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 Schedule 4). Prior to, and during, completion of this application form, please refer to Resource Consent Guidance Notes and Schedule of Fees and Charges — both available on the Council's web page.

1. Pre-Lodgement Meeting

Have you met with a council Resource Consent representative to discuss this application prior to lodgement? ◯ **Yes** ✔ **No**

2. Type of Consent being applied for

(more than one circle can be ticked):

- ✔ **Land Use**
- ◯ **Fast Track Land Use***
- ◯ **Subdivision**
- ◯ **Consent under National Environmental Standard** (e.g. Assessing and Managing Contaminants in Soil)
- ◯ **Discharge**
- ◯ **Change of Consent Notice (s.221(3))**
- ◯ **Extension of time (s.125)**
- ◯ **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?	
Who else have you consulted with?	

*For any questions or information regarding iwi/hapū consultation, please contact Te Hono at Far North District Council **tehonosupport@fndc.govt.nz***

5. Applicant Details

Name/s: Laminata Homes Ltd.

Email: [redacted]

Phone number:

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

6. Address for Correspondence

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

Name/s: Northland Planning and Development 2020 Limited c/o - Rochelle Jacobs

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: Marie Driver, Iritana Smith, Maiki Smith, Rita Smith & Wiremu Smith

Property Address/ Location: 45 Tauteihiihi Road, Kohukohu

Postcode

8. Application Site Details

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

Name/s: As per above

Site Address/ Location:

Postcode

Legal Description: Tauteihiihi 2B4C and 2B4A **Val Number:**

Certificate of title: ROT-503537

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.

The wooden bridge has failed such that there is no vehicular access to the lower site. Please access the site on foot by crossing the stream.
For the upper site, please park at the vehicle crossing.

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.

To establish 4 papakainga homes on site where consent is triggered for Papakainga Housing, Fire Risk and setback from water rules.

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.

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):

- [x] **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**
- [x] **Changing the use of a piece of land**
- [x] **Disturbing, removing or sampling soil**
- [ ] **Removing or replacing a fuel storage system**

13. 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**

13. Draft Conditions:

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

If yes, do you agree to extend the processing timeframe pursuant to Section 37 of the Resource Management Act by 5 working days? ✔ **Yes** ◯ **No**

14. 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) Laminata Homes Ltd.

Email: [redacted]

Phone number:

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

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) Nikolas Morrison c/o Laminata Homes Ltd.

Signature:
(signature of bill payer) [redacted]

Date 19/03/25

MANDATORY

15. 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.

15. Important information continued...

Declaration

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

Name: (please write in full) Rochelle Jacobs

Signature: [redacted] **Date** 14-Mar-2025

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

Checklist (please tick if information is provided)

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

Land-Use Consent for

Rihari Wirihiona & Maggie Smith Whanau Trust

45 Tauteihiihi Road, Kohukohu

Date: 31 March 2025

Attention: Liz Searle & Whitney Peat

Please find attached:

- an application form for a land use resource consent to construct four new dwellings for papakainga housing purposes on a Maori land title site that is zoned ***Rural Production Zone*** in the Operative District Plan and ***Maori Purpose – Rural*** in the Proposed District Plan; and
- an Assessment of Environmental Effects of the potential and actual effects of the proposal on the environment.

While the Papakainga housing activity is a Controlled activity rules relating to fire risk to residential units, building / impermeable surface setbacks from a river and wastewater disposal area setbacks from a wetland result in an overall **Discretionary Activity** under the Far North Operative District Plan (ODP). The application is a **Permitted Activity** insofar as the Proposed District Plan.

If you require further information, please do not hesitate to contact the me.

Regards,

Rochelle Jacobs
Director/Senior Planner

NORTHLAND PLANNING & DEVELOPMENT 2020 LIMITED

Contents

Attachments:

1. **FNDC Application Form**
2. **Record of Title –** *LINZ*
3. **Site & Building Plan(s) –** *Laminata*
4. **Site Suitability Report –** *Geologix Consulting Engineers*
5. **FFWS Application Form –** *FENZ*
6. **Property Legalisation Corresponence –** *FNDC*
7. **Archaeoligical Assessment –** *Context Archeology*

Assessment of Environment Effects Report

1. Description of the Proposed Activity

1.1 The Applicant is seeking resource consent to construct four new dwellings and associated on-site services on two physically separate sites at 45 Tauteihiihi Road, Kohukohu that are comprised in one record of title. The dwellings are intended to house whanau members on land in shared ownership.

1.2 The proposed dwellings would be located on the two sites described in Section 2 below. The dwelling units are designed by Laminata and will be constructed off-site and located on-site when the required site works are completed. The proposed dwellings are a simple, single storey mono-pitched roof design, comprising vertical timber cladding, colour steel roofing and external decking. The application site and building plans prepared by Laminata are attached at **Appendix 3**.

1.3 On the lower (eastern block), a 112m^2 three-bedroom house and smaller 65m^2 two-bedroom house are proposed centrally on the site above the regional council mapped flood plain area. The existing dwelling and shed comprising 278m^2 of roof area will be removed as part of this development. The house buildings are setback the required 10 metres from the external boundaries. To provide some physical separation between the dwellings, it is necessary for the smaller of the two dwellings to be located partially within the required 30m setback from the river. The proposed wastewater disposal area will be within 30m of a wet area (presumed to be a wetland) in the lower eastern part of the site adjacent to the road. The dwellings on the lower block would utilise the existing accessway off Tauteihiihi Road. Accessway construction is limited to the 188m^2 proposed parking area as no works are required to upgrade the existing driveway within the site boundary. The additional area of paved driveway and parking area will be 94m^2. Roof runoff will be attenuated by rainwater tanks as described in the Geologix Engineering Report (refer **Appendix 4**).

1.4 Minimal earthworks comprising 120.2m^3 is required on the lower block for building foundation and the construction of the parking area. The former bridge access to the lower site within the road reserve has now failed. This will be replaced with a culvert, designed in accordance with FNDC Engineering Standards. These detailed culvert designs are yet to be completed, as such a condition regarding Engineering plan approval is offered. Contact was made with Councils Property Legislation Team regarding options for approval of this infrastructure given its location within the road corridor (refer **Appendix 6**). Confirmation that a LTO is not required, and that the establishment of the culvert can be addressed as part of the overall resource consent application can be found within the email trail. Given this, the applicant requests that the description and associated conditions of this resource consent reference this activity as well. The replacement culvert works will be undertaken prior to the development works occurring on site to re-establish vehicular access.

1.5 On the upper (northern) block, two similar size dwelling units (65m^2) will be located on pastureland in the lower eastern corner of the site. Both dwellings would be setback more than

10 metres from the external boundaries. House 2 would be located approximately 12.83m from the adjacent bush area. Vehicle access from Tauteihiihi Road through to the to the unit carparking spaces is required as it is currently formed as a unsealed farm crossing and access. Approximately 65.25m^3 of cut earthworks are required to establish the new 434m^2 metal driveway and parking areas. The applicant has indicated that due to the timber pile foundation design, minimal earthworks for the dwelling construction is required. Roof rainwater runoff will be attenuated within tanks, with a separate 4m^3 tank provided for driveway attenuation. During construction, erosion and sediment control measures will include a silt fence erected on the downslope face of the proposed accessway and parking areas.

1.6 On-site water supply, wastewater treatment and disposal will be provided on each site in the locations indicated on the site plans (refer Sheet 1.5 and 1.6). It is noted however, that there has been an update to the location of the wastewater disposal area within the Site Suitability Report, and this has at time of lodgement not been reflected on the site plan. An updated plan will be provided as soon as possible. In the interim please refer to the Site Suitability Report for Assessment purposes. The wastewater disposal areas include the required reserve areas, which also includes the necessary setbacks from boundaries. The engineers have recommended that wastewater is conveyed to land disposal via a pressure compensating dripper irrigation system and planted with evapotranspiration species. The existing overland flow path on the lower block (labelled a swale drain on Sheet 1.6) will be retained as a means of draining stormwater from the site and will be clear of all buildings and water tanks. The existing entry pathway and culvert drain will be retained.

1.7 The narrow nature of Tauteihiihi Road is such that the Applicant's engineers' recommendation is for the inclusion of a vehicle passing bay located between the two sites. This is provided in accordance with the ODP private accessway standards that requires passing bays in rural zones on blind corners at spacings not exceeding 100m and to be at least 15m long, with a minimum useable width of 5.5m. The location of the passing bay is indicated on the Geologix Report 'Upper Site Plan' attached at **Appendix 4.**

2. Site and Surrounds Description

2.1 The application site is located at 45 Tauteihiihi Road, Kohukohu (refer Figure 1 below). The site comprises two physically separate partition lots in one freehold Maori land title that is legally described as Tauteihiihi 2B 4A and 2B 4C Block (ID# 503537). For the purpose of this application, the two partition lots are referred to as the 'upper' block and the 'lower' block. A copy of the record of title is attached at **Appendix 1**.

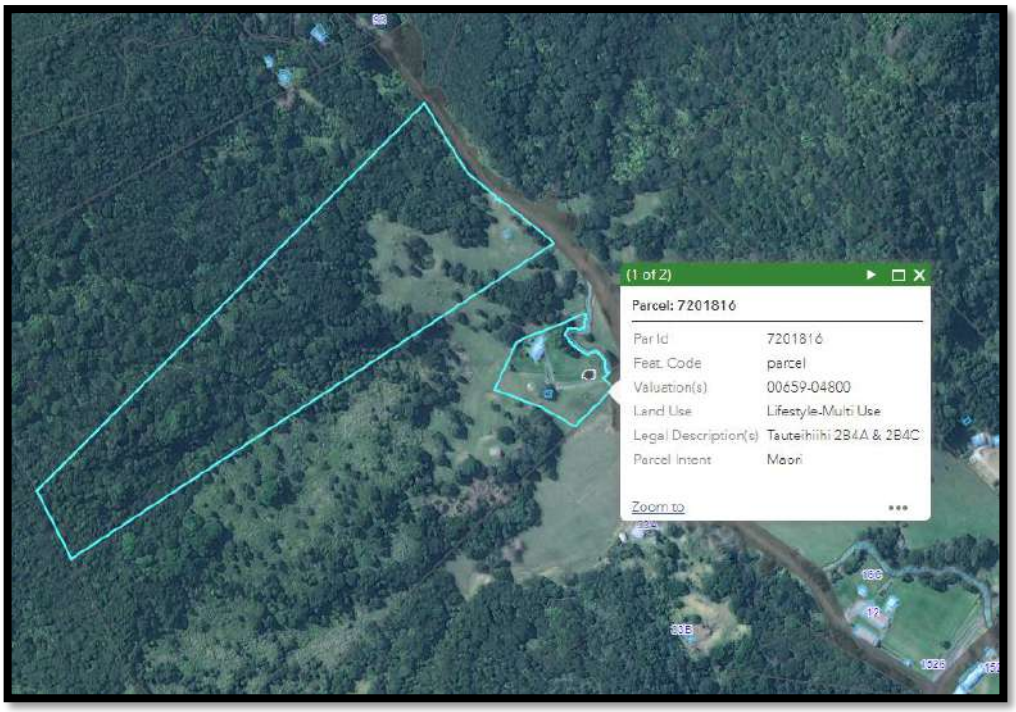

Figure 1 - Aerial view of the site(s) and the surrounding properties - Source: Prover

2.2 The total combined site area is 8.6025 hectares. Both allotments are sloping, with east facing building sites.

Lower Block -

2.3 The lower block comprises a land area of approximately 8,000m^2. It is largely clear of vegetation with a small pocket of mixed vegetation in the northern corner adjacent to an existing river that runs along the Eastern boundary. There is an existing single storey dwelling and three bay utility shed on the lower property. Both are in a state of disrepair and will be removed from the site.

2.4 The lower part of this site is within the Northland Regional Council mapped 1%, 2% and 10% AEP rainfall events generated by the adjacent river. There is an identified overland flowpath (constructed drain) that runs in an easterly direction between the house and the driveway and utility shed.

Figure 2 – Northland Regional Council mapped floodplains

2.5 In the lower south- eastern part of the site below the existing driveway, there is a wet area that is presumed to be a natural inland wetland as defined by the National Environmental Standard for Freshwater Management (NES-FM). There has been no ecological survey of this wetland as there are no works proposed within close proximity to this area that would affect its hydrological function. This includes the construction of the dwellings with simple timber pile foundations, and the new carparking area. Stormwater runoff from the upper parts of the catchment within the site and adjacent property would continue to discharge to the lower wet areas on the site, along with any runoff that seeps downslope of the treated wastewater disposal area. The proposed wastewater disposal (reserve) area for the lower block would be within 30m of this wetland.

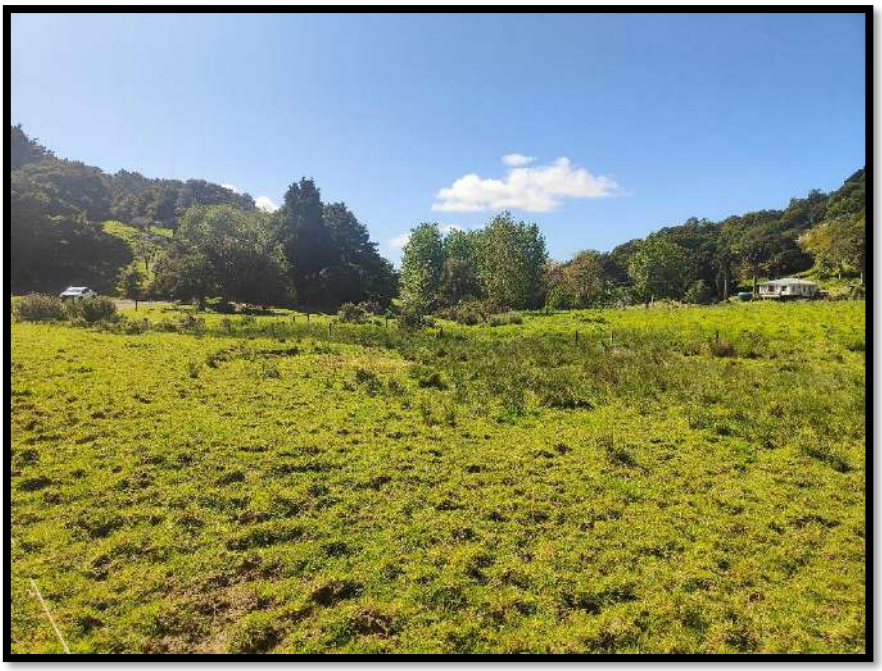

Figure 3 – Wetland area in south-eastern part of lower block adjacent to the road

2.6 The existing driveway crossing to the lower block is at Tauteihiihi Road. The road reserve includes a forked entrance way and bridge crossing that provides access to the property. The timber bridge within the road reserve was at the time of site visit in a state of disrepair. This bridge has since failed such that there is no longer vehicular access available to the site.

Figure 4 – Tauteiihiihi Road entrance to the lower block site

Figure 5 – Existing timber bridge within legal road, (now failed)

Upper Block -

2.7 The upper block comprises a land area of approximately 7.8 hectares and is located further north of the lower block. The majority of this site is covered in native bush, with cleared areas in the lower part. There is an existing constructed irrigation dam in the upper cleared area on this site. A small portion of this site is within the Northland Regional Council mapped flood plains (refer Figure 2 above). Soil conditions are assessed to be suitable for residential buildings and the disposal of wastewater.

Figure 6 – Constructed irrigation dam on the upper block

Figure 7 – View looking east down the site to cleared development areas and existing shed

2.8 Vehicle access to the site would be from Tauteihiihi Road. There is no existing formed driveway within the site. Existing buildings include a small farm shed.

2.9 The total existing impermeable area over the two partition allotments comprises the following:

Lower Block
House and utility shed – 278m^2
Existing driveway and pathway – 340m^2

Upper Block
Existing shed – 30m^2

Total = 648m^2 (or 0.0080%)

2.10 The site is not a HAIL site as mapped by Far North District Council. A review of Retrolens has not highlighted any previous HAIL activities.

2.11 The site does not contain highly productive land and would be exempt as Maori land under Clause 3.9(3)(d) of the NPS-HPL.

2.12 The soil conditions, including geotechnical stability and suitability for wastewater disposal are described in the attached Geologix Site Suitability Report (refer **Appendix 4**). The report indicates that the site(s) are suitable for residential type buildings, including the on-site disposal of wastewater.

2.13 The surrounding environment is rural land within the wider upper rural Hokianga Harbour environment adjacent to the township of Kohukohu. The sites are not within the mapped PDP coastal environment.

2.14 Tauteihiihi Road is a remote rural road. At the site location, the road serves an additional five properties further up this road.

3. Reasons for Consent

Operative Far North District Plan (ODP)

3.1 The site is zoned Rural Production in the ODP. The sites are comprised in two Maori land titles that are defined within the ODP definition of sites underlined as follows:

> ***SITE***
> *(a) An area of land which is:*
> *(i) composed of one allotment in one certificate of title or two or more contiguous allotments held together in one or more certificates of title in such a way that the allotments cannot be dealt with separately without the prior consent of the Council; or*
> *(ii) contained in a single allotment on an approved survey plan of subdivision for which approvals under s223 and/or s224 of the Act have been obtained and for which a separate certificate of title could be issued without further consent of the Council.*
> *(b) Except that in the case of:*
> *(i) land subdivided under the Unit Titles Act 1972, or stratum subdivision, "site" shall be deemed to be the whole of the land subject to the unit development or stratum subdivision; and*
> *(ii) land subdivided under the cross lease or company lease systems (other than strata titles), "site" shall be defined as an area of land containing:*
> - *any building, accessory buildings, plus any land exclusively restricted to the users of those buildings; or*
> - *a remaining share or shares in the fee simple creating a vacant part of the whole for future cross lease or company lease purposes.*
>
> *(c) In the case of Maori land within the meaning of Te Ture Whenua Maori Act 1993:*
> *(i) includes a parcel of land created by a partition under s289, provided that its area complies with the Residential Intensity rule for the zone in which the land is located; or*
> *(ii) parcels of land partitioned and given effect to, by approval of the Maori Land Court, before 28 April 2000.*

3.2 Both sites are partition order sites that that have been created under s124(1) of the Te Ture Whenua with a combined site area of 8.6025 hectares. The definition above refers to partition sites having an area that complies with the Residential Intensity rule for the zone. For the Rural Production Zone this includes the following residential intensity rule thresholds:

- ***Rule 8.6.5.1.1 Permitted Activity*** *– one unit per 12ha of land (with a minimum of 3,000m^2 for its exclusive use surrounding the unit plus a minimum of 11.7ha elsewhere on the property)*
- ***Rule 8.6.5.3.6 Restricted Discretionary Activity*** *– one unit per 4ha of land (with a minimum of 3,000m^2 for its exclusive use surrounding the unit plus a minimum of 3.7ha elsewhere on the property)*
- ***Rule 8.6.5.4.1 Discretionary Activity*** *– one unit per 2ha of land (with a minimum of 2,000m^2 for its exclusive use surrounding the unit plus a minimum of 1.8ha elsewhere on the property*

3.3 There is a separate RPZ rule that applies to papakainga housing activities. However, for the purposes of assessing any development control rule, the definition of site above would apply.

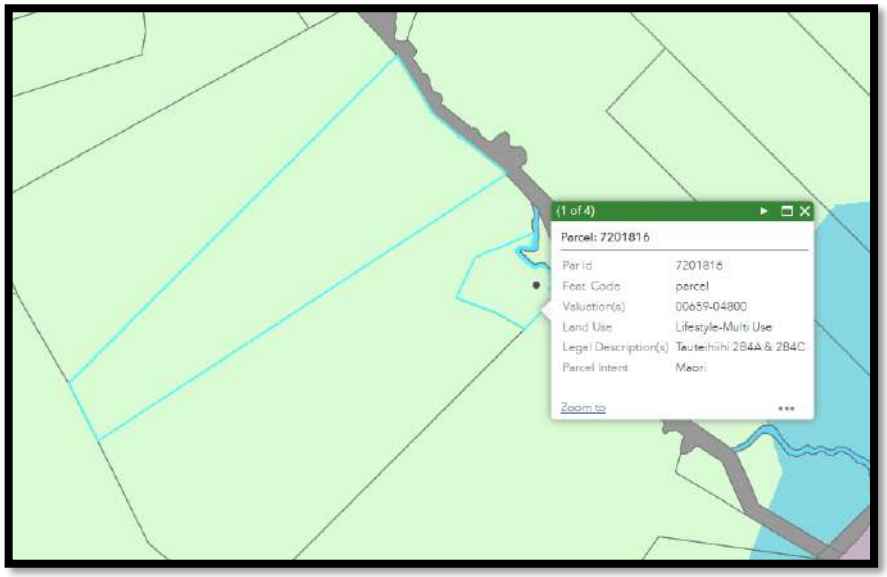

Figure 8 - Operative District Plan Zone – Rural Production

3.4 An assessment of the relevant District Plan rule standards is set out in **Table 1** and **Table 2** below:

Rural Production Zone Standards

Table 1 - Assessment against the Rural Production Zone rule standards		
Plan Reference	**Rule**	**Performance of Proposal**
8.6.5.1.1	**Residential Intensity**	**Consent Required** Refer to Papakainga Housing Rule
8.6.5.1.2	**Sunlight**	**Permitted.** The proposed buildings can comply

8.6.5.1.3	**Stormwater Management**	**Permitted** The maximum permitted impermeable surface including buildings is 15% of the site area. The total amount of impermeable surfaces proposed over the entire partition site (lower and upper block) is as follows: • Residential buildings (roof area) – Total = 307m^2 • Access driveway and parking – Total = 872m^2 **Total – 1,179m^2** (or 0.013% of the partition site area)
8.6.5.1.4	**Setback from Boundaries**	**Permitted.** The proposed residential buildings would be located more than 10m from the partition boundary(s). While it is noted that some features such as water tanks are located within the 10m setback, these structures are not defined as buildings, such that this rule is not applicable.
8.6.5.1.5	**Transportation**	**Not applicable**
8.6.5.1.6	**Keeping of Animals**	**Not applicable.**
8.6.5.1.7	**Noise**	**Permitted.** The proposal is a residential activity such that compliance is assumed. The RPZ noise standards apply to activities on the site.
8.6.5.1.8	**Building Height**	**Permitted.** The maximum building height in the RPZ is 12m. The proposed residential buildings are mono-pitched single storey buildings with a maximum roof height of approx. 4m.
8.6.5.1.10	**Building Coverage**	**Permitted.** The proposed building coverage over the partition 'site' is 338m^2 or 0.0039%.
8.6.5.1.11	**Scale of Activities**	**Not applicable**
8.6.5.1.12	**Temporary Activities**	**Not applicable.**
8.6.5.2.2	**Papakainga Housing**	**Controlled Activity**

		The proposal is for a papakainga housing development involving four new dwellings on a Maori land site created by way of a partition order. *To be a controlled activity, a proposal must:* *(a) Comply with the standards for permitted activities in the RPZ, except for the residential intensity standard;* *(b) For each residential dwelling at least 3,000m^2 of land surrounding each unit for its exclusive use; and* *Provided that the amount of land elsewhere on the site, in addition to the 3,000m^2 surrounding the unit, is not less than that required for the discretionary activity residential intensity standard.* Within the RPZ this standard is the 1.8 hectares specified in the Discretionary Residential Intensity Rule 8.6.5.4.1 The total partition site area is 8.6025 hectares. The land required to meet the above rule standard is 8.4000ha such that this standard can be achieved.

Applicable District Wide Standards

Table 2 – Assessment against the relevant District Wide rule standards

Plan Reference	Rule	Performance of Proposal
Chapter 12 – Natural and Physical Resources		
12.1 & 12.2	**Landscapes and Natural Features** **Indigenous Flora & Fauna**	**Not applicable**
12.3 Soils	Rule 12.3.6.1.2 Excavation and/or filling in the Rural Production Zone	**Permitted.** *Upper Block* Total = 65.25m^3 *Lower Block* Total = 120.2m^3
12.4 Natural Hazards	Rule 12.4.6.1.2 Fire Risk to Residential Units	**Discretionary Activity** The proposed House 2 on the upper block will be located within 20 metres of an existing bush area that exceeds 500m^2 (refer Bulk and Location Plan, Sheet 1.5, Rev 5).

		A Discretionary resource consent is required under Rule 12.4.6.3.
12.5 Heritage		Not applicable.
12.7 Lakes, Rivers, Wetlands and the Coastline	Rule 12.7.6.1.1 Setback from lakes, rivers and the coastal marine area	**Discretionary Activity** The minimum setback distance for all buildings and impermeable surfaces from a river (>3m wide) in the RPZ is 30m. The proposed smaller dwelling on the lower block will be located approximately 24.11m from the adjacent river that runs along the eastern boundary. The constructed entranceway way and lower part of the proposed driveway on the upper block will also be within the 30m setback from the river.
	12.7.6.1.2 Setback from Smaller Lakes, Rivers and Wetlands	**Discretionary Activity** The reserve wastewater disposal area forms part of a building consent application. While there will be physical building, consent is sought as a technicality.
	Rule 12.7.6.1.4 Land Use activities involving discharges of human sewage effluent	**Discretionary Activity** The reserve wastewater disposal area will be within 30m of the wetland pasture area in the south-eastern part of the lower block.
Chapter 15 - Transportation		
15.1.6A	**Traffic Intensity**	**Permitted** Traffic movements generated by the proposed residential development are within the permitted thresholds.
15.1.6B	**Parking**	**Permitted** Rule 15.1.6B.1.1 (Appendix 3C) requires a minimum of two carparks per dwelling. Two on-site carparks for each dwelling unit is proposed.
15.1.6C	**Access**	**Permitted** Vehicle access will be provided to each allotment off Tauteihiihi Rd. These will be constructed and/or upgraded to FNDC Engineering Standards. Associated vehicle access works within the existing road reserve include the provision of passing bay between

		the two sites and upgrading of the bridge entry to the lower block.

ODP Activity Status

3.5 The assessment against the relevant ODP permitted standards above has identified the following rule breaches:

- Controlled Activity Rule 8.6.5.2.2 – Papakainga Housing
- Permitted Activity Rule 12.4.6.1.2 – Fire Risk to Residential Units
- Permitted Activity Rule 12.7.6.1.1 – Building and impermeable surface setback from a river
- Permitted Activity Rule 12.7.6.1.2 Wastewater Reserve Disposal Area setback from Wetland
- Permitted Activity Rule 12.7.6.1.4 – Wastewater Reserve Disposal area setback from a wetland

3.6 Overall, the proposed activities are a Discretionary Activity under the ODP resulting from a breach to the permitted standards for fire risk to residential buildings, building and impermeable surface setback from a river and wastewater disposal area setback from a wetland.

