Te Kaunihera o Te Hiku o te Ika
Far North District Council

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***

☐ **Change of Consent Notice (s.221(3))**

☐ **Certificate of Compliance (s.139)**

☐ **Extension of time (s.125)**

☐ **Discharge:** Total voume = _____ m³
Note; volumes >3m³ requires NRC Consent.

☐ **Subdivision**

☐ **Existing Use Certicicate (s.139A)**

☐ **Consent under National Environmental Standard**
(e.g. Assessing and Managing Contaminants in Soil)

☐ **Other (please specify)** _____

****The fast track is for simple land use consents and is restricted to consents with a controlled activity status.***

3. Would you like to opt out of the fast track process?

☑ **Yes** ☐ **No**

4. Consultation

Have you consulted with Iwi/Hapū? ☑ **Yes** ☐ **No**

If yes, which groups have you consulted with?
Muriwhenua

Who else have you consulted with?
Pre-application meeting held with Swetha Maharaj as attachment J

For any questions or information regarding iwi/hapū consultation, please contact:
The Resource Consents Planning Technicians, **planning_technicians@fndc.govt.nz**

5. Applicant details

Name/s: Avant Group

Email: [redacted]

Phone number:

Postal address:
(or alternative method of service under section 352 of the act)

Have you been the subject of abatement notices, enforcement orders, infringement notices and/or convictions under the Resource Management Act 1991? ● **Yes** ✓ **No**

If yes, please provide details.

n/a

6. Address for correspondence

Name and address for service and correspondence (if using an Agent write their details here)

Name/s: Nick Freeman

Email: [redacted]

Phone number:

Postal address:
(or alternative method of service under section 352 of the act)

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

7. 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: Proprietors of Muriwhenua

Property address/ location: Te Hapua 42 Block

8. Application site details

Location and/or property street address of the proposed activity:

Name/s: Proprietors of Muriwhenua

Site address/ location: Te Hapua 42 Block

Postcode 0484

Legal description: Te Hapua 42 Block **Val Number:**

Certificate of title: 517692

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? ◯ **Yes** ☑ **No**

Is there a dog on the property? ◯ **Yes** ☑ **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.

9. Description of the proposal

Please enter a brief description of the proposal here. Please refer to Chapter 4 of the *District Plan, and Guidance Notes*, for further details of information requirements.

The proposal is a discretionary activity relating to an area of 1.1 hectares of land fronting Te Hapua Road within the wider landholding. Muriwhenua propose to establish a Papakainga development consisting of 20 single family homes for the pupose of housing whanau.

If this is an application for a 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), with reasons for requesting them.

The proposal has been prepared in accordance with the following version of the FNDC Engineering Standards:

◯ **2009** ☑ **2023**

10. Would you like to request public notification?

◯ **Yes** ☑ **No**

11. Other consent required/being applied for under different legislation

(more than one circle can be ticked):

◯ **Building Consent** Enter BC ref # here (if known)

◯ **Regional Council Consent (ref # if known)** Ref # here (if known)

◯ **National Environmental Standard Consent** Consent here (if known)

◯ **Other (please specify)** Specify 'other' here

12. 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:

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? Please tick if any of the following apply to your proposal, as the NESCS may apply as a result? ◯ **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**

13. Natural hazards (National Policy Statement for Natural Hazards 2025)

Is the site subject to known or potential natural hazards (for example, flooding, coastal inundation, erosion, or unstable land), as contemplated by the National Policy Statement for Natural Hazards 2025? ◯ **Yes** ✔ **No**

If yes, please identify the relevant natural hazard(s) by ticking the applicable box(es) below:

- ◯ **Flooding**
- ◯ **Landslips**
- ◯ **Coastal Erosion**
- ◯ **Coastal Inundation**
- ◯ **Active Faults**
- ◯ **Liquefaction**
- ◯ **Tsunami**

Please ensure all relevant technical reports are submitted with the application.

14. 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.

Your AEE is attached to this application ✔ **Yes**

15. Draft conditions:

Do you wish to see the draft conditions prior to the release of the resource consent decision? ✔ **Yes** ◯ **No**

IIf yes, please be advised that the timeframe will be suspended for 5 working days as per s107G of the RMA to enable consideration for the draft conditions.

16. 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 in full) Avant Group

Email: [redacted]

Phone number: [redacted]

Postal address: (or alternative method of service under section 352 of the act) [redacted]

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 write in full) Megan Lockwood (Avant Group)

Signature: (signature of bill payer) [redacted] Date 24-Apr-2026

MANDATORY

17. 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.

18. Declaration

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

Name (please write in full) Nick Freeman

Signature [redacted] Date 24-Apr-2026

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

See overleaf for a checklist of your information...

Checklist of your information

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)
- ☑ Details of your consultation with Iwi and hapū
- ☐ 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.

tattico

Te Hāpua 42 Block

Muriwhenua

Application for Resource Consent and

Assessment of Environmental Effects

Draft - April 2026

Contents

Supporting Documents Provided

A. Certificate of Title
B. Wastewater Report, prepared by GWE
C. Ecology Report, prepared by Wild Ecology
D. Traffic Assessment, prepared by Engineering Outcomes
E. Geotechnical Report, prepared by Haigh Workman
F. Infrastructure Report, prepared by Maven
G. FN-ODP Rules Assessment, prepared by Tattico
H. FN-PDP Rules Assessment, prepared by Tattico
I. Objectives and Policies Assessment, prepared by Tattico
J. Pre-application Meeting Notes, prepared by Far North District Council

1 INTRODUCTION

This report is submitted in support of a land use consent application by Muriwhenua ("**the Applicant**") who are the landowners of a significant whenua Māori landholding in Te Hāpua, Far North District. The site is legally described as Te Hāpua 42 and is a 5,875-hectare Māori Freehold Title landholding that is managed under a Māori Incorporation by the Proprietors of Muriwhenua.

The proposal itself relates to an area of 1.1-hectare of land fronting Te Hāpua Road within the wider landholding. Muriwhenua propose to establish a Papakāinga development consisting of 20 single family homes for the purpose of housing whānau. The site is zoned General Coastal Zone.

The key issues with this proposal are the lack of infrastructure currently located at the area of works including:

- Wastewater treatments and disposal systems
- Potable water connections
- Communal accessways

These issues are effectively alleviated as the proposal includes providing all infrastructure on the site. The supporting specialists reports provide detailed descriptions on how each piece of infrastructure is provided. Dry service infrastructure is located near the site below Te Hāpua road and can be connected to the proposed development with minimal work.

Overall, resource consent is sought for a **Discretionary Activity**. The proposal is considered to be in accordance with the objectives and policies of the Far North District Plan and the relevant provisions of the Resource Management Act. On the basis of the assessment set out in this report, I consider that any adverse effects that will result from the establishment of this Papakāinga development can be appropriately mitigated and are less than minor overall.

This report has been prepared in accordance with the requirements of Section 88 and the fourth schedule of the Resource Management Act 1991 (RMA) and is intended to provide the information necessary for a full understanding of the proposal and any actual or potential effects the proposal may have on the environment.

2 APPLICANT AND PROPERTY DETAILS

APPLICANT AND PROPERTY DETAILS	
Applicant	Muriwhenua Incorporation
Address	Te Hāpua 42 Block
Legal Descriptions	Refer to Certificate(s) of Title at **Attachment A**
Site Area	5,875 hectares
Far North District Plan	
Zone	▪ General Coastal
Precinct	▪ n/a
Overlays	▪ Coastal Environment
Controls	▪ n/a
Road Classification	▪ n/a
Designations	▪ n/a

3 BACKGROUND

3.1 Relevant context

Muriwhenua is made up of six iwi: Ngāti Kurī, Ngāi Takoto, Te Pātū, Ngāti Kahu, Te Aupōuri and Te Rarawa. Muriwhenua are the owners of a large landholding of 5,875 hectares in the Far North region. At present it contains a single coastal settlement with a population of approximately 300 residents. The settlement is subject to coastal inundation, and the quality of the houses is poor. The need for warm and dry houses that will not flood is of great importance to Muriwhenua.

Through the Papakāinga Planning and Development Fund, Muriwhenua has been approved for funding by MHUD for the proposed development provided they acquire resource consent.

3.2 Pre-application meetings

A pre-application meeting was held on 15 May 2025 discussing the need for the housing and the reason for the location.

3.3 Engagement with iwi

Muriwhenua are supportive of this proposed development to get their whanau into warm and dry homes. This will have a major positive impact on their community.

3.4 Relevant plan changes

3.4.1 Far North Proposed District Plan ("PDP")

Far North District Council notified the Proposed District Plan (**PDP**) on 27 July 2022, which seeks to manage and protect the natural and physical resources that are important to the community, and to ensure that environmental qualities and values are safeguarded for future generations to enjoy.

Sections relating to earthworks and ecosystems and indigenous biodiversity have immediate legal effect and are relevant to this application.

No decision version of the plan has been released to date, therefore only those provisions mentioned above are applicable to this proposal. All relevant objectives and policies must be considered in accordance with Section 86A of the RMA.

The permitted baseline, receiving environment, assessment against objectives, policies and rules set out within this application take into account the PDP to the extent it is applicable. A complete assessment against the notified version of the PDP is included at **Attachment H** to this report.

4 SITE AND LOCALITY DESCRIPTION

4.1 Site and locality description

For the purpose of this application, the Site is the wider 5,875-hectare landholding legally described as Te Hāpua 42 Block, however it is really only the area of land being considered for the first stage of Papakāinga development that is relevant.

Figure 1: The Site (Area of works located by the star)

The Site comprises of the entire Muriwhenua landholding at the top of the north island. It is bounded by conservation land to the east and west. The bays Takapaukura and Kapowairua (Spirits Bay) are located directly to the north with the Pacific Ocean being the wider catchment. To the south of the Site is Parengarenga Harbour. It is a meandering body of water with many tributaries extending far in land. The Site has varied topography and is predominantly covered in regenerating indigenous vegetation and pinus radiata forestry.

4.2 Te Hāpua settlement description

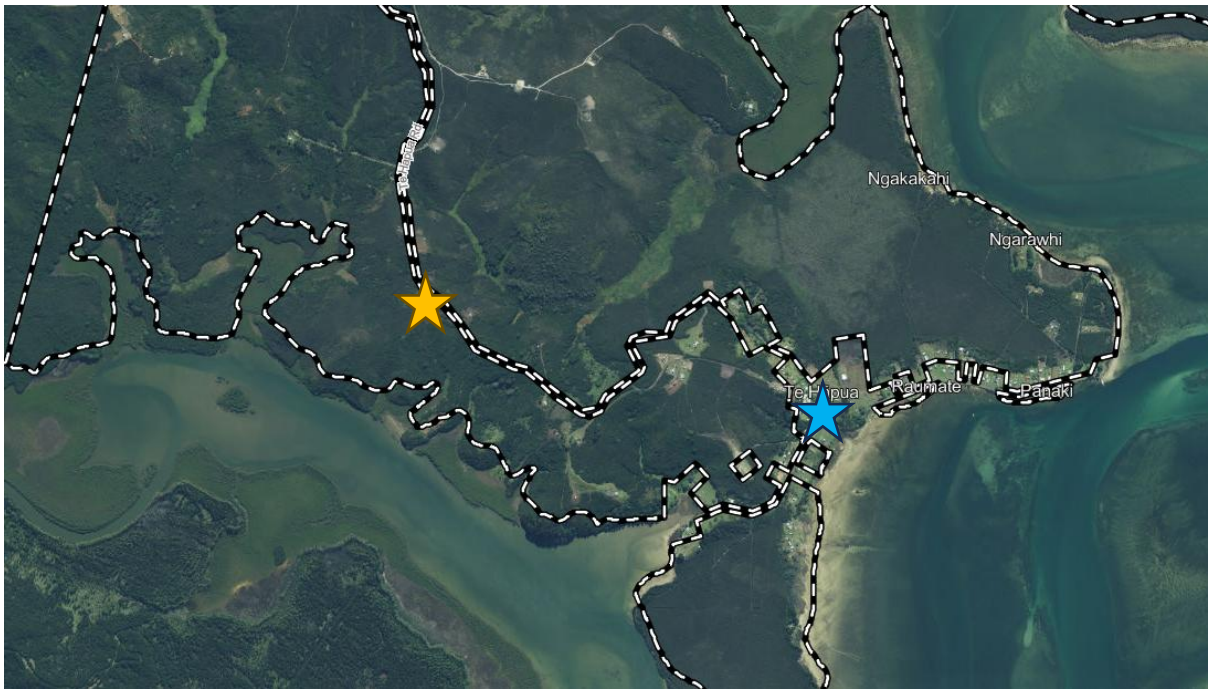

Figure 2: Southern Portion of the Site (Area of works and existing settlement located by the yellow and blue star respectively)

Focusing on the southern portion of the Site, the coastal settlement of Te Hāpua (identified with the blue star) is located on the Parengarenga Harbour beach front. It is a low-lying settlement that consists of near 300 people and is the northernmost settlement in New Zealand. It is categorised by low-density housing and is serviced by a local school and marae. There are multiple sites of significance to Māori including reserves and a cemetery.

4.3 Area of works description

The area of works is located approximately 2.5km northwest of the existing settlement. It is set significantly higher than the existing settlement although it is still located within the General Coastal zone. The proposed Papakāinga housing is situated approximately 300m north of Parengarenga Harbour. The area of works is appropriately set-back from all streams, tributaries, wetlands and bodies of water. Access to the land is primarily via Te Hāpua Road, Spirits Bay Road. The communal space, Te Hāpua marae, is located 1.6km east of the site (straight line distance). The area of works is located on the western side of Te Hāpua Road and comprises an area of approximately 1.1-hectares. See **Figure 3** below.

Figure 3: Area of works

The area is entirety comprised of secondary regenerating kanuka (Kunzea linearis var. linearis) scrubland/forest. The site does not contain any aquatic habitats (streams) or any areas that meet the definition of a natural inland wetland in terms of the NPS:FW 2020. This area is situated on a knoll of approximately 54.00 m RL which slopes gently down to Te Hāpua Road to the north-east, moderately down towards the south (between 12 – 13°), and steeply down towards the north-west at approximately 25 to 30°. There is an existing track that runs from Te Hāpua Road, around the southern side of the knoll and on to a narrow ridgeline that extend towards the south-west of the knoll.

5 PROPOSAL

5.1 Description of the proposal

A summary of the key elements of the proposal is set out below. More detailed descriptions of the various components of the proposal are set out in the plans and reports appended to this report, including:

Supporting information		
Attachment	**Plan set / report**	**Prepared by**
Attachment B	Wastewater Report	GWE
Attachment C	Ecology Report	Wild Ecology
Attachment D	Traffic Assessment	Engineering Outcomes
Attachment E	Preliminary Geotechnical Appraisal Area_1	Haigh Workman Ltd
Attachment F	Infrastructure Report	Maven
Attachment G	FN-ODP Rules Assessment	Tattico
Attachment H	FN-PDP Rules Assessment	Tattico
Attachment I	Objectives and Policies Assessment	Tattico
Attachment J	Pre-application Meeting Notes	Far North District Council

5.1.1 Overview of proposed development

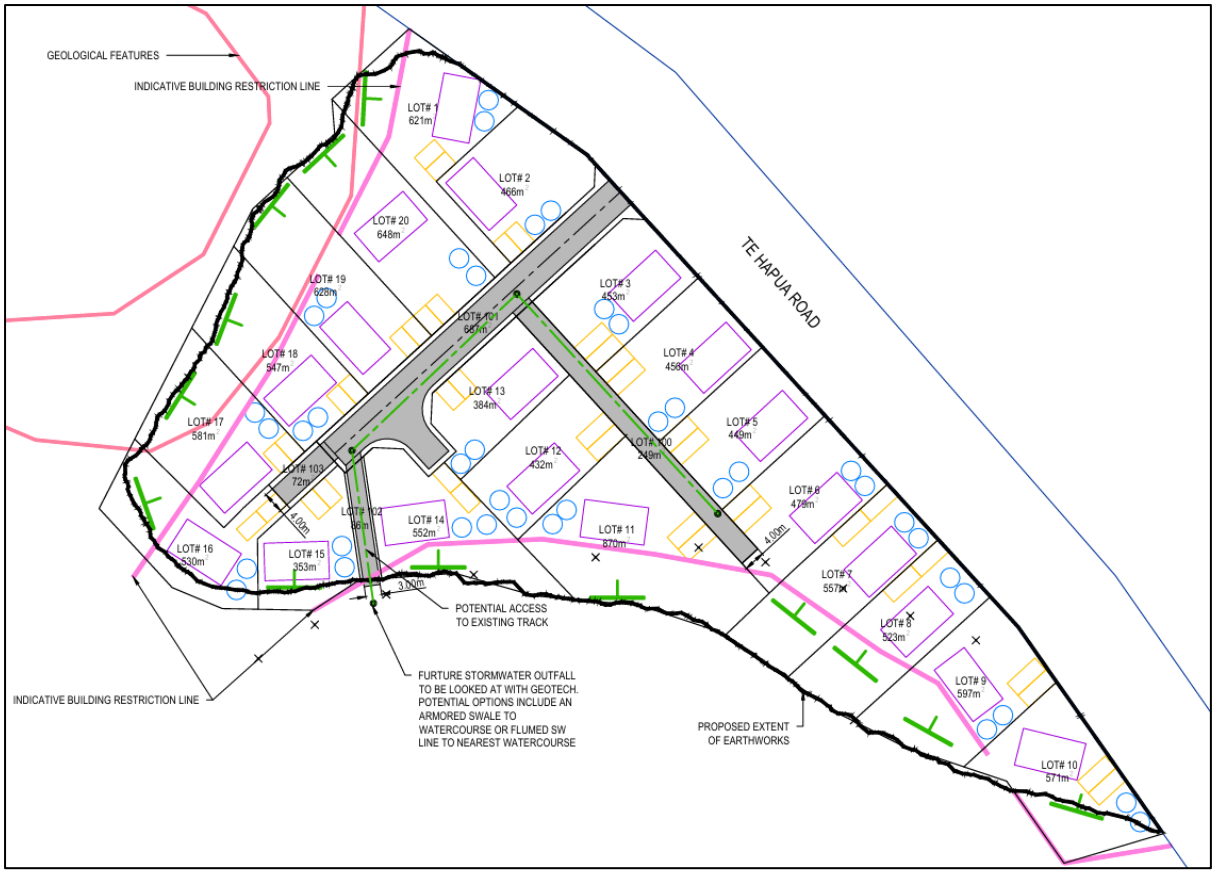

Figure 3: Masterplan

The proposed development includes:

- 20 detached family homes
- Each house includes an indicative private-use section ranging from 353m^2-870m^2. Note that no subdivision is proposed however.
- A 7m x 12m building platform

5.1.2 Access and parking

- Four of the houses will have direct access from Te Hāpua Road.
- All remaining houses will be access via communal accessway
- Each unit will be provided with two uncovered carparks.

5.1.3 Landscaping

A range of vegetation including fruit trees will be planted throughout the application site.

5.1.4 Site works

Earthworks on the site are proposed for the location of the houses and new access ways. The earthworks will involve a ground disturbance of 11,200m^2. The cut will be approximately 5.5m at its maximum and the fill will be approximately 0.5m at its maximum. The bulk earthwoks involve 21.179m^3. The excess cut will be disposed of within the wider Te Hāpua Site.

The current design does not rely on retaining walls although batters will be used. The design of these batters is subject to a comprehensive geotechnical analysis.

5.1.5 Servicing

The site has no existing infrastructure on it except for Te Hāpua Road and power and communications networks present within Te Hāpua Road or nearby. All servicing and infrastructure will be provided and localised on site including:

- Two 22,500L water tanks
- Effluent processing and disposal facilities
- Communal accessways

5.1.6 Subdivision

No subdivision is proposed for this development. Muriwhenua will maintain the landholding in its current state.

5.1.7 Northland Regional Council

The proposed works may trigger the need for resource consents under the Northland Regional Plan. Separate resource consent will be sought from Northland Regional Council prior to the implementation of any works consented under the current application.

6 REASONS FOR CONSENT

6.1 Introduction

Resource consent is being sought to enable the proposal (as described in this report and supporting material) and this report intends to identify all necessary consents for those activities to occur. The list of reasons for consent may not be an exhaustive list and if further consent matters are identified post-lodgement of the application, those should also be considered as forming part of this application.

A fulsome assessment of the relevant planning provisions is included at **Attachment G** to this report. The following serves as a summary of the resource consent triggers that have been identified, as well as any permitted activities the proposal is relying on.

6.2 Land use consents under Section 9 of the Resource Management Act 1991

6.2.1 Far North District Plan – Operative

Chapter 10 General Coastal Environment

- The construction and use of Papakāinga Housing (20 houses proposed) is a controlled activity under Rule 10.6.5.2.1. The proposed development infringes the standards under this Rule and is a **discretionary activity** under Rule 10.6.5.4.
- The construction and use of dwellings (20 proposed) is a **discretionary activity** under Rule 10.6.5.4.4 – Integrated Development

Chapter 15 Transportation

- The proposed development generates 80 vehicle movements a day and resource consent is sought for a **discretionary activity** under Rule 15.1.6A – Traffic.

6.2.2 Far North – Proposed District Plan

A rules assessment against the provisions of FN-PDP is included as **Attachment H** to this report. In addition to the matters set out above, the proposal also requires consent under the Notified Version of FN-PDP for the following reasons:

Part 2 – Natural Environment Values

- The proposal involves the clearing of 1.1 hectares of naturally regenerated kanuka scrubland and resource consent is sought for a **discretionary activity** under Rule IB-R4 - Indigenous vegetation clearance and any associated land disturbance outside a Significant Natural Area

6.2.3 Land use consents summary

Overall, the proposed land use consents triggered by the proposal are to be assessed as a **discretionary activity.**

6.3 Permitted activities

Schedule 4 of the RMA requires that where an application is relying on a permitted activity as part of the proposal, a description of the permitted activity that demonstrates that is complies with the requirements, conditions and permissions for the permitted activity must be provided. The proposal relies on the following permitted activities:

Far North District Plan - Operative

- 10.6.5.1.1 Visual amenity
- 10.6.5.1.3 Scale of activities
- 10.6.5.1.4 Building height
- 10.6.5.1.5 Sunlight
- 10.6.5.1.6 Stormwater management
- 10.6.5.1.7 Setback from boundaries
- 10.6.5.1.10 Noise

Far North District Plan - Proposed

- EW-R13 Earthworks and erosion and sediment control

6.4 Reasons for consent conclusion

Overall, the land use components of the proposal are to be assessed as a **discretionary activity**.

7 PUBLIC NOTIFICATION ASSESSMENT

An assessment is required under Sections 95A and 95D to determine whether an application is to be publicly notified. The required assessment is set out below.

Section 95A of the RMA sets out the steps that a consent authority must follow, in the given order, to determine whether to publicly notify an application for resource consent. The performance of the application against the relevant criteria of section 95A is provided below.

7.1 Step 1 - Mandatory public notification in certain circumstances

Step 1 (Sections 95A(2) and (3)) requires public notification where the applicant has requested that the application be publicly notified, or when the application is made jointly with an application to exchange recreation reserve land under section 15AA of the Reserves Act 1977.

The above does not apply to this proposal.

7.2 Step 2 – If not required by step 1, public notification precluded in certain circumstances

Step 2 (Sections 95A(4) and (5)) precludes public notification where all applicable rules and national environmental standards preclude public notification, if the application is for a controlled activity, or if the application is for a boundary activity (restricted discretionary, discretionary or non-complying activity status).

In this case, the applicable rules do not preclude public notification, and the proposal is not for a controlled activity or a boundary activity.

7.3 Step 3 – If not precluded by Step 2, public notification required in certain circumstances

Step 3 (Sections 95A(7) and (8)) sets out that where public notification is not precluded under Step 2, then an application is to be publicly notified if it is subject to a rule or national environmental standard that requires public notification, or if a consent authority decides in accordance with Section 95D that the activity will have or is likely to have adverse effects on the environmental that are more than minor.

In this case, the application is not subject to a rule that requires public notification. An assessment against the requirements of Section 95D is set out in Section 7.6 below, where it is concluded that any adverse effects on the environment will be less than minor and do not meet the threshold for public notification.

7.4 Step 4 – public notification in special circumstances

Step 4 (Section 95A(9)) requires that if public notification has not been precluded or required under Steps 1 to 3, then a determination must be made as to whether special circumstances exist in relation to the application that would warrant the application being publicly notified.

In this case, no special circumstances have been identified that would warrant public notification of the application. Special circumstances are those that are exceptional or unusual, but something less than extraordinary; outside of the common run of applications of this nature; or circumstances which make notification desirable, notwithstanding any conclusion under Section 95D that adverse effects will be no more than minor. In this case, the development of 20 residential dwellings for the Muriwhenua community in Te Hāpua are not out of the ordinary. No special circumstances are considered to exist.

7.5 Parameters of an assessment under Section 95D

For the purpose of Section 95A(8)(b) of the RMA, a consent authority must determine whether an activity will have or is likely to have adverse effects on the environment that are more than minor. The scope of any assessment under Section 95D is defined by the matters at 95D(a) to (e), which are addressed below.

7.5.1 Section 95D(a)

The assessment must disregard any effects on persons who own or occupy the following land:

The site is entirely bound by conservation zones to the east and west. The site is located to the north of a rural production zone at 7290 Far North Road, Te Kao. The sites are separated by a body of water.

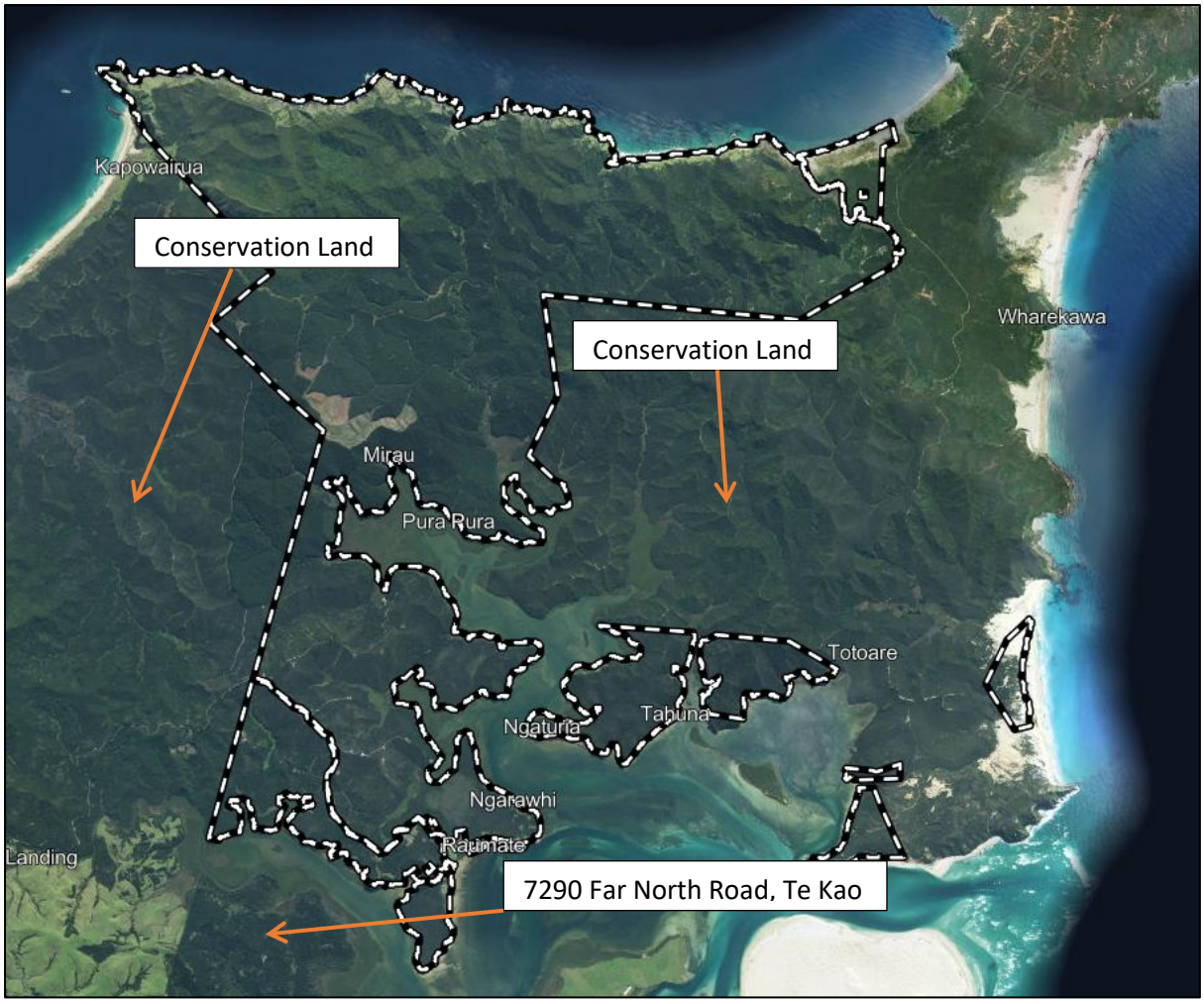

Figure 4: Adjacent properties

7.5.2 Section 95D(b)

The assessment may disregard an adverse effect on the activity if a rule or national environmental standard permits an activity with that effect (**the permitted baseline**). The following permitted activities may be undertaken on the Site:

- C10 – Coastal Environment
  - 10.6.5.1.1 Visual Amenity
  - 10.6.5.1.3 Scale of Activities
  - 10.6.5.1.4 Building Height
  - 10.6.5.1.5 Sunlight
  - 10.6.5.1.6 Stormwater Management
  - 10.6.5.1.7 Setback from Boundaries
  - 10.6.5.1.10 Noise

- Part 2 – District Wide Matters
    - EW-R13 Earthworks and erosion and sediment control

The above matters form a permitted baseline that may be usefully applied to the proposal, and accordingly, these effects have been disregarded in the assessment that follows.

7.5.3 Section 95D(c)

In the case of discretionary activities, the assessment may have regard to any adverse effect of the activity that Council deems relevant. For completeness, Council's discretion is unfettered. The assessment that follows in Section 7.6 identifies the relevant assessment matters although Council's assessment is not limited to those matters.

7.5.4 Section 95D(d)

In this case, no trade competitors have been identified, and the effects of trade competition have been disregarded in the assessment that follows.

7.5.5 Section 95D(e)

In this case, no written approvals have been sought or received in relation to the application.

7.6 Assessment of adverse effects on the wider environment

The following assessment is an analysis of the actual and potential adverse effects arising from the proposal. The application is to be considered as a discretionary activity overall and subsequently, Council's discretion is unfettered in this case.

7.6.1 Character, amenity and streetscape effects

The proposed activity requires resource consent for a **discretionary activity** under Rule 10.6.5.2.1 and 7.6.7.1.4. The relevant assessment criteria include, but is not limited to:

- Papakāinga Housing

  (i) the number and location of dwellings;

  (ii) the location and standard of access;

  (iii) screening and planting.

- Integrated Development

  (i) the objectives and policies of the Plan;

  (ii) the degree to which the application exceeds the standards for the zone;

  (iii) the degree to which the potential effects of the application have been avoided, remedied or mitigated;

  (iv) any other matter which it determines to be relevant to the application.

The proposed development provides 20 houses so as to not require the removal of large areas of biodiversity. 16 of the houses are accessed via JOALs. Four of the houses have direct access to Te Hāpua Road. This layout was designed to make use of the natural topology without requiring the need for unnecessary earthworks. All the units have vegetation within their boundaries although these boundaries are not subdivided. The location was chosen for its low ecological value which has been cleared previously for agricultural purposes and the current biodiversity currently on-site is natural regrowth. All the houses are screened from Te Hāpua Road.

The proposed development meets the objectives and policies of the Plan. Although the proposed development does not provide at least 3000m^2 of exclusive use land, this is not deemed necessary as the Muriwhenua community lives traditionally a denser rural life in Te Hāpua than what is provided for in the Plan. The proposed lot sizes range from 353-870m^{2,} but the wider landholding is not being subdivided and remains available to the Muriwhenua community. This proposal is not about maximising development potential, but establishing safe and healthy housing for an existing community.

Significant consideration has been taken to ensure the geotechnical, ecological, wastewater and infrastructure effects have been avoided, remedied and mitigated. This site was chosen for its developable land, low ecological value, topographical features to allow for the disposal of wastewater and the ability to provide necessary infrastructure. The proposed development is necessary to provide warm, safe and dry housing to the Muriwhenua community, many of which are experiencing flooding and coastal inundation in their properties and dwellings. This proposed development will greatly increase the quality of life to this community.

Any character, amenity and streetscape effects arising from the proposal are considered to be internalised within the application site given the location across an area of 1.1ha within the wider landholding of 5,875-hectares. Further, the significant levels of mature trees across the wider landholding and the shear distances to adjacent land mean that any physical changes within the area of works will not be perceived from outside the site.

Overall, the adverse effects arising from the proposed development is negligible.

7.6.2 Transport effects

The proposed activity requires resource consent for a **discretionary activity** under Rule 15.1.6A.5.1 – Traffic Intensity. There are no associated assessment criteria relating to this activity although I provide general comments below that confirm that transport effects will be less than minor.

A traffic report prepared by Engineering Outcomes (**attachment D**) concludes that,

> *"Overall, with the measures proposed and as shown in Figure 1 – vegetation trimming and, probably, sight benching on the edge of Te Hāpua Road in relation to the main access plus the installation of a warning sign opposite the main access, it is concluded that the traffic effects of the proposal will be well managed such that the associated risks are well within acceptable limits.*
>
> *In particular, with the recommended work, all sight distances will exceed the safe-stopping sight distance standard in all directions, with the important directions all at least close to the safe intersection standard – the highest standard applicable to safety.*
>
> *Te Hapua Road and its intersection with Far North Road are fit-for-purpose even with the additional traffic and the additional dust is not expected to create a significant nuisance.*
>
> *Overall, it is concluded that the traffic engineering effects and safety risks associated with the proposal will be well within acceptable limits and less than minor."*

I agree with the expert analysis of Engineering Outcomes. Overall, the adverse transport effects arising from this development are less than minor.

7.6.3 Infrastructure effects

The proposed activity requires resource consent for a **discretionary activity** under Rule 10.6.5.4.4 – Integrated Development. The relevant assessment criteria includes:

(iii) the degree to which the potential effects of the application have been avoided, remedied or mitigated; and

(iv) any other matter which it determines to be relevant to the application.

The development of Papakāinga housing risk generating adverse effects relating to infrastructure. The Infrastructure Report prepared by Maven (**attachment F**) concludes that this development is acceptable provided the design is further refined from specialist input. I agree with the expert analysis and provide Maven's conclusions below.

Earthworks

"The earthworks design is purposefully in cut, as to reduce the likelihood of instability issues. The excess material will need to be disposed off in an affordable means, and the location/methodology will be important to keep costs down. Final earthwork levels will be revised once additional Geotech testing/reporting has been prepared."

Stormwater

"A new stormwater network will need to be constructed, and this will provide a means of overflow from each lot/unit storage tanks and will convey surface waters associated with the accessway and parking areas. The final location and design of the outfall is subject to ecology and Geotech input and will be confirmed as part of the developed design stage."

Water Supply

"Water supply for each unit will be via above ground tanks. The concept plan includes two 22,500L tanks for each house. The roof caught water will likely be supplemented from the bore and wider town supply workstream, as per the design details in the WWLA report appended."

Firefighting

"Firefighting supply will likely be via communal tank(s) and will be subject to consultation and approval from FENZ. The communal approach will reduce the need to provide storage volume within each lot for firefighting purposes, given the need to maximise potable storage volume and supply."

Flooding / Overland Flow Paths

"There is no known flooding or overland flow paths within the development area. All units will be provided with freeboard in accordance with the NZBC. There is no known downstream flooding, and thus it is suggested that attenuation should not be required, although this will need to be agreed with Far North District Council."

Wastewater

"Suitable wastewater disposal can be provided for the development. The units are proposed to be serviced by a combined community wastewater treatment system with disposal to land. The sizing and location of the disposal fields are subject to Geotech assessment, and this will be worked through the

developed design stage. It is assumed the ridge to the south-west of the development site can support the disposal areas."

Telecommunications

"Telecommunications and power networks are present in the surrounding area and it is anticipated that service can be made available to the proposed development."

Overall, the infrastructure effects are appropriately avoided through design solutions. The actual or potential adverse effects resulting from this proposal are less than minor.

7.6.4 Geotechnical effects

The proposed activity requires resource consent for a **discretionary activity** under Rule 10.6.5.4.4 – Integrated Development. The relevant assessment criteria includes:

(iii) the degree to which the potential effects of the application have been avoided, remedied or mitigated; and

(iv) any other matter which it determines to be relevant to the application.

The development of Papakāinga housing risk generating adverse effects relating to land instability and ground conditions. The Geotechnical Report prepared by Haigh Workman (**attachment E**) concludes that the anticipated lightweight timber framed housing is suitable for the ground conditions. This report is only a preliminary appraisal, and Haigh Workman notes that future geotechnical investigations will confirm soil bearing capacity. However, the preliminary report concludes that the site is of an acceptable nature to progress with the design, noting that further investigation to guide design will happen once MHUD funding is provided. I provide Haigh Workman's geotechnical considerations below.

Slope Stability

"As outlined in section 2.2 – Geomorphology, there are numerous historical scarp features on the surrounding slopes. Furthermore, the southern slopes are considered to be near equilibrium (i.e. Factor of Safety of 1.0) and are also prone to long term soil creep.

A preliminary assessment has been carried out to determine Building Restriction Lines (setbacks) from the slip features using an infinite slope analysis method, i.e. $FoS = \tan(\phi)/\tan(\beta)$, and factor of safety of 1.5. In this assessment, a long term slope regression angle is calculated based on the existing slope angles. The assessment does not take soil strengths or groundwater conditions into consideration and is only used as a rough guide to form a preliminary opinion on building restriction lines. Computer

modelling is required at a later stage (once geotechnical investigations have been undertaken) refine/confirm the recommended setback distances.

Based on the preliminary assessment, and conceptual earthworks plan provided, the minimum required setback distance from the western earthworks boundary is approximately 12 m (where ground level will be cut down the most). The setback from the features to the south-east and south-west would be approximately 20 m (on the basis that no earthworks are carried out in those areas). It is also recommended that any buildings be setback a minimum distance of 10 m from the 'break in slope' to the south, i.e. setback from the point where gradients begin to exceed 10°. Drawings G02 and G03 in Appendix A show the building restriction lines before and after cutting of the knoll.

Note, these setbacks are preliminary only and are based on the conceptual earthworks plan provided by Maven Associates which shows the knoll being cut down approximately 5.5 m and daylighting at the outer edges.

Filling on sloping ground (i.e. sidling fills) or near any historic scarp features should be avoided. Fill material generated from any cutting should be placed well away from the development area, preferably in low lying areas or gullies (if permitted)."

Expansive Soils

"Based on our experience with the Tangihua Complex, the residual soils are considered susceptible to swelling and shrinking under seasonal variations of water content, i.e., volume change. In absence of site investigations and laboratory testing, the site should be designated as highly reactive (Class H) in accordance with B1/AS1."

Building Foundations

"Foundation type will depend on the development proposed however, single storey lightweight timber framed housing construction is anticipated.

Ground conditions are expected to be suitable for shallow foundations for lightweight timber framed dwellings provided the foundations are outside of the building setback zones, take expansive soils into consideration and allow sloping ground (if required). Future geotechnical investigations should confirm soil bearing capacity and soil expansivity class in accordance with AS2870:2011 and provide framework for foundation design."

Earthworks

"The preliminary civil design concept provided by Maven Associates indicates a bulk cut of the knoll with depths up 5.5 mbgl, sloping at 2 to 3% down towards the outer edges. The earthworks plan also shows minor filling up to 0.5 m in the south-eastern part of the site.

The preliminary building restriction lines indicated on the attached drawing G03 are based on the Maven Associates earthworks plan provided. Cutting the knoll down reduces the slope stability risk and

gain more useable area for the future house sites. The earthworks plan provided shows 23 lots however, Lots 1, 12, 18, 19, 20 are unlikely to have enough area for buildings, parking/turning given the proposed building restriction lines. The lot sizes and arrangement will require adjusting to suit the geotechnical constraints outlined in this report.

The above mentioned excavations will generate a significant amount of fill which will need to be placed away from the development area. Given the historic instability features identified on the surrounding slopes, steepness of the slopes and inherent unstable nature of the underlying allochthonous geology, no fill should be placed on sloping ground (i.e. sidling fills) to create the future building platforms or roading infrastructure.

A suitable fill disposal site should be nominated well away from the development area (preferably in a low lying area or gully if permitted) to avoid any detrimental effects on site stability.

As the development area will be entirely within cut, daylighting at the outer edges, no cut or fill bater slopes are envisaged."

Stormwater

"Controlling stormwater is imperative to the stability of the site. Concentrated stormwater flows from all impermeable areas must be collected, conveyed in sealed pipes, and discharged in a manner that will not affect the stability of the ground. Concentrated stormwater flows must not be allowed to discharge onto or into the ground close to the development area or on sloping ground as this would be detrimental to site stability. Stormwater soakage devices are not considered appropriate for this development.

We anticipate urban type reticulation of stormwater for the proposed development. Devices to collect, transport and discharge concentrated flows should be designed with flexible joints/connections (particularly in areas outside the building restriction line) to avoid potential for leakage onto the slopes.

It is recommended that all stormwater flows from the reticulated network be discharged in a dispersive manner at the bottom the gully towards the south (i.e. combined stormwater outlet at bottom of gully)."

Wastewater Disposal

"It is anticipated that wastewater will be conveyed to a combined wastewater treatment and disposal system (i.e. urban type reticulation).

The location of the future disposal field should be subject to geotechnical scrutiny. It is recommended that no effluent disposal field be located over any of the historic scarp features identified on the attached plan numbered G02."

More investigation is to be conducted as the design progresses. The applicant proposes to share this information with Council to ensure effectiveness. Overall, the adverse geotechnical effects arising from this proposal are less than minor.

7.6.5 Ecological effects

The proposed activity requires resource consent for a **discretionary activity** under Rule IB-R4 – Indigenous vegetation clearance. There are no associated assessment criteria relating to this activity although I provide general comments below that confirm that ecological effects will be less than minor.

The Ecological Report prepared by Wild Ecology (**attachment C**) concludes that the site that is proposed to be developed was selected for its lower ecological value and significance. I agree with the expert analysis and provide Wild Ecology's conclusions below.

> *"It is considered that the proposed development area 1 has been selected through comprehensive preliminary design process which has considered areas within the wider site boundaries which are of lower ecological value and significance. Development area 1 is one of the locations identified within the site boundaries which have been historically cleared and utilised for agricultural production purposes. The area has been historically (and likely remains to be) grazed. Development in this area would enable high quality housing development vitally required for the local community while limiting the potential adverse ecological effects which can be addressed through comprehensive ecological management and mitigation principles.*
>
> *The proposed management actions described within the body of this report will minimise potential adverse ecological effects associated with the development proposal on the habitats and species likely present on site and immediate surrounds. It is acknowledged that a range of 'At Risk' fauna may be present within site and immediate surrounds, however any actual and potential adverse effects to be managed through proposed mitigation measures outlined under Table 5 above.*
>
> *The following recommendations are made to ensure that potential adverse effects associated with the development proposal can be avoided, minimised or mitigated to the extent practicably feasible.*
>
> 1. *That a site-specific Ecological Management Plan (EMP) is prepared for the site (as a condition of consent) to ensure ecological avoidance, minimisation and mitigation strategies are implemented as part of the site's development proposal. The EMP should provide detail on how adverse effects to native fauna including 'Threatened' or 'At Risk' species will be avoided or minimised through vegetation clearance protocols, seasonal constraints on earthworks, salvaging and relocation and other management actions. Specific proposed management detail should include:*
>   a. *Vegetation clearance management protocols (including seasonal restrictions to vegetation clearance) to provide detail on how adverse effects associated with vegetation clearance will be avoided or minimised through vegetation clearance protocols.*

b. *Lizard management protocols to provide detail how lizard protection, salvage and relocation protocols will be implemented during site construction works with input as required from project engineers and other specialists. This Plan should cover any avoidance, remediation, mitigation and monitoring that may be carried out in association with the development of the site. Recommendations should follow the key principles to lizard salvage as described in DOC (2019).*

Note: Relevant Wildlife Authority Permits will need to be obtained from DoC and a suitably qualified herpetologist will be required to supervise the vegetation clearance works on site. Please note that at current date it takes approximately 12-18 months from the date of application to obtain such permits.

c. *Avifauna management protocols clearly outlining methods that will be utilised to avoid or minimise potential adverse effects on avifauna.*

2. *The consent holder shall employ a suitably qualified and experienced ecologist holding appropriate Wildlife Act permits, who must carry out pre-vegetation clearance surveys and must be onsite to supervise any vegetation removal to search for and salvage any native fauna with lesser mobility (i.e. lizards) and to relocate them to the alternative location(s) on the site."*

A site-specific Ecological Management Plan (EMP) will be prepared for the site as a condition of consent to ensure adverse effects. Overall, adverse ecological effects as a result of this development are less than minor.

7.6.6 Public notification conclusion

On the basis of the foregoing assessment, it is my view that the application can be processed without public notification for the following reasons:

- Public notification is not mandatory (Step 1)
- Public notification is not precluded (Step 2)
- The adverse effects of the activity on the wider environment are considered to be less than minor and therefore does not meet the threshold for public notification (Step 3); and
- No special circumstances exist that would warrant public notification (Step 4).

8 LIMITED NOTIFICATION ASSESSMENT

An assessment is required under Sections 95B and 95E to 95G to determine whether an application is to be publicly notified. The required assessment is set out below.

Where an application is not publicly notified under Section 95A, then Section 95B of the RMA sets out the steps that a consent authority must follow, in the given order, to determine whether to limited notify the application. The performance of the application against the relevant criteria of section 95B is provided below.

8.1 Step 1 – Certain affected groups and affected persons must be notified

Step 1 (Sections 95B(2) to (4)) requires limited notification of the application to protected customary rights groups, affected customary marine title groups (in the case of an application for a resource consent for an accommodated activity), or where the proposed activity is on or adjacent to, or may affect land that is the subject of a statutory acknowledgement and where the person to whom the statutory acknowledgement is made is an affected person under Section 95A of the RMA.

The above does not apply to this proposal.

8.2 Step 2 - If not required by step 1, limited notification precluded in certain circumstances

Step 2 (Sections 95B(5) and (6)) precludes limited notification where all applicable rules and national environmental standards preclude limited notification, or if the application is for a controlled activity (but not a subdivision of land) an no other activities.

In this case, the applicable rules do not preclude limited notification, and the proposal is not for a controlled activity (but no other activities).

8.3 Step 3 – If not precluded by Step 2, certain other affected persons must be notified

Step 3 (Sections 95B(7) to (9)) sets out that where limited notification is not precluded under Step 2, then an assessment must be undertaken in accordance with Section 95E to determine whether any person is an affected person.

In this case, the application is not subject to a rule that precludes limited notification. An assessment against the requirements of Section 95E is set out in Section 8.6 below, where it is concluded that any adverse effects on potentially affected persons will be negligible and do not meet the threshold for limited notification.

8.4 Step 4 – public notification in special circumstances

Step 4 (Section 95B(10)) requires that if public notification has not been precluded or required under Steps 1 to 3, then a determination must be made as to whether special circumstances exist in relation to the application that would warrant notification to any other persons not already determined to be eligible for limited notification under Section 95B (and excluding persons assessed under Section 95E as not being affected persons).

In this case, no special circumstances have been identified that would warrant limited notification of the application to any persons. In this case, the development of Papakāinga housing for the Muriwhenua community in Te Hāpua are not out of the ordinary. No special circumstances are considered to exist.

8.5 Parameters of an assessment under Section 95E

For the purpose of giving limited notification of an application to a person under Section 95B(4) and (9) of the RMA, 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). The assessment of effects on persons set out in Section 8.6 below takes into account the requirements at Sections 95E(2) and (3), as summarised below:

(a) Any adverse effects of the activity on a person have been disregarded where a rule or national environmental standard permits an activity with that effect. Relevant to this application, the following are noted specifically:

- C10 – Coastal Environment
  - 10.6.5.1.1 Visual Amenity
  - 10.6.5.1.3 Scale of Activities
  - 10.6.5.1.4 Building Height
  - 10.6.5.1.5 Sunlight
  - 10.6.5.1.6 Stormwater Management
  - 10.6.5.1.7 Setback from Boundaries
  - 10.6.5.1.10 Noise

- Part 2 – District Wide Matters
  - EW-R13 Earthworks and erosion and sediment control

(b) The assessment identifies the relevant assessment matters and limits assessment to those matters; and

(c) No statutory acknowledgements are relevant to the Site; and

(d) No written approvals have been sought or obtained in connection with this proposal.

8.6 Assessment of adverse effects on persons

The assessment of potentially affected persons relates to those owners and occupies of adjacent land as identified in Section 7.5.1 above:

8.6.1 Assessment of effects on adjacent properties

Any potential adverse effects arising from the proposal are considered to be internalised within the application site given the location across an area of 1.1ha within the wider landholding of 5,875-hectares. Further, the significant levels of mature trees across the wider landholding and the shear distances to adjacent land mean that any physical changes within the area of works will not be perceived from outside the site.

The preceding discussion has discussed the wider environmental effects of the proposal, and given the distances involved to any property owned by others, no further assessment is considered necessary here. Any adverse effects on specific people are considered to be negligible.

8.6.2 Limited notification conclusion

On the basis of the foregoing assessment, it is my view that the application can be processed without limited notification for the following reasons:

- Limited notification is not mandatory (Step 1)
- Limited notification is not precluded (Step 2)

- The adverse effects of the activity on owners and occupiers of adjacent land are considered to be less than minor and therefore does not meet the threshold for limited notification to any parties(Step 3); and
- No special circumstances exist that would warrant limited notification (Step 4).

9 STATUTORY ASSESSMENT UNDER SECTION 104 OF THE RMA

9.1 Statutory matters

The following section analyses the relevant statutory provisions that apply to the application and the locality. Significantly, these are the provisions of the Resource Management 1991 and associated policies and documents that relate to resource consents. The RMA sets out the statutory framework, within which resources are managed in New Zealand. The framework sets out a hierarchy of tests that must be passed in order for resources to be utilised, either on a temporary or permanent basis. Section 104 of the RMA sets out the matters for consideration when assessing a resource consent.

Under section 104(1) of the RMA, when considering an application for resource consent and any submissions received, the consent authority must, subject to Part 2, have regard to:

(i) Any actual and potential effects on the environment of allowing the activity
(ii) The relevant provisions of a national policy statement
(iii) A New Zealand Coastal Policy Statement
(iv) A regional policy statement
(v) A plan or proposed plan; and
(vi) Any other matter that the consent authority considers relevant and reasonably necessary to consider the application

Overall, the proposal is to be considered as a discretionary activity. Section 104B states that a consent authority may grant or refuse an application for a restricted discretionary activity. If granted, the consent authority may impose conditions only over those matters they have retained discretion over. The following assessment addresses the relevant provisions of Section 104(1) of the RMA as they relate to the proposal.

9.2 Weighting of Proposed Plan Changes

The RMA requires that before a plan change becomes operative, resource consent applications must be considered against the provisions of both the operative plan and any relevant proposed plan change(s).

Under Section 86A and Section 104(1)(b)(vi) of the RMA, consent authorities must have regard to proposed objectives and policies from the time of notification of a plan change. Under Section 86B(1), a rule in a plan change has legal effect once a decision on submissions is made and publicly notified. Section 86B does not

limit or affect the weight that a consent authority gives to objectives, policies, or other issues, reasons or methods in plan before the plan change becomes operative.

Weighting only becomes relevant where conflict arises between operative and proposed objectives and policies. Guidance provided by case law is that more weight should generally be placed on provisions of an operative plan until such time as a proposed plan change has advanced sufficiently through the statutory process, although this is not the only consideration.

In this case, the objectives and policies within both the operative and proposed Far North District Plans are not in opposition with each other and the proposed development is commensurate with both plans. No further weighting assessment is necessary.

9.2.1 Far North Proposed Plan Change

The Far North Proposed Plan Change (**PDP**) is a Council-initiated plan change made to better manage resources within the Far North Region. The Far North Proposed Plan Change was notified on 27 July 2022. The hearings commended in May 2024 and the Council advises that a decision will be released in June 2026. On this basis the objectives and policies of the proposed plan are relevant to the consideration of this application, however, the rules have no legal effect under **S86B** of the RMA at this time.

It is considered that the outcomes of the operative and proposed provisions under PDP are similar, and it is therefore not considered necessary to assign a weighting to the relevant objectives and policies.

9.3 Section 104(1)(a) – Actual or potential effects on the environment

9.3.1 Assessment of adverse effects

Section 104(1)(a) of the RMA requires that a council have regard to any actual or potential effects on the environment of allowing an activity.

Pursuant to section 104(3)(a), a council must not have regard to any effect on a person who has given written approval to the proposal, nor any trade competitor or effects of trade competition. No written approvals have been sought or received in relation to this application.

An assessment of effects on the environmental is set out in Section 7.6 of this report, where it is concluded that the adverse effects of the proposal will be negligible. An assessment of effects on persons is set out at Section 8.6 of this report, where it is concluded that no persons would be adversely affected by the proposal.

9.3.2 Assessment of positive effects

In addition to the above, the following actual or potential positive effects have been identified as arising from the proposal:

- The construction provides economic benefit to the region through employment opportunities.

Further to the above, consideration has been given to the overall site composition, building design and internal and external amenity on-site, and it is considered that future residents will experience a high level of amenity. The following are noted in particular:

- The Muriwhenua community who are currently experiencing coastal inundation and flooding in their houses will be provided with a much higher quality of home free from natural hazards.
- These homes will help prevent sickness and overall improve safety and their quality of life.
- The development of Papakāinga housing will contribute to the enhancement of cultural outcomes for Muriwhenua

9.3.3 Actual and potential effects conclusion

It is considered that on balance, any actual or potential effects arising from the proposal are considered to be positive.

9.4 Section 104(1)(b)(1) – National Environmental Standard

*9.4.1 National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health 2011 (**NES Contaminated Soil**)*

The NES Contaminated Soil does not apply to this Site. No HAIL activities are being undertaken or are more than likely to have been undertaken on the Site, therefore the NES Contaminated Soil is not triggered.

*9.4.2 National Environmental Standard for Freshwater (**NES Freshwater**)*

The NES Freshwater does not apply because there are no wetlands or streams located within or adjoining the areas of works.

9.5 Section 104(1)(b)(ii) – Other regulations

No other regulations are considered to be of relevance to the assessment of this application.

9.6 Section 104(1)(b)(iii) – National Policy Statements

*9.6.1 National Policy Statement on Urban Development 2020 (**NPSUD**)*

The NPS came into force on 20 August 2020. The NPSUD provides direction to decision-makers under the RMA on planning for urban environments. It is a guiding document that directs local authorities to update their Plans and make decisions that support and provide for particular outcomes within urban environments.

The NPSUD has classified each of the local authorities in New Zealand into either Tier 1, 2 or 3. Far North District Council is a Tier 3 authority and is strongly encouraged to adopting Parts 2 and 3 of the NPS-UD, adopting whatever modifications to the NPS-UD are necessary or helpful to enable them to do so. The proposed Far North District Plan incorporates the NPS-UD in sections relating to:

- Mixed Use
- Light Industrial
- Heavy Industrial
- Horticulture Processing Facilities

None of these activities are relevant to the proposed activity and no further comment on this is considered necessary.

9.7 Section 104(1)(b)(iv) – New Zealand Coastal Policy Statement (**NZCPS**)

The NZCPS is considered to be of relevance to the site given its location adjoining the coastal environment The objectives of the NZCPS relate to preserving the natural character of the coastal environment as well as its function to sustain its ecosystems.

The greatest potential for direct impact on the coastal marine area arises from the potential for sedimentation effects as a result of the earthworks needed to facilitate construction of the Papakāinga development. This proposal manages the adverse effects of earthworks by installing sedimentation catches

/ barriers so that earth does not slip down the bank towards to the water. The excavated earth will be transported to a suitable fill site on the Muriwhenua land that is away from the coastal environment.

Overall, the proposal achieves the high-level policy matters set out in the NZCPS.

9.8 Section 104(1)(b)(vi) Far North District Plan

9.8.1 Objectives and policies assessment

A full assessment of the district level objectives and policies of the operative and proposed versions of the Far North District Plan is set out in **Attachment I** to this report.

Overall, I consider that the proposal is consistent with the broad outcomes for the General Coastal Zone and relevant district-wide chapters reflected in the associated objectives and policies of the operative and proposed Plans. In my view, the proposal actively supports the policy direction for the General Coastal zone, delivering high amenity and sufficiently intensive residential development that provides safe housing and contributes to a well-functioning coastal environment.

9.9 Assessment criteria

The proposed development is subject to a number of discretionary activities, and the Council has unfettered discretion in terms of the matters that it may consider in the assessment of this application There are no relevant assessment criteria to these activities.

10 SECTION 104(1)(c) – OTHER MATTERS

10.1 Introduction

Section 104(1)(c) requires that any other matter the consent authority considers relevant and reasonably necessary to determine the application be considered. In this case, no other matters are considered relevant to this application.

11 PART 2 OF THE RESOURCE MANAGEMENT ACT 1991

The Court of Appeal in *RJ Davidson Family Trust v Marlborough District Council* [2018] 3 NZLR 283 confirmed the legal approach for assessing resource consent applications against Part 2 of the RMA. The Court stated at [74]:

> *"If it is clear that a plan has been prepared having regard to Part 2 and with a coherent set of policies designed to achieve clear environmental outcomes, the result of a genuine process that has regard to those policies in accordance with s 104(1) should be to implement those policies in evaluating a resource consent application. Reference to Part 2 in such a case would likely not add anything…Equally, if it appears the plan has not been prepared in a manner that appropriately reflects the provisions of Part 2, that will be a case where the consent authority will be required to give emphasis to Part 2."*

In the context of this restricted discretionary activity application, I consider that the District Plan has been adequately prepared and reflects the provisions of Part 2 of the RMA. The objectives and policies of the District Plan capture all relevant planning considerations and contain a coherent set of policies designed to achieve clear environmental outcomes. They also provide a clear framework for assessing all relevant potential effects and I consider that there is no need to go beyond these provisions to look to Part 2 in making an assessment of the appropriateness of this application as an assessment against Part 2 would not add anything to the evaluation exercise.

12 CONCLUSION

The proposal involves the construction of Papakāinga housing for 20 new dwellings as part of the Te Hāpua settlement.

This application sets out the relevant assessment required for resource consent applications under the RMA. The plans and technical assessments submitted with the application have been provided in support of the application and in relation to the relevant criteria.

In terms of the RMA, all appropriate matters in Sections 95A, 95B, 104 are considered to have been addressed and the following conclusions are noted:

- Resource consent is required as a discretionary activity overall
- Public notification is not required as adverse effects arising from the proposal are considered to be less than minor
- Limited notification is not required as no persons are considered to be adversely affected by the proposal
- The proposal accords with the relevant objectives and policies; and
- The proposal is consistent with Part 2 of the RMA

It is concluded that the proposal satisfies the relevant matter and is in accordance with the relevant provisions of the statutory documents. Therefore, in accordance with sections 104B, I support the grant of consent to this application for a discretionary activity.

Nick Freeman
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RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
QUALIFIED

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier **517692**

Land Registration District **North Auckland**

Date Registered 29 March 2010 09:00 am

Prior References

NA46A/1113 NAPR27/158 NAPR27/160
NAPR27/162

Type	Amalgamation Order under Section 435 Maori Affairs Act 1953	**Instrument**	MFAO 8453728.1
Area	5875.3036 hectares more or less		
Legal Description	Te Hapua 42 Block		

Registered Owners

Proprietors of Muriwhenua

Interests

Subject to the provisions of the Maori Lands Administration Act 1900 (affects part formerly known as Pakohu No 1 Block)

The within order has been embodied in the register pursuant to Section 124(1) Te Ture Whenua Maori Act 1993. It will not be finally constituted a folium of the register until a plan has been deposited pursuant to Section 167(5) Land Transfer Act 1952

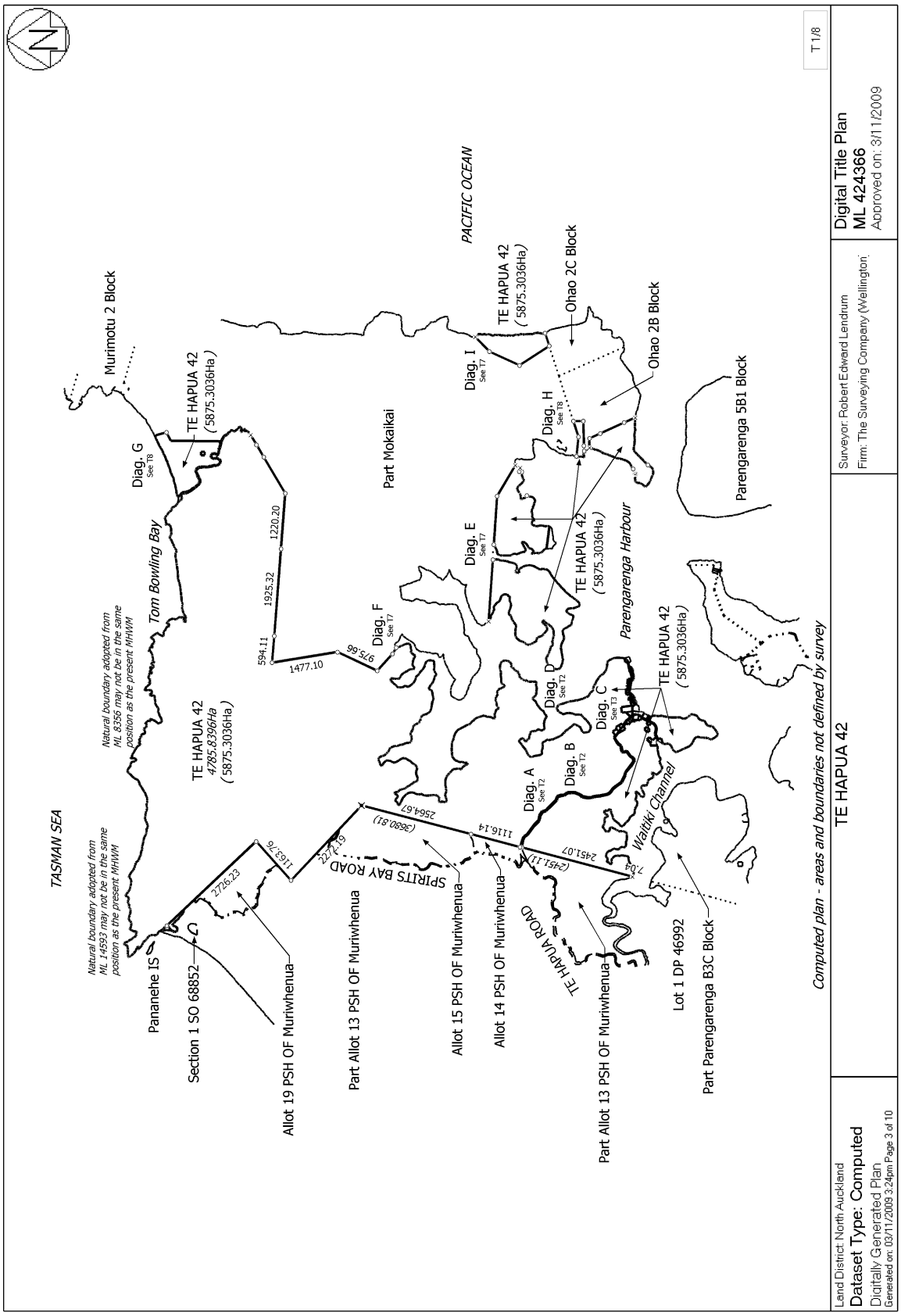
8453728.4 Roadway Order laying out a roadway over part (11.0250 ha) herein as shown on ML 15991 and ML 15992 - 29.3.2010 at 9:00 am

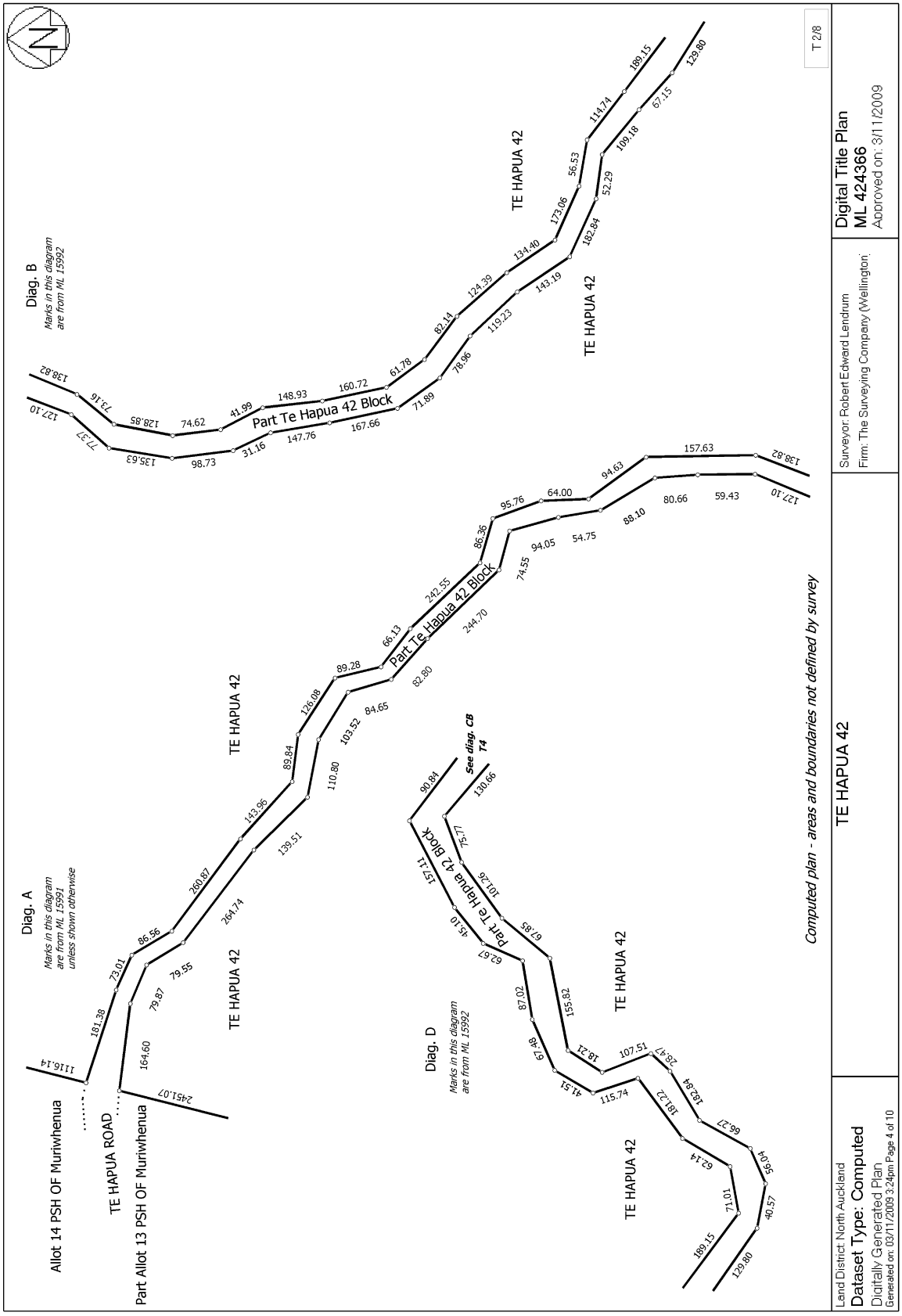
8453728.5 Roadway Order laying out a roadway over part (286m2) herein as shown on ML 16044 - 29.3.2010 at 9:00 am

8453728.7 Status Order determining the status of the within land to be Maori Freehold Land - 29.3.2010 at 9:00 am

9110084.1 Notice pursuant to Section 195(2) Climate Change Response Act 2002 - 2.7.2012 at 11:59 am

12818942.3 Forestry Right pursuant to the Forestry Rights Registration Act 1983 to Ngā Ngāhere o Muriwhenua Tika Limited - 25.10.2023 at 12:10 pm


N
T 1/8
TASMAN SEA
PACIFIC OCEAN
Tom Bowling Bay
Part Mokaikai
Parengarenga Harbour
Waitiki Channel
Murimotu 2 Block
TE HAPUA 42 (5875.3036Ha)
TE HAPUA 42 4785.8396Ha (5875.3036Ha)
Ohao 2C Block
Ohao 2B Block
Parengarenga 5B1 Block
Diag. G See T8
Diag. I See T7
Diag. H See T8
Diag. E See T7
Diag. F See T7
Diag. D See T2
Diag. C See T3
Diag. A See T2
Diag. B See T2
Natural boundary adopted from ML 8356 may not be in the same position as the present MHWM
Natural boundary adopted from ML 14593 may not be in the same position as the present MHWM
1220.20
1925.32
594.11
975.66
1477.10
1163.76
2726.23
2274.19
(3680.81)
2564.67
1116.14
(2451.11)
2451.07
7.04
Pananehe 1S
Section 1 SO 68852
Allot 19 PSH OF Muriwhenua
Part Allot 13 PSH OF Muriwhenua
SPIRITS BAY ROAD
Allot 15 PSH OF Muriwhenua
Allot 14 PSH OF Muriwhenua
TE HAPUA ROAD
Part Allot 13 PSH OF Muriwhenua
Lot 1 DP 46992
Part Parengarenga B3C Block
Computed plan - areas and boundaries not defined by survey
TE HAPUA 42
Land District: North Auckland
Dataset Type: Computed
Digitally Generated Plan
Generated on: 03/11/2009 3:24pm Page 3 of 10
Surveyor: Robert Edward Lendrum
Firm: The Surveying Company (Wellington)
Digital Title Plan
ML 424366
Approved on: 3/11/2009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ML 424366
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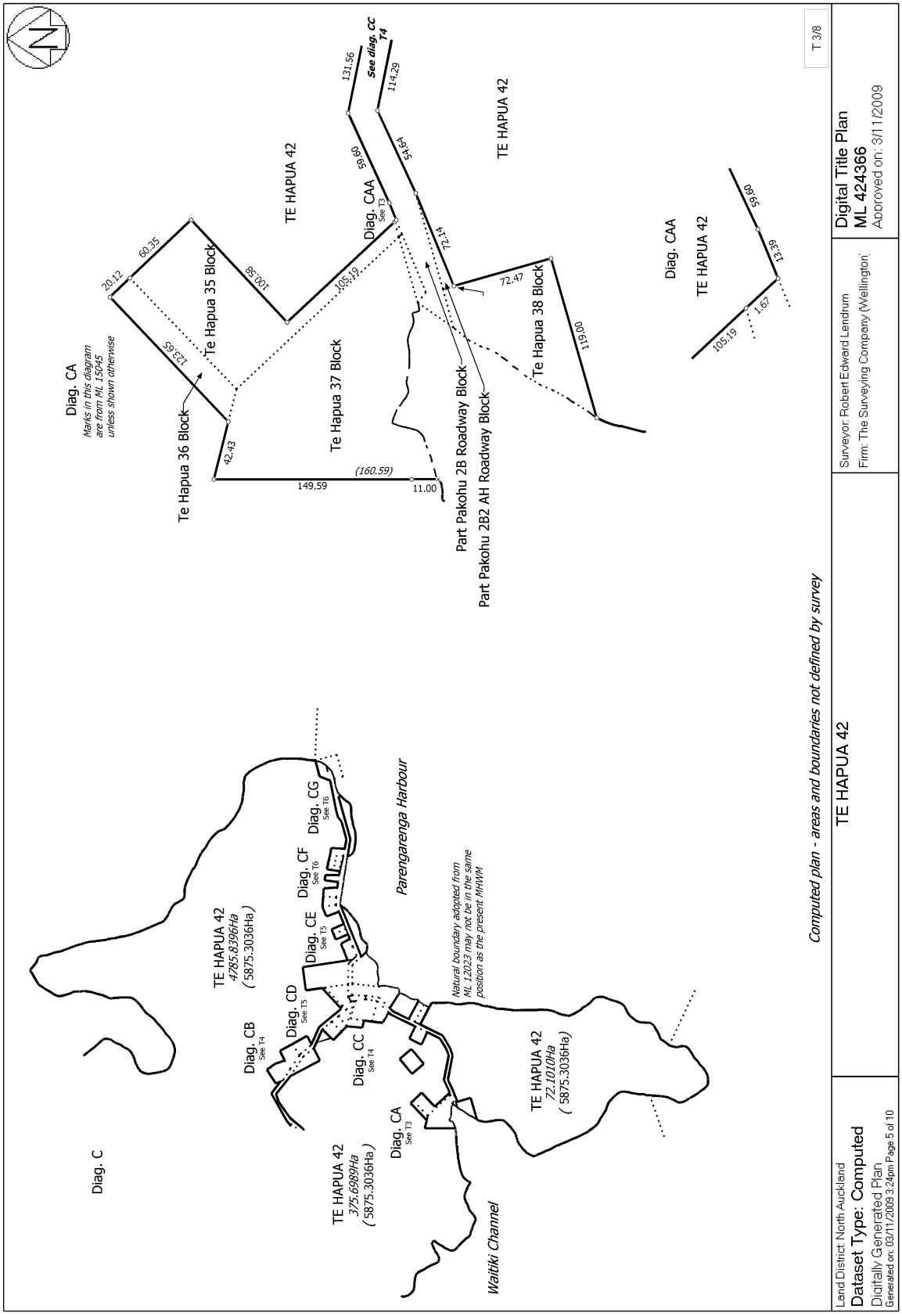
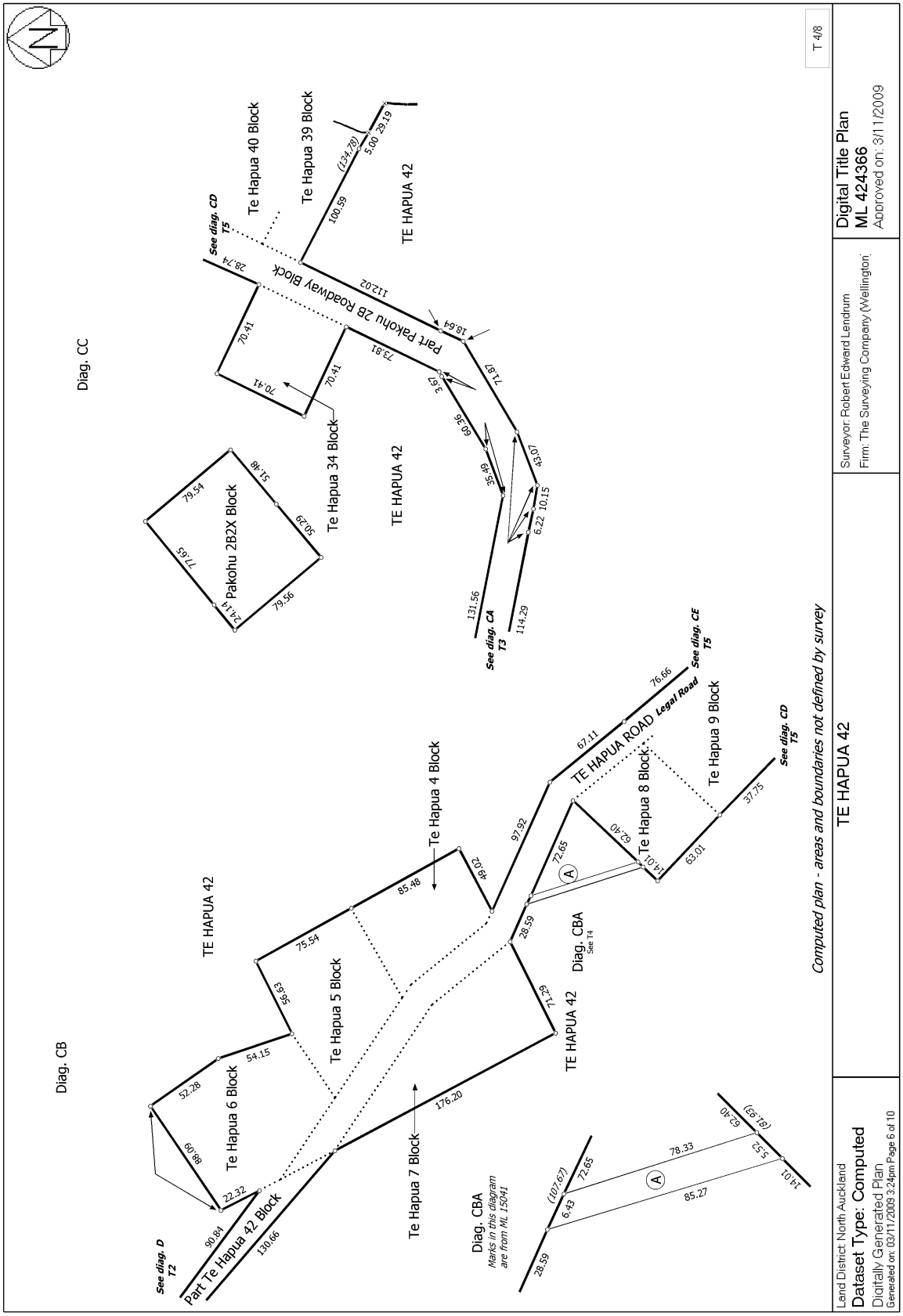
Surveyor: Robert Edward Lendrum
Firm: The Surveying Company (Wellington)
Land District: North Auckland
Dataset Type: Computed
Digitally Generated Plan
Generated on: 03/11/2009 3:24pm Page 4 of 10
Computed plan - areas and boundaries not defined by survey
TE HAPUA 42
Diag. A
Marks in this diagram are from ML 15991 unless shown otherwise
Allot 14 PSH OF Muriwhenua
TE HAPUA ROAD
Part Allot 13 PSH OF Muriwhenua
Diag. B
Marks in this diagram are from ML 15992
Part Te Hapua 42 Block
Diag. D
Marks in this diagram are from ML 15992
Part Te Hapua 42 Block
See diag. CB T4


