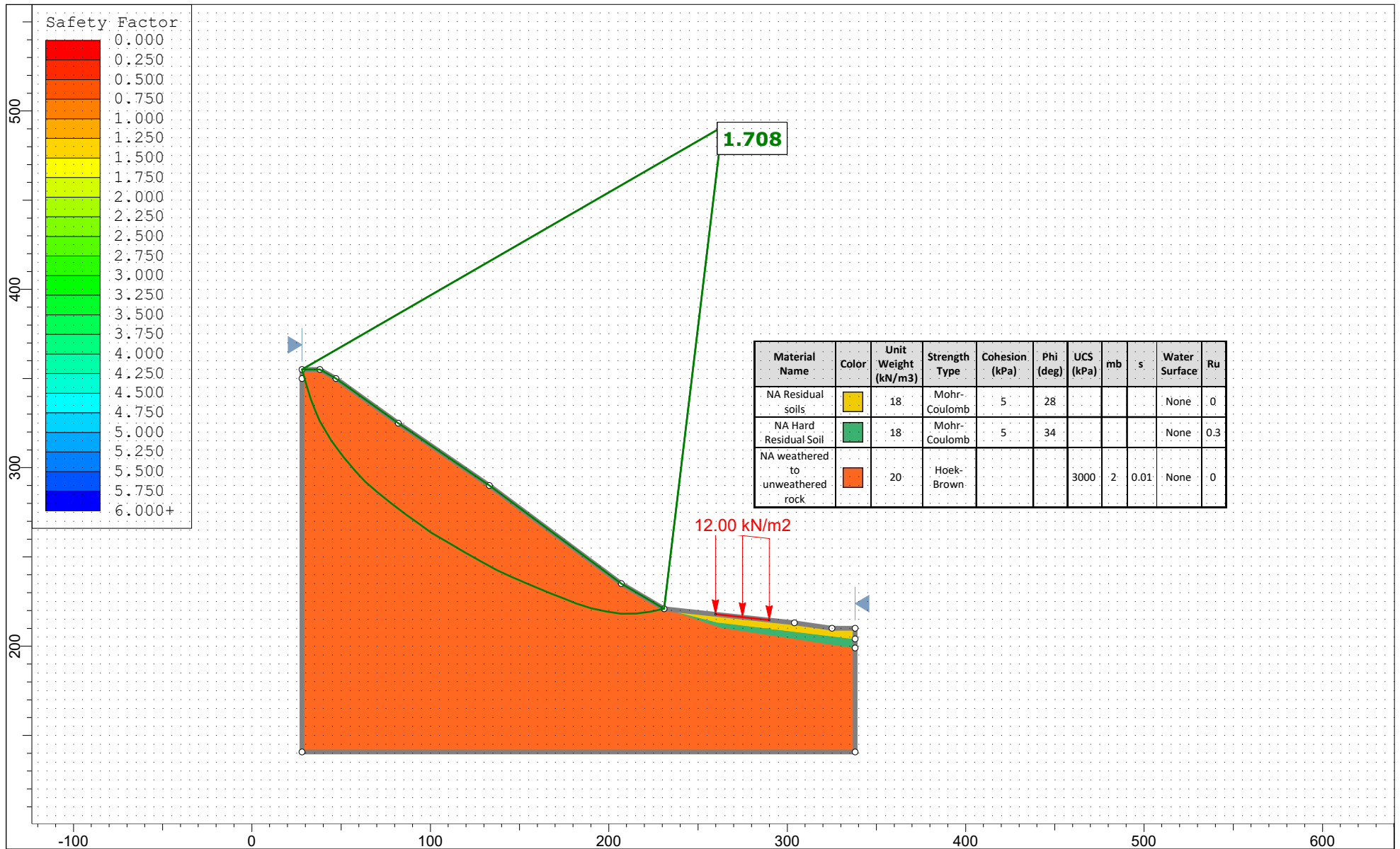


 geologix consulting engineers	Project		C0021_Lot2_BB'	
	Group		Existing Condition	
	Scenario		elevated gw	
	Drawn By		RL	
Date		20/12/2023		
Company		Geologix Consulting Engineers Lt		
File Name				