Proposed District Plan (PDP)

3.7 The proposed activities are subject to the PDP provisions. The PDP was publicly notified on the 27th of July 2022. The submission and further submission periods have closed. PDP hearings have been underway since May 2024. As no decisions on submissions have been made, little weight is attributed to the proposed provisions.

3.8 The proposed site zone is *Maori Purpose - Rural*.

3.9 The lower parts of the site(s) are within the mapped 10-yr and 100-yr ARI River Flood Hazard Zone. Applicable rules that have current legal effect are limited to the management of earthworks activities as included in Table 3 below.

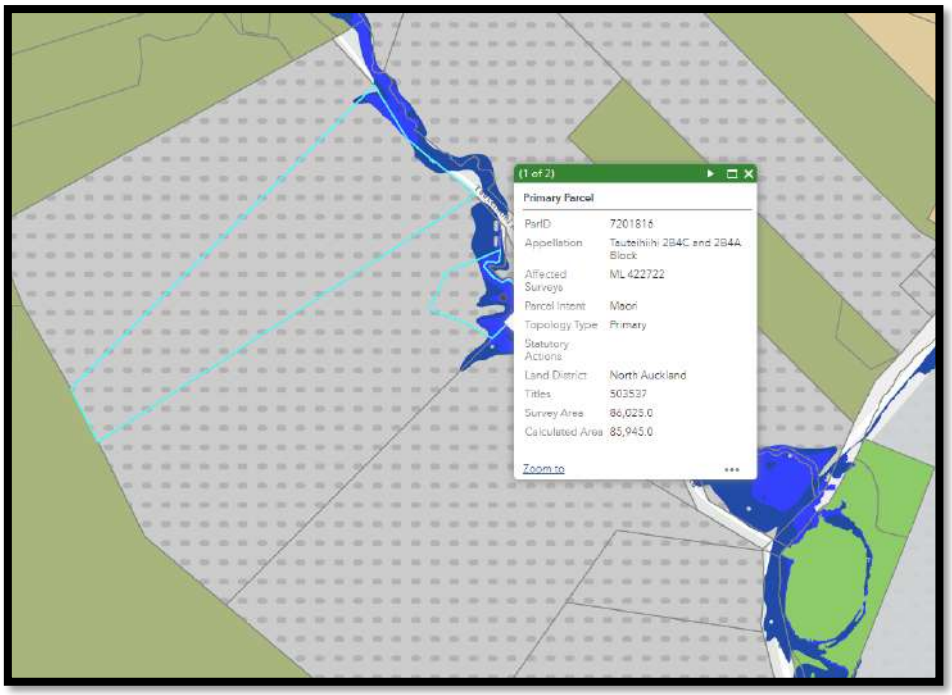

Figure 9 – Proposed District Plan Zone – Maori Purpose - Rural Zone (with 10-yr and 100-yr River Flood Hazard Zone Overlay)

3.10 An assessment of the proposed activities against the PDP rules that have immediate legal effect, is set out in **Table 3** below:

Table 3 – Assessment against the PDP rule standards that have immediate legal effect

Chapter	Rule Reference	Compliance of Proposal
Hazardous Substances	The following rules have immediate legal effect: Rule HS-R2 has immediate legal effect but only for a new significant hazardous facility located within a scheduled site and area of significance to Māori, significant natural area or a scheduled heritage resource Rules HS-R5, HS-R6, HS-R9	**Not applicable.** The site does not contain any hazardous substances nor are any proposed.
Heritage Area Overlays	All rules have immediate legal effect (HA-R1 to HA-R14) All standards have immediate legal effect (HA-S1 to HA-S3)	**Not applicable.** The site is not located within a Heritage Area Overlay.
Historic Heritage	All rules have immediate legal effect (HH-R1 to HH-R10). Schedule 2 has immediate legal effect.	**Not applicable.** The site does not contain any areas of Historic Heritage.
Notable Trees	All rules have immediate legal effect (NT-R1 to NT-R9)	**Not applicable.**

	All standards have legal effect (NT-S1 to NT-S2) Schedule 1 has immediate legal effect	The site does not contain any notable trees.
Sites and Areas of Significance to Maori	All rules have immediate legal effect (SASM-R1 to SASM-R7) Schedule 3 has immediate legal effect	**Not applicable.** The site does not contain any scheduled sites or areas of significance to Māori.
Ecosystems and Indigenous Biodiversity	All rules have immediate legal effect (IB-R1 to IB-R5)	**Not applicable.** The site does not contain any known ecosystems or indigenous biodiversity to which these rules would apply.
Subdivision	The following rules have immediate legal effect: SUB-R6, SUB-R13, SUB-R14, SUB-R15, SUB-R17	**Not applicable.** The proposal is not for subdivision.
Activities on the Surface of Water	All rules have immediate legal effect (ASW-R1 to ASW-R4)	**Not applicable.** The proposal does not involve activities on the surface of water.
Earthworks	The following rules have immediate legal effect: EW-R12, EW-R13 The following standards have immediate legal effect: EW-S3, EW-S5	**Permitted.** All earthworks in all zones are subject to Accidental Discovery Protocol standards EW-S3 and sediment control standards EW-S5 The minor volume of proposed earthworks will be undertaken in accordance with these standards.
Signs	The following rules have immediate legal effect: SIGN-R9, SIGN-R10 All standards have immediate legal effect but only for signs on or attached to a scheduled heritage resource or heritage area	**Not applicable.**
Orongo Bay Zone	Rule OBZ-R14 has partial immediate legal effect because RD-1(5) relates to water	**Not applicable.**

PDP Activity Status

3.11 The proposed activity is currently **Permitted** under the PDP.

National Environmental Standards

National Environment Standard for Assessing and Managing Contaminants in Soil to Protect Human Health 2011

3.12 The site is not identified as a HAIL site on the Council database of HAIL sites. The site has no known history of horticulture or agriculture activities. The site is not a HAIL site.

National Environment Standard for Freshwater Regulations 2020 (NES-F)

3.13 As described in Section 2 above, an on-site managed pasture area in the south-eastern part of the lower block potentially contains an area of natural inland wetland as defined by NES-F. Regulations relating to the drainage of natural wetlands apply to the proposed activities insofar as there are development works involving the construction of additional impermeable surfaces (a four-car carpark), residential dwellings (from which rainwater will be collected into water tanks) and a wastewater disposal field. The discharge of treated wastewater into a land-based disposal field is exempt from the Northland Regional Council's consideration of activities that may affect wetlands. The constructed carpark area and new dwellings are not expected to divert any of the existing surface water runoff away from the wetland area or have any effect on its existing hydrology. Stormwater will continue to sheet flow off the driveway into the pasture areas and / or be captured by the existing culvert that drains to the adjacent river. For these reasons, the proposed activities in proximity to the wetland are assessed to be a permitted activity.

Control of Earthworks Bylaw

3.14 The site is zoned Rural Production Zone. The proposed earthworks comply with the Control of Earthworks Bylaw.

3.15 An earthworks permit is not required for the proposed earthworks activities.

4. Statutory Assessment under the Resource Management Act (RMA)

Section 104B of the RMA

4.1 Section 104B governs the determination of applications for Discretionary and Non-Complying Activities. A consent authority may grant or refuse the application. If it grants the application, it may impose conditions under Section 108.

Section 104(1) of the RMA

4.2 The relevant parts of Section 104(1) of the RMA state that when considering an application for resource consent –

"the consent authority must, subject to Part 2, and section 77M have regard to –

(a) any actual and potential effects on the environment of allowing the activity; and

(ab) any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment that will or may result from allowing the activity; and

(b) any relevant provisions of –

i. a national environmental standard:

ii. other regulations:

iii. a national policy statement:

iv. a New Zealand Coastal Policy Statement:

v. a regional policy statement or proposed regional policy statement:

vi. a plan or proposed plan; and

(c) any other matter the consent authority considers relevant and reasonably necessary to determine the application."

4.3 Actual and potential effects arising from the development as described in 104(1)(a) can be both positive and adverse (as described in Section 3 of the Act). Positive effects arising from this development is the provision of improved housing for family members associated with the applicant's whanau. The existing housing is in a dilapidated state and is no longer suitable for residential living. Both the ODP and the PDP RPZ and the Māori Purpose – Rural zones anticipate and provide for papakainga type housing in the Far North District to enable Māori to live on shared ownership sites within their own marae land. The PDP states that Māori make up 40% of the district's population and that 17% of the District's land is within Māori land tenure. The ability for Māori to live communally on their own land is a positive effect arising from this residential development proposal.

4.4 Section 104(1)(ab) requires that the consent authority consider *'any measure proposed or agreed to by the applicant for the purposes of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity'*. The proposal is not of a scale or nature that would require specific offsetting or environmental compensation measures to ensure positive effects on the environment. Potential adverse effects on the environment arising from the addition of papakainga type housing on the site(s) are less than minor. Stormwater runoff from the site would be attenuated in accordance with FNDC standards to avoid exacerbating flooding effects on the adjacent downstream road environment.

4.5 Section 104(1)(b) requires that the consent authority consider the relevant provisions of national environmental standards, regulations, national policy statements, regional policy statements or plans, including proposed plans. Other than NES-FM, there are no national standards, regulations or national policy statements that are directly relevant to the proposed activities and / or that are not adequately managed within the framework hierarchy of the District Plan.

4.6 An assessment of the relevant statutory documents is provided in the Report sections below.

4.7 Section 104(1)(c) states that consideration must be given to 'any other matters that the consent authority considers relevant and reasonable, necessary to determine the application.' There are no other matters relevant to this application.

4.8 In accordance with Section 104(6), adequate information is provided to determine this application.

4.9 The proposal is to be assessed as a Discretionary Activity under the ODP District-wide rules relating to fire risk to residential units and the building, impermeable surface and wastewater disposal area setback requirements from rivers and wetlands. The Council has full discretion to consider the broad range of policy matters relating to land use activities in the Rural Production zone and to a lesser weighted extent, matters relating to the proposed Māori Purpose – Rural zone.

Section 104(1)(a) - Assessment of Effects on the Environment

4.10 Having reviewed the relevant plan provisions and taking into account the matters to be addressed by an assessment of environmental effects as outlined in Clause 7 of Schedule 4 of the Act, the potential adverse effects are limited to matters relating to a Papakainga housing development that is provided for in the RPZ as a controlled activity and wider District matters relating to fire risk to habitable buildings and effects on river waterways and wetlands that may be impacted by buildings and associated wastewater disposal areas being located in close proximity. While the Council has broad discretion to consider all relevant District Plan policy that might apply to the proposal, the assessment of potential adverse effects is limited to these matters.

4.11 The Discretionary District-Wide Assessment Criteria set out the matters for discretion when considering natural hazard fire risk to residential buildings (12.4.7) and setbacks from waterways (12.7.7). For any Part 2 infringements these matters are covered by Chapter 11 of the plan. In the case of Papakainga Housing this chapter does not include any assessment on this matter. The following environmental assessments are made below:

Papakainga Housing

4.12 With respect to any potential effects arising from a Papakainga housing type development on Māori owned land, these are largely anticipated by both the ODP and the PDP. Both Plans provide for this type of development as means of achieving Council responsibilities under the Treaty of Waitangi to provide for the ongoing use and development of Māori land. Providing ODP development standards are met, resource consent for Papakainga housing must be granted and may be subject to conditions of consent. The Applicant accepts that the existing road access to the site(s) is inadequate and requires some upgrading in terms of replacing the bridge crossing of the river with a preferred culvert design and the provision of a passing bay. The Applicant seeks that a condition of consent be included requiring these works to be undertaken in accordance with FNDC Engineering Standards.

Fire Risk

12.4.7 Assessment Criteria relating to natural hazards

(a) the degree 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;

4.12.1 The identified risk is a fire hazard created by the proximity of House 2 on the upper block being within 20m of an adjacent bush area. All of the other houses will be located more than 20m from the bush or bush areas that are less than 500m^2 in area. Fire can be a risk in all locations and can be a significant risk in rural locations where there is no urban fire-fighting water supply. Residential activity can increase the risk of fire in rural locations, therefore it is necessary to ensure that this risk is avoided to the extent possible through the location of buildings relative to bush areas or mitigated by ensuring that there is no use of flammable building materials, unsuitable plants around the perimeter of the house and an available fire-fighting water supply.

(b) the extent to which the activity may adversely affect cultural and spiritual values;

4.12.2 There would be no adverse effect on cultural or spiritual values.

(c) the degree to which any proposed activity is compatible with the maintenance of the natural character of the environment;

4.12.3 The proposed activity which is a residential house on a rural Māori site will have no adverse effect on the natural character of the existing environment.

(d) the effects on amenity values, landscape values, heritage features and indigenous habitats and ecosystems, especially in the coastal environment and associated with rivers, lakes, wetlands and their margins;

4.12.4 There would be no adverse effect on the above listed values.

(e) the effects on natural features, such as beaches, sand dunes, mangrove areas, wetlands and vegetation, which have the capacity to protect land and structures from natural hazards;

4.12.5 The proposed activity is not adjacent to any coastal features, or vegetation that could be affected by the development. There is a wet pasture area in the south-eastern part of the lower block that is presumed to be a natural inland wetland. This area is located away from the residential development areas on the site and would not pose any natural hazard risk.

(f) any adverse effects on water quality;

4.12.6 There would be no adverse effect on water quality.

(g) any adverse effects of the activity on any archaeological sites;

4.12.7 There would be no adverse effect on any identified or unidentified archaeological sites.

(h) any effect on the life supporting capacity of soil;

4.12.8 There would be no adverse effect on the life supporting capacity of soil.

(i) the potential impact of sea level rise;

4.12.9 The proposed development will not be affected by sea level rise.

(j) in respect of fire risk to residential units:

(i) the degree of fire risk to dwellings arising from the proximity of the woodlot or forest and vice versa; and

4.12.9.1 Residential buildings located less than 20m from large (>500m^2) adjacent bush areas are potentially at risk from fire should a fire occur. Risk to property or life is greater in rural areas where there is potentially no water source for firefighting purposes. In respect of this development proposal, the proposed house building 2 on the upper lot would be located approximately 12m from the adjacent bush area, which is less than the required 20m distance deemed sufficient to limit fire risk to a building.

(ii) any mitigation measures proposed to reduce the fire risk; and

4.12.9.2 The Applicant has consulted FENZ about the proposed house location and to authorise an exemption of the NZ Fire Service Code of Practice for Fire-Fighting Water Supplies (SNZ PAS 5409:2008). A response from FENZ is attached at **Appendix 5**. FENZ has recommended that the proposed mitigation measures, which may include a minimum of 10,000 litres of fire-fighting water supply stored in tanks on site. The site would have as a secondary water source, the constructed pond above the house site and the river below. These water locations are both within 90m of the house site and accessible to fire-fighters should they be required. In addition to water supply, FENZ have included recommendations with respect to the use of fire safe construction, maintaining safety zones around the house, the use of fire resistant plants. All of these requirements can be complied with.

(iii) the adequacy of the water supply; and

4.12.9.3 FENZ has deemed that the proposed fire-fighting water supply which includes water tanks and nearby pond and river sources is adequate.

(iv) the accessibility of the water supply to fire service vehicles.

4.12.9.4 The proposed water supply would be accessible to fire service vehicles. The existing 4metre wide access road has been included in the FENZ code exemption application and approved on that basis, so this assumes that fire-fighting vehicles are able to access the site. All of the water supplies are within 90m of the house sites, with tanks located adjacent to the dwellings.

(j) any cumulative adverse effects on the environment arising from the activity;

4.12.10 There is no indication from FENZ that the proposed residential development will result in any cumulative adverse effects on the existing environment with respect to fire risk.

(k) the potential need for ongoing maintenance and the potential effects of such maintenance;

4.12.11 Not applicable.

(l) the effects of any proposed option to either avoid, remedy or mitigate the effects of identified natural hazards;

4.12.12 It is anticipated that where recommendations for mitigating fire risk are complied with, the potential risk of fire to property and life can be avoided.

(m) the ability to monitor the effects of the activity and take remedial action (e.g. removal) if necessary;

4.12.13 Responsibility for the monitoring accessibility to water supply and ensuring that house curtilage areas remain free of fire risk vegetation will fall to the Applicant. These measures are included for the protection of property and life at the site and is particularly important in remote rural locations where it can take longer for FENZ to arrive at the site.

(n) the extent to which any proposed activity or works intended to provide protection from natural hazards will result in the effects of the natural hazard being transferred to another location.

4.12.14 Not applicable.

Summary

4.13 Having regard to the above assessment criteria and the response from FENZ about the proposed design, house location, water supply availability and vehicle access to the site, the potential adverse effects arising from a fire risk to houses on the site are assessed to be no more than minor.

Building, impermeable surface or wastewater disposal area setback from a river or wetland

4.14 ODP rules that regulate the distance between buildings, impermeable surfaces or wastewater disposal areas from adjacent water bodies are to protect the natural, cultural, heritage and

landscape values of these features. The construction of these development features close to the margins of rivers can adversely affect their natural amenity values, which often includes the associated river land form, and riparian vegetation. The site is located in a remote rural part of Kohukohu on a narrow no-exit local road that serves just a handful of properties. The river flows in a north-south direction down the valley and has local amenity value as it traverses bush areas and private farmland. The proposed houses would be located on the upper (western) side of the river and to the extent possible away from the rivers' margins. The setback infringement from House 2 on the lower block is 6m and the site(s) associated wastewater disposal area from the river and wetland is assessed to have a less than minor adverse effect on the river margin which is within an existing pasture area and the adjacent wetland in the lower block as commented on below.

Discretionary Activity Rule 12.7.7 - Assessment criteria

(a) the extent to which the activity may adversely affect cultural and spiritual values;

4.14.1 The location of the house on the lower block would be located 24m from the river bed. The associated wastewater disposal area on the lower block would be within 30m of a wetland area in the lower south-eastern part of this site and the river on the upper block. The new sealed driveway will be within the 30m setback from the river. The Applicant, who is a Maori land owner has not identified any cultural or spiritual values that would be affected by the proposed development locations.

(b) the extent to which the activity may adversely affect wetlands;

4.14.2 The pasture area in the lower south-eastern part of the lower block was observed on site to be more likely than not a wetland. This area would sit just within the permitted 30m setback from the proposed wastewater disposal area and encompass the reserve disposal area. The wastewater system is designed to FNDC standards and any treated wastewater would be discharged to a designated disposal field with an adjacent reserve area. The proposed discharge is not expected to adversely impact the wetland which is a rural pasture environment. This is signified by the fact that more recent legislation, i.e. NES-F enables wastewater treatment within this setback without the need for consent.

(c) the extent to which the activity may exacerbate or be adversely affected by natural hazards;

4.14.3 The house location is outside of the Northland Regional Council mapped flood plains and would not exacerbate any existing flooding hazard. The wastewater disposal areas are also located outside of mapped flood hazard. While part of the driveway will be located within the flood hazard, this small sealed area is not anticipated to adversely impact upon or exacerbate the flood hazard.

(d) the potential effects of the activity on the natural character and amenity values of lakes, rivers, wetlands and their margins or the coastal environment;

4.14.4 The Lower house location is within an existing dwelling curtilage area that forms part of the setback margin from the river. The location of the house does not require any vegetation removal or change to the existing landform that would adversely affect the natural character or amenity of the river. The house is a small, single storey building (65m^2), that will have the

appearance of a clustered residential development on the site in keeping with its rural location. The wastewater disposal area sits just within the 30m setback, with the majority of the system being a reserve disposal area the effects are considered minor. The new driveway impermeable surfaces are not considered to impact on the amenity values of the river.

(e) the history of the site and the extent to which it has been modified by human intervention;

4.14.5 The site is a rural Maori land title property. The site has been modified in terms of historic clearance for farming purposes, the construction of an irrigation pond on the upper block and the adjacent road.

(f) the potential effects on the biodiversity and life supporting capacity of the water body or coastal marine area or riparian margins;

4.14.6 There would be no adverse effects on the biodiversity and life-supporting capacity of the adjacent river or its margins. The existing driveway on the lower block would continue to drain runoff to the river.

(g) the potential and cumulative effects on water quality and quantity, and in particular, whether the activity is within a water catchment that serves a public water supply;

4.14.7 There are no adverse effects on water quality or quantity expected to arise from the location of the proposed house, wastewater disposal field location and formed driveway.

(h) the extent to which any proposed measures will mitigate adverse effects on water quality or on vegetation on riparian margins;

4.14.8 There are no adverse effects on water quality, vegetation or riparian margins expected to arise from the proposed house location, driveway location and wastewater disposal location.

(i) whether there are better alternatives for effluent disposal;

4.14.9 The proposed wastewater disposal areas will be located outside of the required river setback. While within the wetland setback, this encroachment is minor.

(j) the extent to which the activity has a functional need to establish adjacent to a water body;

4.14.10 The nature of the site is such that the developable area of the site is in the lower cleared areas, that are accessible from the road. The development is utilising an existing residential location and will re-establish new housing for whanau. A minor 4m infringement to the river setback is required to provide separation from the larger dwelling and to locate the necessary septic tank. The driveway on the upper site is required to be formed to provide access from the Council road.

(k) whether there is a need to restrict public access or the type of public access in situations where adverse safety or operational considerations could result if an esplanade reserve or strip were to vest.

4.14.11 Not applicable.

Summary

4.15 Regarding the minor extent of the proposed setback infringement and the potential impact on the adjacent river and wetland environment and any associated natural, landscape, cultural or spiritual values, the potential adverse effects are assessed to be less than minor.

Section 104(1)(b) – Relevant provisions of any statutory planning document

4.16 In accordance with Section 104(1)(b) of the Act, the following documents are relevant to this application. As stated above, other than the NPS-HPL and NPS-F there are no other national policy statements or regulations that are relevant to the proposed activity. Given the permitted activity status of the proposal in regards to the corresponding NES documents no further assessment of the above mentioned NPS's is considered necessary.

Regional Policy Statement for Northland 2016 / Regional Plan for Northland (February 2024)

4.17 The Regional Policy Statement for Northland (RPS) and the Regional Plan for Northland are the governing regional statutory documents for Northland that includes the application site. The small-scale nature of the proposed land use activity is such that it can be adequately assessed under the provisions of the ODP provisions. The minor nature of the setback infringement from the river and potential fire risk are not of regional scale and would not be contrary to any regional objectives or policies.

4.18 The proposal is consistent with the intent of the Regional Policy Statement and the development is permitted insofar as the Proposed Regional Plan.

Far North Operative District Plan 2009

4.19 The relevant objectives and policies of the ODP are those related to the Rural Environment, which includes the land in the RPZ. As assessed above, it is considered that the proposed residential activity would generate less than minor adverse effects on the existing environment and can be mitigated through fire risk prevention measures and the location of the new houses within an existing residential development area. The proposal would be consistent with the character of the surrounding area, which is a mix of rural bush clad Maori and general title land.

Chapter 2 – Tangata Whenua

Tangata Whenua - Objectives

2.7.1 Through the provisions of the Resource Management Act, to give effect to the rights guaranteed to Maori by Te Tiriti O Waitangi (Treaty of Waitangi).

2.7.2 To enable Maori to develop and manage their land in a manner which is consistent with sustainable management of the natural and physical resources of the District as a whole.

2.7.3 To recognise and provide for the protection of waahi tapu and other ancestral sites and the mauri (life force) of natural and physical resources.

Tangata Whenua - policies

2.8.1 That Council will provide opportunities for the involvement of tangata whenua in the sustainable management of the natural and physical resources of the District.

2.8.2 That tangata whenua be consulted over the use, development or protection of natural resources where these affect their taonga.

2.8.3 That the Council will have regard to relevant provisions of any whanau, hapu or iwi resource management plans, taiapure plans or mahinga mataitai plans.

2.8.4 That development on ancestral land will be provided for, consistent with the requirement for sustainable management of resources.

2.8.5 That waahi tapu and other taonga be identified and protected by provisions in the Plan.

4.20 The residential activity sought is papakainga housing. Tangata whenua objectives and policies seek to give effect to the rights given to Maori under the Treaty of Waitangi (Objective 2.7.1). This includes enabling Maori to develop and manage their land in a manner that is consistent with the sustainable management of natural and physical resources (Objective 2.7.2). Provision for papakainga type housing where whanau members can live together on shared ownership Maori land gives effect to this intent and is provided for as a controlled activity in the Rural Production zone environment. Such developments remain subject to District-wide rules that manage potential adverse effects on the natural environment, natural hazards and heritage management, and on physical resources such as roads and other infrastructure. This development proposal is consistent with District Plan policies that give Maori the opportunity to develop and reside on their own land. Where there are breaches to District-wide rules that manage effects on the natural environment (the adjacent river) and natural hazards (fire risk to residential buildings), the necessary design measures are included to ensure that any adverse effects are either avoided or mitigated.

4.21 As assessed, the proposed papakainga housing development is enabled by these objectives and policies.

Chapter 8 – Rural Environment – Rural Production Zone

RPZ objectives

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

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

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

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

8.6.3.5 To protect and enhance the special amenity values of the frontage to Kerikeri Road between its intersection with SH10 and the urban edge of Kerikeri.

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

8.6.3.7 To avoid remedy or mitigate the adverse effects of incompatible use or development on natural and physical resources. 8.6.3.8 To enable the efficient establishment and operation of activities and services that have a functional need to be located in rural environments.

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

<u>RPZ - policies</u>

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

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

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

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

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

8.6.4.6 That the built form of development allowed on sites with frontage to Kerikeri Road between its intersection with SH10 and Cannon Drive be maintained as small in scale, set back from the road, relatively inconspicuous and in harmony with landscape plantings and shelter belts.

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

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

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

4.22 The Rural Environment covers the majority of the Far North District and includes areas of Maori land. It has a varied landform, extent of vegetation, waterways and land use activities. The objectives for the Rural Environment seek to promote the sustainable management of its natural and physical resources, which includes varied natural features, life-supporting soils, indigenous vegetation, and avoid land use conflict. The RPZ has a rural production focus, while recognising that a wide range of activities may exist in the zone where they are compatible with its productive purpose. Residential housing commonly occurs in the rural environment as it provides housing for those living on the land and using it productively. This development proposal is for a type of housing available to Maori wanting to live with other whanau members on Maori land. The intensity of development applied for is consistent with what the ODP RPZ provides for as a controlled activity. The scale and intensity of residential development proposed would not be inconsistent with what is anticipated in the RPZ.

Chapter 12 – Natural and Physical Resources

4.23 Chapter 12 of the ODP is concerned with the sustainable management of natural and physical resources throughout the Far North District and which extend across zone boundaries. The application site is within the rural environment and is not within any significant landscape or coastal environment location. The location of the site adjacent to a river and bush areas that pose a fire risk to residential buildings are matters for policy consideration.

Section 4 – Chapter 12 – Natural and Physical Resources – Natural Hazards

Objectives

12.4.3.1 To reduce the threat of natural hazards to life, property and the environment, thereby to promote the well being of the community.