Diag. CA
Marks in this diagram are from ML 15045 unless shown otherwise
Te Hapua 36 Block
Te Hapua 35 Block
Te Hapua 37 Block
TE HAPUA 42
Diag. CAA
See T3
See diag. CC T4
Part Pakohu 2B Roadway Block
Part Pakohu 2B2 AH Roadway Block
Te Hapua 38 Block
TE HAPUA 42
Diag. CAA
TE HAPUA 42
20.12
60.35
123.65
100.58
105.19
42.43
149.59
(160.59)
11.00
131.56
114.29
59.69
54.64
72.14
72.47
119.00
59.60
13.31
1.67
105.19
Diag. C
TE HAPUA 42
4785.8396Ha
(5875.3036Ha)
TE HAPUA 42
375.6989Ha
(5875.3036Ha)
TE HAPUA 42
72.1010Ha
(5875.3036Ha)
Diag. CA
See T3
Diag. CB
See T4
Diag. CC
See T4
Diag. CD
See T5
Diag. CE
See T5
Diag. CF
See T6
Diag. CG
See T6
Parengarenga Harbour
Natural boundary adopted from ML 12023 may not be in the same position as the present MHWM
Waitiki Channel
Computed plan - areas and boundaries not defined by survey
T 3/8
TE HAPUA 42
Land District: North Auckland
Dataset Type: Computed
Digitally Generated Plan
Generated on: 03/11/2009 3:24pm Page 5 of 10
Surveyor: Robert Edward Lendrum
Firm: The Surveying Company (Wellington)
Digital Title Plan
ML 424366
Approved on: 3/11/2009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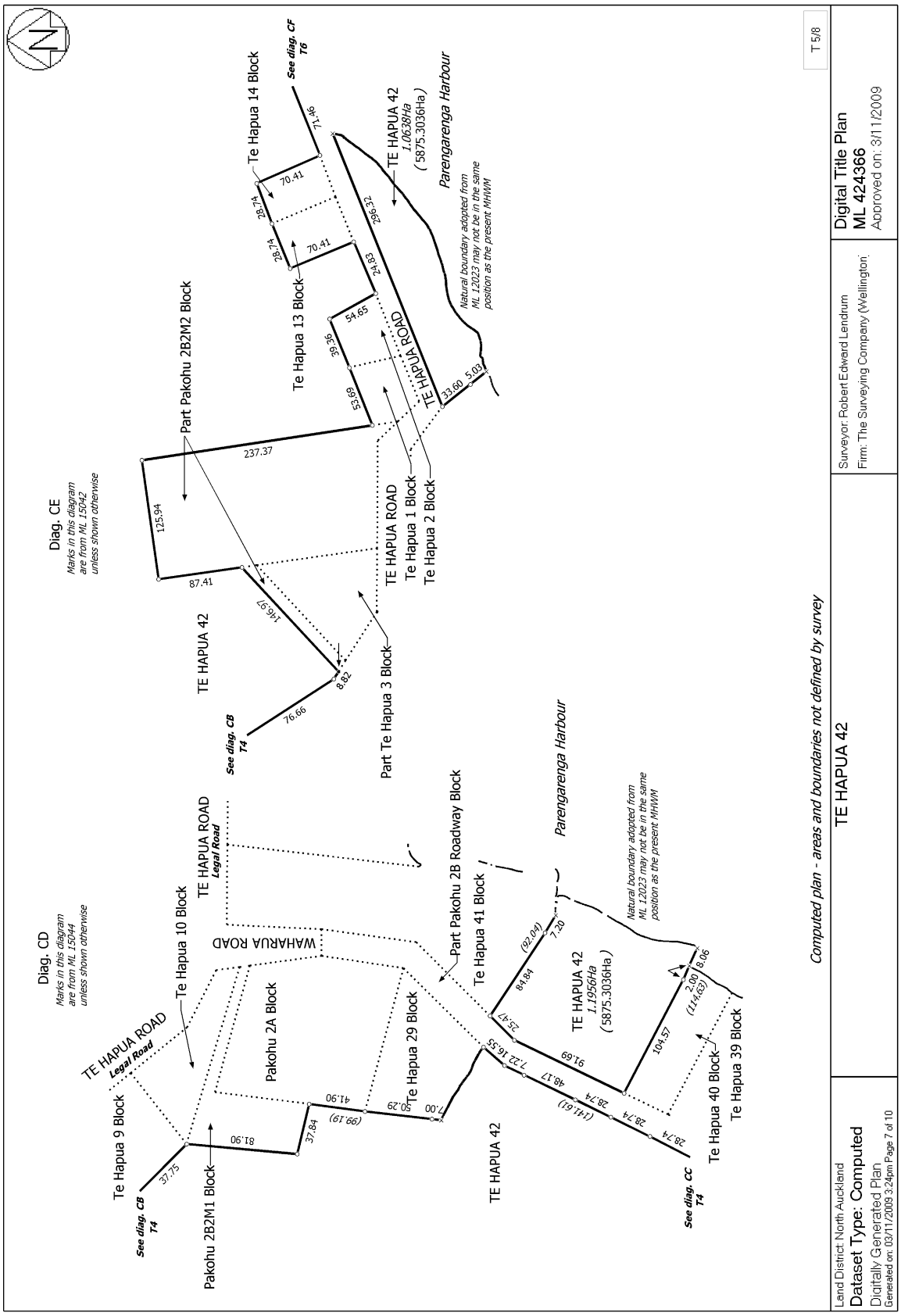
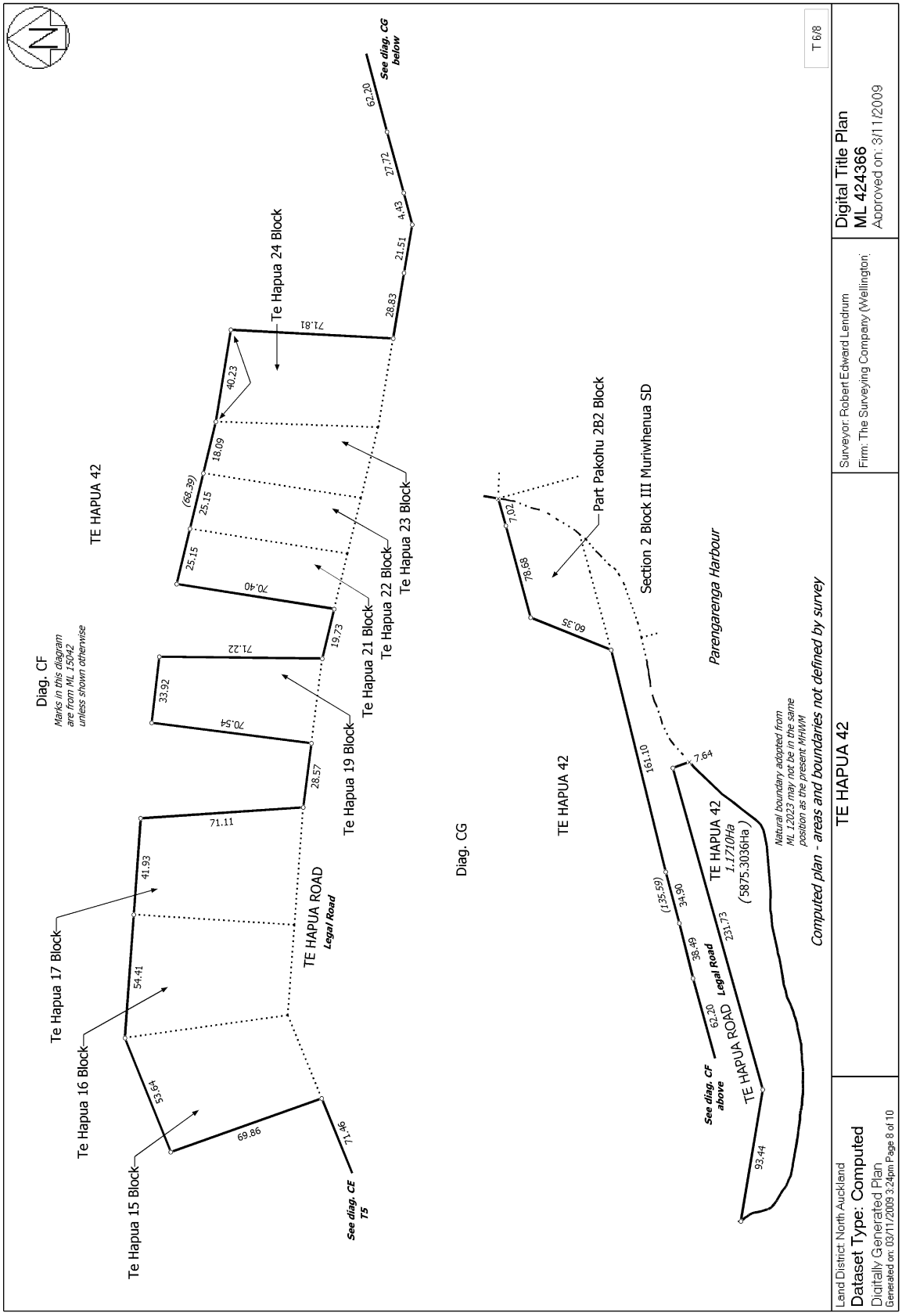
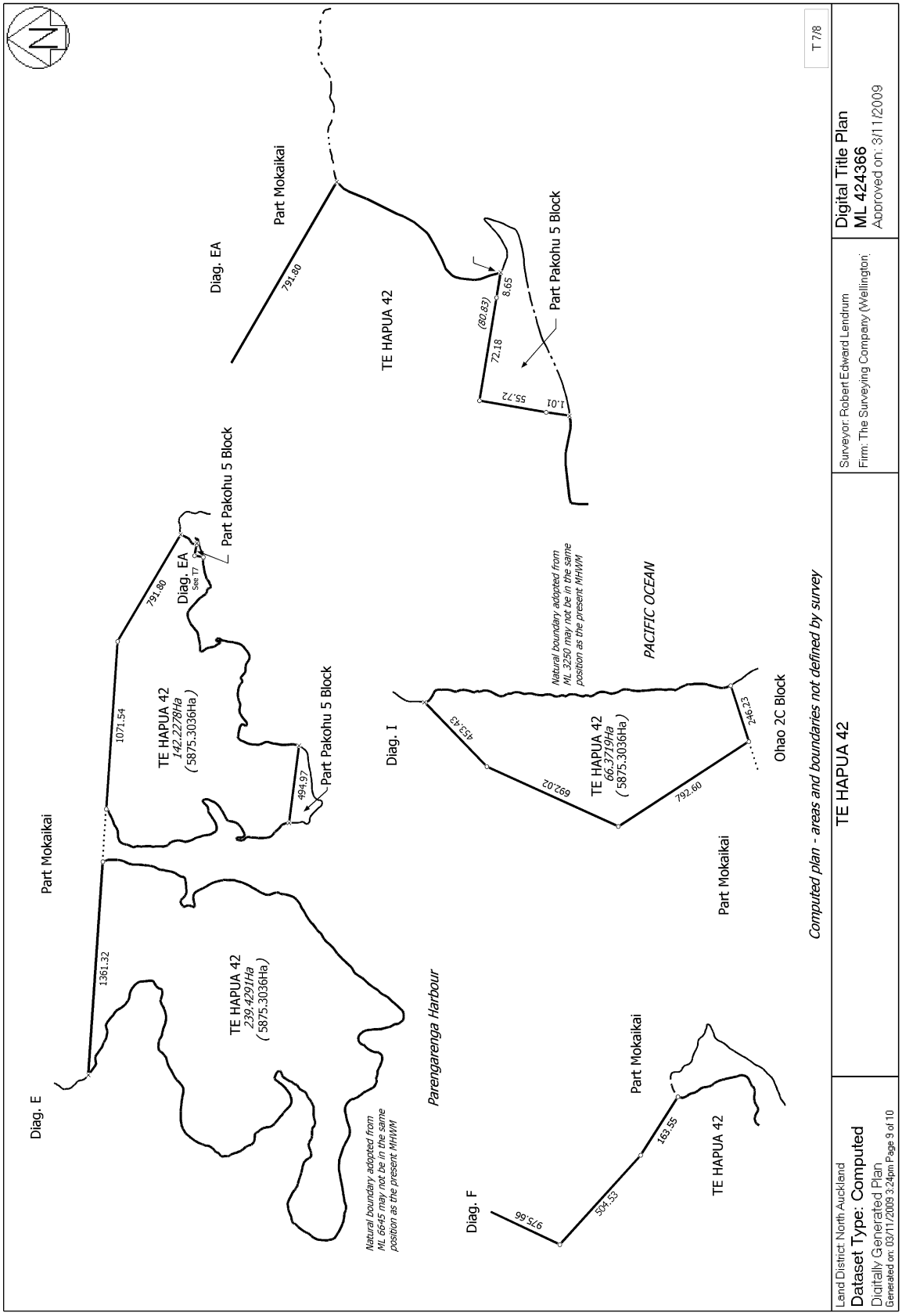
Digital Title Plan
ML 424366
Approved on: 3/11/2009
Surveyor: Robert Edward Lendrum
Firm: The Surveying Company (Wellington)
Computed plan - areas and boundaries not defined by survey
TE HAPUA 42
Land District: North Auckland
Dataset Type: Computed
Digitally Generated Plan
Generated on: 03/11/2009 3:24pm Page 6 of 10
Diag. CC
Diag. CB
Diag. CBA
Marks in this diagram are from ML 15041
Diag. CBA
See T4
Te Hapua 40 Block
Te Hapua 39 Block
Te Hapua 34 Block
Te Hapua 4 Block
Te Hapua 5 Block
Te Hapua 6 Block
Te Hapua 7 Block
Te Hapua 8 Block
Te Hapua 9 Block
Pakohu 2B2X Block
Part Pakohu 2B Roadway Block
Part Te Hapua 42 Block
TE HAPUA ROAD Legal Road
TE HAPUA 42
See diag. CD T5
See diag. CA T3
See diag. CE T5
See diag. D T2
See diag. CD T5
28.74
(134.78)
5.00
29.19
100.59
112.02
18.64
71.87
43.07
10.15
6.22
114.29
131.56
3.67
73.31
70.41
70.44
60.26
35.49
79.54
51.48
50.29
79.56
71.65
124.14
85.48
49.02
97.92
67.11
76.66
72.65
62.40
10.01
63.01
37.75
28.59
71.29
54.15
52.28
60.88
22.32
90.84
130.66
176.20
75.54
56.95
(107.67)
6.43
72.65
78.33
85.27
28.59
62.40
(81.93)
5.52
14.01


T 5/8
Digital Title Plan
ML 424366
Approved on: 3/11/2009
Surveyor: Robert Edward Lendrum
Firm: The Surveying Company (Wellington)
Computed plan - areas and boundaries not defined by survey
TE HAPUA 42
Land District: North Auckland
Dataset Type: Computed
Digitally Generated Plan
Generated on: 03/11/2009 3:24pm Page 7 of 10
Diag. CE
Marks in this diagram are from ML 15042 unless shown otherwise
Diag. CD
Marks in this diagram are from ML 15044 unless shown otherwise
Part Pakohu 2B2M2 Block
Te Hapua 14 Block
Te Hapua 13 Block
TE HAPUA 42
1.0638Ha
(5875.3036Ha)
Parengarenga Harbour
Natural boundary adopted from ML 12023 may not be in the same position as the present MHWM
TE HAPUA ROAD
Te Hapua 1 Block
Te Hapua 2 Block
Part Te Hapua 3 Block
TE HAPUA 42
See diag. CB T4
See diag. CF T6
TE HAPUA ROAD
Legal Road
Te Hapua 10 Block
WHAHARUA ROAD
Part Pakohu 2B Roadway Block
Te Hapua 41 Block
Parengarenga Harbour
Natural boundary adopted from ML 12023 may not be in the same position as the present MHWM
TE HAPUA 42
1.1956Ha
(5875.3036Ha)
TE HAPUA ROAD
Legal Road
Te Hapua 9 Block
Pakohu 2A Block
Te Hapua 29 Block
TE HAPUA 42
Te Hapua 40 Block
Te Hapua 39 Block
Pakohu 2B2M1 Block
See diag. CB T4
See diag. CC T4
237.37
125.94
87.41
146.97
8.82
76.66
71.46
70.41
28.74
28.74
70.41
298.32
24.83
54.65
39.36
53.69
33.60
5.03
(92.04)
7.20
84.84
25.47
91.69
7.22
16.55
48.17
28.74
(141.61)
28.74
28.74
104.57
2.00
(114.69)
18.06
7.00
50.29
(99.19)
41.90
37.84
81.90
37.75


Diag. CF
Marks in this diagram are from ML 15042 unless shown otherwise
TE HAPUA 42
Te Hapua 17 Block
Te Hapua 16 Block
Te Hapua 15 Block
Te Hapua 24 Block
Te Hapua 23 Block
Te Hapua 22 Block
Te Hapua 21 Block
Te Hapua 19 Block
TE HAPUA ROAD
Legal Road
See diag. CE TS
See diag. CG below
Diag. CG
TE HAPUA 42
Part Pakohu 2B2 Block
Section 2 Block III Muriwhenua SD
Parengarenga Harbour
Natural boundary adopted from ML 12023 may not be in the same position as the present MHWM
See diag. CF above
TE HAPUA ROAD
Legal Road
TE HAPUA 42
1.1710Ha
(5875.3036Ha)
Computed plan - areas and boundaries not defined by survey
T 6/8
Land District North Auckland
Dataset Type: Computed
Digitally Generated Plan
Generated on: 03/11/2009 3:24pm Page 8 of 10
TE HAPUA 42
Surveyor: Robert Edward Lendrum
Firm: The Surveying Company (Wellington)
Digital Title Plan
ML 424366
Approved on: 3/11/2009


Part Mokaikai
Diag. E
1361.32
TE HAPUA 42
239.4291Ha
(5875.3036Ha)
Natural boundary adopted from ML 6645 may not be in the same position as the present MHWM
Parengarenga Harbour
Diag. F
975.66
504.53
163.55
Part Mokaikai
TE HAPUA 42
Part Mokaikai
Diag. I
453.43
692.02
TE HAPUA 42
66.3719Ha
(5875.3036Ha)
Natural boundary adopted from ML 3250 may not be in the same position as the present MHWM
PACIFIC OCEAN
792.60
246.23
Ohao 2C Block
Diag. EA
Part Mokaikai
791.80
TE HAPUA 42
(80.83)
8.65
72.18
55.72
1.01
Part Pakohu 5 Block
Diag. EA
See T7
Part Pakohu 5 Block
791.80
1071.54
TE HAPUA 42
142.2278Ha
(5875.3036Ha)
494.97
Part Pakohu 5 Block
Computed plan - areas and boundaries not defined by survey
T 7/8
TE HAPUA 42
Land District: North Auckland
Dataset Type: Computed
Digitally Generated Plan
Generated on: 03/11/2009 3:24pm Page 9 of 10
Surveyor: Robert Edward Lendrum
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Digital Title Plan
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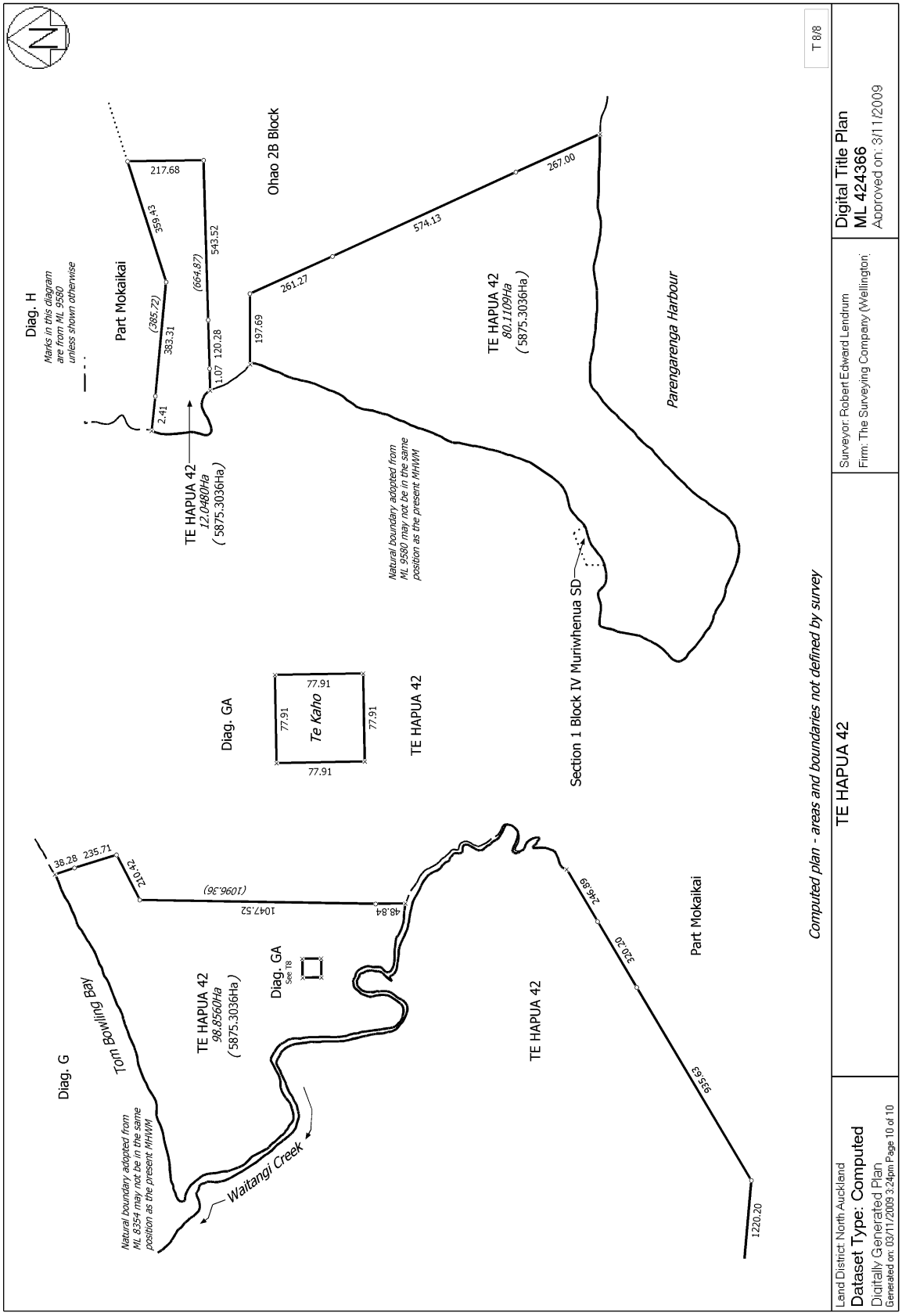
T 8/8
Digital Title Plan
ML 424366
Approved on: 3/11/2009
Surveyor: Robert Edward Lendrum
Firm: The Surveying Company (Wellington)
Computed plan - areas and boundaries not defined by survey
TE HAPUA 42
Land District: North Auckland
Dataset Type: Computed
Digitally Generated Plan
Generated on: 03/11/2009 3:24pm Page 10 of 10
Diag. H
Marks in this diagram are from ML 9580 unless shown otherwise
Part Mokaikai
217.68
359.43
543.52
(664.87)
(385.72)
383.31
2.41
1.07
120.28
Ohao 2B Block
267.00
574.13
261.27
197.69
TE HAPUA 42
12.0480Ha
(5875.3036Ha)
TE HAPUA 42
80.1109Ha
(5875.3036Ha)
Parengarenga Harbour
Natural boundary adopted from ML 9580 may not be in the same position as the present MHWM
Section 1 Block IV Muriwhenua SD
Diag. GA
77.91
77.91
77.91
77.91
Te Kaho
TE HAPUA 42
38.28
235.71
21.02
(1096.36)
1047.52
48.84
Diag. G
Tom Bowling Bay
TE HAPUA 42
98.8560Ha
(5875.3036Ha)
Diag. GA
See T8
TE HAPUA 42
246.89
320.20
Part Mokaikai
63.59
1220.20
Natural boundary adopted from ML 8354 may not be in the same position as the present MHWM
Waitangi Creek

Report on Maori Land details for the following Record(s) of Title

Record(s) of Title

517692	Identified as potentially Maori Freehold Land

***** End of Report *****

GWE
CONSULTING ENGINEERS

ONSITE WASTEWATER MANAGEMENT SUBDIVISION REPORT FOR DISCHARGE CONSENT

Muriwhenua
Te Hapua

MURIWHENUA INCORPORATION
April 2026 | V2

PROGRESS ENGINEERED. PROBLEMS SOLVED.

Auckland | Waiheke | Waikato | Bay of Plenty

DOCUMENT CONTROL RECORD

Client:	Muriwhenua Incorporation
Project Location:	Muriwhenua, Te Hapua
Job Number:	J5294-1
Document:	Onsite Wastewater Management | Subdivision Report for Discharge Consent
Version:	V2
Document Status:	Final - Approved for Issue
Date:	April 2026
Prepared by:	 Patrick O'Riordan, Technical Director
Reviewed by:	 Gareth Williams, Director
Approved by:	 Patrick O'Riordan, Technical Director
Filename:	https://gweconsult.sharepoint.com/sites/ActiveProjects/LD/Muriwhenua Te Hapua-J5294/04-WW/04-Reports/RWW01v2 FINAL- Muriwhenua Te Hapua-WWDR.docx

GWE Consulting Engineers
www.gwe.co.nz
0800 445 001

DOCUMENT STATUS

STATUS	DATE	DETAILS	AUTHOR	CHECKED	APPROVED
FINAL	April 2024	Final	AC	DK	PO
FINAL	April 2026	Updates to Regional Plan	PO	GW	PO

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

This report was prepared by GWE Consulting Ltd (GWE) for the Muriwhenua Incorporation as our client.

GWE has received drawings for a proposed subdivision of 20 residential lots (designated "Area 1") on Te Hapua Block 42, located off Te Hapua Road, Te Hapua. The site is approximately 2.5 km from the main Te Hapua community.

This report assesses the suitability of the site to support a 20-lot residential subdivision in relation to wastewater engineering and is intended to be used to provide support for the subdivision consent application.

The information in this report is based on information received from the client, their consultants, and planners.

2 SITE DETAILS

The subject site is located at Te Hapua 42 Block, on the southern side of Te Hapua Road. The site is legally described as Te Hapua Block with a gross lot area of approximately 5,875 hectares (with Area 1 having a developed area of approximately 1.2 ha). The property lies adjacent to Te Hapua Road and is currently undeveloped.

The site locality plan (Area 1 - purple) is displayed in Figure 1 below.

Figure 1: Site Locality Plan - Muriwhenua, Te Hapua (Area 1)

Source: Preliminary Civil Infrastructure Report – Maven Associates

Area 1 primarily contains native scrub/trees and is situated on a knoll of approximately 54 m RL. An existing track runs from Te Hapua Road along the southern side of the knoll and continues on to a narrow ridgeline.

3 PROPOSAL

The site is proposed to be subdivided to create 20 residential lots (Lots 1-20). Lots 1-20 range from 353 m^2 to 870 m^2 in area.

GWE has been provided with a subdivision scheme plan prepared by *Maven Associates* titled *Proposed Concept Layout Plan* dated *6 March 2024* (Refer to Appendix A).

Proposed lot sizes are summarised in Table 1 below.

Table 1: Proposed Residential Lot Sizes

PROPOSED LOT	GROSS AREA	PROPOSED LOT	GROSS AREA (m^2)
Lot 1	621 m^2	Lot 11	870 m^2
Lot 2	466 m^2	Lot 12	432 m^2
Lot 3	453 m^2	Lot 13	384 m^2
Lot 4	456 m^2	Lot 14	552 m^2
Lot 5	449 m^2	Lot 15	353 m^2
Lot 6	479 m^2	Lot 16	530 m^2
Lot 7	557 m^2	Lot 17	581 m^2
Lot 8	523 m^2	Lot 18	547 m^2
Lot 9	597 m^2	Lot 19	628 m^2
Lot 10	571 m^2	Lot 20	648 m^2

There are no reticulated wastewater services in the area.

For wastewater design, GWE have allowed for a 4-bedroom dwelling on each lot. This corresponds to an occupancy allowance of approximately 6 people.

A flow allowance of 180 litres/person/day is proposed (based on roof water tank supply and standard fixtures as per Table H3 of AS/NZS 1547:2012 and Table 6.2 of TP58). The peak wastewater volume generated from a 4-bedroom dwelling is anticipated to be 1,080 litres/day.

This peak wastewater volume generated from all 20 lots is expected to be 21,600 litres/day (21.6 m^3/day). Water use may be lower if water reduction fixtures are installed at building consent stage.

A decentralised wastewater system is proposed to manage wastewater from the subdivision.

3.1 Regulatory

The recommendations in this report are based on the information received from the Client, an intrusive ground investigation and in accordance with the following guidelines and regulation documents:

- FNDC Operative District Plan.
- Regional Plan for Northland, Appeals Version, February 2024.

- Auckland Regional Council Technical Publication No. 58: Onsite Wastewater Systems: Design and Management Manual (TP58), 2004.
- Australian/New Zealand Standard, Onsite Domestic Wastewater Management, AS/NZS 1547:2012.

In accordance with Rule C.6.1.5 of the NRC Regional Plan, the discharge of 21.6 m^3/day of treated wastewater from a decentralised system is a **Discretionary Activity**. A discharge consent will be necessary.

4 SITE ASSESSMENT

4.1 Site Assessment

A site investigation was undertaken on 23 March 2023 (Autumn) by a GWE Engineer. The following land use characteristics were determined:

- The site primarily contains native scrub/trees. Large areas of burnt scrub/trees were located adjacent to the existing track.
- Topography at the site was variable. The disposal areas will be sited within areas containing slopes of generally <15-20°.
- Areas of instability have been noted across the site by Haigh Workman Limited (Refer to Appendix B for GWE's site plans identifying areas of instability). The disposal areas will be sited outside of the identified areas of instability.
- The Geological Map of New Zealand, (Institute of Geological and Nuclear Sciences Ltd, 2014) 1:250,000, indicated that the underlying soils is of the Undifferentiated Tangihua Complex basalt in Northland Allochthon described as Basaltic pillow lava and pillow breccia, with sills and dikes of basalt and dolerite.

4.2 Subsoil Investigation

An assessment of the underlying soils was undertaken by GWE Engineers during the site investigation. Hand auger holes (AH1-AH20) were drilled to a target depth of 1.2 m below ground level (bgl).

A summary, including relevant soil structure, textural features and horizon depths are outlined in Table 1 below. Approximate borehole locations are indicated on the Wastewater Site Plan (Drawing No. 500) appended as Appendix B. No percolation testing was conducted.

A summary of subsoil investigations is included in Table 2.

Table 2: Bore Log Summary

HORIZON	DESCRIPTION	DRAINAGE	CATEGORY
AH1			
0.0-0.1 m	TOPSOIL, dark brown, moist to wet, organic.		
0.1-1.2 m	Silty CLAY, dark brown, very stiff, slightly plastic, dry to moist. @0.5 m – turning medium brown. @0.9 m – turning reddish brown with more silt content.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH2			
0.0-0.1 m	TOPSOIL, moist, rootlets and foliage, organic.		
0.1-1.0 m	Silty CLAY, dark brown, high stiffness, slightly plastic, dry, becoming lighter with depth.	Slow Drainage	6
1.0-1.2 m	Clayey SILT, medium brown, friable, dry to moist. @1.1 m – light brown mottling.	Moderate to Slow Drainage	5
1.2 m	Terminated at target depth. No groundwater encountered.		
AH3			
0.0-0.6 m	Silty CLAY, dark brown, high stiffness, low plasticity, dry to moist. @0.5 m - turning medium brown and more silt content.	Slow Drainage	6
0.6-1.2 m	Clayey SILT, medium brown, friable, dry. @0.9 m - turning brown/white with trace sand. @1.1 m – turning reddish brown with white mottles	Moderate to Slow Drainage	5
1.2 m	Terminated at target depth. No groundwater encountered.		
AH4			
0.0-0.1 m	TOPSOIL, dark brown, wet, organic, rootlets.		
0.1-0.9 m	Silty CLAY, dark brown, high stiffness, moderate plasticity, dry to moist, becoming light with depth. @0.4 m - medium brown. @0.6 m – moist.	Slow Drainage	6
0.9-1.2 m	Clayey SILT, medium brown, moist, friable, orangish/brown mottling.	Moderate to Slow Drainage	5
1.2 m	Terminated at target depth. No groundwater encountered.		
AH5			
0.0-1.2 m	Silty CLAY, medium brown, high stiffness, moderate plasticity, moist. @0.6 m – orange/brown/rust mottling. @0.9 m – Turning tan/medium brown with orange/red mottles.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH6			

HORIZON	DESCRIPTION	DRAINAGE	CATEGORY
0.0-0.15 m	TOPSOIL, dark brown, moist to wet, organic		
0.15-1.2 m	Silty CLAY, dark brown, high stiffness, moderate plasticity moist. @0.6 m - Becoming tan. @1.0 m – Turning reddish tan and moderate stiffness.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH7			
0.0-0.15 m	TOPSOIL, wet, rootlets, organics.		
0.15-1.2 m	Silty CLAY, medium to dark brown, high stiffness, moderate plasticity, moist, rootlets, becoming lighter with depth. @0.6 m – tan. @0.9 m – tan/orangish brown. @1.0 m – white mottles.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH8			
0.0-0.1 m	TOPSOIL, dark brown, moist, rootlets		
0.1-0.8 m	Silty CLAY, medium brown, high stiffness, moderate plasticity, dry to moist, becoming lighter with depth. @0.7 m – tan.	Slow Drainage	6
0.8-1.2 m	Clayey SILT, tan, black/white and rust mottles, dry, friable. @1.1 m – turning medium brown.	Moderate to Slow Drainage	5
1.2 m	Terminated at target depth. No groundwater encountered.		
AH9			
0.0-0.2 m	TOPSOIL, dark brown, moist to wet, rootlets.		
0.2-1.2 m	Silty CLAY, dark brown, high stiffness, moderate plasticity, moist, becoming lighter with depth. @0.5 m – medium brown. @0.9 m – turning reddish brown.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH10			
0.0-0.1 m	TOPSOIL, moist, rootlets, organics.		
0.1-1.2 m	Silty CLAY, dark brown, high stiffness, low plasticity, rootlets, dry, becoming lighter with depth. @0.7 m – tan and moist. @1.0 m – reddish brown.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH11			
0.0-0.1 m	TOPSOIL, dark brown, rootlets, organics, moist.		

HORIZON	DESCRIPTION	DRAINAGE	CATEGORY
0.1-1.2 m	Silty CLAY, dark brown, high stiffness, low plasticity, moist, becoming lighter with depth. @0.4 m – medium brown. @0.7 m – reddish brown. @0.8 m – black mottles.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH12			
0.0-0.1 m	TOPSOIL, dark brown, moist, rootlets.		
0.1-1.2 m	Silty CLAY, medium/dark brown, high stiffness, low plasticity, becoming lighter with depth. @0.7 m – orangish brown. @0.9 m – white/cream mottling.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH13			
0.0-0.1 m	TOPSOIL, medium/dark brown, dry, organic.		
0.1-0.9 m	Silty CLAY, medium brown, rootlets, high stiffness, low plasticity, dry to moist. @0.5 m – turning medium brown/orange.	Slow Drainage	6
0.9-1.2 m	Clayey SILT, orangish brown, dry to moist, friable, grey/brown mottles.	Moderate to Slow Drainage	5
1.2 m	Terminated at target depth. No groundwater encountered.		
AH14			
0.0-0.1 m	TOPSOIL, light/medium brown, dry, rootlets, friable, organic.		
0.1-1.2 m	Silty CLAY, medium brown, rootlets, high stiffness, low plasticity, dry. @0.6 m – light/medium brown. @0.9 m – Reddish brown and moist.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH15			
0.0-1.2 m	Silty CLAY, medium/dark brown, rootlets, high stiffness, moderate plasticity, dry to moist. @0.5 m – turning medium brown. @0.7 m – red mottling. @0.8 m – turning reddish brown. @0.9 m – moist.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH16			
0.0-1.2 m	Silty CLAY, medium brown, rootlets, high stiffness, moderate plasticity, moist. @0.3 m – turning yellow/brown. @0.8 m – turning reddish brown.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		

HORIZON	DESCRIPTION	DRAINAGE	CATEGORY
AH17			
0.0-1.2 m	Silty CLAY, medium brown, high stiffness, moderate plasticity, dry to moist, becoming lighter with depth. @0.6 m – turning light brown/orange. @0.8 m – red mottles. @0.9 m – turning reddish brown, moist.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH18			
0.0-1.2 m	Silty CLAY, medium/dark brown, high stiffness, moderate plasticity, dry to moist. @0.5 m – becoming medium brown. @0.8 m – becoming reddish brown.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH19			
0.0-0.6 m	Silty CLAY, dark brown, rootlets, high stiffness, low plasticity, dry.	Slow Drainage	6
0.6-1.2 m	Clayey SILT, medium brown, friable, dry. @0.8 m – turning reddish brown. @1.0 m – turning greyish brown.	Slow to Moderate Drainage	5
1.2 m	Terminated at target depth. No groundwater encountered.		
AH20			
0.0-1.2 m	Silty CLAY, dark brown, rootlets, high stiffness, low plasticity. @0.6 m – becoming medium brown with orange mottles. @0.8 m – becoming orangish brown. @1.2 m – dry to moist.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		

The subsoil assessment is summarised as follows:

- Soils at the site are predominantly comprised of silty CLAY, with a corresponding soil category of 6 under TP58.
- Loading rates for the wastewater disposal design shall be based upon category 6 soils.
- No groundwater was encountered.
- Signs of a seasonally elevated groundwater table were present (mottling). However, this could be due to poor infiltration and GWE expects the groundwater table to be >0.9 m in the disposal field areas.

5 WASTEWATER ASSESSMENT

A decentralised system is proposed to service the subdivision. Wastewater from each lot will be transferred to a single wastewater treatment and disposal system.

5.1 Wastewater Flows

5.1.1 Residential Occupancy

Each lot has been assessed as having a 4-bedroom dwelling, with an associated occupancy of six people. It should be noted that any study, office, gym, or similar room within any future dwelling may be considered to be a '*potential bedroom'*.

5.1.2 Discharge Type

The proposed lots are intended for residential end use and only domestic wastewater will be produced. Domestic type wastewater is generated from residential kitchens, bathrooms, laundries, toilets and other household areas.

5.1.3 Design Flow Allowance

For the purpose of subdivision assessment, GWE have assumed a flow allowance of 180 Litres/person/day (L/p/d), in accordance with TP58 Table 6.2 and Table H3 of AS/NZS 1547:2012.

This elected flow rate is based on onsite roof water supply and standard fixtures (including automatic washing machine). The roof water tank supply could be supplemented by a bore water supply during drier periods. The flow allowance is considered appropriate given the roof water tank supply is considered to be the primary water source.

Although not assumed, we recommend full water reduction fixtures to promote water conservation across the development. Actual per capita water usage may be lower than 180 L/p/d if water-reduction fixtures are specified at building consent stage for each lot. Table 3 outlines the assumed design flow allowance for the proposed lots.

Table 3: Design Flow Allowance

LOT	Lots 1-20 (all)
WATER SUPPLY	Roof water (supplemented by bore water, if required)
WATER FIXTURES	Standard Fixtures assumed*
DESIGN PER CAPITA FLOW ALLOWANCE	**180 Litres/person/day**
DEVELOPMENT/NO. OF PERSONS	4-bedroom dwellings (20 lots) **Each House Occupancy: 6 people**
TOTAL SITE OCCUPANCY	**120 persons (20 lots)**
TOTAL FLOW	**21,600 Litres/day**
OTHER NOTES	No grey-water reuse recycling proposed.

Note: **Actual water usage may be lower than 180 l/p/d if water-reduction fixtures are specified at building consent stage. Water-reduction fixtures include; dual flush toilets, shower and tap flow restrictors, aerator faucets, water-conserving/front loading washing machines, no bath.*

5.2 Wastewater Reticulation

Wastewater will be transferred to the wastewater treatment plant by either a conventional gravity sewer system (CGSS), septic tank effluent pumping/gravity (STEP/STEG) or a low pressure sewer system (LPSS).

All three options are expected to be feasible. The chosen option and reticulation design will be undertaken at .

5.3 Wastewater Treatment

Based on the site soil conditions and requirements under TP58/ASNZS:1547, secondary treatment (or better) is recommended.

A packaged treatment system is recommended for the subdivision due to their reliability, ease of servicing/maintenance and the availability of suitable systems.

Table 4 presents several manufacturers of on-site wastewater treatment systems that provide plant that have demonstrated ability to treat raw wastewater to secondary quality effluent standards. Most of the suppliers are based or have approved agents in the Northland Region.

Table 4: Wastewater Treatment System Suppliers

WASTEWATER TREATMENT TECHNOLOGIES	• Innoflow Technologies Ltd • Reflections Treatment Systems • Hynds Pipe Systems (Hynds Lifestyle) • Waterflow
ALARM SYSTEM	Minimum requirement – visual and audible alarm located at plan.
FLOWMETER	Telemetry flowmeter to be provided.

Nuisance effects (noise, odour) are not expected are not expected from the wastewater treatment system.

5.4 Land Application

Wastewater from the treatment system is proposed to be discharged to a Pressure Compensating Drip Irrigation (PCDI) field. PCDI wastewater disposal is common activity within Northland and New Zealand and is considered to be a best-practice land disposal option.

The proposed land disposal system to service the subdivision is based on the following requirements

- Hydraulic loading rate of 2 mm/d.
  - TP58 permits loading rates of up to 3 mm/day for Category 6 soils. A 2 mm/day loading rate has been chosen to minimise any potential environmental impacts of the disposal.
  - Based on a design flow of 21,600 Litres/day, the required primary disposal field area is 10,800 m^2.

- A 30% reserve disposal field has been provided (3,240 m^2), in accordance with the PA criteria for NRC onsite wastewater discharges (Section C.6.1.3).
- Biochemical Oxygen Demand (BOD) loading rates
  - A healthy soil environment can assimilate up to 600 kg-BOD/ha/day.
  - The proposed BOD loading is <150 kg-BOD/ha/year, an order of magnitude below acceptable loadings.
- Separation to sensitive environmental features (Refer to Section 5.4.1)
- Separation to lot boundaries (Refer to Section 5.4.1)
- Appropriate site topography (slopes are generally <20º)
- Available land within close proximity of the WWTP.
- Separation to areas on instability (Refer to Section 5.4.1)

5.4.1 Specific Disposal Area Requirements

Setback Distances

Table 9 of the NRC Regional Plan and TP58 provide the following recommended wastewater setbacks for secondary treated wastewater, as summarised in Table 5.

Table 5: Required Setback Distances

FEATURE	NRC REGIONAL PLAN	TP58
Surface water (including wetlands)	15 m	15 m
Drains	5 m	
Potable water supply bore	20 m	20 m
Groundwater table	0.6 m	0.9 m
Property boundary	1.5	1.5 m
Buildings/houses	-	1.5 m
Floodplain	5% AEP	5% AEP
Retaining wall, embankments, etc	-	3 m or 45°

The disposal field has been designed to meet the requirements under TP58 and the NRC regional plan.

Areas of Instability

Haigh Workman Limited identified historic slip features in the vicinity of the proposed disposal field areas.

GWE have adopted a 10 m set back to all identified slip features. The separation distance provided and the conservative loading rate of 2 mm/day is expected to be sufficient. However, GWE recommend specific geotechnical review is provided to confirm the suitability of the design.

Reserve Area

Wastewater reserve areas are to remain undeveloped to allow for future extension/ relocation of the land application system should failure occur from misuse (e.g. overloading), etc.

A 30% reserve area is proposed, in line with NRC requirements.

5.4.2 Pressure Compensating Drip Irrigation (PCDI)

The land application can comprise either be surface laid or subsurface laid PCDI, depending on the intended landscaping.

- Subsurface dripline should be buried 100-150 mm into topsoil and planted using grass. If topsoil is unavailable, good-quality topsoil should be imported to the disposal area. Line spacing should be reduced to 0.5 m centres to achieve even distribution of wastewater, the length of dripline should be increased accordingly.
- Surface laid dripline should be covered with 100-150 mm of mulch and planted using species appropriate for onsite wastewater disposal areas. The planting density should be at least one plant per m^2 or provide at least 80% canopy cover. Line spacing can be 1 m when installed on the ground surface.

The existing native scrub/trees will be sufficient to uptake wastewater and nutrients (additional planting can also be undertaken, if necessary). A list of suitable evapotranspiration plants is included in Appendix C. Plants absorb applied wastewater and will assist in up taking the remaining nutrients in the discharge. Any ammonia that is present in the wastewater is converted to nitrate by micro-organisms in the oxygen rich upper soil layers, and any nitrate that remains is taken up by micro-organisms deep in the soil.

A summary of the proposed PCDI disposal area design is outlined in Table 6.

Table 6: Land Disposal Area Design

TYPE LAND DISPOSAL SYSTEM	PCDI
TREATMENT QUALITY	Secondary Effluent
DRIPPER LINES	Surface laid PCDI: dripper lines to be at 1.0 m spacing. Subsurface PCDI: dripper lines to be at 0.5 m spacing
SOIL CATEGORY (TP58)	6
LOADING RATE	2 mm/day (conservative)
LOADING METHOD	Timer dose pump
PUMP	High water level alarm shall be installed in pump chamber with audible/visual alarm. Pump Chamber Volume – system specific Emergency Storage volume – min. 24 hours storage
PRIMARY DISPOSAL AREAS	10,800 m^2
RESERVE DISPOSAL AREA	3,240 m^2 - 30%
VEGETATION	Existing native scrub/trees. Additional planting as necessary (Appendix C)

LOCATION	Refer to Drawing No. 500 (Appendix B)
STORMWATER CONTROLS	All surface water shall be diverted away from the disposal area. Discharge location of stormwater management devices shall be located downslope of all wastewater disposal area.

5.5 Alternative Options

This report has identified that a decentralised wastewater system comprising of a secondary wastewater treatment system with disposal to PCDI is suitable for servicing the subdivision. This option is considered to be the best-practicable option.

Alternative wastewater options that were investigated and determined to be unsuitable include:

- Individual lot wastewater management (on-site wastewater systems for each lot)
- Decentralised system with disposal to surface water
- Trucking wastewater off-site

5.5.1 Individual Lot Wastewater Management

Individual lot wastewater management was considered but determined to be unsuitable due to the following:

- The lot sizes do not support on-site wastewater management.
- A significant amount of cut/fill is required for the lots. Disposal to fill soils is considered a higher risk activity.
- On-site wastewater management presents a higher risk of human exposure to wastewater (as opposed to a single large wastewater field located away from the residential development).
- A significant amount of suitable land is available for a decentralised wastewater solution.

5.5.2 Decentralized System with Disposal to Surface Water

An option involving a discharge to surface water was considered and determined to be unsuitable given the availability of suitable land in the area. A discharge to water is also considered to have a significantly higher adverse environmental impact.

5.5.3 Trucking Wastewater Off-site

Trucking wastewater off-site was determined to be unsuitable due to the volumes of wastewater produced on a daily basis. Furthermore, haulage would present a significant environmental impact through diesel emissions from trucks, noise and dust.

5.6 Summary

A decentralised wastewater system comprised of a secondary wastewater treatment system with disposal to PCDI is considered suitable for servicing the subdivision.

21,600 L/day of wastewater is expected to be produced from the 20-lot subdivision, based on each lot having a 4-bedroom dwelling and 180 L/p/d.

Based on site investigations, it is recommended that PCDI with a conservative loading rate of 2 mm/day is used. The disposal system can be either surface or subsurface laid.

6 ASSESSMENT OF ENVIRONMENTAL EFFECTS

It is anticipated that the recommendations proposed will have a less than minor effect on the receiving environment.

6.1 Impact on Surface Water

It is proposed that a minimum separation of 15 m can be achieved from OLFPs, in accordance with TP58. Furthermore, a high level of treatment (secondary treatment) and a conservative loading rate (2 mm/day for PCDI) is proposed. The disposal areas are in areas exposed to sun and wind and will also contain evapotranspiration vegetation with a significant amount of wastewater removed through evapotranspiration.

Given:

a. the wastewater will be treated to a high level (secondary/tertiary treatment).

b. the proposed loading rate at the site is conservative, so there is negligible risk of runoff.

c. proposed vegetation will result in some of the treated water being taken up by plants and evapotranspiration, so there will be less that leaches into the ground.

d. Separation distances for treated effluent are maintained in accordance with TP58/NZS 1547 for surface water (15 m).

The effects on surface water are expected to be less than minor.

6.2 Impact on Groundwater

GWE expects the groundwater separation will meet the requirement under TP58 of 0.9 m (beyond the 0.6 required by the NRC regional plan PA criteria).

Good treatment quality (secondary) and subsequent percolation and treatment through topsoil and the in-situ soils will ensure groundwater is not contaminated because of the discharge of treated effluent. Furthermore, the proposed loading rate of 2 mm/day is conservative and will enable wastewater to be up taken by other means.

The effects on groundwater are expected to be less than minor.

6.3 Impact on Soils

The site soils are generally categorised as TP58 category 6 with slow draining characteristics. TP58 recommends loading rates of up to 3 mm/day. GWE have proposed a conservative loading rate of 2 mm/day.

The proposed system has been specified to ensure an even loading of treated wastewater over the whole disposal area. Evapotranspiration vegetation will promote the uptake of nitrogen and phosphorus.

The treated wastewater is expected to have low BOD and TSS concentration (BOD_5 <20 mg/L, TSS <30 mg/L), reducing the impact on the receiving soils by reducing the level of biological breakdown of organic compounds which soils would normally expect to complete. The nature of the wastewater minimises any impact on receiving soils and can enhance the long-term acceptance rate (LTAR). Reduction in soakage capacity as a result of application of the high-level treated wastewater into the soil is not expected to occur.

6.4 Impact on Amenity Values

Given the high level of wastewater treatment proposed, odours are not anticipated at the plant nor the disposal area. Moreover, the volume of treated wastewater produced is proposed to be dispersed over a large area.

The treatment plant and disposal system are sited a minimum of 3 m from property boundaries. As such, indiscernible adverse odour effects are not anticipated. The treatment plant is not expected to result in any discernible adverse noise effects to the owners or neighbours.

6.5 Summary

Wastewater treatment and disposal for the proposed subdivision has been designed in accordance with relevant guidelines (TP58/NZS 1547) and is consistent with the Resource Management Act, the NRC Regional Plan and the FNDC District Plan.

For the reasons outlined above, and throughout the application, insignificant adverse environmental effects are anticipated. Groundwater, surface water, public health, and amenity are all adequately protected. Overall, the proposal to treat and discharge wastewater from the proposed subdivision using a decentralised wastewater system, is considered to have less than minor adverse effects.

Ongoing maintenance and management of the proposed treatment system in accordance with the supplier's specifications will be required to ensure that no minor adverse effects arise.

Furthermore, there are several specific design features are proposed. These provide factors of safety and will mitigate against environmental effects, including:

- High level of treatment proposed (secondary treatment).
- Conservative wastewater loading rate proposed (2 mm/day).
- Proposed vegetation will promote nutrient uptake and evapotranspiration.
- Separation distances in accordance with TP58/NRC Regional Plan are maintained.
- 30% reserve area is available.

6.6 Proposed Monitoring and Management Plan

Wastewater treatment and disposal will need to be undertaken in a responsible manner to ensure that the discharge continues to have less than minor effects on the receiving environment. The proposed subdivision is expected to generate approximately 21,600 litres/day of domestic wastewater, which will be treated to secondary standard and discharged to land via a Pressure Compensating Drip Irrigation (PCDI) system. The proposed wastewater system also incorporates a telemetry flowmeter, audible/visual alarms, emergency storage and a 30% reserve disposal area. Ongoing monitoring and management of the system is therefore proposed to ensure that treatment and disposal performance is always maintained.

The objectives of the monitoring and management plan are to:

- ensure the wastewater treatment plant and land disposal system operate effectively at all times
- ensure that treated wastewater is disposed of within the design parameters adopted for the site
- confirm that no surface runoff, ponding, objectionable odour or other nuisance effects arise
- ensure that all maintenance is undertaken in accordance with the manufacturer's recommendations; and
- provide a clear framework for responding to alarms, equipment failure, system malfunction or any unexpected environmental effects.

6.6.1 Commissioning and Establishment

Prior to the system becoming operational, the final wastewater treatment and disposal system shall be installed, commissioned and tested by suitably qualified and experienced persons. Commissioning shall confirm that:

- The treatment plant is operating in accordance with the supplier's specifications.
- The PCDI disposal field has been installed generally in accordance with the approved design.
- The timer dosing system, pumps, control panel, telemetry flowmeter and audible/visual alarms are fully operational.
- Emergency storage is available within the pump chamber/system.
- Stormwater is diverted away from the disposal area.
- The reserve disposal area remains available and undeveloped.
- All required setbacks and separation distances are achieved on site.

Following completion of installation, as-built information for the treatment plant, pipework and land disposal areas should be retained by the owner/body responsible for the system for future operation and maintenance purposes.

6.6.2 Routine Operation and Maintenance

The wastewater treatment plant and disposal system shall be operated and maintained in accordance with the manufacturer's recommendations and any resource consent conditions. A service and maintenance contract with the treatment plant supplier, or another suitably qualified wastewater service provider, should be maintained at all times.

Routine operation and maintenance should include, as a minimum:

- Regular inspection of the treatment plant, pumps, valves, control equipment and alarm systems.
- Checking sludge accumulation within the treatment plant and arranging desludging as required.
- Checking the operation of blowers, pumps, dosing equipment and filters.
- Checking that the telemetry flowmeter is operating correctly and recording flows.
- Flushing and maintaining the PCDI network as required by the supplier's recommendations.
- Checking that no damage has occurred to irrigation lines, valves or pipework.
- Maintaining the disposal area vegetation so that healthy vegetative cover is retained.
- Ensuring that surface water controls continue to divert stormwater away from the disposal area.
- Ensuring that the reserve disposal area remains available for future use if required.

Ongoing maintenance and management of the proposed treatment system in accordance with the supplier's specifications will be required to ensure that no more than minor adverse effects arise.

6.6.3 Performance Monitoring

The following monitoring is proposed for the system:

Flow Monitoring

A telemetry flow meter shall be installed on the system to record wastewater flows automatically. Flow records should be reviewed periodically to identify any unusual increase in water use, infiltration, leakage or system overloading. This monitoring will also provide confirmation that actual wastewater flows remain generally consistent with design expectations.

Alarm Monitoring

The system shall include audible and visual alarms, including a high-water alarm within the pump chamber/system. Alarm events should be investigated promptly by the operator or maintenance provider. A record of alarm events, causes and corrective actions taken should be maintained.

Disposal Field Monitoring

The disposal area should be visually inspected on a routine basis for signs of:

- Surface breakout or ponding of treated wastewater.
- Runoff beyond the disposal area.
- Excessive wetness or saturated ground conditions.
- Damage to driplines, pipework or ancillary infrastructure.
- Erosion within or immediately downslope of the disposal area.
- Reduced vegetation health.
- Objectionable or offensive odour.

If any of the above are observed, remedial action should be undertaken as soon as practicable.

Amenity and Environmental Monitoring

The operator should confirm during routine inspections that:

- There is no objectionable odour beyond the site boundary.
- There is no discharge of treated wastewater to surface water.
- The disposal field remains free draining and is performing as intended.
- The wastewater system is not causing any discernible adverse amenity effects.

Disposal Area Management

The primary and reserve disposal areas shall be protected from activities that may compromise their long-term performance. In particular:

- No buildings or structures shall be erected within the disposal areas.
- No filling, regrading or excavation shall occur within the disposal areas without specific design review.
- No vehicle access, stock access, stockpiling or other activities likely to compact the soil shall occur within the disposal areas.
- Vegetation shall be maintained to promote evapotranspiration and nutrient uptake.
- Any replacement planting should be of a type suitable for on-site wastewater disposal areas.
- The reserve disposal area shall remain undeveloped and available at all times for future extension or relocation of the land application system should failure occur from misuse, overloading, malfunction or maintenance requirements.

- Surface water management devices shall continue to direct stormwater away from the disposal areas, with stormwater discharges located downslope of the wastewater disposal field.

Contingency Measures and Corrective Actions

If monitoring identifies system malfunction or unexpected effects, corrective action shall be undertaken promptly. Trigger events requiring corrective action include:

- Activation of a high-level alarm.
- Treatment plant failure.
- Pump or dosing failure.
- Surface ponding or runoff of treated wastewater.
- Objectionable odour.
- Damage to the irrigation network.
- Any indication that the disposal area is not accepting wastewater as intended.

In the event of such an occurrence, the following actions should be undertaken as appropriate:

- Inspect the system as soon as practicable.
- Arrange for the service contractor to attend site.
- Repair or replace faulty components.
- Reduce hydraulic loading where practicable until the issue is rectified.
- Utilise emergency storage within the system.
- If necessary, remove wastewater off-site temporarily by tanker until the system is returned to service.
- If required by resource consent conditions, advise Northland Regional Council of the malfunction and the actions taken to remedy it.

Should the primary disposal area not perform as intended over the long term, the reserve disposal area can be brought into service, subject to detailed design review and any required approvals.

Record Keeping and Reporting

Records should be maintained for the wastewater system, including:

- Telemetry flow records.
- Service and maintenance visits.
- Alarm activations.
- Desludging events.

- Repairs and replacement works.
- Complaints, if any.
- Inspection notes relating to the performance of the disposal area.

A summary of monitoring and maintenance undertaken should be made available to Northland Regional Council on request or provided at a frequency required by any future resource consent conditions.

Overall, the proposed monitoring and management measures, combined with the high level of treatment proposed, the conservative loading rate of 2 mm/day, the provision of stormwater controls and the availability of a 30% reserve disposal area, are expected to ensure that the wastewater system continues to operate effectively and that adverse environmental effects remain less than minor.

7 STATUATORY ASSESSMENT

The adverse effects arising from the proposed discharge on the receiving environment have been assessed in Section 6 and are found to be no more than minor.

7.1 Regional Plan for Northland

In accordance with section C6 of the Regional Plan for Northland, the discharge of 21.6 m^3/day of treated wastewater from a decentralised system is a **Discretionary Activity** as the flows exceed 2 m^3/day. Rule C6.1.5 therefore applies.

A discharge consent will be required.

Table 7 7 outlines the permitted activity conditions as per NRC PRP Rule C.6.1.3 and where they are being complied with in the proposal.

Table 7: Proposed Regional Plan for Northland - Permitted Activity Rule (C.6.1.3)

PERMITTED ACTIVITY CRITERIA (C.6.1.3)		PROPOSED ACTIVITY
1.	The on-site system is designed and constructed in accordance with the Australian/New Zealand Standard. On-site Domestic Wastewater Management (AS/NZS 1547:2012).	**Complies** – AS/NZS1547 design
2.	The volume of wastewater discharged does not exceed two cubic metres per day.	**Does not comply** – The design flow is >2 m^3/day
3.	The discharge is not via a spray irrigation system or deep soakage system.	**Complies** – The proposed land disposal method is PCDI (not spray irrigation or deep soakage).
4.	The slope of the disposal area is not greater than 25 degrees.	**Complies** – The land disposal area slope is under 25 degrees
5.	For wastewater that has received secondary treatment or tertiary treatment, it is discharged via: ~~a. a trench or bed system in soil categories 3 to 5 that is designed in accordance with Appendix L of Australian/New Zealand Standard On-Site Domestic Wastewater Management (AS/NZS 1547:2012); or~~	**Complies** – Secondary treatment and PCDI land disposal is proposed and will be covered by a minimum of 100 millimetres of topsoil, mulch, or bark

PERMITTED ACTIVITY CRITERIA (C.6.1.3)		PROPOSED ACTIVITY
	b. an irrigation line system that is dose loaded and covered by a minimum of 50 millimetres of topsoil, mulch, or bark, and	
6.	For the discharge of wastewater onto the surface of slopes greater than 10 degrees: a. The wastewater, excluding greywater, has received at least secondary treatment. b. The irrigation lines are firmly attached to the disposal area. c. Where there is an up-slope catchment that generates stormwater runoff, a diversion system is installed and maintained to divert surface water runoff from the up-slope catchment away from the disposal area. d. A minimum 10 metre buffer area down-slope of the lowest irrigation line is included as part of the disposal area. e. The disposal area is located within existing established vegetation that has at least 80 percent canopy cover. f. The irrigation lines are covered by a minimum of 100 millimetres of topsoil, mulch, or bark.	**Complies:** a. Secondary treatment proposed b. PDCI to be pinned to slope surface (surface laid) or buried (subsurface) c. A cut-off drain is not required as the upslope catchment area is not considered significant d. 10 m buffer area is allowed for. e. Bush and scrub is likely to self-seed at the proposed PCDI disposal area. f. PDCI lines will be covered by a minimum of 100 mm of topsoil, mulch or bark.
7.	The disposal area and reserve disposal area are situated outside the relevant exclusion areas and setbacks in (C.6.1.3) Table 9: Exclusion areas and setback distances for on-site domestic wastewater systems.	**Complies** - The proposed disposal area can meet the required separation distances
8.	For septic tank treatment systems, a filter that retains solids greater than 3.5 millimetres in size is fitted on the outlet.	**Complies** – Outlet filter to be installed as per manufacturer specifications.
9.	The following reserve disposal areas are available at all times: ~~a. 100 percent of the existing effluent disposal area where the wastewater has received primary treatment or is only comprised of greywater, or~~ b. 30 percent of the existing effluent disposal area where the wastewater has received secondary treatment or tertiary treatment, and	**Complies** – 30% reserve area available.
10.	The on-site system is maintained so that it operates effectively at all times and maintenance is undertaken in accordance with the manufacturer's specifications.	**Complies** – Maintenance and management of the proposed treatment system should be ongoing to ensure that no minor adverse effects arise.
11.	The discharge does not contaminate any groundwater water supply or surface water.	
12.	There is no surface runoff or ponding of wastewater.	
13.	There is no offensive or objectionable odour beyond the property boundary.	

7.2 FNDC Operative District Plan

Wastewater from the proposed subdivision is generally in accordance with the standards for subdivision outlined in the FNDC Operative District Plan. Specifically relating to sanitary sewage disposal (Section 13.10.5):

(e) Where a reticulated system is not available, or a connection is impractical, whether a suitable sewage treatment or other disposal systems is provided in accordance with regional rules or a discharge system in accordance with regional rules or a discharge permit issued by the Northland Regional Council

There are no reticulated services available. The proposed disposal will be managed in accordance with a future discharge permit.

(g) Whether provision has been made by the applicant for monitoring mechanisms to ensure contaminants are not discharged into the environment from a suitable sewage treatment or other disposal system, together with any consent notices to ensure compliance

Consideration was given to the required monitoring mechanisms. A telemetry flow meter has been recommended to ensure flows are monitored continuously.

(j) Whether the subdivision represents the best practical option in respect of the provision that is made for the disposal of sewage and waste water.

The proposed disposal of effluent to land on the individual lots has been specified using AS/NZS 1547/TP58 and is generally in accordance with good practice for onsite wastewater management. Alternative options were investigated and determined to be unsuitable.

8 CONCLUSIONS AND RECOMMENDATIONS

GWE considers a decentralised wastewater treatment and disposal system to service the proposed 20 lot residential subdivision to be suitable. The disposal system is able to achieve appropriate separations and setbacks from potential environmental hazards.

GWE has assumed each lot will have a 4-bedroom dwelling (6 person occupancy) with a per capita flow rate of 180 litres/day. The total peak wastewater flowrate from the subdivision is expected to be 21,600 L/day.

A secondary treatment system with disposal to a PCDI system at a rate of 2 mm/day can adequately service the subdivision.

9 LIMITATIONS

This report has been prepared for the sole benefit of **Muriwhenua Incorporation** as our client, and their appointed representatives, according to their instructions, for the specific objectives described herein. This report is qualified in its entirety and should be considered in the light of our Terms of Engagement with the Client and the following:

a. Data or opinions contained within the report may not be used in other contexts or for any other purpose without our prior review and written agreement. Any reliance will be at the parties' sole risk.

b. No responsibility is assumed for inaccuracies in reporting by the information providers. In no event, regardless of whether GWE 's consent has been provided, does GWE accept any liability, whether directly or indirectly, for any liability or loss suffered or incurred by any third party to whom this report is disclosed placing any reliance on this report, in part or in full.

c. GWE has relied on information provided by the Client and by third parties to produce this document and arrive at its conclusions. GWE has not verified information provided (unless specifically noted otherwise) and we assume no responsibility and make no representations with respect to the adequacy, accuracy, or completeness of such information.

APPENDIX A

PROPOSED CONCEPT LAYOUT PLAN (MAVEN ASSOCIATES)

ASSUMED PROPOSED NETWORK TO COVEY PRIVATE ROADING AND LOTS THAT DO NOT FACE BANK.

GEOLOGICAL FEATURES

INDICATIVE BUILDING RESTRICTION LINE

TE HAPUA ROAD

LOT# 1 621m²
LOT# 2 466m²
LOT# 3 453m²
LOT# 4 456m²
LOT# 5 449m²
LOT# 6 479m²
LOT# 7 557m²
LOT# 8 523m²
LOT# 9 597m²
LOT# 10 571m²
LOT# 11 870m²
LOT# 12 432m²
LOT# 13 384m²
LOT# 14 552m²
LOT# 15 353m²
LOT# 16 530m²
LOT# 17 581m²
LOT# 18 547m²
LOT# 19 628m²
LOT# 20 648m²
LOT# 100 249m²
LOT# 101 667m²
LOT# 102 86m²
LOT# 103 72m²

CH 0
CH 20
CH 40
CH 60
CH 80
CH 100

4.00m
8.00m

POTENTIAL ACCESS TO EXISTING TRACK

FURTURE STORMWATER OUTFALL TO BE LOOKED AT WITH GEOTECH. POTENTIAL OPTIONS INCLUDE AN ARMORED SWALE TO WATERCOURSE OR FLUMED SW LINE TO NEAREST WATERCOURSE

INDICATIVE BUILDING RESTRICTION LINE

PROPOSED EXTENT OF EARTHWORKS

POSSIBLE WASTEWATER DISPOSAL FIELD
REFER TO HAIGH WORKMAN PLAN G03
FUTURE INVESTIGATIONS REQUIRED

LEGEND

- EX BDY
- PROP BDY
- PROP 7m X 12m BUILDING
- PROP 25,000L TANK
- PROP 3m X 5m CARPARK
- PROP 3m X 7m CARPARK
- PR STORMWATER
- EX/PROP SWMH

Rev	Description	By	Date
C	FOR INFORMATION	AO	06/0324
B	FOR INFORMATION	YG	15/12/23
A	FOR INFORMATION	AO	13/12/23

	By	Date
Survey	TM	12/2013
Design	AO	01/12/23
Drawn	AO	01/12/23
Checked	TM	12/2023

Maven Associates
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5 Owens Road, Epsom
Auckland 1023

Project
TE HAPUA
SITE A1 INVESIGATION
FOR
PROPRIETORS
OF MURIWHENUA

Title
PROPOSED CONCEPT
LAYOUT
PLAN

Project no.	147012
Scale	1:750 @ A3
Cad file	147014-1A-CONCEPT.DWG
Drawing no.	1A-C100
Rev	C

DATE: 3/6/24 FILE PATH: F:\MAVEN\PROJECTS\14700's MURIWENUA\DWG\14704-1A-CONCEPT.DWG

APPENDIX B
GWE SITE PLAN

Plot Date : 12:51 pm, 31 Mar 2024

DEVELOPMENT: AREA 1

RESERVE DISPOSAL AREA - 3,240 m² (30%)

LOCATION OF PROPOSED WASTEWATER TREATMENT PLANT

FUTURE STORMWATER OUTFALL TO BE EXTENDED DOWNSLOPE

PRIMARY DISPOSAL AREA - 10,800 m²

LOT 1 621 m²
LOT 2 466 m²
LOT 3 453 m²
LOT 4 456 m²
LOT 5 449 m²
LOT 6 479 m²
LOT 7 557 m²
LOT 8 523 m²
LOT 9 597 m²
LOT 10 571 m²
LOT 11 870 m²
LOT 12 432 m²
LOT 13 384 m²
LOT 14 552 m²
LOT 15 353 m²
LOT 16 530 m²
LOT 17 581 m²
LOT 18 547 m²
LOT 19 628 m²
LOT 20 648 m²

AH1 AH2 AH3 AH4 AH5 AH6 AH7 AH8 AH9 AH10 AH11 AH12 AH13 AH14 AH15 AH16 AH17 AH18 AH19 AH20

3.0 m
10.1 m
6.50
15.0 m
10.0 m

0 10.0 20.0 30.0 40.0 50.0
1:1000 DRAWING IN METRE

NOTES:

1. DRAWING IS BASED ON DATA FROM LINZ (ACCESSED MARCH 2024), PROPOSED CONCEPT PLAN (MAVEN ASSOCIATES, 13/12/2023) AND SITE INVESTIGATION PLAN AREA 1 (HAIGH WORKMAN, 02/2024)
2. LOCATION OF WWTP AND IRRIGATION AREA TO BE CONFIRMED ON-SITE.
3. WASTEWATER TREATMENT: SECONDARY
4. CATEGORY 6 SOILS
5. SURFACE OR SUBSURFACE LAID PCDI
6. 2 mm/DAY LOADING RATE
7. DESIGN FLOW: 21,600 LITERS/DAY.
8. PRIMARY IRRIGATION AREA: 10,800 m².
9. RESERVE IRRIGATION AREA: 3,240 m² (30%)
10. DO NOT SCALE FROM THIS DRAWING

LEGEND

OVERLAND FLOW PATH

PROP. PRIMARY DISPOSAL AREA

PROP. RESERVE DISPOSAL AREA

HISTORIC SLIP FEATURE

LOCATION OF AUGER HOLES — AH1

ISSUE STATUS: FINAL

REV	AMENDMENT	CAD	ENG	APPD	DATE
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PROJECT ADDRESS:
MURIWHENUA, TE HAPUA

DRAWING TITLE:
WASTEWATER SITE PLAN

CLIENT NAME:
MURIWHENUA INCORPORATION

SCALE: 1:1000 | A3

PROJECT No:	DRAWING No:	REV
J5294	500	0

Filename : H:\Muriwhenua Te Hapua-J5294\01-incoming Data\Drawings\ds-new-zealand-3layers-DWG(1)\Muriwhenua DWG.dwg

APPENDIX C

SUITABLE PLANTS FOR ONSITE WASTWATER SYSTEMS

Auckland Regional Council Technical Sheet G-1
LIST OF WATER TOLERANT PLANTS SUITABLE FOR ON-SITE WASTEWATER DISPOSAL SYSTEMS

GENERAL MATTERS TO CONSIDER WHEN PLANTING A LAND DISPOSAL AREA:

Plants that are suitable for planting in moist conditions, such as those associated with wastewater land disposal fields need to be selected on the basis of both their tolerance for such moist conditions and for their potential for high level of growth/high transpiration of moisture in such conditions.

Standard lawn grass is a proven effective high transpiration plant species in such conditions, as are a large number of other plant species seen in typical domestic gardens.

Consideration needs to be given to effects of roots from plants and from trees in particular on wastewater distribution pipe networks/emitter lines in land application systems. Potential for root intrusion/disruption to the pipe system must be considered prior to selection and planting of a plant or tree species.

Advise on such matters for particular plant species can be obtained from garden centre specialists and landscaping consultants.

NATIVE PLANTS SUITABLE FOR MOIST CONDITIONS IN THE AUCKLAND REGION:

The following list covers native plant species are considered to be suitable for planting in moist conditions, such as those associated with wastewater disposal fields in Auckland situations. They are all tolerant or fond of moist conditions and all are native to the Auckland region. Much of this information has been adapted from one of the ARC Botanic Gardens advisory leaflets; "14 – New Zealand plants for wet places" and the list edited and reviewed by Dr. Rhys Gardner Consulting Botanist, Auckland War Memorial Museum (August 2004).

Grasses, ground covers, and other plants

Astelia grandis **(swamp astelia)**
Large clump forming plant with bright green, flax-like foliage. Female plants produce upright panicles of orange berries in the centre of the plant. This endemic species will not tolerate eutrophic conditions and prefers peat soils.

Blechnum novaezealandiae **(kiokio)**
Large, robust fern growing to 1 or even 2m, Hardy species that tolerates most conditions, but does best in well drained, shady areas.

Carex
There are many members of this genus which grow naturally in damp to wet areas. They all have quite fine drooping foliage and are vigorous in moist conditions. Most prefer very light shade. The following species have been identified for their suitability:

Carex dissita
Endemic species with dull green to reddish tufts often 0.5m tall (although this can vary). Tolerates a range of swampy habitats, but is also noted to grow on drier soils under forest cover.

Carex flagellifera
Endemic species with dense spreading reddish-brown tuffs to 0.5m tall. Prefers damp soil and full sun, but is noted to thrive in a variety of habitats including boggy pasture.

Carex geminata
Robust and vigorous endemic species that grows to 1.5m tall. Thrives in a range of wet habitats. Suitable for a larger area.

Carex lessoniana
Robust and vigorous endemic species that grows to 1.5m tall. Similar to *C.geminata* in that the species is spreading and suitable for a larger wet area.

Carex secta **(purei, makura)**
Endemic species that exhibits tall spreading tussocks. Has been noted to grow to 3m tall, widespread in swampy areas. Useful in the creation of bird habitat.

Carex virgata
Endemic species that forms dense, light green tussocks up to 1m tall. Thrives in a variety of habitats including swamps, drain margins, seepages and wet pastures. Useful in the creation of bird habitat.

***Cortaderia fulvida* (toetoe)**
Branching from the base and forming a clump to 4m high. Long strap-shaped leaves with red-orange coloured veins, flower heads cream yellow. New shoots exhibit pale waxy cover on lower parts (unlike pampas grass) Prefers good drainage and semi-shade. Will struggle to compete if dried out in summer.

***Cyperus ustulatus* (toetoe upoko-tangata, giant umbrella sedge)**
Vigorous leafy sedge growing to 1m in open damp places. Tolerates immersion in standing water within a range of habitats from seepages to wetlands.

***Dicksonia squarrosa* (wheki, tree fern)**
Tree fern up to 7m tall that exhibits tolerance of wet open ground, and floods. Found to shelter and accumulate with other native plants. The base of the fern attracts biodiversity. Useful application to streambank and seepage habitats.

***Elatostema rugosum* (parataniwha)**
Herbaceous plant up to 0.5m tall that spreads by rhizomes. Bronze coloured foliage with serrated edge. Grows on moist sites in light to heavy shade. Intolerant of dry habitats.

Hypolepis dicksonioides
Large fern that prefers fertile moist, but well-drained ground, grows vigorously and spores into planted areas with abundance. Does however, die back during winter.

***Phormium tenax* (harakeke, flax)**
Fast growing clump-forming flax with large stiff leaves, to 3m. Full exposure and sun. Moist to wet conditions. Does not have deep or wide roots. Easily propagated from split fans or grown from seed. Attracts birds, especially Tui.

Trees and shrubs

Consideration needs to be given to the effects of roots land application on wastewater distribution pipe networks. This problem can be more significant for large tree species.

***Carpodetus serratus* (putaputaweta, marbleleaf)**
Lowland forest tree up to 7m tall. Large bunches of cream coloured flowers appear in spring followed by black berries.

Coprosma areolata
Species that grows to 4m tall. Low tolerance to drought, with medium to high fertility.

***Coprosma robusta* (karamu, shining karamu)**
Shrubs or small trees growing to 3m+, with glossy green leaves. Masses of orange-red fruit in autumn are attractive to birds. Hardy plant.

***Coprosma tenuicaulis* (swamp coprosma)**
Endemic species that grows to 3m tall. Leaves pale green with slender branches. Will tolerate a range of swampy to boggy habitats including standing water.

***Cordyline australis* (ti kouka, cabbage tree)**
Palm-like in appearance with large heads of linear leaves and panicles of scented flowers. Sun to semi-shade. Prefers damp to moist soil. Grows eventually to 12m+ height.

Dacrycarpus dacrydioides (kahikatea, white pine)
Tree that grows to 40m. Moderately growing species, which prefers wetland and boggy environments. Application of this species must consider the possible impact of its root systems on the wastewater disposal field.

***Geniostoma rupestre* (hangehange)**
Common forest shrub with pale green glossy foliage, growing to 2-3m. Tiny flowers give off strong scent in spring. Looks best in sunny position where it retains a bushy habit, and prefers well-drained soil.

***Hebe stricta* (koromiko)**
Shrub or small tree growing to 2-5m in height. Natural forms have white to bluish flowers. Plant in full sun. Tolerates exposure. (NB Many cultivars and hybrids are available commercially, but these are all unsuitable for use near existing natural vegetation.)

***Laurelia novae-zelandiae* (pukatea)**
Large upright tree (to 30m) with attractive bright green foliage and distinctive whitish bark . Fast growing and able to handle a wide variety of soils. It will tolerate periodic flooding, breathing roots develop in water logged soils. Can be grown from seed. Tolerant of some sun and frost. Not tolerant of wind.

Leptospermum scoparium **(manuka)**
Shrub or small tree growing to 4m+ in height. Ubiquitous shrub varying in form throughout New Zealand. Ideal to provide shelter for other plants as it is quick growing and hardy. Requires full sun and. Hardy and tolerant of difficult conditions, including waterlogging and drought.

Melicytus ramiflorus **(mahoe)**
A fast growing yet long lived tree to 7m height. Prefers well drained fertile soils. Tolerates some frost, wind and sun Birds are attracted to the blue berries.