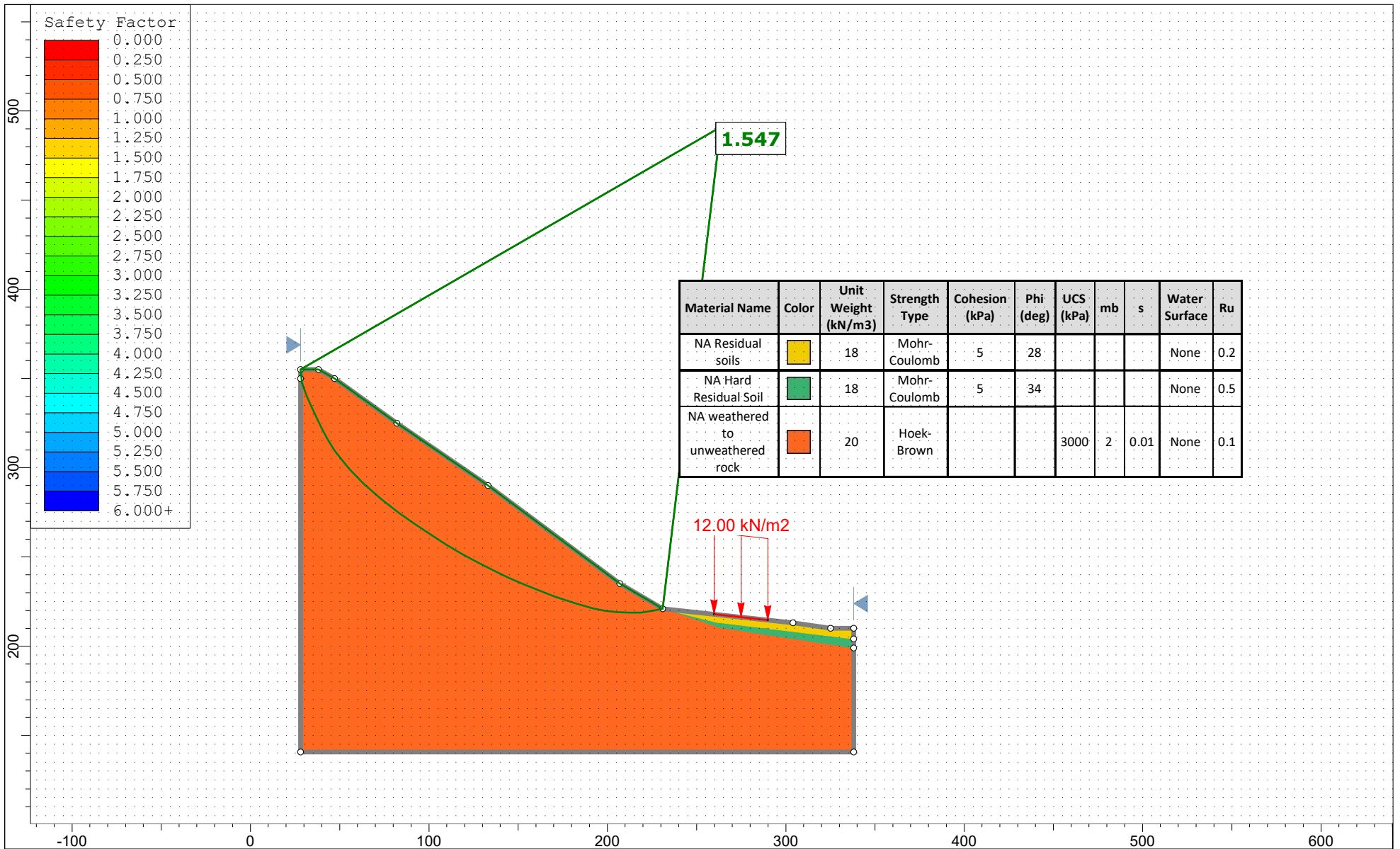
Material Name	Color	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (deg)	UCS (kPa)	mb	s	Water Surface	Ru
NA Residual soils		18	Mohr-Coulomb	5	28				None	0
NA Hard Residual Soil		18	Mohr-Coulomb	5	34				None	0.3
NA weathered to unweathered rock		20	Hoek-Brown			3000	2	0.01	None	0

	Project		C0021_Lot2_BB'	
	Group	Existing Condition	Scenario	seismic
	Drawn By	RL	Company	Geologix Consulting Engineers Lt
	Date	20/12/2023	File Name	