12.4.3.2 To ensure that development does not induce natural hazards or exacerbate the effects of natural hazards.

12.4.3.3 To ensure that natural hazard protection works do not have adverse effects on the environment.

12.4.3.4 To ensure that the role in hazard mitigation played by natural features is recognised and protected.

12.4.3.5 To improve public awareness of natural hazards as a means of helping people to avoid them.

12.4.3.6 To take into account reasonably foreseeable changes in the nature and location of natural hazards.

Policies

12.4.4.1 That earthworks and the erection of structures not be undertaken in areas where there is a significant potential for natural hazards unless they can be carried out in such a way so as to avoid being adversely affected by the natural hazards, and can avoid exacerbating natural hazards.

12.4.4.2 That the natural character of features, such as beaches, sand dunes, mangrove areas, wetlands and vegetation, which have the capacity to protect land values and assets from natural coastal hazards, is protected and enhanced.

12.4.4.3 That protection works for existing development be allowed only where they are the best practicable option compatible with sustainable management of the environment.

12.4.4.4 That the sea level rise, as predicted by the Intergovernmental Panel of Climate Change or Royal Society of NZ, be taken into account when assessing development in areas potentially affected.

12.4.4.5 That information on known natural hazards be made available in order that the public can make informed resource management decisions.

12.4.4.6 That the adverse effects on people, property and the environment from coastal hazards in Coastal Hazard Areas, as identified by the Northland Regional Council, are avoided.

12.4.4.7 That the risk to adjoining vegetation and properties arising from fires be avoided.

12.4.4.8 That the location, intensity, design and type of new coastal subdivision, use and development be controlled so that the need for hazard protection works is avoided or minimised.

12.4.4.9 That the role of riparian margins in the mitigation of the effects of natural hazards is recognised and that the continuing ability of riparian margins to perform this role be assured.

4.24 Section 4 of Chapter 12 addresses a variety of potential natural hazards which includes fire risk. Objective 12.3.4.1 seeks to reduce the threat of natural hazards to life, property and the environment, to promote the wellbeing of the community. Policy 12.4.4.7 seeks to avoid the risk to adjoining vegetation and properties arising from fires. Based on feedback from FENZ, it has been determined that the site layout, location of houses relative to bush areas, mitigation measures including an adequate and accessible fire-fighting water supply and limits on planting around buildings is sufficient to reduce the risk of fire to the adjacent bush areas and buildings. While it is not possible to completely avoid such risk where there are reduced distances between bush areas and buildings, careful management and having fire-fighting supply available can provide sufficient and appropriate mitigation.

Chapter 12- Section 7 – Natural and Physical Resources – Lakes, Rivers, Wetlands and Coastline

4.25 Section 7 of Chapter 12 broadly covers matters relating to the sustainable management of the margins of lakes, river, wetlands and the coastline. The proposed development seeks to position a house building, formed driveway and wastewater disposal areas within the required 30m setback from the adjacent river and wetland area. The house site on the lower block is elevated above the river and is outside any mapped floodplains. Of relevance to the proposal are objectives and policies relating potential adverse effects on the natural, cultural (and spiritual), heritage and landscape values of the river margin and adjacent wetlands.

Objectives

12.7.3.1 To avoid, remedy or mitigate the adverse effects of subdivision, use and development on riparian margins.

12.7.3.2 To protect the natural, cultural, heritage and landscape values and to promote the protection of the amenity and spiritual values associated with the margins of lakes, rivers and indigenous wetlands and the coastal environment, from the adverse effects of land use activities, through proactive restoration/rehabilitation/revegetation.

12.7.3.3 To secure public access (including access by Maori to places of special value such as waahi tapu, tauranga waka, mahinga kai, mahinga mataitai, mahinga waimoana and taonga raranga) to and along the coastal marine area, lakes and rivers, consistent with Chapter 14 - Financial Contributions, to the extent that this is compatible with:

(a) the maintenance of the life-supporting capacity of the waterbody, water quality, aquatic habitats, and

(b) the protection of natural character, amenity, cultural heritage, landscape and spiritual values; and

(c) the protection of public health and safety; and

(d) the maintenance and security of authorised activities (but acknowledging that loss of privacy or fear of trespass are not valid reasons for precluding access). In some circumstances public acquisition of riparian margins may be required and managed for purposes other than public access, for example to protect significant habitats, waahi tapu or historic sites, or for public recreation purposes.

12.7.3.4 To provide for the use of the surface of lakes and rivers to the extent that this is compatible with the maintenance of the life supporting capacity of the water body, water quality, aquatic habitats, and the protection of natural character, amenity, cultural heritage, landscape and spiritual values.

12.7.3.5 To avoid the adverse effects from inappropriate use and development of the margins of lakes, rivers, indigenous wetlands and the coastline.

12.7.3.6 To protect areas of indigenous riparian vegetation:

(a) physically, by fencing, planting and pest and weed control; and

(b) legally, as esplanade reserves/strips.

12.7.3.7 To create, enhance and restore riparian margins.

Policies

12.7.4.1 That the effects of activities which will be generated by new structures on or adjacent to the surface of lakes, rivers and coastal margins be taken into account when assessing applications.

12.7.4.2 That land use activities improve or enhance water quality, for example by separating land use activities from lakes, rivers, indigenous wetlands and the coastline, and retaining riparian vegetation as buffer strips.

12.7.4.3 That adverse effects of land use activities on the natural character and functioning of riparian margins and indigenous wetlands be avoided.

12.7.4.4 That adverse effects of activities on the surface of lakes and rivers in respect of noise, visual amenity of the water body, life supporting capacity of aquatic habitats, on-shore activities, the natural character of the water body or surrounding area, water quality and Maori cultural values, are avoided, remedied or mitigated.

12.7.4.5 That activities which have a functional relationship with waterbodies or the coastal marine area be provided for.

12.7.4.6 That public access to and along lakes, rivers and the coastline be provided as a consequence of development or as a result of Council (see Method 10.5.19) or public initiatives except where it is necessary to restrict access or to place limits on the type of access, so as to:

(a) protect areas of significant indigenous vegetation and/or significant habitats of indigenous fauna or

(b) protect cultural values, including Maori culture and traditions; or

(c) protect public health and safety; to the extent that is consistent with policies in Chapter 14.

12.7.4.7 That any adverse effects on the quality of public drinking water supplies from land use activities, be avoided, remedied or mitigated. (Refer to Commentary and Methods 12.7.5.6 and 12.7.5.7.)

12.7.4.8 That the Council acquire esplanade reserves, esplanade strips and access strips in accordance with Chapter 14 - Financial Contributions and Method 10.5.10 of the Plan.

12.7.4.9 That riparian areas in Council ownership be managed so as to protect and enhance the water quality of surface waters.

12.7.4.10 That historic buildings erected close to, or over, water bodies be protected and provision be made for new buildings where this form of development is in keeping with the historic pattern of settlement.

4.26 Relevant to this proposal are the Section 7 objectives and policies that seek to avoid adverse effects on the natural character and functioning of riparian margins (12.7.4.3). The proposed house location is within the 30m setback but is not within what could be described as the functioning part of the riparian margin. The elevated location of the house site above the extent

of the flood plain suggests that it is beyond any riparian environment and is completely terrestrial. Potential adverse effects on the amenity and natural character of river margin are less than minor due to the fact that the house site is within an existing residential house location and has a character that is associated an open space curtilage area that surrounds the existing house. It is considered that the House 1 site on the lower block is sufficiently setback from the river margin to avoid any adverse effects on its natural character.

4.27 With respect to the location of the proposed wastewater disposal areas, these would be within 30m of the wetland on the lower block and the adjacent river on the upper block. Due to its slope, the wastewater disposal area on the upper block includes a 10m buffer to capture any additional treated water runoff from within the designated disposal area. From there runoff would cross the road verge, carriageway and eastern side pasture areas before entering the river. Except in large storm events, this is unlikely to create risk to the quality of the adjacent river environment. Similarly, the wetland environment on the lower block, could at times receive treated wastewater, however the slope is such that it does not require an additional buffer areas as required by the Northland Regional Plan. This potential risk is assessed to be very low and has not been an issue raised by the local hapu in during the residential development plans for the site.

Proposed Far North District Plan 2022

4.28 The application site is proposed to be zoned 'Maori Purpose – Rural'. While land use rules, other than earthworks have no current legal effect, a policy assessment is required and provided as part of this application.

Maori Purpose Zone objectives

MPZ-O1 - The viability of the Māori Purpose zone is ensured for future generations.

MPZ-O2 - The Māori Purpose zone enables a range of social, cultural and economic development opportunities that support the occupation, use, development and ongoing relationship with ancestral land.

MPZ-O3 - Use and development in the Māori Purpose zone reflects the sustainable carrying capacity of the land and surrounding environment.

Maori Purpose Zone objectives

MPZ-O1 - Provide for the use and development of ancestral Māori land administered under Te Ture Whenua Māori Act 1993.

MPZ-O2 - Enable a range of activities on Māori land in the Māori Purpose zone including marae, papakāinga, customary use, cultural and small-scale commercial activities where the adverse effects can be avoided, remedied or mitigated.

MPZ-O3 - Provide for development on Māori land where it is demonstrated:

a. it is compatible with surrounding activities;

b. it will not compromise occupation, development and use of Māori land;

c. *it will not compromise use of adjacent land or other zones to be efficiently and effectively used for their intended purpose;*

d. *it maintains character and amenity of surrounding area;*

e. *it provides for community wellbeing, health and safety;*

f. *it can be serviced by onsite infrastructure or reticulated infrastructure where this is available; and*

g. *that any adverse effects can be avoided, remedied or mitigated.*

MPZ-04 - Manage land use and subdivision to address the effects of the activity requiring resource consent, including (but not limited to) consideration of the following matters where relevant to the application:

a. *consistency with the scale, density, design and character of the environment and purpose of the zone;*

b. *the location, scale and design of buildings and structures;*

c. *the positive effects resulting from the economic, social and cultural wellbeing provided by the proposed activity.*

d. *at zone interfaces:*

i. *any setbacks, fencing, screening or landscaping required to address potential conflicts;*

ii. *managing reverse sensitivity effects on adjacent land uses, including the ability of surrounding properties to undertake primary production activities in a rural environment;*

e. *the adequacy and capacity of available or programmed development infrastructure to accommodate the proposed activity; or the capacity of the site to cater for on-site infrastructure associated with the proposed activity;*

f. *the adequacy of roading infrastructure to service the proposed activity;*

g. *managing natural hazards;*

h. *any loss of highly productive land;*

i. *adverse effects on areas with historic heritage and cultural values, natural features and landscapes, natural character or indigenous biodiversity values; and*

j. *any historical, spiritual, or cultural association held by tangata whenua, with regard to the matters set out in Policy TW-P6.*

4.29 The proposed objectives and policies for the Maori Purpose zone are enabling of development on Maori land that contributes to housing opportunities such as papakainga, whilst also considering the site location, the size, scale and design of the development relative to the character of the surrounding environment, necessary infrastructure (including road access) and the management of natural hazard risks. This approach is not dissimilar to the current ODP and

policies that enable papakainga type housing development. It is considered that the proposed activity is entirely consistent with the PDP zone policies and is enabled by the Plan.

5. Notification Assessment – Sections 95A to 95G of the RMA

Public Notification Assessment

5.1 Section 95A requires a council to follow specific steps to determine whether to publicly notify an application. The following is an assessment of the application against these steps:

Step 1 Mandatory public notification in certain circumstances

An application must be publicly notified if, under section 95A(3), it meets any of the following criteria:
(a) the applicant has requested that the application be publicly notified:
(b) public notification is required under section 95C:
(c) the application is made jointly with an application to exchange recreation reserve land under section 15AA of the Reserves Act 1977.

5.2 Public notification of the application is not required or requested. The application is not made jointly with an application to exchange reserve land. Step 1 does not apply. Step 2 is considered.

Step 2: Public Notification precluded in certain circumstances.

(4) Determine whether the application meets either of the criteria set out in subsection (5) and,—
(a) if the answer is yes, go to step 4 (step 3 does not apply); and
(b)if the answer is no, go to step 3.
(5) The criteria for step 2 are as follows:
(a) the application is for a resource consent for 1 or more activities, and each activity is subject to a rule or national environmental standard that precludes public notification:
(b) the application is for a resource consent for 1 or more of the following, but no other, activities:
(i) a controlled activity:
(ii) [Repealed]
(iii) a restricted discretionary, discretionary, or non-complying activity, but only if the activity is a boundary activity.
(iv) [Repealed]

(6) [Repealed]

5.3 Public Notification is not precluded as the proposal is a Discretionary activity and is not a boundary activity. Step 3 is considered.

Step 3: Public Notification required in certain circumstances

5.4 The proposal is not subject to a rule or NES requiring public notification and the proposal does not have effects that will be more than minor. Public Notification is not required. Step 4 is considered.

Step 4: Public notification in special circumstances

5.5 Section 95A(9) states that a council must publicly notify an application for resource consent if it considers that 'special circumstances' exist.

5.6 There are no special circumstances that would warrant public notification of the application. The proposed activity is a small-scale papakainga housing development that is residential in nature and provided for in both the ODP and PDP. Discretionary Activity status arises from rule breaches relating to fire risk to residential units and setbacks from rivers. No other person, landowner or organisation is affected by this proposal.

Public Notification Summary

5.7 It is considered that the public notification of the application is not required.

Limited Notification Assessment

5.8 If the application is not publicly notified, a consent authority must follow the steps of section 95B to determine whether to give limited notification of an application.

Step 1: Certain affected groups and affected persons must be notified

(2) Determine whether there are any—
- *(a) affected protected customary rights groups; or*
- *(b) affected customary marine title groups (in the case of an application for a resource consent for an accommodated activity).*

(3) Determine—
- *(a) whether the proposed activity is on or adjacent to, or may affect, land that is the subject of a statutory acknowledgement made in accordance with an Act specified in Schedule 11; and*
- *(b) whether the person to whom the statutory acknowledgement is made is an affected person under section 95E.*

(4) Notify the application to each affected group identified under subsection (2) and each affected person identified under subsection (3).

5.9 There are no protected customary rights groups or customary marine title groups or statutory acknowledgement areas that are relevant to this application. Step 1 does not apply and Step 2 must be considered.

Step 2: Limited notification precluded in certain circumstances

(5) Determine whether the application meets either of the criteria set out in subsection (6) and,—

(a) if the answer is yes, go to step 4 (step 3 does not apply); and
(b) if the answer is no, go to step 3.

(6) The criteria for step 2 are as follows:
(a) the application is for a resource consent for 1 or more activities, and each activity is subject to a rule or national environmental standard that precludes limited notification:
(b) the application is for a controlled activity (but no other activities) that requires a resource consent under a district plan (other than a subdivision of land).

5.10 There is no rule in the plan or national environmental standard that precludes notification. The application is not for a controlled activity. Step 2 does not apply. Step 3 is considered.

Step 3: Certain other affected persons must be notified

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

(8) In the case of any other activity, determine whether a person is an affected person in accordance with section 95E.

(9) Notify each affected person identified under subsections (7) and (8) of the application.

5.11 The proposal is not for a boundary activity nor is it a prescribed activity.

5.12 Based on the preceding assessment of effects on the environment, it is considered that there are no persons, including any adjoining neighbours that would be adversely affected to a minor or more than minor extent.

5.13 The potential adverse effects on any persons are less than minor. Step 3 does not apply. Step 4 is considered.

Step 4: Further notification in special circumstances

(10) whether special circumstances exist in relation to the application that warrant notification of the application to any other persons not already determined to be eligible for limited notification under this section (excluding persons assessed under section 95E as not being affected persons),

5.14 The proposal is to establish papakainga residential housing on a Maori land site. There are no special circumstances that would apply.

Limited Notification Assessment Summary

5.15 For the reasons set out above, it is concluded that Steps 1 to 4 do not apply, and that this application can be processed on a non-notified basis. There are no adjacent neighbours that would be affected by the proposed development.

6. Conclusion

6.1 The Applicant seeks resource consent to establish a papakainga type residential housing development on the application site at Kohukohu. The density of the proposed development is consistent with the RPZ controlled activity rule standard and is enabled by both the ODP and PDP objectives and policies.

6.2 The proposed location of house 2 and its associated wastewater disposal area on the lower block would infringe the required 30m setback to the adjacent river that runs adjacent to the eastern boundary and the lower wetland area. The house 2 site on the lower block is located well clear of any existing riparian vegetation and is outside of any mapped flood plain. The formation of a driveway from the Council Road to the houses on the upper block also infringes the 30m setback standard. Potential adverse effects arising from these breaches are assessed to be less than minor.

6.3 The proposed location of house 2 on the upper block is within the required 20m setback of the adjacent bush area and therefore poses a potential fire risk to bush and the building. FENZ has assessed the proposed house location and deemed it to be suitable in terms of the location and availability of a fire-fighting water supply and the careful management of planted areas around the house. Potential fire risk is deemed to be acceptable in this rural location.

6.4 Due to the above District-wide rule infringements, the proposed activity is assessed to be a Discretionary Activity. Potential adverse effects on the environment are considered to be no more than minor. The proposed Papakainga type housing would not be contrary to the objectives and policies of the ODP or the PDP. This includes design and layout aspects that result in breaches to ODP District-wide rules.

6.5 The Applicant requests that the application be granted on a non-notified basis.

7. Limitations

7.1 This report has been commissioned solely for the benefit of our client, in relation to the project as described above, and to the limits of our engagement, with the exception that the Far North District Council or Northland Regional Council may rely on it to the extent of its appropriateness, conditions and limitations, when issuing their subject consent.

7.2 Copyright of Intellectual Property remains with Northland Planning and Development 2020 Limited, and this report may NOT be used by any other entity, or for any other proposals, without our written consent. Therefore, no liability is accepted by this firm or any of its directors, servants or agents, in respect of any information contained within this report.

7.3 Where other parties may wish to rely on it, whether for the same or different proposals, this permission may be extended, subject to our satisfactory review of their interpretation of the report.

7.4 Although this report may be submitted to a local authority in connection with an application for a consent, permission, approval, or pursuant to any other requirement of law, this disclaimer shall still apply and require all other parties to use due diligence where necessary.

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 **503537**

Land Registration District **North Auckland**

Date Registered 06 November 2009 09:00 am

Type Partition Order **Instrument** MFPO 8335528.1

Area 8.6025 hectares more or less

Legal Description Tauteihiihi 2B 4A and 2B 4C Block

Registered Owners

Wiremu Peter Smith, Marie Ngareta Driver, Iritana Cecilia Smith, Rita Margaret Smith (also known as Rita Margaret Yates) and Maiki Katherine Smith as responsible trustees jointly, no survivorship

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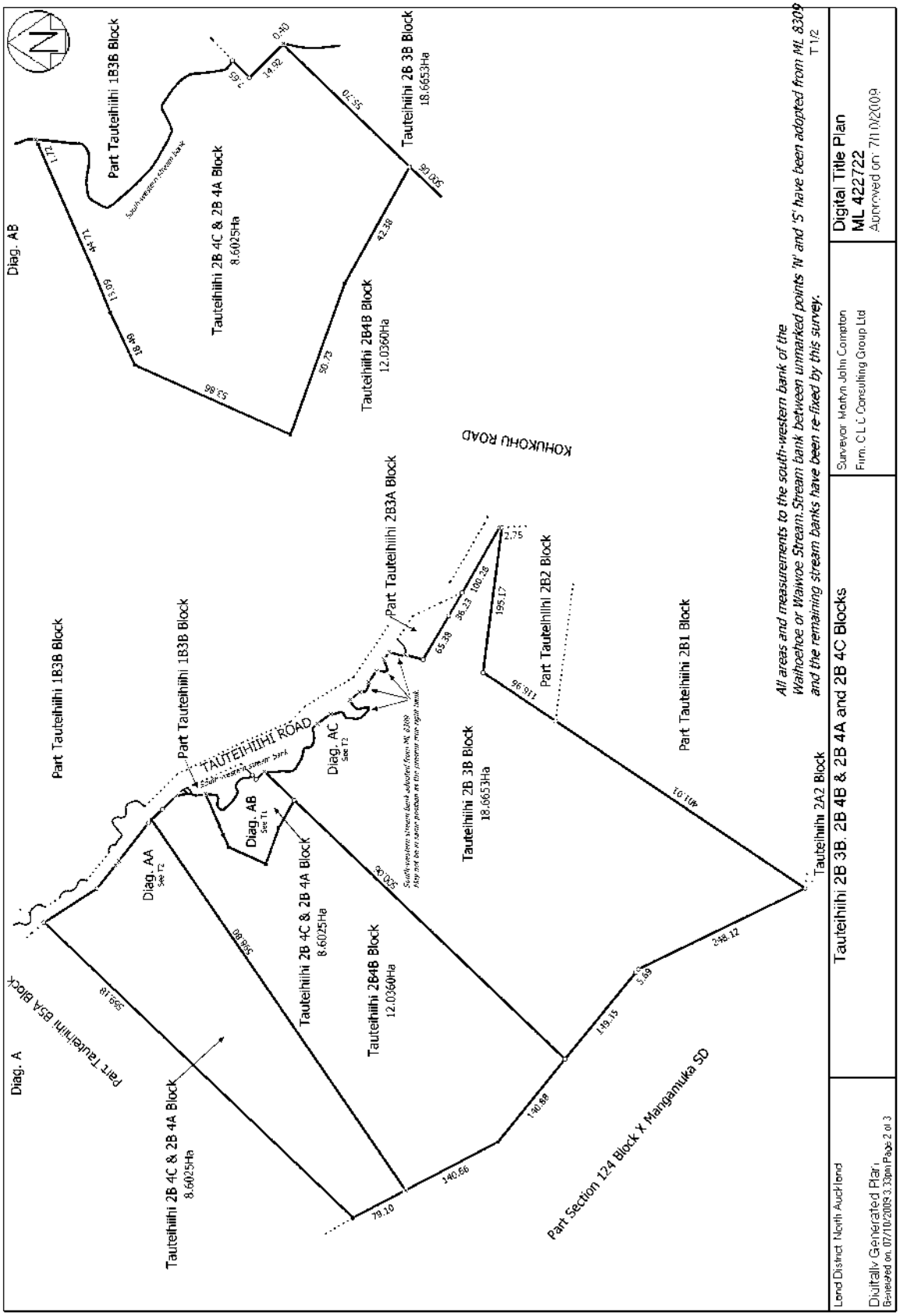
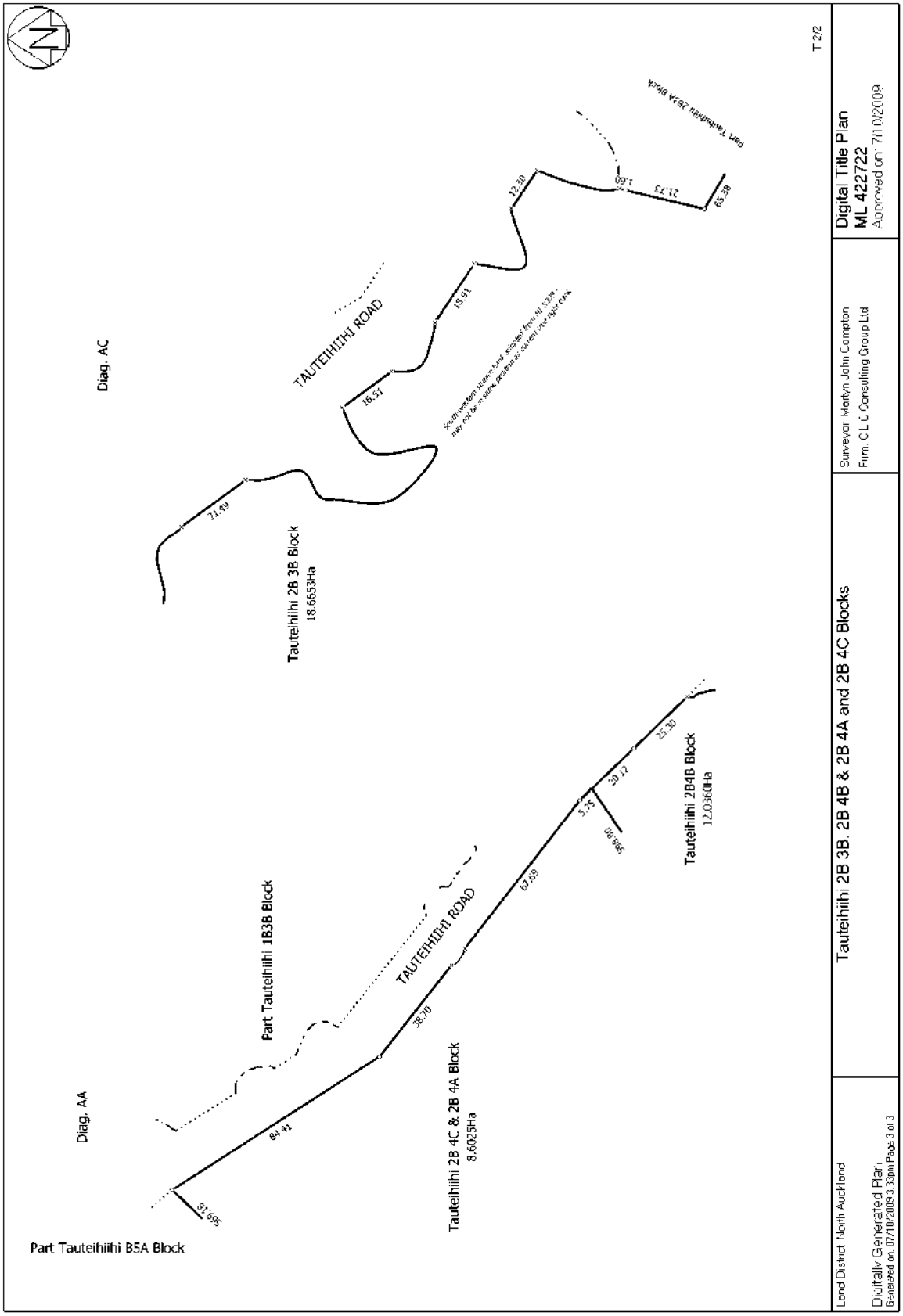
Interests

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

8335528.3 Status Order determining the status of the within land to be Maori Freehold Land - 6.11.2009 at 9:00 am


Diag. AB
Part Tauteihiihi 1B3B Block
Part Tauteihiihi 1B3B Block
Part Tauteihiihi 1B3B Block
TAUTEIHIIHI ROAD
Diag. AA
See T2
Diag. AB
See T1
Diag. AC
See T2
Tauteihiihi 2B 4C & 2B 4A Block
8.6025Ha
Tauteihiihi 2B 4C & 2B 4A Block
8.6025Ha
Tauteihiihi 2B4B Block
12.0360Ha
Tauteihiihi 2B 3B Block
18.6653Ha
Part Tauteihiihi 2B3A Block
KOHUKOHU ROAD
Part Tauteihiihi 2B2 Block
Part Tauteihiihi 2B1 Block
Tauteihiihi 2A2 Block
Part Tauteihiihi 1B3B Block
Part Tauteihiihi 1B3B Block
Tauteihiihi 2B4B Block
12.0360Ha
Tauteihiihi 2B 3B Block
18.6653Ha
Part Tauteihiihi 1B3B Block
Tauteihiihi 2B 4C & 2B 4A Block
8.6025Ha
Part Tauteihiihi 8SA Block
Diag. A
Part Section 124 Block X Mangamuka SD
All areas and measurements to the south-western bank of the Waihoehoe or Waiwoe Stream.Stream bank between unmarked points 'N' and 'S' have been adopted from ML 8309 and the remaining stream banks have been re-fixed by this survey.
T1/2
Land District North Auckland
Digitally Generated Plan
Generated on 07/10/2009 3:33pm Page 2 of 3
Tauteihiihi 2B 3B, 2B 4B & 2B 4A and 2B 4C Blocks
Surveyor Martyn John Compton
Firm. C L C Consulting Group Ltd
Digital Title Plan
ML 422722
Approved on 7/10/2009


T 2/2
Digital Title Plan
ML 422722
Approved on 7/10/2009
Surveyor Martyn John Compton
Firm. C L C Consulting Group Ltd
Tauteihiihi 2B 3B, 2B 4B & 2B 4A and 2B 4C Blocks
Land District North Auckland
Digitally Generated Plan
Generated on 07/10/2009 3:33pm Page 3 of 3
Diag. AC
TAUTEIHIIHI ROAD
Tauteihiihi 2B 3B Block
18.6653Ha
21.49
16.51
18.91
12.30
1.60
21.73
65.39
Part Tauteihiihi 2B3A Block
Diag. AA
Part Tauteihiihi 1B3B Block
TAUTEIHIIHI ROAD
Tauteihiihi 2B 4C & 2B 4A Block
8.6025Ha
84.42
91.69
38.70
69.69
5.74
999.88
20.12
25.30
Tauteihiihi 2B4B Block
12.0360Ha
Part Tauteihiihi B5A Block

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

Record(s) of Title

503537	Identified as potentially Maori Freehold Land

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

TAUTEIHIIHI - TIHIMANANO PAPAKĀINGA
TP0054F - SCOPE OF WORK;

<u>LOWER SITE - TAUTEIHIHI 2B4C - (PHASE ONE)</u>
REPLACE EXISTING OLD HOMESTEAD WITH NEW 3-4 BEDROOM HOUSE AND 2 BEDROOM MINOR DWELLING.
USE EXISTING POWER AND PROVIDE NEW WASTEWATER AND WATER TANKS.
REPLACE ACCESS BRIDGE CULVERT.