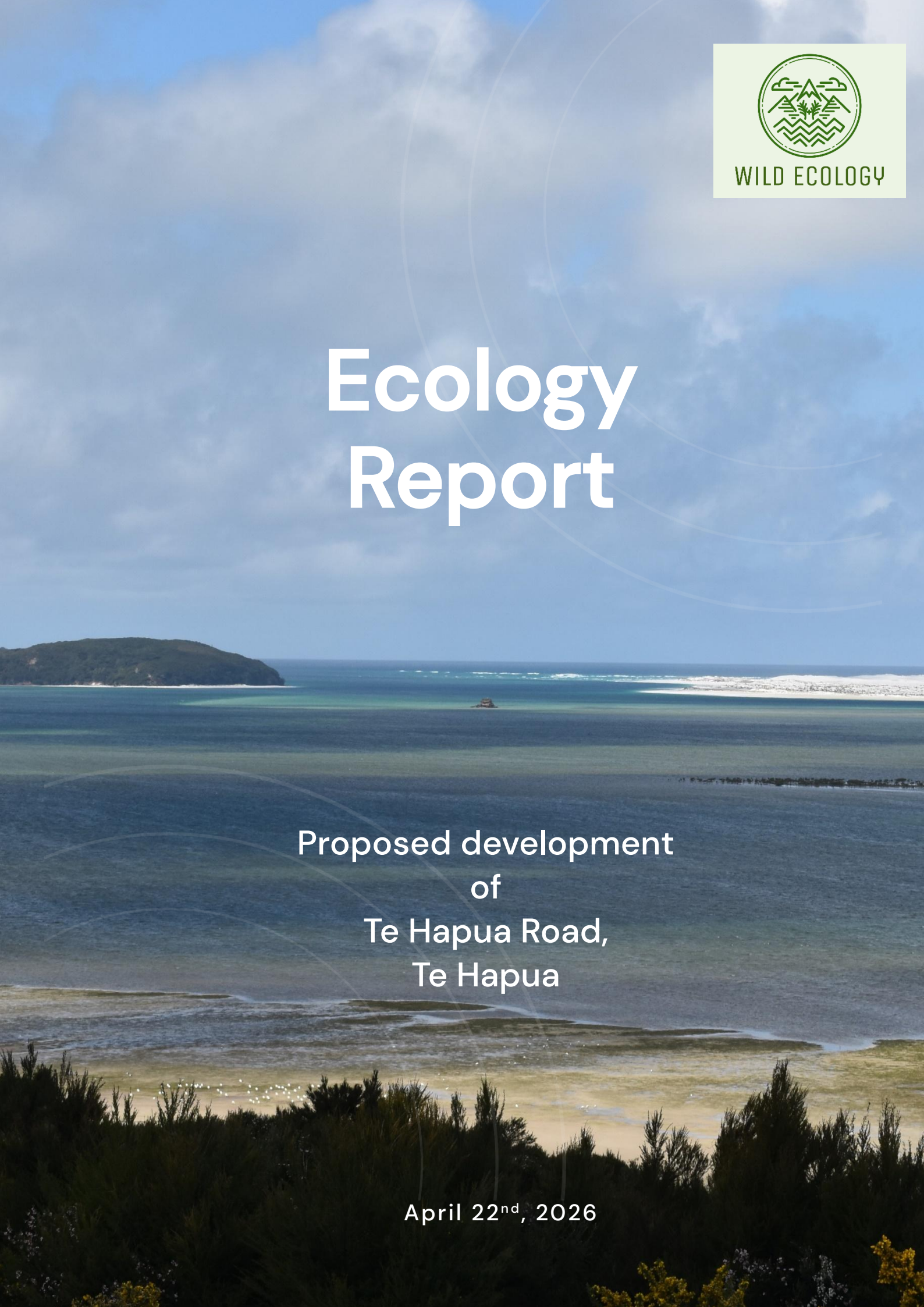
Pennantia corymbosa **(kaikomako)**
Slow growing species that will reach 12m in moist, fertile sites. Useful species application in bank stabilisation or wetland habitats.

Plagianthus betulinus **(ribbonwood)**
Fast growing species to 15m. Similar application to that of *Pennantia corymbosa*.

Rhopalostylis sapida **(nikau)**
New Zealand's only native palm, with red berries attractive to birds. Requires light shade, plenty of moisture and protection from wind when young. Grows well in areas of permanent dampness.

Syzygium maire **(maire tawake)**
Attractive and moderately growing wetland tree to 15m with bronze foliage, large bunches of reddish fruit and distinctive whitish bark. Requires a sheltered sunny position. Tolerates some frost.

Vitex lucens **(puriri)**
Fast growing to 20m in fertile, open but sheltered conditions. Will struggle with poor drainage during adolescence.



WILD ECOLOGY

Ecology Report

Proposed development
of
Te Hapua Road,
Te Hapua

April 22nd, 2026

DOCUMENT QUALITY ASSURANCE

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Author:	Madara Vilde Principal Ecologist Wild Ecology	
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CONTENTS

1.0 INTRODUCTION

1.1 Scope

A new settlement development is proposed at the general location of Te Hapua Road, Te Hapua. Please see Appendix 1 for the indicative development plan prepared by Hawthorn Landscape Architects. Wild Ecology were engaged by proprietors of Muriwhenua ('the Applicant') to carry out preliminary site investigations to assess and evaluate potential locations for new settlement area(s), evaluate the structure, quality and ecological significance of vegetation within the site boundaries, provide advice as to whether the site can be developed in a manner that is consistent with the ecological provisions of the Far North District Plan (Operative), and provide recommendations on how to avoid, minimise or mitigate any adverse ecological effects associated with the site's development.

As part of the initial engagement Wild Ecology was provided with a number of indicative potential suitable development areas within the wider site boundaries, which were surveyed and investigated as part of a site walkover visits on September 9th and 10th, 2023 to identify and classify terrestrial and aquatic habitats, watercourses and conduct a rapid wetland assessment to identify and delineate 'natural inland wetland' areas within the wider site boundaries.

Following the delineation and classification of habitats, watercourses and 'natural inland wetland' areas within the wider site boundaries, this report makes recommendations in relation to relevant ecological considerations under Far North District Plan (FNDP) Operative (2009), National Environmental Standards for Freshwater Management (NES-FW (2020) and Proposed Regional Plan for Northland (October 2023) (PRPN).

2.0 METHODOLOGY

2.1 Desktop review

The desktop investigation included a review of the initial potential development areas as prepared by Maven and associated ecological site information. Ecological databases were also accessed including Retrolens historic aerial imagery, NRC LIDAR aerial imagery and contours, and LINZ river centrelines 1:50000 scale.

2.2 Site investigation

The site and surrounding areas were visited on September 9th and 10th, 2023 and a site walkover was conducted over the entire site with terrestrial and aquatic features identified. The natural features were surveyed and recorded using a GPS unit (Trimble DA2).

Vegetation was recorded and classified in general accordance with Singers *et al.* (2017).

The following fauna surveys were conducted:

- Opportunistic bird surveys were conducted at various parts of the site to record avifauna (bird) present on site.
- A 24 hrs survey with an acoustic bat survey was undertaken using Acoustic Bat Monitor (SongMeter SM4).
- Basic visual observations and qualitative assessment of habitat values for native lizards (skinks and geckos) was undertaken during site visits.
- An acoustic recorder (SongMeter SM4) was left on site for 24 hrs to obtain avifauna and herpetofauna records.

2.3 Watercourse classification

Watercourses on site and immediate surrounds were classified in general accordance with criteria outlined in the Proposed Regional Plan for Northland (October 2023).

The surveys were within the recommended window for classifying intermittent and ephemeral watercourses (July–October). There were no rainfall events within 48 hours prior to the September 9th, 2023 survey (Meteorological Service of New Zealand Ltd 2023).

2.4 Wetland delineation

For wetland delineation protocols in the field the NPS-FM refers to the Ministry for the Environment (MfE) Wetland delineation protocols (2020) which are generally based on following the four main steps outlined in Figure 1. The primary step is based on the Vegetation tool for wetland delineation in New Zealand (Clarkson 2013) to determine the status of wetlands. This step relies on the presence or absence of hydrophytic vegetation as being the dominant vegetation type. The list of hydrophytes used in this assessment are as per the most recently revised list (Clarkson *et al.* 2021). The results from the vegetation tool provided conclusive results and therefore dominance - prevalence hydrophytic vegetation test (Step 2) and hydric soils tool (Step 3) and wetland hydrology tools (Step 4) were not utilised for this site.

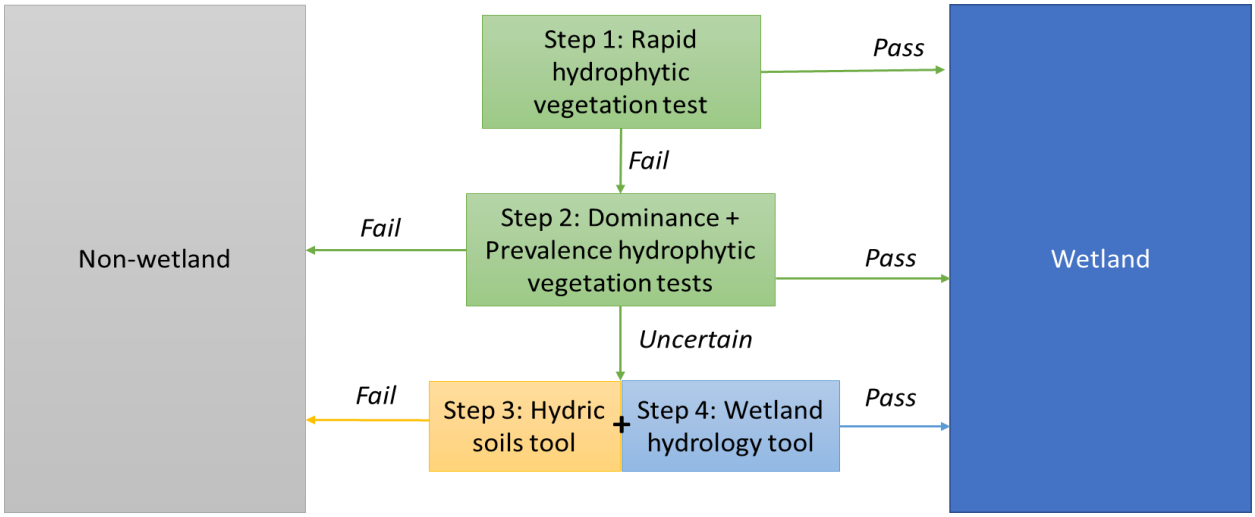

Figure 1: Four steps for delineating wetlands using the hydrophytic vegetation, hydric soils and wetland hydrology tools

2.5 Preliminary ecological feedback

Following site survey visits conducted in September 2023, Wild Ecology provided preliminary ecological feedback to the wider project team based on the on-site habitat mapping and survey observations. Wild Ecology provided the wider project team with comprehensive habitat mapping based on extensive desktop analysis of historic and current aerial imagery, relevant FNDC and NRC overlays coupled with information gathered during the September 2023 site visits. Wild Ecology provided a number of locations within the wider site boundaries that could potentially form suitable development areas, primarily extending along Te Hapua Road and forming a proximal extension of the existing Te Hapua Settlement.

Following the initial feedback, a new indicative proposed development area (described as proposed development area 1 within the body of this report) was identified. The purpose of this report is to describe the existing ecological baseline setting of proposed development area 1 and evaluate whether site development at this location can occur in a manner that is compatible with the wider ecological setting and the ecological provisions of the District Plan.

Please note that this report only focuses on the description of the habitat types and associated values contained within proposed development area 1 – the wider site setting is a complex mosaic of gumland, wire rush wetland, kanuka shrubland, exotic vegetation and existing cleared areas, and is not considered in detail.

3.0 ECOLOGICAL CONTEXT

3.1 Te Paki Ecological District

Te Paki Ecological District covers approximately 30,917 ha and is located at the northern extremity of the North Island, adjoining Aupouri Ecological District to the south. It is characterised by extensive areas of indigenous shrublands and gumlands linking long sandy beaches, dunes, freshwater wetlands and forest remnants. Unlike most ecological districts where the direct impacts of humans can be seen, with numerous dwellings, pasture and plantation forests, Te Paki Ecological District comprises relatively continuous indigenous habitat over two-thirds of its area.

Te Paki Ecological District contains a high diversity of flora and fauna species, including many endemic taxa. Of particular significance are the 101 indigenous landsnail taxa known to inhabit the Ecological District (ED), including 39 locally endemic taxa. There are 20 locally endemic plant taxa, of which 17 are restricted to the Surville Cliffs serpentinite formation at North Cape and at least four lizards which are either endemic to the Te Paki ED or the Te Paki – Aupouri ED's. There are high numbers of rare or threatened species in the Ecological District, as well as rare ecosystem types. At present, nationally threatened taxa include 981 plants, 23 birds, 63 landsnails, 6 beetles, one weta, one moth, one slug, one earthworm, one spider, two freshwater invertebrates, 7 lizards and 2 fish. There are also a further 82 regionally significant taxa, which are considered rare or threatened in Northland (including 693 plants, 10 birds, two reptiles and two fish).

Much of Te Paki Ecological District was once covered in dense kauri forest (Millar and Rough 1976), some of which was destroyed by rising sea levels (e.g. Waikuku Flat) and most of the remainder by human activity. Conifers were likely to have been predominant on ridges and spur crests in the western area, on less fertile soils in eastern areas, and locally on floodplains. Mixed

broadleaf forest was likely to have occurred elsewhere (Clunie 1984), with kohekohe, karaka, tawapou, and pohutukawa increasing in abundance towards the coast (Kelly 1967).

Repeated burning has transformed the area into primarily shrubland communities which are subject to frequent erosion. Only pockets of broadleaf forest remain in some gullies and on coastal cliffs. The reduction in pollinating and seed-dispersing bird and insect species, and the survival of mainly fire-resistant plant species has slowed regeneration to forest (Clunie 1984). Due to a long period of vegetation clearance, pasture establishment, and extensive grazing, much of the ED is only relatively recently 'reverting' from pasture. Today only isolated pockets of indigenous forest remain. Several centuries of human occupation, with its associated burning and clearance of vegetation, have resulted in a landscape that is now dominated by regenerating shrubland.

3.2 Site characteristics

Proposed development area 1 is located at Te Hapua Road, Te Hapua forming part of TE HAPUA 42 Block. Development area 1 is located approximately 2 km north of Te Hapua settlement (Figure 2). The proposed development area 1 is located on an elevated ridgeline with access from Te Hapua Road. The site is zoned 'General Coastal' under the Far North District Plan (Operative). The total net site area of proposed development area 1 is approximately 1.19 ha. The proposed development area 1 is in its entirety comprised of secondary regenerating kanuka (*Kunzea linearis var. linearis*) scrubland/forest (VS2) (Figure 3). The area is bisected by existing farm tracks and during site visits in September 2023 it was observed that the area was heavily encroached by weedy pest plant species. The site does not contain any aquatic habitats (streams) or any areas that meet the definition of a natural inland wetland.

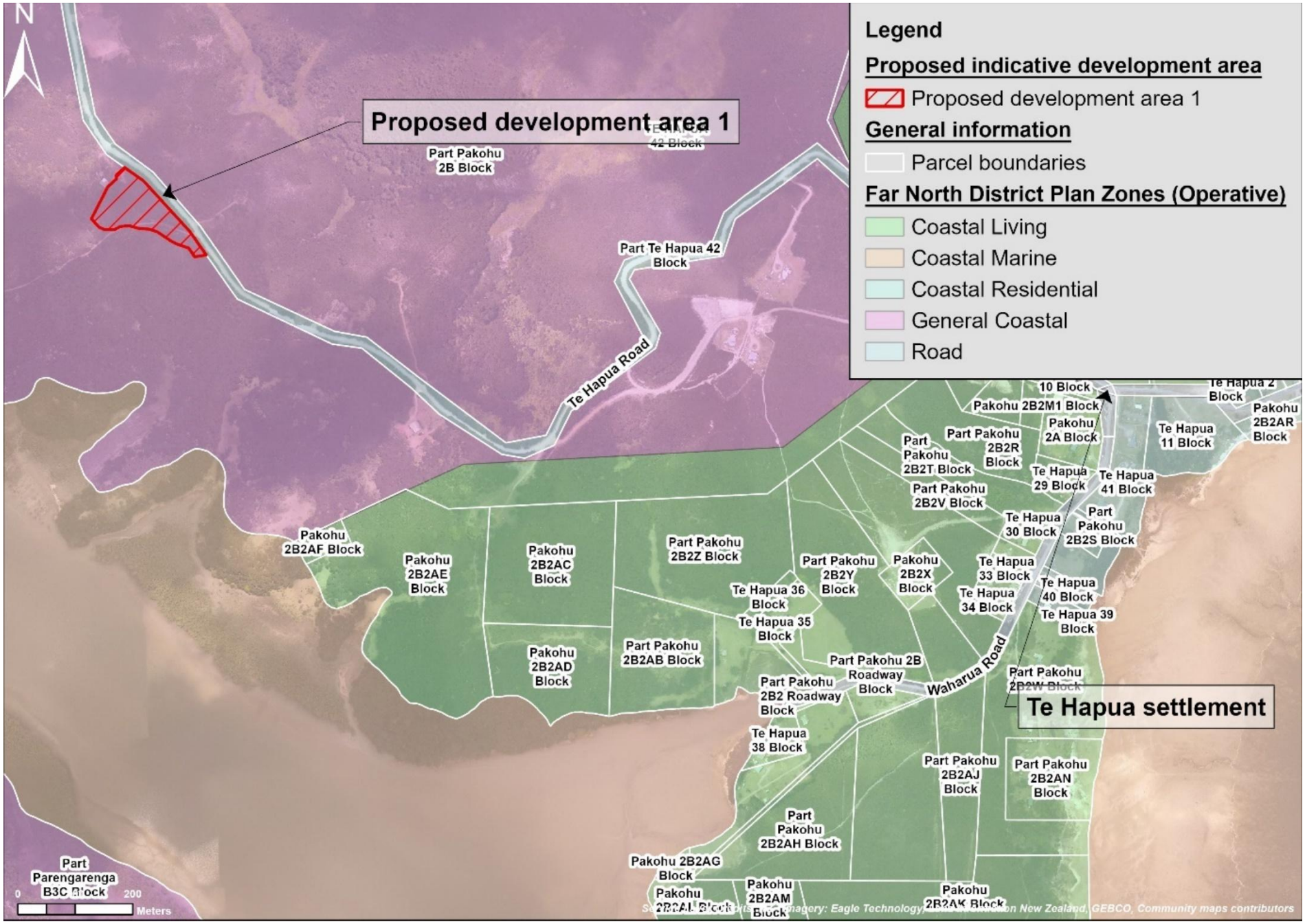

Figure 2: Showing proposed development area 1 location in relation to Te Hapua settlement and associated Far North District Plan (Operative) zoning

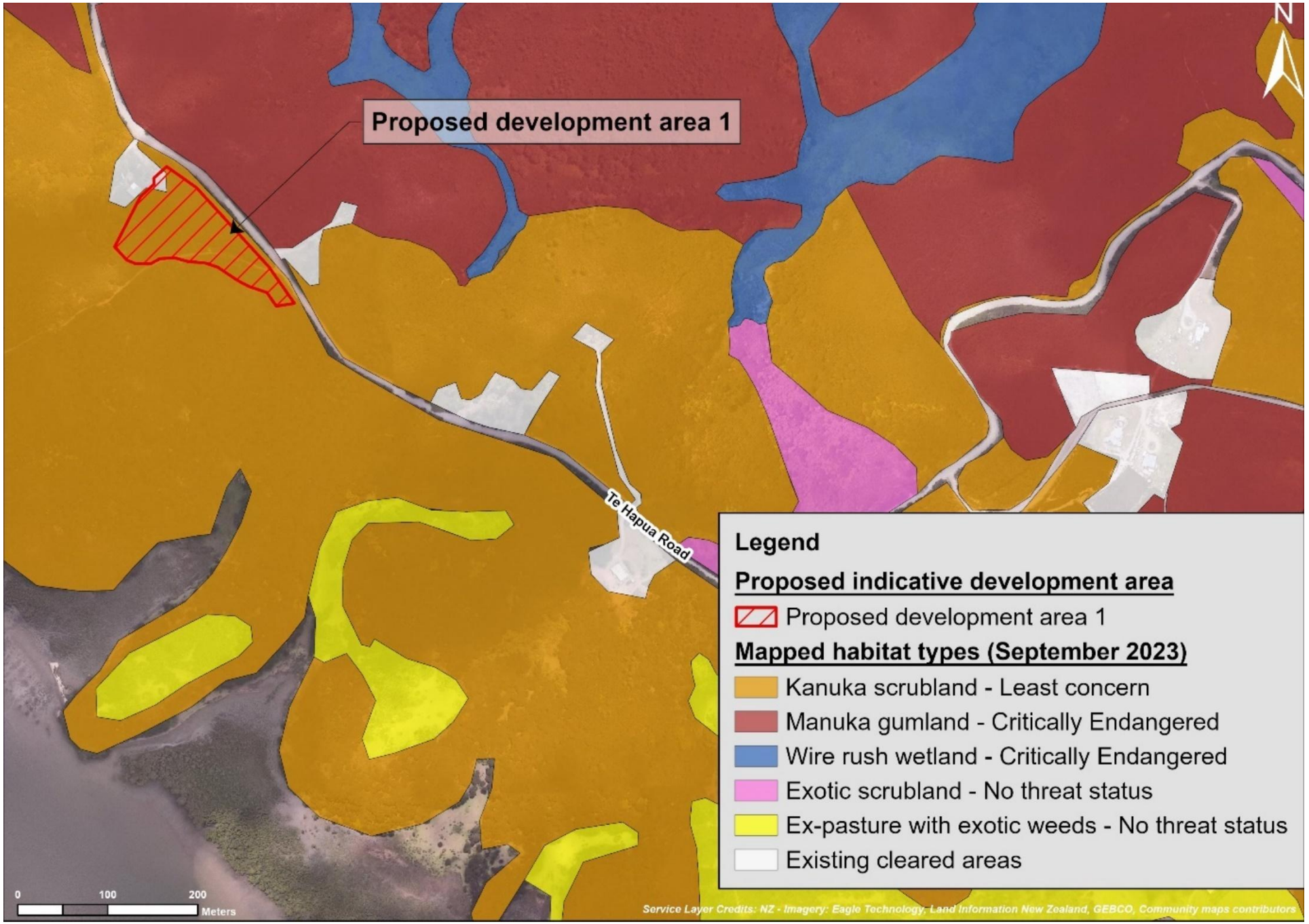

Figure 3: Showing a basic habitat map of the site and wider surrounds

Figure 4: Showing a representative example of kanuka scrubland habitat contained within proposed development area 1

The site is situated within the Te Paki Ecological District. While proposed development area 1 itself is not subject to a Protected Natural Area (PNA) overlay, the wider site to the north is designated as Te Paki Shrublands and Forest Remnants (NO2003) and Parengarenga Harbour (NO2026) to the south (Figure 5). Te Paki Shrublands and Forest Remnants is best described as the largest tract of forest remaining in the ED. It supports a high number of 'Regionally Significant,' 'Uncommon,' 'At Risk' and 'Threatened' flora and fauna alike. The vegetation within development area 1 forms an extension of Te Paki Shrublands and Forest Remnants, however it has been historically cleared through fire or mechanical removal of vegetation, and therefore at current day generally consists of low-quality regenerating kanuka scrubland habitat type.

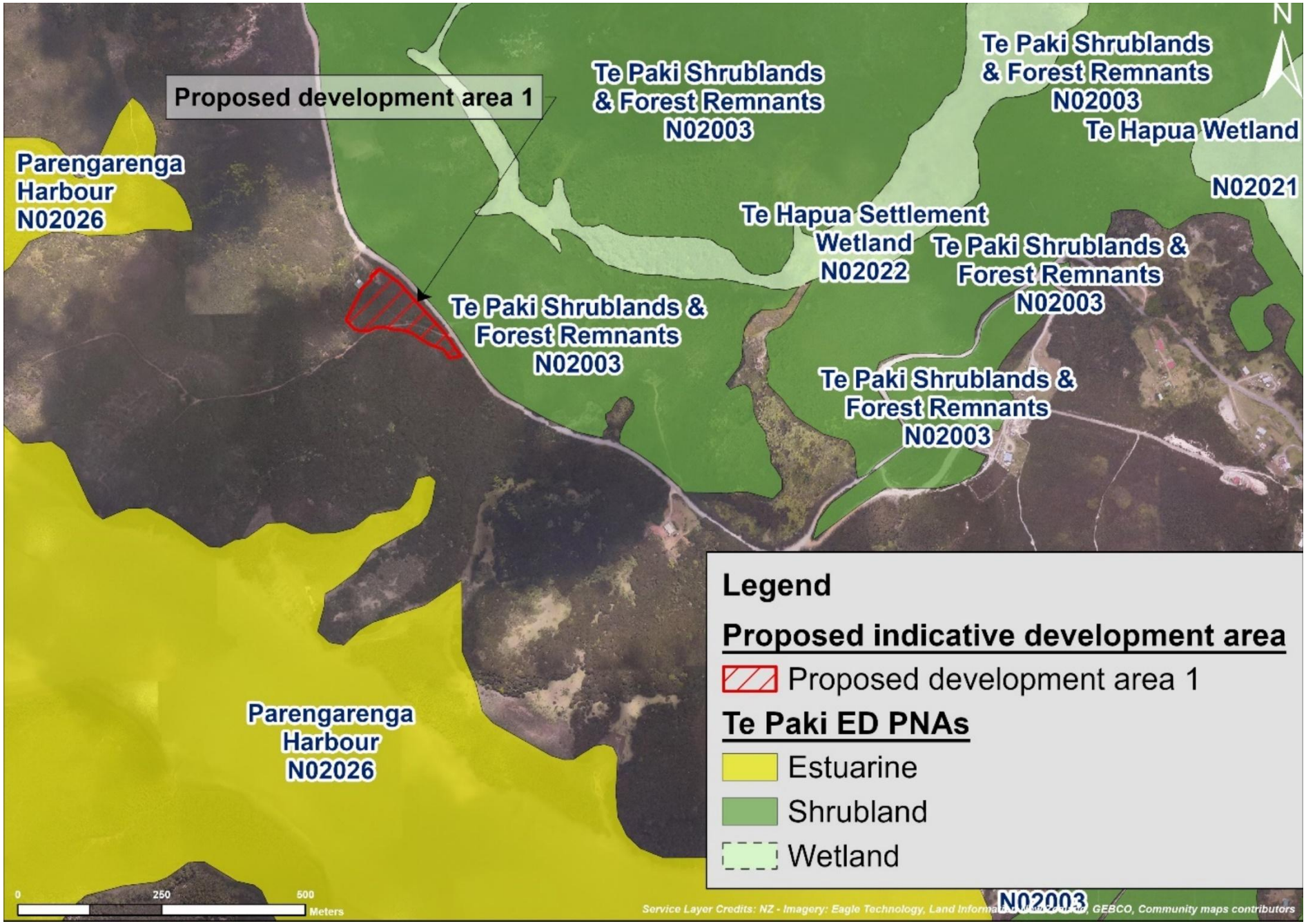

Figure 5: Map showing proposed development area 1 in relation to PNAs as identified in Lux *et al.* (2009)

3.3 Terrestrial habitats

The terrestrial vegetation within Site 1 boundaries is dominated by regenerating kanuka scrub/forest (VS2), generally approximately 6m in height. The vegetation on site has been modified and cleared historically for farming purposes which is reflective of the vegetation structure differences across the wider site.

Historic aerial imagery from Retrolens (Figure 6) suggests that the indigenous vegetation within site 1 boundaries has been actively cleared between 1957 until at least 1981 (Figure 7) and majority of the vegetation within site 1 is a result of regeneration processes and is maximum of 30-40 years old. It is likely that the areas of kanuka scrubland have been grazed historically and signs of current grazing pressures were observed, with much of the kanuka scrubland containing minimal ground and shrub tier layers. The wider site beyond the boundaries of Site 1 is comprised of a mixture of kanuka scrubland, manuka gumland, wire rush wetland, and exotic scrub. The large extensive tracts of manuka gumland and wire rush wetland have likely been cleared in the past alongside the areas of kanuka scrubland, however, given their natural low fertility and unproductive soils these areas have likely been farmed for a much shorter amount of time and therefore their regeneration has been much more rapid.

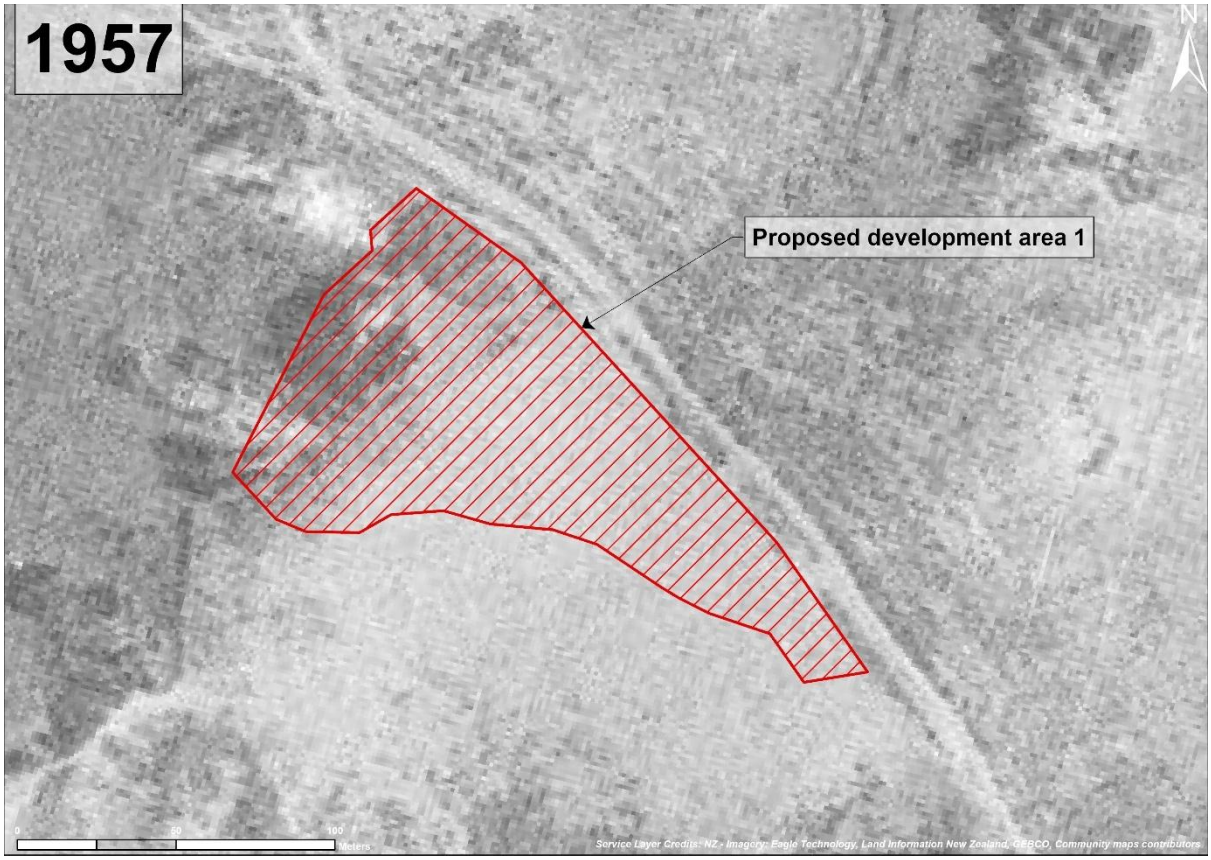

Figure 6: Showing the site and surrounds in 1957 (Source: Retrolens) – note Site 1 is clear of vegetation and likely was utilised for grazing purposes

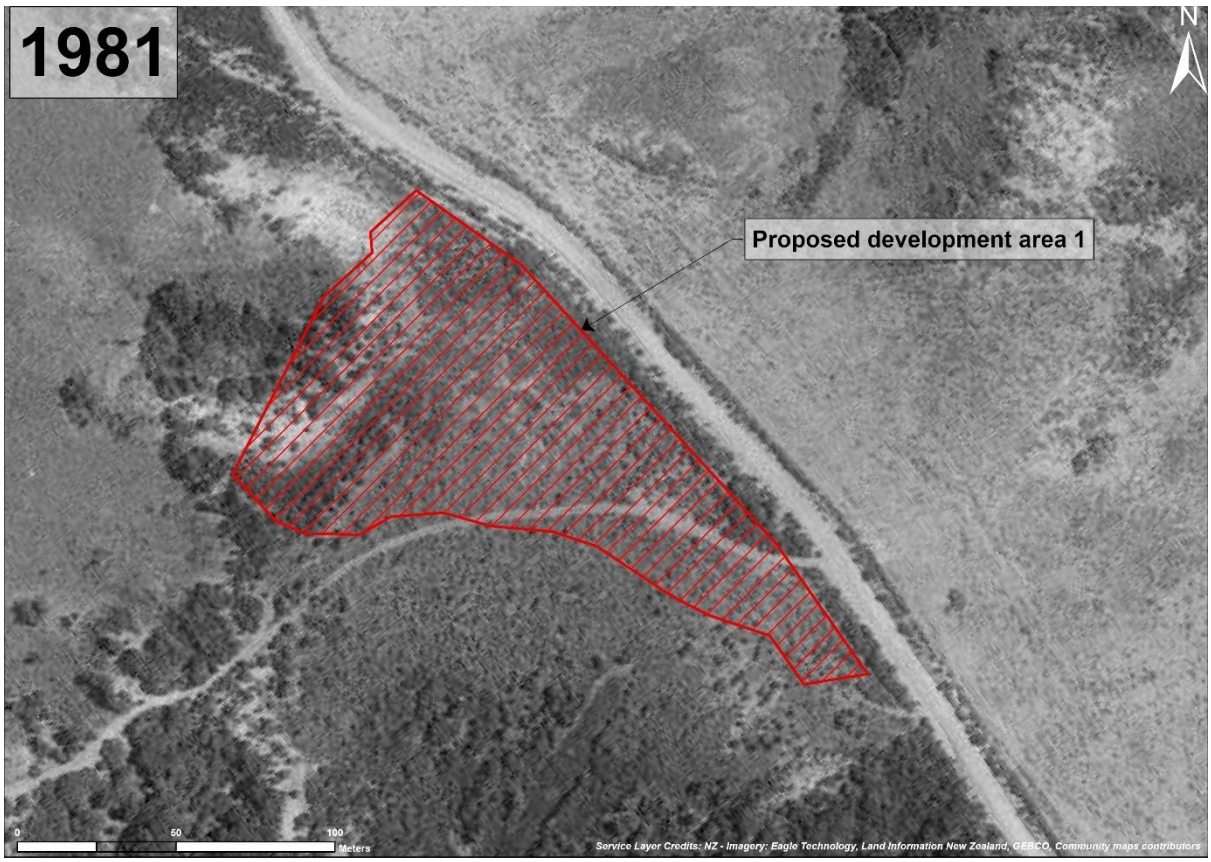

Figure 7: Showing the site and surrounds in 1981 (Source: Retrolens) – note the majority of Site 1 boundaries were likely still in pasture at this stage with signs of natural regeneration observed

At current day kanuka (*Kunzea linearis var. linearis*) (up to 6m in height) is dominant throughout Site 1 (Figure 8). Grading southwards from Te Hapua Road kanuka scrubland contains some common pioneer regeneration speicies such as ponga (*Cyathea dealbata*), mamaku (*Cyathea medullaris*), wheki (*Dicksonia squarrosa*), mahoe (*Melicytus ramiflorus*), mapou (*Myrsine australis*), hangenage (*Geniostoma ligustrifolium var. ligustrifolium*), putaputaweta (*Carpodetus serratus*), mingimingi (*Coprosma propinqua*), mamangi (*Coprosma arborea*) and twiggy coprosma (*Coprosma rhamnoides*). Along the edges of the kanuka scrubland and along road edges periwinkle (*Vinca major*), Arum lily (*Zantedeschia aethiopica*), gorse (*Ulex europaeus*), pampas (*Cortaderia selloana*), Woolly nightshade (*Solanum mauritianum*) were present (Figure 9). Ground tier was largely absent due to ongoing grazing pressures, but generally some regenerating saplings and seedlings of the higher tier species from the surrounding areas were observed.

Figure 8: Showing the composition of regenerating scrub/forest (VS2) within proposed Site 1

Figure 9: Showing common weedy species along bush and track edges

3.4 Avifauna

Avifauna species were observed within site 1 boundaries through opportunistic observations during site visits on September 9th and 10th 2023, and deployment of a passive acoustic recorder

(SongMeter SM4) between September 9th and 10th, 2023. Please note that this section only considers birds observed/recorded within proposed development area 1 with a bird species list outlined in Table 1. Overall, the diversity of birds observed within site 1 boundaries was moderate, with 9 native/endemic and 4 introduced species.

The birds observed within Site 1 boundaries are representative of the regenerating kanuka habitat contained on site, with the most commonly observed species being New Zealand fantails (*Rhipidura fuliginosa*). House sparrow (*Passer domesticus*) was the 2nd most commonly observed species. The site is not located within a known range of north island brown kiwi (*Apteryx mantelli*).

Table 1: Bird species recorded within site 1 boundaries during site visit in September 2023

Scientific name	Common name	Conservation status
Acridotheres tristis	Myna	Introduced & Naturalised
Carduelis carduelis	European goldfinch	Introduced & Naturalised
Circus approximans	Swamp harrier	Native & Not Threatened
Chrysococcyx lucidus	Shining cuckoo	Native & Not Threatened
Hemiphaga novaeseelandiae	Kereru	Endemic & Not Threatened
Hirundo neoxena	Welcome swallow	Native & Not Threatened
Ninox novaeseelandiae	Morepork	Native & Not threatened
Passer domesticus	House sparrow	Introduced & Naturalised
Porphyrio melanotus	Pukeko	Native & Not threatened
Rhipidura fuliginosa	New Zealand fantail	Endemic & Not Threatened
Todiramphus sanctus	Sacred kingfisher	Native & Not Threatened
Vanellus miles	Spur-winged plover	Native & Not Threatened
Zosterops lateralis	Silvereye	Native & Not Threatened

Figure 10: Fantail was the most commonly recorded species within proposed development site 1 boundaries

While the majority of avifauna recorded on site 1 is deemed as common, the wider area is known to be habitat to a number of 'At Risk' and 'Threatened' avifauna species. However, the proposed development on Site 1 will not adversely affect their habitat and therefore they are not considered in more detail within the body of this report.

3.5 Herpetofauna

A visual inspection and habitat suitability assessment of areas likely to be utilized by native lizards for sheltering or foraging (e.g., beneath logs, boulders, and manmade objects) was conducted during site visits in September 2023.

Opportunistic observations across potential development area 1 only found the presence of exotic rainbow skink (*Lampropholis delicata*). Rainbow skinks arrived in New Zealand in the late 1960s, but only became classified as an 'Unwanted Organism' in recent years and removed from the Wildlife Act in 2010 (DoC 2015).

While no indigenous herpetofauna was recorded on site, it is considered that optimal habitat for herpetofauna is present on site. Figure 11 and Table 2 below outline the species likely to occur within the wider area and their corresponding conservation status. The current ecological value of Site 1 for native herpetofauna is considered to be moderate due presence of suitable habitat (kanuka shrubland), however their presence may be limited by the ongoing grazing pressures within the area which has reduced lower ground tier and shrub layers within the bush which are favoured by ground dwelling lizards.

The proposal requires for approximately 1.19 ha of regenerating kanuka shrubland habitat to be cleared to facilitate the construction of practicable building platforms and associated infrastructure. It is deemed that the development will require for suitable lizard management protocols to be employed during the required vegetation clearance to ensure that potential adverse effects on any potential lizard populations likely to be present on site are appropriately managed and mitigated.

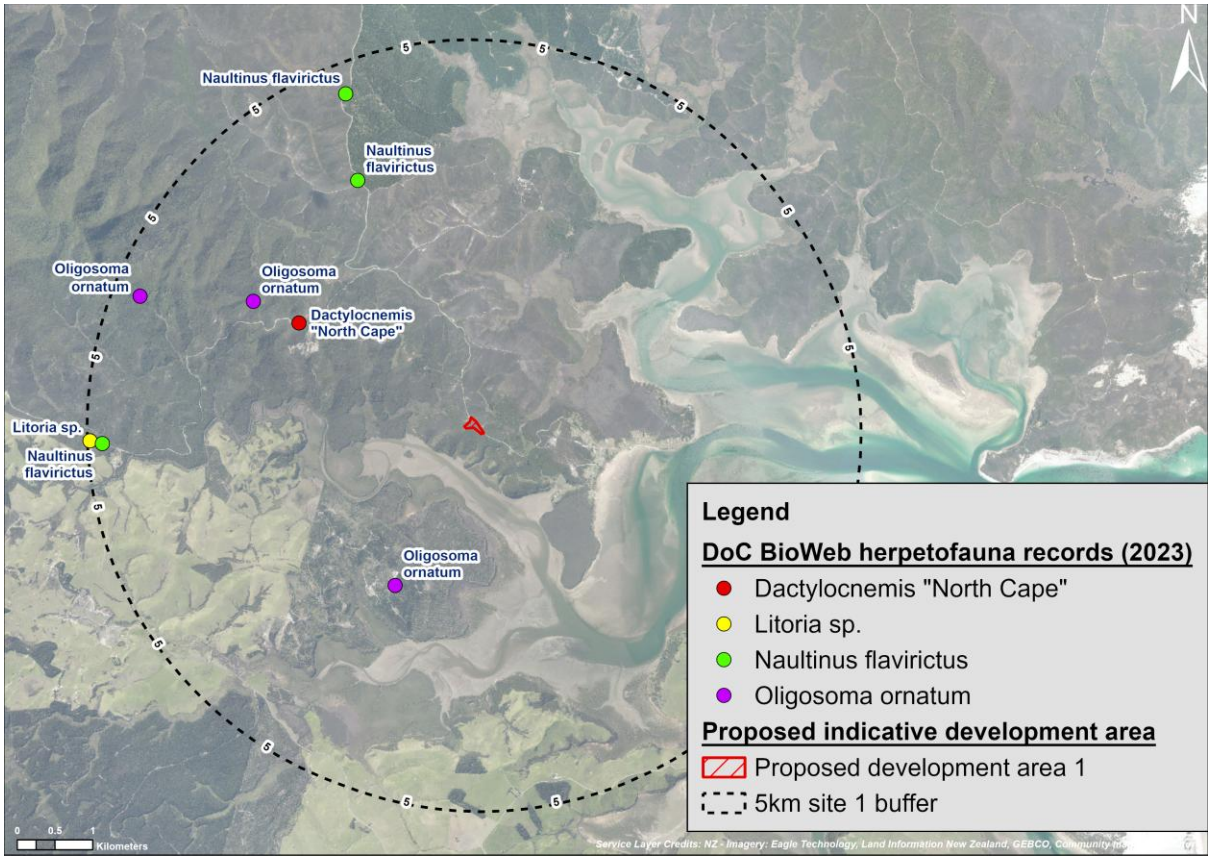

Figure 11: Showing DoC BioWeb database records for herpetofauna within 5-km radius from the subject site

Table 2: Herpetofauna likely to be present with the wider surrounding area, inbuilding latest Threat Status (Hitchmough et al. 2021)

Common name	Latin name	Threat status	Suitable habitat on site or adjacent?
Rainbow/plague skink (non-native 'Unwanted' organism)	*Lampropholis delicata*	Unwanted organism	Present on site and surrounds
Green and golden bell frog	*Ranoidea aurea*	Exotic species	Likely present on site and surrounds
Aupōuri gecko	*Naultinus flavirictus*	At Risk - Declining	Recorded >4km north of the site
Te Paki gecko	*Dactylocnemis "North Cape"*	At Risk - Declining	Recorded >2.5km north-west of the site
Ornate skink	*Oligosoma ornatum*	At Risk - Declining	Recorded >2km north-west and south-west of the site

3.6 Bats

New Zealand has two extant native bat species, the long-tailed bat (*Chalinolobus tuberculatus*) and the lesser short-tailed bat (*Mystacina tuberculata*), both of which are endemic microbat species. Long-tailed bats is listed as "Nationally Critical" (Donnell *et al.* 2017). No previous bat records have been recorded within >40km from the site, with the closest confirmed record of long-tailed bat activity being at Aupouri, approximately 40km south of the site.

The AR4 Acoustic Sound Recorder was set on the subject site for 24 hrs between September 9th and 10th, 2023. The sound recorder was set up to record bats with a sampling time of 8 hours, set to start 15 minutes before dusk, set on setting "Bat". The overnight weather was cool (minimum 10°C). No long-tailed bat activity was recorded during the survey period which indicates that it is unlikely that there are any potential bat roosts on site and the site and immediate areas are not currently utilized as a commuting route within the wider landscape. It is likely that their presence on site and immediate surrounds is limited by lack of large contiguous areas of mature indigenous bush and abundance of common pest animals including possum, rats, mustelids and pigs.

The proposal requires for approximately 1.19 ha of regenerating kanuka shrubland habitat to be cleared to facilitate practicable building platforms and associated infrastructure. Some suitable habitat for bat commuting (forest edges) was noted on site, albeit roosting potential is likely to be low due to the relatively young age of the kanuka shrubland and no potential bat roosts noted within site 1 boundaries.

3.7 Summary of values

Method 12.2.5.6 of FNDP requires that in assigning ecological significance to habitats and species noted on site, the ecological matters of Representativeness, Rarity/Distinctiveness, Diversity and Pattern, and Ecological Context have to be considered. This is based on criteria outlined under Appendix 5 of Regional Policy Statement for Northland. Table 3 below outlines the ecological values assigned to the identified ecological features within proposed Site 1.

The overall existing ecological values of the site are generally as low-moderate, associated with long history of indigenous vegetation clearance within Site 1 boundaries and utilising this area for grazing. While the ecological significance and condition of the kanuka shrubland habitat is deemed as limited, the potential adverse effects associated with the proposed vegetation clearance will have to be managed through appropriate ecological management controls, including lizard, avifauna and overall vegetation clearance protocols to ensure that adverse effects can be minimised as far as practicable.

Table 3: Assessment of significance of habitats contained within Site 1 boundaries based on Appendix 5 of RPS for Northland

Criteria	Criteria met?	Comment
(a) whether the area contains critical, endangered, vulnerable or rare taxa, or taxa of indeterminate threatened status (in the context of this clause, taxa means species and subspecies);	✘	Proposed development area 1 is exclusively dominated by kanuka shrubland (VS2) which has a conservation status of 'Least Concern' (Singers *et al.* 2017). No critical, endangered, vulnerable or rare taxa, or taxa of indeterminate threatened status was noted within Site 1 boundaries during site visits carried out in September 2023.
(b) whether the area contains indigenous or endemic taxa that are threatened or rare in Northland;	✘	Te Paki Ecological District contains a high diversity of flora and fauna species, including many endemic taxa. However, no endemic flora or fauna was noted within site 1 boundaries.
(c) whether the area contains representative examples in an ecological district of a particular habitat type;	✘	Site 1 has been heavily impacted by previous land clearance activities and does not contain any habitats that could be considered as one of the best representative examples of its particular habitat type.
(d) whether the area has a high diversity of taxa or habitat types for the ecological district;	✘	Site does not contain high density of habitat types for the ecological district. The site supports the expected faunal diversity associated with the range of habitat types present on site.
(e) whether the area forms an ecological buffer, linkage or corridor to other areas of significant vegetation or significant habitats of indigenous fauna;	✓	The site is situated within the Te Paki Ecological District. While proposed development area 1 itself is not subject to a Protected Natural Area (PNA) overlay, the wider site to the north is designated as Te Paki Shrublands and Forest Remnants (NO2003) and Parengarenga Harbour (NO2026) to the south. Te Paki Shrublands and Forest Remnants is best described as the largest tract of forest remaining in the ED. It supports a high number of 'Regionally Significant,' 'Uncommon,' 'At Risk' and 'Threatened' flora and fauna alike. The vegetation within development area 1 forms an extension of Te Paki Shrublands and Forest Remnants, however it has been historically cleared through fire or mechanical removal of vegetation, and therefore at current day generally consists of low-quality regenerating kanuka scrubland habitat type.

(f) whether the area contains types that are rare in the ecological district;	✘	The site contains a regenerating kanuka shrubland forest ecosystem habitat that extends throughout the Site 1 boundaries – this habitat type is common in the ecological district.
(g) whether the area supports good populations of taxa which are endemic to the Northland or Northland-Auckland regions;	✘	Te Paki Ecological District contains a high diversity of flora and fauna species, including many endemic taxa. However, no endemic flora or fauna was noted within site 1 boundaries.
(h) whether the area is important for indigenous or endemic migratory taxa;	✘	No indigenous migratory taxa were recorded within Site 1 boundaries during site visits carried out in September 2023.
(i) whether the area supports viable populations of species, which are typical of that type of habitat within an ecological district and retain a high degree of naturalness	✘	The site was observed to support taxa which are typical of regenerating kanuka shrubland however it does not retain a high degree of naturalness due to historic vegetation clearance and land use practices.
Overall		Low-moderate

4.0 POTENTIAL ECOLOGICAL EFFECTS AND MITIGATION

4.1 Rule 12.2.6.1.3 – Vegetation Clearance

Please note that the majority of the land owned by the Applicant which has not already been built on is dominated by indigenous vegetation, and therefore vegetation clearance to facilitate a new settlement area development is inevitable. It is deemed that the most practicable and feasible approach to reducing potential adverse effects is through condensing the potential new development to a single area so that the overall requirement for vegetation clearance is limited to a single localised area rather than creating multiple pockets of vegetation clearance to enable scattered single site development.

The proposal is not able to comply with the permitted activity standards under Rule 12.2.6.1.3 Indigenous Vegetation Clearance in the General Coastal Zone and therefore is a restricted discretionary activity. The total proposed vegetation clearance required for proposed Stage 1 development is approximately 1.19 ha comprising of exclusively regenerating kanuka shrubland habitat which is not subject to an existing Protected Natural Areas overlay. FNDP requires that any vegetation clearance exceeding the permitted activity standards is a restricted discretionary activity, and Council has restricted discretion over the matters outlined under Table 4 when considering and determining an application for resource consent. Please note only matters of discretion relevant to ecological matters are addressed.

Table 4: Relevant FNDP Matters for Discretion (12.2.7) and Ecological Comment

FNDP Matter for Discretion	Comment
(a) the significance of the area assessed using the criteria listed in Method 12.2.5.6;	Overall, Site 1 is deemed to be of low-moderate ecological significance in reference to as assessed using the criteria listed in Method 12.2.5.6.
(b) the location and scale of any activity and its potential to adversely affect the natural functioning of the ecosystem	Site 1 is currently almost exclusively vegetated. The area to be cleared forms part of naturally occurring regenerating kanuka scrub area and is estimated to be approximately 30-40 years old, having regenerated after the sites use for intensive farming activity had ceased. The location of Site 1 was carefully selected following initial ecological surveys and input to ensure that appropriate sites were selected which would minimise potential adverse effects on the wider vegetation sequences which are of high ecological significance.
(c) the potential effects on the biodiversity and life supporting capacity of the area;	Please note that almost the entirety of the land owned by the Applicant which has not already been built on is dominated by indigenous vegetation, and therefore vegetation clearance to facilitate a new settlement development is inevitable. Site 1 area was selected to avoid development in other areas which were deemed to be of distinctively higher ecological significance and value (for example manuka fen). It is deemed that by limiting vegetation clearance to a single area (rather than multiple scattered areas) the potential adverse effects on biodiversity are limited and acceptable in the context of the wider site.
(f) the extent to which adverse effects on areas of significant indigenous vegetation and significant habitats of indigenous fauna are avoided, remedied or mitigated;	Overall, the primary potential ecological adverse effects associated with the proposal relate to indigenous vegetation clearance. Given that almost all of the site (apart from existing built areas) is dominated by indigenous vegetation, vegetation clearance is inevitable. The final site 1 location has been selected through comprehensive ecological mapping and is mindful of the overall sensitivity and ecological significance of the wider site and it is recommended that all built development on site is designed in an eco-conscious manner. A number of recommendations have been made within this report to ensure that any adverse ecological effects can be avoided or reduced to a practicable minimum. It is acknowledged that a range of 'At Risk' fauna may be present within the wider area of the site, however any actual and potential adverse effects to be managed through proposed mitigation measures outlined under Table 5 below.

(g) the extent to which any proposed measures will result in the permanent protection of the area, and the long term sustainability of revegetation and enhancement proposals;	It is deemed that extensive tracts of vegetation on site are already protected through current provisions of NES-FW which regulates activities in or near natural inland wetlands. No permanent protection of the area or revegetation planting is proposed as part of the proposal.
(h) whether a voluntary agreement by a landowner to protect indigenous vegetation and/or habitats is registered with the Council;	The ecological significance of the vegetation to be cleared is as assed as low/moderate – the vegetation is located on an existing 'edge' of the bush and primarily consists of regenerating kanuka with an understory of commonly regenerating tree/shrub species, interspersed with common edge weedy species such as gorse, blackberry and pampas.
(i) whether dogs, cats or mustelids will be excluded;	No specific controls proposed albeit responsible pet ownership should be abided by.
(j) proposals for the re-establishment of populations of threatened species, either in areas where the species previously inhabited or other suitable habitat, and/or replanting or restoration of habitats and indigenous vegetation;	The proposed development will have to abide by strict vegetation clearance protocols to ensure that adverse effects on avifauna and herpetofauna can be avoided. This may involve relocation of any herpetofauna encountered during vegetation clearance to be translocated to alternative suitable habitat outside the immediate vegetation clearance footprint. Suitable habitat is plentiful within the wider site area.
(k) the environmental effect of the increase in residential intensity and/or extra lots in relation to the benefits of achieving permanent legal protection of areas of significant indigenous vegetation and/or significant habitats of indigenous fauna;	As discussed above, following initial discussions it was deemed that creation of a single development area was ecologically more sensitive than scattering development along multiple smaller isolated areas. No permanent legal protection for the wider site is proposed as part of this development project.
(l) the value of vegetation in protecting the life supporting capacity of soil, maintaining or improving water quality and reducing the potential for downstream siltation and flooding;	Proposed development area 1 is located on an elevated ridgeline and is not located in proximity to any watercourses. Appropriate sediment and erosion controls will need to be employed during active site development works to ensure that vegetation clearance and subsequent site development do not results in any potential adverse effects on aquatic habitats.
(m) the extent to which the activity may adversely affect areas of known high density kiwi habitat;	No known high density kiwi habitat is present within the wider surrounds.
(n) the environmental effects of a proposed development in relation to the benefits of achieving permanent protection and/or management of areas	Please see comment under subclause (k).

of significant indigenous vegetation or significant habitats of indigenous fauna;	
(o) the extent to which there are reasonable alternatives to provide for sustainable management;	As part of the initial engagement, Wild Ecology identified eight broad areas considered suitable for potential development from an ecological perspective. Site 1 was assessed as one of the most suitable, as it has been historically modified through land clearance and past grazing pressures. Development in this area would utilise land of relatively lower ecological value to provide high-quality housing for the local community.
(p) the extent to which the habitat policies of any national policy statement, the Regional Policy Statement for Northland and the District Plan are implemented;	Please see comment under subclause (k).
(q) the extent to which other animals or plants that will be introduced as a result of the application and may have a significant adverse effect on indigenous ecosystems are excluded or controlled;	None proposed.
(r) the effectiveness of any proposed pest control programme.	None proposed.

4.2 Summary of effects

The following sections describe potential ecological effects based on the general layout and location plan and associated services as shown within the proposed development plan prepared by Maven. The potential development area 1 has been selected in consultation with Wild Ecology to ensure that development is placed as far as practicable within areas of lower ecological significance with minimal effect on the surrounding gumland and wetland habitats. While vegetation clearance of exclusively kanuka scrubland is required to ensure that adequate areas for the proposed new dwellings and associated services can be provided for, the potential adverse effects associated with the vegetation clearance can be sufficiently minimised and mitigated.

Generally, the potential adverse effects associated with the site development on ecological values are:

- Loss of indigenous vegetation;
- Increasing edge effects through vegetation clearance;
- Potential loss of habitat for indigenous fauna;
- Potential introduction of plant pathogens;
- Increased presence of pet animals on site;
- Change in flow regime due to increased site imperviousness;

Any site development should consider the above potential effects and ensure that measures are put in place to avoid, remedy, mitigate, offset or compensate actions that are to be taken to ensure that the site development does not result in adverse ecological effects or a net loss of ecological value. A brief assessment of potential ecological effects and mitigation measures is provided under Table 5.

Table 5: Magnitude and level of impact for proposed development before and after mitigation

Effect/activity	Habitat impacted	Ecological value	Magnitude of effect (no mitigation)	Comment	Proposed mitigation measures	Level of effect (with mitigation)
Vegetation clearance	Terrestrial habitats – kanuka scrubland	Moderate	Moderate	Approximately 1.19 ha of indigenous regenerating kanuka vegetation is to be cleared from the immediate development footprint to allow for the provision of new dwellings and associated ingratitude Vegetation communities within the proposed development footprint are secondary and consist of regenerating kanuka scrub that had historically been cleared up until 1980s.	Sensitive development design, utilising areas that have been cleared historically, guiding development away from mature indigenous trees and other areas of high ecological value. Vegetation clearance protocols should be prepared, including procedures for minimising the area and duration of soil exposure from vegetation clearance, minimising the volume of vegetation to be mulched, locating wood residue piles with an appropriate separation distance from any waterways, and minimising potential leachate from the machinery used. Large indigenous forest trees are not present within the proposed vegetation clearance footprint and will not be affected. Vegetation clearance only to take place in regenerating kanuka scrubland (regenerating since approx. 1980s). Implementation of appropriate sediment, earthworks controls during vegetation clearance to avoid potential sedimentation of nearby watercourses. Vegetation clearance to take place using low impact machinery suited for site specific condition.	Low

Effect/activity	Habitat impacted	Ecological value	Magnitude of effect (no mitigation)	Comment	Proposed mitigation measures	Level of effect (with mitigation)
					Use GPS-enabled machinery, string lines, or other appropriate strategies to contain vegetation clearance and construction effects to only the area within the final footprint extent, to avoid any further encroachment on bush area. Vegetation removal to take place outside of the peak bird breeding season (October to February, inclusive), where feasible and practicable. Implementation of pre-vegetation clearance ecological surveys to ensure that development footprint is clear of species with lesser mobility (herpetofauna). Implementation of appropriate ecological supervision (and species relocation, where necessary) during vegetation clearance to ensure that no indigenous fauna is killed during the clearance process.	

Effect/activity	Habitat impacted	Ecological value	Magnitude of effect (no mitigation)	Comment	Proposed mitigation measures	Level of effect (with mitigation)
Sedimentation from earthworks	Stream habitats	High	High	Earthworks will be required to establish building platforms and install required services. No stream or wetland habitats noted within Site 1 boundaries. No new culvert or stream crossings required to be installed as part of the site's development.	To mitigate the risk of sediment entering the streams and wetland areas present outside Site 1 boundaries during site development works, and contaminating the downstream catchment, erosion and sediment control plans should be prepared in accordance with Northland Regional Council's Erosion and Sediment Control Guidelines.	Low
Stormwater and wastewater management	Stream habitats	High	High	All stormwater and wastewater management are to be low impact systems designed in accordance with relevant expert reporting.	To address the potential increase of stormwater and wastewater discharges, appropriate stormwater and wastewater management is required for the development. Wastewater disposal system for the site should be designed to be located within existing terrestrial vegetation to avoid requirement for further vegetation clearance. The wastewater disposal system should be surface laid, ensuring that appropriate setbacks from stream and wetland areas as per PRPN setback requirements can be abided by.	Low

Effect/activity	Habitat impacted	Ecological value	Magnitude of effect (no mitigation)	Comment	Proposed mitigation measures	Level of effect (with mitigation)
Introduction of pathogens and pest plants and organisms	Terrestrial and aquatic habitats	Moderate	High	Potential risk associated with primarily development stage of works using dirty earthmoving machinery introducing potential risk of spreading spores and plant material.	All machinery entering the site will have to be appropriately disinfected and cleaned regularly (if taken offsite). A hygiene protocol should be drawn up to address regular disinfection of tools brought to site.	Low
Disturbance of wildlife	Bush habitat	Moderate	High	Acute effects associated with initial site development and ongoing effects associated with human disturbance and introduction of pet animals.	All works on site to be carried outside the breeding season for susceptible animals (e.g., outside bird breeding season). No specific controls proposed, but it is assumed that responsible pet ownership principles would be abided by (i.e. no pet animals allowed to roam outside the immediate development boundaries).	Low
Fire risk	Bush habitat	Moderate	High	Introduction of new buildings near/in the bush area has the potential for increasing fire risk	Sensitive building design suggested – using low flammability materials for building design and utilising external sprinkler systems. Ongoing flammable weed management (e.g. gorse) to ensure fire risk is minimized. Fire prevention protocols should be considered during the building phase (e.g. building during the wetter, winter season) and therein afterwards (e.g. no open pit	Low

Effect/activity	Habitat impacted	Ecological value	Magnitude of effect (no mitigation)	Comment	Proposed mitigation measures	Level of effect (with mitigation)
					outdoor fires) in accordance with Northland Regional Council (NRC) fire restrictions, rules and bylaws.	
Light	Terrestrial habitat	Moderate	Moderate	The potential adverse effects from artificial light on the surrounding habitats and species using these areas pose some low-level minor risk to the fauna species moving through the site. Many New Zealand avifauna, herpetofauna and insects are fully or partially nocturnal. Introduction of unrestricted light levels within the area are likely to disrupt species movements, therefore these need to be managed through appropriate controls.	The potential impacts of the effects of artificial lighting can be significantly minimised through the following: • Exterior lights should be cowled (shielded) and or low-level downward directional, to reduce light spill and direct lighting only where required. • Exterior lights are to be on a short (1min) timer, set to automatically switch off when not in use. • No flood lights within areas facing forest vegetation. Any external lighting should be LED, narrow spectrum, with minimum Ultraviolet spectrum. Should be warm spectrum avoiding white and blue light spectrum.	Low

Effect/activity	Habitat impacted	Ecological value	Magnitude of effect (no mitigation)	Comment	Proposed mitigation measures	Level of effect (with mitigation)
Avifauna	Bush habitat	Moderate	High	No 'At Risk' of 'Threatened' avifauna noted on site, however works should be minimized to reduce disturbance	Vegetation removal to take place outside of the peak bird breeding season (October to February, inclusive), as far as practicable, to avoid disturbance to active native bird nests or mortality of eggs/chicks. The consent holder shall employ a suitably qualified and experienced ecologist, who must be onsite to supervise any vegetation removal. Should any active bird nests be identified during the pre-vegetation clearance survey, appropriate exclusion areas (≥10m) should be demarcated, nests monitored for fledging and vegetation clearance postponed until chicks have fledged.	Low
Herpetofauna	Bush area	Moderate	High	Previous records of indigenous lizards recorded within 5 km of the site. Suitable habitat present on site.	Prepare a herpetofauna management protocols (as part of the Ecological Management Plan for the site) to address protocols that ensure avoidance, remediation, mitigation and monitoring. All vegetation clearance works to be supervised by an appropriately qualified ecologist holding a site specific Wildlife Act permit for salvage and relocation of herpetofauna. The appropriate wildlife permits will need to be applied for 12-18 months prior of vegetation clearance activities to begin from DoC. Conduct vegetation clearance activities during warmer months, when lizards are active (October – April).	

Effect/activity	Habitat impacted	Ecological value	Magnitude of effect (no mitigation)	Comment	Proposed mitigation measures	Level of effect (with mitigation)
Bats	Bush area	Moderate	Moderate	No long-tailed bat presence recorded within 40km of the site, no roost potential observed within the development footprint.	No loss of bat roosting trees anticipated as proposed vegetation clearance is to take place within kanuka scrub area with no mature trees observed. Implementation of pre-vegetation clearance ecological surveys to ensure that development footprint is clear of bat roosting trees, any potential roost sites are inspected and where bat roosts are discovered all works to cease immediately until such a time bat roosts can be appropriately evaluated by a suitably qualified ecologist.	Negligible
Overall assessment		Moderate	High			Low

5.0 CONCLUSION AND RECOMMENDATIONS

It is considered that the proposed development area 1 has been selected through comprehensive preliminary design process which has considered areas within the wider site boundaries which are of lower ecological value and significance. Development area 1 is one of the locations identified within the site boundaries which have been historically cleared and utilised for agricultural production purposes. The area has been historically (and likely remains to be) grazed. Development in this area would enable high quality housing development vitally required for the local community while limiting the potential adverse ecological effects which can be addressed through comprehensive ecological management and mitigation principles.

The proposed management actions described within the body of this report will minimise potential adverse ecological effects associated with the development proposal on the habitats and species likely present on site and immediate surrounds. It is acknowledged that a range of 'At Risk' fauna may be present within site and immediate surrounds, however any actual and potential adverse effects to be managed through proposed mitigation measures outlined under Table 5 above.

The following recommendations are made to ensure that potential adverse effects associated with the development proposal can be avoided, minimised or mitigated to the extent practicably feasible.

1. That a site-specific Ecological Management Plan (EMP) is prepared for the site (as a condition of consent) to ensure ecological avoidance, minimisation and mitigation strategies are implemented as part of the site's development proposal. The EMP should provide detail on how adverse effects to native fauna including 'Threatened' or 'At Risk' species will be avoided or minimised through vegetation clearance protocols, seasonal constraints on earthworks, salvaging and relocation and other management actions. Specific proposed management detail should include:

    a. Vegetation clearance management protocols (including seasonal restrictions to vegetation clearance) to provide detail on how adverse effects associated with vegetation clearance will be avoided or minimised through vegetation clearance protocols.

    b. Lizard management protocols to provide detail how lizard protection, salvage and relocation protocols will be implemented during site construction works with input as required from project engineers and other specialists. This Plan should cover any avoidance, remediation, mitigation and monitoring that may be carried out in association with the development of the site. Recommendations should follow the key principles to lizard salvage as described in DOC (2019).

        Note: Relevant Wildlife Authority Permits will need to be obtained from DoC and a suitably qualified herpetologist will be required to supervise the

vegetation clearance works on site. Please note that at current date it takes approximately 12-18 months from the date of application to obtain such permits.

c. Avifauna management protocols clearly outlining methods that will be utilised to avoid or minimise potential adverse effects on avifauna.

2. The consent holder shall employ a suitably qualified and experienced ecologist holding appropriate Wildlife Act permits, who must carry out pre-vegetation clearance surveys and must be onsite to supervise any vegetation removal to search for and salvage any native fauna with lesser mobility (i.e. lizards) and to relocate them to the alternative location(s) on the site.

6.0 REFERENCES

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APPENDIX 1 – PROPOSED DEVELOPMENT PLAN

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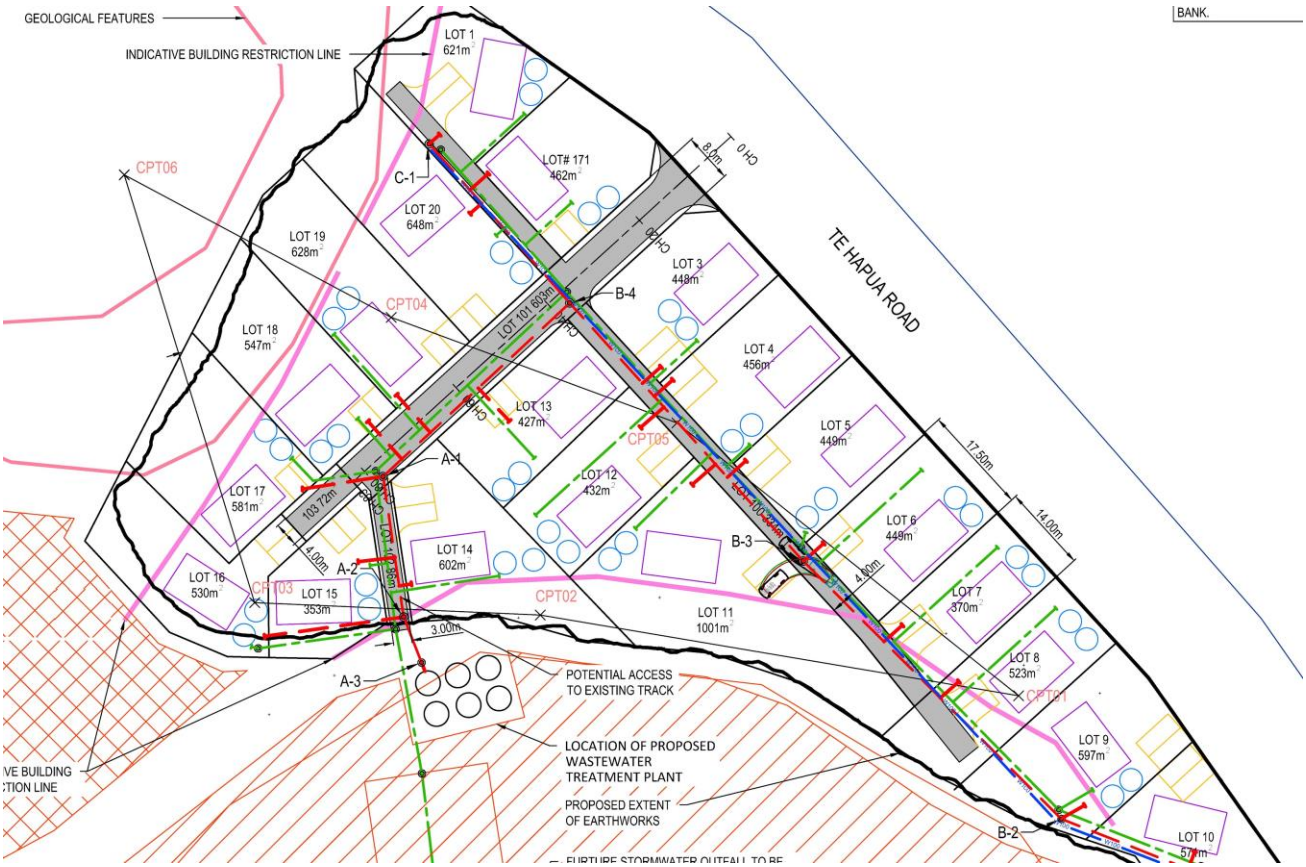
PROPOSED PAPAKĀINGA
TE HĀPUA ROAD,
TE HĀPUA, TAI TOKERAU



ASSESSMENT OF TRAFFIC EFFECTS

Prepared by Dean Scanlen
Engineering Outcomes Ltd
21 April 2026

Table of Contents

1. THE PROPOSAL

This is a traffic report in relation to proposed papakāinga housing consisting of twenty dwellings on Te Hāpua 42 Block on Te Hāpua Road, Te Hāpua, plus associated access and other services.

The proposal is described in concept plans prepared by Maven Associates, referenced 147012 Revision D, issued on 13 April 2026 and reproduced in Appendix A.

All but two dwellings (the exceptions being #9 and 10) are proposed to lead to a new shared access and crossing point connecting to the southwestern side of Te Hāpua Road at distance 8.88 kilometres (measured from its connection to Far North Road Waitiki Landing[1]). For dwellings 9 and 10, direct connections are proposed onto Te Hāpua Road at 9.01 kilometres The three waters are proposed to be managed entirely on site.

2. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Overall, with the measures proposed and as shown in Figure 1 – vegetation trimming and likely sight benching on the edge of Te Hāpua Road in relation to the main access plus the installation of a warning sign opposite the main access, it is concluded that the traffic effects of the proposal will be well managed such that the associated risks are well within acceptable limits.

In particular, with the recommended work, all sight distances will exceed the safe-stopping sight distance standard in all directions, with the important directions all at least close to the safe-intersection standard – the highest standard applicable to safety.

Te Hapua Road and its intersection with Far North Road are fit-for-purpose even with the additional traffic and the additional dust is not expected to create a significant nuisance.

Overall, it is concluded that the traffic engineering effects and safety risks associated with the proposal will be well within acceptable limits and less than minor.

[1] At 34 degrees 30 minutes 47.26 seconds south & 173 degrees 53 minutes 30.7 seconds east.

N
0 10 20 30 40 50
metres
Sightline for recommended SD; needs vegetation and likely bank trimming
Install bi-directional chevron board (WYT3/PW68) opposite the main entrance
Available sightline; close to SISD with vegetation trimming
Sight distances from this location all exceed SISD
8800
8820
8840
8860 metres from Far North Rd
8880
8900
8920
8940
8960
8980
9000
9020
9040
BANK.
TE HAPUA ROAD
RESTRICTION LINE
LOT 1 621m²
LOT# 171 462m²
LOT 20 648m²
LOT 19 628m²
LOT 18 547m²
LOT 17 581m²
LOT 16 530m²
LOT 15 353m²
LOT 14 602m²
LOT 13 427m²
LOT 12 432m²
LOT 11 1001m²
LOT 3 448m²
LOT 4 456m²
LOT 5 449m²
LOT 6 449m²
LOT 7 370m²
LOT 8 523m²
LOT 9 597m²
LOT 10
LOT 101 603m²
C-1
B-4
B-3
B-2
A-1
A-2
A-3
CPT01
CPT02
CPT03
CPT04
CPT05
8.0m
17.50m
14.00m
4.00m
3.00m
103.72m
POTENTIAL ACCESS TO EXISTING TRACK
LOCATION OF PROPOSED WASTEWATER TREATMENT PLANT

Fig. 1
Sight distances

engineering outcomes
Tel. 09 436 5534
info@e-outcomes.co.nz

Project
Papakāinga
Part Te Hapua 42 Block Te Hapua

Client
Muriwhenua Incorporation

Surveyed by
LINZ
NRC

Amendments

Council ref.

Scale 1:600 at A3
Date 21-Apr-2026 16:19:34

3. SIGHT DISTANCES

Sight distance is the key issue with the proposal. Table 1 shows the situation with the two crossing locations in terms of sight distances. In Table 1, complying sight distances are calculated from the measured operating speed and from first principles, with driver reaction time of 2.0 seconds, surface friction coefficients of 0.27[2] and gradient correction.

Table 1. Sight distances in relation to the two crossing locations

	Initial Speed (km/h)	Gradient %	SSSD (m)	SISD (m)	Available Sight Distance (m)
			2.0	**5.0**	
Southeastbound approaching the main access (8.88 km)	61	4.0%	81	132	105*
Northwestbound approaching the main access (8.88 km)	59	-4.0%	92	142	129*
Southeastbound approaching Lots 9 and 10 (9.01 km)	61	3.0%	83	134	>150
Northwestbound approaching Lots 9 and 10 (9.01 km)	59	5.0%	76	125	147
Negative gradient is downhill					
*Likely to need at least vegetation trimming to be achieved.					

The speed limit on Te Hāpua Road is 100 kilometres per hour but the operating speed is less approaching this locality because of a combination of the alignment and the unsealed surface.

Photo 1. A panorama along Te Hāpua Road from southwest (left) to northeast, centred on the location of the new main access (marked by the orange jacket), viewed from the opposite (northeastern) side of Te Hāpua Road.

[2] As recommended in the *Unsealed Roads Manual* for longitudinal deceleration.

Photo 2. Looking northwest along Te Hāpua Road from the new main access. With vegetation trimming (and probably) some sight benching, the visibility in this direction can be opened up to at least 105 metres (from 5 metres behind the centre of the near lane) and this is recommended. That is, the safe-stopping standard plus 1.5 seconds at the full operating speed.

Photo 3. Looking southeast along Te Hāpua Road from the new main access. With vegetation trimming, the sight distance in this direction will be opened up to well above the safe-stopping standard, in fact close to the higher safe-intersection standard. This photo is taken from close to the edge of the carriageway to show what is achievable. The vegetation trimming needs to ensure this sight distance is available from at least 5 metres behind the centre of the near lane.

Photo 4. The background to the main access. A bi-directional chevron is recommended to address this.

Photo 5. Looking northwest along Te Hapua Road from 9.01 kilometres - sight distance greater than the safe-intersection standard.

Photo 6. Looking southeast along Te Hapua Road from 9.01 kilometres - sight distance greater than the safe-intersection standard.

4. COUNCIL STANDARDS AND RELEVANT RULES

The council's width standards for sight distances are given in its *Engineering Standards 2023* metres Sheet 4. This includes the following note for roads, including Te Hapua Road, with Access status:

3. Access transport corridor sight distances are calculated based upon Approach Sight Distance (ASD) with Reaction (R_T) time of 1.5 seconds.

Sight distances have been calculated in this way except with 2.0 seconds of driver reaction time, so are conservative.

Rule 15.1.6C.1.1(d) of the operative district plan specifies that a subdivision that serves 9 or more sites, access shall be by public road. This proposal is not a subdivision, so this rule does not apply to it.

5. TRAFFIC

All vehicle movements are one-way movements whether an entry or exit or a movement in one direction along public roads.

Traffic generation in this locality is estimated at no more than 4 movements per household in papakāinga, so no more than 80 total movements per day at full development, likely even less. A bias is expected to/from the northwest, but not large because there is a church, school and wharf at Te Hāpua. No significant seasonal component is expected.

The current traffic on this part of Te Hāpua Road is estimated at 122 movements on an average day[3].

The *CAS* database of crashes reported to the Police has been searched on all of Te Hāpua Road for the entire period since the start of 2016. A number of crashes have been reported, but only one injury-causing crash involved more than one vehicle. In that incident, an unlicensed motorbike with no brakes and driven by an unlicensed child, drove down a sloping driveway and collided with a westbound vehicle on Te Hapua Road, resulting in serious injuries. That incident occurred in Te Hāpua itself. Another serious-injury causing crash involved a vehicle driving straight through the Te Hāpua Road/Waharua Road intersection from Waharua Road, also in Te Hapua and also with serious injuries resulting.

6. ASSESSMENT OF TRAFFIC EFFECTS AND PROPOSED MITIGATION MEASURES

The key traffic engineering issue with the proposal is sight distances. With the work recommended in Figure 1, sight distances are concluded to be adequate.

The most restricted sight distance is northwest of the main access crossing for which the recommended work achieves only the safe-stopping standard plus 1.5 seconds of travel at the full operating speed. That is midway between what are generally considered the minimum and maximum standards applicable to safety.

[3] Mobile Road

This is acceptable here because this is the less important direction in terms of sight distance – most vehicles will turn left when exiting, the potential angle of any collision associated with a vehicle exiting to the right is relatively acute[4] and there is no recent[5] history of collisions associated with such turns anywhere on the unsealed road network in the Far North district[6].

Two parking spaces are provided for each dwelling, only four of which (for dwellings 9 and 10) rely on Te Hāpua Road for manoeuvring. The manoeuvring for dwellings 9 and 10 is in a location with sight distance that exceeds the highest standard applicable to safety in both directions.

Te Hāpua Road is adequate even with for the additional traffic the proposal will generate, despite most of it not being sealed. Its unsealed sections are relatively wide and the only serious two-vehicle collision reported since at least the start of 2016 involved an unlicensed motorbike with no brakes driven by an unlicensed child down a sloping driveway. While this incident was immensely harmful to the people involved, it cannot be factored into an assessment of effects because the factors behind it cannot be managed with engineering measures or design.

While there are a handful of dwellings within 40 metres of the unsealed sections of Te Hāpua Road, which is most of it, all are well screened with existing planting that provides significant screening and filtering of dust during dry weather.

7. FAR NORTH DISTRICT PLAN – ASSESSMENT CRITERIA

There are three sets of criteria in the plan relevant to traffic management and access. No assessment is given against 15.1.6A.7 because there are no rule infringements under that section. No assessment is given against the parking criteria in Section 15.1.6B.5, because all parking demand can be accommodated on the dwellings sites in accordance with section 15.1.6B, as a permitted activity. Each of the other criteria is quoted here and the assessment is given with each one.

7.1 Rule 15.1.6A.4.1: Traffic Intensity Matters for Consideration

This is an assessment of the proposal against matters that the Council will restrict the exercise of its discretion to with respect to restricted-discretionary activities.

Criterion (a)

The time of day when the extra vehicle movements will occur.

Assessment of Criterion (a): The proposal is expected to generate traffic at all times of the day, with typical weekday commuter peaks and smaller peaks around midday on Saturdays.

Criterion (b)

The distance between the location where the vehicle movements take place and any adjacent properties.

Assessment of Criterion (b): There are a handful of dwellings within 40 metres of the unsealed sections of Te Hāpua Road, which is most of it, but all are well screened with existing planting that provides significant screening and filtering of dust during dry weather.