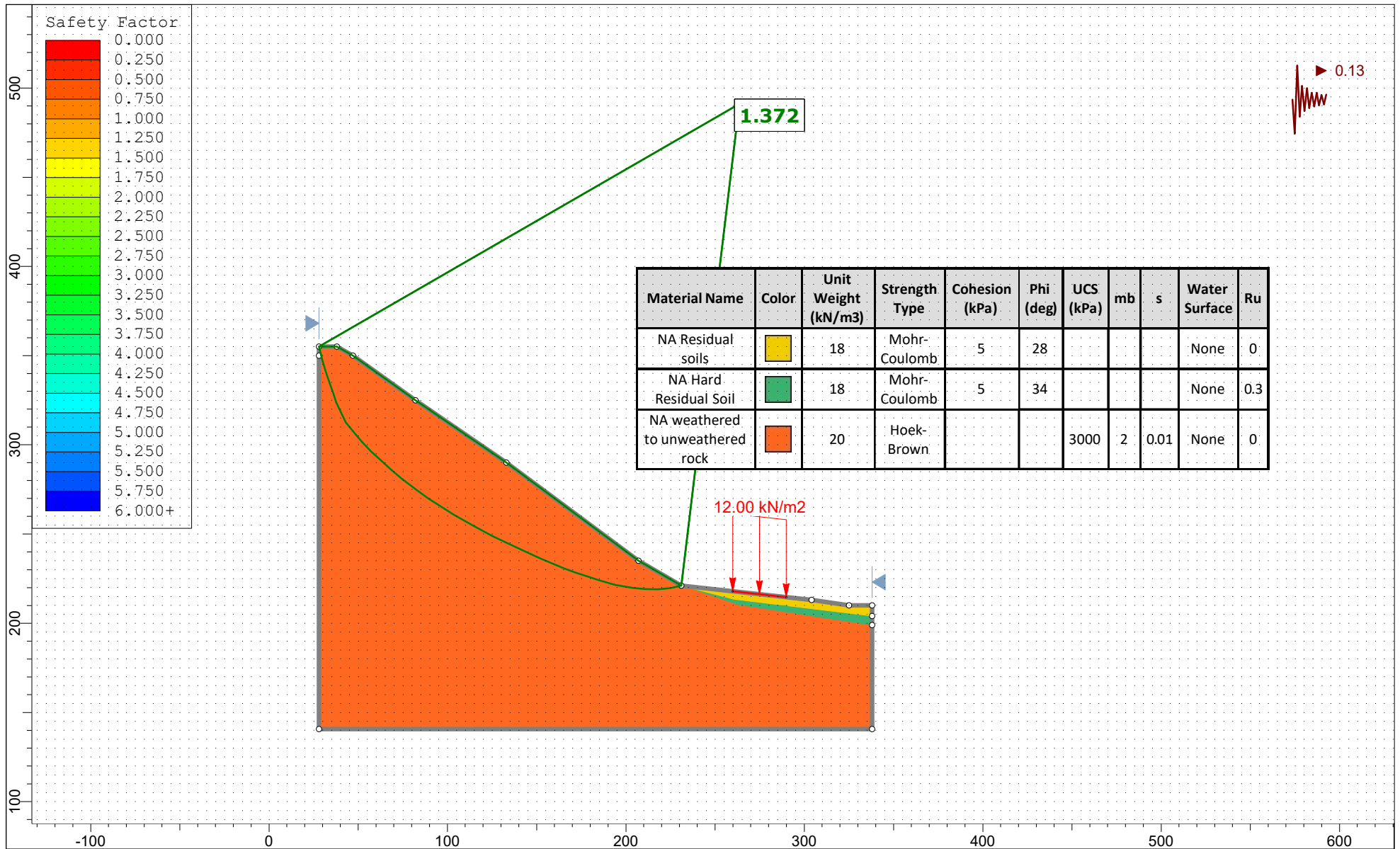
Material Name	Color	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (deg)	UCS (kPa)	mb	s	Water Surface	Ru
NA Residual soils	Yellow	18	Mohr-Coulomb	5	28				None	0
NA Hard Residual Soil	Green	18	Mohr-Coulomb	5	34				None	0.3
NA weathered to unweathered rock	Orange	20	Hoek-Brown			3000	2	0.01	None	0




 geologix consulting engineers	Project	C0021_Lot2_BB'	
	Group	Proposed Condition	Scenario normal gw
	Drawn By	RL	Company Geologix Consulting Engineers Lt
	Date	20/12/2023	File Name




Material Name	Color	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (deg)	UCS (kPa)	mb	s	Water Surface	Ru
NA Residual soils		18	Mohr-Coulomb	5	28				None	0.2
NA Hard Residual Soil		18	Mohr-Coulomb	5	34				None	0.5
NA weathered to unweathered rock		20	Hoek-Brown			3000	2	0.01	None	0.1

 geologix consulting engineers	Project		C0021_Lot2_BB'		
	Group		Proposed Condition	Scenario	elevated gw
	Drawn By		RL	Company	Geologix Consulting Engineers Lt
	Date		20/12/2023	File Name	



Material Name	Color	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (deg)	UCS (kPa)	mb	s	Water Surface	Ru
NA Residual soils		18	Mohr-Coulomb	5	28				None	0
NA Hard Residual Soil		18	Mohr-Coulomb	5	34				None	0.3
NA weathered to unweathered rock		20	Hoek-Brown			3000	2	0.01	None	0

 geologix consulting engineers	Project		C0021_Lot2_BB'	
	Group		Proposed Condition	
	Drawn By		RL	
	Date		20/12/2023	
	Scenario		seismic	
	Company		Geologix Consulting Engineers Lt	
	File Name			