<u>UPPER SITE - TAUTEIHIHI 2B4A - (PHASE TWO)</u>
PROVIDE NEW ACCESS ROAD UP TO FUTURE HOUSE SITES.
TWO NEW 2 BEDROOM HOUSE WITH NEW WASTEWATER AND WATER TANKS.
NEW SOLAR ARRAY FOR THE CABINS POWER.

KARIKARI - new house

CREATING A NEW LEGACY FOR WHĀNAU

STATUS:	DRAFT RC - Techincal
PROJECT NAME + ADDRESS:	Rihari Wirihiona Seon & Maiki Smith Whānau TAUTEIHIIHI 2B4A & 2B4C BLOCKS
DATE:	25/02/2025
PROJECT NUMBER:	TP02

nik@laminata.nz
021 376 983
Laminata

MT POKAKA TIMBER PRODUCTS LTD
Housing Division

SHEET NUMBER	REVISION
1.1	04

OLD FAMILY HOUSE - TO BE DEMOLISHED

OLD UTILITY SHED - VIEW FROM HOUSE

OLD FAMILY HOUSE - TO BE DEMOLISHED

TAUTEIHIHI 2B4C BLOCK

1 EXISTING SITE 1:1000

OLD UTILITY SHED - VIEW FROM HOUSE

OLD TIMBER BRIDGE - TO BE REPLACED

WATER FLOW OF AWA UNDER BRDIGE

PROJECT No.		PROJECT NAME + ADDRESS	SHEET TITLE	STATUS			SHEET NUMBER	REVISION
TP02	Laminata / MT POKAKA TIMBER PRODUCTS LTD	TAUTEIHIIHI 2B4A & 2B4C BLOCKS KOHUKOHU	SITE PHOTOS	CONSENT	DESIGN: -- DRAWN: -- CHECKED: -- APPROVED: --	SCALE: Shown@A3 DATE: 25/02/2025	1.2	05

EXISTING IRRGATION DAM

1 EXISTING SITE 1:1000

OLD COW SHED AND ACCESSWAY UP FROM ROAD

FUTURE HOUSE SITE ON ACCESS ROAD UP HILL

LOOKING UP PROPOSED ACCESS ROAD UP HILL

CABINS SITES

PROJECT No. TP02	Laminata	MT POKAKA TIMBER PRODUCTS LTD	PROJECT NAME + ADDRESS TAUTEIHIIHI 2B4A & 2B4C BLOCKS KOHUKOHU	SHEET TITLE SITE PHOTOS	STATUS CONSENT	DESIGN: -- DRAWN: -- CHECKED: -- APPROVED: --	SCALE: Shown@A3 DATE: 25/02/2025	SHEET NUMBER 1.3	REVISION 05

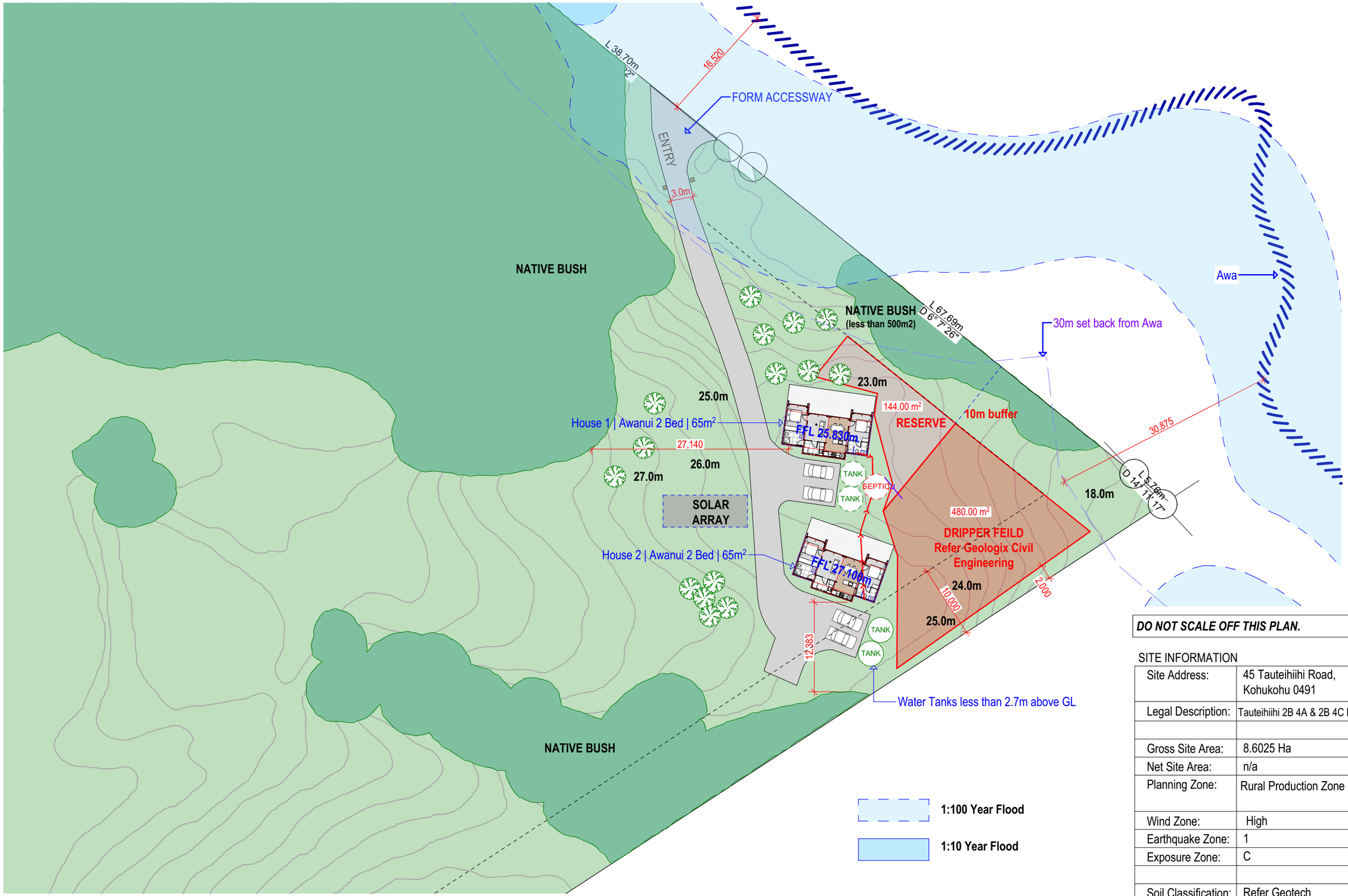
DO NOT SCALE OFF THIS PLAN.

SITE INFORMATION

Site Address:	45 Tauteihiihi Road, Kohukohu 0491
Legal Description:	Tauteihiihi 2B 4A & 2B 4C Block
Gross Site Area:	8.6025 Ha
Net Site Area:	n/a
Planning Zone:	Rural Production Zone
Wind Zone:	High
Earthquake Zone:	1
Exposure Zone:	C
Soil Classification:	Refer Geotech

1 EXISTING SITE 1:2500

PROJECT No.		PROJECT NAME + ADDRESS	SHEET TITLE	STATUS			SCALE:	SHEET NUMBER	REVISION
TP02	Laminata / MT POKAKA TIMBER PRODUCTS LTD	TAUTEIHIIHI 2B4A & 2B4C BLOCKS KOHUKOHU	EXISTING SITE PLAN	CONSENT	DESIGN: --	DRAWN: --	Shown@A3	1.4	04
					CHECKED: --	APPROVED: --	DATE: 25/02/2025		



DO NOT SCALE OFF THIS PLAN.

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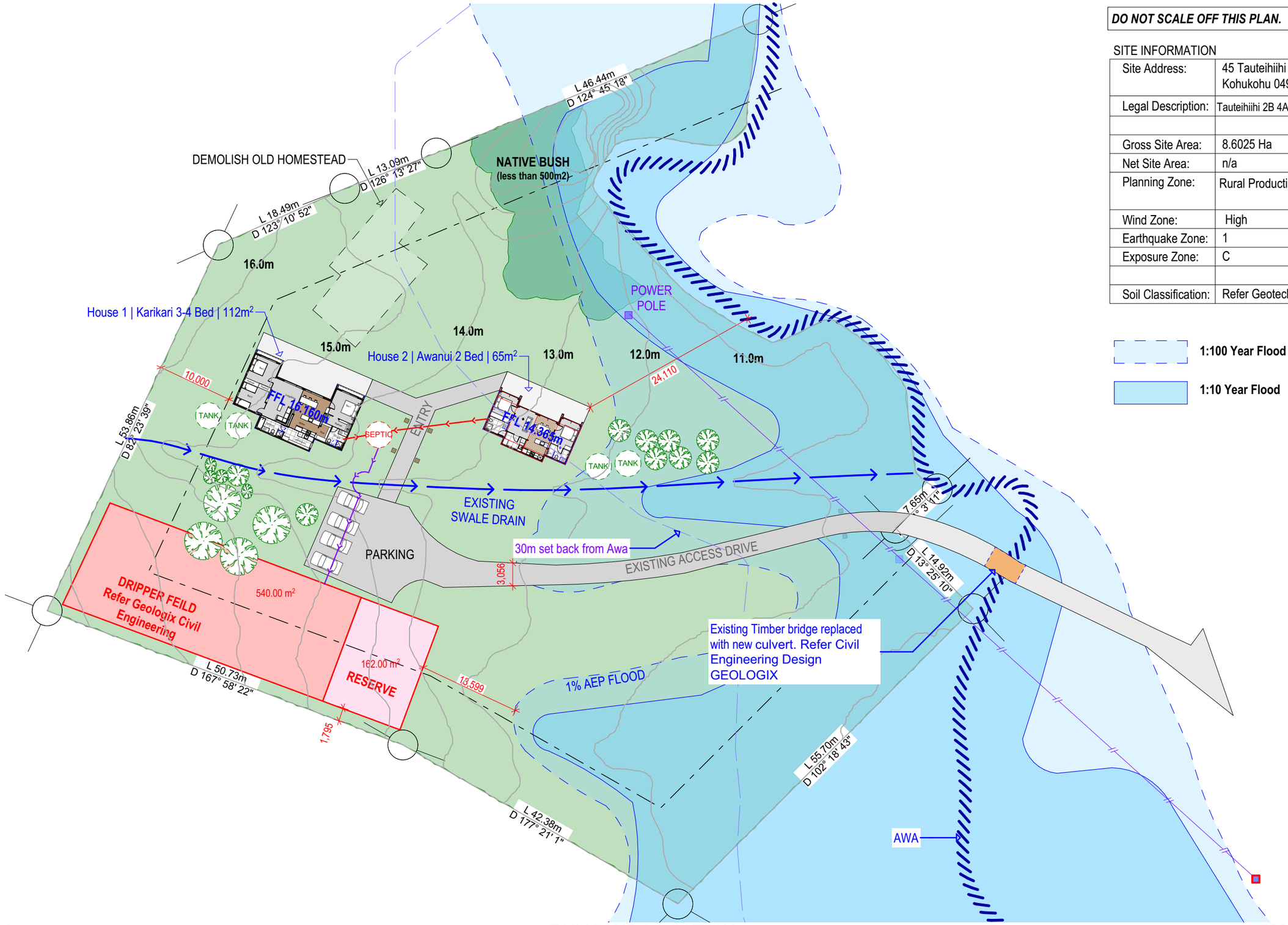
Planning Zone:	Rural Production Zone
Wind Zone:	High
Earthquake Zone:	1
Exposure Zone:	C
Soil Classification:	Refer Geotech

1 BULK AND LOCATION 1:500

PROJECT No.		PROJECT NAME + ADDRESS	SHEET TITLE	STATUS			SCALE:	SHEET NUMBER	REVISION
TP02	Laminata / MT POKAKA TIMBER PRODUCTS LTD	TAUTEIHIIHI 2B4A & 2B4C BLOCKS KOHUKOHU	TOP 2B4A BLOCK | PROPOSED BULK AND LOCATION	CONSENT	DESIGN: -- DRAWN: -- CHECKED: -- APPROVED: --	DATE: 25/02/2025	Shown@A3	1.5	05



DO NOT SCALE OFF THIS PLAN.

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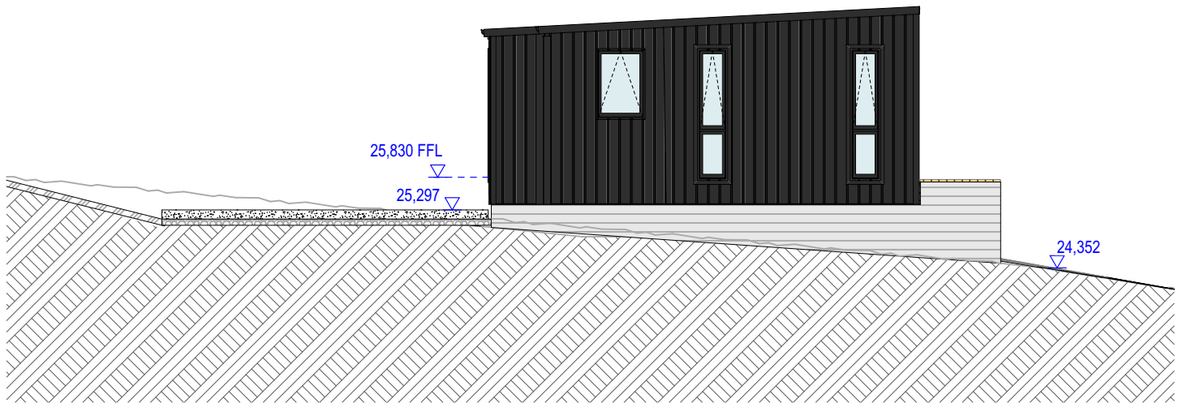
Wind Zone:	High
Earthquake Zone:	1
Exposure Zone:	C
Soil Classification:	Refer Geotech

1:100 Year Flood

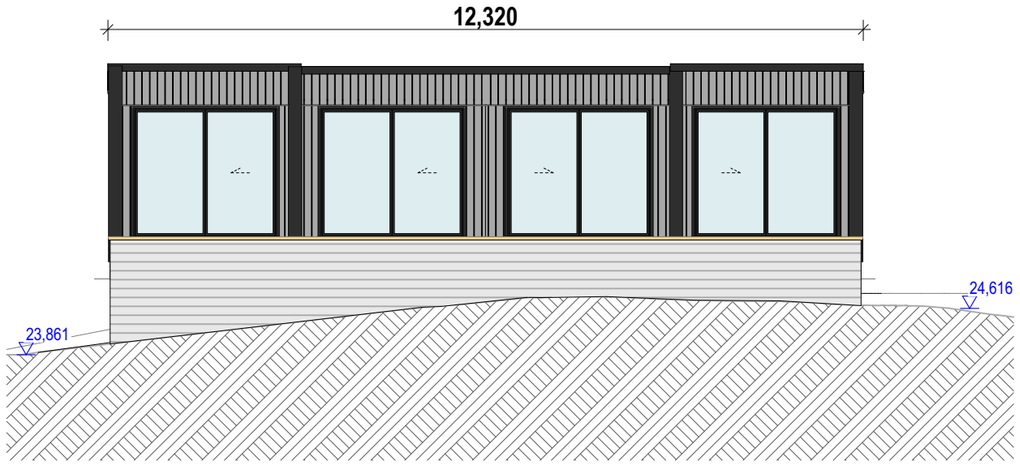
1:10 Year Flood

1 BULK AND LOCATION 1:500

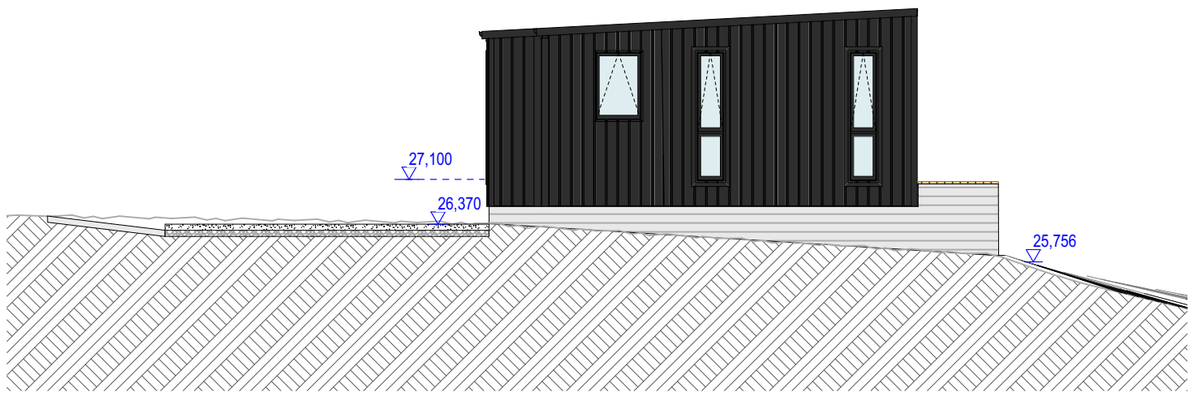
PROJECT No.		PROJECT NAME + ADDRESS	SHEET TITLE	STATUS			SHEET NUMBER	REVISION
TP02	Laminata / MT POKAKA TIMBER PRODUCTS LTD	TAUTEIHIIHI 2B4A & 2B4C BLOCKS KOHUKOHU	LOWER 2B4C BLOCK | BULK & LOCATION	CONSENT	DESIGN: -- DRAWN: -- CHECKED: -- APPROVED: --	SCALE: Shown@A3 DATE: 25/02/2025	1.6	04



2 BLOCK A | HOUSE 1 1:100



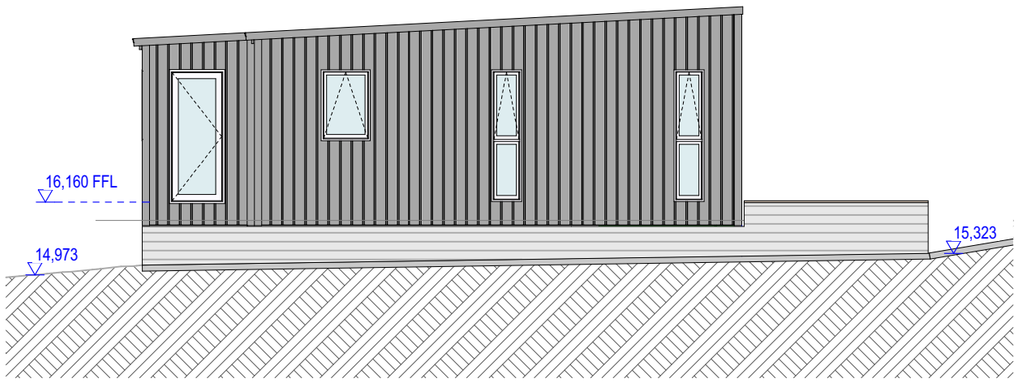
3 BLOCK A | HOUSE 1 1:100



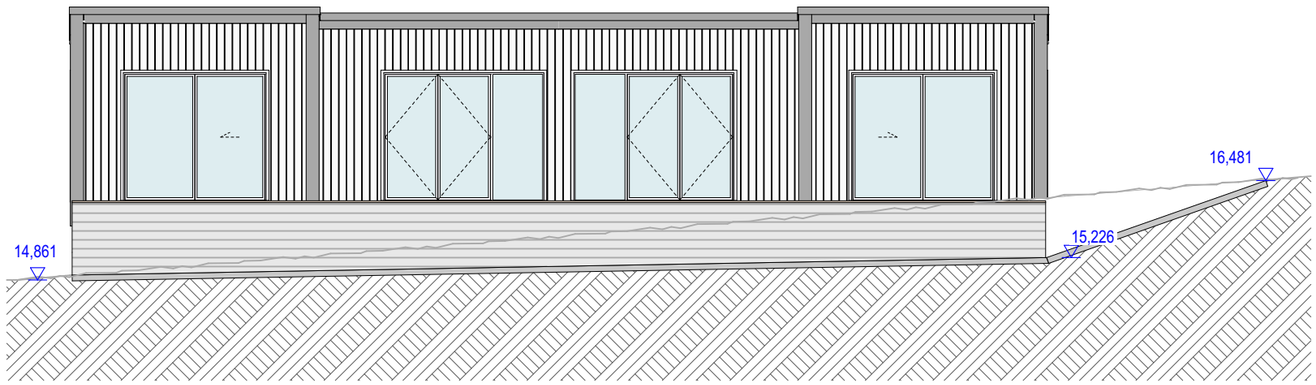
1 BLOCK A | HOUSE 2 1:100

4 BLOCK A | HOUSE 2 1:100

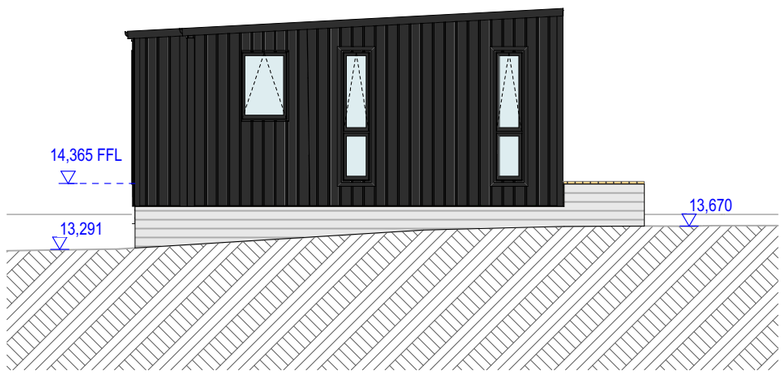
PROJECT No. TP02	Laminata	MT POKAKA TIMBER PRODUCTS LTD	PROJECT NAME + ADDRESS TAUTEIHIIHI 2B4A & 2B4C BLOCKS KOHUKOHU	SHEET TITLE HOUSE ELEVATIONS	STATUS CONSENT	DESIGN: -- DRAWN: -- CHECKED: -- APPROVED: --	SCALE: Shown@A3 DATE: 25/02/2025	SHEET NUMBER 1.7 REVISION 05