[4] For which the operating speed is below the safe-system threshold for such collisions.
[5] In the most recent 5 calendar years.
[6] In which there is nearly 2,000 kilometres of unsealed roads and numerous existing instances of sight distances that are less than the ideal standard to the left of intersections and access crossings.

Criterion (c)

The width and capability of any street to be able to cope safely with the extra vehicle movements.

Assessment of Criterion (c): This is addressed as described in section 6 and finds that Te Hāpua Road will be suitable at its current width even with the additional traffic.

Criterion (d)

The location of any footpaths and the volume of pedestrian traffic on them.

Assessment of Criterion (d): There are no footpaths Te Hāpua Road. The site is nearly 2.5 kilometres from Te Hāpua School and even further from other facilities in the settlement. This is well outside the walking range of most people, even with footpaths. As such, walking outside of the new village is not expected.

Criterion (e)

The sight distances associated with the vehicle access onto the street.

Assessment of Criterion (e): See section 6. All sight distances are at least adequate.

Criterion (f)

The existing volume of traffic on the streets affected.

Assessment of Criterion (f): See section 5.

Criterion (g)

Any existing congestion or safety problems on the streets affected.

Assessment of Criterion (g): There is no congestion in this locality and no evidence of safety issues on Te Hāpua Road that the proposal might exacerabate.

Criterion (h)

With respect to effects in local neighbourhoods, the ability to mitigate any adverse effects through the design of the access, or the screening of vehicle movements, or limiting the times when vehicle movements occur.

Assessment of Criterion (h): The main access is more than 40 metres clear of the nearest existing dwelling, with the next nearest more than130 metres distant, so no targeted mitigation nor other restrictions are warranted.

Criterion (i)

With respect to the effects on through traffic on roads with more than 1000 vehicle movements per day, the extent to which Council's "Engineering Standards and Guidelines" (2004) are met.

Assessment of Criterion (i): The only route in this category is Far North Road more than 50 kilometres south of the site. That is sealed and of a suitable standard for the traffic generated by the proposal.

Criterion (j)

Effects of the activity where it is located within 500m of reserve land administered by the Department of Conservation upon the ability of the Department to manage and administer that land.

Assessment of Criterion (j): None of the site is located within 500m of reserve land administered by the Department of Conservation.

Criterion (k)

The provision of safe access for pedestrians moving within or exiting the site

Assessment of Criterion (k): No footpaths are proposed on internal access. With their short lengths, relatively narrow widths and full forward visibility, the risk to people on foot is well within acceptable limits and less than minor.

7.2 Section 15.1.6A.7: General Assessment Criteria, Traffic

This section includes eleven criteria. Criteria (a), (j), (k) and (l) are unique to this section of the plan. Criteria (b) to (i) are identical to criteria (a) to (h) of the assessment criteria in 15.1.6A.4.1, respectively, and have already been assessed in the previous section. This section is restricted to the criteria unique to 15.1.6A.7.

Criterion (a)

The extent to which the expected traffic intensity exceeds the threshold set by the Traffic Intensity Factor contained in **Appendix 3A** in **Part 4** of the district plan.

Assessment of Criterion (a): The permitted Traffic Intensity Factor (TIF) threshold for this site is 60 whereas twenty dwellings have a total TIF of 200. In reality, the traffic generation will be less than half of that level and split in both directions and, as shown, the road network is suitable.

Criterion (j)

With respect to the effects on through traffic on arterial roads, strategic roads and State Highways, any measures such as right-turn bays, flush medians, left-turn deceleration tapers, etc. proposed to be installed on the road as part of the development to accommodate traffic turning into and out of the site.

Assessment of Criterion (j): Te Hāpua Road connects to Far North Road. That is sealed and has more than adequate capacity for its existing traffic, which is below 500 movements per day at Te Hapua Road, plus that from the proposal.

Criterion (k)

The extent to which the activity may cause or exacerbate natural hazards or may be adversely affected by natural hazards, and therefore increase the risk to life, property and the environment.

Assessment of Criterion (k): None of the site access or the proposed road widening will cause or exacerbate natural hazards. This has been evaluated by other experts.

Criterion (l)

Whether providing or having access to bicycle parking, shower/changing facilities or alternative transportation would reduce the number of vehicle movements associated with the proposed activity.

Assessment of Criterion (l): With the ability for individual occupants to store bicycles and provide associated facilities at their dwellings, there is little, probably nothing, to be gained by the provision of special facilities.

15.1.6C.4.1 Property Access

Criteria (a) and (b) of this repeat those in other sections and have already been addressed. Specific comment is given for all others.

Criterion (c): Any foreseeable future changes in traffic patterns in the area.

No significant projects or road links are planned that might significantly change the patterns of traffic in this vicinity.

Criterion (d): Possible measures or restrictions on vehicle movements in and out of the access.

For the reasons given, the traffic will be well managed and there is no need for restrictions on vehicle movements.

Criterion (e): The adequacy of the engineering standards proposed and the ease of access to and from, and within, the site.

The proposed site access will be adequate and fit-for-purpose for the reasons given.

Criterion (f): The provision of access for all persons and vehicles likely to need access to the site, including pedestrian, cycle, disabled, vehicular.

The access connections to Te Hāpua Road ensure adequate access for all transport modes. In particular, cyclists will be able to enter the site safely by way of the access and vehicle crossing connections.

Criterion (g): The provision made to mitigate the effects of stormwater runoff, and any impact of roading and access on waterways, ecosystems, drainage patterns or the amenities of adjoining properties.

The new parking and associated access and manoeuvring will not require additional earthworks over and above the general development of the site, nor cause or exacerbate natural hazards. This is addressed in more detail in the reports of others.

Criterion (h) relates to sites with a road frontage on Kerikeri Road so is not relevant.

Criterion (i) The provisions of the roading hierarchy, and any development plans of the roading network.

No significant projects or road links are planned that might significantly change the patterns of traffic in this vicinity.

Criterion (j) relates to alternative access for car parking and vehicle loading in business zones and is not relevant.

Criterion (k) Any need to require provision to be made in a subdivision for the vesting of reserves for the purpose of facilitating connections to future roading extensions to serve surrounding land; future connection of pedestrian accessways from street to street; future provision of service lanes; or planned road links that may need to pass through the subdivision; and the practicality of creating such easements at the time of subdivision application in order to facilitate later development, so is not relevant.

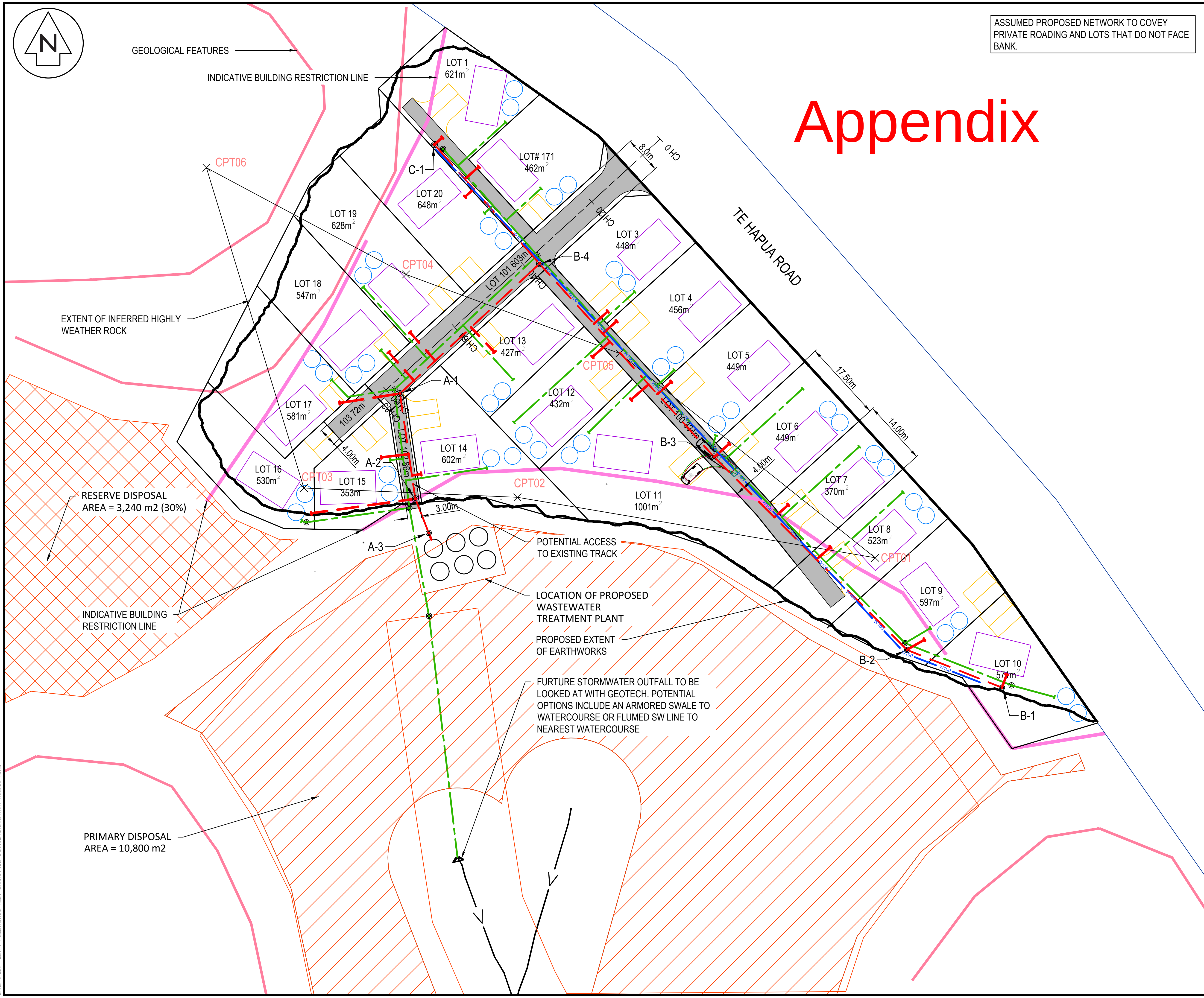
Also Criterion (l) Enter into agreements that will enable the Council to require the future owners to form and vest roads when other land becomes available (consent notices shall be registered on such Certificates of Title pursuant to Rule 13.6.7).

There is nothing to be gained by facilitating access to areas outside the site using the mechanisms described. No internal access has potential outlets to other locations and is private in any event.

Criterion (m) With respect to access to a State Highway that is a Limited Access Road, the effects on the safety and/or efficiency on any State Highway and its connection to the local road network and the provision of written approval from the New Zealand Transport Agency.

The site does not lead directly to a State highway.

Appendix



LEGEND

- EX BDY
- PROP BDY
- PROP 7m X 12m BUILDING
- PROP 25,000L TANK
- PROP 3m X 5m CARPARK
- PROP 3m X 7m CARPARK
- PR STORMWATER
- EX/PROP SWMH
- PR LOT CONNECTION
- PROP WASTEWATER
- EX/PROP WWMH
- PR WW LOT CON
- OVERLAND FLOW PATH
- PROP. PRIMARY DISPOSAL AREA
- PROP. RESERVE DISPOSAL AREA

Rev	Description	By	Date
D	Formation Layout Amendments	SB	13/04/26
C	FOR INFORMATION	AO	06/03/24
B	FOR INFORMATION	YG	15/12/23
A	FOR INFORMATION	AO	13/12/23

	By	Date
Survey	TM	12/2013
Design	AO	01/12/23
Drawn	AO	01/12/23
Checked	TM	12/2023

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Project
TE HAPUA SITE A1 INVESIGATION FOR PROPRIETORS OF MURIWHENUA

Title
PROPOSED CONCEPT LAYOUT PLAN

Project no.	147012
Scale	1:750 @ A3
Cad file	147014-1A-CONCEPT.DWG
Drawing no.	1A-C100
Rev	D

DATE: 4/15/26 FILE PATH: G:\MAVEN\ARCHIVED PROJECTS\147012 - MURIWHENUA\DWG\147014-1A-CONCEPT.DWG

Geotechnical Assessment Report

Proposed Affordable Housing Development

Te Hapua Road, Te Hapua – AREA# 1

For

Proprietors of Muriwhenua

Supporting report for Applications to Far North District Council and Northland Regional Council

Haigh Workman reference 23 200

April 2026

Phone: +64 9 407 8327 • info@haighworkman.co.nz • www.haighworkman.co.nz

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1 Revision History

Revision Nº	Issued By	Description	Date
A	Josh Curreen	First Issue	February 2024
B	Josh Curreen	Updates for RC	April 2026

Prepared By

Josh Curreen

Senior Geotechnical Engineer
MEngNZ

Approved By

John Papesch

Director
CPEng, CMEngNZ

TABLE OF CONTENTS

TABLES

FIGURES

Executive Summary

Haigh Workman Ltd (Haigh Workman) has been engaged by Proprietors of Muriwhenua to carry out a geotechnical investigation for a proposed affordable housing development comprising 20 houses at Te Hapua Road, Te Hapua.

This report contains information required for proposed earthworks, as well as outlining geotechnical design issues that need to be considered for subsequent building design and subdivision construction.

The soils directly underlying the site comprise natural soils of the Tangihua Complex of the Northland Allochthon sequence. All boreholes drilled within the development area encountered residual soils below a thin veneer of topsoil. Borehole BH08, drilled at the lower platform to the north-west, encountered fill to 1.3 m where refusal was obtained on plastic material. CPT soundings within the development area indicate stiff to hard residual soils to depths of between 7.7 m and 24.3 m, generally increasing in strength with depth, underlain by highly weathered rock. CPT06 was undertaken on the lower platform to the north-west and encountered inferred landfill material to 4.0 m and inferred colluvium to 7.5 m overlying the natural residual soils.

Slope stability analyses indicates that stable building platforms can be provided on all lots subject to the recommendations herein. Building restriction lines are required on the western and southern sides of the development area, and have been set out on the attached drawings G03 and G04.

Overall soils types are considered highly expansive (Class H), based upon shrink-swell and Atterberg limit testing carried out on the site. Due to this classification, soils lie outside the definition of good ground within NZS3604:2011. Shallow foundations are considered to be generally appropriate for the majority of the lots, provided they are within the building restriction line. Foundation recommendations are outlined in Section 7.

Future geotechnical investigation is recommended for each individual lot at building consent stage to confirm the subsoil conditions, confirm the soil expansivity, and provide site specific geotechnical assessment for foundation design within each lot. This report is not intended to be used for foundation design, other than provide general framework for building platform suitability. A summary of the Lot specific geotechnical recommendations is given in Table 8.

All earthworks should be carried out to the requirements of NZS 4404:2010 ‘Land Development and Subdivision Infrastructure’ and NZS 4431:2022 ‘Engineered Fill Construction for Lightweight Structures’, and in accordance with the recommendations outlined in Section 8.

Filling should be kept to a minimum and limited to 0.5 m as outlined on the preliminary earthwork drawings. Filling should be avoided on or around the steeper slopes on the southern and western sides of the development area. Filling beyond the building restriction line should also be avoided, unless further geotechnical assessment is undertaken to demonstrate it is safe to do so.

1 Introduction

1.1 Project Brief and Scope

Haigh Workman Ltd (Haigh Workman) has been commissioned by Proprietors of Muriwhenua to prepare a geotechnical assessment report for use in support of Resource Consent applications to Far North District Council and Northland Regional Council for the proposed 20 lot housing development within the area designated as 'Area 1' at Te Hapua Road, Te Hapua (refer to Figure 1 below).

The scope of this report encompasses the geotechnical suitability in the context of the proposed development as defined in our Short Form Agreement dated 1 January 2024. This appraisal has been designed to assess the subsoil conditions for earthworks and identify geotechnical constraints for the proposed development. As part of this assessment, the following work has been undertaken:

- A walkover inspection of the site with surface mapping of the geomorphological features;
- Reference to geological maps to assess the likely underlying geology and subsoil conditions;
- A review of aerial photographs;
- Intrusive site investigation for evaluation of subsurface conditions;
- Laboratory testing to confirm soil properties; and
- Slope stability analyses to identify stable building platforms.

This report summarises our findings and recommendations in relation to the proposed development plans provided by Maven Associates to support Consent applications to Far North District Council and Northland Regional Council. The principal objectives of the investigation are to develop geotechnical models of the site so that geotechnical constraints to the proposed development can be identified and to provide assurance to Council that stable building platforms are available or can be made available for the proposed development.

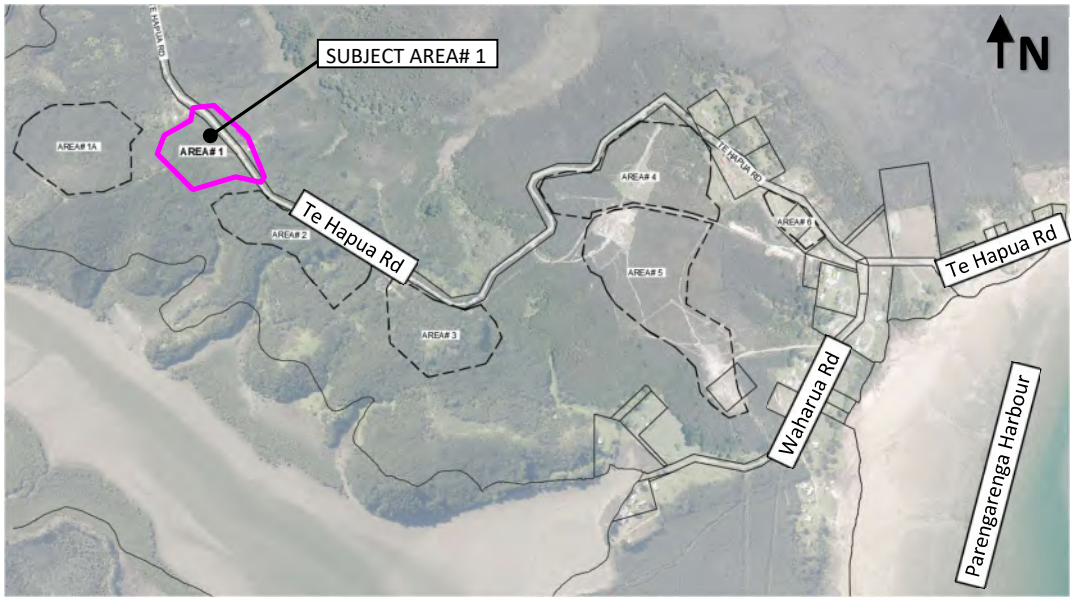


Figure 1: Site Overview

2 Site Description and Proposed Development

2.1 General

Site Address: Te Hapua Road, Te Hapua

Legal Description: Lot 1, DP 204859

Site Area: 5875 ha (Area 1 being approximately 1.2 ha)

The subject development area (Area# 1) is located on Te Hapua 42 Block, on the southern side of Te Hapua Road, approximately 2.5 km before reaching the main Te Hapua community area.

Area# 1 is situated on a knoll of approximately 54.00 mRL which slopes gently down to Te Hapua Road to the north-east, moderately down towards the south (between 12 – 13°), and steeply down towards to the north-west at approximately 25 to 30°. There is an existing track runs from Te Hapua Road, around the southern side of the knoll and on to a narrow ridgeline that extends towards the south-west of the knoll.

The Area# 1 zone shown in Figure 1 is based on Maven Associates Ltd drawings. Currently there are no existing buildings within this zone and the area is mostly clad in native scrub/trees.

The approximate location of these site features are shown on site G02 attached in Appendix A. An overview of the subject area is illustrated in Figure 2 below.

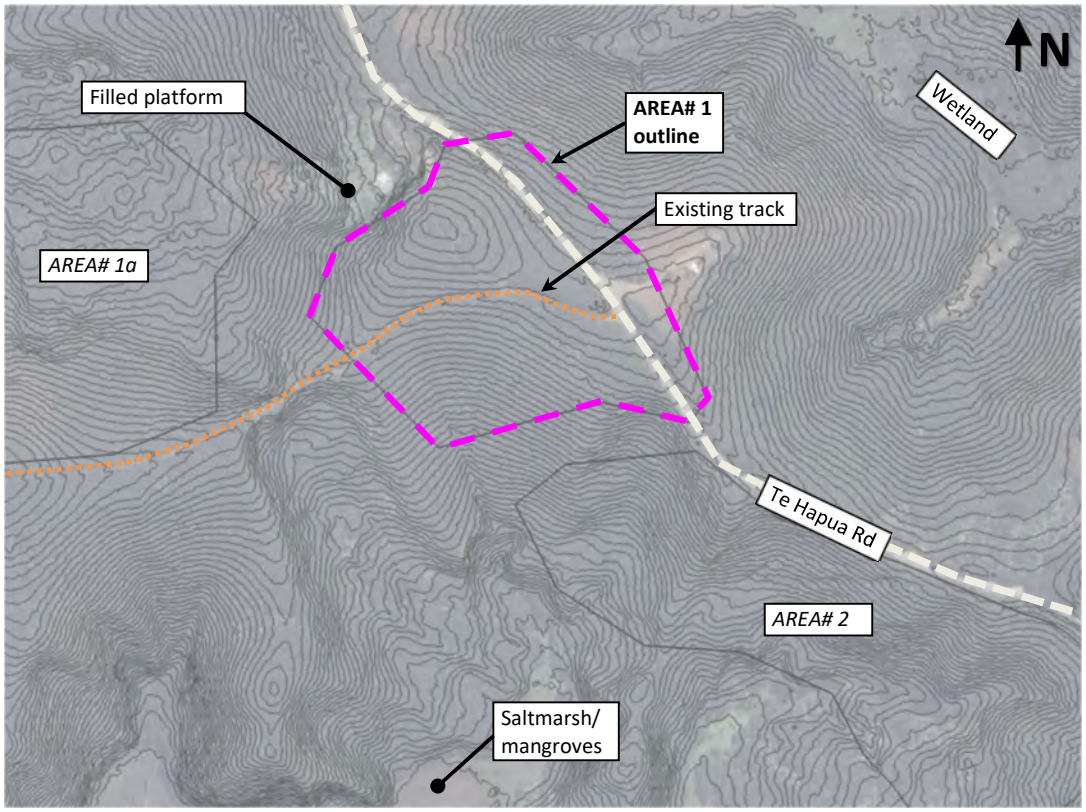


Figure 2: Site Location

2.2 Proposed Development

Based on the preliminary civil infrastructure report prepared by Maven Associates, and discussions with the project managers (Avant), it is understood that the proposed development works involve:

- The creation of 20 residential lots with areas ranging from 353 m² to 870 m².
- A main Jointly Owned Access Lot (J.O.A.L) off Te Hapua Road with 2 smaller J.O.A.Ls branching off.
- Stormwater reticulation with pipes generally following the J.O.A.Ls and being directed towards the southern slopes (discharge point to be confirmed).
- Wastewater reticulation (disposal area to be confirmed).
- Earthworks involving cutting the knoll down by up to 5.5 mbgl, sloping at 2 to 3% down towards the outer edges of the earthworks area.
- Minor filling up to 0.5 m in the south-eastern part of the site.

3 Geology

3.1 Published Geology

Sources of Information:

- GNS Geological Map 1 "Geology of the Kaitaia area", 1:250,000 scale[*].
- NZMS Sheet 290 N02/03, 1:100,000 scale map, Edition 1, 1980: "North Cape-Houhora" (Soils);

The published geology shows the site to be underlain by Tangihua Complex (Ktb) which is part of the Northland Allochthon sequence. The Tangihua Complex consists of offshore basaltic lava sequences that have been overthrust from the northeast, to overlie the basement Waipapa (composite) terrane. There is a geological boundary between Tangihua Complex and Parengarenga Group (Mpp) approximately 300 m north-east of the subject site. The Parengarenga Group materials are derived from Mount Camel terrane, the Northland Allochthon and Coromandel Group Volcanoes. The lower Te Hapua community area is situated over alluvial deposits of the Karioitahi Group.

An extract of the geological map is shown in Figure 3, with geological units presented in Table 1.

[*] Isaac, M.J. (compiler) 1996. Geology of the Kaitaia Area. Institute of Geological and Nuclear Sciences 1:250 000 geological map 1. 1 sheet + 44 p. Lower Hutt, New Zealand: Institute of Geological and Nuclear Sciences Limited.

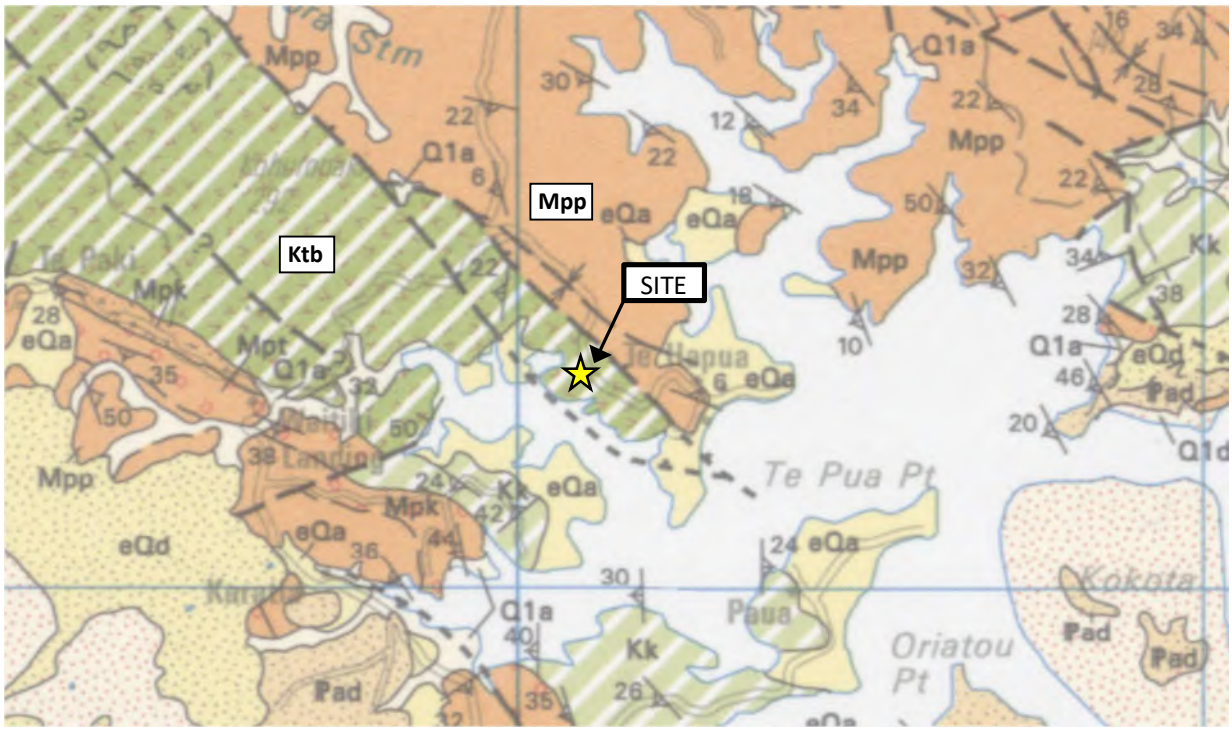


Figure 3: Geological Map Extract

Table 1: Geological Legend

Symbol	Unit Name	Description
eQa	Karioitahi Group (Alluvium)	Partly consolidated sand, mud and peat or lignite of estuarine, lacustrine, swamp, alluvial and colluvial origins. Pleistocene age.
Mpp	Parengarenga Group (Paratoetoe and Matapia Formation)	Poorly bedded sandstone and pebble to boulder conglomerate derived from the Mount Camel terrane, the Northland Allochthon and Coromandel Group Volcanoes.
Ktb	Tangihua Complex (Northland Allochthon)	Basaltic pillow lava and pillow breccia with sills and dikes of basalt and dolerite.

There are old fault lines running either side of the subject site as shown in Figure 3, one along the Tangihua – Parengarenga Group geological boundary, and a concealed fault line that runs up the Waitiki channel, through towards the north-west. These fault lines are inferred to be associated with the emplacement of the Northland Allochthon sheets.

Further reference to the New Zealand land inventory map, Sheet 290 N02/03 (North Cape-Houhora), indicates the site is underlain by *'soils of the rolling and hilly land; well to moderately well drained, Rangiuru clay (RU)'*.

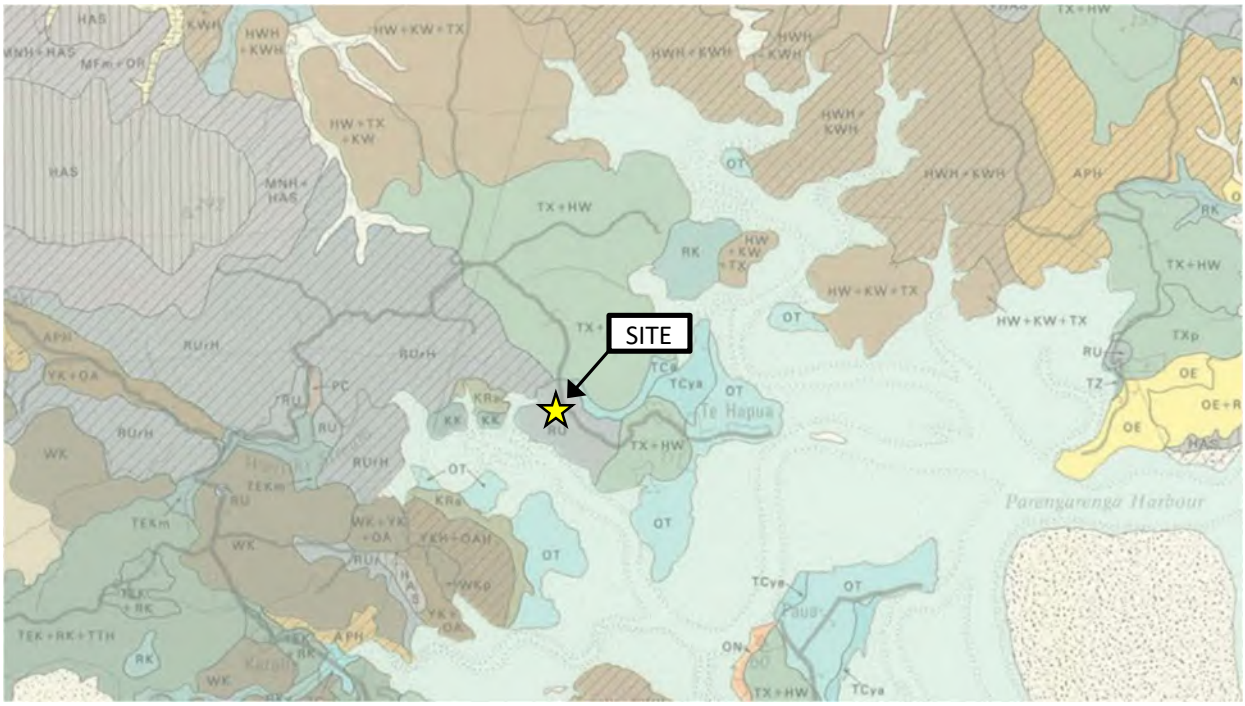


Figure 4: NZMS Soil Map - Sheet 290 N02/03

3.2 Geomorphology

Based on the site walkover carried out, review of the geological maps and topography from LINZ LiDAR data, the geomorphology of the site and surrounding area is inferred as follows.

The subject site is situated on a knoll which slopes gently down to Te Hapua Road to the north-east, moderately down towards the south, and steeply down towards an existing cut/fill platform to the north-west. There are numerous historic scarp features on the steeper surrounding slopes as illustrated in Figure 5 below. The geometry of the scarp around the lower platform differs from the other scarps and it is inferred that the head of an historic slip feature has been filled in this area. Earthworks also appear to have been carried out around the northern side of the slip feature. Setbacks will be required from all historic scarp features for any future development.

The existing track running around the southern side of the knoll is essentially the 'break in slope' where slopes south of the track becomes steeper than 10 degrees. The southern slopes beyond the track are considered to be susceptible to long term soil creep, even at low slope angles, in this geology.

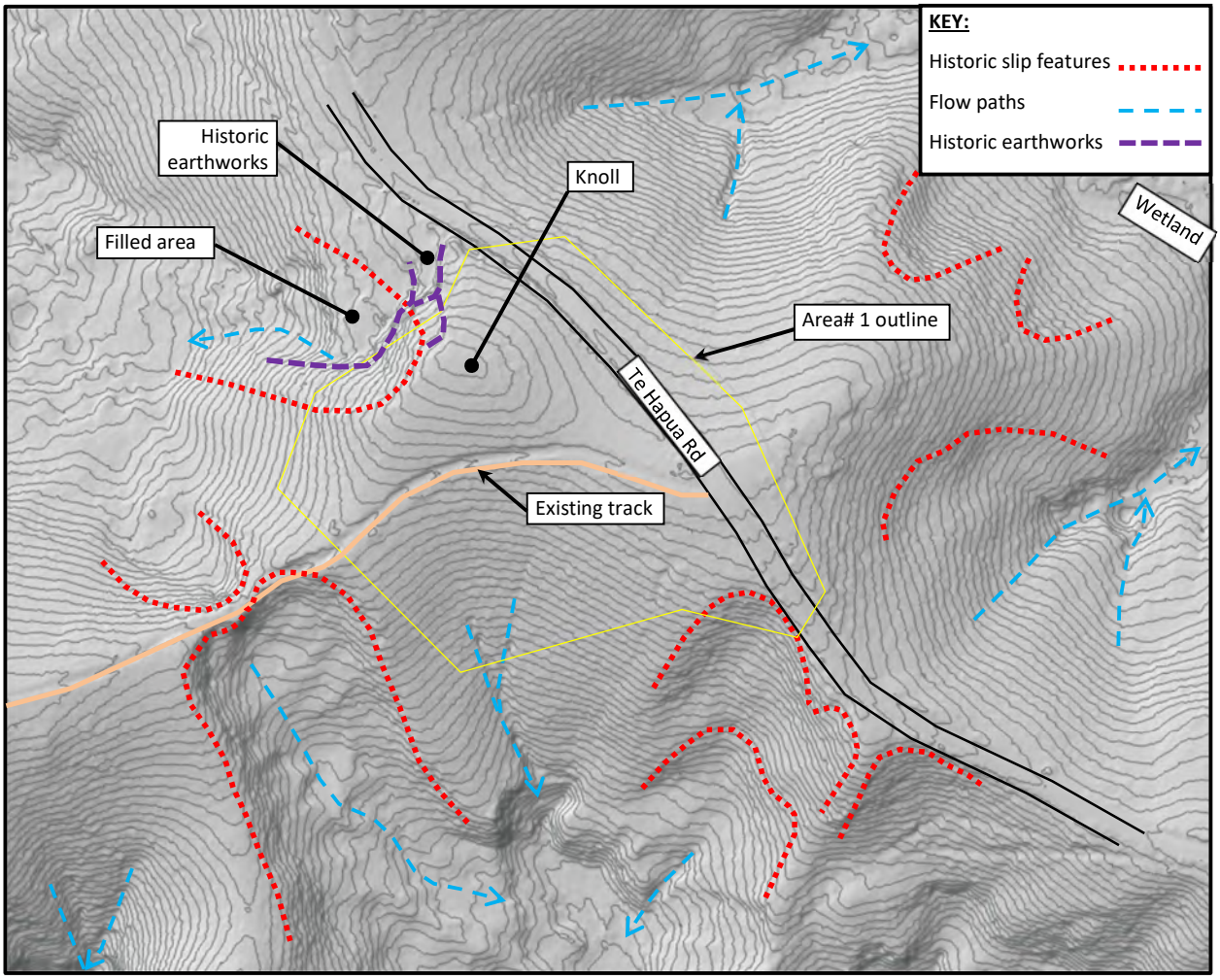
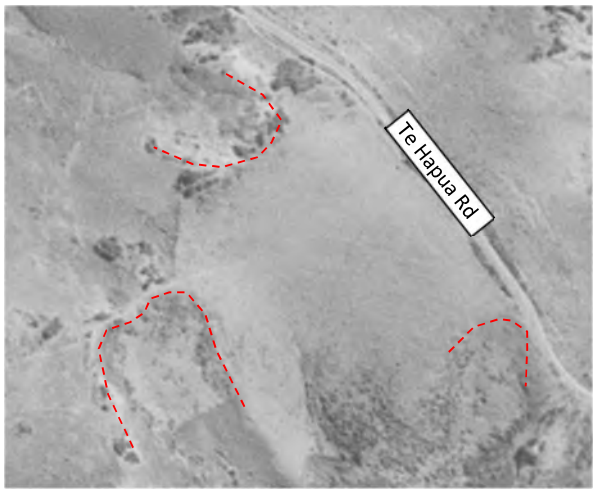
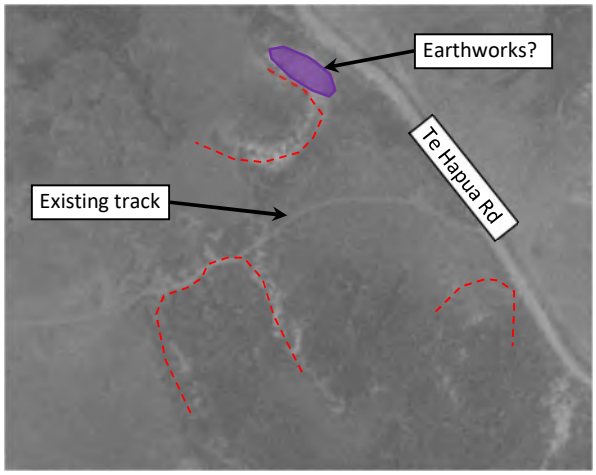
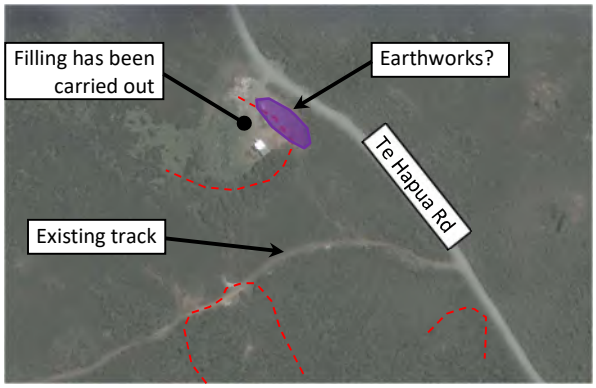


Figure 5: Geomorphological Feature from DEM (2018 – 2020)

4 Historic Aerial Photography

	**1955 Aerial (Retrolens)** Earliest historic aerial available that clearly shows the old site features. Site appears to be in pasture with a few small trees dotted over steeper slopes. Lower platform does not appear to have been formed yet.
	**1980 Aerial (Retrolens)** Possibly some earthworks carried out around the lower platform. The existing track around the southern side of knoll has been formed. Ground surface covered in regenerating bush/scrub.
	**2005 Aerial (Google Earth)** Lower platform has been filled. Shed constructed. Track possibly widened. No other obvious change since 1980.

	**2015 Aerial (Google Earth)** Slopes further vegetated. No obvious changes between 2015 and present day.

5 Geotechnical Investigations

5.1 Subsoil Investigations

Haigh Workman undertook geotechnical investigations on 13th February 2024. The investigations comprised the drilling of eight hand auger boreholes (BH01 to BH08) and six Cone Penetration Tests (CPT01 to CPT06).

5.1.1 Hand Auger Boreholes

The hand auger boreholes were drilled to depths of between 2.0 and 5.0 metres below ground level (mbgl). Investigations were logged in accordance with The New Zealand Geotechnical Society, "Guidelines for the Field Classification and Description of Soil and Rock for Engineering Purposes" (2005). Investigation locations are shown on the drawings in Appendix A. All shear strengths shown on the appended logs are Vane Shear Strengths in accordance with the NZGS; "Test Method for determining the Vane Shear Strength of a Cohesive Soil using a Hand-held Shear Vane", 2001.

5.1.2 Cone Penetrometer Tests

CPTs were undertaken by Underground Investigation Ltd. Testing was undertaken to refusal (anchors pulling out of the ground). A maximum depth of 24.9 m was achieved at CPT03 location. Underground Investigation Ltd provided a cone penetration rig attached to a remote controlled, rubber tracked machine to test and record ground information. CPT soundings are presented in Appendix C.

5.2 Ground Conditions

Based on the results of the geotechnical investigation conducted by Haigh Workman and review of published geological maps, it is considered that the soils directly underlying the site comprise natural soils of the Tangihua Complex. All boreholes encountered residual allochthonous soils below a thin veneer of topsoil. Borehole BH08, drilled at the lower platform to the north-west, encountered fill to 1.3 m where refusal was obtained on plastic material.

CPT soundings within the development area indicate stiff to hard residual soils to depths of between 7.7 m and 24.3 m, generally increasing in strength with depth, underlain by highly weathered rock. CPT06 was undertaken

on the lower platform to the north-west and encountered inferred landfill material to 4.0 m and inferred colluvium to 7.5 m overlying the natural residual soils.

The ground surface across the development area and nearby slopes were drawn from LINZ Data Service LiDAR contours. Geological cross sections are included within Appendix A.

Subsoil conditions on the site have been interpolated between the boreholes, therefore some variation between test positions are likely. Detailed hand auger logs are presented within Appendix B. The tables below summarise the materials encountered in both the hand auger boreholes and CPTs.

Table 2: Hand Auger Borehole Summary

Geological Unit	Test I.D.					
	BH01	BH02	BH03	BH04	BH05	BH06
Landfill material	NE	NE	NE	NE	NE	0.0 – 1.3 (Refusal)
Topsoil	0.0 – 0.05 m	0.0 – 0.1 m	NE	0.0 – 0.1 m	0.0 – 0.1 m	NE
Residual Tangihua Complex	1.0 – 2.0 m (Refusal)	0.1 – 3.2 m (Refusal)	0.0 – 2.0 m (Refusal)	0.1 – 3.0 m (Refusal)	0.1 – 4.0 m (Refusal)	NE
Groundwater Level	NE	NE	NE	NE	NE	NE

**NE = Not Encountered. E.O.B = End of Borehole.*

Table 3: CPT Results Summary

Inferred Geological Unit		Test I.D.					
		CPT01	CPT02	CPT03	CPT04	CPT05	CPT06
Inferred Landfill material		NE	NE	NE	NE	NE	0.0 – 4.0m
Inferred colluvium *(Soft to Firm soils)*		NE	NE	NE	NE	NE	4.0 – 7.5m
TANGIHUA COMPLEX	**Stiff to Very Stiff clay mixtures** *(Su 50 to 200 kPa)*	0.0 – 2.0m	0.0 – 20.7m	0.0 – 10.3m	0.0 – 2.6m	0.0 – 13.3m	7.5 – 9.5m
	Hard silt and sandy mixtures *(Su >200 kPa)*	2.0 – 19.2m	20.7 – 21.5m	10.3 – 24.3m	2.6 – 7.7m	13.3 – 16.1m	9.5 – 12m
	Highly Weathered Rock *Basalt*	19.2 – 20.6m (Refusal)	21.5 – 22.3m (Refusal)	24.3 – 24.9m (Refusal)	7.7 – 8.2m (Refusal)	16.1 – 16.6m (Refusal)	12 – 12.5m (Refusal)
Groundwater Level		NE	NE	NE	NE	NE	NE

NE = Not Encountered.

All CPTs were pushed to refusal (inferred to be weathered Tangihua Complex rock) at depths of between 8.2 m and 24.3 m.

5.2.1 Topsoil

Topsoil was encountered within boreholes BH01, BH02, BH04 and BH05 to 100 mm depth. The natural topsoil was generally described as dark greyish brown clayey silt, dry with low plasticity.

5.2.2 Un-certified Fill

The investigations carried out around the lower platform to the north-west of the proposed development area encountered landfill material up to 4.0 m depth (inferred from CPT). Based on historic aerial photographs, this area was filled in sometime between 1980 and 2005. The landfill is well outside the proposed development area and was only investigated to complete the geological ground model through cross section B-B'.

Minor localised filling may be present along the southern side of the existing track, however, will be outside the development area.

5.2.3 Inferred Colluvium

CPT06 encountered soft to firm clayey soils beneath the landfill material which are inferred to be collivum (slip material) from the historic feature on the western side of the knoll. The inferred colluvial deposits are up to 7.5 m at CPT06 location, which aligns with the existing ground slopes.

5.2.4 Residual Soils (Tangihua Complex – Northland Allochthon)

Fine-grained residual soils were encountered across the development site. Boreholes BH01 to BH07 encountered residual soils to their termination depths. Vane shear strengths were between 80 kPa and 200 kPa+, indicative of stiff to hard soils. In general the boreholes encountered silty clay and clayey silt within the upper 1.0 m to 1.5 mbgl, underlain by silt with minor clay.

The CPTs indicated stiff to hard residual soils to depths of between 7.7 m and 24.3 m, generally increasing in strength with depth, underlain by highly weathered rock (basalt). CPT04, undertaken on the top of the knoll, encountered weathered rock at approximately 7.7 m which was comparatively shallow to the surrounding tests.

5.2.5 Groundwater Conditions

Groundwater was not encountered in any of our hand auger boreholes, or within the CPTs during the investigation. Groundwater standpipes were not installed in the hand auger boreholes or CPTs and no further groundwater monitoring has been undertaken. Groundwater levels can and do fluctuate and higher groundwater levels may be encountered following periods of prolonged or heavy rainfall. Perched groundwater in the upper fine-grained soils is likely and has been modelled with an Ru of 0.5 under worst case groundwater conditions.

5.3 Laboratory Testing

A soil sample was collected from the recovered soils at location BH04 between 0.4 to 0.9 mbgl. The sample was sent to an IANZ accredited laboratory to undertake testing to determine the materials Atterberg limits and linear shrinkage. Laboratory test results are presented in Appendix D.

6 Geotechnical Assessment

6.1 Geotechnical Design Parameters

Geotechnical design parameters recommended in this report are based on in-situ test results, empirical relationships, and back analysis. Back analysis was carried out along cross section B-B' which runs through the observed slip scarp on the western side of the knoll. Sensitivity analyses was carried out for the residual soil layers to obtain a factor of safety of 1.0 for worst case groundwater conditions.

Refer to Table 4 below for soil parameters adopted within this report. Depths for the units are shown in Table 3 above and on the geological cross sections.

Table 4: Geotechnical Design Parameters

Soil Unit	Bulk Unit Weight γ (kN/m^3)	Peak Undrained Shear Strength S_u (kPa)	Effective Cohesion c' (kPa)	Effective Friction Angle ϕ' (degrees)	Groundwater Conditions (Ru)*
Landfill material	16	N/A	1	22	0.15 (0.3)
Inferred Colluvium	17	N/A	2	20	0.15 (0.3)
Stiff to Very Stiff residual soils	18	50 – 100	8	20	0.15 (0.3)
Hard residual soils	18	200	10	20	0.15 (0.3)
Highly Weathered Rock	20	500	20	20	0.15 (0.15)

**Parentheses indicate worst case/elevated groundwater conditions.*

Groundwater has been modelled using a pore pressure coefficient for each layer (Ru). This develops a porewater pressure profile specific to each slip surface and is appropriate for the short term / transient pore water pressures that are expected to develop following rainfall onsite and the groundwater flow conditions that will result due to the sloping topography.

For the elevated groundwater scenario (and back analysis), the upper 1.5 m residual layer has been saturated using an Ru of 0.5 to simulate perched groundwater in the upper clayey soils. This was also carried out for the static scenario through cross section A-A' due to the potential for the effluent disposal field to be situated over the southern slopes.

For modelling purposes, we have adopted a surcharge of 10 kN/m^2 for the assumed future building loads.

6.2 Slope Stability Assessment

6.2.1 General

The subject site is situated on a knoll which slopes gently down to Te Hapua Road to the north-east, moderately down towards the south, and steeply down towards a cut/fill platform to the north-west. There are numerous historic scarp features on the steeper surrounding slopes as outlined in section 3.2, and on drawing G02. The steep slopes surrounding the lower platform to the north-west have been historically excavated and show signs of erosion over the non-vegetated areas.

The existing track running around the southern side of the knoll is essentially the 'break in slope' where slopes south of the track becomes steeper than 10 degrees. The slopes to the south of the track show signs of soil creep, i.e. leaning trees and rolling ground.

Due to the steepness of the slopes, historic slip features surround the site and visual assessment indicating soil creep, slope stability analyses have been carried out to assess the stability of the proposed development area.

6.2.2 Stability Analyses

Slope stability analyses were undertaken along all cross sections measured through the site using computer software by Rocscience, Slide (Version 9.031). The soil parameters used are presented in Table 4. The purpose of the stability modelling was to assess the overall global stability for the proposed development area, including prevailing/static groundwater conditions, elevated groundwater, and during a ULS seismic event.

The post-development scenarios are based on the earthworks design by Maven Associates dated December 2023, Rev. A. The earthworks design indicates a maximum cut depth of approximately 5.5 m at the knoll, sloping at 2% to 3% to the outer edge of the earthworks extent.

Stability analyses outputs for all scenarios are attached. The criteria adopted for assessing the global stability is outlined in Table 5 below.

Table 5: Design Factors of Safety (FOS)

Load Case	Design Factor of Safety
Static groundwater	≥ 1.5
Elevated groundwater	≥ 1.3
Seismic loading (0.13 g)	≥ 1.0

6.2.3 Seismic Hazard

Anticipated peak ground acceleration has been taken from Module 1: Overview of the guidelines – Earthquake geotechnical engineering practice, adopting the mean hazard value of 0.13 g as the principal parameter for pseudo-static analysis (500-year return period). Step-change behaviour response has been assessed adopting the 'lower-bound' value of 0.19 g.

6.2.4 Analyses Results

The stability analyses carried out for all scenarios are outlined in Table 6 below.

Table 6: Analyses Results

Section I.D.	Scenario	Result	Required	Outcome
A-A'	Static conditions	1.74	1.5	Stable. However, soil creep observed across southern slopes. Provide 10m setback from the 'break in slope'
	Post-development – Static conditions	1.77	1.5	
	Post-development – Elevated groundwater	1.50	1.3	
	Post-development – Seismic case (0.13g)	1.10	1.0	
B-B'	Static conditions	1.13	1.5	Minimum Factor of Safety provided with a **12 m building setback from earthworks boundary**
	Post-development – Static conditions	>1.5	1.5	
	Post-development – Elevated groundwater	>1.3	1.3	
	Post-development – Seismic case (0.13g)	>1.0	1.0	
C-C'	Post-development – Static conditions	>1.5	1.5	Stable under post-development conditions. **Provide 20 m building setback from historic slip feature**
	Post-development – Elevated groundwater	>1.3	1.3	
	Post-development – Seismic case (0.13g)	>1.0	1.0	
D-D'	Post-development – Static conditions	>1.5	1.5	Stable under post-development conditions. **Provide 20 m building setback from historic slip feature**
	Post-development – Elevated groundwater	>1.3	1.3	
	Post-development – Seismic case (0.13g)	>1.0	1.0	

The stability analyses summary sheets for all scenarios are included in Appendix E.

The global stability of the steep slopes along the north-western side of the site is less than required for post-development conditions and building setbacks are required. The proposed development on Lots 1, 2, 17, 18, 19 and 20 should be setback a minimum of 12 m from the edge of the cut platform. A Building Restriction Line (BRL) has been set out on the attached site plan G03. If building beyond the BRL is desired, in-ground retaining walls (or other ground improvement) will be required which would require site-specific analyses and design.

The southern slopes also shown signs of shallow surface soil creep and shallow-seated slope instability, generally where gradients exceed 10° which is denoted 'break in slope' on the attached drawings. To safeguard against soil creep, it is also recommended that buildings on Lot 7 to Lot 15 be setback a minimum distance of 10 m from the 'break in slope' to the south, i.e. setback from the point where gradients begin to exceed 10°. Building closer than 10 m is however possible if foundations are designed to mitigate the effects of soil creep and would be subject to site specific investigation and design at building consent stage.

Filling on sloping ground (i.e. sidling fills) or near any historic scarp features should be avoided. Fill material generated from any cutting should be placed well away from the development area, preferably in low lying areas or gullies (if permitted) or along the ridgeline towards the south-west. If filling is to be carried out on the southern slopes, further investigations and slope stability analyses will be required.

Provided the recommendations are adhered to, it is considered that the proposed development is unlikely to adversely affect the existing stability of the site.

6.3 Settlement

Residential dwellings should be designed to tolerate angular distortion as a result of consolidation settlement of up to 1:240 (approximately 25 mm over a 6.0 m length) as required by the New Zealand Building Code (B1/VM4).

The soils encountered in our investigation were found to be stiff to very stiff fine-grained residual soils and are expected to be of low compressibility. Furthermore, no filling will be carried out beneath the building platforms and the structures will be of lightweight construction. As such, building settlement is expected to be within the building code tolerable limits.

6.4 Liquefaction

The subsoils beneath the proposed development comprise fine grained residual soils which are considered too plastic to liquefy. Furthermore, groundwater was not encountered in any of the boreholes. On this basis, we do not consider the site to at risk of liquefaction.

7 Building Design Considerations

7.1 Shrink/Swell Behaviour

The geotechnical investigations undertaken across the site indicated fine-grained clayey soils. The reactivity and the typical range of movement that could be expected from soils underlying any given building site depends on the amount of clay present, clay mineral type and proportion, depth and distribution of clay throughout the soil profile. Moisture changes tend to occur slowly in clays and produce swelling upon wetting and shrinkage upon drying. In addition, subsequent building damage can be limited by good building practice, including wetting of clay subgrade at least 48 hours ahead of base filling and slab preparation.

During our site investigation, a soil sample was collected from hand auger borehole BH04. The sample was tested for Atterberg Limits and Linear Shrinkage in accordance with NZS4402:1986, to assess the soil expansivity and properties for foundation design. The laboratory test results are presented in Table 7 below.

Table 7: Laboratory Test Results

Sample I.D.	Depth (m)	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage (%)
BH01	0.4 – 0.9	43.7	131	45	86	27

The results indicate that the soils supporting the foundations are expansive and prone to seasonal volume change, predominantly shrinkage during summer, could result in surface settlements due to volume change. Based on the laboratory test results, it is our opinion that the site should be classified as Class H, highly expansive (in accordance with the New Zealand Building Code) and deeper foundations would be necessary to mitigate the effects of prolonged dry seasons.

Results are plotted on the Casagrande Chart in Figure 6 below, plotting above the A-Line, indicating highly reactive soils.

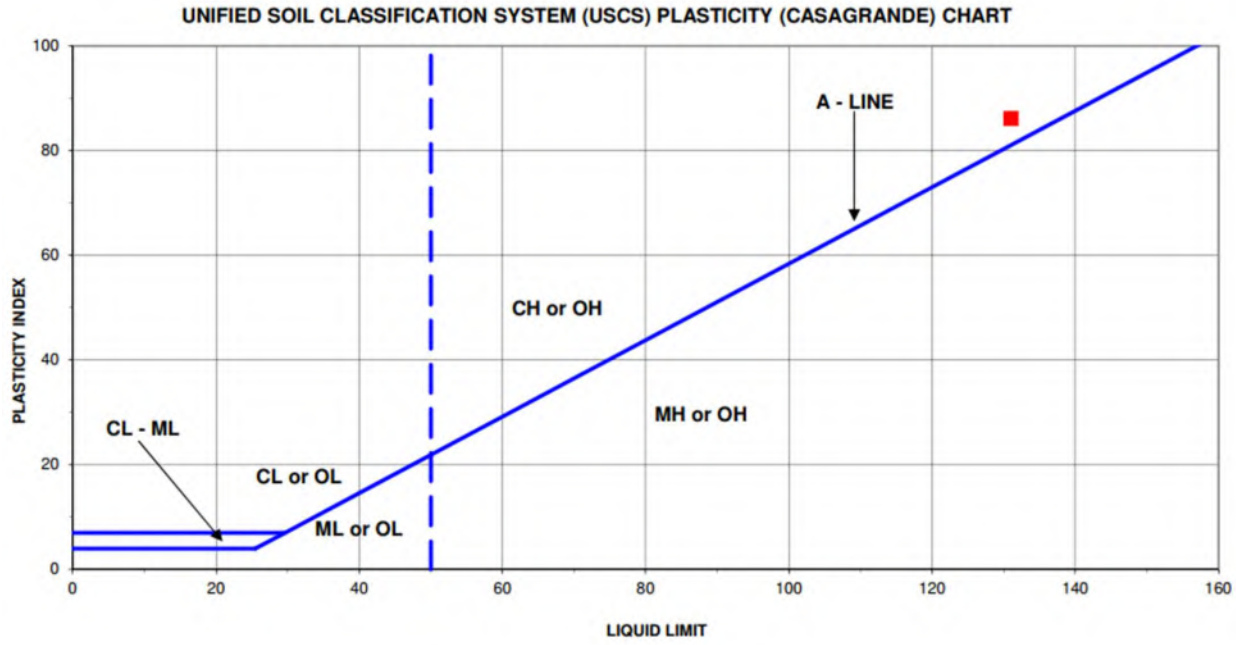


Figure 6: Casagrande Chart

7.2 Shallow Foundations

The soils tested across the site indicated stiff to very stiff silts and clays. Shallow foundations are considered to be generally appropriate for all lots, provided they are within the building restriction lines.

An ultimate bearing capacity of 300 kPa can be adopted for shallow foundation design, with a geotechnical strength reduction factor of 0.5 for limit state design, subject to site specific testing at the building consent stage.

Foundation conditions fall outside the definition of 'good ground' as contained in NZS3604:2011 due to the presence of expansive soils. We recommend the foundations be designed in accordance with B1/AS1 with an allowance for class *'H', 'Highly expansive'* soil.

8 Development Recommendations

8.1 Topsoil, Fill and Unsuitable Soils

All vegetation, topsoil and otherwise unsuitable material should be removed from earthworks areas and/or development area. The topsoil layer was found to be between 50 mm and 100 mm deep in our boreholes but may vary elsewhere across the property. No fill or otherwise unsuitable material was encountered in any of our boreholes however based on visual observations, minor localised filling may be present along the southern side of the existing track, however, will likely be removed as part of the development earthworks.

Unsuitable materials should be stripped from any areas of earthworks and stockpiled away from the steeper slopes, well clear of earthwork operations, or removed from the site.

8.2 Cut Excavations

The preliminary civil design concept provided by Maven Associates (dated December 2023, Rev. A) indicates a bulk cut of the knoll with depths up 5.5 mbgl, sloping at 2 to 3% down towards the outer edges. The earthworks plan also shows minor filling up to 0.5 m in the south-eastern part of the site.

Based on the current earthworks concept drawing, the cut will daylight at the outer edge of the platform and no cut batters are envisaged. However, any cut batters are proposed/introduced to the design, it is recommended that all long-term cut batters be formed at gradients no steeper than 1V:5H (i.e. 11 degrees). This batter slope is largely based on soil creep observations on the surrounding slopes. Erosion protection is also recommended on all exposed cut/fill batters (i.e. erosion control matting and/or planting).

Given the large area available retaining walls are not expected to be required to support cut excavations however, should any retaining be intended, then we recommend the retaining walls be designed by a Chartered Professional Engineer and the matter be referred back to Haigh Workman for additional recommendations.

8.3 Fills

8.3.1 Development Area

The development area will predominantly be formed in cut with minor filling (up to 0.5 m maximum) at the south-eastern extent of the development area.

Filling should be kept to a minimum and limited to 0.5 m as outlined on the preliminary earthwork drawings. Filling should be avoided on or around the steeper slopes on the southern and western sides of the development area. Filling beyond the building restriction line should also be avoided, unless specific engineered design is undertaken to demonstrate it is safe to do so.

All earthworks should be carried out to the requirements of NZS 4404:2010 'Land Development and Subdivision Infrastructure' and NZS 4431:2022 'Engineered Fill Construction for Lightweight Structures'. It is recommended that any unsuitable material identified during excavation be removed and replaced with engineered fill. We recommend that all grass coverings, topsoil layers and unsuitable fill material be removed below any proposed areas of intended fill placement.

Given the shallow depth to hard silty soils and weathered rock around the area of the knoll (CPT04), consideration also be should be given to sub-excavation and replacement (or mixing) with clayey fill in that area to aid drainage and vegetation grown around the amenity areas.

Any fill placed near or beneath any proposed dwelling, infrastructure or other structures, will need verification of compaction and confirmation by the engineer that settlement caused by filling will not adversely affect the proposed structures. Verification of compaction should be undertaken by a professional engineer at regular lifts, i.e. inspection at preplacement and every 500 mm thereafter (or as agreed between the Client and Engineer).

Compaction control of the cohesive fill consists of maximum allowable air voids and minimum allowable shear strengths and outlined in NZS4431:2022. The fill specification outlined below is recommended for earthworks. An outline of the specification details are as follows, to be read in collaboration with NZS4431:1989:

- Vane shear strength testing comprising an average of ten tests of 140 kPa with no single vane shear test of less than 120 kPa.
- Testing shall also include air void testing with a minimum of ten consecutive tests with an average of 10% air voids with no single test greater than 12%, in accordance with NZS4402:1986.

Fill batters less than 0.5 m in height should be formed at gradients no steeper than 1V:3H. If batter slopes greater than the above recommendations are required retaining walls will be required. Fills of any height that are to be subject to surcharge loading of any sort should be supported using specifically designed retaining walls or battered to a suitable slope angle subject to specific geotechnical design recommendations.

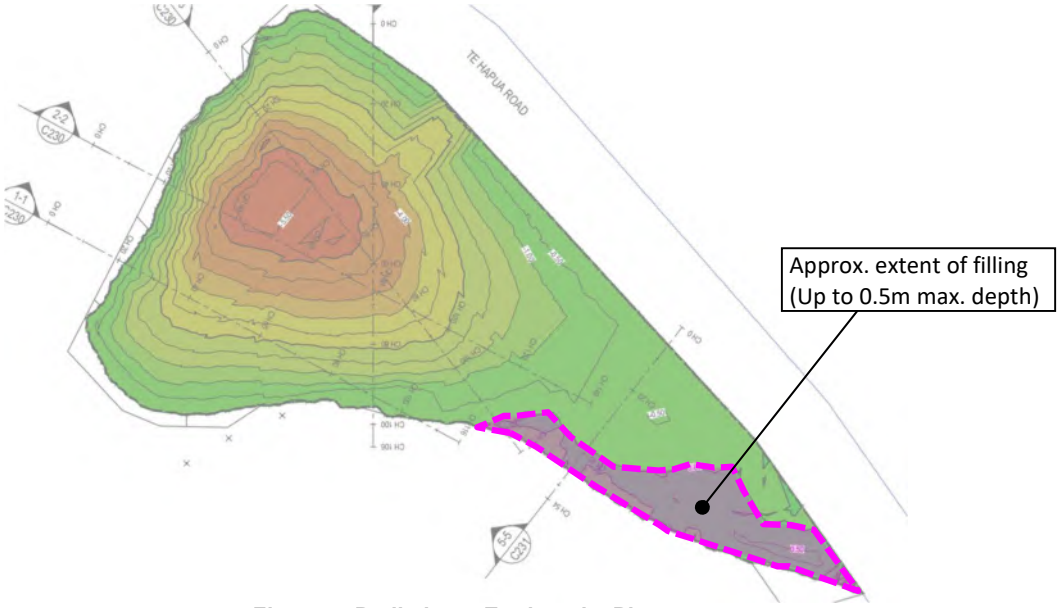


Figure 7: Preliminary Earthworks Plan

8.3.2 Excess Fill

The proposed excavations will generate a significant amount of excess fill which will need to be placed away from the development area. Given the historic instability features identified on the surrounding slopes,

steepness of the slopes and inherent unstable nature of the underlying allochthonous geology, filling on sloping ground (i.e. sidling fills) should be avoided unless further investigations (machine testing) and slope stability analyses is undertaken to demonstrate that it is safe to do so.

No fill should be placed within, or near any historic slip features identified on drawing G02. A suitable fill disposal site should be nominated well away from the development area to avoid any detrimental effects on site stability. The preferred fill disposal site would be either; in a low lying area or gully (if permitted) OR spread over the ridgeline to the south-west of the development area (beyond the slip features identified on G02).

8.4 Erosion and Sediment Control

Prior to commencing earthworks, a sediment control system needs to be constructed to ensure the Territorial and Regional Authority requirements are met. Typical details can be found in the Auckland Council publication GD05. Erosion and sediment control should be undertaken as early as possible before soil particles become dislodged and mobilised. The use of contour drains, mulching and earth bunds to control erosion during the construction phase is recommended, as is maintaining vegetation cover where possible to reduce erosion potential.

8.5 Unexpected Ground Conditions

The CPT carried out at the top of the knoll (at deepest point of cut) encountered rock at approximately 7.7 m, with hard residual soils from around 2.6 m.

Excavation to the finished cut level should be achievable by direct excavation with a sizeable excavator. However, depending on the final alignment and depth of service trenches (stormwater, wastewater etc.), trench excavations could be through rock in the deeper area of cut.

Provision should be made for encountering rock (i.e. rock breaking and/or ripping) for service trench excavations and foundation excavations around the deeper cut area.

If unexpected ground conditions are encountered the engineer responsible for providing certification of the earthworks and Geotechnical Completion Report should be contacted immediately to provide advice.

8.6 Pavement Design

Vegetation, organic and deleterious material, topsoil and otherwise unsuitable material should be removed from the site under pavement areas prior to aggregate placement. Based on our observations during site investigations we consider the stiff natural ground at the site should provide an adequate subgrade for any proposed asphaltic or concrete paved access, parking and turning areas. We recommend for preliminary design a CBR value of 4%. It is recommended that in-situ testing of all road subgrades is conducted by a suitably qualified and experienced engineer.

8.7 Stormwater Control

Controlling stormwater is imperative to the stability of the site. Concentrated stormwater flows from all impermeable areas must be collected, conveyed in sealed pipes, and discharged in a manner that will not affect the stability of the ground. Concentrated stormwater flows must not be allowed to discharge onto or into the

ground close to the development area or on sloping ground as this would be detrimental to site stability. Stormwater soakage devices are not considered appropriate for this development.

The preliminary civil drawings indicate a reticulated stormwater network with the combined outlet directed towards the south, between Lots 14 and 15. It is recommended that stormwater be piped a minimum distance of 20 m beyond the earthworks boundary area before discharging into an armoured swale (or similar), following the existing overland flow path towards the south. The final outfall method and location should be subject geotechnical review.

Devices to collect, transport and discharge concentrated flows should be designed with flexible joints/connections (particularly in areas outside the building restriction line) to avoid potential for leakage onto the slopes.

8.8 Wastewater Disposal

Based on the soils encountered during our investigation, the soils are considered to be Category 6 (slow draining) in accordance with Technical Publication No. 58 (TP58).

There is a suitable disposal area available across the southern slopes provided the minimum setback requirement from water courses, overland flow paths etc. are met. No wastewater disposal is permitted within any of the historic slip features outlined on drawing G02.

Once the wastewater disposal area has been sized, Haigh Workman should be engaged to provide geotechnical comment on the field location and any impacts on the site stability.

8.9 Retaining Walls

Given the nature of the development, no retaining walls are envisaged. If any retaining walls are introduced at a later design stage the matter should be referred back to Haigh Workman for further recommendations.

8.10 Safety in Design

The recommendations made in this report have been made with regards to Safety in Design, which should be taken into account during the design phase. The following points were raised during planning for safety in design:

- Construction monitoring needs to be considered;
- Trench construction for services should be benched to ensure the vertical height does not exceed 1.0 m without shoring / trench shields;
- Temporary battering of excavations and fills.

8.11 Construction Monitoring

A Chartered Professional Engineer familiar with the findings of this report should be engaged to carry out construction monitoring during subdivision development and earthworks to confirm soil conditions are consistent with those adopted within this report.

The recommendations given in this report are based on limited site data from discrete locations. Variations in ground conditions could exist across the site. It is in the interests of all parties that a Chartered Professional Engineer inspect excavations and foundation conditions exposed during construction, so that ground conditions can be compared with those assumed in formulating this report. In any event, we should be notified of any variations in ground conditions from those described or assumed to exist.

A geotechnical completion report should be prepared at the completion of subdivision works, with as-builts provided by the Contractor of all earthworks and drainage works undertaken.

9 Conclusion

Geotechnical investigations indicate that the proposed development area is stable subject to the recommendations herein and the subsoil properties are appropriate for residential development. The extent of the geotechnical investigations are outlined within this report.

The development will need to be undertaken in accordance with current best engineering practice and the following guidelines are applicable to the site:

- The natural ground within the specified building platform areas is considered generally suitable for residential development of residential buildings, subject to the following conditions:
    - All lots will be subject to site-specific geotechnical investigations and foundation design by a Chartered Professional Engineer.
    - Building Restriction Lines (BRL) have been set out as shown on the attached site plan G03. The proposed development on Lots 1, 2, 17, 18, 19 and 20 should be setback a minimum of 12 m from the edge of the cut platform.
    - The southern slopes also shown signs of shallow surface soil creep and shallow-seated slope instability. To safeguard against soil creep, it is also recommended that buildings on Lot 7 to Lot 15 be setback a minimum distance of 10 m from the 'break in slope' to the south. Building closer to the southern slope is possible if foundations are designed accordingly for soil creep.
    - Foundation soils lie outside the definition of 'good ground' in NZS3604:2011 due to the presence of expansive clay soils. Based upon Atterberg limits and linear shrinkage testing the soils are considered highly expansive (Class H). Confirmation of the site reactivity class is to be conducted within the geotechnical completion report.
    - Foundation design should limit the geotechnical ultimate bearing capacity to 300 kPa, with a geotechnical strength reduction factor of 0.5 for limit state design for flat ground building sites. Specific design will need to be undertaken for sloping ground where present. Specific design for expansive soils may be undertaken by first principles or by reference to AS2870:2011, with return periods from B1/AS1.
- No earthworks involving fills in excess of 0.5 m should take place unless endorsed by a suitable design undertaken by a Chartered Professional Engineer with suitable geotechnical experience familiar with the contents of this report. Detailed site-specific slope stability analyses is required if filling exceeds 0.5 m depth within the proposed development area.
- All earthworks should be carried out to the requirements of NZS 4404:2010 'Land Development and Subdivision Infrastructure' and NZS 4431:2022 'Engineered Fill Construction for Lightweight Structures', and in accordance with the recommendations outlined in Section 8. Any unsuitable material identified during excavation shall be removed and replaced with engineered fill.

- No fill should be placed within, or near any historic slip features identified on drawing G02. A suitable fill disposal site should be nominated well away from the development area to avoid any detrimental effects on site stability.
- No cut batters are anticipated, however if required, long-term cut batters should be formed at gradients no steeper than 1V:5H (i.e. 11 degrees). Fill batters less than 0.5 m in height should be formed at gradients no steeper than 1V:3H.
- The CPT carried out at the top of the knoll (at deepest point of cut) encountered rock at approximately 7.7 m, with hard residual soils from around 2.6 m. Provision should be made for encountering rock (i.e. rock breaking and/or ripping) for service trench excavations and foundation excavations around the deeper cut area.
- For pavement design, we recommend a design CBR of 4% (subject to subgrade testing during construction).
- Concentrated stormwater flows from all impermeable areas must be collected, carried in sealed pipes and discharged in a manner that will not affect the stability of the ground. Design of devices to collect, transport and discharge concentrated flows should be engineered.
- Our assessment is based on interpolation between borehole positions and site observations. Local variations in ground conditions may occur. Unfavourable ground conditions may be encountered during earthworks. It is important that we are contacted in this eventuality or in the event that any variation in subsoil conditions from this described in this report are found. Design assistance is available as required to accommodate any unforeseen ground conditions present.

Provided the recommendations provided in this report are followed, the subject site is capable of being developed as proposed. All works should be carried under the guidance of a Chartered Professional Engineer familiar with the contents of this report. A geotechnical completion report is recommended at the completion of the earthworks to confirm the findings in this report and document the work undertaken, e.g. earthworks compaction certification.

This report is not intended to be used for foundation design, other than provide general framework for building platform suitability. Future specific geotechnical investigations are recommended to confirm the subsoil conditions, confirm the soil expansivity, and provide site specific geotechnical assessment for foundation design within each lot.

10 Lot Specific Geotechnical Recommendations

Table 8: Summary of Lot Specific Geotechnical Recommendations

Lot No.	Comments on nominated building platform	Lot Specific Geotechnical Recommendations
Lot 1	Building Restriction Line required from western slope. Refer section 6.2 and drawings G02 to G03.	Shallow foundations with 300 kPa ultimate bearing capacity, Class H soils. Site specific geotechnical report required at time of building.
Lot 2 – Lot 6	Gentle slopes, entirely within cut. No building restriction lines.	Shallow foundations with 300 kPa ultimate bearing capacity, Class H soils. Site specific geotechnical report required at time of building.
Lot 7 – Lot 9	10 m setback required from southern slope for shallow foundations. Refer section 6.2 and drawings G02 to G03.	Shallow foundations with 300 kPa ultimate bearing capacity, Class H soils. Pile foundations (designed for soil creep) required if less than 10m from southern slope. Site specific geotechnical report required at time of building.
Lot 10	10 m setback required from southern slope for shallow foundations. Building Restriction Line 20 m from historic slip feature to the south-east. Refer section 6.2 and drawings G02 to G03.	Shallow foundations with 300 kPa ultimate bearing capacity, Class H soils. Pile foundations (designed for soil creep) required if less than 10m from southern slope. Site specific geotechnical report required at time of building.
Lot 11 – Lot 15	10 m setback required from southern slope for shallow foundations. Refer section 6.2 and drawings G02 to G03.	Shallow foundations with 300 kPa ultimate bearing capacity, Class H soils. Pile foundations (designed for soil creep) required if less than 10m from southern slope. Site specific geotechnical report required at time of building.
Lot 16	Building Restriction Line 12 m from edge of cut platform / slope. Building Restriction Line 20 m from historic slip feature to the south-west. Refer section 6.2 and drawings G02 to G03.	Shallow foundations with 300 kPa ultimate bearing capacity, Class H soils. Site specific geotechnical report required at time of building.
Lot 17 – Lot 20	Building Restriction Line 12 m from edge of cut platform / slope. Refer section 6.2 and drawings G02 to G03.	Shallow foundations with 300 kPa ultimate bearing capacity, Class H soils. Site specific geotechnical report required at time of building.

11 Limitations

This report has been prepared for the use of Proprietors of Muriwhenua with respect to the particular brief outlined to us. This letter report is to be used by our Client and their Consultants only and may be relied upon when considering geotechnical advice. Furthermore, this report may be utilised in the preparation of resource consent applications with local authorities. The information and opinions contained within this report shall not be used in other context for any other purpose without prior review and agreement by Haigh Workman Ltd.

The recommendations given in this report are based on site data from discrete locations. If any changes are made, we must be allowed to review the new development proposal to ensure that the recommendations of this report remain valid Inferences about the subsoil conditions away from the test locations have been made but cannot be guaranteed. We have inferred an appropriate geotechnical model that can be applied for our analyses. However, variations in ground conditions from those described in this report could exist across the site. Should conditions encountered differ to those outlined in this report we ask that we be given the opportunity to review the continued applicability of our recommendations.

Appendix A – Drawings

Drawing No.	Title
G01	Site Location Plan
G02	Sitewide Features Plan
G03	Site Investigation Plan
G04	Building Restriction Lines (Post-development)
G05	Geological Section A-A' and B-B'
G06	Geological Section C-C' and D-D'

NOTES:

1. LOT BOUNDARIES, AERIAL PHOTO AND LIDAR CONTOURS TAKEN FROM INFORMATION TAKEN FROM LAND INFORMATION NEW ZEALAND (LINZ).

Issue	Date	Revision
A	29/02/2024	FIRST ISSUE

DWG: SITE LOCALITY MAP

Scale 1:7500 @A3 | Date FEB 2024

Drawn JMC | Checked JP | Approved JP

File T:\CLIENTS\PROPRIETORS OF MURIWHENUA\JOBS\23 200 - 9047 F/R NORTH ROAD, TE HAPUA TE KAO (SECTION 11 BL ...\ENGINEERING\AREA 1\DRAWINGS\23 200 - AREA 1_FEB2024.DWG

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Te Hapua Road, Te Hapua

Client: Proprietors of Muriwhenua

Project No. 23 200 | RC no. N/A

DWG No. G01

Sheet No. 1 of 6

Plotted By Josh Curreen at 1/03/2024 1:47:10 pm

NOTES:

1. LOT BOUNDARIES, AERIAL PHOTO AND LIDAR CONTOURS TAKEN FROM INFORMATION TAKEN FROM LAND INFORMATION NEW ZEALAND (LINZ).

KEY:

- HISTORIC SLIP FEATURES
- BREAK IN SLOPE (WHERE SLOPES BECOME GREATER THAN 10°)

INFERRED HISTORIC EARTHWORKS

FILLED PLATFORM

HISTORIC SLIP FEATURE

TOP OF KNNOLL

TE HAPUA ROAD

Existing track

BREAK IN SLOPE (I.E. >10° BEYOND)

BREAK IN SLOPE (I.E. >10° BEYOND)

HISTORIC SLIP FEATURE

HISTORIC SLIP FEATURE

25.00
30.00
35.00
40.00
45.00
50.00
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00

Issue	Date	Revision
A	29/02/2024	FIRST ISSUE
B	22/04/2026	REVISED FOR RC

DWG: SITEWIDE FEATURES PLAN AREA 1

Scale 1:1500 @A3 | Date FEB 2024

Drawn JMC | Checked JP | Approved JP

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Project No. 23 200 | RC no. N/A

DWG No. G02

Sheet No. 2 of 6

Plotted By Josh Curreen at 22/04/2026 10:36:03 am

NOTES:

1. LOT BOUNDARIES, AERIAL PHOTO AND LIDAR CONTOURS TAKEN FROM INFORMATION TAKEN FROM LAND INFORMATION NEW ZEALAND (LINZ).