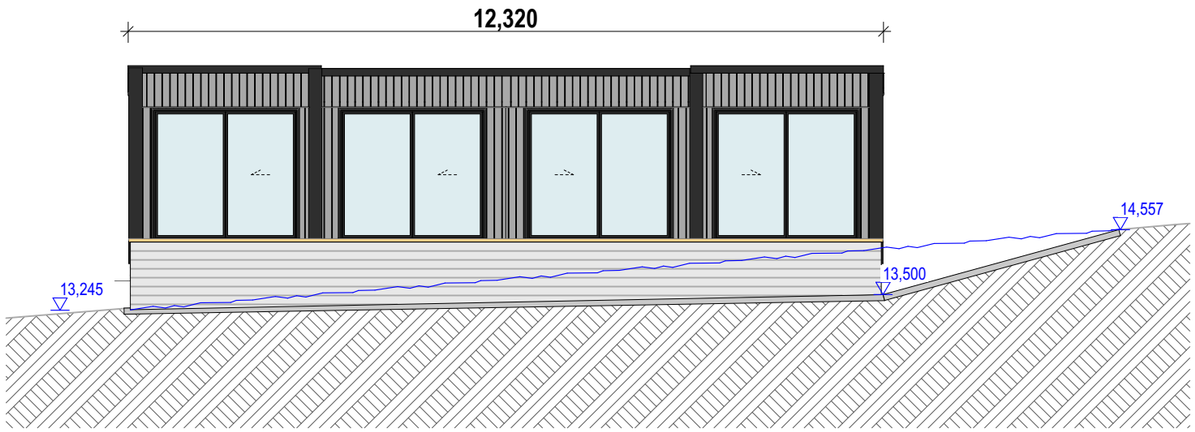
1 BLOCK C | HOUSE 1 1:100



4 BLOCK C | HOUSE 1 1:100

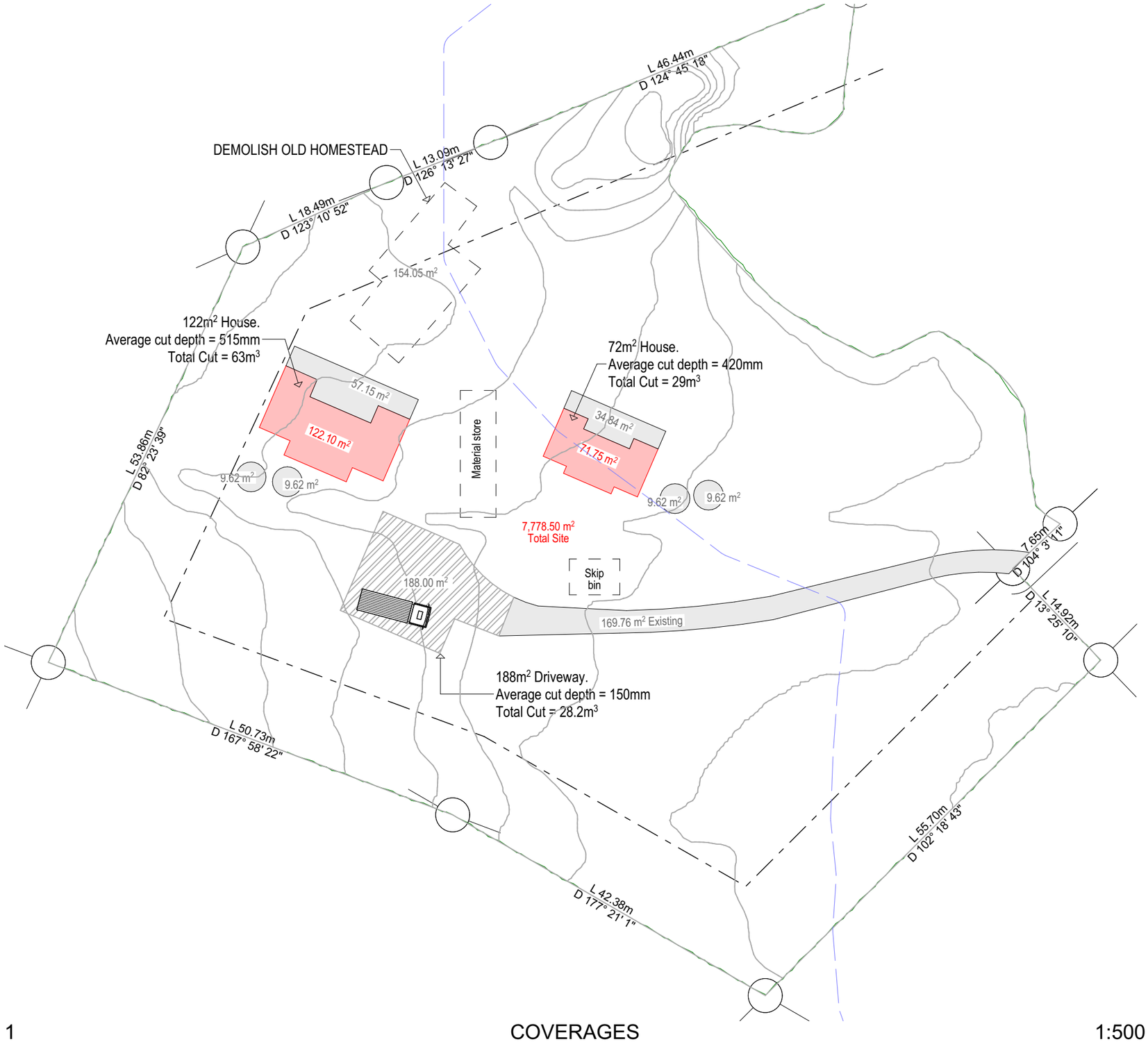


2 BLOCK C | HOUSE 2 1:100



3 BLOCK C | HOUSE 2 1:100

PROJECT No. TP02	Laminata	MT POKAKA TIMBER PRODUCTS LTD	PROJECT NAME + ADDRESS TAUTEIHIIHI 2B4A & 2B4C BLOCKS KOHUKOHU	SHEET TITLE HOUSE ELEVATIONS	STATUS CONSENT	DESIGN: -- DRAWN: -- CHECKED: -- APPROVED: --	SCALE: Shown@A3 DATE: 25/02/2025	SHEET NUMBER 1.8 REVISION 05



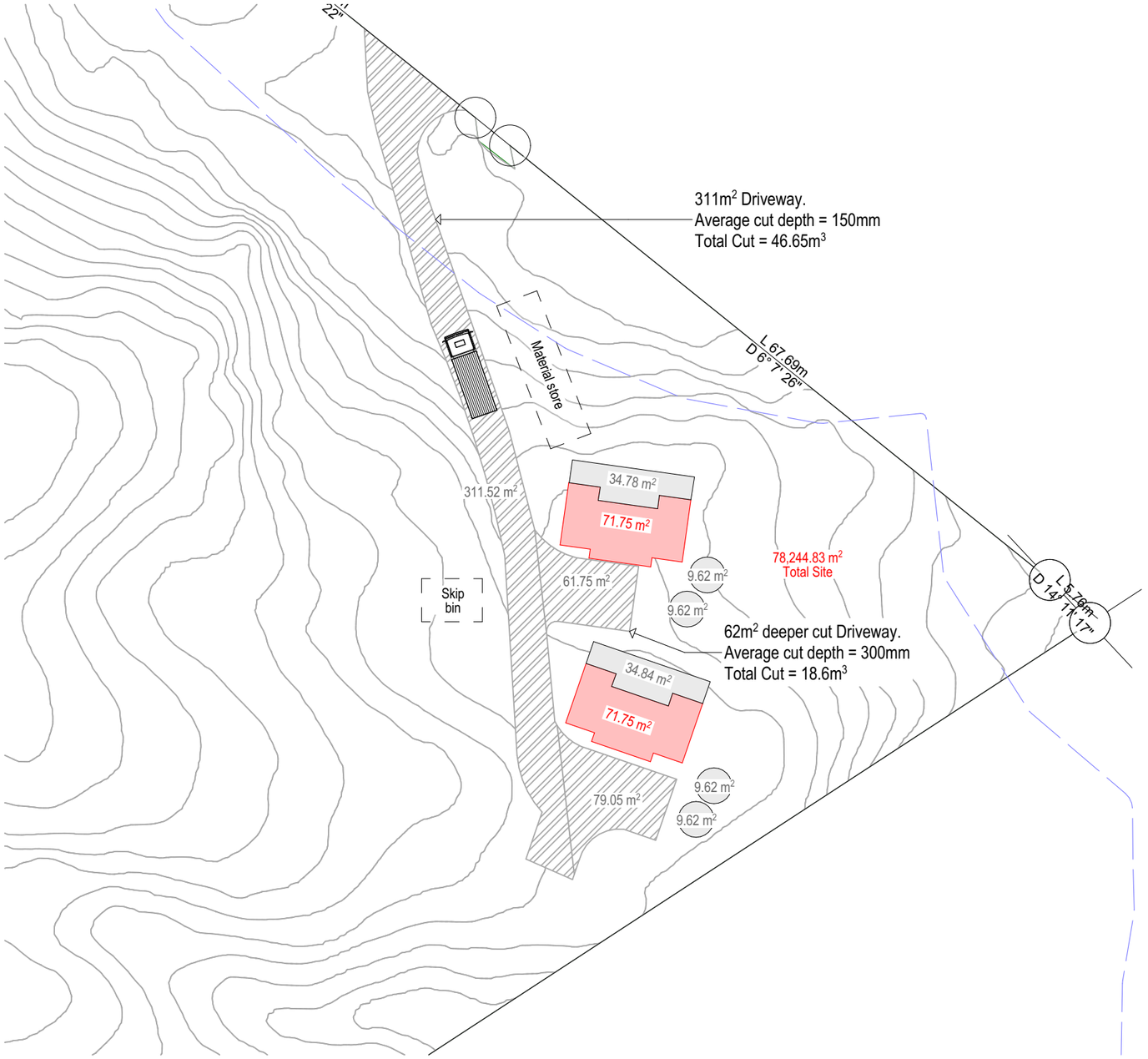
COVERAGES | 2B4A			
AREA	**EXISTING**	**PROPOSED**	**%**
PAVED	170.00m²	318.00m²	4.1%
BUILDING	154.00m²	194.00m²	2.49%
LADSCAPE	7,454.5.00m²	7,266.50m²	93.5%
TOTAL IMPERVIOUS	324.00m²	512.00m²	6.5%
TOTAL SITE	**7,778.5m²**		

= Area of Cut
TOTAL CUT = 120m²

Dwelling founded on timber piles - Minimal earth works carried out.

1 COVERAGES 1:500

PROJECT No.		PROJECT NAME + ADDRESS	SHEET TITLE	STATUS			SCALE:	SHEET NUMBER	REVISION
TP02	Laminata / MT POKAKA TIMBER PRODUCTS LTD	TAUTEIHIIHI 2B4A & 2B4C BLOCKS KOHUKOHU	TOP 2B4A BLOCK | COVERAGES/SITE MANAGEMENT	CONSENT	DESIGN: -- DRAWN: -- CHECKED: -- APPROVED: --	DATE: 25/02/2025	Shown@A3	1.9	04



COVERAGES | 2B4C			
AREA	**EXISTING**	**PROPOSED**	**%**
PAVED	0.00m²	522.00m²	0.7%
BUILDING	31.00m²	144.00m²	0.2%
LADSCAPE	78,214.00m²	77579.00m²	99.1%
TOTAL IMPERVIOUS	31.00m²	666.00m²	0.9%
TOTAL SITE	**78,245m²**		

= Area of Cut

TOTAL CUT = 65.25m²

Dwelling founded on timber piles - Minimal earth works carried out.

1 COVERAGES 1:500

PROJECT No.		PROJECT NAME + ADDRESS	SHEET TITLE	STATUS			SHEET NUMBER	REVISION
TP02	Laminata / MT POKAKA TIMBER PRODUCTS LTD	TAUTEIHIIHI 2B4A & 2B4C BLOCKS KOHUKOHU	LOWER 2B4C BLOCK | COVERAGES/SITE MANAGEMENT	CONSENT	DESIGN: -- DRAWN: -- CHECKED: -- APPROVED: --	SCALE: Shown@A3 DATE: 25/02/2025	1.10	05

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consulting engineers

SITE SUITABILITY ENGINEERING REPORT

45 TAUTEIHIIHI ROAD KOHUKOHU

LAMINATA HOMES LIMITED

C0564-S-01
MARCH 2025
REVISION 1

geologix
consulting engineers

DOCUMENT MANAGEMENT

Document Title	Site Suitability Engineering Report
Site Reference	45 Tauteihiihi Road, Kohukohu
Client	Laminata Homes Limited
Geologix Reference	C0564-S-01-R01
Issue Date	March 2025
Revision	01
Prepared	Gerard McHardy Civil Design Engineer, BEng Civil, MEngNZ
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Approved	Edward Collings Managing Director, CEnvP Reg. 0861, CPEng Reg. 1033153, CMEngNZ
File Reference	*Z:\Projects\C0500-C0599\C0552 - Tauteihiihi Road, Punguru\06 - Reports\C0552-S-01-R01.docx*

REVISION HISTORY

Date	Issue	Prepared	Reviewed	Approved
March 2025	First Issue – For Resource Consent	GM	SH	EC

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TABLES

1 INTRODUCTION

This Site Suitability Engineering Report has been prepared by Geologix Consulting Engineers Ltd (Geologix) for Laminata Homes Limited as our Client in accordance with our standard short form agreement and general terms and conditions of engagement.

Our scope of works has been undertaken to assist with the Resource Consent application in relation to the proposed papakaianga development of a rural property located at 45 Tauteihiihi Road, Kohukohu, the 'site'. Specifically, this assessment addresses engineering elements of natural hazards, wastewater, stormwater, access and internal roading and associated earthwork requirements to provide safe and stable building platforms with less than minor effects on the environment as a result of the proposed activities outlined in Section 1.1.

1.1 Proposal

A proposed development plan was presented to Geologix at the time of writing, prepared by Laminata Homes Limited[1] and has been reproduced within Appendix A as Drawing No 100. It is understood that it is proposed to demolish an existing homestead and ancillary structures and establish a papakaianga development with one main and three minor dwellings within two separate areas of the site, one area being a low-lying portion of the site containing an existing dwelling and the second being on elevated land to the north of the existing dwelling. Any amendments to the referenced plan may require an update to the recommendations of this report.

The site is located in a rural production zone as per the FNDC Operative District Plan.

Site access will be provided directly from Tauteihiihi Road. The proposed major and minor dwellings located near the existing dwelling will be accessed via an existing vehicle crossing and driveway. The remaining dwellings will be accessed via a new vehicle crossing and accessway off Tauteihiihi Road. Each vehicle crossing has been considered from a safety aspect in relation to visibility of incoming and outgoing vehicle movements. A specific Traffic Impact Assessment (TIA) is not within the scope of this report.

2 DESKTOP APPRAISAL

The site is located at 45 Tauteihiihi Road, Kohukohu. The site is comprised of two separate areas, an irregular shaped section on low lying land encompassing approximately 0.8 ha and another irregularly shaped area to the north encompassing approximately 7.8 ha (8.6 ha total). Topographically, the majority of the site is moderately steep and undulating. The site setting is presented schematically as

[1] *Laminata Homes, Site Plan 2B4A&C Blocks Ref. TP02, dated 10/09/2024.*

Figure 1 below.

Figure 1: Site Setting

The majority of the site is currently covered with bush with the low-lying portion of the site and eastern end of the northern section being pasture.

An existing residence is located in the low-lying portion of the site. The residence comprises dwelling structures and sheds that are all accessed via an existing accessway that is largely surfaced in metal up to the residence area. This accessway includes an old wooden bridge (which is to be replaced) crossing a stream on the western side of Tauteihiihi Road.

A detailed review of existing watercourses and overland flow paths is presented in Section 3.

2.1 Existing Reticulated Networks

Far North District Council (FNDC) GIS mapping indicates that no existing public 3 water infrastructure or reticulated networks are present within Tauteihiihi Road or near the site boundaries. This report has been prepared with the goal of the development being self-sufficient for the purpose of wastewater, stormwater, and potable water management.

2.2 Geological Setting

Available geological mapping[2] indicates the site to be underlain by Northland Allochthon Group. These are primarily comprised micaceous sandstone, with minor conglomerate, and interbeds of blue-grey mudstone.

[2] *Edbrooke, S.E, 2001. Geology of the Auckland area. Institute of Geological & Nuclear Sciences 1:250 000 geological map 3.*

2.3 Existing Geotechnical Information

Existing development and/ or Building Consent ground investigations were not made available to Geologix at the time of writing. Additionally, a review of available GIS databases, including the New Zealand Geotechnical Database[3] did not indicate borehole records within 500 m of the site.

3 SURFACE WATER FEATURES AND OVERLAND FLOWPATHS

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

3.1 Surface Water Features

An existing stream flows from north to south along the eastern side of Tauteihiihi Road, passing under the road via a culvert located near the eastern corner of the northern section of the site before flowing along the eastern side of the lower portion of the site, passing under the existing bridge within the accessway.

This watercourse continues to flow south-eastwards, past the Tauteihiihi Marae, before reaching the sea approximately 500m downstream.

There is also a man-made irrigation dam contained within the northern portion of the site, above the proposed building sites.

3.2 Overland Flow Paths

There is a clearly defined, channelised, flowpath evident within the lower portion of the site, flowing west to east between the existing dwelling and accessway towards the stream running along the eastern boundary. Elsewhere, it should be considered for there to be other minor overland flow paths formed within the gullies of the site's undulating topography.

3.3 Flood Hazard

Northland Regional Council Natural Hazard Maps indicates that the site is affected by a river flood hazard of the 10%, 2% and 1% Annual Exceedance Probability (AEP) or 1-in-10, 50 and 100-year rain events. The areas of the site affected by the river flood hazard comprises approximately the eastern half of the lower portion of the site and Tauteihiihi Road at the access point of the northern area of the site. All building platforms are positioned away from flooding hazards.

The flood hazard is assessed in detail in a separate report C0564-F-02-R01, prepared by Geologix.

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[3] *https://www.nzgd.org.nz*

4 GROUND INVESTIGATION

A site-specific walkover survey and intrusive ground investigation was undertaken by Geologix on 6th November 2024. The ground investigation was scoped to confirm the findings of the above information and to provide parameters for wastewater assessment. The ground investigation comprised:

- Four hand augered boreholes designated BH01 to BH04 inclusive, within the proposed dwelling locations with a target depth of 5.0m below ground level (bgl).
- Two hand augered boreholes designated BH05 to BH06 inclusive, formed within the proposed wastewater disposal fields on each site with a target depth of 1.5m below ground level (bgl).

4.1 Site Walkover Survey

A visual walkover survey of the property confirmed:

- The topography is in general accordance with that outlined in Section 2 and the available GIS/ topographic contours.
- The site is accessed from the southern side of Tauteihiihi Road and is forested on most of the land except for where the dwellings are proposed. Nearby land in all directions are generally comprised of forested land or pasture land.
- No existing retaining walls or supporting structures were noted during our walkover survey. An old bridge leads to the existing dwelling at the southeastern side of the site.
- There were no signs of instability at the time of our investigation.

4.2 Ground Conditions

Arisings recovered from the exploratory boreholes were logged by a suitably qualified geotechnical engineering professional in general accordance with New Zealand Geotechnical Society guidelines[4]. Engineering borehole logs are presented as Appendix B to this report and approximate borehole positions recorded on Drawing No. 200 within Appendix A. Strata identified during the ground investigation can be summarised as follows:

- **Topsoil encountered down to 0.2 m bgl.** Described as organic silt with minor rootlets, brown to dark brown and moist.
- **Northland Allochthon Group Residual Soil to depths of 3.0 to >4.9 m bgl.** The Northland Allochthon residual soil encountered is generally clayey silt with some gravel, clay or sand, low to high plasticity and moist. The unit was described as brown, orange and grey

[4] *New Zealand Geotechnical Society, Field Description of Soil and Rock, 2005.*

The Northland Allochthon was found to be variable in strength. In total, fifty-seven in-situ field vane tests recorded vane shear strengths ranging from 44 to 202 kPa. Apart from HA01 where a 44kPa shear vane value was recorded, the soils were generally stiff to very stiff ranging from 94 to 203 kPa and a characteristic unit vane shear strength of 157 kPa was determined at 95 % confidence.

- **Northland Allochthon Completely Weathered Parent Rock to depths of 1.7 to >4.9 m bgl.** Weathered rock was identified within all boreholes except HA02 & HA06 generally comprising orange brown and grey clayey silt with some sand. The unit was detailed as hard, moist and low plasticity. Measured shear vane values were 202kPa and above.

- **Northland Allochthon Highly Weathered Parent Rock at a depth of >1.7 m bgl.** Highly Weathered rock was inferred within borehole HA03 & HA05 where Scala penetrometer values exceeded 20 blows per 100mm.

A summary of ground investigation data is presented below as Table 1.

Table 1: Summary of Ground Investigation

Hole ID	Location	Hole Depth	Topsoil Depth	Groundwater[2]	Wastewater Category[4]
BH01	Southern Block	3.9 m	0.2 m	NE	6 – slow draining
BH02	Southern Block	4.9 m	0.1 m	3.0 m	6 – slow draining
BH03	Southern Block	3.0 m	0.2 m	NE	6 – slow draining
BH04	Northern Block	4.0 m	0.15 m	NE	6 – slow draining
BH05	Northern Block	1.5 m	0.15 m	NE	6 – slow draining
BH06	Northern Block	1.2 m	0.1 m	NE	6 – slow draining

1. *All depths recorded in m bgl unless stated.*
2. *Groundwater measurements taken on day of drilling.*
3. *NE – Not Encountered.*
4. *Wastewater category in accordance with Auckland Council TP58[5].*

5 GEOTECHNICAL ASSESSMENT

Based on the results of the desktop appraisal, a site walkover survey, and the ground investigation, Geologix have undertaken a site-specific geotechnical assessment to determine geotechnical stability and recommendations of the proposed development.

5.1 Geotechnical Design Parameters

Geotechnical design parameters are presented in Table 2 below. They have been developed based on our ground investigation, the results of in-situ testing and experience with similar materials.

[5] *Auckland Council, Technical Publication 58, On-site Wastewater Systems: Design and Management Manual, 2004, Table 5.1.*

Table 2: Geotechnical Effective Stress Parameters

Geological Unit	Unit Weight, kN/m³	Effective Friction Angle, °	Effective Cohesion, kPa	Undrained shear strength, kPa
Northland Allochthon Residual Soil	18	29	4	90 *
Northland Allochthon CW Parent Rock	19	30	5	200
Northland Allochthon HW Parent Rock	20	32	7	

CW – Completely Weathered.
* Adopting Bjerrum correction factor of 0.6 from characteristic vane shear strength.

5.2 Site Subsoil Class

The site has been designated as Site Subsoil Class C according to the provisions of NZS1170:2004[6]

5.3 Seismic Hazard

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

1. Ultimate Limit State (ULS) shall provide for… "avoidance of collapse of the structural system…or loss of support to parts… damage to non-structural systems necessary for emergency building evacuation that renders them inoperable".

2. Serviceability Limit State (SLS) are to avoid damage to… "the structure and non-structural components that would prevent the structure from being used as originally intended without repair after the SLS earthquake…".

The seismic hazard in terms of Peak Ground Acceleration (PGA) has been assessed based on the NZTA Bridge Manual[7]. Table 3 presents the return periods for earthquakes with ULS and SLS 'unweighted' PGAs and horizontal coefficients for the corresponding magnitude. The PGAs were determined using building Importance Level (IL) 2, defined by NZS1170.5:2004. Reference should be made to the structural designer's assessment for the final determination of building importance level.

Table 3: Summary of Seismic Hazard Parameters

Limit State	Effective Magnitude	Return Period (years)	Unweighted PGA
ULS	6.5	500	0.19 g
SLS	5.8	25	0.03 g

[6] NZS1170.5:2004, Structural Design Actions Part 5: Earthquake Actions Clause 3.1.3.
[7] As outlined in New Zealand Geotechnical Society and MBIE guidelines for Earthquake Geotechnical Practice in New Zealand, March 2016.

5.4 Soil Expansivity

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

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

Based on our experience with residual Northland Allochthon soils, laboratory analysis within the strata on other projects in the local area and site observations, the shallow soils are conservatively expected to meet the requirements of a highly expansive or Class H soil type. In accordance with AS2870:2011[8] and New Zealand Building Code[9], Class H or Highly Expansive soils typically have a soil stability index (I_{SS}) range of 3.8 to 6.5 % and a 500-year design characteristic surface movement return (y_s) of 78 mm.

To ensure the foundation designs comply with the Building Code requirements a quantification of the expansive soil class assumptions can be made by geotechnical laboratory analysis. It is recommended that this is undertaken during detailed design at the Building Consent stage once final development levels are known.

5.5 Liquefaction Potential

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

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

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[8] AS2870, Residential Slabs and Footings, 2011.

[9] New Zealand Building Code, Structure B1/AS1 (Amendment 19, November 2019), Clause 7.5.13.1.2.

5.6 Site Stability

At the time of writing, no obvious indications of major deep-seated instability were identified at the site, and the risk of such deep-seated instability developing as a result of the development proposal is low. Within the scope of this ground investigation Geologix have undertaken a computer modelled slope stability analysis through three critical sections of the site topography and proposed house sites upon sloping ground. The cross-section alignments are presented on Drawing No. 200 within Appendix A and modelled slope profiles are within Appendix E.

The slope was analysed within propriety software Slide 2 Version 9.034, developed by RocScience Inc. The purpose of the stability assessment was to:

- Ensure the proposed development and house site concepts are feasible.
- Provide a working, accurate ground model in relation to site stability refined according to observed conditions and the results of this ground investigation.
- If required, develop a proposed retaining concept or building setback restrictions in regard to geotechnical stability requirements.
- Inform the requirements of Consent and further engineering works at the time of Building Consent.

The stability analysis process was undertaken by calibrating the model to observed conditions by refining the ground investigation data to develop the effective stress parameters presented in Table 2 and applying them to the proposed condition. In summary, the key aspects of ground instability identified in the walkover survey include:

- Broad slopes with potential for soil creep.
- Stability of proposed house sites at the crest of steeply sloping land to the CMA.

Limit equilibrium stability analysis was adopted in the analysis to express the results as a Factor of Safety (FS). When FS = 1.0, the represented mechanism is in equilibrium with the disturbing, active forces equal to the resisting, stabilising forces. A lower FS indicates that instability could occur under the modelled scenario whereas a higher FS demonstrates a margin of safety in respect of stability. Minimum FS criteria have been developed for use in residential development by Auckland Council[10] which are widely adopted in the Far North region. Modelling three separate event scenarios the accepted minimum FS are summarised as follows:

- Minimum FS = 1.5 for static, normal groundwater conditions.

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[10] *Auckland Council, Code of Practice for Land Development and Subdivision, Section 2 Earthworks and Geotechnical Requirements, Version 1.6, September 2013.*

- Minimum FS = 1.3 for elevated groundwater conditions (storm events).
- Minimum FS = 1.2 for dynamic, seismic events.

5.6.1 Stability Analysis Results

Slope stability analysis results are presented in full as Appendix E and summarised below as Table 4.

Table 4: Summary of Stability Analysis Results

Profile	Scenario	Global Min.	Development Footprint (min FS)	Result
Section A				
Existing	Static[1]	1.309	>1.5	Pass
	Elevated GW[2]	0.992	>1.3	Pass
	Seismic[3]	0.927	>1.0	Pass
Proposed	Static[1]	1.310	>1.5	Pass
	Elevated GW[2]	0.994	>1.3	Pass
	Seismic[3]	0.927	>1.0	Pass

1. *Static, normal groundwater minimum FS = 1.5*
2. *Static, elevated groundwater minimum FS = 1.3*
3. *Dynamic, seismic conditions minimum FS = 1.0*

5.6.2 Stability Analysis Conclusions

The developed slope stability model is considered to be a reasonable representation of the observed conditions on site. No detailed architectural plans or earthworks plan is available during the preparation of this report. Slope stability analyses may subject to be revised once earthworks extents are known.

From the current modelled slope stability analysis computation, factors of safety are satisfactory for the existing site conditions and the current building platforms.

5.7 Conceptual Geotechnical Recommendations

The following geotechnical recommendations have been developed based on the plans and details supplied to us at the time of writing. Amendments or revisions to the plans detailed in this report may require a review of the following recommendations.

5.8 Conceptual Foundations

5.8.1 Southern Block Minor Dwelling Foundations

Due to the shallow firm soils encountered in the location of the minor dwelling for the southern block, shallow foundations are not recommended. We recommend that future foundations in this location are founded on shallow piles founded below the firm soil deposits. These piles shall be 1.5m deep or socketed 3x pile diameters into soil with a measured shear strength of 60 kPa, whichever is greater. Such foundations may be designed adopting an Ultimate Bearing Capacity of 300 kPa for a highly expansive soil type and a geotechnical reduction factor of 0.5.

5.8.2 *All other Foundations*

For the remaining foundations the development platform shall be formed by a minor topsoil strip to exposure natural northland allochthon soils. It is recommended that any non-engineered fill, underlying soft spots (S_u <60 kPa) and any other unsuitable or deleterious materials (such as relic foundations, driveway hardstanding etc.) are sub-excavated and replaced with suitably selected and compacted materials such as GAP65 hard fill.

Provided the building site is protected with the stability control measures outlined by this report and based on the natural formation having an average undrained shear strength of 90kPa with 100 – 300mm layer of compacted GAP65 on this formation then it is expected that either shallow standard raft, piles or strip footing foundations can be adopted for a future dwelling. Such foundations may be designed by a professional structural engineer adopting an Ultimate Bearing Capacity of 300 kPa for a highly expansive soil type and a geotechnical reduction factor of 0.5. The use of widespread deep piled foundations is not considered necessary.

5.9 Conceptual Retaining Walls

As per the site topography with gentle to moderate slopes within the proposed building sites and surrounding area retaining walls may be required to support the building structures.

It is recommended that all proposed retaining walls are designed by a professional engineer familiar with the findings and geotechnical parameters of this report. In addition, any retaining upon sloping ground at the site shall be subject to specific geotechnical stability analysis at the Building Consent stage.

Based on the results of the ground investigation and for flat backslopes, preliminary earth pressure parameters for design are presented within Table 5.

Table 5: Earth Pressure Parameters

Strata	At Rest Pressure Coefficient, K_O	Active Pressure Coefficient, K_A	Passive Pressure Coefficient, K_P
Northland Allochthon Residual Soil	0.515	0.309	5.622
Northland Allochthon CW Parent Rock	0.5	0.297	6.132
Northland Allochthon HW Parent Rock	0.47	0.275	7.371

1. *Adopts soil/ wall friction coefficient of 0.67 for concrete according to NZBC B1/VM4 Table 2. Refinement required for alternative materials.*
2. *Considers 0 ° backslope only. Parameters to be modified by design engineer.*

It is recommended that a 100 mm diameter perforated drain coil and cohesionless backfill (minimum 300 mm wide) is installed behind all retaining walls including any block walls to control any temporary hydrostatic pressures.

6 WASTEWATER ASSESSMENT

The scope of this wastewater assessment comprised a ground investigation to ascertain a lot-specific wastewater disposal classification for concept design of suitable systems for a probable future rural residential development. Relevant design guideline documents adopted include:

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

The concept rural residential developments within this report assume that the proposed new lot will comprise a three-bedroom dwelling and two-bedroom minor dwelling on the low-lying section of the site with a peak occupancy of 9 people and two two-bedroom minor dwellings on the upper section of the site with a peak occupancy of 8 people[11].

6.1 Existing Wastewater Systems

No specific existing wastewater system was observed during the site visit. It is anticipated that an existing septic tank or other underground system is in place near the existing dwelling. No existing wastewater treatment or disposal systems have been identified or surveyed within the northern portion of the site.

6.2 Wastewater Generation Volume

In lieu of potable water infrastructure servicing the site, roof rainwater collection within on-lot tanks has been proposed for this assessment. The design water volume for roof water tank supply is estimated at 120 litres/ person/ day[12]. This assumes full water saving fixtures[13] being installed within the proposed future developments. This should be reviewed for each proposed building at the Building Consent stage.

For the concept wastewater design this provides a total daily wastewater generation of 1,080 litres/day for the dwellings on lower portion of the site and 960 litres/day for the dwellings in the elevated northern section.

6.3 Treatment System

Selection of a wastewater treatment system will be provided by future developers at Building Consent stage. This will be a function of a refined design peak occupancy. It is recommended that to meet suitable minimum treated effluent output, secondary treatment systems are accounted for across the site. In Building Consent design, considering final disposal field topography and proximity to controlling site feature, a higher treated effluent output standard such as UV disinfection to tertiary quality maybe required.

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[11] TP58 Table 6.1.

[12] TP58 Table 6.2, AS/ NZS 1547:2012 Table H3.

[13] No bath and no garbage grinders.

No specific treatment system design restrictions and manufacturers are currently in place. However, the developer will be required to specify the treatment system proposed at Building Consent.

6.4 Land Disposal System

It is recommended that treated effluent is conveyed to land disposal via a Pressure Compensating Dripper Irrigation (PCDI) system, a commonplace method of wastewater disposal.

The proposed PCDI systems may be surface laid and covered with minimum 150 mm mulch and planted with specific evapotranspiration species with a minimum of 80 % species canopy cover or subsurface laid topsoil with minimum 200 mm thickness and planted with lawn grass. Site-won topsoil during development from building and/ or driveways footprints may be used in the area of land disposal systems to increase minimum thicknesses. Specific requirements of the land disposal system include the following which have been complied with for this report.

Table 6: Disposal Field Design Criteria

Design Criteria	Site Conditions
For the proposed PCDI system, topography at the disposal areas shall not exceed 25°. Exceedances will require a Discharge Consent. For the proposed transpiration mound, topography at the disposal areas shall not exceed 15%.	Concept design complies
On shallower slopes <25 ° but >10 °, compliance with Northland Regional Plan (NRP) rule C.6.1.3(6) is required.	Disposal field sited on slopes >10 ° so final design will need to meet C.6.1.3(6)(a)-(f) inclusive in order to be permitted activity.
On all terrain irrigation lines should be laid along contours.	Concept design complies
Disposal system situated no closer than 900 mm (vertically) from the winter groundwater table (secondary treated effluent).	Concept design complies
Separation from surface water features such as stormwater flow paths (including road and kerb channels), rivers, lakes, ponds, dams, and natural wetlands according to Table 9, Appendix B of the NRP.	Concept design complies. All overland flow paths separation distances to disposal areas are >15 m.
The effluent is treated and disposed of on-site such that each site has its own treatment and disposal system no part of which shall be located closer than 30m from the boundary of any river, lake, wetland, or the boundary of the coastal marine area. FNDC rule 12.7.6.1.4	The 10m buffer zone below the upper section wastewater field is within the 30m offset from the stream. The lower section wastewater disposal field is within 30m of a wet area adjacent to the stream within the south-eastern corner.

6.4.1 Soil Loading Rate

Based on the results of the ground investigation, conservatively the shallow soils are inferred to meet the drainage characteristics of TP58 Category 6, sandy clay, non-swelling clay, and silty clay – slowly draining. This correlates to NZS1547 Category 5, poorly drained described as light clays.

For a typical PCDI system, a Soil Loading Rate (SLR) of 2 mm/ day is recommended within NZS1547 Table 5.2 and TP58 Table 9.2.

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

- 100 to 150 mm minimum depth of good quality topsoil (NZS1547 Table M1, note 1) to slow the soakage and assist with nutrient reduction.
- Minimum 30 % reserve disposal field area to enact 2.0 mm/ day SLR.

6.4.2 Disposal Areas

The sizing of wastewater system disposal areas is a function of soil drainage, the loading rate and topographic relief. For the proposed development a primary and reserve disposal field is required as follows. The recommendations below are presented on Drawings No. 500-501.

- **PCDI Primary Disposal Field Lower Section.** A minimum PCDI primary disposal field of 540 m^2 laid parallel to the natural contours.
- **PCDI Reserve Disposal Field Lower Section.** NRP rule C.6.1.3(9)(b) requires a minimum reserve disposal field equivalent to 30 % of the primary disposal field for secondary or tertiary treatment systems. It is recommended to provide a 162 m^2 reserve disposal area to be laid parallel to the natural contours.

  This lower section's reserve disposal field is within 30m (about 18m) of a denoted "wet area". It is however considered that the proposed secondary treatment system provides suitable treatment for effluent fields located up to 15 m from sensitive features such as wetlands.
- **PCDI Primary Disposal Field Upper Section.** A minimum PCDI primary disposal field of 480 m^2 laid parallel to the natural contours.

  This field comprises a further 10m buffer area at its downslope end to account for its slope being > 10°. This 10m buffer extent is within 30m of a river. It is however noted that the proposed secondary treatment system provides suitable treatment for effluent fields located up to 15 m from sensitive features such as rivers.
- **PCDI Reserve Disposal Field Upper Section.** NRP rule C.6.1.3(9)(b) requires a minimum reserve disposal field equivalent to 30 % of the primary disposal field for secondary or tertiary treatment systems. It is recommended to provide a 144 m^2 reserve disposal area to be laid parallel to the natural contours.
- Disposal fields discharging secondary treated effluent are to be set at the 20-year ARI (5% AEP) flood inundation height to comply with the above NRP rule.

6.5 Summary of Concept Wastewater Design

Based on the above design assumptions a concept wastewater design is presented in Table 7 and presented schematically upon Drawing No. 100 Appendix A. It is recommended that each lot is subject to Building Consent specific review and design amendment according to final development plans.

Table 7: Concept Wastewater Design Summary

Design Element	Specification
Concept development	Upper Section: Two 2-bedroom dwellings, peak occupancy of 8 Lower Section: 3-bedroom and 2-bedroom, peak occupancy of 9
Design generation volume	120 litres/ person/ day
Water saving measures	Full water-reduction fixtures, reduced flush 6/3 litre water closets, shower-flow restrictors, aerator faucets, automatic washing machine & dishwasher, no garbage grinder[1]
Water meter required?	No
Min. Treatment Quality	Secondary
Soil Drainage Category	TP58 Category 6, NZS1547 Category 5
Soil Loading Rate	PCDI System: 2.0 mm/ day Transpiration Mound: 8.0 mm/ day
Primary disposal field	Lower section subsurface laid PCDI, min. 540 m^2 Upper section subsurface laid PCDI, min. 480 m^2
Reserve disposal field	Lower section subsurface laid PCDI, min. 162 m^2 Upper section subsurface laid PCDI, min. 144 m^2
Dosing Method	Pump with high water level visual and audible alarm. Minimum 24-hour emergency storage volume.
Stormwater Control	Divert surface/ stormwater drains away from disposal fields. Cut off drains required in upper section.

6.6 Assessment of Environmental Effects

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

It is has been noted that certain portions of the wastewater disposal fields are within 30m of sensitive receptors. The placement of the wastewater fields has been optimised to suit the development features and mitigate the proximity to these sensitive receptors as far as practically achievable. Beyond that, it is considered that the proposed secondary treatment system provides suitable treatment for effluent fields located up to 15 m from such sensitive receptors, and therefore the effect of the proposal is considered to be suitably managed.

The scale of final development is unknown at the time of writing and building areas, impervious areas including driveways, ancillary buildings and landscaped gardens may reduce the overall area for on-site wastewater disposal. For the purpose of this report, the above impervious features are considered to be as shown on Drawing Sheet 100, Appendix A. The conceptual wastewater disposal field areas are clear of these building locations.

It is recommended that the AEE is reviewed at the time of Building Consent once specific development plans, final disposal field locations and treatment systems are established. The TP58 guideline document provides a detailed AEE for Building Consent application. Based on the proposed plans, ground investigation, walkover inspection and Drawing No. 100, a site-specific AEE is presented as Appendix C to demonstrate the proposed wastewater disposal concept will have a less than minor effect on the environment.

7 STORMWATER ASSESSMENT

Considering the nature of rural residential development, increased storm water runoff occurs as pervious surfaces such as pasture are converted to impervious features such as roads or future on-lot buildings and driveways.

7.1 Impervious Surfaces and Activity Status

A summary of the impervious areas of the proposed lots is provided as Table 8 below which has been developed from our observations and the provided Scheme Plan.

The activity status reflected in Table 8 is with respect to Operative FNDC Plan Section 8.6.5.1.3 only. Furthermore, the development stormwater proposal has been assessed in accordance with the Operative FNDC Plan Section 13.8 on the basis that the overall development is determined to be a Restricted Discretionary Activity.

Table 8: Summary of Impervious Surfaces

Surface	Lower section		Upper section	
Existing Condition		**(0.8 ha)**		**(7.8 ha)**
Roof	278m²		30m²	
Driveway (Gravel)	340m²		0m²	
Total impervious	618m²	7.7%	30m²	0.04%
Proposed Condition		**(0.8 ha)**		**(7.8 ha)**
Roof	177m²		130m²	
Driveway	434m²		438m²	
Total	611m²	11.8%	568m²	0.7%
Activity Status		Permitted		Permitted

7.2 Stormwater Management Concept

The stormwater management concept considered in this report has been prepared to meet the requirements of the local and regional consent authorities considering the design storm event as follows:

- **Proposed Development (Lower Portion).** The proposed concept includes removal of an existing dwelling and ancillary buildings and construction of a three-bedroom dwelling and two-bedroom minor dwelling. The proposal includes 177 m^2 of roof area and an additional 94 m^2 of metal driveway/parking areas. Roof runoff will be attenuated within rain tanks and the paving has been modelled as an offset within these attenuation devices.

  The existing metal driveway has been considered as existing consented and has not been included in the attenuation calculations

- **Proposed Development (Upper Portion).** The proposed concept includes removal of an existing cow shed and construction of a two 2-bedroom minor dwellings. The proposal includes 130 m^2 of roof area and 434 m^2 of metal driveway (above the 1% AEP floodplain). Roof runoff will be attenuated within rain tanks.

  For the proposed driveway, there is not enough roof area from the dwellings to offset the metal driveway. Due to the lower end of the driveway being within the floodplain and steep topography on the slopes above, there is not an appropriate location to form a stormwater pond with appropriate batters. Also, due to the unsealed driveway and rough grass it is anticipated that an underground tank would likely be affected by sediment runoff.

  Due to the reasons above and the small area of the driveway relative to the site we propose that the driveway not be attenuated in this case.

7.3 Design Storm Event

Relevant design rainfall intensity and depths have been ascertained for the site location from the NIWA HIRDS meteorological model[14]. The NIWA HIRDS rainfall data is presented in full within Appendix D. Provision for climate change has been adopted by means of applying a factor of 20 % to rainfall intensities used in the post-development condition only, in accordance with FNDC Engineering Standards 2023.

The proposed development will cause an increase to flooding hazard on downstream property (the Tauteihiihi Marae) as well as the flood hazard present within the site. Therefore, it is proposed to provide flood control for the 1% AEP storm event in compliance with FNDC Engineering Standard Table 4-1 in addition to the 50% AEP AND 20% AEP storms.

[14] *NIWA High Intensity Rainfall Data System, https://hirds.niwa.co.nz.*

The FNDC Engineering Standards 2023 specify that the post-development stormwater runoff peak discharge is limited to 80 % of the pre-development condition. This provision also complies with NRP Rule C6.4.2(2).The attenuation modelling results are summarised in Table 10-12 and provided in full in Appendix D.

7.4 Concept Stormwater Attenuation

The proposed attenuation concept limits the post-development peak discharge to 80 % of the pre-development condition for the storm events to validate the feasibility of the proposed activity only.

For the concept development, this is achievable by installing specifically sized low-flow orifices into the roof runoff tanks which comprise a detention volume and a retention volume. A typical schematic retention/ detention tank arrangement detail is presented as Drawings No. 410 & 411 within Appendix A.

For the proposed concept accessway for the upper portion of the site a separate attenuation tank is proposed. Tank dimensions are presented as Drawing No. 412 within Appendix A.

The concept design presented should be subject to verification and an updated design at Building Consent stage once final development plans are available. This is typically applied as a consent notice to the applicable titles. We note that the detailed design will be required to provide appropriate orifices to ensure the 1%, 50 % and 20 % AEP events are both sufficiently mitigated.

The rational method has been adopted by Geologix with run-off coefficients as published by FNDC Engineering Standards[15] to provide a suitable attenuation design to limit post-development peak flows to 80 % of pre-development conditions.

Table 9: Summary of Probable Future and Existing Development Concept

Item	Pre-development Impervious Area	Post-development Impervious Area	Proposed Concept Attenuation Method
Future Concept Developments Lower Site			
Buildings	278 m^2	177 m^2	Detention within roof water tanks
Driveways	340 m^2	434 m^2	Off-set detention in roof water tanks
Total	**618 m^2**	**611 m^2**	
Future Concept Developments Upper Site			
Buildings	30 m^2	130 m^2	Detention within roof water tanks
Driveways	0 m^2	438 m^2	Not attenuated
Total	**30 m^2**	**568 m^2**	
Total	**648 m^2**	**1,179 m^2**	

[15] *FNDC Engineering Standards 2023, Version 0.6, Issued May 2023.*

Calculations to support the concept design are presented as Appendix D to this report. A summary of the proposed stormwater attenuation design is presented as 10 & 11 (Roofwater tanks). As above, it is recommended that this concept design is refined at the Building Consent stage once final development plans are available. A Consent notice may be required to be applied to ensure this is undertaken.

Table 10: Proposed Development Attenuation Concept (Three-bedroom)

Design Parameter	Flow Attenuation: 50 % AEP (80% of pre dev)	Flow Attenuation: 20 % AEP (80% of pre dev)	Flood Control: 1 % AEP (80% of pre dev)
Regulatory Compliance	FNDC Engineering Standards Table 4-1	FNDC Engineering Standards Table 4-1	NRC Proposed Regional Plan
Pre-development peak flow	8.4 l/s	10.87 l/s	19.01 l/s
80 % pre-development peak flow	6.72 l/s	8.69 l/s	15.21 l/s
Post-development peak flow	9.76l/s	12.63 l/s	22.09 l/s
Total Storage Volume Required	5,188 litres	6,790 litres	12,591 litres
Concept Summary:	- Attenuation storage calculation accounts for offset flow from driveway (not indicated explicitly in summary above. Refer Appendix D for calcs in full) - 2 x 25,000 litre tank is sufficient for attenuation (12,591 l) + potable storage (37,409 l) - 1 % AEP attenuation in isolation requires a 20 mm orifice 0.80 m below overflow. However regulatory requirements are to consider additional orifices to control the 50 % and 20 %. We note this may vary the concept orifice indicated above. This should be provided with detailed design for building consent approval.		

Table 11: Proposed Development Attenuation Concept (Two-bedroom)

Design Parameter	Flow Attenuation: 50 % AEP (80% of pre dev)	Flow Attenuation: 20 % AEP (80% of pre dev)	Flood Control: 1 % AEP (80% of pre dev)
Regulatory Compliance	FNDC Engineering Standards Table 4-1	FNDC Engineering Standards Table 4-1	NRC Proposed Regional Plan
Pre-development peak flow	0.68 l/s	0.88 l/s	1.54 l/s
80 % pre-development peak flow	0.54 l/s	0.7 l/s	1.23 l/s
Post-development peak flow	1.17 l/s	1.51 l/s	2.64 l/s

Total Storage Volume Required	374 litres	484 litres	848 litres
Concept Summary:	- 2 x 25,000 litre tank is sufficient for attenuation (848) + potable storage (49,152 l) - 1 % AEP attenuation in isolation requires a 62 mm orifice 0.19 m below overflow. However regulatory requirements are to consider additional orifices to control the 50 % and 20 %. We note this may vary the concept orifice indicated above. This should be provided with detailed design for building consent approval.		

7.4.1 Discharge Dispersion Management

The direct discharge of stormwater in a concentrated manner can cause scour and erosion in addition to saturation of shallow soils. It is recommended that overflow from drainage structures is conveyed to a designated discharge point with suitable dispersion devices downslope of proposed building footprints and wastewater disposal fields.

For the application of roof rainwater tanks, typical rural residential developments provide either above or below ground level spreader dispersion pipes to release tank overflow in a controlled manner. The incoming overflow pipes can be either buried or pinned to the surface as desired. It is recommended that all pipes are designed to accommodate the design storm event peak overflows from the attenuation tank.

It is recommended that the dispersion devices are subject to specific assessment at the Building Consent stage to limit scour and erosion from tank overflows. FNDC's Engineering Standards 2023 suggest that outlet structures are designed in accordance with Auckland Council's Hydraulic Energy Management: Inlet and Outlet Design for Treatment Devices (TR2013/018).

7.5 Stormwater Quality

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

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

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

- Leaf guards on roof guttering and first flush devices on downpipes.
- Rainwater tank for potable use onsite only to be filled by roof runoff.

- Room for sedimentation (minimum 150 mm recommended as per Auckland Council GD01) within the base of the stormwater attenuation roof runoff tanks as dead storage volume.
- Suitably lined swale drains from rainwater inception (road surfaces) to discharge points.

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

8 POTABLE WATER & FIRE FIGHTING

In the absence of potable water infrastructure within Tauteihiihi Road or within the site it is recommended that roof runoff water tanks are adopted for potable water supply with appropriate filtration and UV disinfection at point of use. The volume of potable water supply on each lot should consider the required stormwater detention volume identified within Table 10 and Table 11.

Furthermore, the absence of potable water infrastructure and fire hydrants within Tauteihiihi Road require provision of the on-lot roof water supply tanks to be used for firefighting purposes, if required. Specific analysis and calculation for firefighting is outside the scope of this report and may require specialist input. Supply for firefighting should be made in accordance with SNZ PAS4509:2008.

9 EARTHWORKS

As part of the development application, earthworks are required as follows:

- **Vehicle crossings.** Cut/ fill earthworks for construction of the vehicle crossings to current FNDC Engineering Standards, including trenching for pipe installation beneath the crossings.
- **New Accessway RoW and Parking.** Cut/ fill earthworks constructing new internal access way within the upper, including new swale on northern side of the road and new pipe culvert as indicated on Drawing Sheet 100. There is evidence of a previous track along the proposed alignment which is considered in the required earthworks to form the subgrade.

9.1 Earthworks Volumes

Earthworks volumes have been conceptually sized as outlined in Table 12 below.

Table 12: Summary of Proposed Earthwork Volumes

Item	Assessment	Comments
New accessway to upper section		
Height/ Depth	0.4 m	Average 0.4m allowed for cut:fill subgrade preparation with allowance for adjusted batters
Area	452 m^2	Area of driveway
Cut Volume	181 m^3	0.4m cut estimated to subgrade preparation
Fill Volume	0 m^3	
New parking to lower section		
Height/ Depth	0.4 m	Average 0.4m allowed for cut subgrade preparation
Area	280 m^2	Area of anticipated earthworks
Cut Volume	112 m^3	Cut subgrade preparation
Fill Volume	0 m^3	
Overall		
Area	732 m^2	
Volume	293 m^3	
Cut Volume	293 m^3	1.5m height max.
Fill Volume	0 m^3	

Proposed earthwork volumes are well within a 5,000 m^3 Permitted Activity volume limit outlined by FNDC District Plan Rule 12.3.6.1.1(a) and the maximum cut and fill height is <3 m to comply with 12.3.6.1.1(b).

Rule C.8.3.1, Table 15 of the Proposed Regional Plan outlines a Permitted Activity as 5,000 m^2 of exposed earth at any time for 'other areas'. Proposed earthwork areas to form the development, are anticipated to comply with the Permitted Activity standard for other areas.

9.2 General Recommendations

Bulk fill with site-won earth can be moderately sensitive to disturbance when exposed to rain or runoff which may cause saturation or vehicle movements and trafficking during

earthworks. Accordingly, care should be taken during construction, including probable future developments to minimise degradation of any earth fill due to construction traffic and to minimise machinery on site.

Any areas of proposed bulk fill which are required to meet specific subgrade requirements within should be subject to a specific earthwork specification prepared by a professional Engineer such as Geologix.

Due to the scope of work and topography of the site, significant excavations are not anticipated. However, to reduce the risk of instability of excavations during construction, it is recommended that **temporary** unsupported excavations have a maximum vertical height of 0.5 m. Excavations >0.5 m should be battered at 1V:1H or 45 °. Permanent batter slopes may require a shallower angle to maintain long term stability and if proposed these should be assessed at the Building Consent stage within a specific geotechnical investigation report.

Temporary batters should be covered with polythene sheets secured to the surface with pins or batons to prevent saturation. All works within close proximity to excavations should be undertaken in accordance with Occupational Safety and Health regulations.

All earthworks should be carried out in periods of fine weather within the typical October to April earthwork season. Consent conditions commonly prescribe working restrictions.

9.3 Erosion and Sediment Control

Specific erosion and sediment control measures are required to control sediment runoff from areas of proposed earthworks within the scope of this application. It is recommended that specific on-lot development is assessed at the time of Building Consent by the future developer.

To form the development the following erosion and sediment control measures are recommended:

- Silt fence around the downslope face of the proposed accessway/parking formations.

10 NATURAL HAZARD ASSESSMENT

To satisfy the Resource Management Act, 1991 the proposed development must plan for and manage the risk from natural hazards to reduce the potential adverse effects to less than minor. Regulatory assessment of natural hazards at the site location are managed under the jurisdiction of the FNDC District Plan[16], Northland Regional Council (NRC) Proposed Regional Plan for Northland[17] and Regional Water and Soil Plan for Northland. Following our ground investigation and considering the measures presented in this report, a summary of the proposed activities against defined natural hazards is presented as Table 13.

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[16] *Operative District Plan Rule 13.7.3.2.*

[17] *Proposed Regional Plan for Northland, Appeals Version, July 2021, Chapter D.6.*

Table 13: Summary of Natural Hazards

Natural Hazard	Applicability	Mitigation & Effect on Environment
Erosion	Yes	Potential for erosion due to earthworks and creation of new accessways and drains. Mitigation provided, resultant effects are less than minor.
Overland flow paths, flooding, inundation	Yes	There are no flooding concerns as a result of the proposed activity. The proposal does cause effect to receiving OLFP systems. Mitigation provided, resultant effects are less than minor.
Landslip	NA	Not assessed within the scope of this report.
Rockfall	NA	Not assessed within the scope of this report.
Alluvion	NA	Not assessed within the scope of this report.
Avulsion	NA	Not assessed within the scope of this report.
Unconsolidated fill	NA	Not assessed within the scope of this report.
Soil contamination	NA	Not assessed within the scope of this report.
Subsidence	NA	Not assessed within the scope of this report.
Fire hazard	NA	Not assessed within the scope of this report.
Sea level rise	NA	No mitigation required, less than minor.

NA – Not Applicable.

11 ACCESS AND INTERNAL ROADING

It should be noted that we are not traffic engineers, and no specific Traffic Impact Assessment is included within the scope of these works. If a more complex level of assessment is required, it is recommended that advice is sought from a chartered traffic engineer.

11.1 Accessways

There is an existing private accessway within the lower section from Tauteihiihi Road that provides access to the existing residence. This is approximately 135m in length, 2.5m wide and comprises a metal surface.

A new 75m accessway to service the upper section approximately 75m long and 2.5m wide with a metal surface.

In addition to the new accessway a passing bay is proposed on Tauteihiihi Road.

11.2 Vehicle Crossings

The proposed vehicle crossing is to be constructed to FNDC Engineering Standards typical detail sheet 21, type 1A, light vehicles with a width at boundary 5.50m.

The proposed and existing vehicle crossings have been considered from a safety aspect in relation to visibility of incoming and outgoing vehicle movements in accordance with the FNDC Engineering Standards 2023 Sheet 4.