KEY:

- HISTORIC SLIP FEATURES
- INFERRED HISTORIC EARTHWORKS
- BREAK IN SLOPE (WHERE SLOPES BECOME GREATER THAN 10°)
- BUILDING RESTRICITON LINES (POST-EARTHWORKS)
- 10m SETBACK FROM SOUTHERN SLOPE (FOR SHALLOW FOUNDATIONS)

INFERRED HISTORIC EARTHWORKS
FILLED PLATFORM
HISTORIC SLIP FEATURE
BUILDING RESTRICTION LINE
PROPOSED EARTHWORKS BOUNDARY
BREAK IN SLOPE (I.E. >10° BEYOND)
SUITABLE WASTEWATER DISPOSAL FIELD AREA (SUBJECT TO SETBACKS FROM OLFPs). INDICATIVE ONLY
EXISTING OLFP
10m SETBACK FOR SHALLOW FOUNDATIONS
PROPOSED EARTHWORKS BOUNDARY
BREAK IN SLOPE (I.E. >10° BEYOND)
HISTORIC SLIP FEATURE
HISTORIC SLIP FEATURE
TE HAPUA ROAD
Existing track
12m MIN.
20m MIN.
10m
10m
20m MIN.
35.00
40.00
45.00
50.00
45.00
40.00
35.00
30.00
BH01
BH02
BH03
BH04
BH05
BH06
BH07
BH08
CPT01
CPT02
CPT03
CPT04
CPT05
CPT06
A G05
B G05
C G06
D G06

Issue	Date	Revision
A	29/02/2024	FIRST ISSUE
B	22/04/2026	REVISED FOR RC

DWG: SITE INVESTIGATION PLAN AREA 1

Scale 1:1500 @A3 | Date FEB 2024
Drawn JMC | Checked JP | Approved JP
File T:\CLIENTS\PROPRIETORS OF MURIWHENUA\JOBS\23 200 - 9047 F/R NORTH ROAD, TE HAPUA TE KAO (SECTION 11 BL ___\ENGINEERING\AREA 1\DRAWINGS\23 200 - AREA 1_FEB2024.DWG

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Client: Proprietors of Muriwhenua
Project No. 23 200 | RC no. N/A

DWG No. G03
Sheet No. 3 of 6

Plotted By Josh Curreen at 22/04/2026 10:37:02 am

NOTES:

1. DRAWING BASED ON EARTHWORKS PLAN PROVIDED BY MAVEN ASSOCIATES.
2. FEATURES HAVE NOT BEEN SURVEYED AND OR APPROXIMATE ONLY.
3. BUILDING RESTRICTION LINES ARE PRELIMINARY ONLY (TO INFORM CONCEPTUAL DESIGN) AND ARE SUBJECT TO SITE SPECIFIC INVESTIGATIONS AND SLOPE STABILITY ANALYSES.

KEY:

- HISTORIC SLIP FEATURES
- INFERRED HISTORIC EARTHWORKS
- BREAK IN SLOPE (WHERE SLOPES BECOME GREATER THAN 10°)
- BUILDING RESTRICITON LINES (POST-EARTHWORKS)
- 10m SETBACK FROM SOUTHERN SLOPE (FOR SHALLOW FOUNDATIONS)

INFERRED HISTORIC EARTHWORKS

HISTORIC SLIP FEATURE

12m MIN

BUILDING RESTRICTION LINE

BREAK IN SLOPE (I.E. >10° BEYOND)

10m

20m MIN.

HISTORIC SLIP FEATURE

TE HAPUA ROAD

CH 0

CH 20

CH 40

CH 60

CH 80

CH 100

LOT# 1 621m²

LOT# 2 466m²

LOT# 20 648m²

LOT# 19 628m²

LOT# 18 547m²

LOT# 17 581m²

LOT# 101 687m²

LOT# 3 453m²

LOT# 4 456m²

LOT# 13 384m²

LOT# 5 449m²

LOT# 12 432m²

LOT# 100 249m²

LOT# 6 479m²

LOT# 103 72m²

LOT# 102 86m²

LOT# 14 552m²

LOT# 11 870m²

LOT# 16 530m²

LOT# 15 353m²

LOT# 7 557m²

LOT# 8 523m²

LOT# 9 597m²

LOT# 10 571m²

4.00m

3.60m

POTENTIAL ACCESS TO EXISTING TRACK

10m SETBACK FOR SHALLOW FOUNDATIONS

10m

FURTURE STORMWATER OUTFALL TO BE LOOKED AT WITH GEOTECH. POTENTIAL OPTIONS INCLUDE AN ARMORED SWALE TO WATERCOURSE OR FLUMED SW LINE TO NEAREST WATERCOURSE

PROPOSED EXTENT OF EARTHWORKS

STORMWATER TO BE PIPED MIN. 20m DOWNSLOPE OF EARTHWORKS AREA, INTO ROCK ARMOURED SWALE

BREAK IN SLOPE (I.E. >10° BEYOND)

20m MIN.

HISTORIC SLIP FEATURE

Issue	Date	Revision
A	29/02/2024	FIRST ISSUE

DWG: BUILDING RESTRICTION LINES - AREA 1 (POST-DEVELOPMENT)

Scale 1:750 @A3 | Date FEB 2024

Drawn JMC | Checked JP | Approved JP

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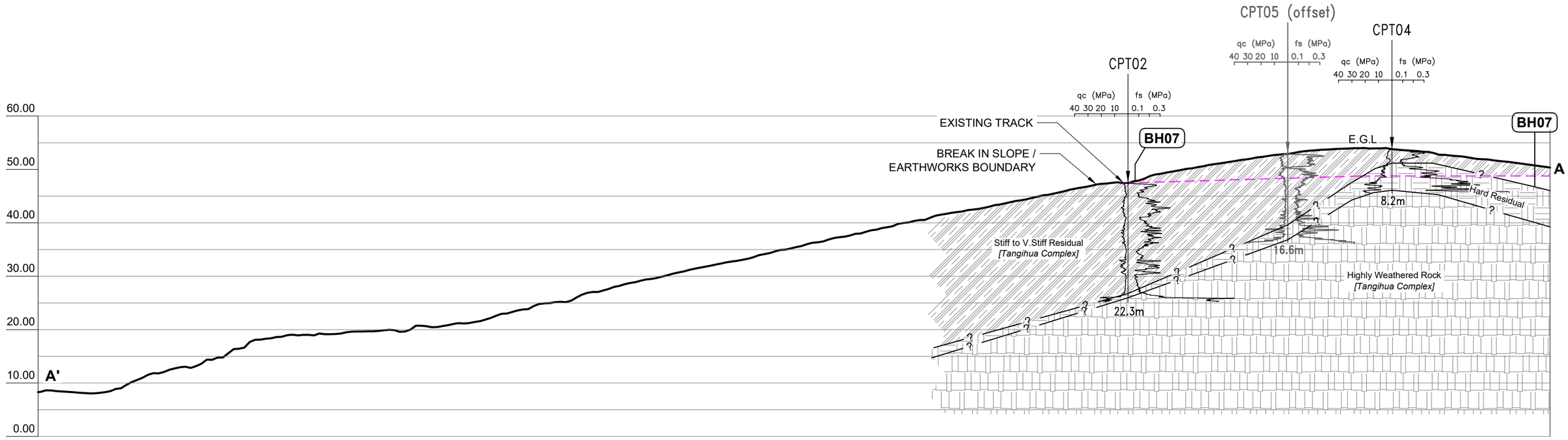
Client: Proprietors of Muriwhenua

Project No. 23 200 | RC no. N/A

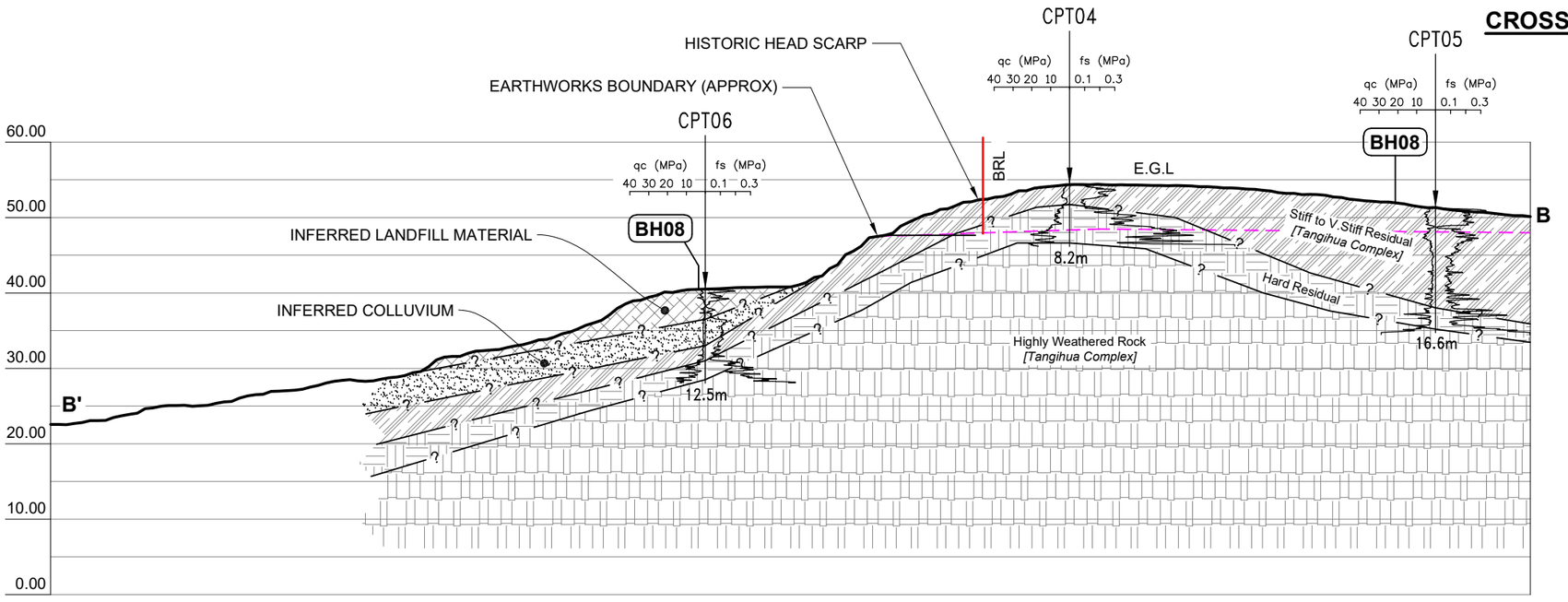
DWG No. G04

Sheet No. 4 of 6

Plotted By Josh Curreen at 1/03/2024 1:49:01 pm



CROSS SECTION A-A



CROSS SECTION B-B

KEY:

- **LANDFILL MATERIAL**
- **FIRM** SOILS *[INFERRED COLLUVIUM]*
- **STIFF TO VERY STIFF** SOILS *[TANGIHUA COMPLEX - NORTHLAND ALLOCHTHON]*
- **HARD** SOILS *[TANGIHUA COMPLEX - NORTHLAND ALLOCHTHON]*
- **WEATHERED ROCK** *[TANGIHUA COMPLEX - NORTHLAND ALLOCHTHON]*

NOTES:

1. THE GROUND PROFILES ARE BASED ON LINZ DATA SERVICE LIDAR INFORMATION AND IS APPROXIMATE ONLY.
2. THE GROUND MODEL HAS BEEN INFERRED FROM THE BOREHOLE DATA. INFERENCES ABOUT THE SOILS CONDITIONS BETWEEN TEST LOCATIONS HAVE BEEN MADE BUT CANNOT BE GUARANTEED.
3. DRAWING NOT TO BE USED FOR CONSTRUCTION PURPOSES.

Issue	Date	Revision
A	29/02/2024	FIRST ISSUE

DWG: CROSS SECTIONS A-A & B-B

Scale 1:1500 @A3 | Date FEB 2024

Drawn JMC | Checked JP | Approved JP

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Project: Geotechnical Appraisal
Te Hapua Road, Te Hapua

Client: Proprietors of Muriwhenua

Project No. 23 200 | RC no. N/A

DWG No. **G05**

Sheet No. **5** of **6**

Plotted By Josh Curreen at 1/03/2024 1:52:09 pm

NOTES:

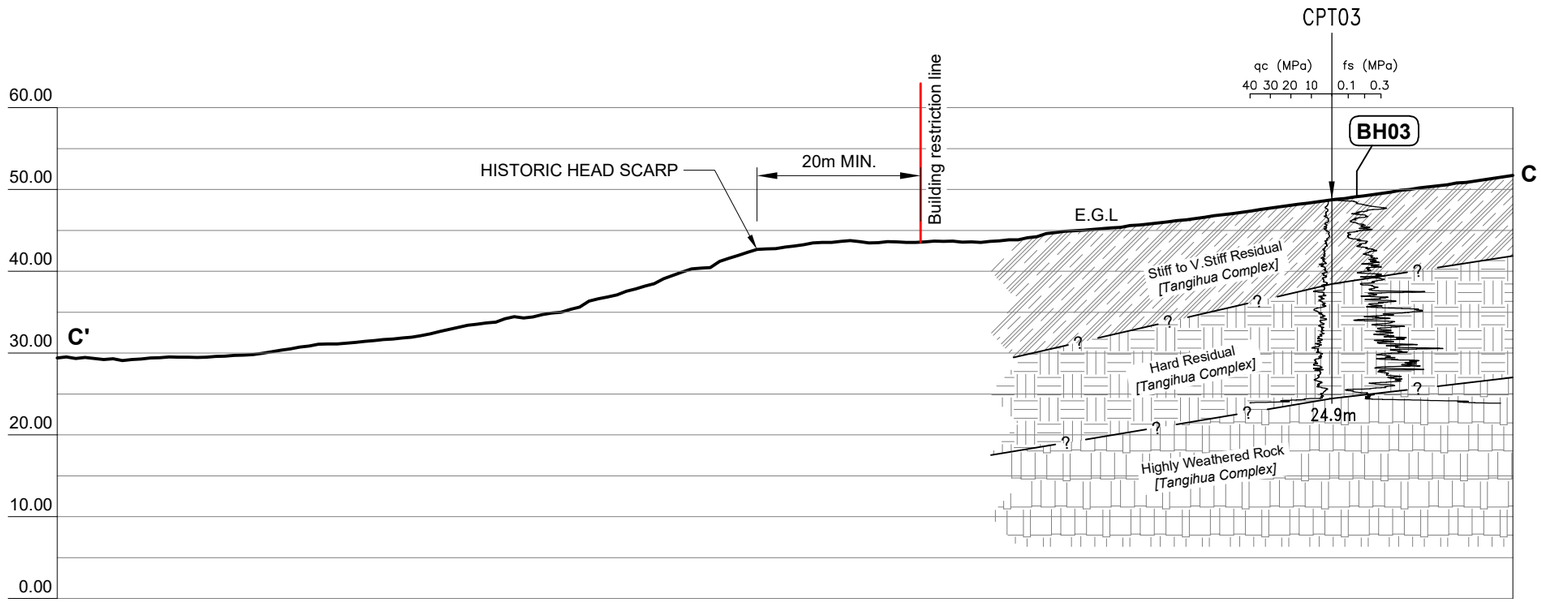
1. THE GROUND PROFILES ARE BASED ON LINZ DATA SERVICE LIDAR INFORMATION AND IS APPROXIMATE ONLY.
2. THE GROUND MODEL HAS BEEN INFERRED FROM THE BOREHOLE DATA. INFERENCES ABOUT THE SOILS CONDITIONS BETWEEN TEST LOCATIONS HAVE BEEN MADE BUT CANNOT BE GUARANTEED.
3. DRAWING NOT TO BE USED FOR CONSTRUCTION PURPOSES.

KEY:

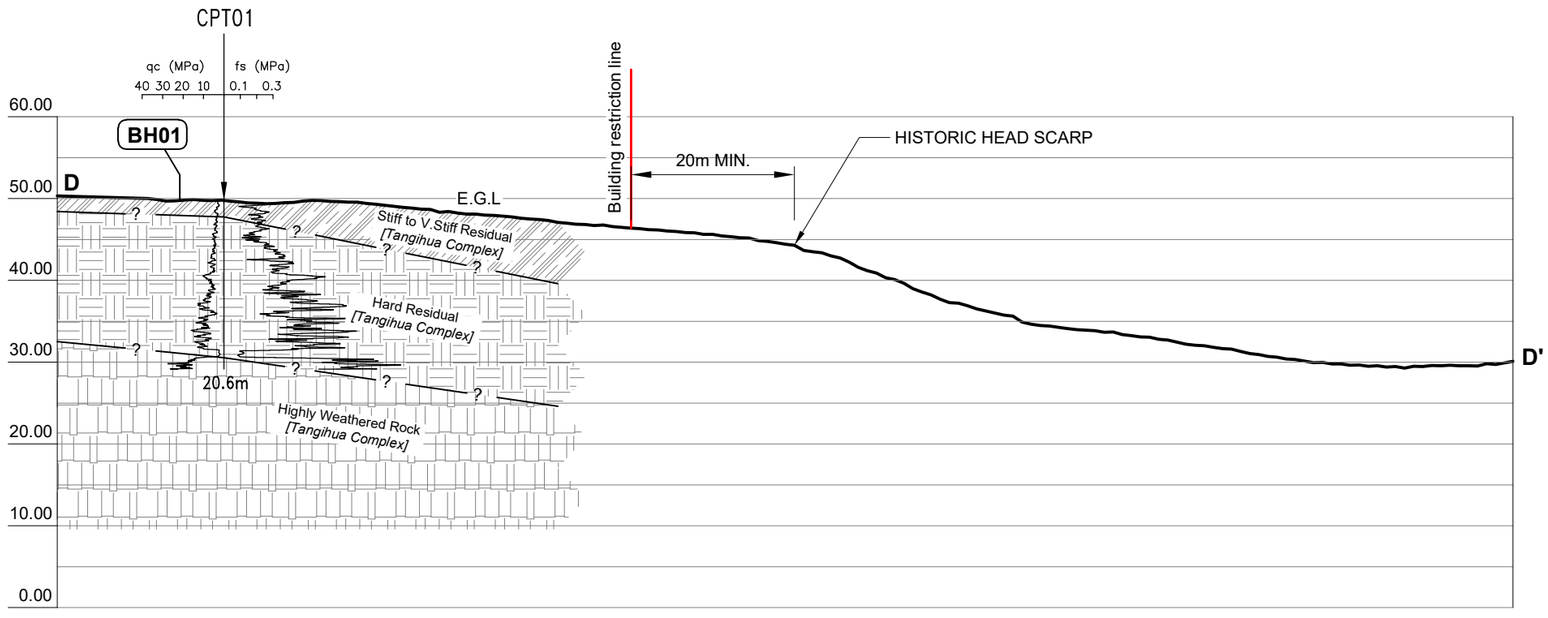
STIFF TO VERY STIFF SOILS
[TANGIHUA COMPLEX - NORTHLAND ALLOCHTHON]

HARD SOILS
[TANGIHUA COMPLEX - NORTHLAND ALLOCHTHON]

WEATHERED ROCK
[TANGIHUA COMPLEX - NORTHLAND ALLOCHTHON]



CROSS SECTION C-C



CROSS SECTION D-D

Issue	Date	Revision
A	29/02/2024	FIRST ISSUE

DWG: CROSS SECTIONS C-C, D-D

Scale 1:1500 @A3 | Date FEB 2024

Drawn JMC | Checked JP | Approved JP

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Client: Proprietors of Muriwhenua

Project No. 23 200 | RC no. N/A

DWG No. **G06**

Sheet No. **6** of **6**

Plotted By Josh Curreen at 1/03/2024 1:52:26 pm

Appendix B – Hand Auger Logs

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Borehole Log - BH01

Hole Location: Refer to Site Plan

JOB No. 23 200

CLIENT:	Proprietors of Muriwhenua	**SITE:**	9047 Far North Road, Te Hapua (Section 11 Blk I Muriwhenua SD)		
Date Started:	13/02/2024	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	JMC
Date Completed:	13/02/2024	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

TOPSOIL / FOILAGE

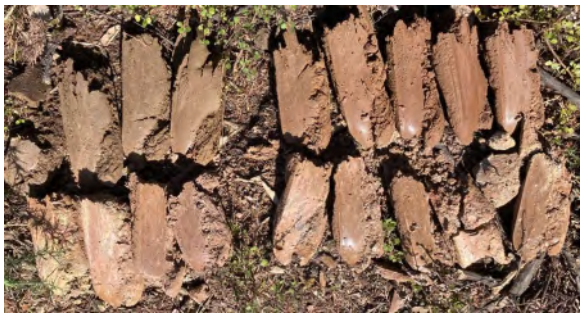
0.05m: Silty **CLAY**; light brownish grey. Hard, dry, high plasticity.
[TANGIHUA COMPLEX]

From 0.5m: Becomes brown.

SILT, trace clay; brown, mottled light grey and light orangish brown. Hard, dry, low plasticity.

From 1.5m: Becomes very stiff.

End of hole at 2.0m (Target Depth)



Depth (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

Geology: TS; TANGIHUA COMPLEX - NORTHLAND ALLOCHTHON

Graphic Log

Water Level: Groundwater Not Encountered

Sensitivity: 8; 6

Vane Shear and Remoulded Vane Shear Strengths (kPa): 250; UTP; 178; 21; 200; 32

Scala Penetrometer (blows/100mm): 0 5 10 15 20

LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. TS = Topsoil.
Hand Held Shear Vane S/N: DR1698
Scala penetrometer testing not undertaken. Groundwater not encountered.

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Borehole Log - BH02

Hole Location: Refer to Site Plan

JOB No. 23 200

CLIENT:	Proprietors of Muriwhenua	**SITE:**	9047 Far North Road, Te Hapua (Section 11 Blk I Muriwhenua SD)		
Date Started:	13/02/2024	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	CN
Date Completed:	13/02/2024	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

Clayey **SILT**; brown. Very stiff, dry, low to medium plasticity. *[TOPSOIL]*

Silty **CLAY**; brown to greyish brown, mottled brownish orange. Very stiff, dry to moist, high plasticity. *[TANGIHUA COMPLEX]*

Clayey **SILT**; brown. Very stiff, moist, medium plasticity.

SILT, some clay; brown. Very stiff, moist, low plasticity.

From 0.9m: Becomes mottled burplish brown and greyish brown, flecked white.

From 1.25m: Trace clay; brownish yellow, mottled white, brownish orange and light purple.

From 1.4m: Becomes purple and white. No to low plasticity.

From 1.5m: Becomes mottled brown and black.

From 1.7m: Becomes purplish brown to dark greyish brown.

From 2.6m: Becomes mottled white.

SILT, some clay; light yellowish brown to orangish brown, mottled white. Very stiff, moist, low plasticity.

From 3.0m: Becomes purplish brown and white.

From 3.1m: Becomes orangish brown.

End of hole at 3.2m (Target Depth)

Depth (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

Geology: TS; TANGIHUA COMPLEX - NORTHLAND ALLOCHTHON

Graphic Log

Water Level: Groundwater Not Encountered

Sensitivity	Vane Shear and Remoulded Vane Shear Strengths (kPa)	Scala Penetrometer (blows/100mm)
	215	
9	184 / 21	
9	80 / 9	
8	138 / 18	
	215	
4	149 / 37	
4	138 / 37	
3	150 / 52	
3	187 / 58	

Scala Penetrometer: 0 5 10 15 20

LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. TS = Topsoil.
Hand Held Shear Vane S/N: DR1617
Scala penetrometer testing not undertaken. Groundwater not encountered.

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Borehole Log - BH03

Hole Location: Refer to Site Plan

JOB No. 23 200

CLIENT:	Proprietors of Muriwhenua	**SITE:**	9047 Far North Road, Te Hapua (Section 11 Blk I Muriwhenua SD)		
Date Started:	13/02/2024	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	JMC
Date Completed:	13/02/2024	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

Silty **CLAY**; brownish grey. Hard, dry, high plasticity. *[TANGIHUA COMPLEX]*

From 0.7m: Becomes reddish orange brown.

Clayey **SILT**; brown, mottled whitish grey. Very stiff, moist, low plasticity.

End of hole at 2.0m (Target Depth)

Depth (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

Geology: TANGIHUA COMPLEX - NORTHLAND ALLOCHTHON

Graphic Log

Water Level: Groundwater Not Encountered

Sensitivity: 6, 6

Vane Shear and Remoulded Vane Shear Strengths (kPa): 250, 250, 178, 32, 175, 29

Scala Penetrometer (blows/100mm): 0 5 10 15 20

LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. TS = Topsoil.
Hand Held Shear Vane S/N: DR1698
Scala penetrometer testing not undertaken. Groundwater not encountered.

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Borehole Log - BH04

Hole Location: Refer to Site Plan

JOB No. 23 200

CLIENT:	Proprietors of Muriwhenua	**SITE:**	9047 Far North Road, Te Hapua (Section 11 Blk I Muriwhenua SD)		
Date Started:	13/02/2024	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	CN
Date Completed:	13/02/2024	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

Clayey **SILT**; greyish brown. Very stiff, dry, low plasticity. *[TOPSOIL]*

Silty **CLAY**; greyish brown to greenish brown. Very stiff to hard, dry, high plasticity. Trace tree rootlets. *[TANGIHUA COMPLEX]*

From 0.4m: Becomes dry to moist.

From 0.5m: No tree rootlets.

From 0.8m: Becomes brown.

Clayey **SILT**; brown. Hard, dry to moist, low to medium plasticity.

SILT, some clay; brown. Very stiff to hard, dry to moist, low plasticity.

From 1.5m: Becomes moist.

SILT; light yellow, mottled light orangish yellow and light pink. Hard, dry to moist, no plasticity.

SILT; brown to purplish brown, flecked / mottled white. Very stiff to hard, dry to moist, no plasticity.

At 2.7m: Mottled orangish yellow.

End of hole at 3.0m (Target Depth)

Laboratory sample taken from 0.4m to 0.9m.

Depth (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

Geology: TS; TANGIHUA COMPLEX - NORTHLAND ALLOCHTHON

Graphic Log

Water Level: Groundwater Not Encountered

Sensitivity

Vane Shear and Remoulded Vane Shear Strengths (kPa): UTP; UTP; 215; UTP; 215; 215

Scala Penetrometer (blows/100mm): 0 5 10 15 20

LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. TS = Topsoil.
Hand Held Shear Vane S/N: DR1617
Scala penetrometer testing not undertaken. Groundwater not encountered.

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Borehole Log - BH05

Hole Location: Refer to Site Plan

JOB No. 23 200

CLIENT:	Proprietors of Muriwhenua	**SITE:**	9047 Far North Road, Te Hapua (Section 11 Blk I Muriwhenua SD)		
Date Started:	13/02/2024	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	CN
Date Completed:	13/02/2024	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description (Based on NZGS Logging Guidelines 2005)	Depth (m)	Geology	Graphic Log	Water Level	Sensitivity	Vane Shear and Remoulded Vane Shear Strengths (kPa)	Scala Penetrometer (blows/100mm)
Clayey **SILT**; dark greyish brown. Very stiff, dry, low plasticity. *[TOPSOIL]*	0.0	TS		Groundwater Not Encountered			0 5 10 15 20
Silty **CLAY**; greyish brown to greenish brown. Very stiff to hard, dry to moist, high plasticity. *[TANGIHUA COMPLEX]*		TANGIHUA COMPLEX - NORTHLAND ALLOCHTHON					
From 0.5m: Becomes yellowish brown to orangish brown. From 0.6m: Becomes brown to orangish brown. From 0.7m: Becomes brown.	0.5					215	
Clayey **SILT**; brown. Very stiff to hard, moist, medium plasticity. From 1.05m: Becomes mottled light yellow. Low to medium plasticity.	1.0					UTP	
SILT, minor clay; brown. Very stiff, moist, low plasticity. From 1.5m: Trace clay. No to low plasticity. At 1.6m: Mottled light yellowish white.	1.5				8	156 / 20	
From 2.0m: No plasticity. *From 2.05m to 2.2m: Void - shear vane and hand auger pushed through a void with no soil recovery.* At 2.3m: Mottled light yellow. Stiff to very stiff.	2.0				1 0	VOID 2.05m TO 2.2m; 104 / 11	
From 2.5m: Becomes brown to purplish brown. Very stiff.	2.5				1 0	181 / 18	
At 3.0m: Mottled light pink and light yellow.	3.0				1 1	199 / 18	
From 3.5m: Becomes mottled light pink and light yellow. From 3.7m: Becomes brown to purplish brown, mottled light pinkish grey. From 3.9m: Becomes mottled grey.	3.5				7	166 / 23	
End of hole at 4.0m (Target Depth)	4.0				4	129 / 31	
	4.5						

LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. TS = Topsoil.
Hand Held Shear Vane S/N: DR1617
Scala penetrometer testing not undertaken. Groundwater not encountered.

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Borehole Log - BH06

Hole Location: Refer to Site Plan

JOB No. 23 200

CLIENT:	Proprietors of Muriwhenua	**SITE:**	9047 Far North Road, Te Hapua (Section 11 Blk I Muriwhenua SD)		
Date Started:	13/02/2024	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	CN
Date Completed:	13/02/2024	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

Clayey **SILT**; dark greyish brown. Very stiff, dry, low plasticity. *[TOPSOIL]*

Silty **CLAY**; greyish brown to greenish brown. Very stiff to hard, moist, high plasticity. *[TANGIHUA COMPLEX]*

From 0.35m: Becomes brown to orangish brown.

From 0.6m: Becomes brown.

Clayey **SILT**; brown. Very stiff, moist, medium plasticity.

From 1.3m: Becomes flecked white.

SILT, some clay; reddish brown, mottled light yellowish grey and brown. Very stiff, moist, low plasticity.

From 1.7m: Becomes brown to purplish brown and white.

At 2.1m: Mottled yellowish orange and pinkish brown.

At 2.55m: Grey. No to low plasticity.

From 2.6m: Becomes purplish brown, mottled grey.

End of hole at 3.2m (Target Depth)

Depth (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

Geology: TS; TANGIHUA COMPLEX - NORTHLAND ALLOCHTHON

Graphic Log

Water Level: Groundwater Not Encountered

Sensitivity: 6, 1, 2, 9, 7, 4

Vane Shear and Remoulded Vane Shear Strengths (kPa):

Depth (m)	Vane Shear	Remoulded Vane Shear
0.5	215	
1.0	215	37
1.5	109	9
2.0	138	15
2.5	133	18
3.0	155	37

Scala Penetrometer (blows/100mm): 0, 5, 10, 15, 20

LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. TS = Topsoil.
Hand Held Shear Vane S/N: DR1617
Scala penetrometer testing not undertaken. Groundwater not encountered.

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Borehole Log - BH07

Hole Location: Refer to Site Plan

JOB No. 23 200

CLIENT:	Proprietors of Muriwhenua	**SITE:**	9047 Far North Road, Te Hapua (Section 11 Blk I Muriwhenua SD)		
Date Started:	13/02/2024	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	JMC
Date Completed:	13/02/2024	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

Silty **CLAY**; brown. Hard, dry, high plasticity. *[TANGIHUA COMPLEX]*

From 0.4m: Becomes reddish orange brown.

From 0.7m: Becomes orangish brown, mottled light grey and brown.

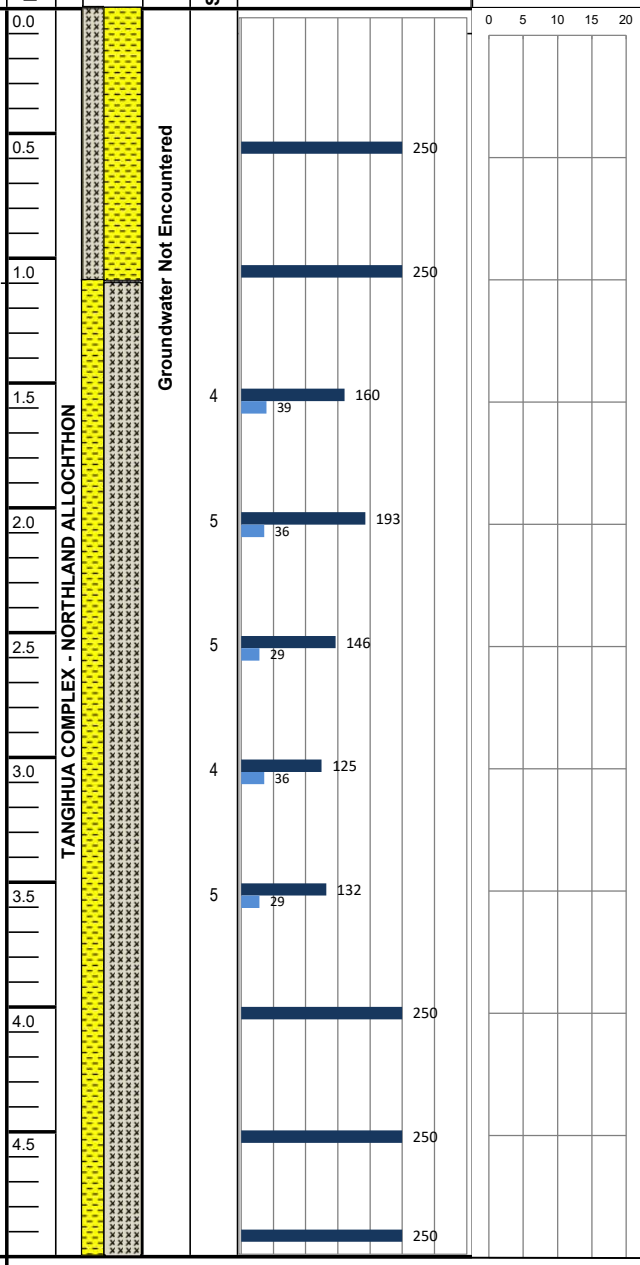
Clayey **SILT**; orangish brown, mottled reddish brown, light grey and pink. Very stiff, moist, low plasticity.

From 1.5m: Becomes brown, mottled pinkish brown, light grey and orangish brown. Occasional fine to medium sand sized clasts (white).

From 3.0m: Becomes pinkish brown and reddish brown, mottled light grey.

From 3.5m: Becomes brown, mottled orangish brown, light grey and light orangish brown.

End of hole at 5.0m (Target Depth)



LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. TS = Topsoil.
Hand Held Shear Vane S/N: DR1698
Scala penetrometer testing not undertaken. Groundwater not encountered.

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Borehole Log - BH08

Hole Location: Refer to Site Plan

JOB No. 23 200

CLIENT:	Proprietors of Muriwhenua	**SITE:**	9047 Far North Road, Te Hapua (Section 11 Blk I Muriwhenua SD)		
Date Started:	13/02/2024	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	JMC
Date Completed:	13/02/2024	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

Silty **CLAY**, trace fine gravel; brown, mottled white. Dry, hard, high plasticity. *[FILL]*

Clayey **SILT**, some intermixed blocks of clay, trace gravel; brown and orangish brown.

At 0.7m: Some fine gravel.

At 1.0m: Some plastic rubbish and string.

End of hole at 1.3m (Unable to Penetrate - Obstruction)

other nearby locations attempted: refusal in fill material

Depth (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

Geology: FILL

Graphic Log

Water Level: Groundwater Not Encountered

Sensitivity

Vane Shear and Remoulded Vane Shear Strengths (kPa): 250; UTP - obstruction

Scala Penetrometer (blows/100mm): 0 5 10 15 20

LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. TS = Topsoil.
Hand Held Shear Vane S/N: DR1698
Scala penetrometer testing not undertaken. Groundwater not encountered.

Appendix C – Cone Penetration Test Records

UNDERGROUND INVESTIGATION

CPT Test Information

Test Hole Number	CPT01	Job Identifier	HW Te Hapua
Test Date	13/02/2024	Operator	Craig Greenfield
Cone Serial Number	5681	Battery Voltage Start	5.9
Cone Area Ratio	0.865	Start Recording	9:53:00 AM
Probe Radius	0.0179	Finish Recording	10:29:00 AM
Date of First Push Current Calibration	14/09/2023	Measured Ground Water Depth	collapsed at 18.1m dry
Metres To Next Calibration	1124	Total Penetration Depth (m)	20.62
Depth of Predrill	0	Test ended due to:	☐ High Tilt ☐ High Tip Pressure ☐ High Friction ☐ High Pore Pressure ☐ High Total load ☐ Danger of Rods Buckling ☐ Target Depth ☑ Anchor Failure
Depth at Start of Test	0		
Anchor Depth (Left)	1.5		
Anchor Depth (Right)	1.5		

Zero Value Change % FSO

	Point Resistance	Pore Pressure	Sleeve Friction
Zero Shift Since First Push Current Calibration	0.06%	0.06%	0.12%
End of test with tip loosened	0.03%	0.01%	0.66%

Dissipation Testing

Test No	Depth (m)	Duration (secs)	Comments

Notes and Comments

Data loss (typically at rod change points). Either deleted or averaged	qc	fs	u

UNDERGROUND INVESTIGATION

CPT Test Information

Test Hole Number	CPT02	Job Identifier	HW Te Hapua
Test Date	13/02/2024	Operator	Craig Greenfield
Cone Serial Number	5708	Battery Voltage Start	5.8
Cone Area Ratio	0.862	Start Recording	11:00:00 AM
Probe Radius	0.0179	Finish Recording	11:38:00 AM
Date of First Push Current Calibration	9/11/2023	Measured Ground Water Depth	collapsed at 0.9m dry
Metres To Next Calibration	1266	Total Penetration Depth (m)	22.287
Depth of Predrill	0	Test ended due to:	☐ High Tilt ☐ High Tip Pressure ☐ High Friction ☐ High Pore Pressure ☐ High Total load ☐ Danger of Rods Buckling ☐ Target Depth ☑ Anchor Failure
Depth at Start of Test	0		
Anchor Depth (Left)	1.5		
Anchor Depth (Right)	1.5		

Zero Value Change % FSO

	Point Resistance	Pore Pressure	Sleeve Friction
Zero Shift Since First Push Current Calibration	0.05%	0.03%	0.02%
End of test with tip loosened	0.06%	0.02%	0.82%

Dissipation Testing

Test No	Depth (m)	Duration (secs)	Comments

Notes and Comments

Data loss (typically at rod change points). Either deleted or averaged	qc	fs	u

UNDERGROUND INVESTIGATION

CPT Test Information

Test Hole Number	CPT03	Job Identifier	HW Te Hapua
Test Date	13/02/2024	Operator	Craig Greenfield
Cone Serial Number	5801	Battery Voltage Start	5.76
Cone Area Ratio	0.843	Start Recording	12:14:00 PM
Probe Radius	0.018	Finish Recording	12:53:00 PM
Date of First Push Current Calibration	9/01/2024	Measured Ground Water Depth	collapsed at 23m dry
Metres To Next Calibration	1421	Total Penetration Depth (m)	24.885
Depth of Predrill	0	Test ended due to:	☐ High Tilt ☑ High Tip Pressure ☑ High Friction ☐ High Pore Pressure ☐ High Total load ☐ Danger of Rods Buckling ☐ Target Depth ☑ Anchor Failure
Depth at Start of Test	0		
Anchor Depth (Left)	1.5		
Anchor Depth (Right)	1.5		

Zero Value Change % FSO

	Point Resistance	Pore Pressure	Sleeve Friction
Zero Shift Since First Push Current Calibration	0.05%	0.01%	0.86%
End of test with tip loosened	0.04%	0.02%	0.46%

Dissipation Testing

Test No	Depth (m)	Duration (secs)	Comments

Notes and Comments

Data loss (typically at rod change points). Either deleted or averaged	qc	fs	u

UNDERGROUND INVESTIGATION

CPT Test Information

Test Hole Number	CPT04	Job Identifier	HW Te Hapua
Test Date	13/02/2024	Operator	Craig Greenfield
Cone Serial Number	5681	Battery Voltage Start	5.76
Cone Area Ratio	0.865	Start Recording	2:10:00 PM
Probe Radius	0.0179	Finish Recording	2:27:00 PM
Date of First Push Current Calibration	14/09/2023	Measured Ground Water Depth	dry to 8.1m
Metres To Next Calibration	1104	Total Penetration Depth (m)	8.185
Depth of Predrill	0	Test ended due to:	☐ High Tilt ☐ High Tip Pressure ☐ High Friction ☐ High Pore Pressure ☐ High Total load ☐ Danger of Rods Buckling ☐ Target Depth ☑ Anchor Failure
Depth at Start of Test	0		
Anchor Depth (Left)	1.5		
Anchor Depth (Right)	1.5		

Zero Value Change % FSO

	Point Resistance	Pore Pressure	Sleeve Friction
Zero Shift Since First Push Current Calibration	0.10%	0.06%	0.34%
End of test with tip loosened	0.05%	0.01%	0.68%

Dissipation Testing

Test No	Depth (m)	Duration (secs)	Comments

Notes and Comments

Data loss (typically at rod change points). Either deleted or averaged	qc	fs	u

UNDERGROUND INVESTIGATION

CPT Test Information

Test Hole Number	CPT05	Job Identifier	HW Te Hapua
Test Date	13/02/2024	Operator	Craig Greenfield
Cone Serial Number	5708	Battery Voltage Start	5.76
Cone Area Ratio	0.862	Start Recording	3:23:00 PM
Probe Radius	0.0179	Finish Recording	3:51:00 PM
Date of First Push Current Calibration	9/11/2023	Measured Ground Water Depth	collapsed at 7.6m dry
Metres To Next Calibration	1244	Total Penetration Depth (m)	16.577
Depth of Predrill	0	Test ended due to:	☐ High Tilt ☑ High Tip Pressure ☐ High Friction ☐ High Pore Pressure ☐ High Total load ☐ Danger of Rods Buckling ☐ Target Depth ☑ Anchor Failure
Depth at Start of Test	0		
Anchor Depth (Left)	1.5		
Anchor Depth (Right)	1.5		

Zero Value Change % FSO

	Point Resistance	Pore Pressure	Sleeve Friction
Zero Shift Since First Push Current Calibration	0.08%	0.04%	0.02%
End of test with tip loosened	0.09%	0.00%	0.82%

Dissipation Testing

Test No	Depth (m)	Duration (secs)	Comments

Notes and Comments

Data loss (typically at rod change points). Either deleted or averaged	qc	fs	u

UNDERGROUND INVESTIGATION

CPT Test Information

Test Hole Number	CPT06	Job Identifier	HW Te Hapua
Test Date	13/02/2024	Operator	Craig Greenfield
Cone Serial Number	5801	Battery Voltage Start	6.43
Cone Area Ratio	0.843	Start Recording	4:20:00 PM
Probe Radius	0.018	Finish Recording	4:44:00 PM
Date of First Push Current Calibration	9/01/2024	Measured Ground Water Depth	collapsed at 1.1m dry
Metres To Next Calibration	1397	Total Penetration Depth (m)	12.535
Depth of Predrill	0	Test ended due to:	☐ High Tilt ☐ High Tip Pressure ☐ High Friction ☐ High Pore Pressure ☐ High Total load ☐ Danger of Rods Buckling ☐ Target Depth ☑ Anchor Failure
Depth at Start of Test	0		
Anchor Depth (Left)	1.5		
Anchor Depth (Right)	1.5		

Zero Value Change % FSO

	Point Resistance	Pore Pressure	Sleeve Friction
Zero Shift Since First Push Current Calibration	0.05%	0.02%	0.58%
End of test with tip loosened	0.04%	0.00%	0.26%

Dissipation Testing

Test No	Depth (m)	Duration (secs)	Comments

Notes and Comments

Data loss (typically at rod change points). Either deleted or averaged	qc	fs	u 0.54

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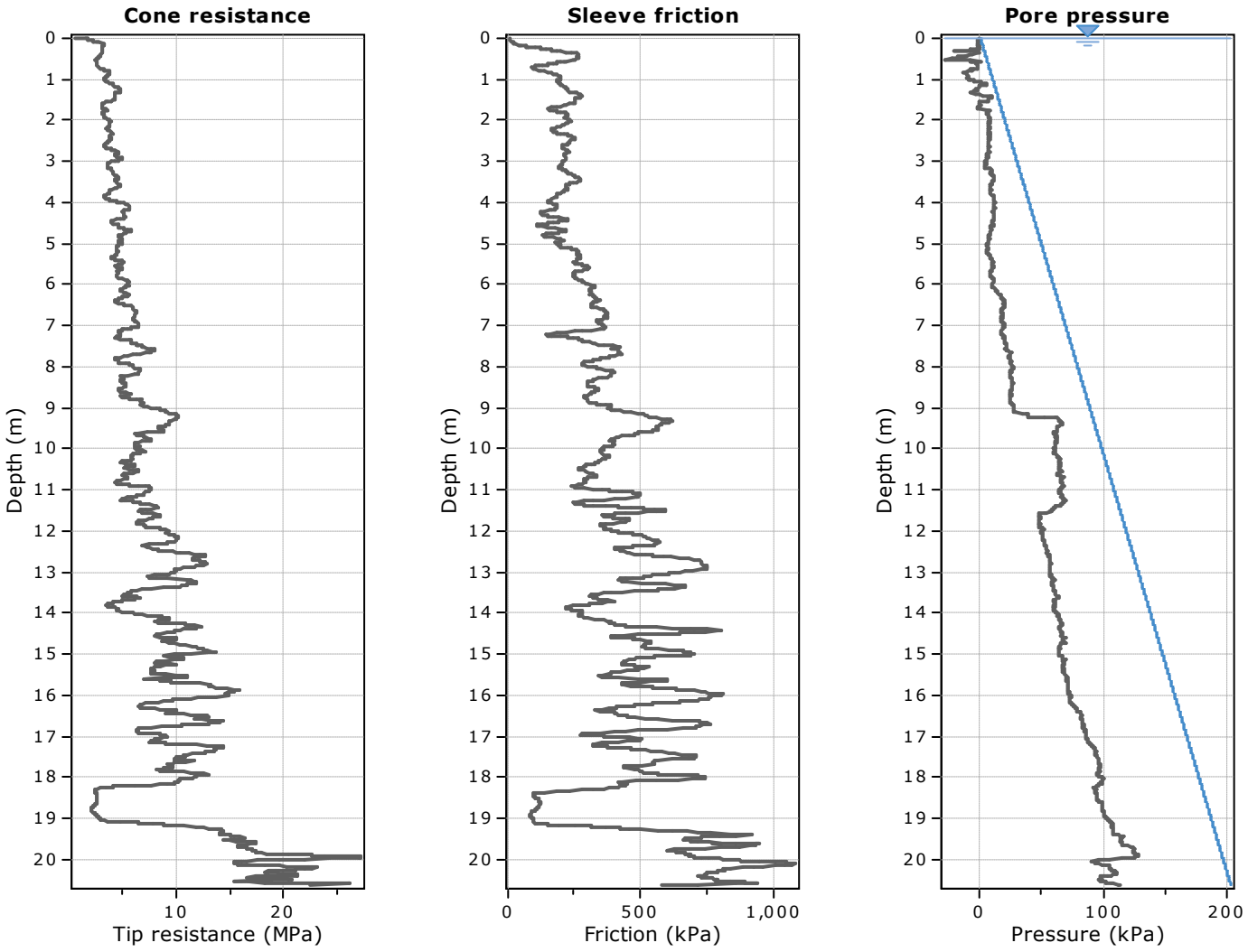
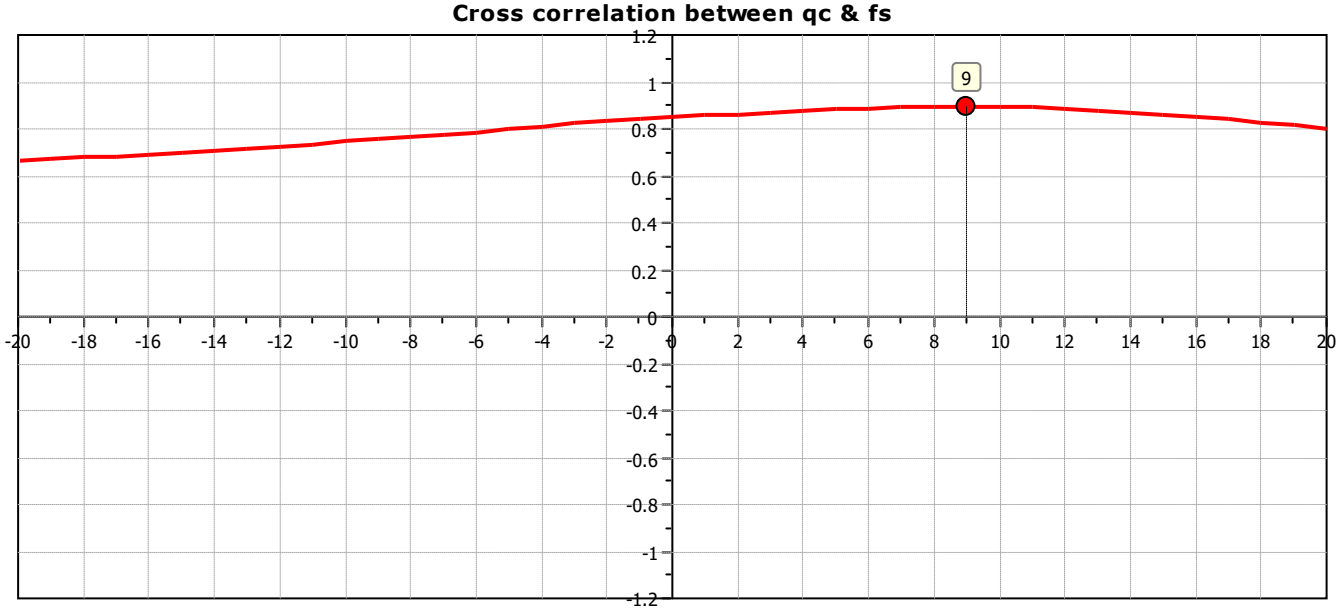
Project: **Proprietors of Muriwhenua**
Location: **Te Hapua**

CPT: CPT01
Total depth: 20.62 m, Date: 16/02/2024



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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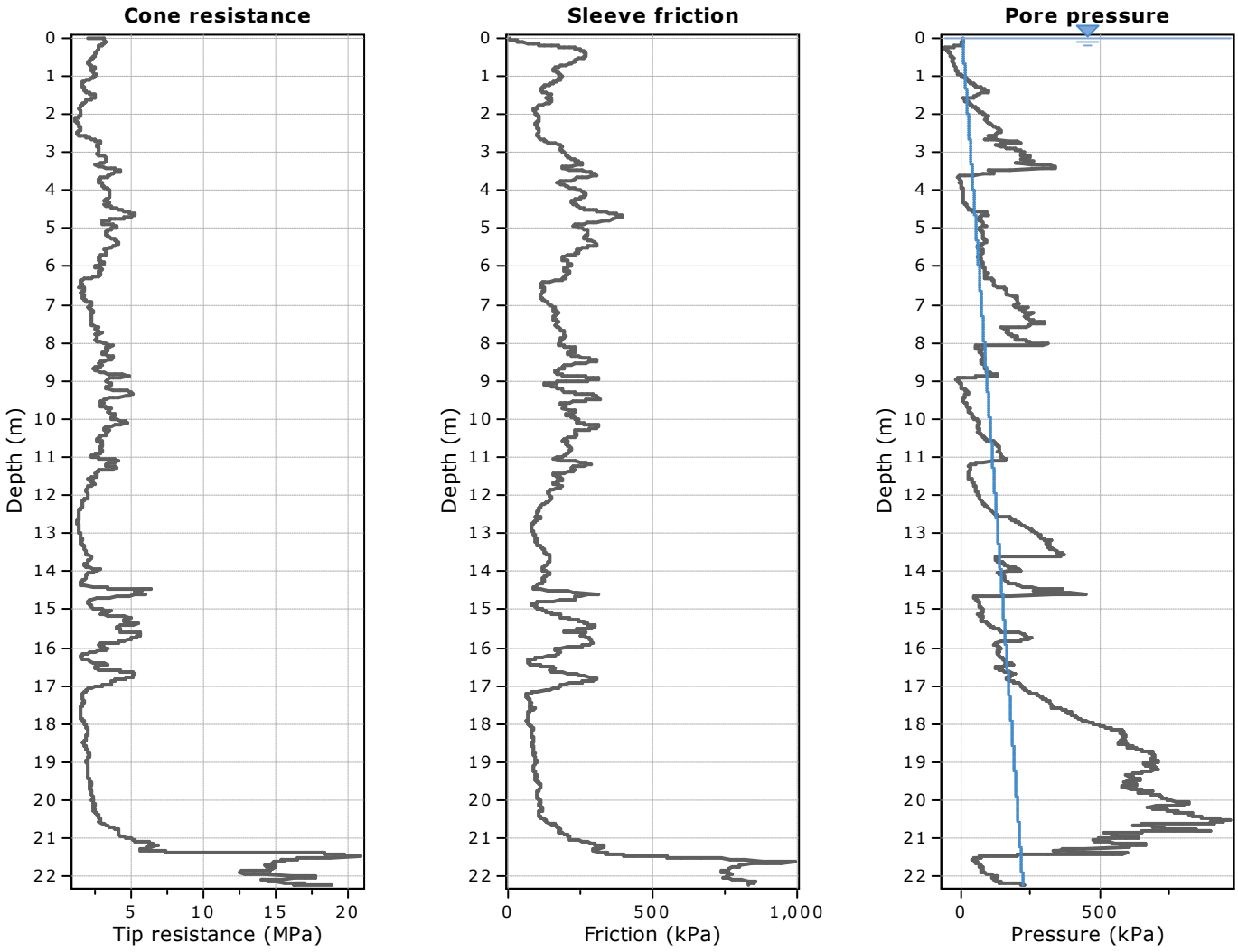
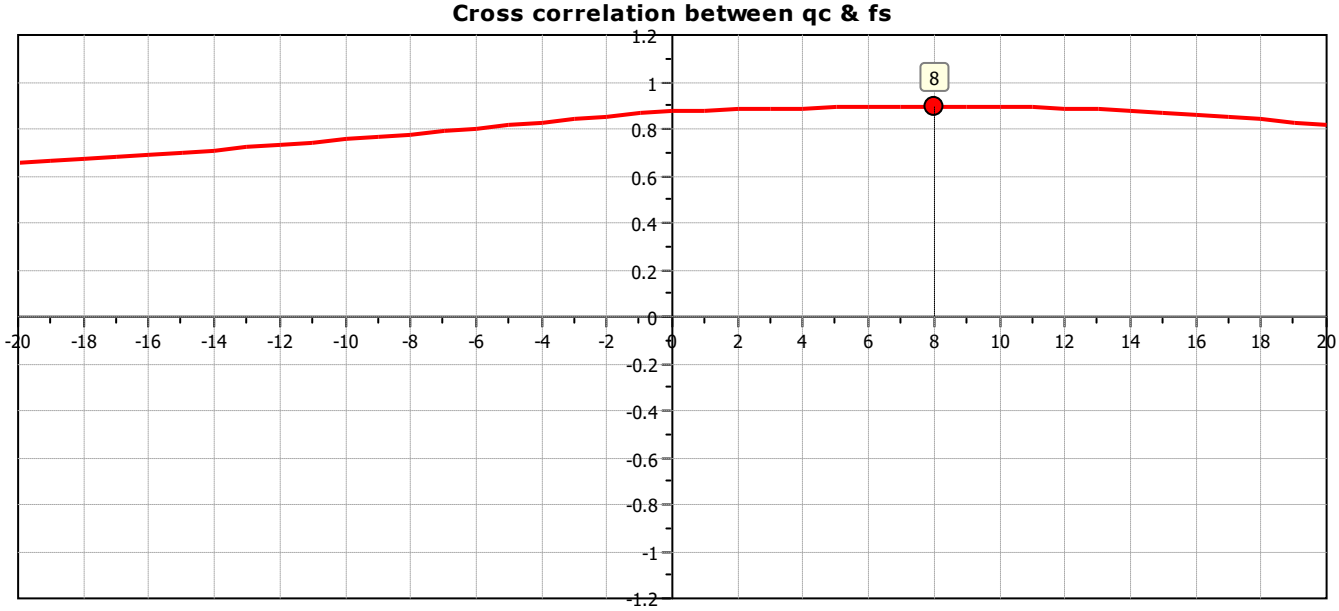
Project: **Proprietors of Muriwhenua**
Location: **Te Hapua**

CPT: CPT02
Total depth: 22.23 m, Date: 16/02/2024



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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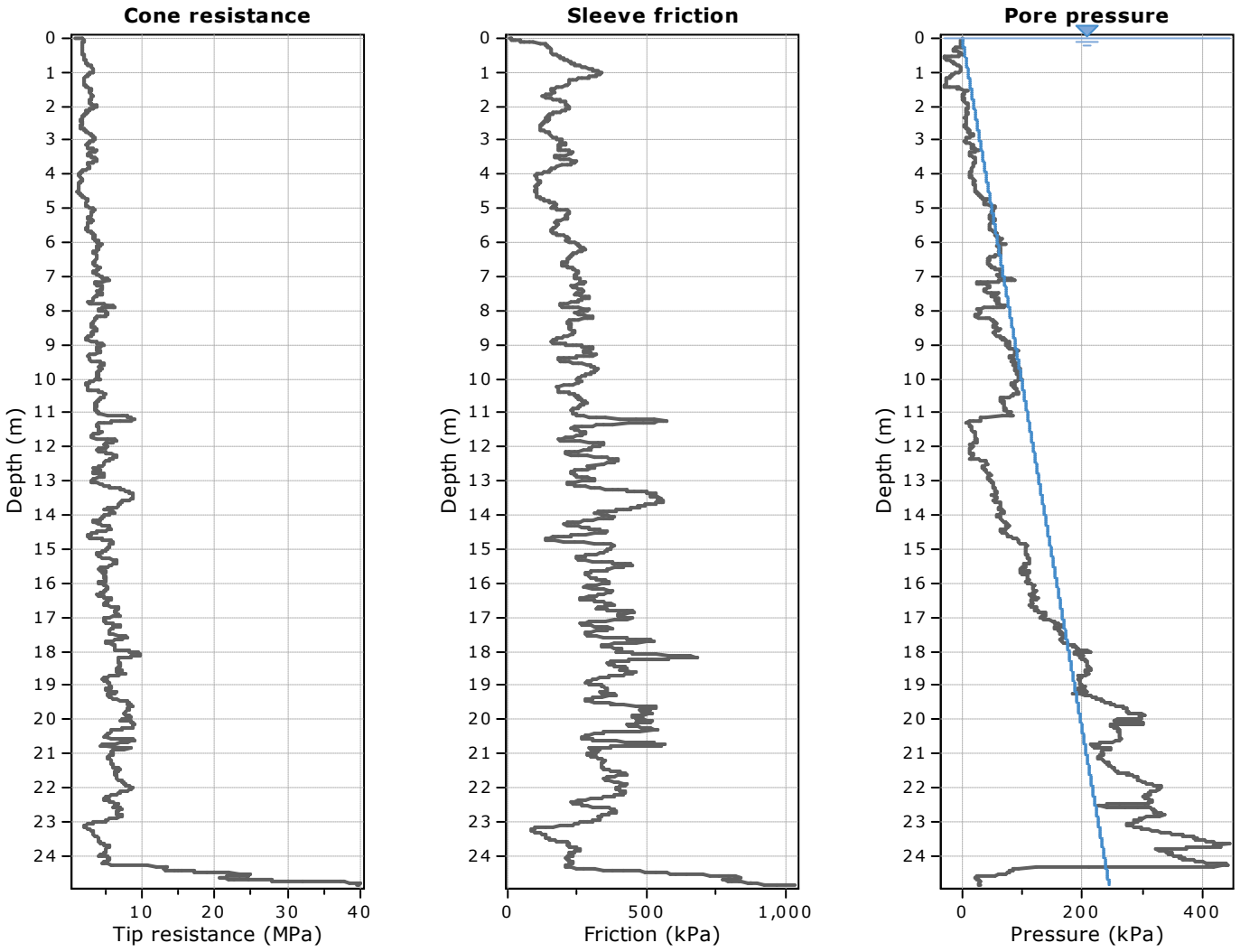
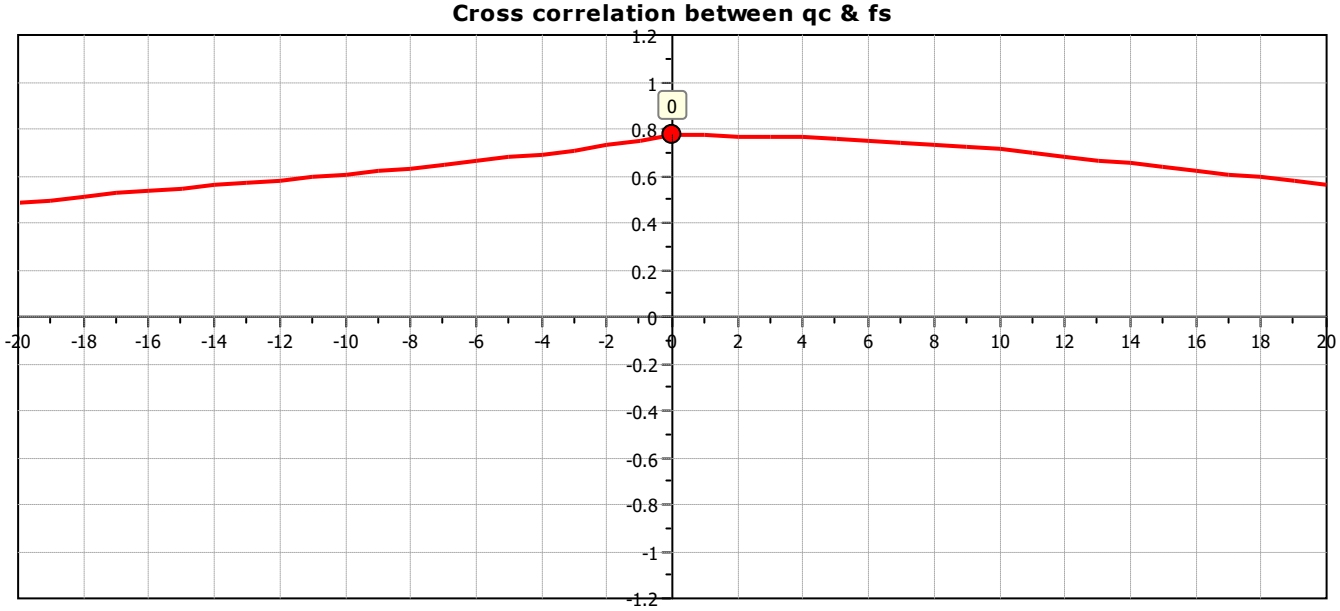
Cone Penetration Testing
craig@undergroundinvestigation.co.nz
+64211473249

Project: **Proprietors of Muriwhenua**
Location: **Te Hapua**

CPT: CPT03
Total depth: 24.86 m, Date: 16/02/2024



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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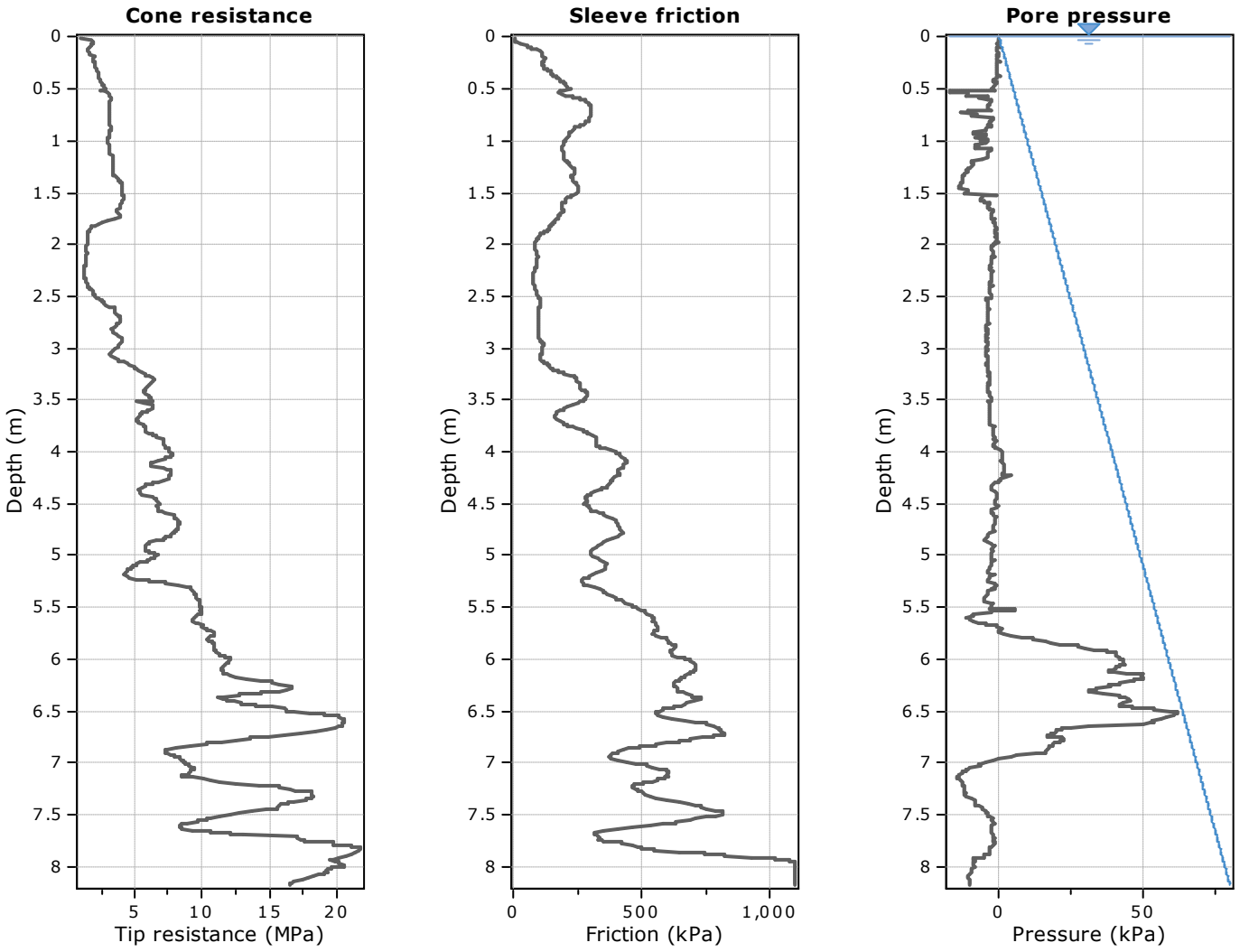
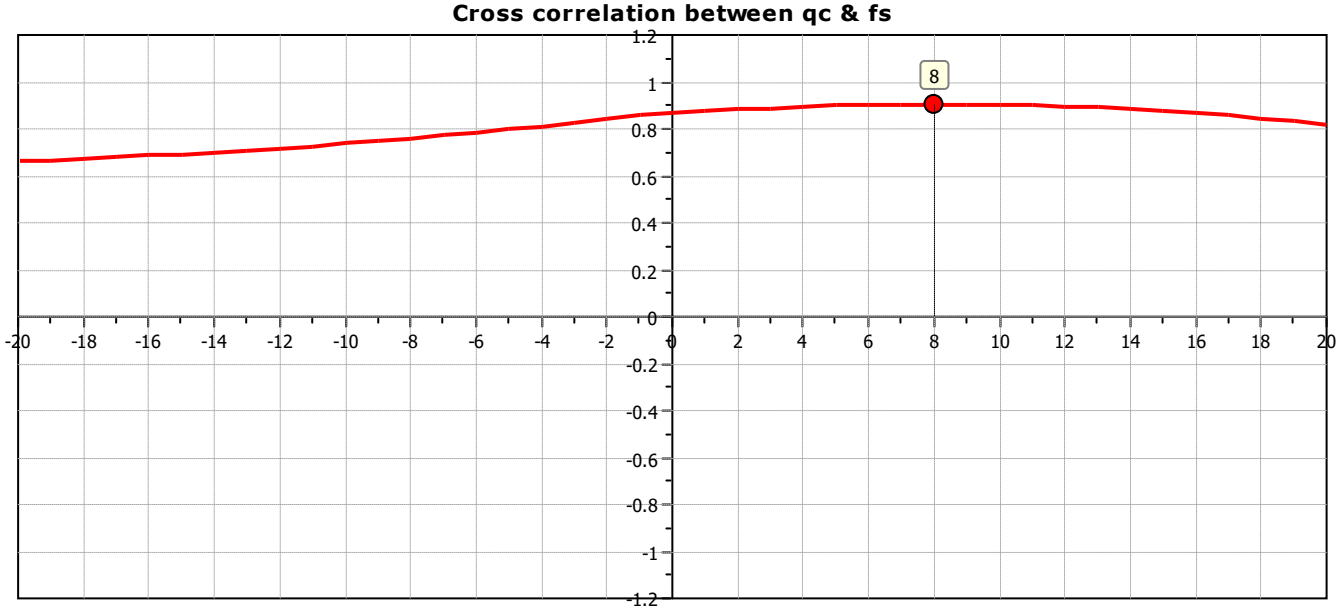
+64211473249

Project: **Proprietors of Muriwhenua**
Location: **Te Hapua**

CPT: CPT04
Total depth: 8.18 m, Date: 16/02/2024



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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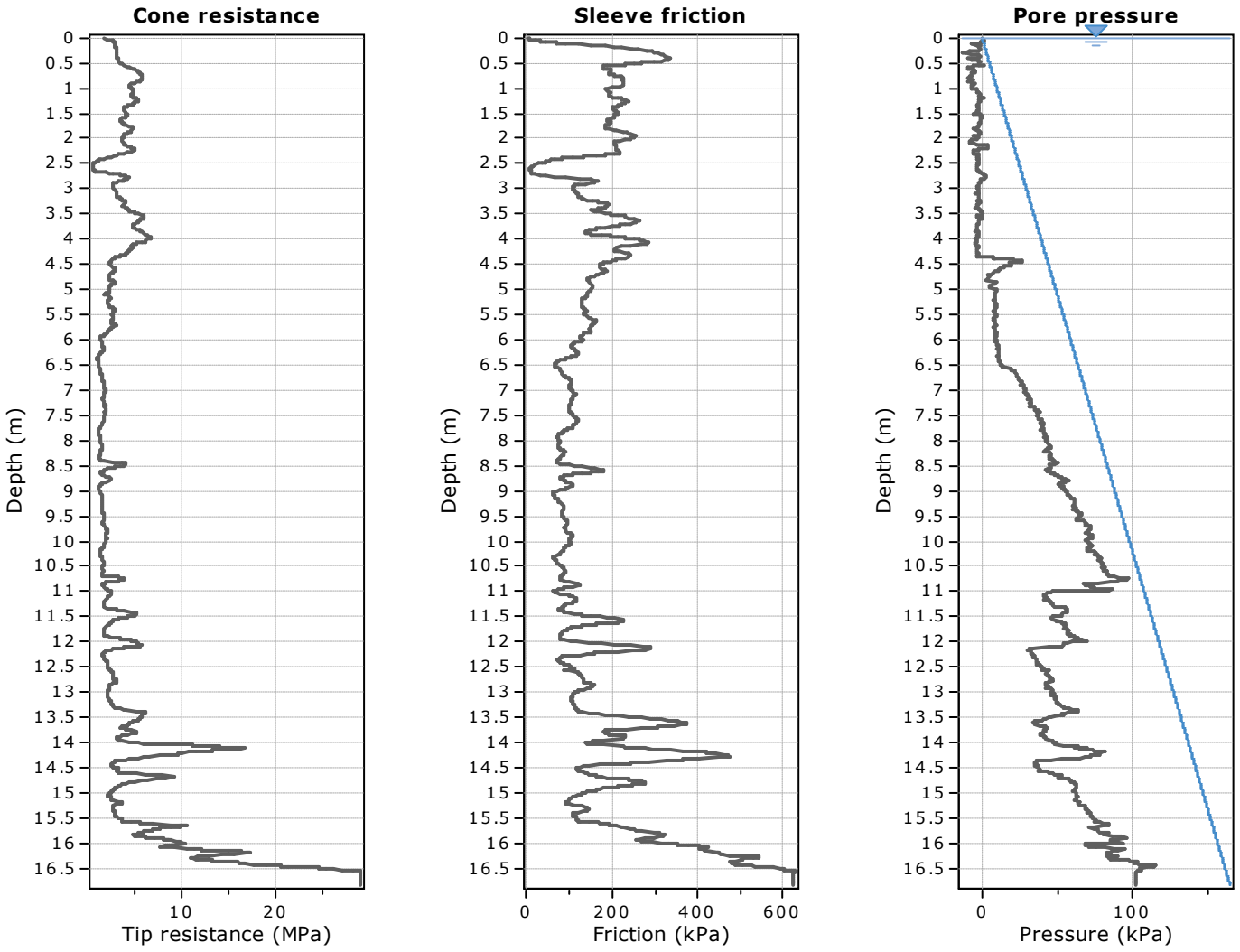
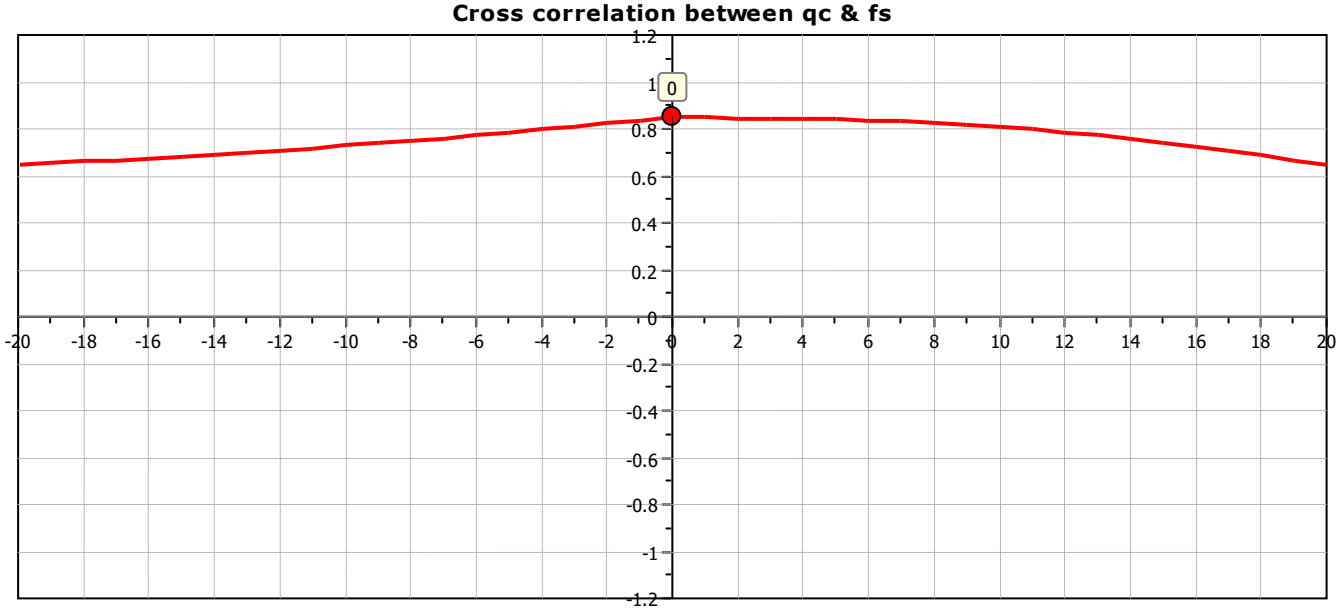
+64211473249

Project: **Proprietors of Muriwhenua**
Location: **Te Hapua**

CPT: CPT05
Total depth: 16.83 m, Date: 16/02/2024



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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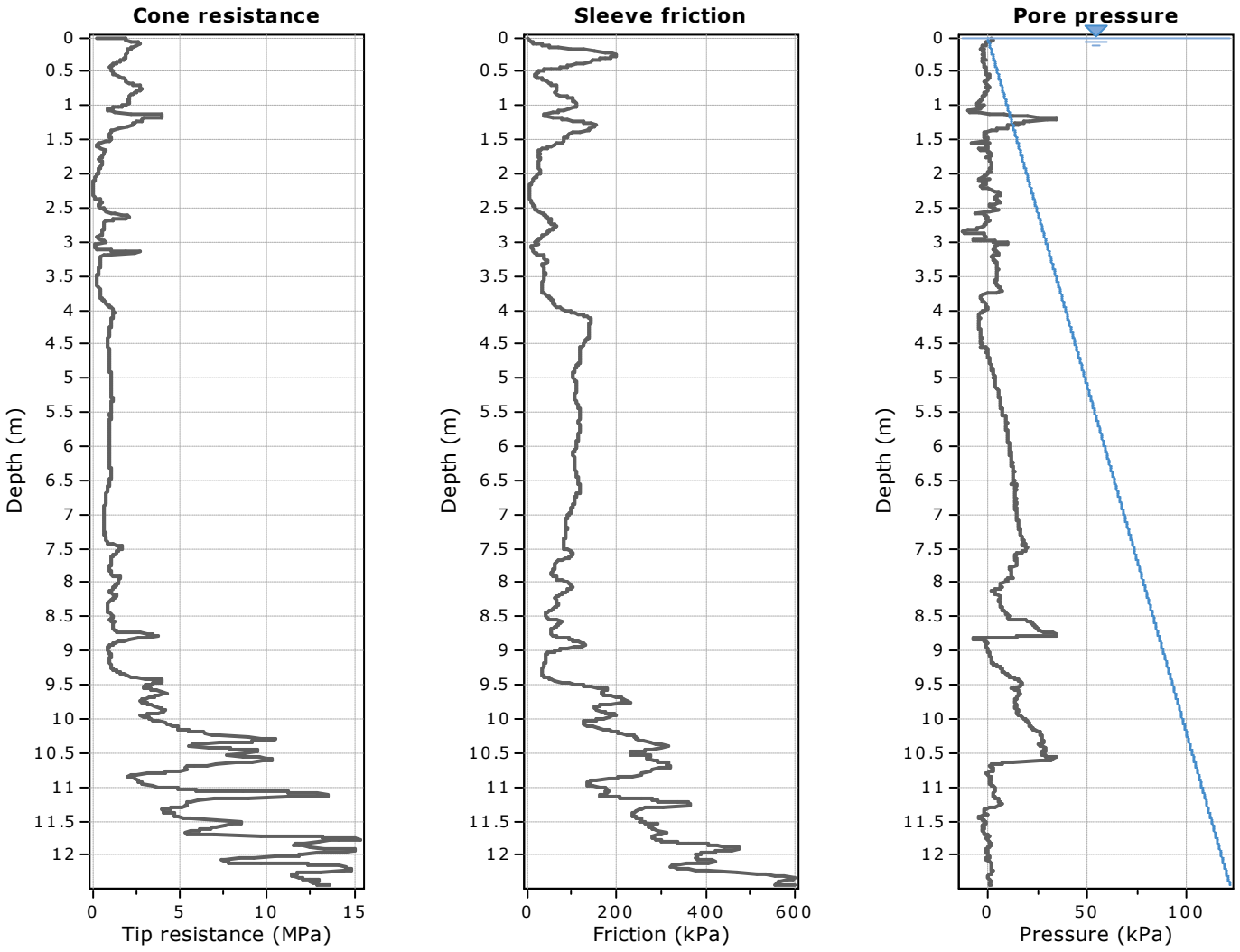
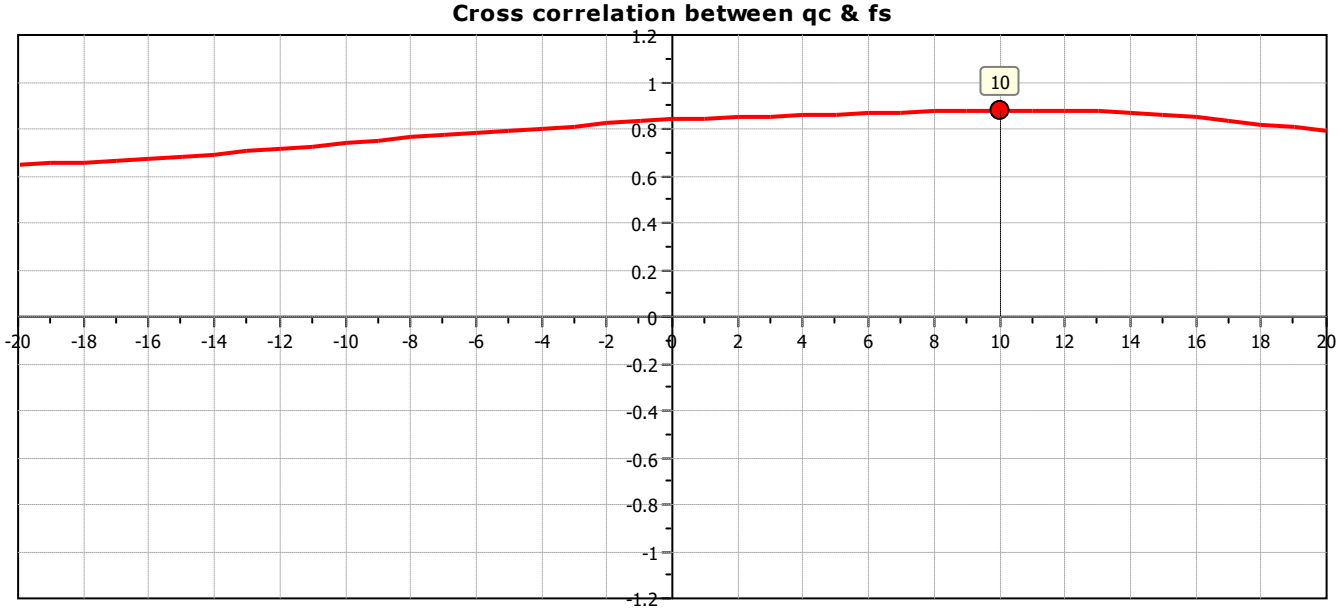
Project: **Proprietors of Muriwhenua**
Location: **Te Hapua**

CPT: CPT06
Total depth: 12.44 m, Date: 16/02/2024



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



Appendix D – Laboratory Test Results

Babbage Geotechnical Laboratory
Level 4
68 Beach Road
Auckland 1010
Telephone
E-mail

P O Box 2027
New Zealand
64-9-367 4954
wec@babbage.co.nz

Please reply to: W.E. Campton

Haigh Workman Ltd.
PO Box 89
Kerikeri 0245

Attention: **JOSH CURREEN**

Job Number: 63632#L
BGL Registration Number: 2828
Checked by: WEC

28th February 2024

ATTERBERG LIMITS & LINEAR SHRINKAGE TESTING

Dear Sir,

Re: TE HAPUA - MURIWHENUA

Your Reference: 23 200
Report Number: 63632#L/AL Te Hapua

The following report presents the results of Atterberg Limits & Linear Shrinkage testing at BGL of a soil sample delivered to this laboratory on the 20th of February 2024. Test results are summarised below, with page 3 showing where the sample plots on the Unified Soil Classification System (Casagrande) Chart.