The National Speed Limit Register was reviewed for the site through the Waka Kotahi open data portal[18]. At the time of writing the speed limit was shown as 60 km/hr on the website. Fairburn Road is identified as being a secondary collector road.

A 3d sight line assessment has been undertaken as part of our concept road modelling to determine the available sight distances at the proposed vehicle crossing and to demonstrate compliance with FNDC Engineering Standards, as set out below in Table 14.

Table 14: Summary of Sight Distances

Vehicle Crossing	Speed Limit	Minimum Sight Distance	Available Distance North	Available Distance South	Complies
New Vehicle Crossing	60 km/h	85 m	200 m	95 m	Yes
Existing Vehicle Crossing	60 km/h	85 m	110 m	45 m	No

The sight distances were obtained from our modelled 3D surface and utilising the Civil 3D 'Visibility Check' tool which indicates sight distances according to existing ground levels from an eye level of 1.15m.

Surface information was obtained from the LINZ - Northland Lidar DEM 2018 -2020 which has had vegetation removed as part of its processing. There are a few trees and shrubs along the boundary which may need to be removed to have a clear line of sight.

The required sight distance of 85 m (for a 60 km/h speed zone) for an access road cannot be achieved due to the road alignment. However, a speed limit of 60 km/hr is deemed to not be

[18] *https://opendata-nzta.opendata.arcgis.com/datasets/NZTA::national-speed-limit-register-nslr/explore*

representative of the speed environment as it is an unsealed road and a reasonably tight 'blind' corner with narrow shoulders which will discourage high speeds around the corner. A sight distance of 45 m complies for a speed environment of 40 km/hr. Additionally there are only two neighbours at the end of the dead-end road.

Similarly, the approach from the southwest is a reasonably tight 'blind' corner with steep embankments above and below the road which will discourage high speeds around the corner.

If required, a site-specific speed survey could be undertaken by a suitable qualified professional. The operating speed and relevant equation may be used to calculate the minimum sight distance.

A specific Traffic Impact Assessment (TIA) is not within the scope of this report.

12 LIMITATIONS

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

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

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

APPENDIX A

Drawings

GENERAL NOTES

1. CONTOURS AT 1 m INTERVALS.
2. TOPOGRAPHIC SURVEY DATA PROVIDED BY LINZ.
3. FOR INDICATION ONLY, NOT FOR CONSTRUCTION.
4. FEATURES PRESENTED ARE INDICATIVE AND HAVE NOT BEEN VERIFIED.
5. DO NOT SCALE FROM THIS DRAWING.

SW — PROPOSED STORMWATER PIPE

DISP — PROPOSED STORMWATER DISPERSION PIPE

PROPOSED BUILDINGS

PROPOSED GRAVEL PAVING

WATERCOURSE

OVERLAND FLOWPATH

1% AEP FLOOD EXTENT

PRIMARY DISPOSAL FIELD

RESERVE DISPOSAL FIELD

10 0 Meters 10 20

1:1000

A	CONSENT	21/01/2025
Revision	Issue	Date

geologix consulting engineers

AUCKLAND | NORTHLAND

Project Name and Address

45 TAUTEIHIIHI ROAD
KOHUKOHU

Project	Drawn By
C0564	GM

Client

LAMINATA HOMES LTD

Sheet Title

OVERALL SITE PLAN

Sheet

100

FILE PATH: C:\Users\GerardMcHardy\Synology Drive\Projects\C0500-C0599\C0564 - 45 Tauteihiihi Road, Kohukohu\07 - Technical & Drawings\Drawings\C0564-45 Tauteihiihi Road, Kohukohu - New Layout.dwg

PLOTTED: 03/04/2025

EXISTING DWELLING
TO BE REMOVED

EXISTING SHED
TO BE REMOVED

3 BEDROOM
DWELLING

112 M2

2 BEDROOM
DWELLING

65 M2

540 M2

1.5M

162 M2

EXISTING SHED
TO BE REMOVED

EX
TO

15.0

10.0

0.0

GENERAL NOTES

1. CONTOURS AT 1 m INTERVALS.
2. TOPOGRAPHIC SURVEY DATA PROVIDED BY LINZ.
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4. FEATURES PRESENTED ARE INDICATIVE AND HAVE NOT BEEN VERIFIED.
5. DO NOT SCALE FROM THIS DRAWING.

—SW— PROPOSED STORMWATER PIPE

— DISP — PROPOSED STORMWATER DISPERSION PIPE

PROPOSED BUILDINGS

PROPOSED GRAVEL PAVING

WATERCOURSE

OVERLAND FLOWPATH

1% AEP FLOOD EXTENT

PRIMARY DISPOSAL FIELD

RESERVE DISPOSAL FIELD

4 0 Meters 4 8

1:400

A	CONSENT	21/01/2025
Revision	Issue	Date

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Project Name and Address

45 TAUTEIHIIHI ROAD
KOHUKOHU

Project	Drawn By
C0564	GM

Client

LAMINATA HOMES LTD

Sheet Title

LOWER SITE PLAN

Sheet

101

FILE PATH: C:\Users\GerardMcHarg\Synology\Drive\Projects\C0500-C0599\C0564 - 45 Tauteihiihi Road, Kohukohu\07 - Technical & Drawings\Drawings\C0564-45 Tauteihiihi Road, Kohukohu - New Layout.dwgC0564-45 Tauteihiihi Road, Kohukohu - New Layout.dwg

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GENERAL NOTES

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SW — PROPOSED STORMWATER PIPE

DISP — PROPOSED STORMWATER DISPERSION PIPE

PROPOSED BUILDINGS

PROPOSED GRAVEL PAVING

WATERCOURSE

OVERLAND FLOWPATH

1% AEP FLOOD EXTENT

PRIMARY DISPOSAL FIELD

RESERVE DISPOSAL FIELD

5 0 Meters 5 10

1:500

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Sheet Title

UPPER SITE PLAN

Sheet

102

FILE PATH: C:\Users\GerardMcHardy\Synology Drive\Projects\C0500-C0599\C0564 - 45 Tauteihiihi Road, Kohukohu\07 - Technical & Drawings\Drawings\C0564-45 Tauteihiihi Road, Kohukohu - New Layout.dwg

PLOTTED: 09/04/2022

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Drawn: VB	Signed: VB	Date: 06/01/2025
Verified: DB	Signed: DB	Date: 06/01/2025
Approved: EC	Signed: EC	Date: 06/01/2025

Client: Laminata Homes LTD

Address: 45 Tauteihiihi Road, Kohukohu, Far North

Project Title: Geotechnical Site Plan

Status: Draft

Scale: 1:750

Sheet Size: A3

Project Number:	Type:	Class:	Sheet #:	Rev:
C0564	RC	G	200	A

GENERAL NOTES

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Meters
5 0 5 10
1:500

Revision	Issue	Date
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Project Name and Address
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KOHUKOHU

Project	Drawn By
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Client
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Sheet Title
SIGHT DISTANCE LOWER SITE

Sheet
300

GENERAL NOTES

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10 0 Meters 10 20

1:1000

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Project Name and Address

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Sheet Title

SIGHT DISTANCE UPPER SITE

Sheet

301

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PASSING BAY
5.5M WIDE
15M LONG

GENERAL NOTES

1. CONTOURS AT 1 m INTERVALS.
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4. FEATURES PRESENTED ARE INDICATIVE AND HAVE NOT BEEN VERIFIED.
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4 0 Meters 4 8

1:400

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Sheet Title

UPPER SITE ACCESSWAY

Sheet

302

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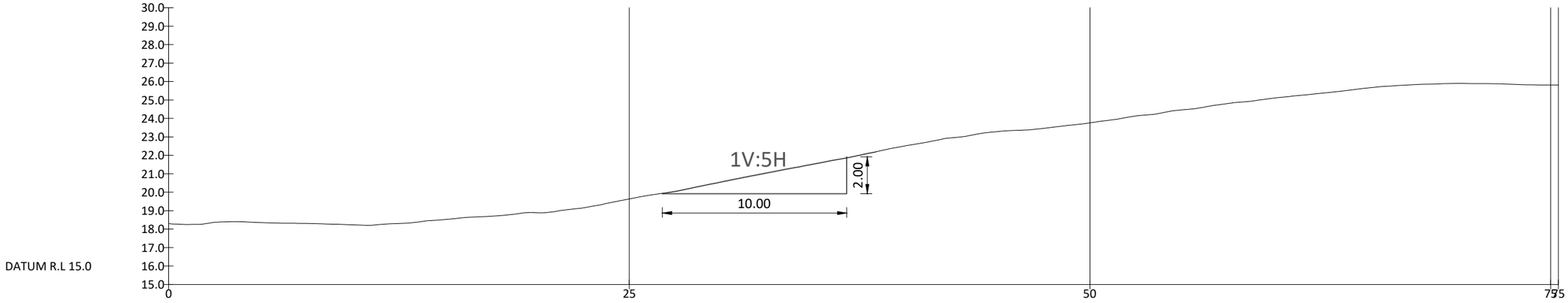

LONGITUDINAL SECTION - MC231
SCALE - HORIZ 1:250.000, VERT. 1:250.000

GENERAL NOTES

2.5 0 Meters 2.5 5
1:250

Revision	Issue	Date
A	CONSENT	21/01/2025

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Project Name and Address
45 TAUTEIHIIHI ROAD
KOHUKOHU

Project	Drawn By
C0564	GM

Client
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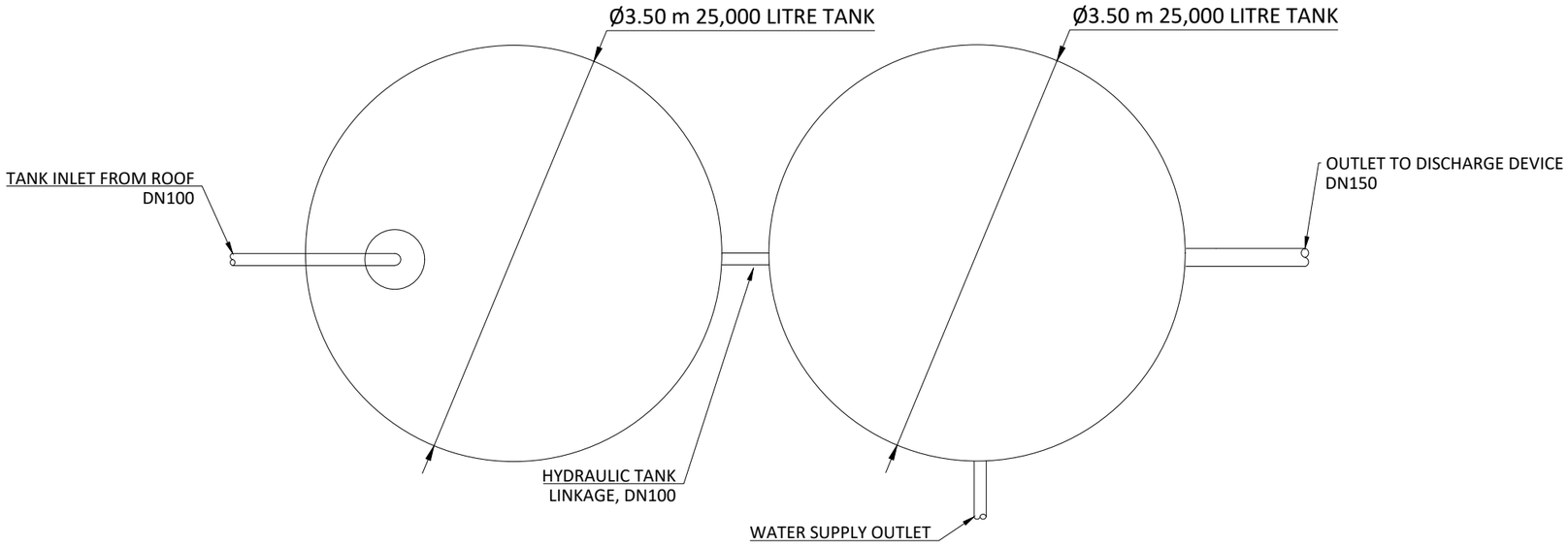
Sheet Title
UPPER ACCESS LONGSECTION

Sheet
350

PROPOSED TANK PLAN VIEW

1:50, A3



PROPOSED TANK SIDE VIEW

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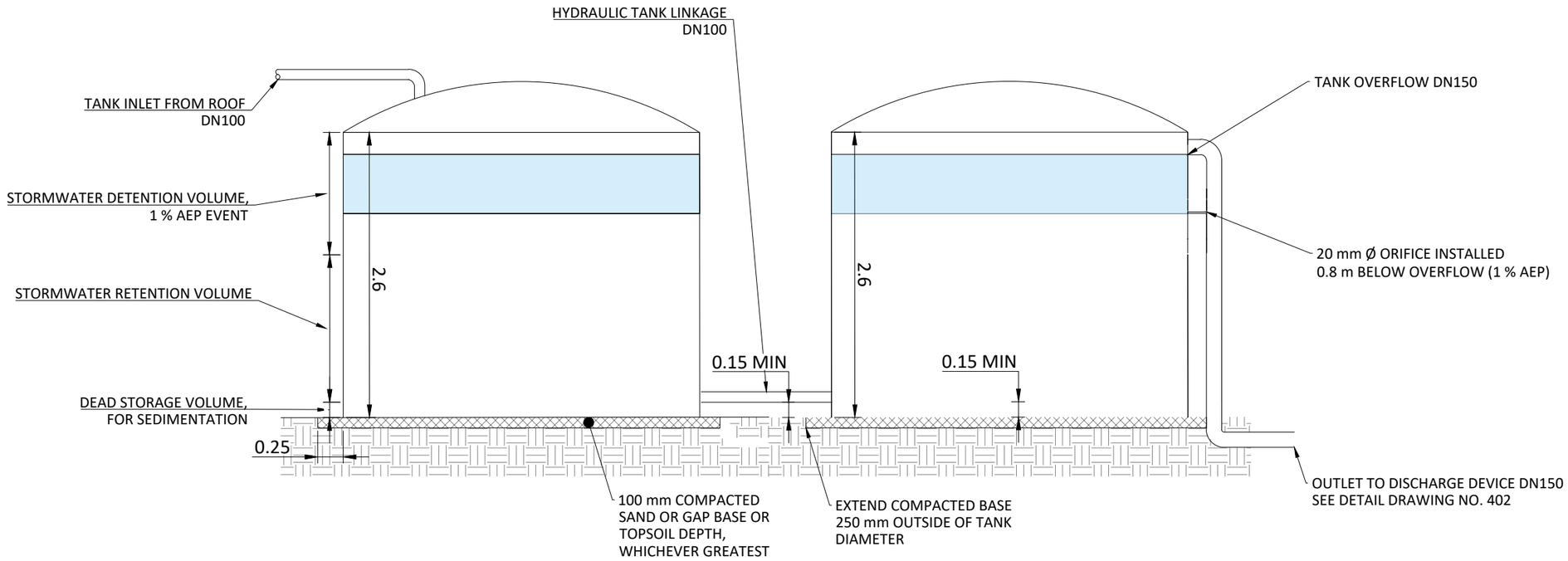

GENERAL NOTES

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A	CONSENT	21/01/2025
Revision	Issue	Date

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Project Name and Address

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Project	Drawn By
C0564	GM

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Sheet Title

THREE BEDROOM DETENTION

Sheet

410

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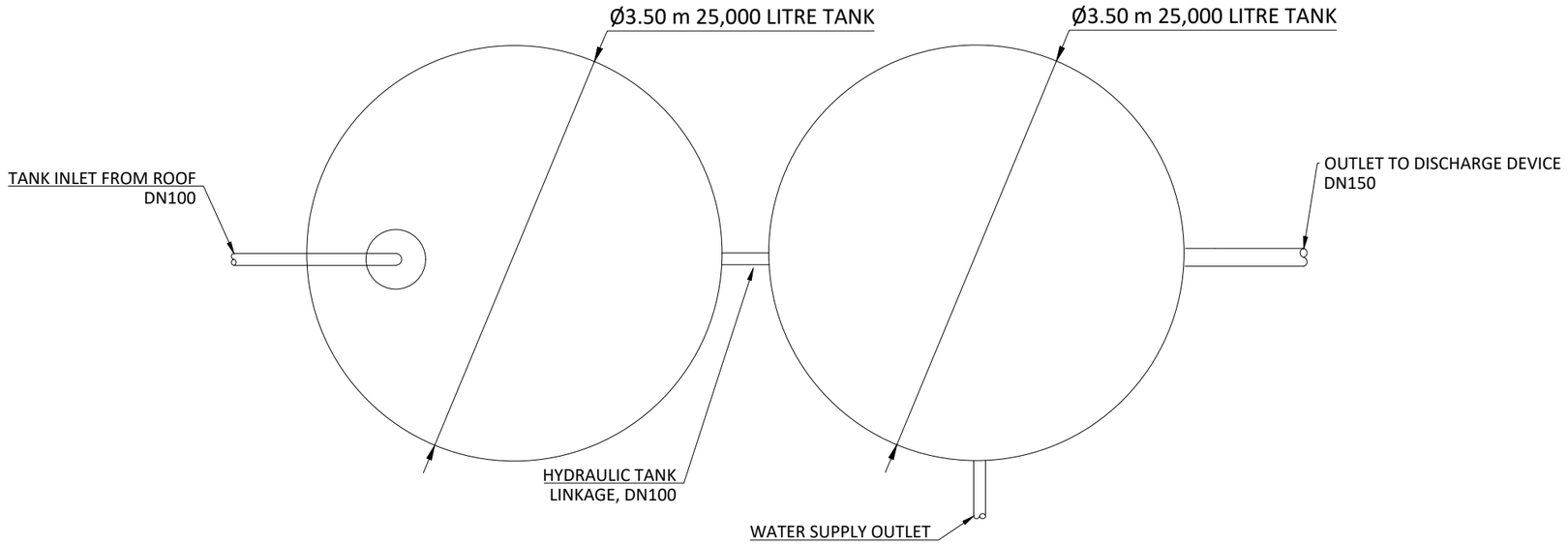
PLOTTED: 09/04/2022

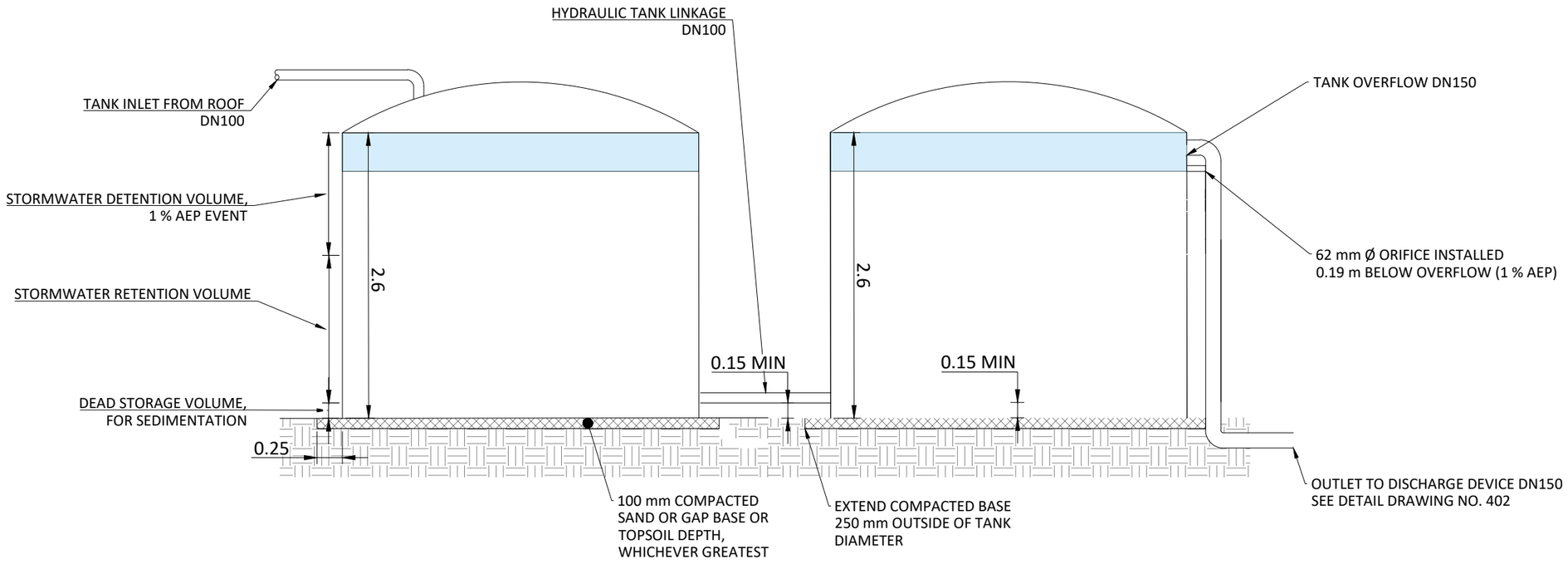
PROPOSED TANK PLAN VIEW

1:50, A3



PROPOSED TANK SIDE VIEW

1:50, A3



GENERAL NOTES

0.5 0 Meters 0.5 1

1:50

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Revision	Issue	Date

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Project Name and Address

45 TAUTEIHIIHI ROAD
KOHUKOHU

Project	Drawn By
C0564	GM

Client

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Sheet Title

TWO BEDROOM DETENTION

Sheet

411

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PLOTTED: 03/04/2025

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APPENDIX B

Engineering Borehole Records

INVESTIGATION LOG

HOLE NO.: HA01

CLIENT: Laminata Homes Ltd

PROJECT: 45 Tauteihiihi Road, Kohukohu

JOB NO.: C0564

SITE LOCATION: 45 Tauteihiihi Road, Kohukohu

START DATE: 06/11/2024

CO-ORDINATES: 1648533mE, 6086115mN

ELEVATION: Ground

END DATE: 06/11/2024

CONTRACTOR: Internal

RIG: 50 mm Hand Auger & DCP

DRILLER: TW

LOGGED BY: TW

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	DEPTH (m)
TOPSOIL comprising of organic SILT with trace rootlets; dark brown. Moist; friable.	0.0
SILT, with some clay; brown with orange mottles. Very stiff to stiff; moist; low plasticity; [Northland Allochthon Residual Soils].	0.2 – 0.6
Clayey SILT; dark brown. Very stiff; moist; low plasticity; [Northland Allochthon Residual Soils].	0.8 – 1.8
1.8m: Becoming hard.	1.8
Clayey SILT; brown with dark orange and grey mottles. Very stiff; low plasticity; [Northland Allochthon Residual Soils].	2.0 – 3.0
3.0m: Becoming hard.	3.0
Clayey SILT; brown. Very stiff; moist; low plasticity; [Northland Allochthon Residual Soils].	3.2 – 3.9
3.9m: Becoming hard.	3.9
End Of Hole: 3.90m	4.0 – 5.0

SAMPLES | LEGEND | WATER: Groundwater Not Encountered

SCALA PENETROMETER (Blows / 100mm)

Depth (m)	Blows / 100mm
4.0	5
4.1	4
4.2	4
4.3	6
4.4	7
4.5	7
4.6	7
4.7	11
4.8	11
4.9	12
5.0	14

VANE SHEAR STRENGTH (kPa) Vane: 3282

Depth (m)	Values
0.2	189
0.3	65
0.6	UTP
0.7	-
0.8	44
0.9	15
1.2	112
1.3	44
1.4	113
1.5	64
1.8	UTP
1.9	-
2.2	122
2.3	44
2.4	134
2.5	64
2.8	151
2.9	99
3.0	203+
3.1	-
3.4	125
3.5	73
3.6	139
3.7	55
3.9	UTP
4.0	-

PHOTO(S)

REMARKS

1. Hand Auger terminated at 3.9 m bgl due to dense strata encountered.
2. DCP was carried out from the base of hand auger to 5.0 m bgl.
3. Groundwater not encountered during drilling.

WATER

- ▼ Standing Water Level
- ▷ Out flow
- ◁ In flow

INVESTIGATION TYPE

- ☑ Hand Auger
- ☐ Test Pit

INVESTIGATION LOG

HOLE NO.: HA02

CLIENT: Laminata Homes Ltd
PROJECT: 45 Tauteihiihi Road, Kohukohu

JOB NO.: C0564

SITE LOCATION: 45 Tauteihiihi Road, Kohukohu
START DATE: 06/11/2024
CO-ORDINATES: 1648512mE, 6086104mN
ELEVATION: Ground
END DATE: 06/11/2024
CONTRACTOR: Internal
RIG: 50 mm Hand Auger
DRILLER: GB
LOGGED BY: GB

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER (Blows / 0mm)	VANE SHEAR STRENGTH (kPa) Vane: 3467	Values	WATER
TOPSOIL comprising of organic SILT with trace rootlets; dark brown. Moist; non plasticity.		0.0					
SILT, with minor clay, with trace gravel; brown with orange and grey mottles. Hard; moist; low plasticity; gravel, fine, mudstone; [Northland Allochthon Residual Soils].		0.2				202+	
0.6m: Becoming very stiff.		0.4				-	
		0.6				147	
		0.8				72	
		1.0				UTP	
		1.2				-	
Clayey SILT, with trace gravel; brown with orange, grey and black mottles. Very stiff; moist; low plasticity; gravel, fine, mudstone; [Northland Allochthon Residual Soils].		1.4				202+	
		1.6				-	
		1.8				165	
		2.0				72	
2.1m: Becoming hard.		2.2				168	
		2.4				92	
		2.6				202+	
		2.8				-	
		3.0				185	
		3.2				116	
		3.4				113	
Silty CLAY, with minor gravel; dark grey. Very stiff; saturated; high plasticity; gravel, fine, sheared mudstone; [Northland Allochthon Residual Soils].		3.6				92	
		3.8				142	
3.9m: Becoming stiff.		4.0				58	
		4.2				139	
		4.4				107	
CLAY; dark grey. Very stiff; saturated; high plasticity; [Northland Allochthon Residual Soils].		4.6				168	
		4.8				72	
End Of Hole: 4.90m		5.0				94	
						81	
						101	
						90	
						134	
						101	
						116	
						92	

PHOTO(S)

REMARKS

1. Hand Auger drilled to target depth of 4.9 m bgl.
2. Groundwater encountered at 3.0 m bgl during drilling.

WATER

- Standing Water Level
- Out flow
- In flow

INVESTIGATION TYPE

- [x] Hand Auger
- [ ] Test Pit

INVESTIGATION LOG

HOLE NO.: HA03

CLIENT: Laminata Homes Ltd
PROJECT: 45 Tauteihiihi Road, Kohukohu

JOB NO.: C0564

SITE LOCATION: 45 Tauteihiihi Road, Kohukohu
START DATE: 06/11/2024
CO-ORDINATES: 1648511mE, 6086083mN
ELEVATION: Ground
END DATE: 06/11/2024
CONTRACTOR: Internal
RIG: 50 mm Hand Auger & DCP
DRILLER: TW
LOGGED BY: TW

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER (Blows / 100mm)	VANE SHEAR STRENGTH (kPa) Vane: 3282	WATER
TOPSOIL comprising of organic SILT with trace rootlets; dark brown. Moist; low plasticity.		0.0	TS			
Silty sandy, with minor clay; light brown and orange brown mixed with grey mottles. Hard; moist; low plasticity; sand, fine; [Northland Allochthon Residual Soils].		0.2			203+ -	
		0.4			UTP -	
		0.6			UTP -	
		0.8			203+ -	
		1.0			203+ -	
		1.2			136 52	
1.8m - 2.4m: Becoming very stiff		1.4			157 64	
		1.6			160 67	
		1.8			203+ -	
2.5m - 3.0m: Becoming moist to wet.		2.0			203+ -	
		2.2				
		2.4				
		2.6				
		2.8				
End Of Hole: 3.00m		3.0		3 5 7 11 22 >>		
		3.2				
		3.4				
		3.6				
		3.8				
		4.0				
		4.2				
		4.4				
		4.6				
		4.8				
		5.0				

Groundwater Not Encountered

PHOTO(S)

REMARKS

1. Hand Auger terminated at 3.0 m bgl due to dense strata encountered.
2. DCP was carried out from the base of hand auger to refusal at 3.5 m bgl.
3. Groundwater not encountered during drilling.