Test standards used were:

Water Content:	NZS4402:1986:Test 2.1
Liquid Limit:	NZS4402:1986:Test 2.2
Plastic Limit:	NZS4402:1986:Test 2.3
Plasticity Index:	NZS4402:1986:Test 2.4
Linear Shrinkage:	NZS4402:1986:Test 2.6

Borehole Number	Sample Number	Depth (m)	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage (%)*
BH04	Sample 1	0.40 – 0.90	43.7	131	45	86	27

**The amount of shrinkage of the sample as a percentage of the original sample length.*

The whole soil was used for the water content test (the soil was in a natural state), and for the liquid limit, plastic limit & linear shrinkage tests. The soil was wet up and dried where required for the liquid limit, plastic limit & linear shrinkage tests.

As per the reporting requirements of NZS4402: 1986: Test 2.1: water content is reported to two significant figures for values below 10%, and to three significant figures for values of 10% or greater. Test 2.2: liquid limit, test 2.3: plastic limit, and test 2.6: linear shrinkage are reported to the nearest whole number.

Please note that the test results relate only to the sample as-received, and relate only to the sample under test.

Thank you for the opportunity to carry out this testing. If you have any queries regarding the content of this report please contact the person authorising this report below at your convenience.

Yours faithfully,

Justin Franklin
Key Technical Person
Assistant Laboratory Manager
Babbage Geotechnical Laboratory

ACCREDITED
IANZ
TESTING LABORATORY
№ 126

DETERMINATION OF THE LIQUID LIMIT, PLASTIC LIMIT & THE PLASTICITY INDEX

Test Methods: NZS4402: 1986: Test 2.2, Test 2.3 and Test 2.4

Tested By:	WEC	February 2024
Compiled By:	JF	28/02/2024
Checked By:	JF	28/02/2024

SUMMARY OF TESTING

Borehole Number	Sample Number	Depth (m)	Liquid Limit	Plastic Limit	Plasticity Index	Soil Classification Based on USCS Chart Below
BH04	**Sample 1**	**0.40 - 0.90**	131	45	**86**	CH

The chart below & soil classification terminology is taken from ASTM D2487-17^{e1} "Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)", April 2020, & is based on the classification scheme developed by A. Casagrande in the 1940's (Casagrande, A., 1948: Classification and identification of soil. Transactions of the American Society of Civil Engineers, v. 113, p. 901-930). The chart below & the soil classification given in the table above are included for your information only, and are not included in the IANZ endorsement for this report.

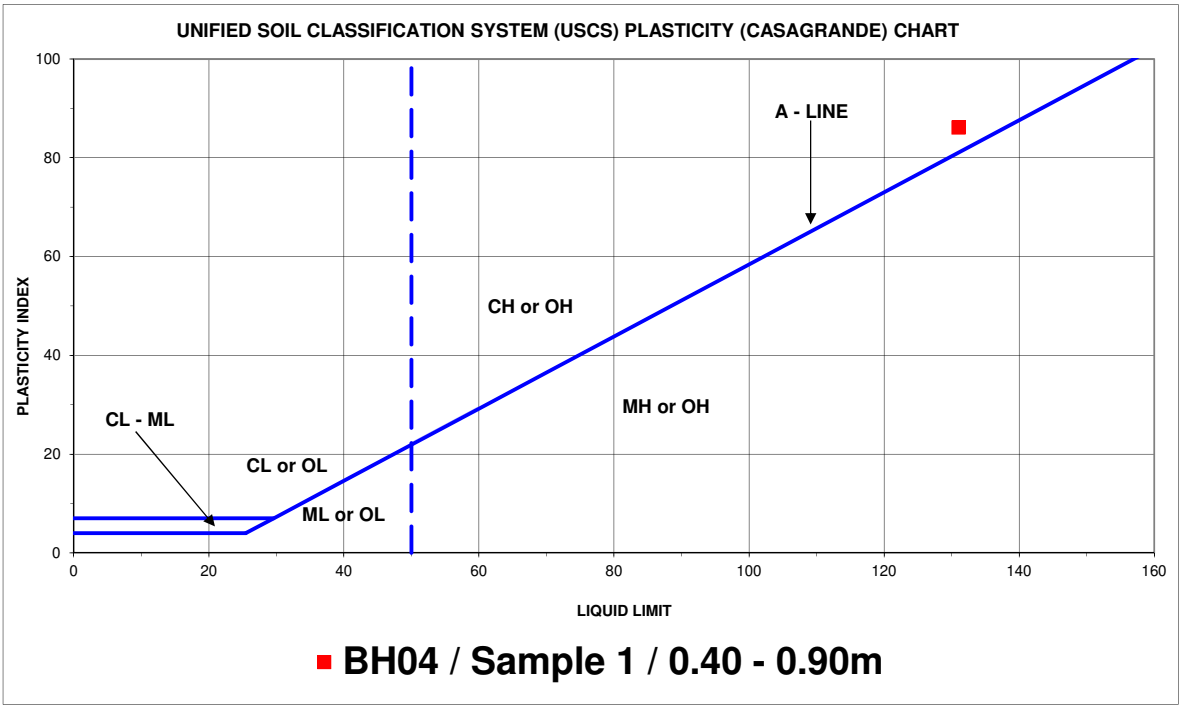
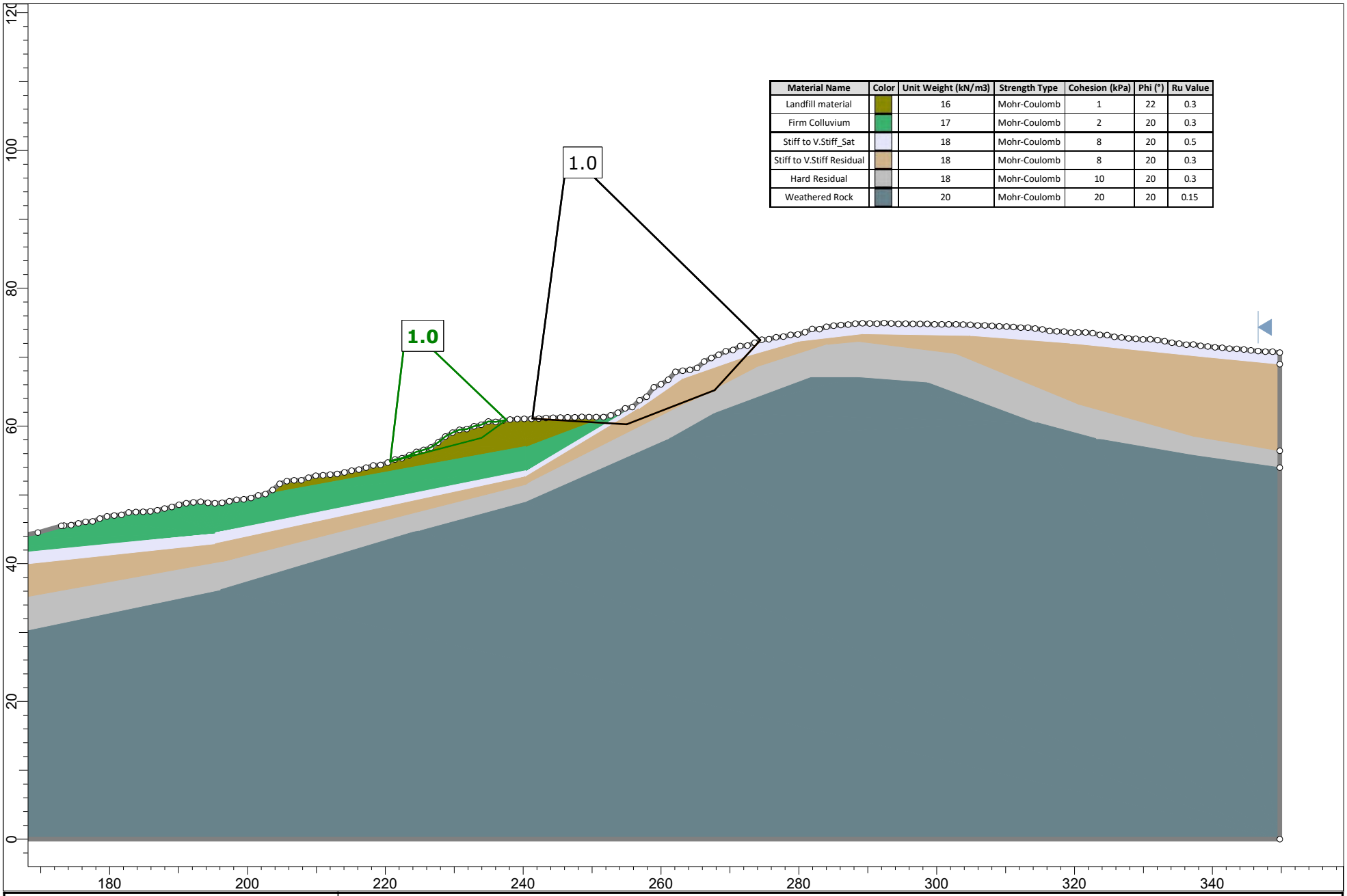


CHART LEGEND

CL = CLAY, low plasticity ('lean' clay)
CH = CLAY, high plasticity ('fat' clay)
OL = ORGANIC CLAY or ORGANIC SILT, low liquid limit
OH = ORGANIC CLAY or ORGANIC SILT, high liquid limit
ML = SILT, low liquid limit
MH = SILT, high liquid limit ('elastic silt')
CL - ML = SILTY CLAY

Appendix E – Slope Stability Outputs



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Ru Value
Landfill material		16	Mohr-Coulomb	1	22	0.3
Firm Colluvium		17	Mohr-Coulomb	2	20	0.3
Stiff to V.Stiff_Sat		18	Mohr-Coulomb	8	20	0.5
Stiff to V.Stiff Residual		18	Mohr-Coulomb	8	20	0.3
Hard Residual		18	Mohr-Coulomb	10	20	0.3
Weathered Rock		20	Mohr-Coulomb	20	20	0.15

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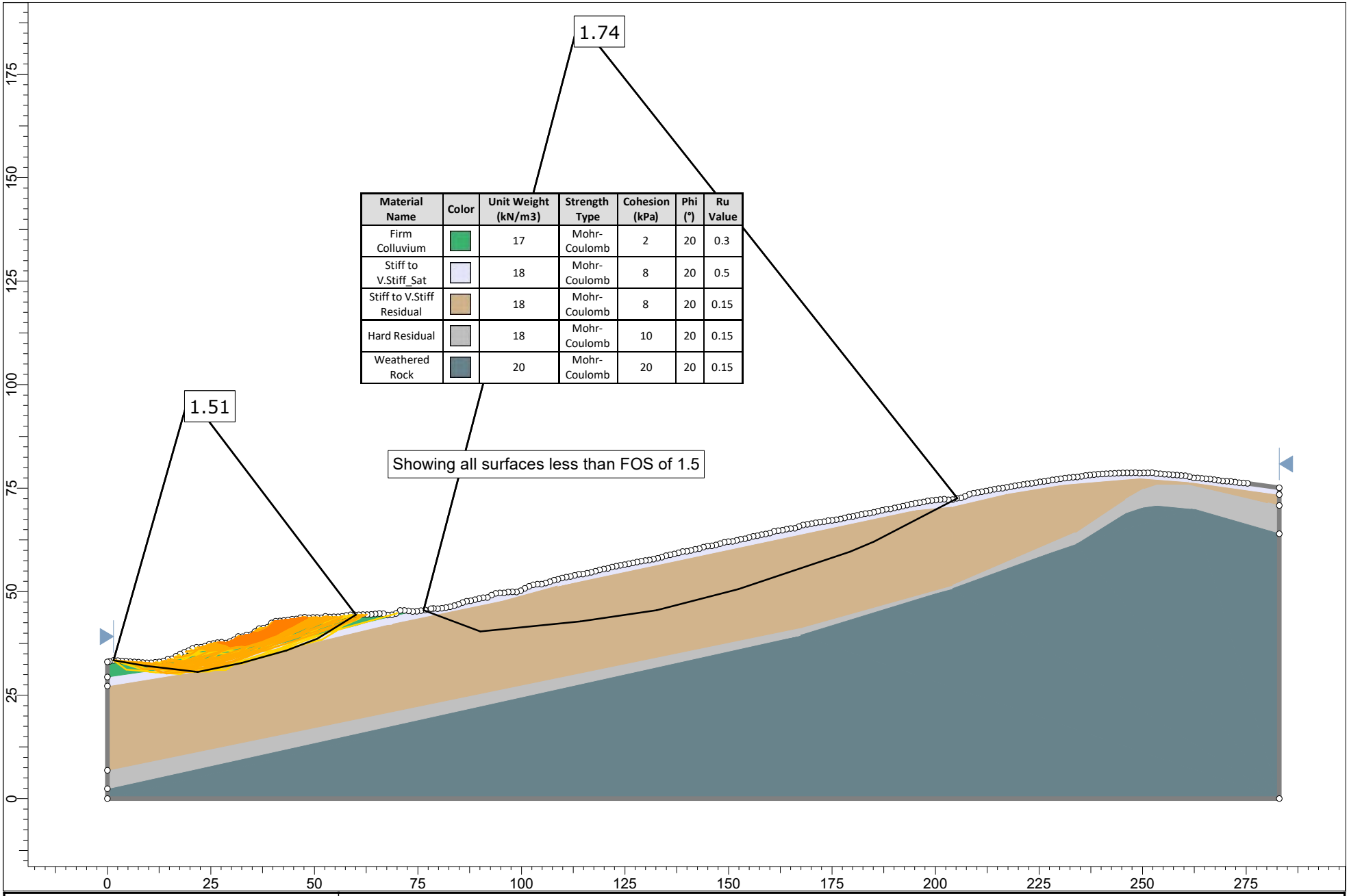
Project	23 200 - Muriwhenua - Te Hapua		
Group	Cross Section B-B	*Scenario*	Back analyses
Drawn By	JMC	*Company*	
Date	23/02/2024, 12:55:54 pm	*File Name*	BB back analysis.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Ru Value
Firm Colluvium		17	Mohr-Coulomb	2	20	0.3
Stiff to V.Stiff_Sat		18	Mohr-Coulomb	8	20	0.5
Stiff to V.Stiff Residual		18	Mohr-Coulomb	8	20	0.15
Hard Residual		18	Mohr-Coulomb	10	20	0.15
Weathered Rock		20	Mohr-Coulomb	20	20	0.15

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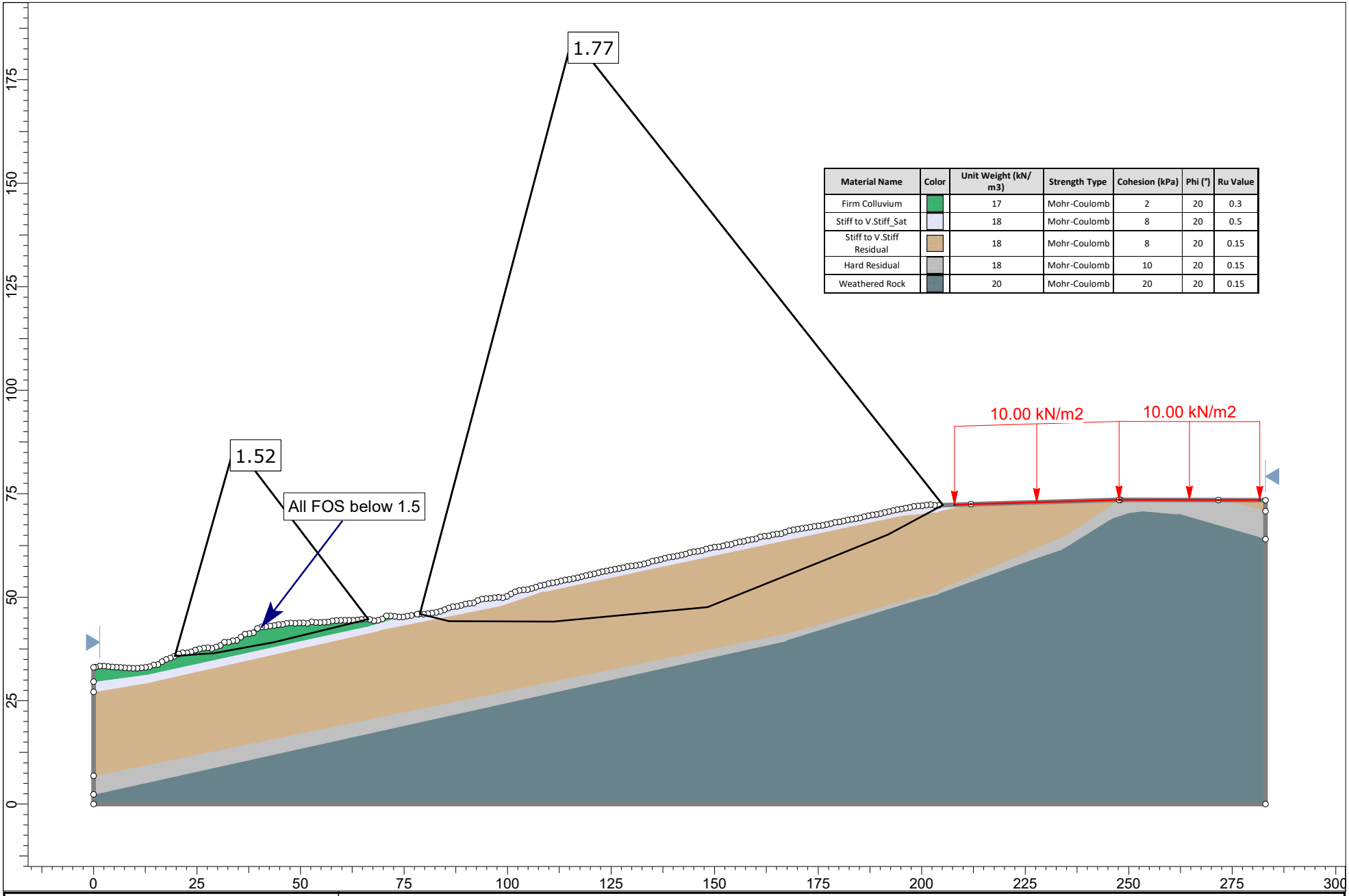
Project	23 200 - Muriwhenua - Te Hapua		
Group	Cross Section A-A	*Scenario*	Static conditions
Drawn By	JMC	*Company*	
Date	23/02/2024, 12:55:54 pm	*File Name*	AA static.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Ru Value
Firm Colluvium		17	Mohr-Coulomb	2	20	0.3
Stiff to V.Stiff_Sat		18	Mohr-Coulomb	8	20	0.5
Stiff to V.Stiff Residual		18	Mohr-Coulomb	8	20	0.15
Hard Residual		18	Mohr-Coulomb	10	20	0.15
Weathered Rock		20	Mohr-Coulomb	20	20	0.15

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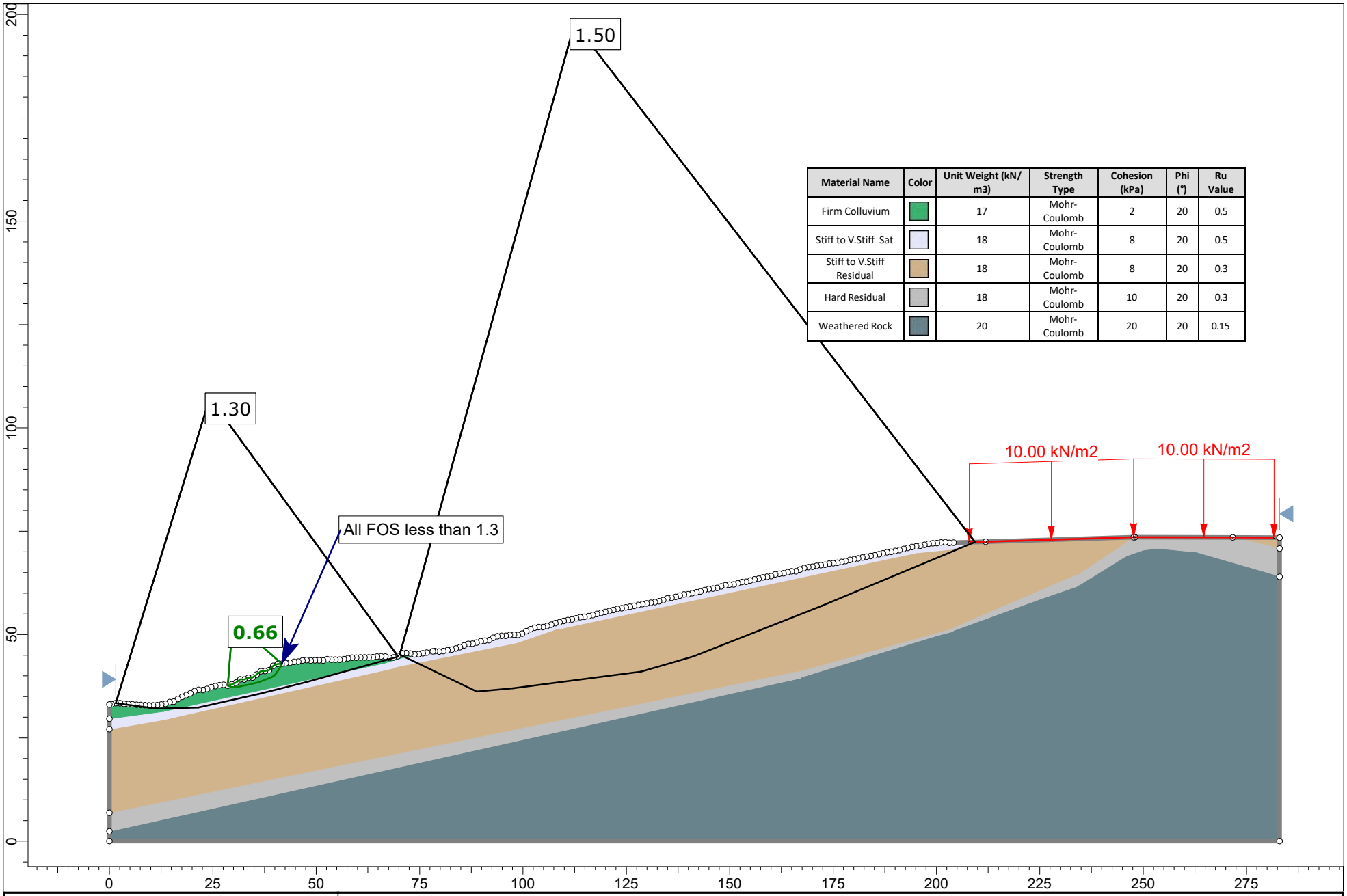
Project	23 200 - Muriwhenua - Te Hapua		
Group	Cross Section A-A	*Scenario*	Static - Post-development
Drawn By	JMC	*Company*	
Date	23/02/2024, 12:55:54 pm	*File Name*	AA static_post-dev.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Ru Value
Firm Colluvium		17	Mohr-Coulomb	2	20	0.5
Stiff to V.Stiff_Sat		18	Mohr-Coulomb	8	20	0.5
Stiff to V.Stiff Residual		18	Mohr-Coulomb	8	20	0.3
Hard Residual		18	Mohr-Coulomb	10	20	0.3
Weathered Rock		20	Mohr-Coulomb	20	20	0.15

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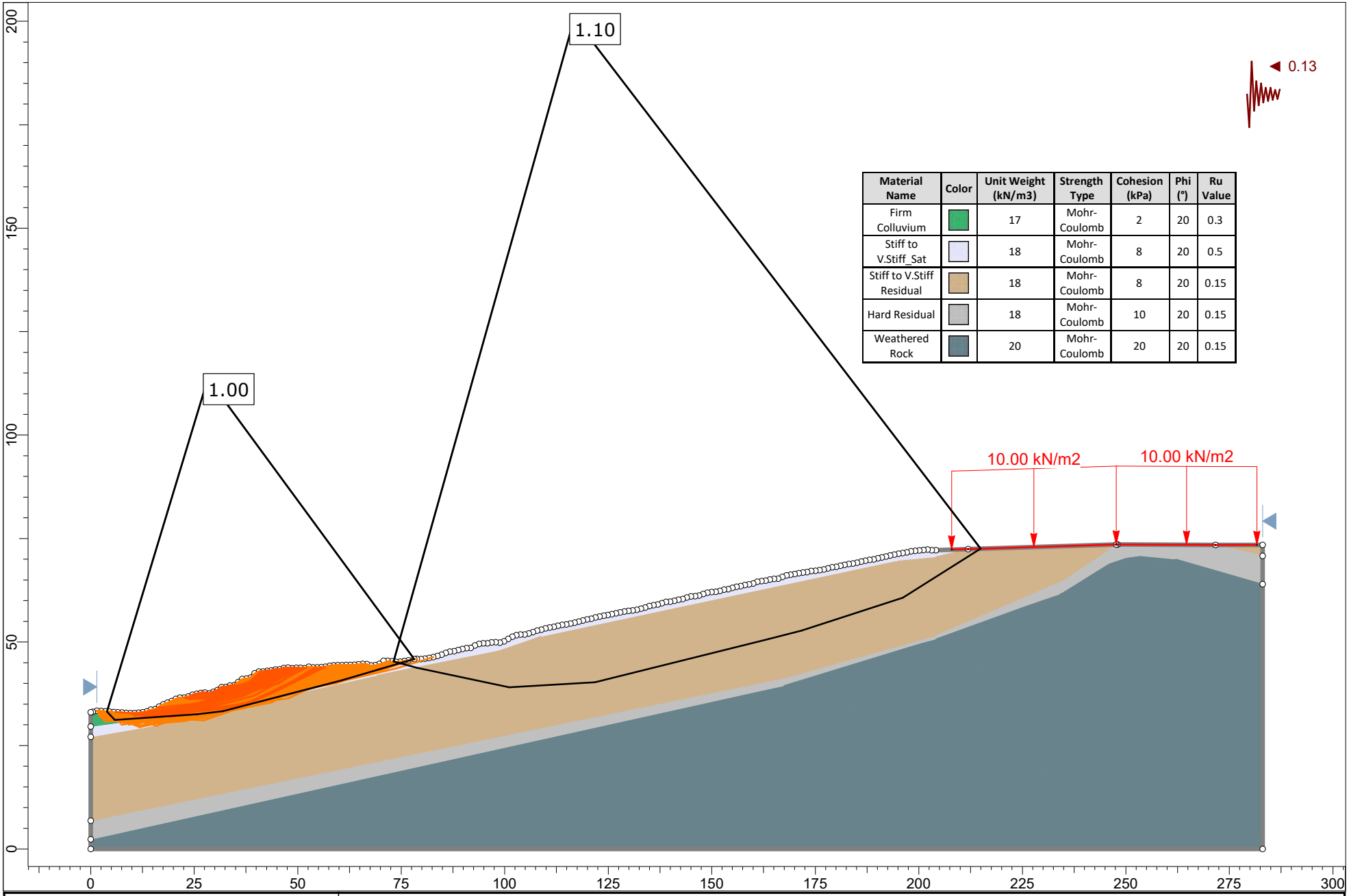
Project	23 200 - Muriwhenua - Te Hapua		
Group	Cross Section A-A	*Scenario*	ElevatedGW - Post-development
Drawn By	JMC	*Company*	
Date	23/02/2024, 12:55:54 pm	*File Name*	AA elevatedGW_post-dev.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Ru Value
Firm Colluvium		17	Mohr-Coulomb	2	20	0.3
Stiff to V.Stiff_Sat		18	Mohr-Coulomb	8	20	0.5
Stiff to V.Stiff Residual		18	Mohr-Coulomb	8	20	0.15
Hard Residual		18	Mohr-Coulomb	10	20	0.15
Weathered Rock		20	Mohr-Coulomb	20	20	0.15

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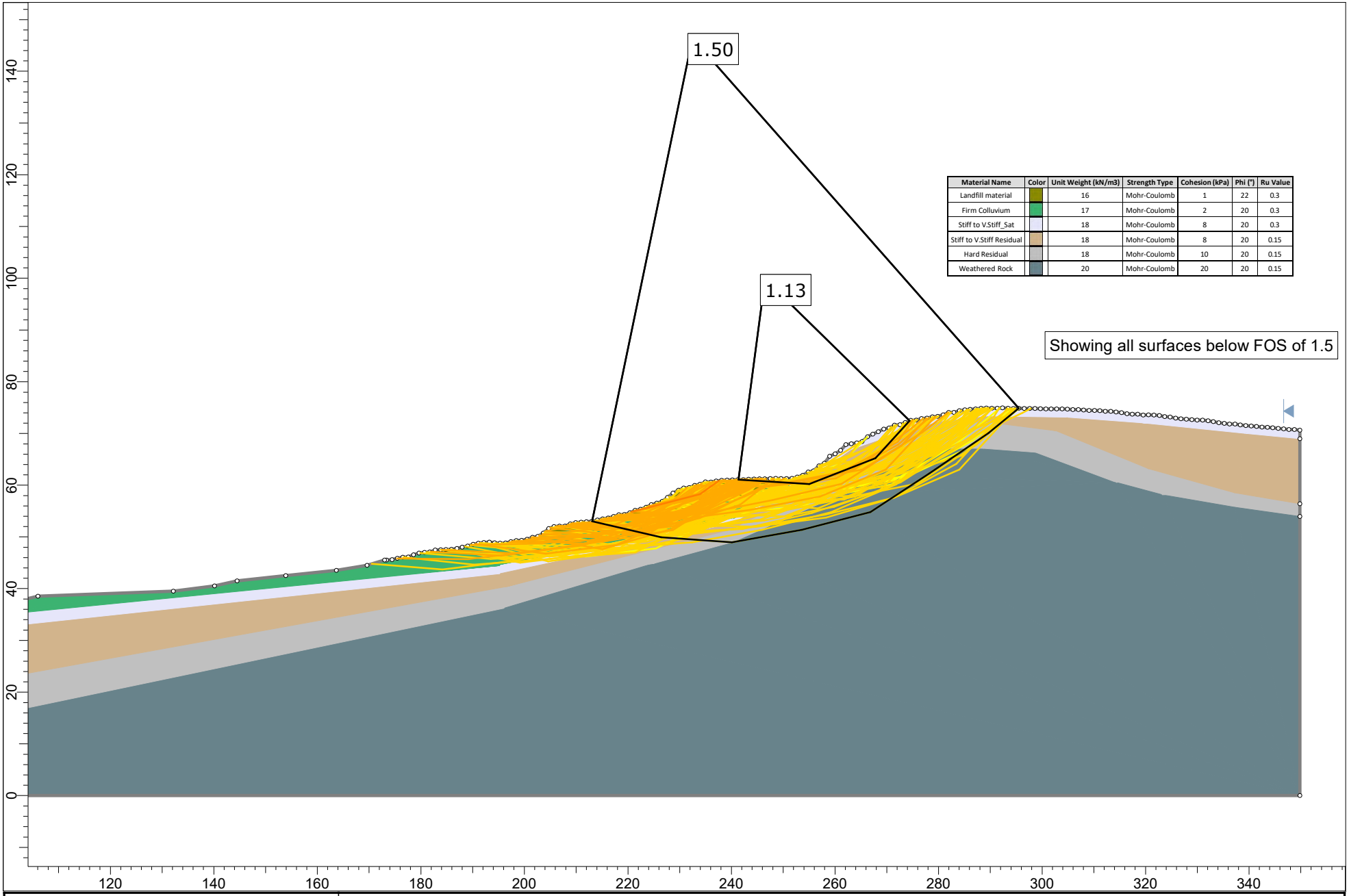
Project	23 200 - Muriwhenua - Te Hapua		
Group	Cross Section A-A	*Scenario*	Seismic - Post-development
Drawn By	JMC	*Company*	
Date	23/02/2024, 12:55:54 pm	*File Name*	AA seismic_post-dev.slmd



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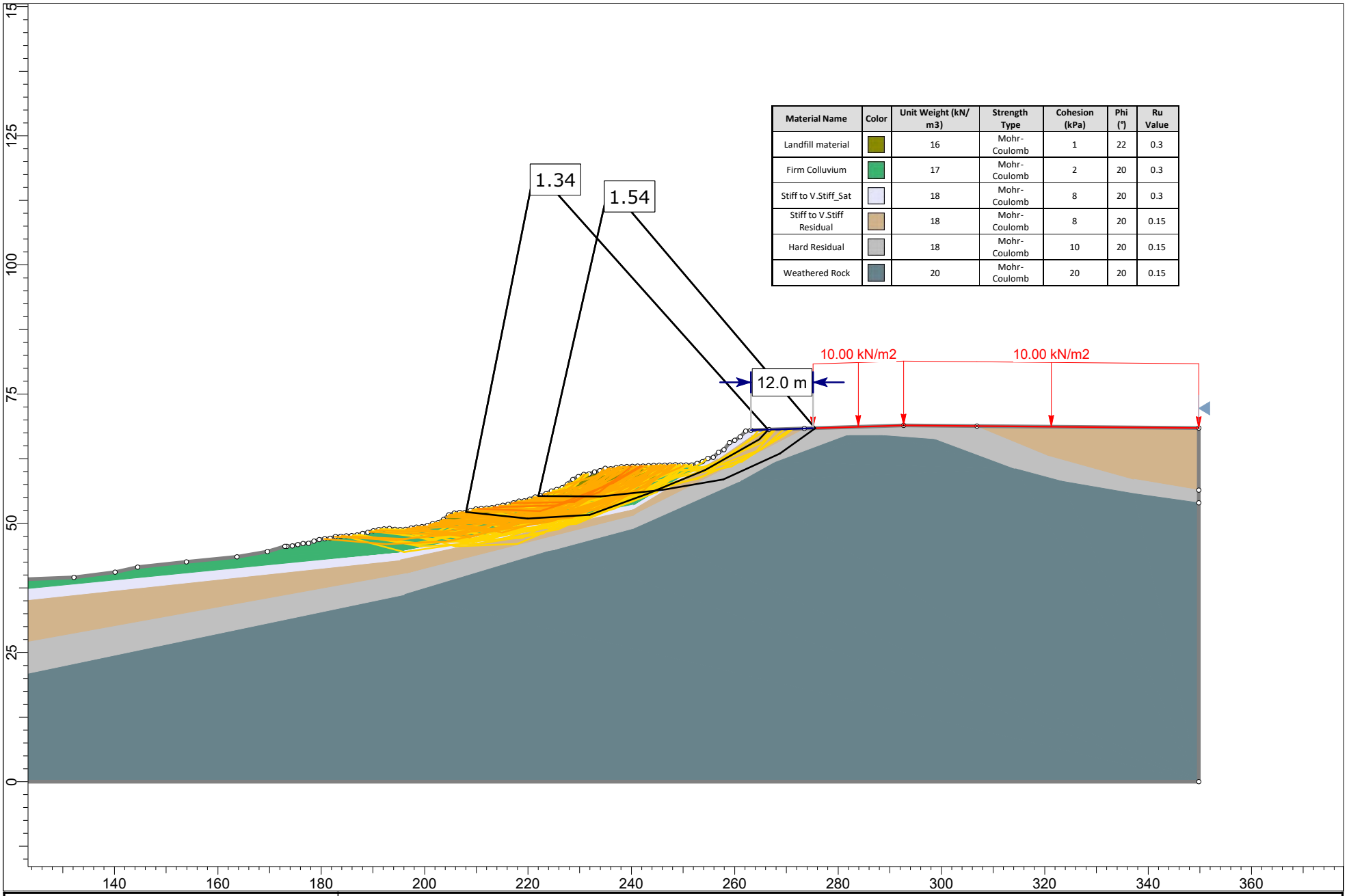
Project	23 200 - Muriwhenua - Te Hapua		
Group	Cross Section B-B	*Scenario*	Static conditions
Drawn By	JMC	*Company*	
Date	23/02/2024, 12:55:54 pm	*File Name*	BB static.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Ru Value
Landfill material		16	Mohr-Coulomb	1	22	0.3
Firm Colluvium		17	Mohr-Coulomb	2	20	0.3
Stiff to V.Stiff_Sat		18	Mohr-Coulomb	8	20	0.3
Stiff to V.Stiff Residual		18	Mohr-Coulomb	8	20	0.15
Hard Residual		18	Mohr-Coulomb	10	20	0.15
Weathered Rock		20	Mohr-Coulomb	20	20	0.15

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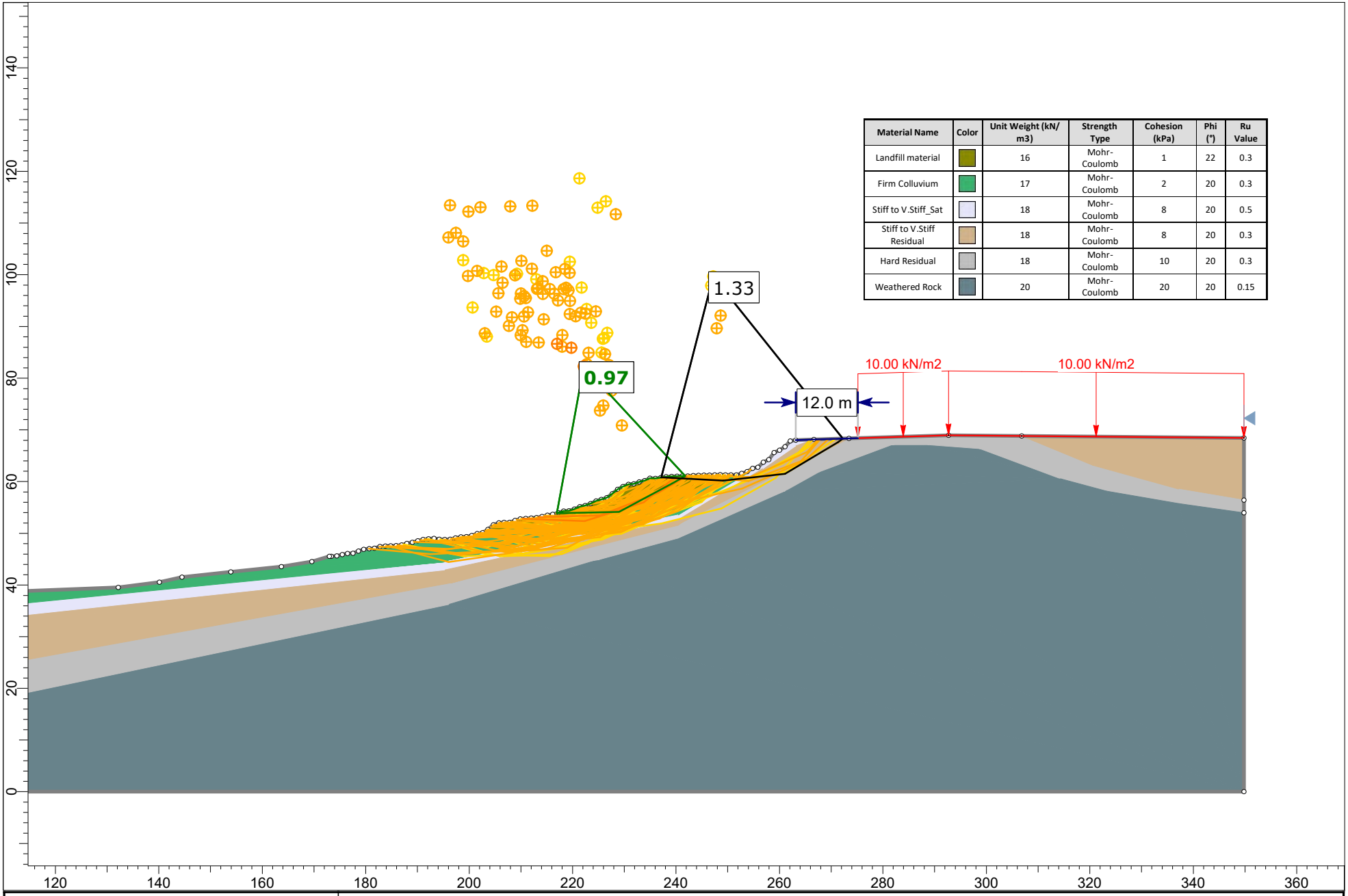
Project	23 200 - Muriwhenua - Te Hapua		
Group	Cross Section B-B	*Scenario*	Static - Post-development
Drawn By	JMC	*Company*	
Date	23/02/2024, 12:55:54 pm	*File Name*	BB static_post-dev.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Ru Value
Landfill material		16	Mohr-Coulomb	1	22	0.3
Firm Colluvium		17	Mohr-Coulomb	2	20	0.3
Stiff to V.Stiff_Sat		18	Mohr-Coulomb	8	20	0.5
Stiff to V.Stiff Residual		18	Mohr-Coulomb	8	20	0.3
Hard Residual		18	Mohr-Coulomb	10	20	0.3
Weathered Rock		20	Mohr-Coulomb	20	20	0.15

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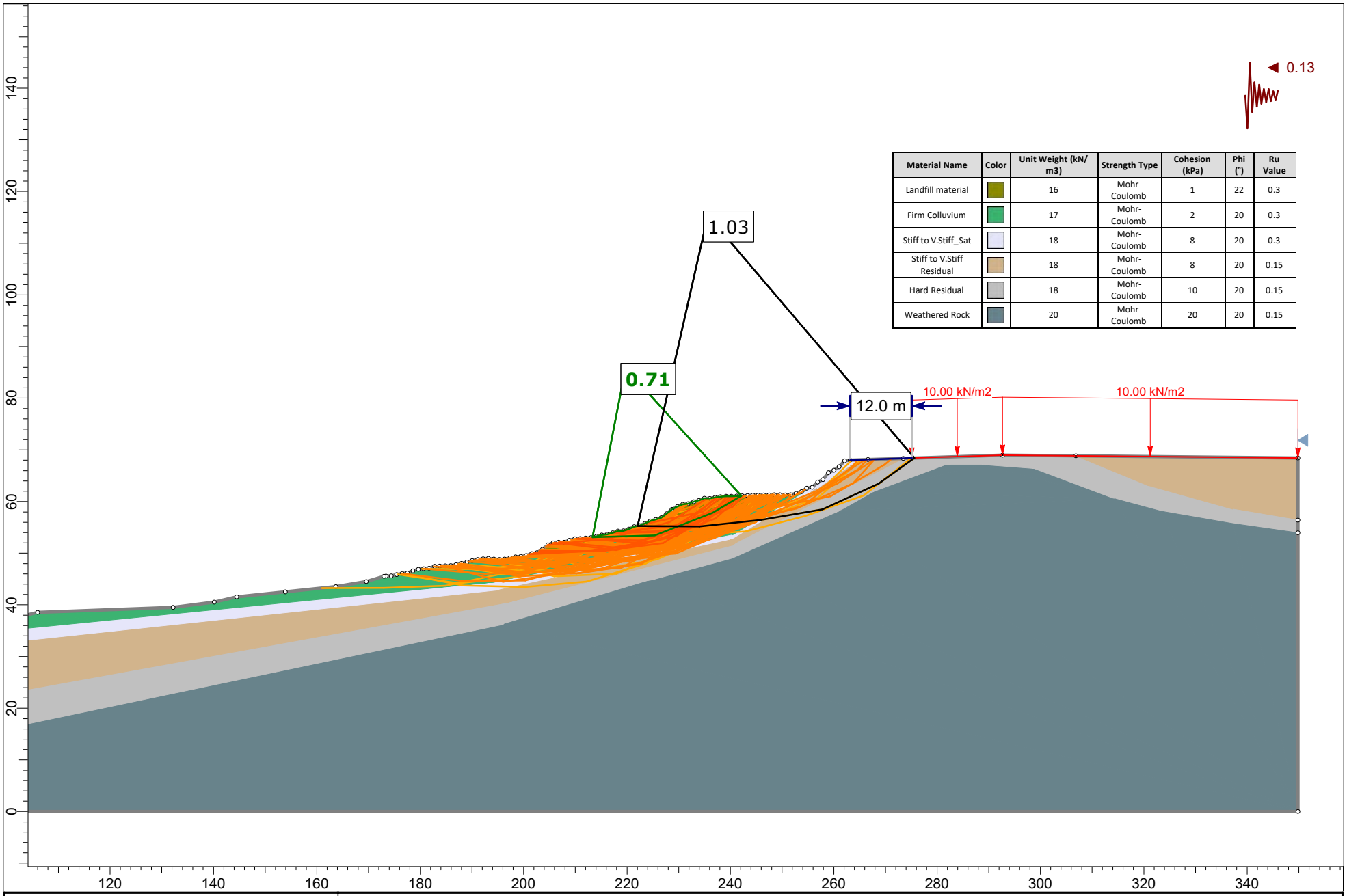
Project	23 200 - Muriwhenua - Te Hapua		
Group	Cross Section B-B	*Scenario*	ElevatedGW - Post-development
Drawn By	JMC	*Company*	
Date	23/02/2024, 12:55:54 pm	*File Name*	BB elevatedGW_post-dev.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Ru Value
Landfill material		16	Mohr-Coulomb	1	22	0.3
Firm Colluvium		17	Mohr-Coulomb	2	20	0.3
Stiff to V.Stiff_Sat		18	Mohr-Coulomb	8	20	0.3
Stiff to V.Stiff Residual		18	Mohr-Coulomb	8	20	0.15
Hard Residual		18	Mohr-Coulomb	10	20	0.15
Weathered Rock		20	Mohr-Coulomb	20	20	0.15

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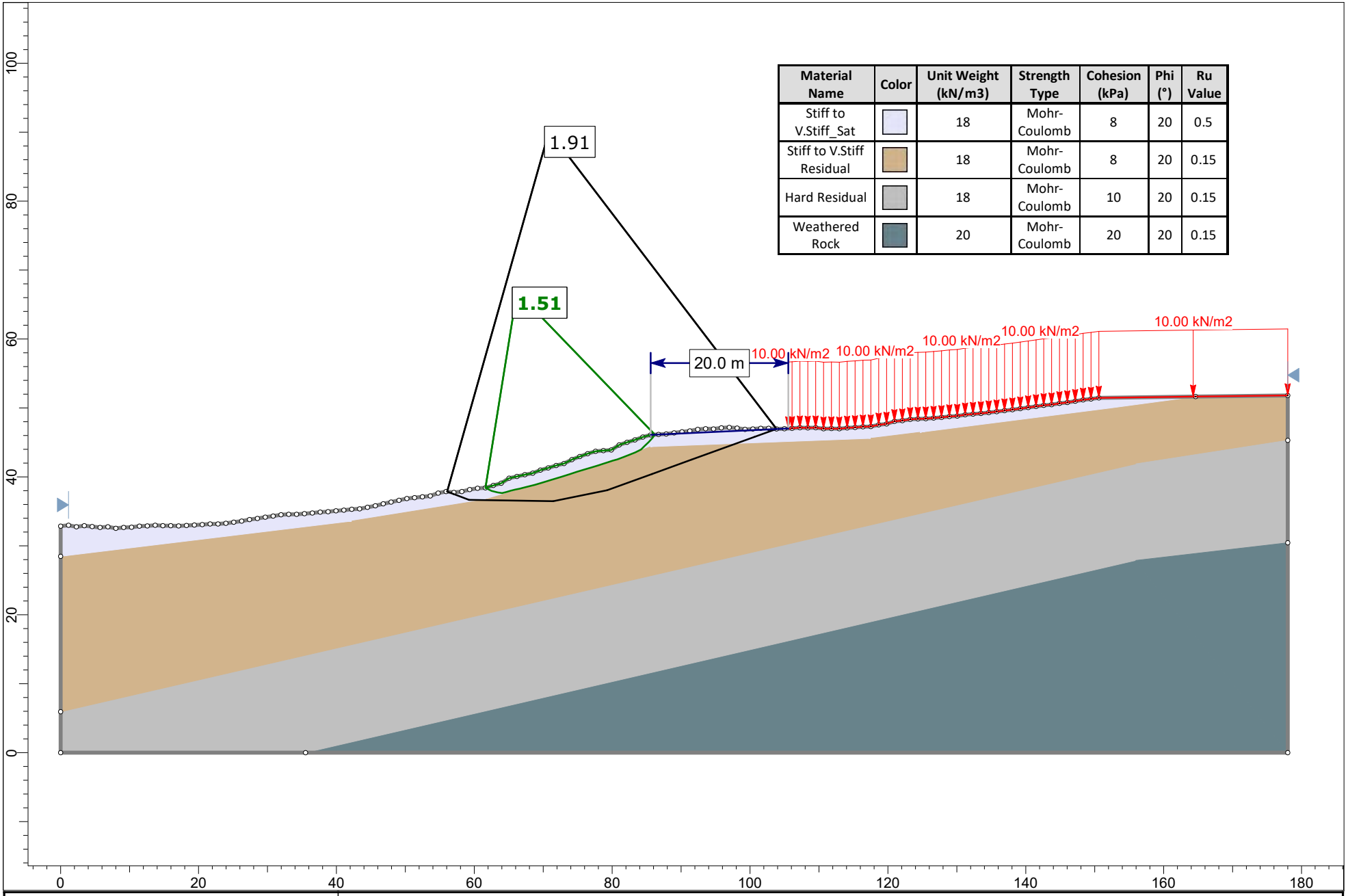
Project	23 200 - Muriwhenua - Te Hapua		
Group	Cross Section B-B	*Scenario*	Seismic - Post-development
Drawn By	JMC	*Company*	
Date	23/02/2024, 12:55:54 pm	*File Name*	BB seismic_post-dev.slmd

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Ru Value
Stiff to V.Stiff_Sat		18	Mohr-Coulomb	8	20	0.5
Stiff to V.Stiff Residual		18	Mohr-Coulomb	8	20	0.15
Hard Residual		18	Mohr-Coulomb	10	20	0.15
Weathered Rock		20	Mohr-Coulomb	20	20	0.15



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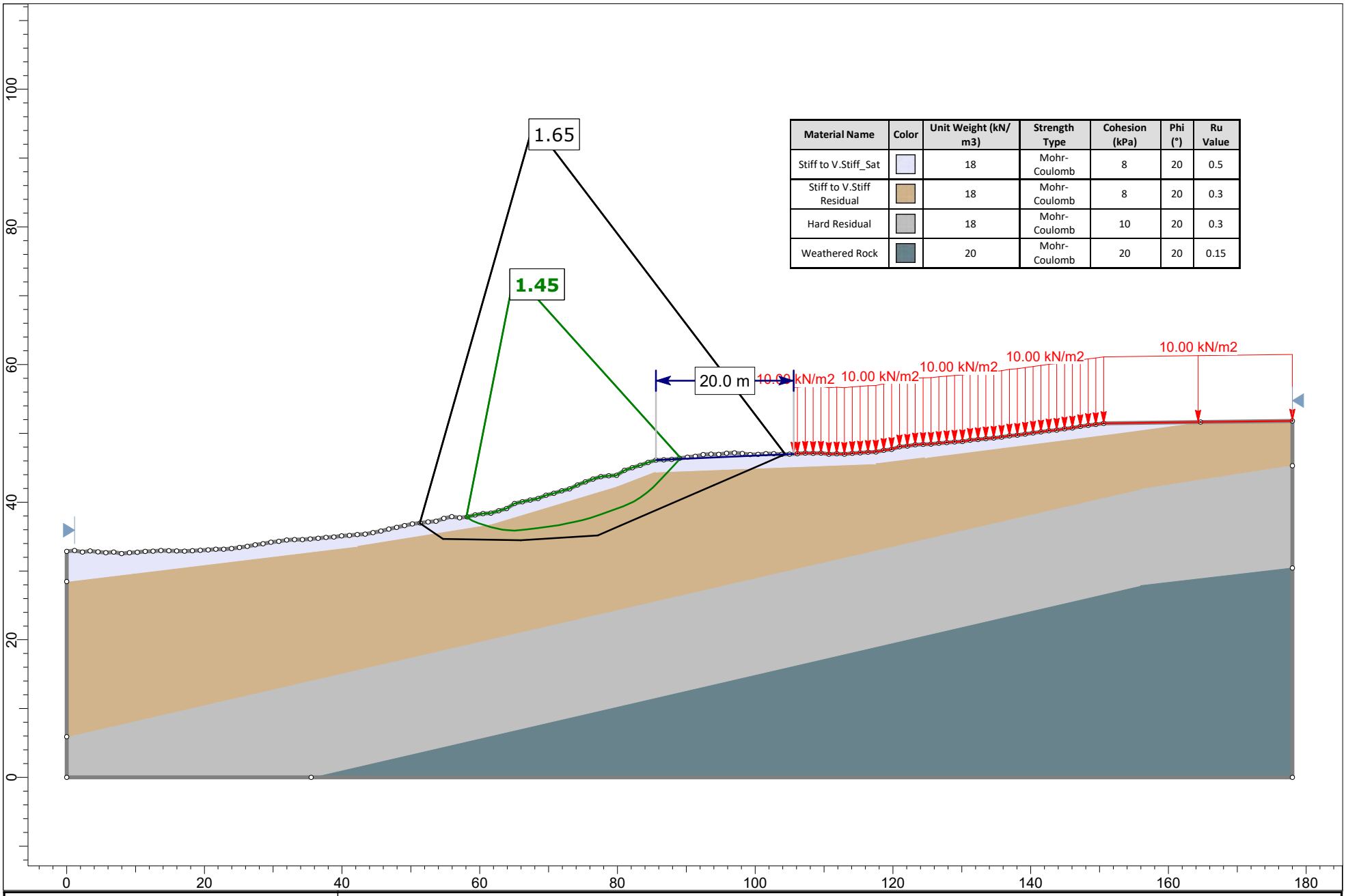
Project	23 200 - Muriwhenua - Te Hapua		
Group	Cross Section C-C	Scenario	Static- Post-development
Drawn By	JMC	Company	
Date	23/02/2024, 12:55:54 pm	File Name	CC static.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Ru Value
Stiff to V.Stiff_Sat		18	Mohr-Coulomb	8	20	0.5
Stiff to V.Stiff Residual		18	Mohr-Coulomb	8	20	0.3
Hard Residual		18	Mohr-Coulomb	10	20	0.3
Weathered Rock		20	Mohr-Coulomb	20	20	0.15

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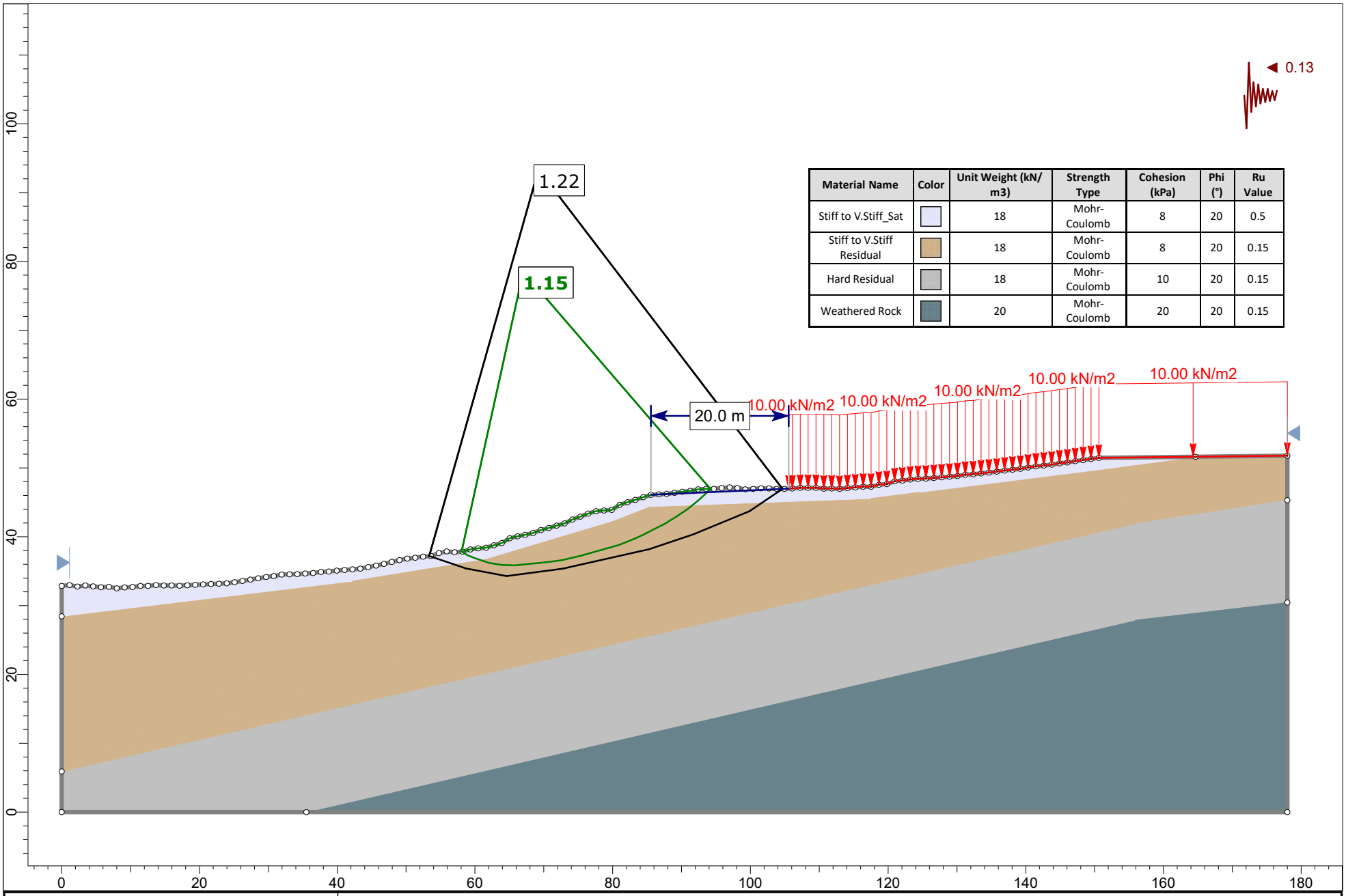
SLIDEINTERPRET 9.031

Project	23 200 - Muriwhenua - Te Hapua		
Group	Cross Section C-C	*Scenario*	Elevated GW - Post-development
Drawn By	JMC	*Company*	
Date	23/02/2024, 12:55:54 pm	*File Name*	CC elevated GW.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Ru Value
Stiff to V.Stiff_Sat		18	Mohr-Coulomb	8	20	0.5
Stiff to V.Stiff Residual		18	Mohr-Coulomb	8	20	0.15
Hard Residual		18	Mohr-Coulomb	10	20	0.15
Weathered Rock		20	Mohr-Coulomb	20	20	0.15

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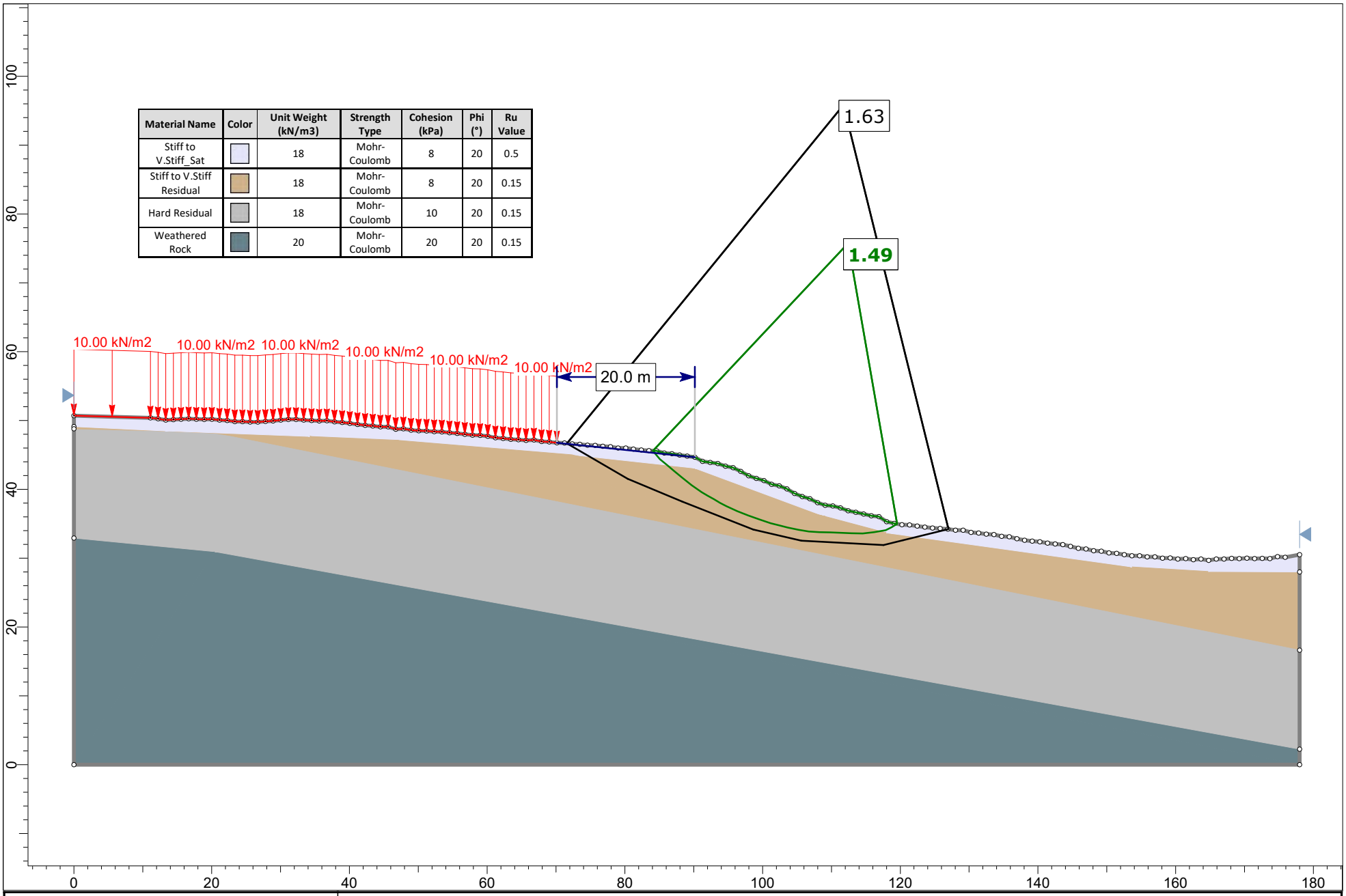
Project	23 200 - Muriwhenua - Te Hapua		
Group	Cross Section C-C	*Scenario*	Seismic - Post-development
Drawn By	JMC	*Company*	
Date	23/02/2024, 12:55:54 pm	*File Name*	CC seismic.slmd

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Ru Value
Stiff to V.Stiff_Sat		18	Mohr-Coulomb	8	20	0.5
Stiff to V.Stiff Residual		18	Mohr-Coulomb	8	20	0.15
Hard Residual		18	Mohr-Coulomb	10	20	0.15
Weathered Rock		20	Mohr-Coulomb	20	20	0.15



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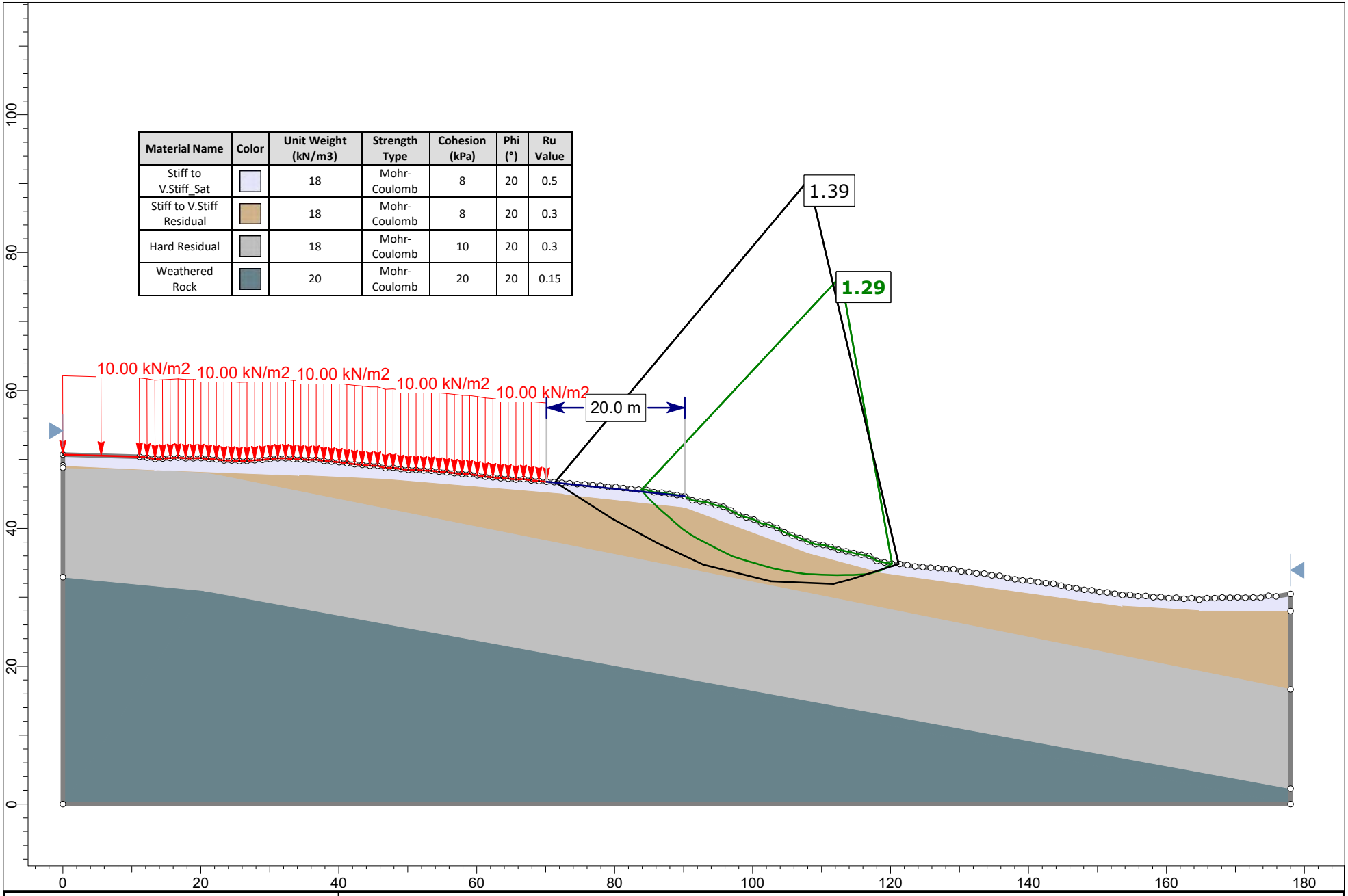
Civil & Structural Engineers

SLIDEINTERPRET 9.031

Project	23 200 - Muriwhenua - Te Hapua		
Group	Cross Section D-D	*Scenario*	Static - Post-development
Drawn By	JMC	*Company*	
Date	23/02/2024, 12:55:54 pm	*File Name*	DD static.slmd

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Ru Value
Stiff to V.Stiff_Sat		18	Mohr-Coulomb	8	20	0.5
Stiff to V.Stiff Residual		18	Mohr-Coulomb	8	20	0.3
Hard Residual		18	Mohr-Coulomb	10	20	0.3
Weathered Rock		20	Mohr-Coulomb	20	20	0.15

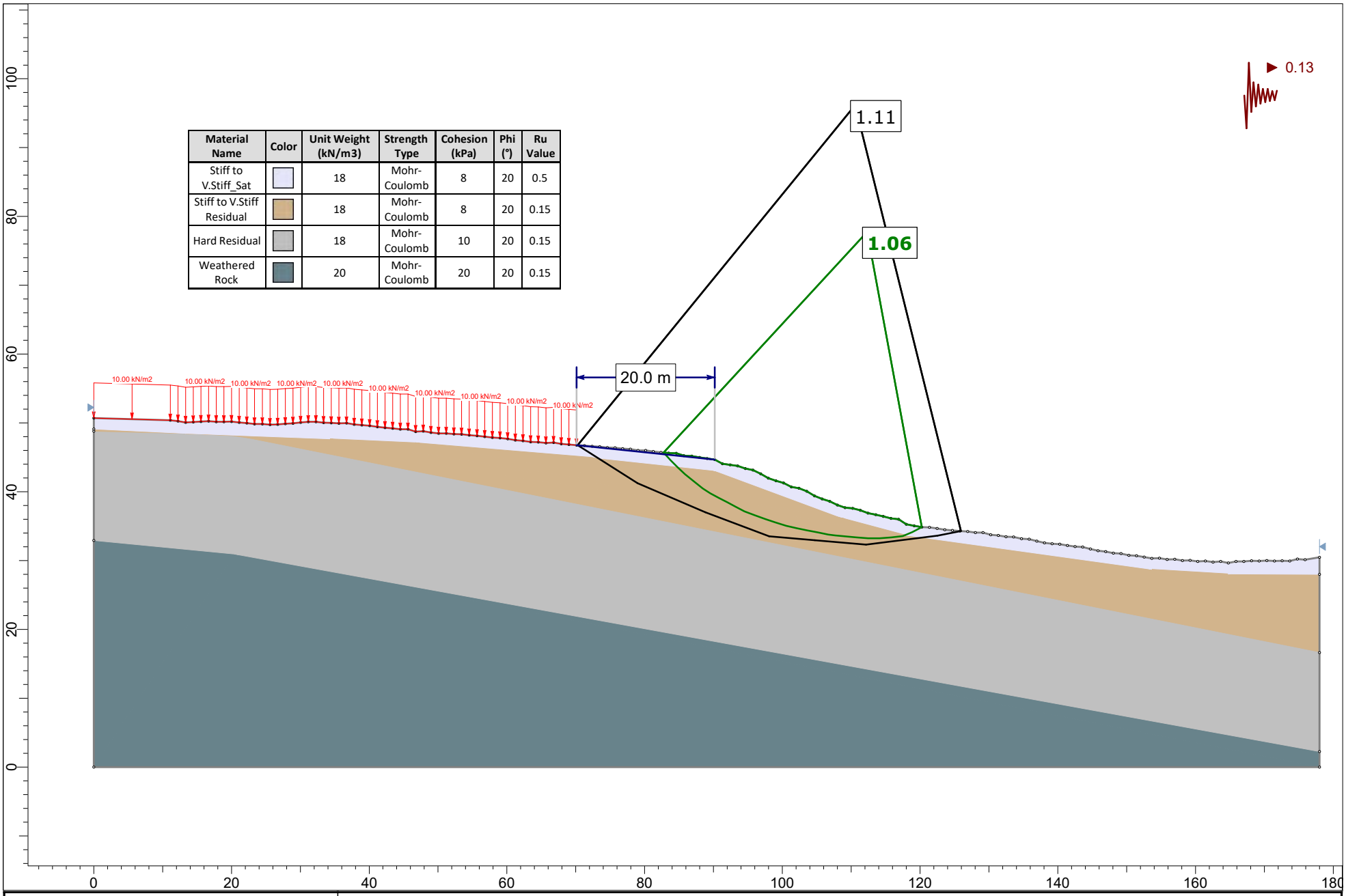


HAIGH WORKMAN LTD
Civil & Structural Engineers

SLIDEINTERPRET 9.031

Project	23 200 - Muriwhenua - Te Hapua		
Group	Cross Section D-D	*Scenario*	ElevatedGW - Post-development
Drawn By	JMC	*Company*	
Date	23/02/2024, 12:55:54 pm	*File Name*	DD elevated GW.slmd

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Ru Value
Stiff to V.Stiff_Sat		18	Mohr-Coulomb	8	20	0.5
Stiff to V.Stiff Residual		18	Mohr-Coulomb	8	20	0.15
Hard Residual		18	Mohr-Coulomb	10	20	0.15
Weathered Rock		20	Mohr-Coulomb	20	20	0.15



HAIGH WORKMAN LTD
Civil & Structural Engineers

SLIDEINTERPRET 9.031

Project	23 200 - Muriwhenua - Te Hapua		
Group	Cross Section D-D	*Scenario*	Seismic - Post-development
Drawn By	JMC	*Company*	
Date	23/02/2024, 12:55:54 pm	*File Name*	DD seismic.slmd

PRELIM CIVIL INFRASTRUCTURE REPORT

Te Hapua Road

Te Hapua

Area 1

CIVIL ENGINEERING ▾ SURVEYING ▾ LAND DEVELOPMENT

PROJECT INFORMATION

CLIENT:	Proprietors of Muirwhenua
PROJECT:	147012

DOCUMENT CONTROL

DATE OF ISSUE:	23 April 2026
REVISION	E
AUTHOR	Toby Mandeno Principal
REVIEWED BY	Amanda Or Senior Engineer
APPROVED BY	Chris Page Regional Manager

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Table of Contents

1. OVERVIEW

1.1 PROJECT

The purpose of this report is to provide an assessment of the infrastructure associated with the proposed affordable housing development, located in Area 1 in Te Hapua. The brief for the first stage of the development, was to prepare a concept design for the initial 20 houses/lots. The concept plan for the area is identified in Figure 1 Concept Plan (below).

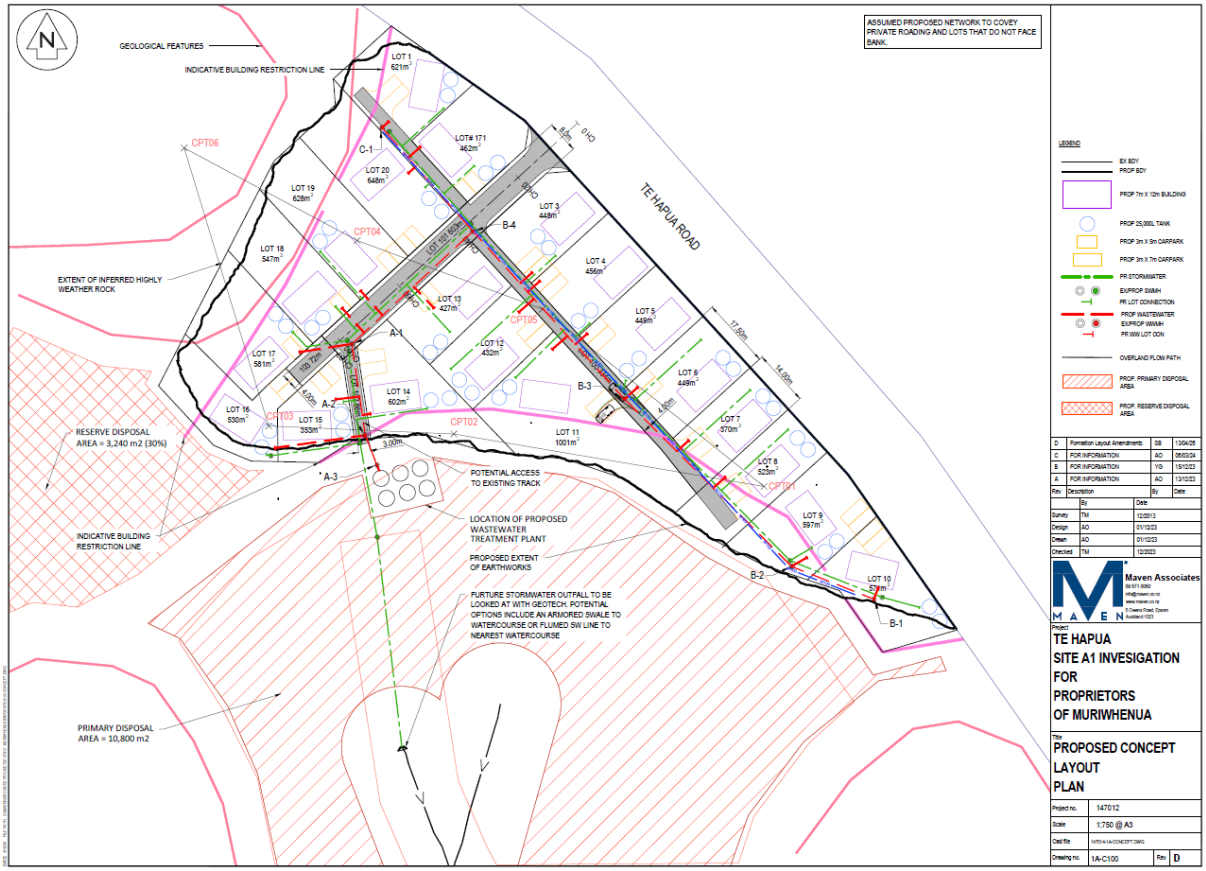


Figure 1: Concept Plan

The information provided herein relates to stormwater, wastewater, stormwater, water supply, and other service infrastructure and the potential capacity to service the proposed development.

This report provides information in support of the due diligence exercise, and further reporting and engineering design will be required before lodgement of a resource consent.

The calculations and assessments included in this report are 'desktop' analysis and are preliminary in nature based on information available at time of issue.

1.2 LEGAL DESCRIPTION

Applicant	Proprietors of Muriwhenua
Record of Title	517692
Legal Description	TE HAPUA BLOCK 42
Site Area	5875ha (Area 1 development area circa 1.2ha)

1.3 SITE DESCRIPTION

The subject development area (Area 1) is located on Te Hapua 42 Block, on the southern side of Te Hapua Road, approximately 2.5 km prior to the main Te Hapua community located on the edge of the Harbour.

Area 1 is situated on a knoll of approximately 54.00 m RL which slopes gently down to Te Hapua Road to the north-east, moderately down towards the south (between 12 – 13°), and steeply down to the north-west at approximately 25 to 30°. There is an existing farm/walking track that extends from Te Hapua Road, through the development area and out onto the ridgeline to the sough-west.

There are no existing buildings or features in the development area. The site is dominated by native scrub/trees. Please refer to the topo plan for additional detail contained within Appendix A.

The location of the subject site in relation to Te Hapua settlement is displayed in Figure 2 below.

Figure 2: Site Locality Plan (site in pink).

There are existing power and communications network present within Te Hapua Road or nearby. There are no reticulated water, wastewater, or stormwater networks in the vicinity.

1.4 PROPOSED DEVELOPMENT

The development will seek Far North District Council approval for the construction of 20 affordable houses as per the Stage 1 project brief. Maven had previously undertaken analysis and review on possible development areas, however, ecology constraints have led to Area 1 being preferred. It is assumed the houses will be prefabricated and likely to be 3 bedrooms in size.

A shared private wastewater network will provide for wastewater disposal, roof caught water will be primary means of potable and non-potable water (which may be supplemented by other means, which are discussed in more detail in this report). A new stormwater network to serve the accessways and overflow from the tanks will be constructed, alongside the private accessway and parking areas. It should be noted that the concept plans included in Appendix B are indicative only and are subject to further refinement and input from other project specialists.

2. EARTHWORKS

Earthworks will be required over the portion of the site which is being redeveloped for residential purposes.

Earthworks will involve ground disturbance of 11,220m². It is expected that the maximum cut will be approximately 5.5m and maximum fill will be approximately 0.5m in height.

Bulk earthworks quantities involve 21,179m³ of excess cut to be disposed of within the site. Working through an affordable dump site/means of carting this excess material will be critical to ensuring cost efficiencies moving forward.

The current design does not rely on retaining walls, with bulk earthworks and any batters to be designed to allowable grades (currently 1:3) subject to Geotech input. The concept plan incorporates the preliminary building setback lines identified by Haigh Workman. Please refer to their report for additional comment. This setback line and Geotech input will be revisited upon further onsite investigation and slope stability analysis. The design will be modified (as/if required) to ensure there is no need for ground improvement works.

The Engineering Drawings (Refer to Appendix B) detail the extent of works. The following is a summary of the proposed works:

2.1 BULK SUBGRADE EARTHWORKS

(not including topsoil stripping; not including rework volume)

- Total area of ground disturbance = 11,220 m²
- Total volume of cut to waste = 21,179 m³
- Maximum cut and fill depth = 0.5m Fill, 5.5m Cut

2.2 OTHERS

- Bulk earthworks assume stripping of 300 mm for pavement and foundation (3,366m³).

Resource consent will require that erosion and sediment control measures are implemented and maintained in accordance with the Engineering Drawings.

Silt control measures will need to be installed onsite prior to or during (as specified) earthworks commencement. All silt control measures will be checked and confirmed acceptable by the Engineer before relevant earthworks commence.

2.3 GEOTECH REPORTING

Since issuing the report in December, Haigh Workman have undertaken further site investigation and have issued a Geotech Report (HW Reference 23 200) dated February 2024. Please refer to this report for detailed information. A meeting has been held between Maven and Haigh Workman and a review/assessment of the previous concept drawings has been done.

The reporting largely confirmed the preliminary setbacks Maven had been working too but has identified the presence of a weather rock layer at circa 8m below the ridgeline. The current bulk earthwork levels are above this, but Maven have identified that there is risk that the stormwater line (MH 1-4) could reach this rock level. There would be options to avoid this and can be worked through as required.

The recommendations relative to the stormwater outfall and wastewater disposal areas have been considered and reflected in the revised engineering drawings attached within Appendix B.

It is noted that further assessment will be required as to where the fill material will need to be placed, however, this will be located away from any break of slope to ensure no instability issues arise as per discussions.

3. FLOODING AND OVERLAND FLOW

3.1 OVERLAND FLOWPATHS ('OLFPS')

Te Hapua Road near the eastern boundary is a localised highpoint, from there sloping down to the west and east away from the development area. The bulk of the sites are elevated above the road, of which will contain OLF in the table drain.

Within the site, proposed levels will allow for sheet flow/concentrated flows via the accessways towards the south. The overland flow will be kept away from building platforms as required. All future freeboards are to comply with the NZ building code. Given the prefabricated nature, floor levels will be set to allow 450mm crawl space below joist as required.

3.2 FLOODING

There is no flood modelling done for Te Hapua. The existing settlement is located around the harbour and is largely low lying. The development area is well elevated and removed from any ponding/flooding areas.

It is not expected that peak flow attenuation will be required in support of the development, given the location of the intended outfall (to stream).

4. STORMWATER

The Far North District Council's Engineering Standards sets out design and construction standards for stormwater and requires all land development projects to be provided with a means of stormwater disposal and treatment.

4.1 STORMWATER RETICULATION

There is no existing stormwater network in the vicinity of the development area. Te Hapua road is a gravelled, rural road with table drains in some sections.

A new stormwater network will be constructed in support of the development. This will provide a means of disposal for all impervious areas (carparks, common accessways, driveways and buildings). The concept plan includes a high-level stormwater network.

Roof caught water will be piped into aboveground tanks. Overflow from the tanks will be connected into the stormwater network alongside catchpits from the common accessways and driveways.

The outfall location is yet to be determined. Geotech advice has been received, and the stormwater network has been extended 20m beyond the work extent as suggested. From this point., flows will be via an above-ground flume to the existing overland flowpaths / stream. The flume is required to provide sufficient disposal area for wastewater as per the GWE design report.

The final design will be subject to Resource Consent and Building Consent approvals from FNDC.

4.2 STORMWATER CAPACITY

The proposed stormwater connection and private stormwater network will be subject to future Engineering Approval / Building Consent and will be designed to have capacity for the 5-year rainfall event, as is required for Far North District Council. The sizing will be undertaken as part of the developed design process.

The updated draft FNDC engineering standards stipulates flow attenuation limits, with post-development 50% and 20% AEP event flow rates to be 80% of the predevelopment levels. This would mean solutions such as tanks or ponds will be required.

If required, the onsite stormwater tanks can provide for attenuation, however, this would reduce overall potable supply, of which should be avoided. This aspect is to be discussed with Far North District Council / Regional Council, given the lack of effects and need to ensure increased potable water supply.

4.3 STORMWATER QUALITY

There is no requirement for the redevelopment area to be provided with treatment, given the low overall areas and nature of development.

5. WASTEWATER

The Far North District Council's Engineering Standards sets out the design principles for wastewater drainage and requires any development project to be provided with a means of wastewater disposal.

5.1 WASTEWATER RETICULATION

There is no existing reticulated wastewater network in Te Hapua. All existing wastewater discharges are treated via septic tanks and dripper irrigation. The lots are proposed to be serviced by a combined community wastewater treatment system with disposal to land.

GWE Consulting Engineers have been engaged to undertake the design of the Wastewater treatment and disposal design. Please refer to the GWE On-site Wastewater Management Subdivision Assessment report attached within Appendix C for additional detail.

In summary, a gravity network (which the appended Maven plans show) will convey wastewater to a central treatment plant, which will treat and then dispose of the treated wastewater via dripper irrigation lines, of which have been sized to accommodate four-bedroom homes, through the required primary and secondary areas. It is likely that the houses will be three-bedroom, and thus the required disposal areas would reduce accordingly.

5.2 WASTEWATER CAPACITY AND DISPOSAL

Based on a disposal rate of 2mm/day, and 20 4-bedroom units, the total primary disposal area required will be 10,800m² with a 30% reserve area (3,240m²) also needed.

The Geotech reporting has identified the areas to the south of the development site as being suitable for disposal of effluent and has confirmed that the assumed soakage rate (2mm/day) as being correct.

The preferred location as per GWE reporting has been shown on the Maven engineering drawings, and the final location/design will be subject to the Resource Consent and Building Consent approvals, with further design input from GWE. Refer to their report attached within Appendix C for additional commentary.

6. WATER SUPPLY

The Far North District Council's Engineering Standards sets out the design principles for water supply and requires assessment against SNZPAS 4509:2008 NZ Fire Service Fire Fighting Water Supply Code of Practice.

6.1 POTABLE WATER RETICULATION

There is no existing water supply network nearby, and there had been an investigation for the potential options to provide water supply for the proposed residential development in *Te Kao / Te Hapua Water Scoping Study* (prepared by Chris Frost, Version 2, Dated 05 June 2020). The preferred solution for improving the water supply to the existing settlement is via bore fed water, which provides reticulated supply to the township.

Work has been undertaken and a bore has been drilled in Area 11 as per Maven plans. The location of the bore is as per the yellow/blue star, with the development area (Area 1) indicated by the red circle.

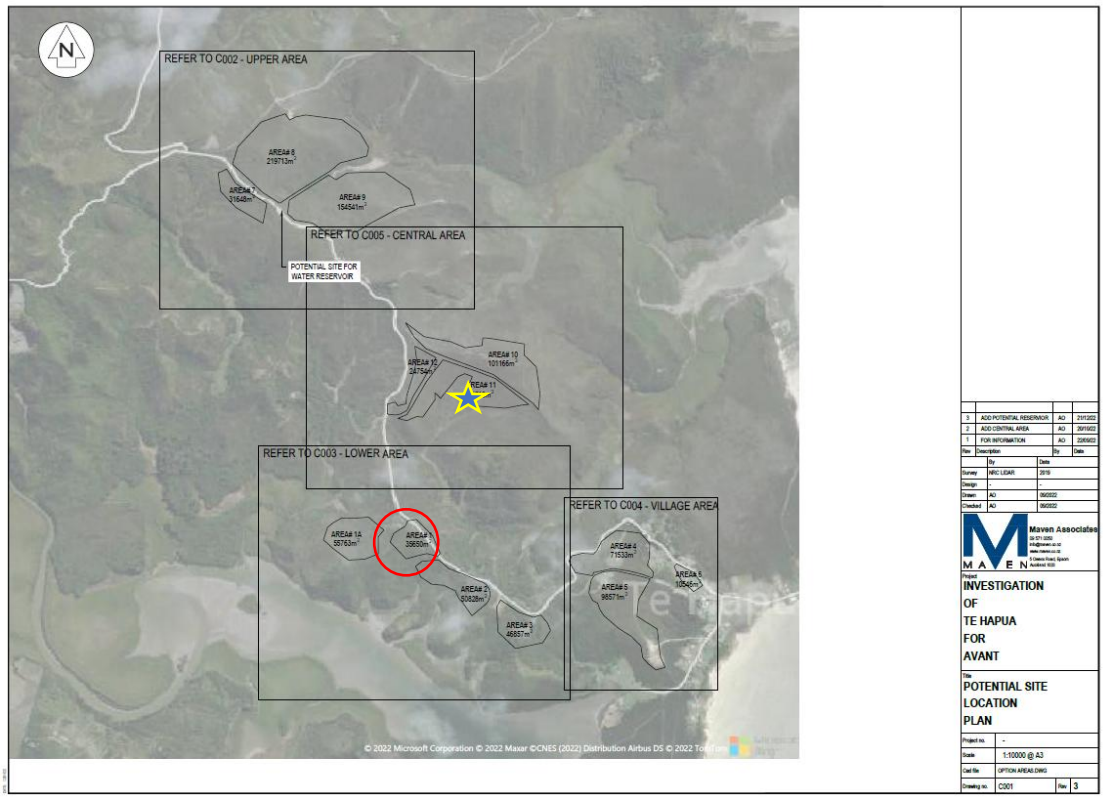


Figure 3: Location of bore (yellow/blue star) and Area 1 development site (red circle)

Please refer to the WWLA report (Appendix D) which confirms the flow rates associated with the drilled bore. In the long term, it is anticipated that the bore will be used to supply a storage tank at a flow rate of approximately 0.4 L/s (34 m_3/day), which means it would take approximately seven to ten days to fill the 250 m^3 proposed reservoir at the observed flow rate. It can also be noted that production from sand bores often improves over the first three months of use. Once full, the bore would be used intermittently to top it up.

Supplementing the town supply detailed above, the development will be supported by tank stored, roof caught water. Based on NIWA rainfall data, a 100m^2 roof area would result in 98.8m^3 on an annual basis. This will provide the primary potable and non-potable supply. FNDC standards require 300L per person per day.

Maven have undertaken some further modelling around water supply and demands, and this is attached to this report for further understanding, and likely need for supplementary water from the bore (Appendix E). Given the distance from the bore to the development, trucking water from the future reservoir is the logical solution, until a larger scaled development was undertaken which could justify the cost of an inground water main.

It is anticipated that each lot/unit will have a minimum of 45,000L of tank storage which will provide the primary potable and non-potable supply for each unit. Additional tank storage can be provided, and this is to be further investigated as the developed design progresses. For the appended concept plans, two 22,5000L tanks have been indicated for each unit.

6.2 FIRE FIGHTING SUPPLY

The minimum firefighting water supply classification for residential developments is FW2. Therefore, any future residential development must meet the following water supply requirements:

The New Zealand Fire Service Firefighting Water Supplies Code of Practice (SNZ PAS 4509:2008) states that 45m³ of water storage must be available within 90m from each dwelling for firefighting purposes within non-reticulated developments, with FW2 water supply classification. The 90m distance is measured from the point where the water supply is available rather than the water source itself (i.e. to the coupling or suction source).

We note that in terms of NZ PAS 4509:2008, a minimum of 45,000 litres is available for Firefighting requirements for a dwelling that is sprinklered and only 7,000 litres for a sprinklered dwelling.

The required design for fire fighting supply will be worked through with Fire and Emergency NZ (FENZ) and will likely result in communal supply point(s) via above ground tanks.

The inclusion of dedicated firefighting supply ensures that on lot stormwater tanks can be used for potable/non potable supply, as otherwise each tank would likely need to hold 10,000L for firefighting supply. The design will be worked through as part of the Resource Consent process.

7. OTHER SERVICES

Telecommunications in the area are managed by Chorus, Power supply in the area is managed by Northpower. It is understood that services are available, however, it is likely that upgrades will be required to service the development.

Underground services will be supplied to each unit by placing them down a service trench across the proposed development, or via service tuds in Te Hapua Road for road facing lots. The actual design and connections are subject to further consultation with the service providers.

8. CONCLUSION

The report outlines the high-level civil servicing strategy for the intended redevelopment of Te Hapua Area 1 as per the project brief.

The concept plans demonstrate a possible arrangement for the 20 units, inclusive of required roading, stormwater, water tanks, and parking areas. The design will be subject to further refinement from specialists during the design development stages.

The earthworks design is purposefully in cut, as to reduce the likelihood of instability issues. The excess material will need to be disposed of in an affordable means, and the location/methodology will be important to keep costs down. Final earthwork levels will be revised once additional Geotech testing/reporting has been prepared. Geotech reporting has identified the presence of a weathered rock surface circa 8m below the ridgeline. Whilst bulk cut levels appear to be above this, Maven notes that the bore holes are not definitive and there is the possibility of SW MH 1-4 extending into the rock layer. There are various options which can be explored to avoid or mitigate this risk.

A new stormwater network will need to be constructed, and this will provide a means of overflow from each lot/unit storage tanks and will convey surface waters associated with the accessway and parking areas. The final location and design of the outfall is subject to ecology and Geotech input and will be

confirmed as part of the developed design stage. The initial Geotech advice has been included into the revised concept engineering plans appended.

Water supply for each unit will be via above ground tanks. The concept plan includes two 22,500L tanks for each house. The roof caught water will likely be supplemented from the bore and wider town supply workstream, as per the design details in the WWLA report appended.

Firefighting supply will likely be via communal tank(s) and will be subject to consultation and approval from FENZ. The communal approach will reduce the need to provide storage volume within each lot for firefighting purposes, given the need to maximise potable storage volume and supply.

There is no known flooding or overland flowpaths within the development area. All units will be provided with freeboard in accordance with the NZBC. There is no known downstream flooding, and thus it is suggested that attenuation should not be reuqired, although this will need to be agreed with Far North District Council.

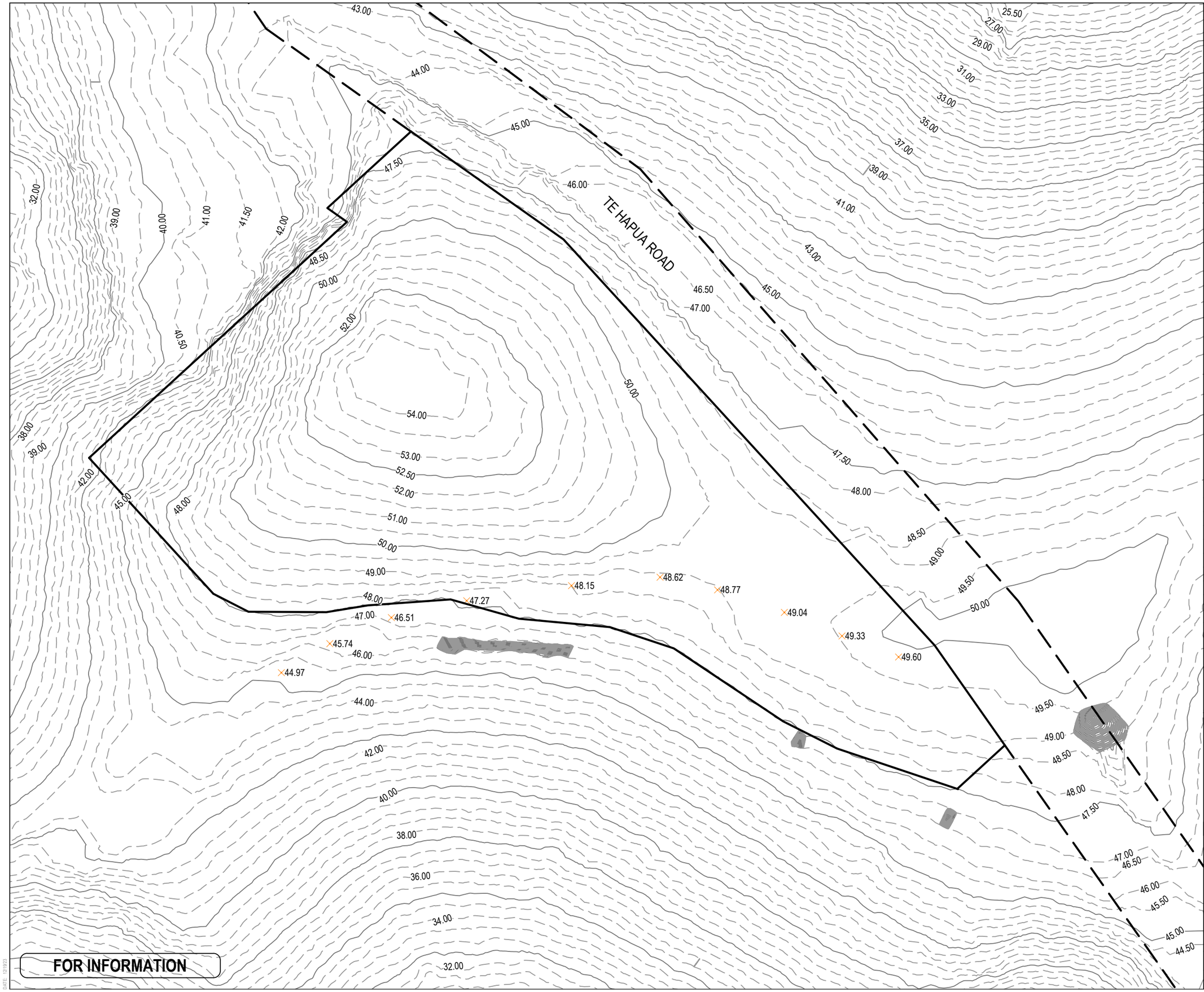
Suitable wastewater disposal can be provided for the development. The units are proposed to be serviced by a combined community wastewater treatment system with disposal to land. The sizing and location of the disposal fields have been undertaken by GWE, as per their appended report. The current disposal fields have been included in the Maven concept plans, and will be finalised prior to the lodgement of the Resource Consent.

A telecommunications, power and gas network are present in the surrounding area and it is anticipated that service can be made available to the proposed development.

Information gathered to-date confirms the site is suitable for the proposed development.

9. APPENDICES

9.i APPENDIX A – TOPO SURVEY



Notes

1. Co-ordinates in terms of NZ Geodetic Datum Mt Eden 2000.
2. Levels in terms of the New Zealand Vertical Datum 2016.
3. Contour/LiDAR information extracted from LINZ data service. Spot heights captured in field to confirm accuracy of surface.
4. Major contour intervals at 2.5m
5. Minor contour intervals at 0.5m

EX MAJOR CONTOUR
EX MINOR CONTOUR
DEVELOPMENT EXTENT
EX ROAD BDY
GPS SPOT HEIGHT

Rev	Description	By	Date
A	FOR ISSUE	CJP	12/23

	By	Date
Survey	CJP	12/23
Design		
Drawn	CJP	12/23
Checked	TM	12/23

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Project
TOPOGRAPHICAL PLAN
TE HAPUA
AREA 1
FOR
MURIWHENUA

Title
TOPOGRAPHICAL SURVEY PLAN

Project no.	147012		
Scale	1:750 @ A3		
Cad file	C050 - TOPO AREA 1.DWG		
Drawing no.	C050	Rev	A

FOR INFORMATION

DATE: 12/19/23

9.ii APPENDIX B - ENGINEERING CONCEPT PLANS

ASSUMED PROPOSED NETWORK TO COVEY PRIVATE ROADING AND LOTS THAT DO NOT FACE BANK.

GEOLOGICAL FEATURES

INDICATIVE BUILDING RESTRICTION LINE

EXTENT OF INFERRED HIGHLY WEATHER ROCK

RESERVE DISPOSAL AREA = 3,240 m2 (30%)

INDICATIVE BUILDING RESTRICTION LINE

PRIMARY DISPOSAL AREA = 10,800 m2

POTENTIAL ACCESS TO EXISTING TRACK

LOCATION OF PROPOSED WASTEWATER TREATMENT PLANT

PROPOSED EXTENT OF EARTHWORKS

FURTURE STORMWATER OUTFALL TO BE LOOKED AT WITH GEOTECH. POTENTIAL OPTIONS INCLUDE AN ARMORED SWALE TO WATERCOURSE OR FLUMED SW LINE TO NEAREST WATERCOURSE

TE HAPUA ROAD

LOT 1 621m²
LOT# 171 462m²
LOT 20 648m²
LOT 19 628m²
LOT 18 547m²
LOT 17 581m²
LOT 16 530m²
LOT 15 353m²
LOT 14 602m²
LOT 13 427m²
LOT 12 432m²
LOT 11 1001m²
LOT 3 448m²
LOT 4 456m²
LOT 5 449m²
LOT 6 449m²
LOT 7 370m²
LOT 8 523m²
LOT 9 597m²
LOT 10 571m²

CPT01 CPT02 CPT03 CPT04 CPT05 CPT06

C-1 B-4 A-1 A-2 A-3 B-3 B-2 B-1

CH 0 CH 20 CH 40 CH 60 CH 80 CH 100 CH 120

8.0m 17.50m 14.00m 4.00m 3.00m 103.72m

LOT 101 603m² LOT 102 86m²

LEGEND

- EX BDY
- PROP BDY
- PROP 7m X 12m BUILDING
- PROP 25,000L TANK
- PROP 3m X 5m CARPARK
- PROP 3m X 7m CARPARK
- PR STORMWATER
- EX/PROP SWMH
- PR LOT CONNECTION
- PROP WASTEWATER
- EX/PROP WWMH
- PR WW LOT CON
- OVERLAND FLOW PATH
- PROP. PRIMARY DISPOSAL AREA
- PROP. RESERVE DISPOSAL AREA

Rev	Description	By	Date
D	Formation Layout Amendments	SB	13/04/26
C	FOR INFORMATION	AO	06/03/24
B	FOR INFORMATION	YG	15/12/23
A	FOR INFORMATION	AO	13/12/23

	By	Date
Survey	TM	12/2013
Design	AO	01/12/23
Drawn	AO	01/12/23
Checked	TM	12/2023

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Project
TE HAPUA
SITE A1 INVESIGATION FOR PROPRIETORS OF MURIWHENUA

Title
PROPOSED CONCEPT LAYOUT PLAN

Project no.	147012		
Scale	1:750 @ A3		
Cad file	147014-1A-CONCEPT.DWG		
Drawing no.	1A-C100	Rev	D

N

LOT 1
621m²

LOT# 171
462m²

LOT 20
648m²

LOT 19
628m²

LOT 18
547m²

LOT 17
581m²

LOT 16
530m²

LOT 15
353m²

LOT 102 86m²

LOT 14
602m²

LOT 13
427m²

LOT 12
432m²

LOT 101 603m²

LOT 100 334m²

LOT 11
1001m²

LOT 3
448m²

LOT 4
456m²

LOT 5
449m²

LOT 6
449m²

LOT 7
370m²

LOT 8
523m²

LOT 9
597m²

LOT 10
571m²

TE HAPUA ROAD

LEGEND

- EX BDY
- PROP BDY
- EX MAJOR CONTOUR
- EX MINOR CONTOUR
- PR MAJOR CONTOUR
- PR MINOR CONTOUR
- PROP EXTENT WORK

Rev	Description	By	Date
B	Boundaries Amended	SB	13/04/26
A	FOR INFORMATION	AO	12/2023

	By	Date
Survey	LIDAR	-
Design	AO	01/12/23
Drawn	AO	01/12/23
Checked	TM	13/12/23

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Project
TE HAPUA
SITE A1 INVESIGATION
FOR
PROPRIETORS
OF MURIWHENUA

Title
PROPOSED CONCEPT
EARTHWORKS
PLAN

Project no.	147012
Scale	1:750 @ A3
Cad file	147012-1A-C200.DWG
Drawing no.	A1-C200 Rev B

DATE: 4/26 FILEPATH: C:\MAVEN\ARCHIVED PROJECTS\147012 MURIWHENUA\DWG\147012-1A-C200.DWG

LEGEND

- EX BDY
- PROP BDY
- EX MAJOR CONTOUR
- EX MINOR CONTOUR
- PR MAJOR CONTOUR
- PR MINOR CONTOUR
- PROP EXTENT WORK

Rev	Description	By	Date
B	Boundaries Amended	SB	13/04/26
A	FOR INFORMATION	AO	12/2023

	By	Date
Survey	LIDAR	-
Design	AO	01/12/23
Drawn	AO	01/12/23
Checked	TM	13/12/23

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Project

TE HAPUA
SITE A1 INVESIGATION
FOR
PROPRIETORS
OF MURIWHENUA

Title

PROPOSED CONCEPT
CONTOURS
PLAN

Project no.	147012
Scale	1:750 @ A3
Cad file	147012-1A-C200.DWG
Drawing no.	A1-C201
Rev	B

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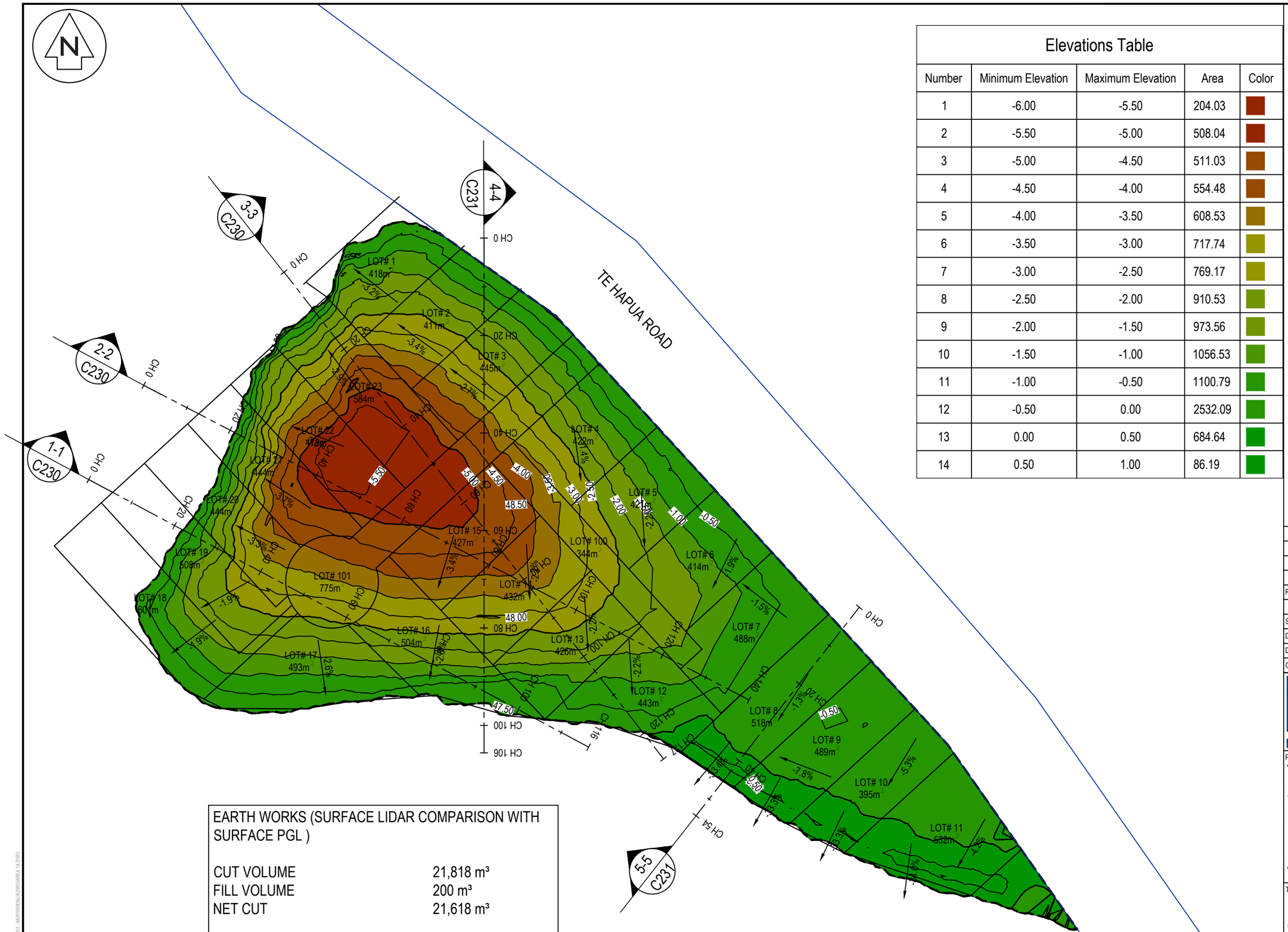

Elevations Table

Number	Minimum Elevation	Maximum Elevation	Area	Color
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3	-5.00	-4.50	511.03	
4	-4.50	-4.00	554.48	
5	-4.00	-3.50	608.53	
6	-3.50	-3.00	717.74	
7	-3.00	-2.50	769.17	
8	-2.50	-2.00	910.53	
9	-2.00	-1.50	973.56	
10	-1.50	-1.00	1056.53	
11	-1.00	-0.50	1100.79	
12	-0.50	0.00	2532.09	
13	0.00	0.50	684.64	
14	0.50	1.00	86.19	

LEGEND
- EX BDY
- PROP BDY
- PROP EXTENT WORK

EARTH WORKS (SURFACE LIDAR COMPARISON WITH SURFACE PGL)

CUT VOLUME		21,818 m³
FILL VOLUME		200 m³
NET CUT		21,618 m³
TOPSOIL STRIPPED (300mm)	=	3,366 m³
EARTHWORKS AREA	=	11,220 m² /1.122 Ha

NOTE: NO ALLOWANCE FOR SERVICES TRENCHES, VOLUMES ARE UNFACTORED AND IN SITU

DRAFT FOR REVIEW

Rev	Description	By	Date
A	DRAFT	AO	2023

	By	Date
Survey	BY	MM/YYYY
Design	AO	01/12/23
Drawn	AO	01/12/23
Checked	-	DATE

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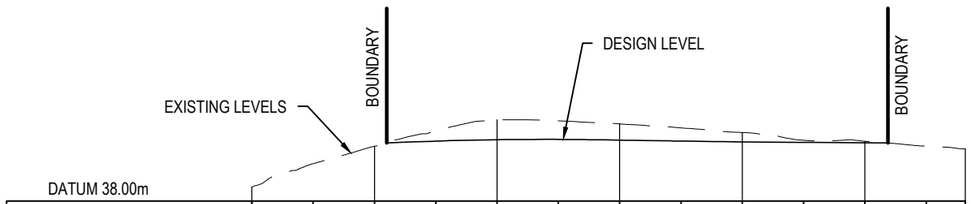
Project
TE HAPUA SITE A1 INVESIGATION FOR AVANT

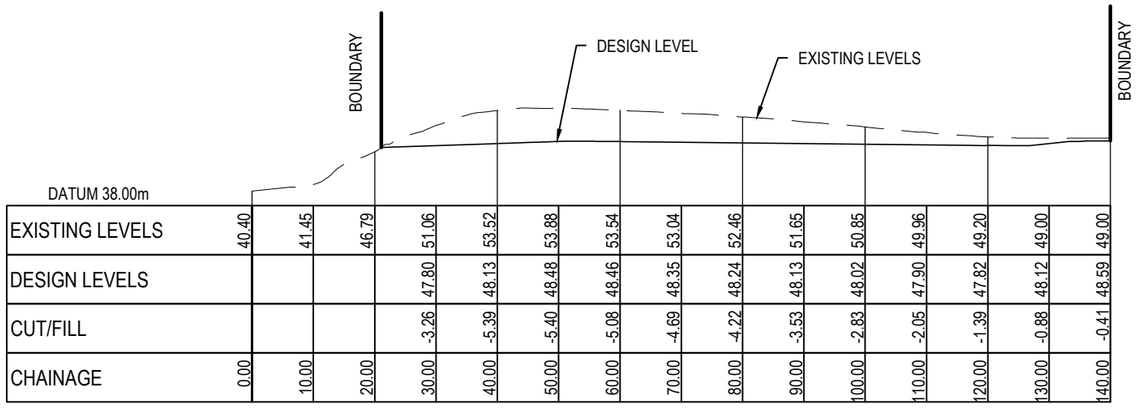
Title
PROPOSED CUT/FILL PLAN

Project no.	147012
Scale	1:750 @ A3
Cad file	AREA 1A.DWG
Drawing no.	A1-C220 Rev A



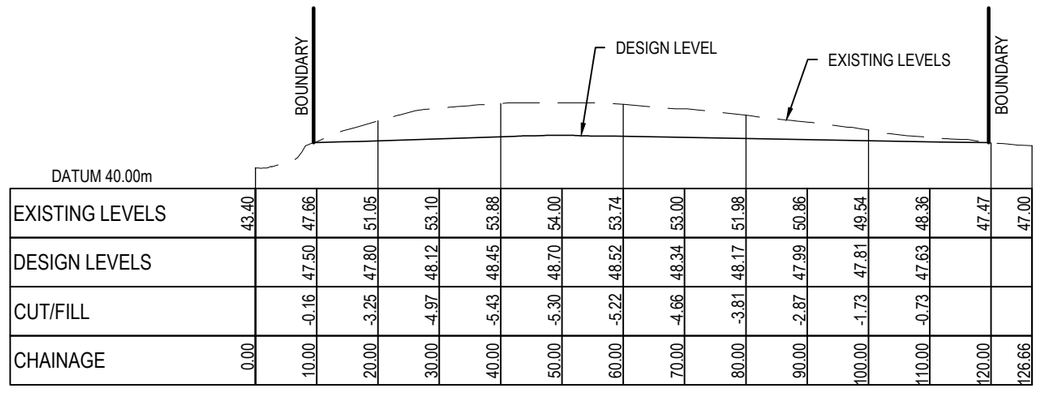
DATUM 38.00m													
EXISTING LEVELS	40.28	44.11	46.96	49.44	51.25	51.09	50.61	49.95	49.19	47.93	47.75	46.99	46.51
DESIGN LEVELS				47.78	48.02	48.07	47.95	47.80	47.68	47.59	47.52		
CUT/FILL				-1.66	-3.23	-3.02	-2.66	-2.16	-1.51	-0.34	-0.23		
CHAINAGE	0.00	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	100.00	110.00	116.35

CROSS SECTION 1
SCALE: HORI 1:1000 VERT 1:1000



DATUM 38.00m														
EXISTING LEVELS	40.40	41.45	46.79	51.06	53.52	53.88	53.54	53.04	52.46	51.65	50.85	49.96	49.20	49.00	49.00
DESIGN LEVELS				47.80	48.13	48.48	48.46	48.35	48.24	48.13	48.02	47.90	47.82	48.12	48.59
CUT/FILL				-3.26	-5.39	-5.40	-5.08	-4.69	-4.22	-3.53	-2.83	-2.05	-1.39	-0.88	-0.41
CHAINAGE	0.00	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	100.00	110.00	120.00	130.00	140.00

CROSS SECTION 2
SCALE: HORI 1:1000 VERT 1:1000



DATUM 40.00m													
EXISTING LEVELS	43.40	47.66	51.05	53.10	53.88	54.00	53.74	53.00	51.98	50.86	49.54	48.36	47.47	47.00
DESIGN LEVELS		47.50	47.80	48.12	48.45	48.70	48.52	48.34	48.17	47.99	47.81	47.63		
CUT/FILL		-0.16	-3.25	-4.97	-5.43	-5.30	-5.22	-4.66	-3.81	-2.87	-1.73	-0.73		
CHAINAGE	0.00	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	100.00	110.00	120.00	126.66

CROSS SECTION 3
SCALE: HORI 1:1000 VERT 1:1000

DRAFT FOR REVIEW

NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH AUCKLAND COUNCIL STANDARDS.
2. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL SERVICES THAT MAY BE AFFECTED BY THEIR OPERATIONS.
3. THE CONTRACTOR SHALL COMPLY WITH ALL RELEVANT HEALTH AND SAFETY REQUIREMENTS.
4. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY APPROVAL FROM UTILITY OPERATORS BEFORE COMMENCING WORK UNDER OR NEAR THEIR SERVICES.
5. SEDIMENT CONTROL SHALL BE INSTALLED AND OPERATIONAL BEFORE EARTHWORKS START ONSITE IN ACCORDANCE WITH COUNCIL STANDARDS.
6. CONTRACTOR SHALL PROVIDE ASBUILT OF WORKING SEDIMENT CONTROL DEVICES AND CONFIRMATION OF POND/DECENT VOLUMES TO ENGINEER.
7. SEDIMENT CONTROL TO COMPLY WITH GD05 STANDARDS.

LEGEND
- EX BDY
- PROP BDY
- PROP EXTENT WORK

Rev	Description	By	Date
A	DRAFT	YG	12/2023

	By	Date
Survey	BY	MM/YYYY
Design	AO	01/12/23
Drawn	AO	01/12/23
Checked	-	DATE

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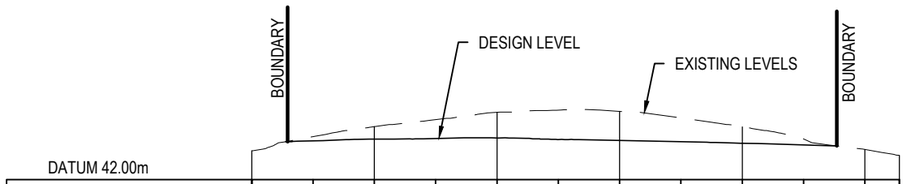
Project
TE HAPUA
SITE A1
INVESIGATION
FOR
AVANT

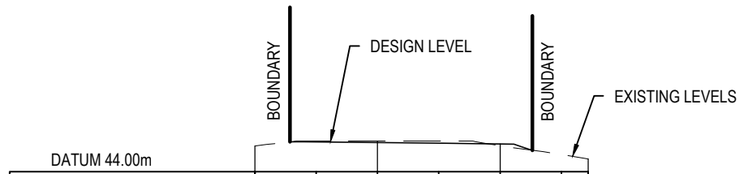
Title
PROPOSED
CROSS SECTION
PLAN

Project no.	147012
Scale	1:1000 @ A3
Cad file	AREA 1A.DWG
Drawing no.	C230 Rev A



DATUM 42.00m												
EXISTING LEVELS	46.70	49.01	50.64	51.78	52.97	53.33	53.13	52.07	50.62	48.62	46.93	45.93
DESIGN LEVELS		48.34	48.61	48.70	48.79	48.55	48.39	48.18	47.94	47.66		
CUT/FILL		-0.68	-2.03	-3.08	-4.18	-4.78	-4.73	-3.89	-2.68	-0.97		
CHAINAGE	0.00	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	100.00	105.63

CROSS SECTION 4
SCALE: HORI 1:1000 VERT 1:1000



DATUM 44.00m							
EXISTING LEVELS	48.20	49.00	49.00	49.00	48.23	46.81	46.07
DESIGN LEVELS		48.84	48.75	48.66	48.53		
CUT/FILL		-0.16	-0.25	-0.34	0.30		
CHAINAGE	0.00	10.00	20.00	30.00	40.00	50.00	54.36

CROSS SECTION 5
SCALE: HORI 1:1000 VERT 1:1000

DRAFT FOR REVIEW

NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH AUCKLAND COUNCIL STANDARDS.
2. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL SERVICES THAT MAY BE AFFECTED BY THEIR OPERATIONS.
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6. CONTRACTOR SHALL PROVIDE ASBUILT OF WORKING SEDIMENT CONTROL DEVICES AND CONFIRMATION OF POND/DECENT VOLUMES TO ENGINEER.
7. SEDIMENT CONTROL TO COMPLY WITH GD05 STANDARDS.

LEGEND
- EX BDY
- PROP BDY
- PROP EXTENT WORK

Rev	Description	By	Date
A	DRAFT	YG	12/2023

	By	Date
Survey	BY	MM/YYYY
Design	AO	01/12/23
Drawn	AO	01/12/23
Checked	-	DATE

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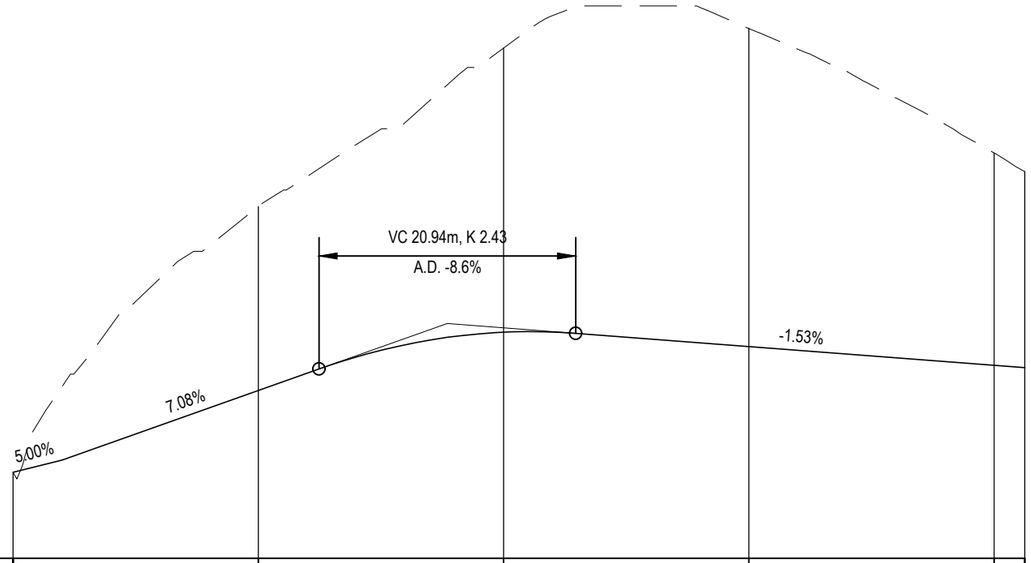
Project
TE HAPUA
SITE A1
INVESIGATION
FOR
AVANT

Title
PROPOSED
CROSS SECTION
PLAN

Project no.	147012		
Scale	1:1000 @ A3		
Cad file	AREA 1A.DWG		
Drawing no.	C231	Rev	A



DATUM 45.00m

EXISTING LEVELS	46.40	50.73	53.31	53.64	51.61	51.30
DESIGN LEVELS	46.40	47.73	48.68	48.45	48.14	48.10
CUT/FILL	0.00	-3.00	-4.63	-5.19	-3.46	-3.20
CHAINAGE	0.00	20.00	40.00	60.00	80.00	82.50

JOAL 1
SCALE: HORI 1:500 VERT 1:100

Rev	Description	By	Date
A	FOR INFORMATION	AO	13/12/23

	By	Date
Survey	TM	12/2013
Design	AO	01/12/23
Drawn	AO	01/12/23
Checked	TM	12/2023

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Project
TE HAPUA
SITE A1 INVESIGATION
FOR
PROPRIETORS
OF MURIWHENUA

Title
PROPOSED CONCEPT
JOAL 1 LONGSECTION
PLAN

Project no.	147012		
Scale	1:500 @ A3		
Cad file	147014-1A-CONCEPT.DWG		
Drawing no.	1A-C310	Rev	A

DATUM 30.00m

EXISTING LEVELS	32.43	43.33	47.23	51.64	52.83	49.43	48.09	47.71
DESIGN LEVELS				48.13	48.60	48.45	48.22	48.03
PIPE INVERT	32.43	40.67	40.86	44.59	44.58	44.84	44.85	45.27	45.36	46.21	46.15	46.74	46.79	47.04
DEPTH INVERT (m)	0.71	2.54	2.78	3.35	3.39	2.33	1.50	1.01
PIPE GRADE	375mm uPVC SN16 Ø @ 15.70%		375mm uPVC SN16 Ø @ -15.77%	375mm uPVC SN16 Ø @ 1.00%	375mm uPVC SN16 Ø @ 1.00%	300mm uPVC SN16 Ø @ 1.52%	300mm uPVC SN16 Ø @ 1.00%	300mm uPVC SN16 Ø @ 1.00%
CHAINAGE	0.00	52.45	76.10	101.79	144.00	199.85	259.09	283.77

SW LINE 1
SCALE: HORI 1:500 VERT 1:100

Rev	Description	By	Date
A	FOR INFORMATION	AO	06/03/24

	By	Date
Survey	TM	12/2013
Design	AO	01/12/23
Drawn	AO	01/12/23
Checked	TM	12/2023

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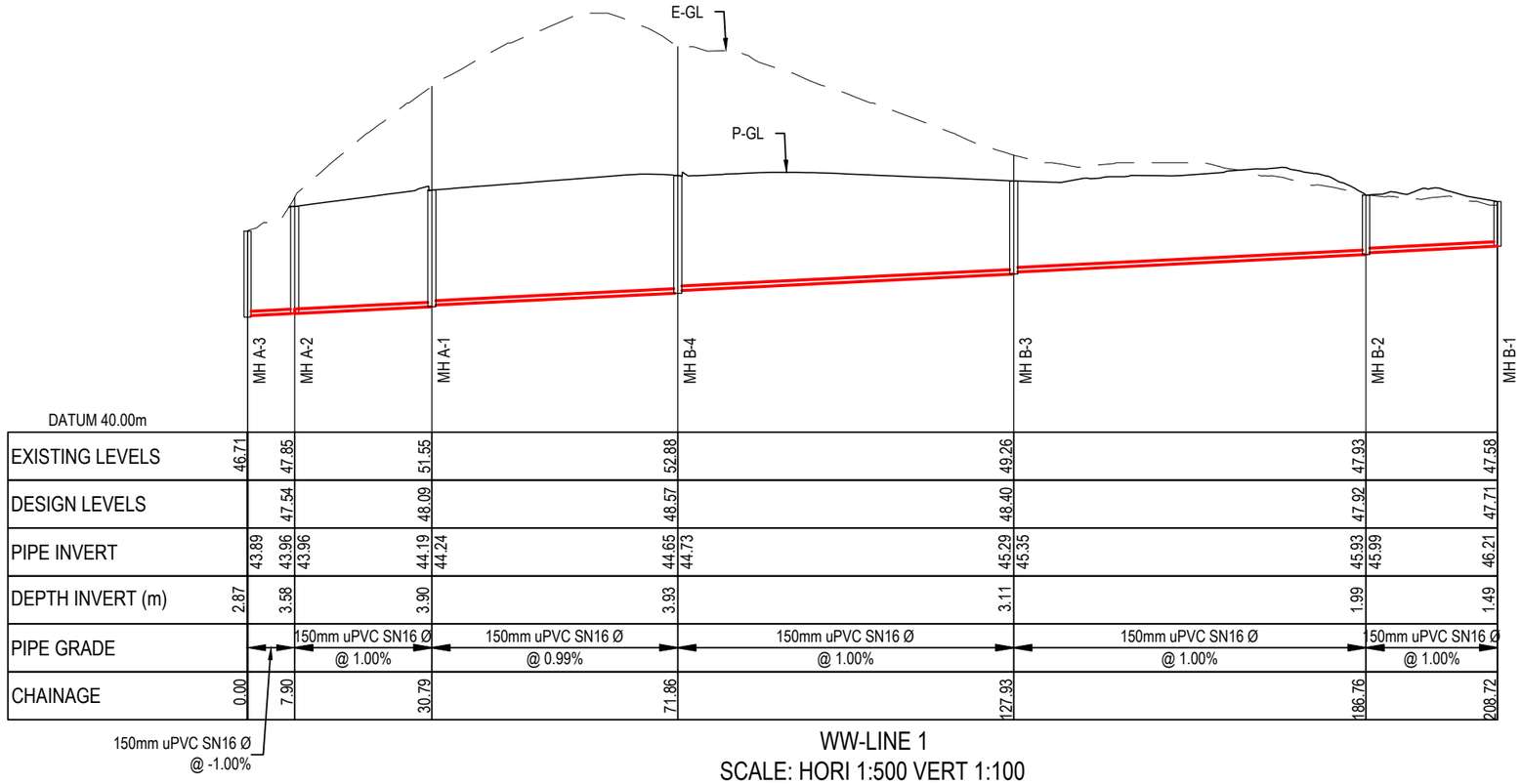
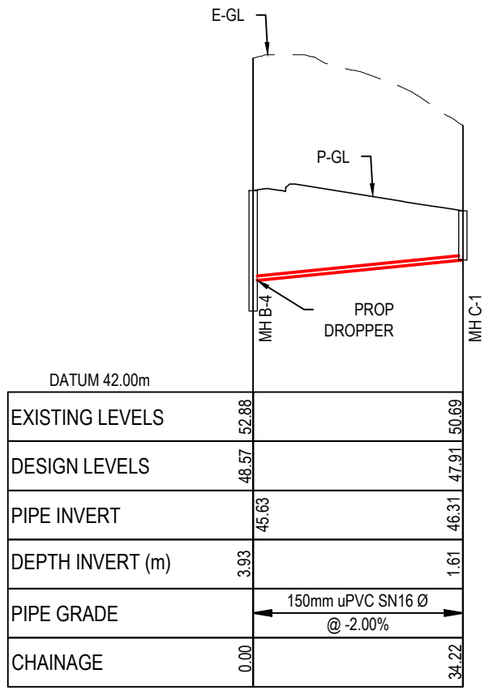
Project
TE HAPUA SITE A1 INVESIGATION FOR PROPRIETORS OF MURIWHENUA

Title
PROPOSED CONCEPT STORMWATER LONGSECTION PLAN

Project no.	147012		
Scale	1:1000 (H) 1:200 (V) @ A3		
Cad file	147014-1A-CONCEPT.DWG		
Drawing no.	1A-C410	Rev	A



WW-LINE 1
SCALE: HORI 1:500 VERT 1:100



WW- LINE 2
SCALE: HORI 1:500 VERT 1:100

Rev	Description	By	Date
A	FOR INFORMATION	YG	04/04/24

	By	Date
Survey	TM	12/2013
Design	AO	01/12/23
Drawn	AO	01/12/23
Checked	TM	12/2023

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Project
TE HAPUA SITE A1 INVESIGATION FOR PROPRIETORS OF MURIWHENUA

Title
PROPOSED CONCEPT WASTEWATER LONGSECTION PLAN

Project no.	147012		
Scale	1:1000 (H) 1:200 (V) @ A3		
Cad file	147014-1A-CONCEPT.DWG		
Drawing no.	1A-C510	Rev	A

9.iii Appendix C – GWE Preliminary Wastewater Memo

GWE
CONSULTING ENGINEERS

ON-SITE WASTEWATER MANAGEMENT SUBDIVISION ASSESSMENT REPORT

Muriwhenua
Te Hapua

MURIWHENUA INCORPORATION

April 2024 | V1

Creative Thinking | Better Environments

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DOCUMENT CONTROL RECORD

Client:	Muriwhenua Incorporation
Project Location:	Muriwhenua, Te Hapua
Job Number:	J5294
Document:	On-site Wastewater Management | Subdivision Assessment Report
Version:	V1
Document Status:	Final - Approved for Issue
Date:	April 2024
Prepared by:	 Ankur Chakraborty, Intern Engineer
Reviewed by:	 Daniel Kuruppu, Senior Water/Wastewater Engineer
Approved by:	 Patrick O'Riordan, Technical Director
Filename:	https://gweconsult.sharepoint.com/sites/ActiveProjects/LD/Muriwhenua Te Hapua-J5294/04-WW/04-Reports/01-Draft_Review/RWW01v1 DRAFT - Muriwhenua Te Hapua - WWDR.docx

GWE Consulting Engineers
Ground Floor Oceanbridge House 25 Anzac Street Takapuna Auckland 0622
PO Box 32 311 Devonport Auckland 0624

DOCUMENT STATUS

STATUS	DATE	DETAILS	AUTHOR	CHECKED	APPROVED
FINAL	April 2024	Final	AC	DK	PO

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

This report was prepared by GWE Consulting Ltd (GWE) for the Muriwhenua Incorporation as our client.

GWE has received drawings for a proposed subdivision of 20 residential lots (designated "Area 1") on Te Hapua Block 42, located off Te Hapua Road, Te Hapua. The site is approximately 2.5 km from the main Te Hapua community.

This report assesses the suitability of the site to support a 20-lot residential subdivision in relation to wastewater engineering and is intended to be used to provide support for the subdivision consent application.

The information in this report is based on information received from the client, their consultants, and planners.

2 SITE DETAILS

The subject site is located at Te Hapua 42 Block, on the southern side of Te Hapua Road. The site is legally described as Te Hapua Block with a gross lot area of approximately 5,875 hectares (with Area 1 having a developed area of approximately 1.2 ha). The property lies adjacent to Te Hapua Road and is currently undeveloped.

The site locality plan (Area 1 - purple) is displayed in Figure 1 below.

Figure 1: Site Locality Plan - Muriwhenua, Te Hapua (Area 1)

Source: Preliminary Civil Infrastructure Report – Maven Associates

Area 1 primarily contains native scrub/trees and is situated on a knoll of approximately 54 m RL. An existing track runs from Te Hapua Road along the southern side of the knoll and continues on to a narrow ridgeline.

3 PROPOSAL

The site is proposed to be subdivided to create 20 residential lots (Lots 1-20). Lots 1-20 range from 353 m^2 to 870 m^2 in area.

GWE has been provided with a subdivision scheme plan prepared by *Maven Associates* titled *Proposed Concept Layout Plan* dated *6 March 2024* (Refer to Appendix A).

Proposed lot sizes are summarised in Table 1 below.

Table 1: Proposed Residential Lot Sizes

PROPOSED LOT	GROSS AREA	PROPOSED LOT	GROSS AREA (M^2)
Lot 1	621 m^2	Lot 11	870 m^2
Lot 2	466 m^2	Lot 12	432 m^2
Lot 3	453 m^2	Lot 13	384 m^2
Lot 4	456 m^2	Lot 14	552 m^2
Lot 5	449 m^2	Lot 15	353 m^2
Lot 6	479 m^2	Lot 16	530 m^2
Lot 7	557 m^2	Lot 17	581 m^2
Lot 8	523 m^2	Lot 18	547 m^2
Lot 9	597 m^2	Lot 19	628 m^2
Lot 10	571 m^2	Lot 20	648 m^2

There are no reticulated wastewater services in the area.

For wastewater design, GWE have allowed for a 4-bedroom dwelling on each lot. This corresponds to an occupancy allowance of approximately 6 people.

A flow allowance of 180 litres/person/day is proposed (based on roof water tank supply and standard fixtures as per Table H3 of AS/NZS 1547:2012 and Table 6.2 of TP58). The peak wastewater volume generated from a 4-bedroom dwelling is anticipated to be 1,080 litres/day.

This peak wastewater volume generated from all 20 lots is expected to be 21,600 litres/day (21.6 m^3/day). Water use may be lower if water reduction fixtures are installed at building consent stage.

A decentralised wastewater system is proposed to manage wastewater from the subdivision.

3.1 Regulatory

The recommendations in this report are based on the information received from the Client, an intrusive ground investigation and in accordance with the following guidelines and regulation documents:

- FNDC Operative District Plan.
- NRC Proposed Regional Plan for Northland, Appeals Version, February 2024.

- Auckland Regional Council Technical Publication No. 58: Onsite Wastewater Systems: Design and Management Manual (TP58), 2004.
- Australian/New Zealand Standard, Onsite Domestic Wastewater Management, AS/NZS 1547:2012.

In accordance with Rule C.6.1.5 of the NRC Regional Plan, the discharge of 21.6 m^3/day of treated wastewater from a decentralised system is a **Discretionary Activity**. A discharge consent will be necessary.

4 SITE ASSESSMENT

4.1 Site Assessment

A site investigation was undertaken on 23 March 2023 (Autumn) by a GWE Engineer. The following land use characteristics were determined:

- The site primarily contains native scrub/trees. Large areas of burnt scrub/trees were located adjacent to the existing track.
- The areas adjacent to the existing track were used to dispose of household rubbish.
- Topography at the site was variable. The disposal areas will be sited within areas containing slopes of generally <15-20º.
- Areas of instability have been noted across the site by Haigh Workman Limited (Refer to Appendix B for GWE's site plans identifying areas of instability). The disposal areas will be sited outside of the identified areas of instability.
- The Geological Map of New Zealand, (Institute of Geological and Nuclear Sciences Ltd., 2014) 1:250,000, indicated that the underlying soils is of the Undifferentiated Tangihua Complex basalt in Northland Allochthon described as Basaltic pillow lava and pillow breccia, with sills and dikes of basalt and dolerite.

4.2 Subsoil Investigation

An assessment of the underlying soils was undertaken by GWE Engineers during the site investigation. Hand auger holes (AH1-AH20) were drilled to a target depth of 1.2 m below ground level (bgl).

A summary, including relevant soil structure, textural features and horizon depths are outlined in Table 1 below. Approximate borehole locations are indicated on the Wastewater Site Plan (Drawing No. 500) appended as Appendix B. No percolation testing was conducted.

A summary of subsoil investigations is included in Table 2.

Table 2: Bore Log Summary

HORIZON AH1	DESCRIPTION	DRAINAGE	CATEGORY
0.0-0.1 m	TOPSOIL, dark brown, moist to wet, organic.		

HORIZON	DESCRIPTION	DRAINAGE	CATEGORY
0.1-1.2 m	Silty CLAY, dark brown, very stiff, slightly plastic, dry to moist. @0.5 m – turning medium brown. @0.9 m – turning reddish brown with more silt content.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH2			
0.0-0.1 m	TOPSOIL, moist, rootlets and foliage, organic.		
0.1-1.0 m	Silty CLAY, dark brown, high stiffness, slightly plastic, dry, becoming lighter with depth.	Slow Drainage	6
1.0-1.2 m	Clayey SILT, medium brown, friable, dry to moist. @1.1 m – light brown mottling.	Moderate to Slow Drainage	5
1.2 m	Terminated at target depth. No groundwater encountered.		
AH3			
0.0-0.6 m	Silty CLAY, dark brown, high stiffness, low plasticity, dry to moist. @0.5 m - turning medium brown and more silt content.	Slow Drainage	6
0.6-1.2 m	Clayey SILT, medium brown, friable, dry. @0.9 m - turning brown/white with trace sand. @1.1 m – turning reddish brown with white mottles	Moderate to Slow Drainage	5
1.2 m	Terminated at target depth. No groundwater encountered.		
AH4			
0.0-0.1 m	TOPSOIL, dark brown, wet, organic, rootlets.		
0.1-0.9 m	Silty CLAY, dark brown, high stiffness, moderate plasticity, dry to moist, becoming light with depth. @0.4 m - medium brown. @0.6 m – moist.	Slow Drainage	6
0.9-1.2 m	Clayey SILT, medium brown, moist, friable, orangish/brown mottling.	Moderate to Slow Drainage	5
1.2 m	Terminated at target depth. No groundwater encountered.		
AH5			
0.0-1.2 m	Silty CLAY, medium brown, high stiffness, moderate plasticity, moist. @0.6 m – orange/brown/rust mottling. @0.9 m – Turning tan/medium brown with orange/red mottles.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		

HORIZON	DESCRIPTION	DRAINAGE	CATEGORY
AH6			
0.0-0.15 m	TOPSOIL, dark brown, moist to wet, organic		
0.15-1.2 m	Silty CLAY, dark brown, high stiffness, moderate plasticity moist. @0.6 m - Becoming tan. @1.0 m – Turning reddish tan and moderate stiffness.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH7			
0.0-0.15 m	TOPSOIL, wet, rootlets, organics.		
0.15-1.2 m	Silty CLAY, medium to dark brown, high stiffness, moderate plasticity, moist, rootlets, becoming lighter with depth. @0.6 m – tan. @0.9 m – tan/orangish brown. @1.0 m – white mottles.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH8			
0.0-0.1 m	TOPSOIL, dark brown, moist, rootlets		
0.1-0.8 m	Silty CLAY, medium brown, high stiffness, moderate plasticity, dry to moist, becoming lighter with depth. @0.7 m – tan.	Slow Drainage	6
0.8-1.2 m	Clayey SILT, tan, black/white and rust mottles, dry, friable. @1.1 m – turning medium brown.	Moderate to Slow Drainage	5
1.2 m	Terminated at target depth. No groundwater encountered.		
AH9			
0.0-0.2 m	TOPSOIL, dark brown, moist to wet, rootlets.		
0.2-1.2 m	Silty CLAY, dark brown, high stiffness, moderate plasticity, moist, becoming lighter with depth. @0.5 m – medium brown. @0.9 m – turning reddish brown.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH10			
0.0-0.1 m	TOPSOIL, moist, rootlets, organics.		
0.1-1.2 m	Silty CLAY, dark brown, high stiffness, low plasticity, rootlets, dry, becoming lighter with depth. @0.7 m – tan and moist.	Slow Drainage	6

HORIZON	DESCRIPTION	DRAINAGE	CATEGORY
	@1.0 m – reddish brown.		
1.2 m	Terminated at target depth. No groundwater encountered.		
AH11			
0.0-0.1 m	TOPSOIL, dark brown, rootlets, organics, moist.		
0.1-1.2 m	Silty CLAY, dark brown, high stiffness, low plasticity, moist, becoming lighter with depth. @0.4 m – medium brown. @0.7 m – reddish brown. @0.8 m – black mottles.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH12			
0.0-0.1 m	TOPSOIL, dark brown, moist, rootlets.		
0.1-1.2 m	Silty CLAY, medium/dark brown, high stiffness, low plasticity, becoming lighter with depth. @0.7 m – orangish brown. @0.9 m – white/cream mottling.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH13			
0.0-0.1 m	TOPSOIL, medium/dark brown, dry, organic.		
0.1-0.9 m	Silty CLAY, medium brown, rootlets, high stiffness, low plasticity, dry to moist. @0.5 m – turning medium brown/orange.	Slow Drainage	6
0.9-1.2 m	Clayey SILT, orangish brown, dry to moist, friable, grey/brown mottles.	Moderate to Slow Drainage	5
1.2 m	Terminated at target depth. No groundwater encountered.		
AH14			
0.0-0.1 m	TOPSOIL, light/medium brown, dry, rootlets, friable, organic.		
0.1-1.2 m	Silty CLAY, medium brown, rootlets, high stiffness, low plasticity, dry. @0.6 m – light/medium brown. @0.9 m – Reddish brown and moist.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH15			
0.0-1.2 m	Silty CLAY, medium/dark brown, rootlets, high stiffness, moderate plasticity, dry to moist. @0.5 m – turning medium brown.	Slow Drainage	6

HORIZON	DESCRIPTION	DRAINAGE	CATEGORY
	@0.7 m – red mottling. @0.8 m – turning reddish brown. @0.9 m – moist.		
1.2 m	Terminated at target depth. No groundwater encountered.		
AH16			
0.0-1.2 m	Silty CLAY, medium brown, rootlets, high stiffness, moderate plasticity, moist. @0.3 m – turning yellow/brown. @0.8 m – turning reddish brown.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH17			
0.0-1.2 m	Silty CLAY, medium brown, high stiffness, moderate plasticity, dry to moist, becoming lighter with depth. @0.6 m – turning light brown/orange. @0.8 m – red mottles. @0.9 m – turning reddish brown, moist.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH18			
0.0-1.2 m	Silty CLAY, medium/dark brown, high stiffness, moderate plasticity, dry to moist. @0.5 m – becoming medium brown. @0.8 m – becoming reddish brown.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		
AH19			
0.0-0.6 m	Silty CLAY, dark brown, rootlets, high stiffness, low plasticity, dry.	Slow Drainage	6
0.6-1.2 m	Clayey SILT, medium brown, friable, dry. @0.8 m – turning reddish brown. @1.0 m – turning greyish brown.	Slow to Moderate Drainage	5
1.2 m	Terminated at target depth. No groundwater encountered.		
AH20			
0.0-1.2 m	Silty CLAY, dark brown, rootlets, high stiffness, low plasticity. @0.6 m – becoming medium brown with orange mottles. @0.8 m – becoming orangish brown. @1.2 m – dry to moist.	Slow Drainage	6
1.2 m	Terminated at target depth. No groundwater encountered.		

The subsoil assessment is summarised as follows:

- Soils at the site are predominantly comprised of silty CLAY, with a corresponding soil category of 6 under TP58.
- Loading rates for the wastewater disposal design shall be based upon category 6 soils.
- No groundwater was encountered.
- Signs of a seasonally elevated groundwater table were present (mottling). However, this could be due to poor infiltration and GWE expects the groundwater table to be >0.9 m in the disposal field areas.

5 WASTEWATER ASSESSMENT

A decentralised system is proposed to service the subdivision. Wastewater from each lot will be transferred to a single wastewater treatment and disposal system.

5.1 Wastewater Flows

5.1.1 Residential Occupancy

Each lot has been assessed as having a 4-bedroom dwelling, with an associated occupancy of six people. It should be noted that any study, office, gym, or similar room within any future dwelling may be considered to be a '*potential bedroom*'.

5.1.2 Discharge Type

The proposed lots are intended for residential end use and only domestic wastewater will be produced. Domestic type wastewater is generated from residential kitchens, bathrooms, laundries, toilets and other household areas.

5.1.3 Design Flow Allowance

For the purpose of subdivision assessment, GWE have assumed a flow allowance of 180 Litres/person/day (L/p/d), in accordance with TP58 Table 6.2 and Table H3 of AS/NZS 1547:2012.

This elected flow rate is based on onsite roof water supply and standard fixtures (including automatic washing machine). The roof water tank supply could be supplemented by a bore water supply during drier periods. The flow allowance is considered appropriate given the roof water tank supply is considered to be the primary water source.

Although not assumed, we recommend full water reduction fixtures to promote water conservation across the development. Actual per capita water usage may be lower than 180 L/p/d if water-reduction fixtures are specified at building consent stage for each lot. Table 3 outlines the assumed design flow allowance for the proposed lots.

Table 3: Design Flow Allowance

LOT	Lots 1-20 (all)
WATER SUPPLY	Roof water (supplemented by bore water, if required)
WATER FIXTURES	Standard Fixtures assumed*

DESIGN PER CAPITA FLOW ALLOWANCE	**180 Litres/person/day**
DEVELOPMENT/NO. OF PERSONS	4-bedroom dwellings (20 lots) **Each House Occupancy: 6 people**
TOTAL SITE OCCUPANCY	**120 persons (20 lots)**
TOTAL FLOW	**21,600 Litres/day**
OTHER NOTES	No grey-water reuse recycling proposed.

Note:

**Actual water usage may be lower than 180 l/p/d if water-reduction fixtures are specified at building consent stage. Water-reduction fixtures include; dual flush toilets, shower and tap flow restrictors, aerator faucets, water-conserving/front loading washing machines, no bath.*

5.2 Wastewater Reticulation

Wastewater will be transferred to the wastewater treatment plant by either a conventional gravity sewer system (CGSS), septic tank effluent pumping/gravity (STEP/STEG) or a low pressure sewer system (LPSS).

All three options are expected to be feasible. The chosen option and reticulation design will be undertaken in subsequent stages.

5.3 Wastewater Treatment

Based on the site soil conditions and requirements under TP58/ASNZS:1547, secondary treatment (or better) is recommended.

A packaged treatment system is recommended for the subdivision due to their reliability, ease of servicing/maintenance and the availability of suitable systems.

Table 4 presents several manufacturers of on-site wastewater treatment systems that provide plant that have demonstrated ability to treat raw wastewater to secondary quality effluent standards. Most of the suppliers are based or have approved agents in the Northland Region.

Table 4: Wastewater Treatment System Suppliers

WASTEWATER TREATMENT TECHNOLOGIES	• Innoflow Technologies Ltd • Reflections Treatment Systems • Hynds Pipe Systems (Hynds Lifestyle) • Waterflow
ALARM SYSTEM	Minimum requirement – visual and audible alarm located at plan.
FLOWMETER	Telemetry flowmeter to be provided.

Nuisance effects (noise, odour) are not expected are not expected from the wastewater treatment system.

5.4 Land Application

Wastewater from the treatment system is proposed to be discharged to a Pressure Compensating Drip Irrigation (PCDI) field. PCDI wastewater disposal is common activity within Northland and New Zealand and is considered to be a best-practice land disposal option.

The proposed land disposal system to service the subdivision is based on the following requirements

- Hydraulic loading rate of 2 mm/d.
    - TP58 permits loading rates of up to 3 mm/day for Category 6 soils. A 2 mm/day loading rate has been chosen to minimise any potential environmental impacts of the disposal.
    - Based on a design flow of 21,600 Litres/day, the required primary disposal field area is 10,800 m^2.
- A 30% reserve disposal field has been provided (3,240 m^2), in accordance with the PA criteria for NRC onsite wastewater discharges (Section C.6.1.3).
- Biochemical Oxygen Demand (BOD) loading rates
    - A healthy soil environment can assimilate up to 600 kg-BOD/ha/day.
    - The proposed BOD loading is <150 kg-BOD/ha/year, an order of magnitude below acceptable loadings.
- Separation to sensitive environmental features (Refer to Section 5.4.1)
- Separation to lot boundaries (Refer to Section 5.4.1)
- Appropriate site topography (slopes are generally <20º)
- Available land within close proximity of the WWTP.
- Separation to areas on instability (Refer to Section 5.4.1)

5.4.1 Specific Disposal Area Requirements

Setback Distances

Table 9 of the NRC Regional Plan and TP58 provide the following recommended wastewater setbacks for secondary treated wastewater, as summarised in Table 5.

Table 5: Required Setback Distances

FEATURE	NRC REGIONAL PLAN	TP58
Surface water (including wetlands)	15 m	15 m
Drains	5 m	
Potable water supply bore	20 m	20 m
Groundwater table	0.6 m	0.9 m
Property boundary	1.5	1.5 m

FEATURE	NRC REGIONAL PLAN	TP58
Buildings/houses	-	1.5 m
Floodplain	5% AEP	5% AEP
Retaining wall, embankments, etc	-	3 m or 45°

The disposal field has been designed to meet the requirements under TP58 and the NRC regional plan.

Areas of Instability

Haigh Workman Limited identified historic slip features in the vicinity of the proposed disposal field areas.

GWE have adopted a 10 m separation to all identified slip features. The separation distance provided and the conservative loading rate of 2 mm/day is expected to be sufficient. However, GWE recommend specific geotechnical review is provided to confirm the suitability of the design.

Reserve Area

Wastewater reserve areas are to remain undeveloped to allow for future extension/ relocation of the land application system should failure occur from misuse (e.g. overloading), etc.

A 30% reserve area is proposed, inline with NRC requirements.

5.4.2 Pressure Compensating Drip Irrigation (PCDI)

The land application can comprise either be surface laid or subsurface laid PCDI, depending on the intended landscaping.

- Subsurface dripline should be buried 100-150 mm into topsoil and planted using grass. If topsoil is unavailable, good-quality topsoil should be imported to the disposal area. Line spacing should be reduced to 0.5 m centres to achieve even distribution of wastewater, the length of dripline should be increased accordingly.
- Surface laid dripline should be covered with 100-150 mm of mulch and planted using species appropriate for onsite wastewater disposal areas. The planting density should be at least one plant per m^2 or provide at least 80% canopy cover. Line spacing can be 1 m when installed on the ground surface.

The existing native scrub/trees will be sufficient to uptake wastewater and nutrients (additional planting can also be undertaken, if necessary). A list of suitable evapotranspiration plants is included in Appendix C. Plants absorb applied wastewater and will assist in up taking the remaining nutrients in the discharge. Any ammonia that is present in the wastewater is converted to nitrate by micro-organisms in the oxygen rich upper soil layers, and any nitrate that remains is taken up by micro-organisms deep in the soil.

A summary of the proposed PCDI disposal area design is outlined in Table 6.

Table 6: Land Disposal Area Design

TYPE LAND DISPOSAL SYSTEM	PCDI
TREATMENT QUALITY	Secondary Effluent
DRIPPER LINES	Surface laid PCDI: dripper lines to be at 1.0 m spacing. Subsurface PCDI: dripper lines to be at 0.5 m spacing
SOIL CATEGORY (TP58)	6
LOADING RATE	2 mm/day (conservative)
LOADING METHOD	Timer dose pump
PUMP	High water level alarm shall be installed in pump chamber with audible/visual alarm. Pump Chamber Volume – system specific Emergency Storage volume – min. 24 hours storage
PRIMARY DISPOSAL AREAS	10,800 m^2
RESERVE DISPOSAL AREA	3,240 m^2 - 30%
VEGETATION	Existing native scrub/trees. Additional planting as necessary (Appendix C)
LOCATION	Refer to Drawing No. 500 (Appendix B)
STORMWATER CONTROLS	All surface water shall be diverted away from the disposal area. Discharge location of stormwater management devices shall be located downslope of all wastewater disposal area.

5.5 Alternative Options

This report has identified that a decentralised wastewater system comprised of a secondary wastewater treatment system with disposal to PCDI is suitable for servicing the subdivision. This option is considered to be the best-practicable option.

Alternative wastewater options that were investigated and determined to be unsuitable include:

- Individual lot wastewater management (on-site wastewater systems for each lot)
- Decentralised system with disposal to surface water
- Trucking wastewater off-site

5.5.1 Individual Lot Wastewater Management

Individual lot wastewater management was considered but determined to be unsuitable due to the following:

- The lot sizes do not support on-site wastewater management.
- A significant amount of cut/fill is required for the lots. Disposal to fill soils is considered a higher risk activity.
- On-site wastewater management presents a higher risk of human exposure to wastewater (as opposed to a single large wastewater field located away from the residential development).

- A significant amount of suitable land is available for a decentralised wastewater solution.

5.5.2 Decentralized System with Disposal to Surface Water

An option involving a discharge to surface water was considered and determined to be unsuitable given the availability of suitable land in the area. A discharge to water is also considered to have a significantly higher adverse environmental impact.

5.5.3 Trucking Wastewater Off-site

Trucking wastewater off-site was determined to be unsuitable due to the volumes of wastewater produced on a daily basis. Furthermore, haulage would present a significant environmental impact through diesel emissions from trucks, noise and dust.

5.6 Summary

A decentralised wastewater system comprised of a secondary wastewater treatment system with disposal to PCDI is considered suitable for servicing the subdivision.

21,600 L/day of wastewater is expected to be produced from the 20-lot subdivision, based on each lot having a 4-bedroom dwelling and 180 L/p/d.

Based on site investigations, it is recommended that PCDI with a conservative loading rate of 2 mm/day is used. The disposal system can be either surface or subsurface laid.

6 ASSESSMENT OF ENVIRONMENTAL EFFECTS

It is anticipated that the recommendations proposed will have a less than minor effect on the receiving environment.

6.1 Impact on Surface Water

It is proposed that a minimum separation of 15 m can be achieved from OLFPs, in accordance with TP58. Furthermore, a high level of treatment (secondary treatment) and a conservative loading rate (2 mm/day for PCDI) is proposed. The disposal areas are in areas exposed to sun and wind and will also contain evapotranspiration vegetation with a significant amount of wastewater removed through evapotranspiration.

Given:

a. the wastewater will be treated to a high level (secondary/tertiary treatment).

b. the proposed loading rate at the site is conservative, so there is negligible risk of runoff.

c. proposed vegetation will result in some of the treated water being taken up by plants and evapotranspiration, so there will be less that leaches into the ground.

d. Separation distances for treated effluent are maintained in accordance with TP58/NZS 1547 for surface water (15 m).

The effects on surface water are expected to be less than minor.

6.2 Impact on Groundwater

GWE expects the groundwater separation will meet the requirement under TP58 of 0.9 m (beyond the 0.6 required by the NRC regional plan PA criteria).

Good treatment quality (secondary) and subsequent percolation and treatment through topsoil and the in-situ soils will ensure groundwater is not contaminated because of the discharge of treated effluent. Furthermore, the proposed loading rate of 2 mm/day is conservative and will enable wastewater to be uptaken by other means.

The effects on groundwater are expected to be less than minor.

6.3 Impact on Soils

The site soils are generally categorised as TP58 category 6 with slow draining characteristics. TP58 recommends loading rates of up to 3 mm/day. GWE have proposed a conservative loading rate of 2 mm/day.

The proposed system has been specified to ensure an even loading of treated wastewater over the whole disposal area. Evapotranspiration vegetation will promote the uptake of nitrogen and phosphorus.

The treated wastewater is expected to have low BOD and TSS concentration (BOD_5 <20 mg/L, TSS <30 mg/L), reducing the impact on the receiving soils by reducing the level of biological breakdown of organic compounds which soils would normally expect to complete. The nature of the wastewater minimises any impact on receiving soils and can enhance the long-term acceptance rate (LTAR). Reduction in soakage capacity as a result of application of the high-level treated wastewater into the soil is not expected to occur.

6.4 Impact on Amenity Values

Given the high level of wastewater treatment proposed, odours are not anticipated at the plant nor the disposal area. Moreover, the volume of treated wastewater produced is proposed to be dispersed over a large area.

The treatment plant and disposal system are sited a minimum of 3 m from property boundaries. As such, indiscernible adverse odour effects are not anticipated. The treatment plant is not expected to result in any discernible adverse noise effects to the owners or neighbours.

6.5 Summary

Wastewater treatment and disposal for the proposed subdivision has been designed in accordance with relevant guidelines (TP58/NZS 1547) and is consistent with the Resource Management Act, the NRC Regional Plan and the FNDC District Plan.

For the reasons outlined above, and throughout the application, insignificant adverse environmental effects are anticipated. Groundwater, surface water, public health, and amenity are all adequately protected. Overall, the proposal to treat and discharge wastewater from the proposed subdivision using a decentralised wastewater system, is considered to have less than minor adverse effects.

Ongoing maintenance and management of the proposed treatment system in accordance with the supplier's specifications will be required to ensure that no minor adverse effects arise.

Furthermore, there are several specific design features are proposed. These provide factors of safety and will mitigate against environmental effects, including:

- High level of treatment proposed (secondary treatment).
- Conservative wastewater loading rate proposed (2 mm/day).
- Proposed vegetation will promote nutrient uptake and evapotranspiration.
- Separation distances in accordance with TP58/NRC Regional Plan are maintained.
- 30% reserve area is available.

6.6 Proposed Conditions

Wastewater treatment and disposal will need to be undertaken in a responsible manner to ensure less than minor effects occur.

To that end, the following condition is proposed to be included in a discharge consent:

- Telemetry Flow Meter
  - This will ensure flows are recorded automatically and provided to NRC.

7 STATUATORY ASSESSMENT

The adverse effects arising from the proposed discharge on the receiving environment have been assessed in Section 6 and are found to be no more than minor.

7.1 Northland Regional Council Proposed Regional Plan

In accordance with Rule C.6.1.5 of the NRC Regional Plan, the discharge of 21.6 m^3/day of treated wastewater from a decentralised system is a **Discretionary Activity** as the flows exceed 2 m^3/day. A discharge consent will be necessary.

Table 7 7 outlines the permitted activity conditions as per NRC PRP Rule C.6.1.3 and where they are being complied with in the proposal.

Table 7: Proposed Regional Plan for Northland - Permitted Activity Rule (C.6.1.3)

	PERMITTED ACTIVITY CRITERIA (C.6.1.3)	PROPOSED ACTIVITY
1.	The on-site system is designed and constructed in accordance with the Australian/New Zealand Standard. On-site Domestic Wastewater Management (AS/NZS 1547:2012).	**Complies** – AS/NZS1547 design
2.	The volume of wastewater discharged does not exceed two cubic metres per day.	**Does not comply** – The design flow is >2 m^3/day
3.	The discharge is not via a spray irrigation system or deep soakage system.	**Complies** – The proposed land disposal method is PCDI (not spray irrigation or deep soakage).

PERMITTED ACTIVITY CRITERIA (C.6.1.3)	PROPOSED ACTIVITY
4. The slope of the disposal area is not greater than 25 degrees.	**Complies** – The land disposal area slope is under 25 degrees
5. For wastewater that has received secondary treatment or tertiary treatment, it is discharged via: ~~e. a trench or bed system in soil categories 3 to 5 that is designed in accordance with Appendix L of Australian/New Zealand Standard On-Site Domestic Wastewater Management (AS/NZS 1547:2012); or~~ f. an irrigation line system that is dose loaded and covered by a minimum of 50 millimetres of topsoil, mulch, or bark, and	**Complies** – Secondary treatment and PCDI land disposal is proposed and will be covered by a minimum of 100 millimetres of topsoil, mulch, or bark
6. For the discharge of wastewater onto the surface of slopes greater than 10 degrees: g. The wastewater, excluding greywater, has received at least secondary treatment. h. The irrigation lines are firmly attached to the disposal area. i. Where there is an up-slope catchment that generates stormwater runoff, a diversion system is installed and maintained to divert surface water runoff from the up-slope catchment away from the disposal area. j. A minimum 10 metre buffer area down-slope of the lowest irrigation line is included as part of the disposal area. k. The disposal area is located within existing established vegetation that has at least 80 percent canopy cover. l. The irrigation lines are covered by a minimum of 100 millimetres of topsoil, mulch, or bark.	**Complies:** a. Secondary treatment proposed b. PDCI to be pinned to slope surface (surface laid) or buried (subsurface) c. A cut-off drain is not required as the upslope catchment area is not considered significant d. 10 m buffer area is allowed for. e. Bush and scrub is likely to self-seed at the proposed PCDI disposal area. f. PDCI lines will be covered by a minimum of 100 mm of topsoil, mulch or bark.
7. The disposal area and reserve disposal area are situated outside the relevant exclusion areas and setbacks in (C.6.1.3) Table 9: Exclusion areas and setback distances for on-site domestic wastewater systems.	**Complies** - The proposed disposal area can meet the required separation distances
8. For septic tank treatment systems, a filter that retains solids greater than 3.5 millimetres in size is fitted on the outlet.	**Complies** – Outlet filter to be installed as per manufacturer specifications.
9. The following reserve disposal areas are available at all times: ~~m. 100 percent of the existing effluent disposal area where the wastewater has received primary treatment or is only comprised of greywater, or~~ n. 30 percent of the existing effluent disposal area where the wastewater has received secondary treatment or tertiary treatment, and	**Complies** – 30% reserve area available.
10. The on-site system is maintained so that it operates effectively at all times and maintenance is undertaken in accordance with the manufacturer's specifications.	**Complies** – Maintenance and management of the proposed treatment system should be

PERMITTED ACTIVITY CRITERIA (C.6.1.3)	PROPOSED ACTIVITY
11. The discharge does not contaminate any groundwater water supply or surface water.	ongoing to ensure that no minor adverse effects arise.
12. There is no surface runoff or ponding of wastewater.	
13. There is no offensive or objectionable odour beyond the property boundary.	

7.2 FNDC Operative District Plan

Wastewater from the proposed subdivision is generally in accordance with the standards for subdivision outlined in the FNDC Operative District Plan. Specifically relating to sanitary sewage disposal (Section 13.10.5):

(e) Where a reticulated system is not available, or a connection is impractical, whether a suitable sewage treatment or other disposal systems is provided in accordance with regional rules or a discharge system in accordance with regional rules or a discharge permit issued by the Northland Regional Council

There are no reticulated services available. The proposed disposal will be managed in accordance with a future discharge permit.

(g) Whether provision has been made by the applicant for monitoring mechanisms to ensure contaminants are not discharged into the environment from a suitable sewage treatment or other disposal system, together with any consent notices to ensure compliance

Consideration was given to the required monitoring mechanisms. A telemetry flow meter has been recommended to ensure flows are monitored continuously.

(j) Whether the subdivision represents the best practical option in respect of the provision that is made for the disposal of sewage and waste water.

The proposed disposal of effluent to land on the individual lots has been specified using AS/NZS 1547/TP58 and is generally in accordance with good practice for onsite wastewater management. Alternative options were investigated and determined to be unsuitable.

8 CONCLUSIONS AND RECOMMENDATIONS

GWE considers a decentralised wastewater treatment and disposal system to service the proposed 20 lot residential subdivision to be suitable. The disposal system is able to achieve appropriate separations and setbacks from potential environmental hazards.

GWE has assumed each lot will have a 4-bedroom dwelling (6 person occupancy) with a per capita flow rate of 180 litres/day. The total peak wastewater flowrate from the subdivision is expected to be 21,600 L/day.

A secondary treatment system with disposal to a PCDI system at a rate of 2 mm/day can adequately service the subdivision.

9 LIMITATIONS

This report has been prepared for the sole benefit of **Muriwhenua Incorporation** as our client, and their appointed representatives, according to their instructions, for the specific objectives described herein. This report is qualified in its entirety and should be considered in the light of our Terms of Engagement with the Client and the following:

a. Data or opinions contained within the report may not be used in other contexts or for any other purpose without our prior review and written agreement. Any reliance will be at the parties' sole risk.

b. No responsibility is assumed for inaccuracies in reporting by the information providers. In no event, regardless of whether GWE 's consent has been provided, does GWE accept any liability, whether directly or indirectly, for any liability or loss suffered or incurred by any third party to whom this report is disclosed placing any reliance on this report, in part or in full.

c. GWE has relied on information provided by the Client and by third parties to produce this document and arrive at its conclusions. GWE has not verified information provided (unless specifically noted otherwise) and we assume no responsibility and make no representations with respect to the adequacy, accuracy, or completeness of such information.

APPENDIX A

PROPOSED CONCEPT LAYOUT PLAN (MAVEN ASSOCIATES)

ASSUMED PROPOSED NETWORK TO COVEY PRIVATE ROADING AND LOTS THAT DO NOT FACE BANK.

GEOLOGICAL FEATURES

INDICATIVE BUILDING RESTRICTION LINE

TE HAPUA ROAD

LOT# 1 621m²
LOT# 2 466m²
LOT# 3 453m²
LOT# 4 456m²
LOT# 5 449m²
LOT# 6 479m²
LOT# 7 557m²
LOT# 8 523m²
LOT# 9 597m²
LOT# 10 571m²
LOT# 11 870m²
LOT# 12 432m²
LOT# 13 384m²
LOT# 14 552m²
LOT# 15 353m²
LOT# 16 530m²
LOT# 17 581m²
LOT# 18 547m²
LOT# 19 628m²
LOT# 20 648m²
LOT# 100 249m²
LOT# 101 667m²
LOT# 102 86m²
LOT# 103 72m²

CH 0
CH 20
CH 40
CH 60
CH 80
CH 100

4.00m
8.00m

POTENTIAL ACCESS TO EXISTING TRACK

FURTURE STORMWATER OUTFALL TO BE LOOKED AT WITH GEOTECH. POTENTIAL OPTIONS INCLUDE AN ARMORED SWALE TO WATERCOURSE OR FLUMED SW LINE TO NEAREST WATERCOURSE

INDICATIVE BUILDING RESTRICTION LINE

PROPOSED EXTENT OF EARTHWORKS

POSSIBLE WASTEWATER DISPOSAL FIELD
REFER TO HAIGH WORKMAN PLAN G03
FUTURE INVESTIGATIONS REQUIRED

LEGEND

- EX BDY
- PROP BDY
- PROP 7m X 12m BUILDING
- PROP 25,000L TANK
- PROP 3m X 5m CARPARK
- PROP 3m X 7m CARPARK
- PR STORMWATER
- EX/PROP SWMH

Rev	Description	By	Date
C	FOR INFORMATION	AO	06/0324
B	FOR INFORMATION	YG	15/12/23
A	FOR INFORMATION	AO	13/12/23

	By	Date
Survey	TM	12/2013
Design	AO	01/12/23
Drawn	AO	01/12/23
Checked	TM	12/2023

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Project
TE HAPUA
SITE A1 INVESIGATION
FOR
PROPRIETORS
OF MURIWHENUA

Title
PROPOSED CONCEPT
LAYOUT
PLAN

Project no.	147012
Scale	1:750 @ A3
Cad file	147014-1A-CONCEPT.DWG
Drawing no.	1A-C100
Rev	C

DATE: 3/6/24 FILE PATH: F:\MAVEN\PROJECTS\14700's MURIWENUA\DWG\14704-1A-CONCEPT.DWG

APPENDIX B
GWE SITE PLAN

Plot Date : 12:51 pm, 31 Mar 2024

DEVELOPMENT: AREA 1

RESERVE DISPOSAL AREA - 3,240 m² (30%)

LOCATION OF PROPOSED WASTEWATER TREATMENT PLANT

FUTURE STORMWATER OUTFALL TO BE EXTENDED DOWNSLOPE

PRIMARY DISPOSAL AREA - 10,800 m²

LOT 1 621 m²
LOT 2 466 m²
LOT 3 453 m²
LOT 4 456 m²
LOT 5 449 m²
LOT 6 479 m²
LOT 7 557 m²
LOT 8 523 m²
LOT 9 597 m²
LOT 10 571 m²
LOT 11 870 m²
LOT 12 432 m²
LOT 13 384 m²
LOT 14 552 m²
LOT 15 353 m²
LOT 16 530 m²
LOT 17 581 m²
LOT 18 547 m²
LOT 19 628 m²
LOT 20 648 m²

AH1 AH2 AH3 AH4 AH5 AH6 AH7 AH8 AH9 AH10 AH11 AH12 AH13 AH14 AH15 AH16 AH17 AH18 AH19 AH20

3.0 m
10.1 m
6.50
15.0 m
10.0 m

0 10.0 20.0 30.0 40.0 50.0
1:1000 DRAWING IN METRE

NOTES:

1. DRAWING IS BASED ON DATA FROM LINZ (ACCESSED MARCH 2024), PROPOSED CONCEPT PLAN (MAVEN ASSOCIATES, 13/12/2023) AND SITE INVESTIGATION PLAN AREA 1 (HAIGH WORKMAN, 02/2024)
2. LOCATION OF WWTP AND IRRIGATION AREA TO BE CONFIRMED ON-SITE.
3. WASTEWATER TREATMENT: SECONDARY
4. CATEGORY 6 SOILS
5. SURFACE OR SUBSURFACE LAID PCDI
6. 2 mm/DAY LOADING RATE
7. DESIGN FLOW: 21,600 LITERS/DAY.
8. PRIMARY IRRIGATION AREA: 10,800 m².
9. RESERVE IRRIGATION AREA: 3,240 m² (30%)
10. DO NOT SCALE FROM THIS DRAWING

LEGEND

OVERLAND FLOW PATH

PROP. PRIMARY DISPOSAL AREA

PROP. RESERVE DISPOSAL AREA

HISTORIC SLIP FEATURE

LOCATION OF AUGER HOLES — AH1

ISSUE STATUS: FINAL

REV	AMENDMENT	CAD	ENG	APPD	DATE
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0	FIRST ISSUE	AC	DK	DK	01/04/24

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PROJECT ADDRESS:
MURIWHENUA, TE HAPUA

DRAWING TITLE:
WASTEWATER SITE PLAN

CLIENT NAME:
MURIWHENUA INCORPORATION

SCALE: 1:1000 | A3

PROJECT No:	DRAWING No:	REV
J5294	500	0

Filename : H:\Muriwhenua Te Hapua-J5294\01-incoming Data\Drawings\ds-new-zealand-3layers-DWG(1)\Muriwhenua DWG.dwg

APPENDIX C

SUITABLE PLANTS FOR ON-SITE WASTWATER SYSTEMS

Auckland Regional Council Technical Sheet G-1
LIST OF WATER TOLERANT PLANTS SUITABLE FOR ON-SITE WASTEWATER DISPOSAL SYSTEMS

GENERAL MATTERS TO CONSIDER WHEN PLANTING A LAND DISPOSAL AREA:

Plants that are suitable for planting in moist conditions, such as those associated with wastewater land disposal fields need to be selected on the basis of both their tolerance for such moist conditions and for their potential for high level of growth/high transpiration of moisture in such conditions.

Standard lawn grass is a proven effective high transpiration plant species in such conditions, as are a large number of other plant species seen in typical domestic gardens.

Consideration needs to be given to effects of roots from plants and from trees in particular on wastewater distribution pipe networks/emitter lines in land application systems. Potential for root intrusion/disruption to the pipe system must be considered prior to selection and planting of a plant or tree species.

Advise on such matters for particular plant species can be obtained from garden centre specialists and landscaping consultants.

NATIVE PLANTS SUITABLE FOR MOIST CONDITIONS IN THE AUCKLAND REGION:

The following list covers native plant species are considered to be suitable for planting in moist conditions, such as those associated with wastewater disposal fields in Auckland situations. They are all tolerant or fond of moist conditions and all are native to the Auckland region. Much of this information has been adapted from one of the ARC Botanic Gardens advisory leaflets; "14 – New Zealand plants for wet places" and the list edited and reviewed by Dr. Rhys Gardner Consulting Botanist, Auckland War Memorial Museum (August 2004).

Grasses, ground covers, and other plants

Astelia grandis **(swamp astelia)**
Large clump forming plant with bright green, flax-like foliage. Female plants produce upright panicles of orange berries in the centre of the plant. This endemic species will not tolerate eutrophic conditions and prefers peat soils.

Blechnum novaezealandiae **(kiokio)**
Large, robust fern growing to 1 or even 2m, Hardy species that tolerates most conditions, but does best in well drained, shady areas.

Carex
There are many members of this genus which grow naturally in damp to wet areas. They all have quite fine drooping foliage and are vigorous in moist conditions. Most prefer very light shade. The following species have been identified for their suitability:

Carex dissita
Endemic species with dull green to reddish tufts often 0.5m tall (although this can vary). Tolerates a range of swampy habitats, but is also noted to grow on drier soils under forest cover.

Carex flagellifera
Endemic species with dense spreading reddish-brown tuffs to 0.5m tall. Prefers damp soil and full sun, but is noted to thrive in a variety of habitats including boggy pasture.

Carex geminata
Robust and vigorous endemic species that grows to 1.5m tall. Thrives in a range of wet habitats. Suitable for a larger area.

Carex lessoniana
Robust and vigorous endemic species that grows to 1.5m tall. Similar to *C.geminata* in that the species is spreading and suitable for a larger wet area.

Carex secta **(purei, makura)**
Endemic species that exhibits tall spreading tussocks. Has been noted to grow to 3m tall, widespread in swampy areas. Useful in the creation of bird habitat.

Carex virgata
Endemic species that forms dense, light green tussocks up to 1m tall. Thrives in a variety of habitats including swamps, drain margins, seepages and wet pastures. Useful in the creation of bird habitat.

***Cortaderia fulvida* (toetoe)**
Branching from the base and forming a clump to 4m high. Long strap-shaped leaves with red-orange coloured veins, flower heads cream yellow. New shoots exhibit pale waxy cover on lower parts (unlike pampas grass) Prefers good drainage and semi-shade. Will struggle to compete if dried out in summer.

***Cyperus ustulatus* (toetoe upoko-tangata, giant umbrella sedge)**
Vigorous leafy sedge growing to 1m in open damp places. Tolerates immersion in standing water within a range of habitats from seepages to wetlands.

***Dicksonia squarrosa* (wheki, tree fern)**
Tree fern up to 7m tall that exhibits tolerance of wet open ground, and floods. Found to shelter and accumulate with other native plants. The base of the fern attracts biodiversity. Useful application to streambank and seepage habitats.

***Elatostema rugosum* (parataniwha)**
Herbaceous plant up to 0.5m tall that spreads by rhizomes. Bronze coloured foliage with serrated edge. Grows on moist sites in light to heavy shade. Intolerant of dry habitats.

Hypolepis dicksonioides
Large fern that prefers fertile moist, but well-drained ground, grows vigorously and spores into planted areas with abundance. Does however, die back during winter.

***Phormium tenax* (harakeke, flax)**
Fast growing clump-forming flax with large stiff leaves, to 3m. Full exposure and sun. Moist to wet conditions. Does not have deep or wide roots. Easily propagated from split fans or grown from seed. Attracts birds, especially Tui.

Trees and shrubs

Consideration needs to be given to the effects of roots land application on wastewater distribution pipe networks. This problem can be more significant for large tree species.

***Carpodetus serratus* (putaputaweta, marbleleaf)**
Lowland forest tree up to 7m tall. Large bunches of cream coloured flowers appear in spring followed by black berries.

Coprosma areolata
Species that grows to 4m tall. Low tolerance to drought, with medium to high fertility.

***Coprosma robusta* (karamu, shining karamu)**
Shrubs or small trees growing to 3m+, with glossy green leaves. Masses of orange-red fruit in autumn are attractive to birds. Hardy plant.

***Coprosma tenuicaulis* (swamp coprosma)**
Endemic species that grows to 3m tall. Leaves pale green with slender branches. Will tolerate a range of swampy to boggy habitats including standing water.

***Cordyline australis* (ti kouka, cabbage tree)**
Palm-like in appearance with large heads of linear leaves and panicles of scented flowers. Sun to semi-shade. Prefers damp to moist soil. Grows eventually to 12m+ height.

Dacrycarpus dacrydioides (kahikatea, white pine)
Tree that grows to 40m. Moderately growing species, which prefers wetland and boggy environments. Application of this species must consider the possible impact of its root systems on the wastewater disposal field.

***Geniostoma rupestre* (hangehange)**
Common forest shrub with pale green glossy foliage, growing to 2-3m. Tiny flowers give off strong scent in spring. Looks best in sunny position where it retains a bushy habit, and prefers well-drained soil.

***Hebe stricta* (koromiko)**
Shrub or small tree growing to 2-5m in height. Natural forms have white to bluish flowers. Plant in full sun. Tolerates exposure. (NB Many cultivars and hybrids are available commercially, but these are all unsuitable for use near existing natural vegetation.)

***Laurelia novae-zelandiae* (pukatea)**
Large upright tree (to 30m) with attractive bright green foliage and distinctive whitish bark . Fast growing and able to handle a wide variety of soils. It will tolerate periodic flooding, breathing roots develop in water logged soils. Can be grown from seed. Tolerant of some sun and frost. Not tolerant of wind.

Leptospermum scoparium **(manuka)**
Shrub or small tree growing to 4m+ in height. Ubiquitous shrub varying in form throughout New Zealand. Ideal to provide shelter for other plants as it is quick growing and hardy. Requires full sun and. Hardy and tolerant of difficult conditions, including waterlogging and drought.

Melicytus ramiflorus **(mahoe)**
A fast growing yet long lived tree to 7m height. Prefers well drained fertile soils. Tolerates some frost, wind and sun Birds are attracted to the blue berries.

Pennantia corymbosa **(kaikomako)**
Slow growing species that will reach 12m in moist, fertile sites. Useful species application in bank stabilisation or wetland habitats.

Plagianthus betulinus **(ribbonwood)**
Fast growing species to 15m. Similar application to that of *Pennantia corymbosa*.

Rhopalostylis sapida **(nikau)**
New Zealand's only native palm, with red berries attractive to birds. Requires light shade, plenty of moisture and protection from wind when young. Grows well in areas of permanent dampness.

Syzygium maire **(maire tawake)**
Attractive and moderately growing wetland tree to 15m with bronze foliage, large bunches of reddish fruit and distinctive whitish bark. Requires a sheltered sunny position. Tolerates some frost.

Vitex lucens **(puriri)**
Fast growing to 20m in fertile, open but sheltered conditions. Will struggle with poor drainage during adolescence.

9.iv Appendix D – WWLA Bore and Water Supply Report

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Muriwhenua Inc.

Attention: Marama Pohatu
marama.muriwhenuainc@gmail.com

23 June 2023 WWLA00805

Te Hapua – Production Bore #2 Installation and Test Pumping Summary.

1. Introduction

Williamson Water & Land Advisory (WWLA) has been commissioned to undertake an owners engineer role on behalf of Muriwhenua Inc. for the development of a community water supply for the Healthy Homes development being planned for papakāinga at Te Hapua. Work undertaken by drilling contractor Barham United Welldrillers (BUW) between 16 May and 8 June 2023 comprised the drilling and installation of a 117 m production bore, that was subsequently test pumped.

This purpose of this memo is to summarise the bore construction process, production potential, and next steps for developing a water supply. The following topics are addressed:

- drilling and lithology encountered;
- test pumping;
- water production potential;
- water quality; and,
- further considerations for next steps (consenting, power supply, bore pump and rising main, headworks design, controls, and water storage).

2. Bore Drilling

Bore Construction

On 16 May 2023, BUW began the process of drilling a water supply production bore at Te Hapua at the location shown in **Figure 1**. This was a second attempt to drill a production bore at this location as an initial bore that was drilled was not productive. The second production bore was designed to account for the difficulties that were encountered in the first bore.

Figure 1. Location of the Te Hapua production bore.

A 200 mm diameter hole was drilled to a depth of 117 m. The upper 48 m of material was interbedded sand, silt, and clay. Below 48 m was moderately consolidated grey sands with silt/clay layers. Compacted sandstone was encountered at 117.5 meters below ground level (mBGL). The harder material had proven unproductive in the first drilling effort, and hence the drilling was terminated.

Once drilling was complete, the material was allowed time to settle, static water level (SWL) was measured at 50.6 mBGL.

The As-Built diagram of the constructed bore is provided in **Appendix A**. As shown, the completed bore comprised an 100 mm inline casing and screen assembly to a depth of 117 m. The top part of the bore comprised continuous 100 mm Schedule 40 steel casing to a depth of 59 mBGL, which was following by alternating 3 m sections of stainless steel wedge–wire screens with 0.15 mm apertures and 9.75 m casing sections. A 3 m steel sump was placed after the last of the five screen at the bottom of the bore

The annulus (space between the screen and the outside of the hole) was backfilled with gravel up to 30 mBGL. The gravel backfill allows groundwater from the surrounding formation to flow into the screen while preventing fine sand from flowing into the bore after a sufficient development period.

A 1 m thick bentonite seal was installed above the gravel and the remaining section of the annulus was filled with 29 m thick cement grout up the ground surface to secure the casing and protect the production zone from surface contamination. The bore was completed with an upstand and a Table E flange to enable installation of the components for the completed production bore (i.e. rising main, pump).

Bore Development

Bore development is the process of extracting water from the bore to clear the screen and fine material that is dislodged in the drilling process. Fine sediment can clog the formation around the bore and the screen, causing limited flow and murky water quality.

A process where high pressure compressed air is injected into the bore to lift water up to the surface (airlifting), was applied to develop the bore and provide an initial indication of flow rate. There was initially a significant amount of sediment in the water that was produced, causing the water to be grey in colour. Airlifting was continued for three days, with periods where a jetting tool was attached to the airline to target discrete sections of screen. During this process the fine sediment was reduced significantly and to a point where it was considered appropriate to run a submersible pump, but still not to a high enough level to terminate development. Therefore, WWLA hired a submersible pump and asked the driller to complete development with that pump and at the same time run a testing pumping exercise. The testing component is required to provide aquifer hydraulic properties for the resource consent, and is discussed below.

3. Test Pumping

Test Pumping Methodology

A submersible pump was temporarily installed to undertake a constant discharge test pumping exercise (CDT). For the CDT the bore was pumped continuously at a constant rate after which the pump was shut off. Groundwater level drawdown in the bore and then recovery were measured throughout the test until near complete groundwater level recovery was observed. The first (attempted) production bore, which is cased to 120 mBGL, was used as a monitoring bore during the CDT.

A CDT serves several purposes:

- Provides an indication of water production potential;
- Continue the process of bore development; and,
- Provides data required to support a groundwater take consent application.

The key parameters for the test are provided in **Table 1** and **Figure 2** shows the CDT in operation.

Table 1. Key parameters for CDT.

Test parameter	
Testing method	Constant discharge test pumping
Test duration	24 hrs
Pumping rate	1 m^3/hr
Pump depth	100 mBGL
Static Water Level	50.6 mBGL
Available drawdown	49.4 m

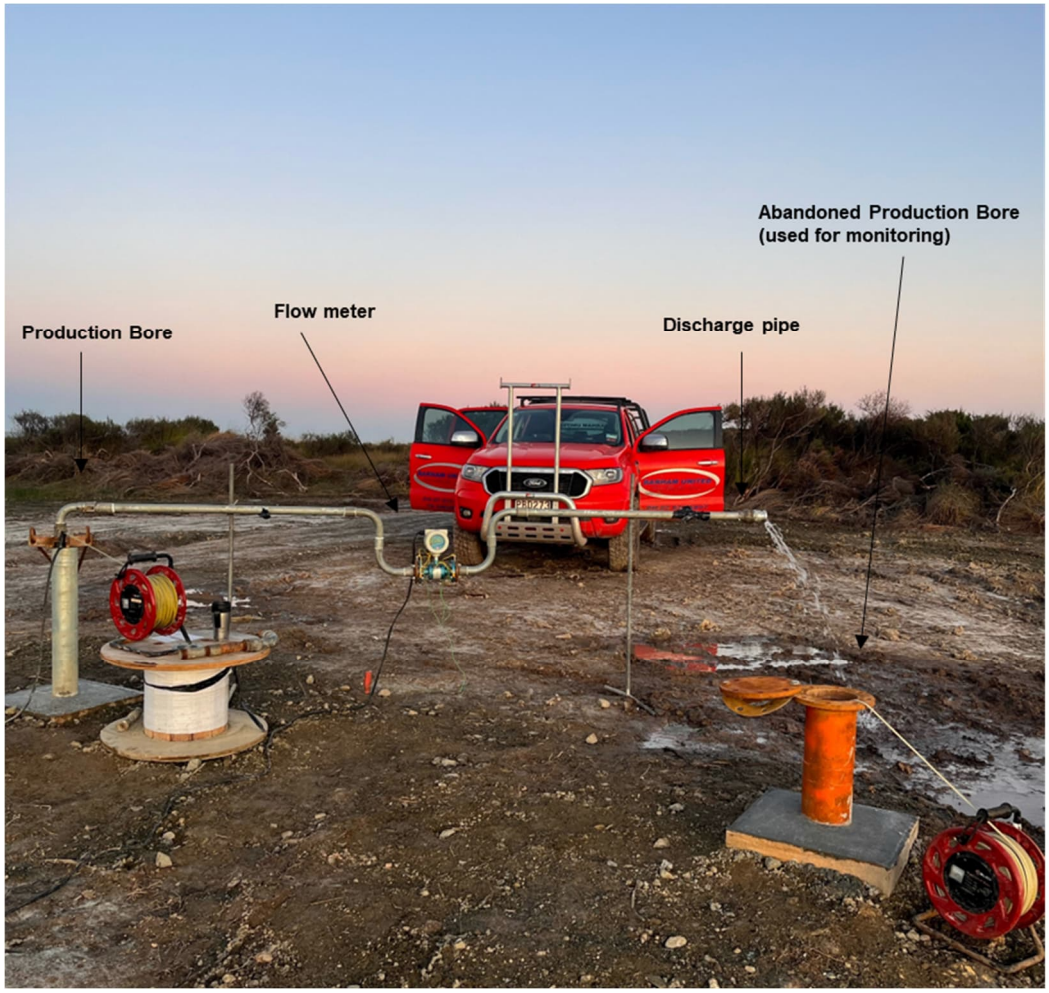

Figure 2. Test pumping setup.

CDT Results

The results of the CDT are shown in **Figure 3**. The following key observations can be taken from the data.

- The bore sustained the target flow rate through the entire 24 test.
- The maximum drawdown was approximately 46 m, most of which occurred within the first 2 hours of the test, while the groundwater level in the bore was near-stable for the second half of the pumping phase.

- Near complete groundwater level recovery occurred after approximately two hours following the cessation of pumping.
- Significant bore development occurred during the early part of the test, with clear water being produced for most of the testing period.
- The groundwater level in the monitoring bore did not change during the CDT, indicating that the bores are hydraulically separated.

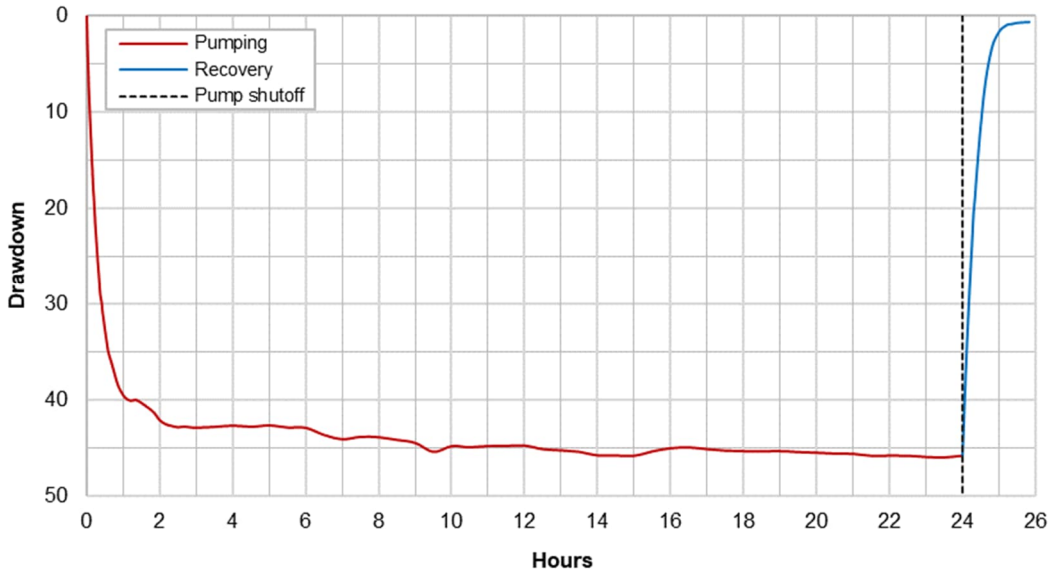

Figure 3. Test pumping results.

Bore Yield Analysis

The CDT set up and results were entered into the WWLA bore yield indication tool. The tool is an analytical tool that can be calibrated to observed data, and then applied to project the potential bore production under other use scenarios. The tool was calibrated by replicating the observed drawdown given the CDT pumping rate, as shown in **Figure 4**. The test pumping resulted in an aquifer hydraulic conductivity value of 8.6 x 10^{-8} m/s, which is typical for sandstone or compressed sand/silt materials as was encountered during drilling.

Installing a pump at the maximum allowable depth in the production bore will increase available drawdown by 10 m relative to the test pumping, with a corresponding 25% increase in potential yield, as shown in **Figure 4**. The expected yield of the production bore with a suitable pump installed at 113.75 mBGL (the depth of the lowest screen section) is 33.7 m^3/day, or approximately 0.4 L/s after 24 hours of operation.

In the short term, it is anticipated that the bore will be used to supply a tap for locals to fill tanks and containers. Higher flow rates can be achieved for shorter periods of operation, as indicated in **Table 2.** For example, a flow rate of 0.75 L/s can be sustained for five minutes – which is enough time to fill a 225 L barrel. Flows exceeding 0.5 L/s can be sustained for the first hour of operation with a corresponding yield of close to 2 m^3. This can potentially be advantageous for obtaining intermittent water supply from the bore prior to construction of a tank storage facility.

In the long term, it is anticipated that the bore will be used to supply a storage tank at a flow rate of approximately 0.4 L/s (34 m^3/day), which means it would take approximately seven to ten days to fill the 250 m^3 proposed reservoir at the observed flow rate. It can also be noted that production from sand bores often improves over the first three months of use. Once full, the bore would be used intermittently to top it up.

Figure 4. Bore yield indication tool set up for test pumping and maximum pump depth conditions.

Table 2. Estimated bore yield versus pumping time.

Hours	Minutes	Flow rate (L/s)	Yield	
			(L)	(m^3)
0.08	5	0.75	225	0.23
0.17	10	0.67	402	0.40
0.25	15	0.63	567	0.57
0.5	30	0.58	1044	1.04
1	60	0.53	1908	1.91
2	120	0.49	3528	3.53
4	240	0.46	6624	6.62
12	720	0.41	17712	17.71
24	1440	0.39	33696	33.70

4. Water Quality

A water sample was collected by BUW at the end of the CDT and submitted to Hills Laboratory for chemical analysis to determine suitability for drinking water (**Figure 5**). The complete testing results are provided in **Appendix B**. The following conclusions can be drawn from the results.

Figure 5. Water sample collected from Te Hapua Production Bore following CDT.

- The water clarity is exceptional, as shown in **Figure 5**.
- The water sample met the New Zealand Drinking Water Standards by the New Zealand Water Services Regulator ("Taumata Arowai"), for all health constituents, indicating that the water is safe for consumption.
- The water sample exceeded the aesthetic values standards for zinc, iron, and manganese. These limits are indicative of what is generally acceptable to consumers in terms of appearance, taste, and odour, but do not raise any health concerns.

The exceedance for manganese was very slight, with the sample testing 0.11 mg/L while the aesthetic standard for taste is 0.10 mg/L. The exceedances for zinc and iron were more significant, with 14.4 mg/L detected relative to the aesthetic standard of 1.5 mg/L for zinc and 7.7 mg/L being measured relative to the aesthetic standard of 0.3 mg/L for iron.

It is likely that these constituents, were elevated due to the use of galvanized pipes during the CDT. This is supported by the results from the Pilot Bore water sample, which was collected after airlift testing using non-galvanised steel pipes. Results from this sample had low zinc levels (0.068 mg/l) detected, and similarly high iron levels to the production Bore (6.4 mg/L) which is likely to have originated from the drilling rods and the steel casing, which takes time to season. It is typical for these metals to reduce in concentrations with ongoing use.

In light of the detection of elevated iron and zinc it is recommended that water quality be confirmed after a significant period of pumping to waste (say one week) and prior to using the bore for drinking water supply. If after this further pumping it is deemed necessary, a suitable treatment program be applied.

Electrical conductivity (EC) levels, which if elevated could indicate connection to sea water, were within acceptable limits, though the values do warrant continued monitoring to recognise if a variation from the baseline occurs.

In conclusion with regard to water quality, the testing results from the Production Bore (and supported by the Pilot Bore water sample) indicate that the Te Hapua production bore is a source of good quality drinking water, provided that appropriate precaution is exercised.

5. Next steps

As the construction of the production bore is now complete, there are additional steps to implementing full use of the bore for its intended purpose. These are:

- Preparation of a resource consent application and assessment of environmental effects (AEE) for the taking and use of the groundwater. The application will be prepared by WWLA and processed by the Northland Regional Council.
- Procurement and installation of a submersible pump and rising main within the bore assembly.
- Procurement and installation of a power supply (most likely solar) and a control system for operating the pump.
- Procurement and installation of a suitable water storage tank (noting the bore can be effectively used as a water tap prior to tank storage being completed).

With the information obtained from drilling, test pumping, and water quality testing, decisions can now be made for selecting a bore pump and rising main, and installing suitable a power supply, and constructing a water storage tank. Previously obtained quotes for the solar power supply and water storage tank will be updated, and all equipment will be procured following discussions with Muriwhenua.

A proposal for WWLA to undertake an Owners Engineer role in facilitating the remaining steps for bore utilisation and consenting will be provided within the coming week.

6. Summary

This report details the construction and test pumping of a drinking water supply bore at Te Hapua. A 100 m bore was drilled into the sand/clay/sandstone formation, intersecting the underlying aquifer to a depth of 117 mBGL.

Test pumping was undertaken and sustained a production rate of 1 m^3/hr for a 24 hour period, where up to 46 m of drawdown was observed and the water level recovered rapidly after the pumping was ceased. This information supports that with the pump installed at a greater depth that maximises allowable drawdown, the bore is estimated to yield approximately 0.4 L/s or 34 m^3/day.

The preceding information was considered with regard to how may people would be supported by the available water supply. Two water use scenarios were considered using per capita water use as shown in Auckland Council's Technical Publication 58 On-site Wastewater Systems Design and Management Manual - Third Edition (2004). These were:

1. 200 L/day/person – Households with standard fixtures and appliances.

2. 145 L/day/person – Households with low flow fixtures and no bath tub.

It was assumed that the bore was operated half the time to allow for periods of rest (i.e. supplying approximately 17 m^3/day). **The result was that the bore is estimated to be capable of supporting between 84 and 116 people at the above water use rates**. The bore could also be

used in tandem with rainwater harvesting (given sufficient water storage) to increase the number of people that would benefit once the Healthy Homes development is up and running.

Water quality testing indicated that the Te Hapua production bore will be a source of high quality drinking water, provided that it is confirmed that the iron and zinc that were detected originated from the galvanised pipes used during the CDT, as is considered likely.

The remaining steps to completing the water supply development are:

- Consenting for a groundwater take.
- Installation of a pump and rising main.
- Installation of a power supply and control system for operating the pump.
- Installation of a suitable water storage tank, though it is noted that the bore can be used as a water tap prior to tank storage being completed.

WWLA remains enthusiastic about helping the Te Hapua community realise their water supply objectives for both the current residents and the planned development. We look forward to further discussions.

Yours sincerely,

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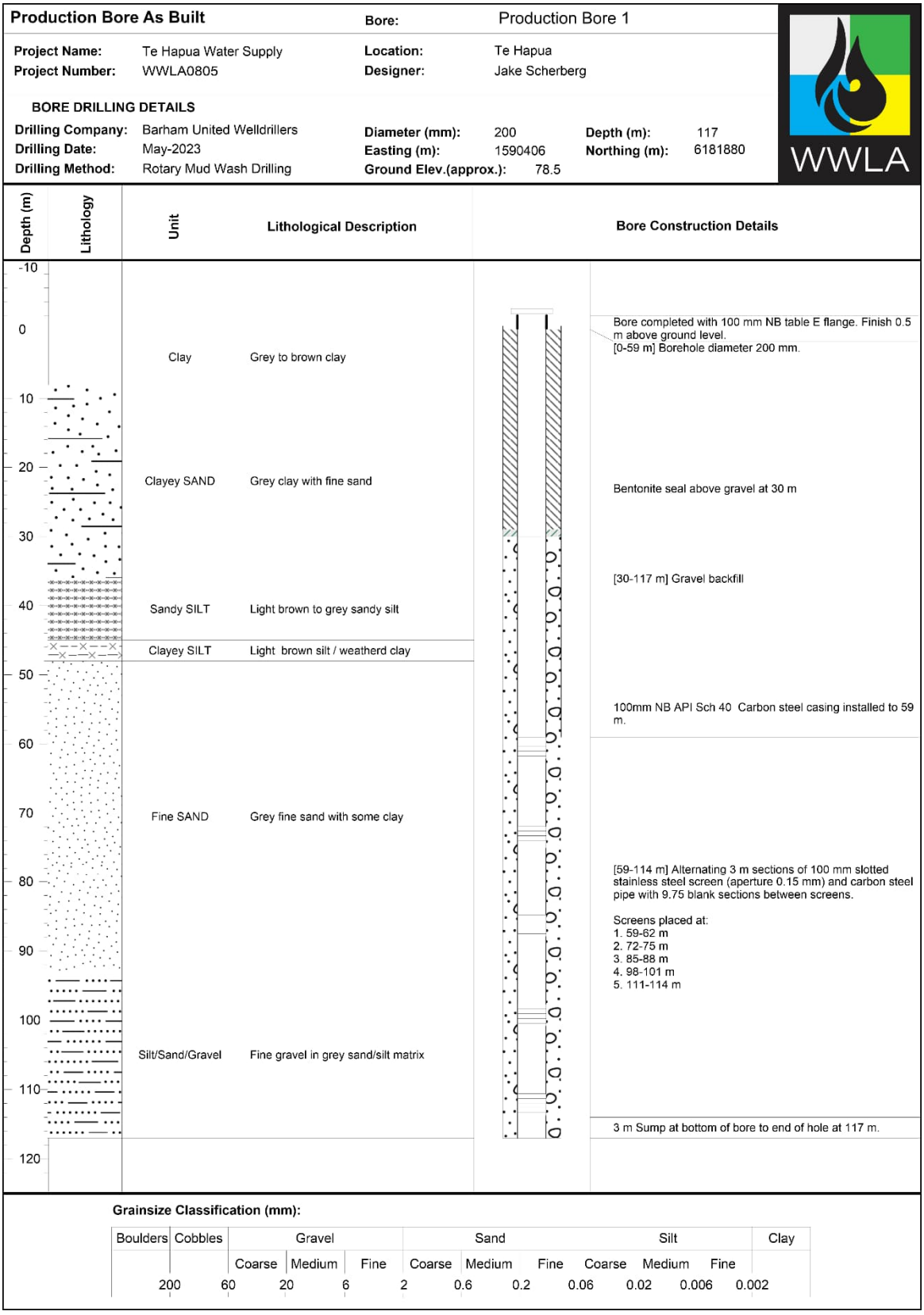
Appendix A. Bore log

Figure 6. As-Built Bore Log for Te Hapua Production Bore.



Appendix B. Water Quality Results

Figure 7. Results from Production Bore water quality analysis.

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Hamilton 3240 New Zealand

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mail@hill-labs.co.nz
www.hill-labs.co.nz

Certificate of Analysis

Client:	Barham United Welldrillers (2021) Limited	**Lab No:**	3299871	DWAPv1
Contact:	Barham United Welldrillers (2021) Limited	**Date Received:**	12-Jun-2023	
	16 Molly Lane	**Date Reported:**	16-Jun-2023	
	RD 1	**Quote No:**		
	Te Awamutu 3879	**Order No:**		
		Client Reference:	Te Hapua	
		Submitted By:	Brad Hermsen	

Sample Type: Aqueous

		Sample Name:	Te Hapua 08-Jun-2023 8:50 am	Aesthetic Values	Maximum Acceptable Values (MAV)
		Lab Number:	3299871.1		
Individual Tests					
Tannin	g/m³		4.9	-	-
Routine Water + E.coli profile Kit					
Escherichia coli	MPN / 100mL		< 1 #1	-	< 1
Routine Water Profile					
Turbidity	NTU		5.9	≤ 5	-
pH	pH Units		6.3	7.0 - 8.5	-
Total Alkalinity	g/m³ as $CaCO_3$		62	-	-
Free Carbon Dioxide	g/m³ at 25°C		69	-	-
Total Hardness	g/m³ as $CaCO_3$		40	≤ 200	-
Electrical Conductivity (EC)	mS/m		34.6	-	-
Electrical Conductivity (EC)	µS/cm		346	-	-
Approx Total Dissolved Salts	g/m³		230	≤ 1000	-
Total Arsenic	g/m³		< 0.0011	-	0.01
Total Boron	g/m³		0.021	-	2.4
Total Calcium	g/m³		4.7	-	-
Total Copper	g/m³		< 0.00053	≤ 1	2
Total Iron	g/m³		7.7	≤ 0.3	-
Total Lead	g/m³		0.0046	-	0.01
Total Magnesium	g/m³		7.0	-	-
Total Manganese	g/m³		0.110	≤ 0.04 (Staining) ≤ 0.10 (Taste)	0.4
Total Potassium	g/m³		6.2	-	-
Total Sodium	g/m³		41	≤ 200	-
Total Zinc	g/m³		14.4	≤ 1.5	-
Chloride	g/m³		65	≤ 250	-
Nitrate-N	g/m³		< 0.05	-	11.3
Sulphate	g/m³		5.4	≤ 250	-

Note: The Maximum Acceptable Values (MAV) are taken from the 'Water Services (Drinking Water Standards for New Zealand) Regulations 2022', published under the authority of the New Zealand Government-2022. Copies of this publication are available from: https://www.legislation.govt.nz/regulation/public/2022/0168/latest/whole.html

The standards set limits for the concentration of determinands in drinking water. The Maximum Acceptable Values (MAVs) for any determinand must not be exceeded at any time.

The Aesthetic Values are taken the publication, 'Aesthetic Values for Drinking Water Notice 2022' issued by the Water Services Regulator ("Taumata Arowai"). Aesthetic values specify or provide minimum or maximum values for substances and other characteristics that relate to the acceptability of drinking water to consumers (such as appearance, taste or odour).

Note that the units: g/m³ are the same as mg/L and ppm.

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.
The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Figure 8. Results from Pilot Bore water quality analysis.

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Certificate of Analysis

Client:	Williamson Water & Land Advisory Limited	**Lab No:**	3186443 SPv1
Contact:	Jake Scherberg	**Date Received:**	01-Mar-2023
	C/- Williamson Water & Land Advisory Limited	**Date Reported:**	08-Mar-2023
	PO Box 314	**Quote No:**	94634
	Kumeu 0841	**Order No:**	WWLA0695
		Client Reference:	Te Hapua
		Submitted By:	Jake Scherberg

Sample Type: Aqueous

Sample Name:		Te Hapua 1 27-Feb-2023 4:00 pm
Lab Number:		3186443.1
Sum of Anions	meq/L	3.2
Sum of Cations	meq/L	3.4
pH	pH Units	6.9
Total Alkalinity	g/m³ as $CaCO_3$	81
Carbonate	g/m³ at 25°C	< 1.0
Bicarbonate	g/m³ at 25°C	99
Free Carbon Dioxide	g/m³ at 25°C	20
Total Hardness	g/m³ as $CaCO_3$	72
Electrical Conductivity (EC)	mS/m	33.1
Total Dissolved Solids (TDS)	g/m³	250
Total Arsenic	g/m³	< 0.0011
Total Boron	g/m³	0.025
Dissolved Calcium	g/m³	11.8
Total Copper	g/m³	0.0021
Total Iron	g/m³	6.4
Total Lead	g/m³	0.00040
Dissolved Magnesium	g/m³	10.4
Total Manganese	g/m³	0.138
Dissolved Potassium	g/m³	5.9
Dissolved Sodium	g/m³	40
Total Zinc	g/m³	0.068
Chloride	g/m³	51
Fluoride	g/m³	0.07
Total Nitrogen	g/m³	< 0.11
Total Ammoniacal-N	g/m³	0.044
Nitrite-N	g/m³	< 0.002
Nitrate-N	g/m³	< 0.002
Nitrate-N + Nitrite-N	g/m³	< 0.002
Total Kjeldahl Nitrogen (TKN)	g/m³	< 0.10
Total Phosphorus	g/m³	0.113
Sulphate	g/m³	7.6

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Aqueous

Test	Method Description	Default Detection Limit	Sample No
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter.	-	1
Total Digestion	Nitric acid digestion. APHA 3030 E (modified) 23rd ed. 2017.	-	1

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.
The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

9.v APPENDIX E – MAVEN WATER SUPPLY CALCULATIONS

MAVEN ASSOCIATES		Job Number 147012	Sheet 1	Rev A
Job Title Title	Muriwhenua Water Supply Check	Author AO	Date 5/04/2024	Checked

Demand	150	litre/person/day	from FNDC	250 L/p/d
Roof Area	84	sq m		
People	3	per household		

Table 6. Monthly/annual rainfall normals (a; mm); percentage of annual total for each month (b; %).

Location		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Cape Reinga Aws	a	58	65	56	109	96	103	128	95	85	61	57	76	988
	b	6	7	6	11	10	10	13	10	9	6	6	8	
	a	85	93	81	96	135	151	169	144	128	99	87	100	1367

https://niwa.co.nz/static/Northland%20ClimateWEB.pdf

Mean Water vol from roof

82,992 L available per year (Roof Area x Mean annual rainfall)

184 No of days supply for household from Roof

Annual Water Requirements

164250 L

\- 81,258 L Insufficient Rain from roof to meet demand

Proposed storage

50,000 L

111 days of water supply

Therefore topup facilities required

Proposed shared Fire fighting tanks to be installed within 90m of dwellings to meet rural fire fighting requirments

MAVEN ASSOCIATES		Job Number 147012	Sheet 2	Rev A
Job Title / Title	Muriwhenua Water Tank - Scenarios for Stage 1A Only	Author AO	Date 5/04/2024	Checked

General Assumptions

2 x 25m^3 Tanks per Dwelling
Usage 0.15 m^3/p/day
Occupancy 3

Total Number Of Dwellings 20
Supply from Borehore 34 m^3/day
Assumed Water Tank Size 6 m^3

12410 m^3 from borehole per Year
(Approx11 km from nearest Petrol station based on Google Earth)

Scenario 1

Roof Area 84 m^2 Connected to Tanks

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Vol Top up per Year per dwelling	Total Topups Vol Required for Stage 1A	*Assumed no. of tank movements*
Mean Monthly Rainfall	58	65	56	109	96	103	128	95	85	61	57	76			
Mean Vol of Rainfall from Roof	4.87	5.46	4.70	9.16	8.06	8.65	10.75	7.98	7.14	5.12	4.79	6.38			
Monthly Water Demand	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69			
Monthly Shortfall/Excess	-8.82	-8.23	-8.98	-4.53	-5.62	-5.04	-2.94	-5.71	-6.55	-8.56	-8.90	-7.30			
Bal	0.18	0.96	0.97	1.44	1.82	1.78	1.85	2.14	2.59	3.03	3.13	3.83			
Topup	9	9	9	5	6	5	3	6	7	9	9	8	85	1700	284

Scenario 2

Roof Area 120 m^2 Connected to Tanks (Assumed Carports connected to Tanks)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Vol Top up per Year per dwelling	Total Topups Vol Required for Stage 1A	*Assumed no. of tank movements*
Mean Monthly Rainfall	58	65	56	109	96	103	128	95	85	61	57	76			
Mean Vol of Rainfall from Roof	6.96	7.80	6.72	13.08	11.52	12.36	15.36	11.40	10.20	7.32	6.84	9.12			
Monthly Water Demand	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69			
Monthly Shortfall/Excess	-6.73	-5.89	-6.97	-0.61	-2.17	-1.33	1.67	-2.29	-3.49	-6.37	-6.85	-4.57			
Bal	3.27	2.39	0.42	0.81	0.64	-0.68	0.99	0.70	2.21	0.85	-1.00	-0.57			
Topup	10	5	5	1	2	0	0	2	5	5	5	5	45	900	150

Scenario 3

Roof Area 170 m^2 Connected to Tanks The Additional area of roof required would not be realisticly be achieveable.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Vol Top up per Year per dwelling	Total Topups Vol Required for Stage 1A	*Assumed no. of tank movements*
Mean Monthly Rainfall	58	65	56	109	96	103	128	95	85	61	57	76			
Mean Vol of Rainfall from Roof	9.86	11.05	9.52	18.53	16.32	17.51	21.76	16.15	14.45	10.37	9.69	12.92			
Monthly Water Demand	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69			
Monthly Shortfall/Excess	-3.83	-2.64	-4.17	4.84	2.63	3.82	8.07	2.46	0.76	-3.32	-4.00	-0.77			
Bal	1.17	0.54	-1.63	3.21	5.84	9.67	17.74	20.20	20.96	17.65	13.65	12.88			
Topup	5	2	2	0	0	0	0	0	0	0	0	0	9	180	30

MAVEN ASSOCIATES		Job Number 147012	Sheet 3	Rev A
Job Title / Title	Muriwhenua Water Tank - Scenarios for Stage 1A & 2	Author AO	Date 5/04/2024	Checked

General Assumptions

2 x 25m^3 Tanks per Dwelling

Usage 0.15 m^3/p/day

Occupancy 3

Total Number Of Dwellings 33

Supply from Borehore 34 m^3/day

Assumed Water Tank Size 6 m^3

12410 m^3 from borehole per Year

(Approx11 km from nearest Petrol station based on Google Earth)

Scenario 1

Roof Area 84 m^2 Connected to Tanks

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Vol Top up per Year per dwelling**	**Total Topups Vol Required for Stage 1A & 2**	***Assumed no. of tank movements***
Mean Monthly Rainfall	58	65	56	109	96	103	128	95	85	61	57	76			
Mean Vol of Rainfall from Roof	4.87	5.46	4.70	9.16	8.06	8.65	10.75	7.98	7.14	5.12	4.79	6.38			
Monthly Water Demand	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69			
Monthly Shortfall/Excess	-8.82	-8.23	-8.98	-4.53	-5.62	-5.04	-2.94	-5.71	-6.55	-8.56	-8.90	-7.30			
Bal	0.18	0.96	0.97	1.44	1.82	1.78	1.85	2.14	2.59	3.03	3.13	3.83			
Topup	9	9	9	5	6	5	3	6	7	9	9	8	85	2805	468

Scenario 2

Roof Area 120 m^2 Connected to Tanks (Assumed Carports connected to Tanks)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Mean Monthly Rainfall	58	65	56	109	96	103	128	95	85	61	57	76			
Mean Vol of Rainfall from Roof	6.96	7.80	6.72	13.08	11.52	12.36	15.36	11.40	10.20	7.32	6.84	9.12			
Monthly Water Demand	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69			
Monthly Shortfall/Excess	-6.73	-5.89	-6.97	-0.61	-2.17	-1.33	1.67	-2.29	-3.49	-6.37	-6.85	-4.57			
Bal	3.27	2.39	0.42	0.81	0.64	-0.68	0.99	0.70	2.21	0.85	-1.00	-0.57			
Topup	10	5	5	1	2	0	0	2	5	5	5	5	45	1485	248

Scenario 3

Roof Area 170 m^2 Connected to Tanks The Additional area of roof required would not be realisticly be achieveable.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Mean Monthly Rainfall	58	65	56	109	96	103	128	95	85	61	57	76			
Mean Vol of Rainfall from Roof	9.86	11.05	9.52	18.53	16.32	17.51	21.76	16.15	14.45	10.37	9.69	12.92			
Monthly Water Demand	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69	13.69			
Monthly Shortfall/Excess	-3.83	-2.64	-4.17	4.84	2.63	3.82	8.07	2.46	0.76	-3.32	-4.00	-0.77			
Bal	1.17	0.54	-1.63	3.21	5.84	9.67	17.74	20.20	20.96	17.65	13.65	12.88			
Topup	5	2	2	0	0	0	0	0	0	0	0	0	9	297	50

1 CONSENT REQUIREMENTS

1.1 Introduction

Without limiting this application being for all necessary resource consents triggered by the proposal, resource consent appears to be required for at least those matters identified below. Resource consent is being sought to enable the proposal (as described in this report and supporting material) and the application intends to include all necessary consents for those activities to occur. The list of reasons for consent may not be an exhaustive list and if further consent matters identified post-lodgement of the application, those should also be considered as forming part of this application.

1.2 Operative Far North District Plan ("FNDP")

The following tables contains an assessment of the proposal against the relevant Far North District Plan provisions, including those of the Coastal Environment chapter.

CHAPTER 10 – GENERAL COASTAL ZONE	
Permitted Activities	**Compliance**
10.6.5.1.1 VISUAL AMENITY	
(a) any new building(s) not for human habitation provided that the gross floor area of any new building permitted under this rule, does not exceed 50m² or for human habitation provided that the gross floor area does not exceed 25m2 ; and	The wastewater treatment plant is less than 50m^2.
(b) the exterior is coloured within the BS5252 standard colour palette range with a reflectance value of 30% or less or are constructed of natural materials which fall within this range; or	It will be painted according to the BS5252 colour palette.
(c) any alteration/addition to an existing building which does not exceed 50m2 , provided that any alteration/ addition does not exceed the height of the existing building and that any alteration/addition is to a building that existed at 28 April 2000; or	No alterations proposed.
(d) renovation or maintenance of any building.	No renovations or maintenance proposed. **Complies**

10.6.5.1.3 SCALE OF ACTIVITIES The total number of people engaged at any one period of time in activities on a site, including employees and persons making use of any facilities, but excluding people who normally reside on the site or are members of the household shall not exceed 4 persons per site or 1 person per 1ha of net site area whichever is the greater.	The Muriwhenua land total 5,875 hectares. A permitted activity allows for 5,875 people to inhabit the site. There are currently approximately 300 people living at Te Hapua. This development relocates people currently living in Te Hapua to healthier homes. This development does not increase the population on the site. Complies
10.6.5.1.4 BUILDING HEIGHT The maximum height of any building shall be 8m.	All buildings are below 8m and complies with this standard.
10.6.5.1.5 SUNLIGHT No part of any building shall project beyond a 45 degree recession plane as measured inwards from any point 2m vertically above ground level on any site boundary.	The development site is located 300m from the nearest site boundary and complies with this standard.
10.6.5.1.6 STORMWATER MANAGEMENT The maximum proportion of the gross site area covered by buildings and other impermeable surfaces shall be 10%.	A maximum of 587.5 hectares can be impermeable. The proposed development area is 1.1 hectares. The existing impervious surfaces on the site are well below 10%. Complies
10.6.5.1.7 SETBACK FROM BOUNDARIES (a) no building shall be erected within 10m of any site boundary, except that on any site with an area of less than 5,000m², this setback shall be 3m from any site boundary; (b) no building for residential purposes shall be erected closer than 100m from the boundary of the Minerals Zone.	The development site is located 300m from the nearest site boundary. No mineral zones are location on the site. Complies
10.6.5.1.8 TRANSPORTATION Assessment of chapter 15 – Transportation below.	
10.6.5.1.9 KEEPING OF ANIMALS Any building, compound or part of a site used for factory farming, boarding kennels or a cattery shall be located no closer than 50m from any site boundary except for a boundary which adjoins the Residential, Coastal Residential or Russell Township Zones where the distance shall be a minimum of 600m.	No farming proposed. Complies

10.6.5.1.10 NOISE All activities shall be so conducted as to ensure that noise from the site shall not exceed the following noise limits at or within the boundary of any other site in this zone, or at any site zoned Residential, Russell Township or Coastal Residential, or at or within the notional boundary of any dwelling in any other rural or coastal zone: 0700 to 2200 hours 55 dBA L10 2200 to 0700 hours 45 dBA L10 and 70 dBA Lmax	All residential activity will **comply** with these noise standards.
10.6.5.1.11 HELICOPTER LANDING AREA A helicopter landing area shall be at least 200m from the nearest boundary of any of the Residential, Coastal Residential, Russell Township or Point Veronica Zones.	**n/a**
Controlled Activities	**Status**
10.6.5.2.1 PAPAKAINGA HOUSING 3000m^2 exclusive use. 5.8ha elsewhere on the property.	The exclusive land for each unit ranges from 350m^2 to 870m^2 and **infringes** this rule. An activity will be assessed as discretionary activity if it does not comply with rule 10.6.5.2. Therefore, resource consent is sought for a **discretionary activity.**
Discretionary Activities	**Status**
10.6.5.4.4 INTEGRATED DEVELOPMENT A management plan for integrated development under this rule shall include information on the following where relevant and necessary for a sufficient understanding of the proposal:	This application is for Papakāinga housing on Māori Freehold Land and resource consent is sought for a **discretionary activity**.
(a) a plan showing the location of the property (including property boundaries), topography, adjoining uses, location of the activities proposed in the application, existing vegetation (type and location), drainage patterns, existing and proposed access road/s, location of any outstanding landscapes or natural features, location of any covenanted or otherwise protected areas;	Civil, ecological, geotechnical appraisal, wastewater and traffic reports are attached to this application. **Complies**

(b) a description of the purpose of the application and the activities which are proposed;	A description is located within the AEE. Complies
(c) a description of the degree (if any) to which the proposed development will exceed the standards set for permitted, controlled, restricted discretionary and discretionary activities in the zone;	A description of infringements is located above. Complies
(d) details of the staging (if any) which is proposed;	All 20 dwellings will be built as one stage. Complies
(e) a description of any heritage resources on the property;	No heritage resources are located on the proposed development site. Complies
(f) other information which is relevant to any assessment of the effects of the application, is as follows:	No other relevant information. Complies
(i) details of provisions made for sewage and stormwater disposal, including Low Impact Design for reduced site impermeable area;	(i) The Wastewater report prepared by GWE provides all necessary information regarding the acceptability of the proposed wastewater treatment and disposal facility. Complies
(ii) details of any earthworks;	(ii) The Infrastructure report prepared by Maven provides all necessary information regarding the acceptability of the proposed earthworks. Complies
(iii) details of the geotechnical aspects of the property;	(iii) The Geotechnical Appraisal Area_1 report prepared by Haigh Workman provides all necessary information regarding the acceptability of the proposed development noting that a full geotechnical report will be completed as the application progresses. Complies
(iv) details of any natural hazard areas and the measures which will be taken to avoid any adverse effects;	(iv) No specialists reports identify any natural hazard areas. Complies
(v) details of the measures (if any) to protect indigenous vegetation and habitats, outstanding landscapes and natural features, heritage resources and riparian margins;	(v) The Ecological report prepared by Wild Ecology provides all necessary information regarding the proposed clearing of vegetation and Ecological Management Plan (EMP). Complies
(vi) the extent to which areas of open space, reserves, natural vegetation and other amenities are already provided by the land owning group on other whanau and hapu lands in the vicinity.	(vi) The areas that are currently provided for residential living within Te Hāpua are currently experiencing flooding, coastal inundation, and unhealthy living. Complies

CHAPTER 15 – TRANSPORTATION	
Rules 15.1.6	**Activity Status**
15.1.6A Traffic Traffic intensity up to 120 is a **discretionary activity**.	The proposed development provides for 20 units. The estimated vehicle movements per household per day is no more than 80. Resource consent is sought for a **discretionary activity**.

1.3 Permitted Activities

Schedule 4 of the RMA requires that where an application is relying on a permitted activity as part of the proposal, a description of the permitted activity that demonstrates that is complies with the requirements, conditions and permissions for the permitted activity must be provided.

- C10 – Coastal Environment
  - 10.6.5.1.1 Visual Amenity
  - 10.6.5.1.3 Scale of Activities
  - 10.6.5.1.4 Building Height
  - 10.6.5.1.5 Sunlight
  - 10.6.5.1.6 Sotrmwater Management
  - 10.6.5.1.7 Setback from Boundaries
  - 10.6.5.1.10 Noise

1.4 Reasons for consent conclusion

Overall, for the land-use aspect, resource consent for a **Discretionary Activity** is required.

FAR NORTH – PROPOSED DISTRICT PLAN ASSESSMENT

1.1 Far North – Proposed District Plan (FN-PDP")

The Far North – Proposed District Plan (**FN-PDP**) was notified on 27 July 2022 and seeks to replace the Operative District Plan to better manage resources.

PART 2 – NATURAL ENVIRONMENT VALUES – ECOSYSTEMS AND INDIGENOUS BIODIVERSITY	
Rules	**Comment**
IB-R4 Indigenous vegetation clearance and any associated land disturbance outside a Significant Natural Area **Per-1**	
1. A report has been obtained from a suitably qualified and experienced ecologist confirming that the indigenous vegetation does not meet the criteria for a Significant Natural Area and it is submitted to Council 14 days in advance of the clearance being undertaken; and	The Ecological report prepared by Wild Ecology finds that this land is regenerated from being removed for agricultural purposes. **Complies**
2. It does not exceed the following amounts per site over a 5-year period: i. Rural Production zone, Horticulture zone, Māori Purpose zone and Treaty Settlement Land Overlay – 5,000m2 if not in a remnant forest, otherwise 500m2 in a remnant forest.	The development site is located within a Māori Purpose zone and is over 5000m^2 **infringing** this rule. Resource consent is sought for a **discretionary activity**.

PART 2 – DISTRICT WIDE MATTERS - EARTHWORKS	
Rules	**Comment**
EW-R13 Earthworks and erosion and sediment control **Per-1** The earthworks complies with standard EW-S5 Erosion and sediment control.	The proposed development requires a sediment management plan which is a **permitted activity**.
Standards	**Compliance**
EW-S5 Erosion and sediment control Earthworks	The proposed development will comply with the Erosion and Sediment Control guidelines and **comply** with this standard.

1. must for their duration be controlled in accordance with the Erosion and Sediment Control Guidelines for Land Disturbing Activities in the Auckland Region 2016 (Auckland Council Guideline Document GD2016/005); and 2. shall be implemented to prevent silt or sediment from entering water bodies, coastal marine area, any stormwater system, overland flow paths, or roads.	

1.2 Permitted Activities

Schedule 4 of the RMA requires that where an application is relying on a permitted activity as part of the proposal, a description of the permitted activity that demonstrates that is complies with the requirements, conditions and permissions for the permitted activity must be provided. In this instance, there are no permitted activities being relied upon for this application.

- EW-R13 Earthworks and erosion and sediment control.

1.3 Reasons for consent conclusion

Overall, resource consent for a Discretionary Activity is required.

1.1 Section 104(1)(b)(vi) – Far North District Plan (district level provisions)

The relevant objectives and policies of the Far North District Plan are set out and considered below.

FAR NORTH DISTRICT PLAN OBJECTIVES AND POLICIES
Chapter 10 – General Coastal Zone

Objectives

1. *To provide for appropriate subdivision, use and development consistent with the need to preserve its natural character.*

2. *To preserve the natural character of the coastal environment and protect it from inappropriate subdivision, use and development.*

3. *To manage the use of natural and physical resources (excluding minerals) in the general coastal area to meet the reasonably foreseeable needs of future generations.*

Policies

1. *That a wide range of activities be permitted in the General Coastal Zone, where their effects are compatible with the preservation of the natural character of the coastal environment.*

2. *That the visual and landscape qualities of the coastal environment in be protected from inappropriate subdivision, use and development.*

3. *Subdivision, use and development shall preserve and where possible enhance, restore and rehabilitate the character of the zone in regards to s6 matters, and shall avoid adverse effects as far as practicable by using techniques including:*

   (a) clustering or grouping development within areas where there is the least impact on natural character and its elements such as indigenous vegetation, landforms, rivers, streams and wetlands, and coherent natural patterns;
   (b) minimising the visual impact of buildings, development, and associated vegetation clearance and earthworks, particularly as seen from public land and the coastal marine area;
   (c) providing for, through siting of buildings and development and design of subdivisions, legal public right of access to and use of the foreshore and any esplanade areas;
   (d) through siting of buildings and development, design of subdivisions and provision of access, that recognise and provide for the relationship of Maori with their culture, traditions and taonga including concepts of mauri, tapu, mana, wehi and karakia and the important contribution Maori culture makes to the character of the District. (Refer Chapter 2 and in particular Section 2.5 and Council's "Tangata Whenua Values and Perspectives (2004)";

(e) providing planting of indigenous vegetation in a way that links existing habitats of indigenous fauna and provides the opportunity for the extension, enhancement or creation of habitats for indigenous fauna, including mechanisms to exclude pests;

(f) protecting historic heritage through the siting of buildings and development and design of subdivisions.

4. That controls be imposed to ensure that the potentially adverse effects of activities are avoided, remedied or mitigated as far as practicable.

5. Maori are significant land owners in the General Coastal Zone and therefore activities in the zone should recognise and provide for the relationship of Maori and their culture and traditions, with their ancestral lands, water, sites, waahi tapu and other taonga and shall take into account the principles of the Treaty of Waitangi.

6. The design, form, location and siting of earthworks shall have regard to the natural character of the landscape including terrain, landforms and indigenous vegetation and shall avoid, remedy or mitigate adverse effects on those features.

Comment

- The proposed development uses a small area of land within a much larger landholding. The proposal allows for the development of Papakāinga housing (20 individual units).
- This proposal achieves the needs of Muriwhenua to have warm and dry homes for community.
- The proposal does not remove an excessive amount of vegetation within the coastal environment.
- The proposed development is clustered together to make an efficient use of resources and the establish a community akin to that already existing on the site.
- This development will allow for Muriwhenua to continue with their cultural practices.
- The proposed planting is per the landscape plan. The planting includes indigenous biodiversity and exotic fruit trees.
- The development site was chosen for its less obstructive effect on the environment. Many other potential sites were subject to overlays and features that a development of this scale would potentially have more significant adverse effects. The proposed works area avoids the majority of such constraints and impacts.

1.1.1 Proposed Far North District Plan

Part 2 – District Wide Matters – Ecosystems and indigenous biodiversity

The objectives and policies of Part 2 – Earthworks are set out at IB-O and IB-P of the proposed district plan. They seek to protect areas of significant vegetation and manage it in a way that provides for the social, economic and cultural well-being of people and communities. It also includes the management of indigenous biodiversity that enables Māori land to be used to develop papākainga housing.

The proposed development is considered to be consistent with these objectives and policies for the following reasons:

- The 1.1 hectares of land to be used for papākainga is located in what is now a naturally regenerated kanuka scrubland. It has previously been cleared for agricultural purposes.
- The proposed development is necessary to provide for the Te Hāpua community's social, economic and cultural well-being.
- The development area is not located within a significant natural area.
- The development area is located within the coastal environment. However, the topographical nature and distance from the water body is such that this vegetation removal will avoid adverse effects to the wider ecosystem.

Part 2 – District Wide Matters – Coastal Environment

The objectives and policies of Part 2 – Coastal Environment are set out at CE-O and CE-P of the proposed district plan. They seek to manage and ensure the long-term preservation of the coastal environment for current and future generations. They also seek to provide for the use of Māori Purpose zoned land provided that the use does not compromise the identified characteristics of the coastal environment.

The proposed development is considered to be consistent with these objectives and policies for the following reasons:

- The proposed development is a minor addition to the Te Hāpua 42 Block.
- It provides the necessary homes for the Muriwhenua community without adversely affecting the character and qualities of the costal environment.

Part 2 – District Wide Matters – Earthworks

The objectives and policies of Part 2 – Earthworks are set out at EW-O and EW-P of the proposed district plan. They seek to facilitate the efficient development of land while managing adverse effects on water bodies and surrounding land.

The proposed development is considered to be consistent with these objectives and policies for the following reasons:

- The proposed development has been carefully designed so that surrounding land will not be affected by the development.
- An earthworks and erosion and sediment management plan will ensure that no earth will run-off beyond the site.

Part 3 – Area Specific Matters – Māori Purpose Zone

The objectives and policies of Part 3 – Māori Purpose Zone are set out at MPZ-O and MPZ-P of the proposed district plan. They seek to ensure that the zone enables a range of opportunities to ensure its viability for future generations by use and development that is sustainable within the land and surrounding environment.

The proposed development is considered to be consistent with these objectives and policies for the following reasons:

- The proposed development is a necessary intervention to ensure the safety and quality of life for residents that are currently living in poor quality houses in Te Hāpua coastal settlement area.
- The proposed development ensures the longevity of the community by providing healthy homes.
- The proposed development does not exceed the carrying capacity of the land and surrounding environment

1.1.2 Objectives and policies conclusion

Overall, the proposal is complementary to the relevant objectives and policies of the operative and proposed versions of the Far North District Plan.

Te Kaunihera o Te Hiku o te Ika
Far North District Council

HE ARA TĀMATA
CREATING GREAT PLACES
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CDM-2025-93 - 731 Te Hapua Road, Te Hapua 0484

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Meeting Minutes

Date: 15 May 2025
Time: 1pm
Participants: Swetha Maharaj, Eden Nathan, Sujeet Tikaram, Elizabeth Stacey, Mark Vinall, Shane Kelly, and Marama Pohatu.

Key Discussions:

1. **Proposal Overview and Project Background:**

   Marama Pohatu highlighted the following:

   - The land is Māori freehold, held under Muriwhenua Incorporation since 1965.
   - There is a longstanding need for safe, warm housing in Te Hapua.
   - This initial stage targets 20 homes, prioritising those in severe housing stress (e.g. overcrowded conditions, caravans).
   - Current housing stock is old (pre-1930s), and the proposed housing is for local whānau, not for sale.

2. **Site Selection and Suitability:**

   Mark Vinall highlighted the following:

   - The selected site (Area A) was identified after rigorous assessment from multiple land areas.
   - Chosen due to:
     - Proximity to Te Hapua Road (main access)
     - Manageable topography
     - Lack of sensitive overlays (except Coastal Environment Overlay)
     - Absence of flooding risks, wetlands, or protected vegetation
   - It is zoned as General Coastal (operative plan) and Māori Purpose Zone (proposed plan).
   - The proposal does not meet density or minimum site size standards under current plans but aims to qualify under the integrated development provisions.
   - The site was chosen to avoid geotechnical, flooding, and ecological constraints.

3. **Scheme Plan and Layout:**

   Mark Vinall highlighted the following:

   - 20 homes clustered along a central private lane, with 4 directly accessing Te Hapua Road.
   - Lot sizes range between 350–870m², each with:

- 7x15m building platform
- Two car parks

- Two 22,500L water tanks (for potable and firefighting use)
- Wastewater to be pumped to an existing treatment facility.
- The site is gentle sloping with minor vegetation (not wetlands).
- Preliminary Geotech investigations confirm the land is suitable for development.

4. **Transport Considerations:**

Elizabeth Stacey highlighted the following:

- It was confirmed that the internal roads will remain private and highlighted the need to comply with private accessway standards.
- Recommend sealing road frontage to mitigate dust in addition to landscaping.
- Vehicle crossings for 4 roadside lots gaining access from Te Hapua Road should be assessed for safety (sightlines etc).
- No significant transport concerns raised.
- A Traffic/Transport Impact Assessment was recommended by Swetha Maharaj to accompany an application to Council.

5. **Three Waters Servicing and Engineering Considerations:**

Sujeet Tikaram highlighted the following:

- No reticulated services available; development must be self-serviced.
- An engineering site suitability report is recommended to address water supply, wastewater and stormwater.
- Confirm capacity of the existing wastewater system for 20 new dwellings.
- Firefighting water supply (2 x 22,500L) will require departure from the firefighting water standards — Fire and Emergency New Zealand consultation is recommended.
- Stormwater disposal systems must remain within lot boundaries and maintain required separation distances – should be address in site suitability report.

6. Planning Considerations:

Swetha Maharaj highlighted the following:

- Residential density exceeds operative and proposed plan standards.
- A robust assessment to justify density and clustering and discuss alignment with Māori Purpose Zone provisions.
- Emphasise positive social and economic outcomes in planning assessment.
- Vegetation clearance may trigger the need for an ecological report.
- Given Outstanding Natural Landscapes and High Natural Character Areas and proximity to areas of Māori significance, iwi and hapū engagement is encouraged.
- Archaeological features present—recommend Heritage NZ consultation.
- A landscape plan would be beneficial.
- Discussion in regard to providing a Landscape and Visual Amenity Assessment to strength the density and clustering argument however it was noted this is a case-by-case basis and if the planning assessment was able to provide thorough photographic and contextual planning assessment this may be acceptable and can be discussed and revisited at a later date if further information is required. However, it is appreciated that there are budget constraints and specialist reports require expenditure that could be spent on housing.

7. **Ownership and Subdivision Clarification:**

- The land is Māori freehold and will remain under Muriwhenua Incorporation. Lots are not for sale; they will be leased.
- Further clarification was provided in regard to the Treaty Settlement overlay and Marama Pohatu provided further context on the land.

8. **Project Intent and Budget Constraints:**

- Shane Kelly and Marama Pohatu noted limited funding and prioritisation of resources toward housing.
- Council indicated openness to streamlined processes and tailored assessments where appropriate.
- A previous similar development on Lamb Rd in Pukenui was cited as an example of a similar density.

9. **Clarifications and Closing Remarks:**

Marama Pohatu emphasised:

- The development provides hope to the community.

Shane Kelly confirmed:

- Central Government funding exists for preliminary work.
- A bore for water supply is already established.
- Emphasis is on cost-effective development with minimal unnecessary consultant expenses.

Swetha Maharaj affirmed:

- Council's support for papakāinga and offered flexibility on assessments if justified well.

The recording ended prior to the final remarks from Sujeet Tikaram in regard to the nearby bore mentioned by Shane Kelly and it was recommended to consider whether consent is required by Northland Regional Council.

The meeting closed at 1.41pm.