WATER

- ▼ Standing Water Level
- ▷ Out flow
- ◁ In flow

INVESTIGATION TYPE

- ☑ Hand Auger
- ☐ Test Pit

INVESTIGATION LOG

HOLE NO.: HA04

CLIENT: Laminata Homes Ltd

PROJECT: 45 Tauteihiihi Road, Kohukohu

JOB NO.: C0564

SITE LOCATION: 45 Tauteihiihi Road, Kohukohu

START DATE: 06/11/2024

CO-ORDINATES: 1648495mE, 6086237mN

ELEVATION: Ground

END DATE: 06/11/2024

CONTRACTOR: Internal

RIG: 50 mm Hand Auger & DCP

DRILLER: GB

LOGGED BY: GB

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER (Blows / 100mm)	VANE SHEAR STRENGTH (kPa) Vane: 3467	Values	WATER
TOPSOIL comprising of organic SILT with trace rootlets; dark brown. Moist; low plasticity.		0.0	TS				
Clayey SILT, with trace rootlets; greyish brown with orange mottles. Very stiff; moist; low plasticity; [Northland Allochthon Residual Soils].		0.2				113 52	
Silty CLAY; greyish brown with orange mottles. Very stiff; moist; low plasticity; [Northland Allochthon Residual Soils].		0.4 0.6 0.8				159 78 173 64	
SILT, with some clay, with minor sand; orange with light grey mottles. Very stiff to hard; moist; low plasticity; sand, fine; [Northland Allochthon Residual Soils].		1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4				146 64 144 51 162 81 202+ - 202+ -	Groundwater Not Encountered
Sandy SILT, with minor clay; orange with light grey mottles. Very stiff; moist; non-plastic; sand, fine; [Northland Allochthon Residual Soils].		2.6 2.8 3.0				196 61 153 61	
SILT, with some clay, with minor sand; greyish brown with orange and black mottles. Very stiff to hard; moist; low plasticity; sand, fine; [Northland Allochthon Residual Soils].		3.2 3.4 3.6 3.8				199 90 202+ - 202+ -	
End Of Hole: 4.00m		4.0 4.2 4.4 4.6 4.8 5.0		3 5 4 6 9 8 6 7 9			

PHOTO(S)

REMARKS

1. Hand Auger terminated at 4.0 m bgl due to dense strata encountered.
2. DCP was carried out from 4.0m bgl to 4.9m bgl.
3. Groundwater not encountered during drilling.

WATER

- ▼ Standing Water Level
- ▷ Out flow
- ◁ In flow

INVESTIGATION TYPE

- ☑ Hand Auger
- ☐ Test Pit

INVESTIGATION LOG

HOLE NO.: HA05

CLIENT: Laminata Homes Ltd

PROJECT: 45 Tauteihiihi Road, Kohukohu

JOB NO.: C0564

SITE LOCATION: 45 Tauteihiihi Road, Kohukohu

START DATE: 06/11/2024

CO-ORDINATES: 1648500mE, 6086216mN

ELEVATION: Ground

END DATE: 06/11/2024

CONTRACTOR: Internal

RIG: 50 mm Hand Auger & DCP

DRILLER: GB/TW

LOGGED BY: GB/TW

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER (Blows / 100mm)	VANE SHEAR STRENGTH (kPa) Vane: 3467	WATER
TOPSOIL comprising of organic SILT with trace rootlets; brown. Moist; low plasticity.		0.0	TS			
Clayey SILT, with trace sand; brown with orange brown mottles. Very stiff to hard; moist; low plasticity; sand, fine; [Northland Allochthon Residual Soils].		0.2			118	
		0.4			52	
		0.6			191	
		0.8			92	
0.8m: Presence of minor fine sand.					202+	
Clayey SILT, with some sand; orange brown with grey mottles. Hard; moist; low plasticity; sand, fine; [Northland Allochthon Completely Weathered Parent Rock].		1.0			-	
		1.2			UTP	
		1.4			-	
End Of Hole: 1.50m		1.6		1.5 / 22 >>	UTP	
		1.8			-	
		2.0				
		2.2				
		2.4				
		2.6				
		2.8				
		3.0				
		3.2				
		3.4				
		3.6				
		3.8				

Groundwater Not Encountered

PHOTO(S)

REMARKS

1. Hand Auger terminated at 1.5 m bgl due to dense strata encountered.
2. DCP was carried out from 1.5m bgl to 1.7m bgl.
3. Groundwater not encountered during drilling.

WATER

- ▼ Standing Water Level
- ▷ Out flow
- ◁ In flow

INVESTIGATION TYPE

- ☑ Hand Auger
- ☐ Test Pit

INVESTIGATION LOG

HOLE NO.: HA06

CLIENT: Laminata Homes Ltd

PROJECT: 45 Tauteihiihi Road, Kohukohu

JOB NO.: C0564

SITE LOCATION: 45 Tauteihiihi Road, Kohukohu

START DATE: 06/11/2024

CO-ORDINATES: 1648516mE, 6086237mN

ELEVATION: Ground

END DATE: 06/11/2024

CONTRACTOR: Internal

RIG: 50 mm Hand Auger

DRILLER: GB

LOGGED BY: GB

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER (Blows / 0mm)	VANE SHEAR STRENGTH (kPa) Vane:	WATER
TOPSOIL comprising of organic SILT with some clay and trace rootlets; brown. Moist; low plasticity.		0.2		2 4 6 8 10 12 14 16 18	50 100 150 200 Values	Groundwater Not Encountered
SILT, with some clay, with trace sand; brownish orange with grey mottles. Moist; low plasticity; sand, fine; [Northland Allochthon Residual Soils].		0.4				
Clayey SILT, with trace rootlets and gravel; dark grey and brownish orange mixed. Moist to wet; low plasticity; gravel, fine, mudstone; [Northland Allochthon Residual Soils].		0.6				
		0.8				
		1.0				
		1.2				
End Of Hole: 1.20m		1.4				
		1.6				
		1.8				
		2.0				
		2.2				
		2.4				
		2.6				
		2.8				
		3.0				
		3.2				
		3.4				
		3.6				
		3.8				
		4.0				
		4.2				
		4.4				
		4.6				
		4.8				

PHOTO(S)

REMARKS

1. Hand Auger terminated at 1.2m bgl due to dense strata encountered.
2. Groundwater not encountered during drilling.

WATER

- Standing Water Level
- Out flow
- In flow

INVESTIGATION TYPE

- [x] Hand Auger
- [ ] Test Pit

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APPENDIX C

Assessment of Environmental Effects and Assessment Criteria

Table 15: Wastewater Assessment of Environmental Effects

Item	NRC Separation Requirement[2]	FNDC Separation Requirement	Site Assessment[3]
Individual System Effects			
Flood Plains	Above 5 % AEP	NR	Complies according to available GIS data and visual assessment.
Stormwater Flowpath[4]	5 m	NR	Complies, see annotations on Drawing No. 100.
Surface water feature[5]	15 m	30 m	Complies to both NRC and FNDC.
Coastal Marine Area	15 m	30 m	Complies, site is inland.
Existing water supply bore.	20 m	NR	Complies. None recorded within or within 20 m of the site boundaries.
Property boundary	1.5 m	1.5	Complies. Including proposed development boundaries.
Winter groundwater table	0.9 m	0.9 m	Complies.
Topography			Ok – chosen disposal areas are flat and level to <15 °.
Cut off drain required?			Yes.
Discharge Consent Required?			No.
	TP58	**NZS1547**	
Cumulative Effects			
Biological Oxygen Demand	≤20 g/m^3		Complies – secondary treatment.
Total Suspended Solids	≤30 g/m^3		Complies – secondary treatment.
Total Nitrogen	10 – 30 g/m^3	15 – 75 g/m^3	Complies – secondary treatment.
Phosphorous	NR	4 – 10 g/m^3	Complies – secondary treatment.
Ammonia	NR	Negligible	Complies – secondary treatment.
Nitrites/ Nitrates	NR	15 – 45 g/m^3	Complies – secondary treatment.
Conclusion: Effects are less than minor on the environment.			

1. AEE based on proposed secondary treated effluent.
2. Northland Regional Plan Table 9.
3. Based on the recommendations of this report and Drawing No. 100.
4. Including any formed road with kerb and channel, and water-table drain that is down-slope of the disposal area.
5. River, lake, stream, pond, dam, or natural wetland.

AEP Annual Exceedance Probability.
NR No Requirement.

geologix
consulting engineers

APPENDIX D

Stormwater Calculations

Project Ref:	C0564		**STORMWATER ATTENUATION TANK DESIGN**	geologix consulting engineers
Project Address:	45 Tauteihiihi Road, Kohukohu			
Design Case:	CONCEPT FUTURE DEVELOPMENT		**THREE BEDROOM 50 % AEP STORM EVENT, 80 % OF PRE DEVELOPMENT**	
Date:	21 January 2025	REV 1		

ATTENUATION DESIGN PROVIDED IN ACCORDANCE WITH NEW ZEALAND BUILDING CODE E1 FOR THE RATIONALE METHOD ACCOUNTING FOR THE EFFECTS OF CLIMATE CHANGE (20% FACTOR AS PER 2023 FNDC ENGINEERING STANDARDS).
PRE-DEVELOPMENT RUNOFF IS FACTORED BY 80% TO SUIT FNDC STANDARDS
RUNOFF COEFFICIENTS DETERMINED FROM FNDC ENGINEERING STANDARDS 2023 TABLE 4-3.

PRE DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
IMPERVIOUS A	278	0.96	EXISTING ROOF
IMPERVIOUS B	340	0.8	DRIVEWAY - METAL
IMPERVIOUS C	0	0	
EX. PERVIOUS	0	0.67	PASTURE
TOTAL	**618**	TYPE D	

POST DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
TO TANK	177	0.96	ROOF
OFFSET	434	0.8	DRIVEWAY - METAL
PERVIOUS	7	0.67	PASTURE
EX. CONSENTED	0	0	
TOTAL	**618**	TYPE D	

RAINFALL INTENSITY, 50% AEP, 10MIN DURATION

50 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	56.1	mm/hr
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	20	%
50 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	67.32	mm/hr

* CLIMATE CHANGE FACTOR OF 20% APPLIED IN ACCORDANCE WITH FNDC ENGINEERING STANDARDS 4.3.9.1. NIWA HISTORIC RAINFALL INTENSITY DATA, 10MIN, IS MULTIPLIED BY CLIMATE CHANGE FACTOR.

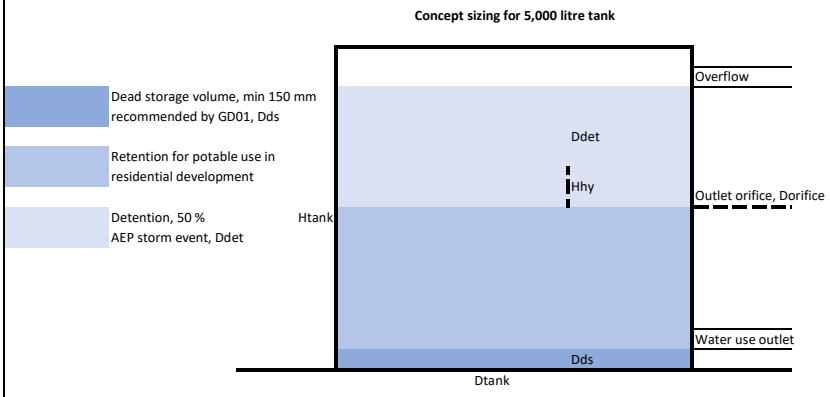
PRE AND POST-DEVELOPMENT RUNOFF, 50%AEP, VARIOUS DURATIONS

DURATION, min	INTENSITY, mm/hr	CC FACTOR	INTENSITY WITH CC, mm/hr	POST DEV RUNOFF, Qpost, l/s	PRE DEV RUNOFF, Qpre, l/s	80% of PRE DEV RUNOFF, Qpre(80%), l/s	COMMENTS
10	56.10	1.2	67.32	9.76	8.40	6.72	*Critical duration (time of concentration) for the catchments is 10min*
20	39.60	1.2	47.52	6.89	7.11	5.69	
30	32.30	1.2	38.76	5.62	5.80	4.64	
60	22.50	1.2	27.00	3.91	4.04	3.23	
120	15.50	1.2	18.60	2.70	2.78	2.23	*Pre-dev calculated on Intensity without CC factor*
360	8.22	1.2	9.86	1.43	1.48	1.18	
720	5.33	1.2	6.40	0.93	0.96	0.77	
1440	3.35	1.2	4.02	0.58	0.60	0.48	
2880	2.03	1.2	2.44	0.35	0.36	0.29	
4320	1.48	1.2	1.78	0.26	0.27	0.21	

ATTENUATION ANALYSIS, VARIOUS DURATIONS

DURATION, min	OFFSET FLOW, Qoff, l/s	TANK INFLOW , Qin, l/s	ALLOWABLE TANK OUTFLOW, Qpre(80%) - Qoff, l/s	SELECTED TANK OUTFLOW, Qout, l/s	DIFFERENCE (Qin - Qout), l/s	Required Storage, litres	
10	6.49	3.18	0.23	0.23	2.95	1771	*Selected Tank Outflow is selected for critical duration (time of concentration).*
20	4.58	2.24	1.11	0.23	2.02	2421	
30	3.74	1.83	0.90	0.23	1.60	2887	
60	2.60	1.27	0.63	0.23	1.05	3776	
120	1.79	0.88	0.43	0.23	0.65	4698	*select largest required storage , regardless of duration, to avoid overflow for event of any duration*
360	0.95	0.47	0.23	0.23	0.24	5188	
720	0.62	0.30	0.15	0.23	0.08	3305	
1440	0.39	0.19	0.09	0.23	No Att. Req.	0	
2880	0.23	0.11	0.06	0.23	No Att. Req.	0	
4320	0.17	0.08	0.04	0.23	No Att. Req.	0	

ATTENUATION TANK DESIGN OUTPUT



SPECIFICATION

TOTAL STORAGE REQUIRED	5.188	m3	Select largest storage as per analysis
TANK HEIGHT, Htank	2.6	m	Concept sizing for 5,000 litre tank
TANK DIAMETER, Dtank	3.5	m	No. of Tanks 2
TANK AREA, Atank	19.24	m2	Area of tank
TANK MAX STORAGE VOLUME, Vtank	50030	litres	
REQUIRED STORAGE HEIGHT, Ddet	0.27	m	Below overflow
DEAD STORAGE VOLUME, Dds	0.15	m	GD01 recommended minimum
TOTAL WATER DEPTH REQUIRED	0.42	m	
SELECTED TANK OUTFLOW, Qout, l/s	0.00023	m3/s	Selected tank outflow
AVERAGE HYDRAULIC HEAD, Hhy	0.13	m	
AREA OF ORIFICE, Aorifice	2.24E-04	m2	
ORIFICE DIAMETER, Dorifice	17	mm	
VELOCITY AT ORIFICE	2.30	m/s	At max. head level

Project Ref:	C0564		**STORMWATER ATTENUATION TANK DESIGN**	geologix consulting engineers
Project Address:	45 Tauteihiihi Road, Kohukohu			
Design Case:	CONCEPT FUTURE DEVELOPMENT		**THREE BEDROOM 20 % AEP STORM EVENT, 80 % OF PRE DEVELOPMENT**	
Date:	21 January 2025	REV 1		

ATTENUATION DESIGN PROVIDED IN ACCORDANCE WITH NEW ZEALAND BUILDING CODE E1 FOR THE RATIONALE METHOD ACCOUNTING FOR THE EFFECTS OF CLIMATE CHANGE (20% FACTOR AS PER 2023 FNDC ENGINEERING STANDARDS).
PRE-DEVELOPMENT RUNOFF IS FACTORED BY 80% TO SUIT FNDC STANDARDS
RUNOFF COEFFICIENTS DETERMINED FROM FNDC ENGINEERING STANDARDS 2023 TABLE 4-3.

PRE DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
IMPERVIOUS A	278	0.96	EXISTING ROOF
IMPERVIOUS B	340	0.8	DRIVEWAY - METAL
IMPERVIOUS C	0	0	
EX. PERVIOUS	0	0.67	PASTURE
TOTAL	**618**	TYPE D	

POST DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
TO TANK	177	0.96	ROOF
OFFSET	434	0.8	DRIVEWAY - METAL
PERVIOUS	7	0.67	PASTURE
EX. CONSENTED	0	0	
0	0	0	
TOTAL	**618**	TYPE D	

RAINFALL INTENSITY, 20% AEP, 10MIN DURATION

20 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	72.6	mm/hr
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	20	%
20 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	87.1	mm/hr

* CLIMATE CHANGE FACTOR OF 20% APPLIED IN ACCORDANCE WITH FNDC ENGINEERING STANDARDS 4.3.9.1. NIWA HISTORIC RAINFALL INTENSITY DATA, 10MIN, IS MULTIPLIED BY CLIMATE CHANGE FACTOR.

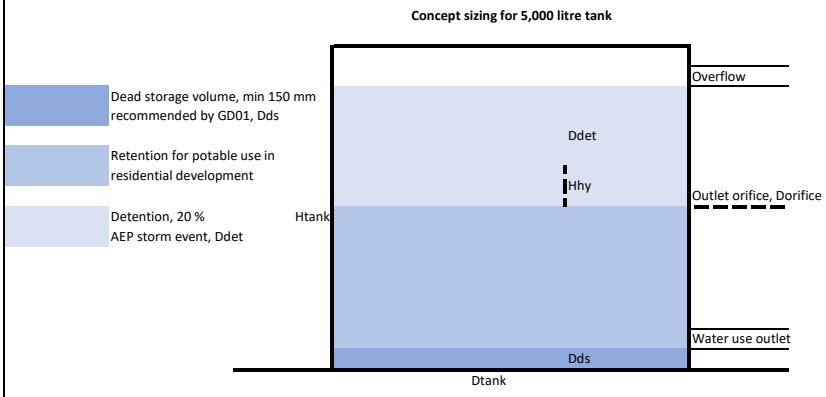
PRE AND POST-DEVELOPMENT RUNOFF, 20%AEP, VARIOUS DURATIONS

DURATION, min	INTENSITY, mm/hr	CC FACTOR	INTENSITY WITH CC, mm/hr	POST DEV RUNOFF, Qpost, l/s	PRE DEV RUNOFF, Qpre, l/s	80% of PRE DEV RUNOFF, Qpre(80%), l/s	COMMENTS
10	72.60	1.2	87.12	12.63	10.87	8.69	*Critical duration (time of concentration) for the catchments is 10min*
20	51.40	1.2	61.68	8.94	9.23	7.39	
30	41.90	1.2	50.28	7.29	7.53	6.02	
60	29.30	1.2	35.16	5.10	5.26	4.21	
120	20.20	1.2	24.24	3.51	3.63	2.90	*Pre-dev calculated on Intensity without CC factor*
360	10.70	1.2	12.84	1.86	1.92	1.54	
720	6.98	1.2	8.38	1.21	1.25	1.00	
1440	4.39	1.2	5.27	0.76	0.79	0.63	
2880	2.67	1.2	3.20	0.46	0.48	0.38	
4320	1.95	1.2	2.34	0.34	0.35	0.28	

ATTENUATION ANALYSIS, VARIOUS DURATIONS

DURATION, min	OFFSET FLOW, Qoff, l/s	TANK INFLOW , Qin, l/s	ALLOWABLE TANK OUTFLOW, Qpre(80%) - Qoff, l/s	SELECTED TANK OUTFLOW, Qout, l/s	DIFFERENCE (Qin - Qout), l/s	Required Storage, litres	
10	8.40	4.11	0.29	0.29	3.82	2292	*Selected Tank Outflow is selected for critical duration (time of concentration).*
20	5.95	2.91	3.28	0.29	2.62	3144	
30	4.85	2.37	2.68	0.29	2.08	3747	
60	3.39	1.66	1.87	0.29	1.37	4924	
120	2.34	1.14	1.29	0.29	0.85	6138	*select largest required storage , regardless of duration, to avoid overflow for event of any duration*
360	1.24	0.61	0.68	0.29	0.31	6790	
720	0.81	0.40	0.45	0.29	0.10	4478	
1440	0.51	0.25	0.28	0.29	No Att. Req.	0	
2880	0.31	0.15	0.17	0.29	No Att. Req.	0	
4320	0.23	0.11	0.12	0.29	No Att. Req.	0	

ATTENUATION TANK DESIGN OUTPUT



SPECIFICATION

TOTAL STORAGE REQUIRED	6.790	m3	Select largest storage as per analysis
TANK HEIGHT, Htank	2.6	m	Concept sizing for 5,000 litre tank
TANK DIAMETER, Dtank	3.5	m	No. of Tanks 2
TANK AREA, Atank	19.24	m2	Area of tank
TANK MAX STORAGE VOLUME, Vtank	50030	litres	
REQUIRED STORAGE HEIGHT, Ddet	0.35	m	Below overflow
DEAD STORAGE VOLUME, Dds	0.15	m	GD01 recommended minimum
TOTAL WATER DEPTH REQUIRED	0.50	m	
SELECTED TANK OUTFLOW, Qout, l/s	0.00029	m3/s	Selected tank outflow
AVERAGE HYDRAULIC HEAD, Hhy	0.18	m	
AREA OF ORIFICE, Aorifice	2.53E-04	m2	
ORIFICE DIAMETER, Dorifice	18	mm	
VELOCITY AT ORIFICE	2.63	m/s	At max. head level

Project Ref:	C0564		**STORMWATER ATTENUATION TANK DESIGN**	geologix consulting engineers
Project Address:	45 Tauteihiihi Road, Kohukohu			
Design Case:	CONCEPT FUTURE DEVELOPMENT		**THREE BEDROOM 1 % AEP STORM EVENT, 80 % OF PRE DEVELOPMENT**	
Date:	21 January 2025	REV 1		

ATTENUATION DESIGN PROVIDED IN ACCORDANCE WITH NEW ZEALAND BUILDING CODE E1 FOR THE RATIONALE METHOD ACCOUNTING FOR THE EFFECTS OF CLIMATE CHANGE (20% FACTOR AS PER 2023 FNDC ENGINEERING STANDARDS).
PRE-DEVELOPMENT RUNOFF IS FACTORED BY 80% TO SUIT FNDC STANDARDS
RUNOFF COEFFICIENTS DETERMINED FROM FNDC ENGINEERING STANDARDS 2023 TABLE 4-3.

PRE DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
IMPERVIOUS A	278	0.96	EXISTING ROOF
IMPERVIOUS B	340	0.8	DRIVEWAY - METAL
IMPERVIOUS C	0	0	
EX. PERVIOUS	0	0.67	PASTURE
0	0	0	
TOTAL	**618**	TYPE D	

POST DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
TO TANK	177	0.96	ROOF
OFFSET	434	0.8	DRIVEWAY - METAL
PERVIOUS	7	0.67	PASTURE
EX. CONSENTED	0	0	
0	0	0	
TOTAL	**618**	TYPE D	

RAINFALL INTENSITY, 1% AEP, 10MIN DURATION

1 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	127.0	mm/hr
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	20	%
1 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	152.4	mm/hr

* CLIMATE CHANGE FACTOR OF 20% APPLIED IN ACCORDANCE WITH FNDC ENGINEERING STANDARDS 4.3.9.1. NIWA HISTORIC RAINFALL INTENSITY DATA, 10MIN, IS MULTIPLIED BY CLIMATE CHANGE FACTOR.

PRE AND POST-DEVELOPMENT RUNOFF, 1%AEP, VARIOUS DURATIONS

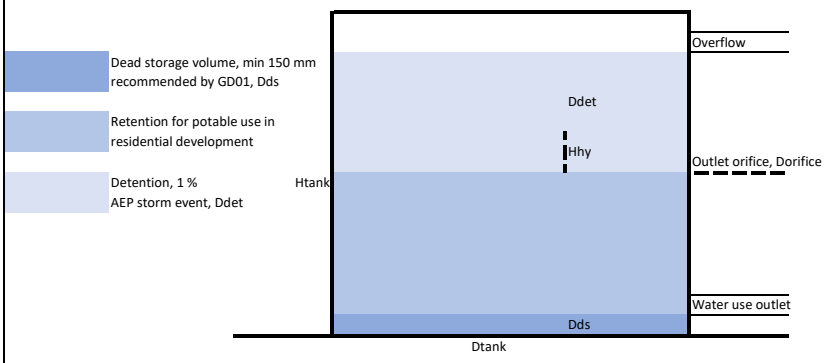
DURATION, min	INTENSITY, mm/hr	CC FACTOR	INTENSITY WITH CC, mm/hr	POST DEV RUNOFF, Qpost, l/s	PRE DEV RUNOFF, Qpre, l/s	80% of PRE DEV RUNOFF, Qpre(80%), l/s	COMMENTS
10	127.00	1.2	152.40	22.09	19.01	15.21	*Critical duration (time of concentration) for the catchments is 10min*
20	90.50	1.2	108.60	15.74	16.26	13.00	
30	74.00	1.2	88.80	12.87	13.29	10.63	
60	52.00	1.2	62.40	9.04	9.34	7.47	
120	36.00	1.2	43.20	6.26	6.47	5.17	*Pre-dev calculated on Intensity without CC factor*
360	19.30	1.2	23.16	3.36	3.47	2.77	
720	12.60	1.2	15.12	2.19	2.26	1.81	
1440	7.99	1.2	9.59	1.39	1.44	1.15	
2880	4.87	1.2	5.84	0.85	0.87	0.70	
4320	3.58	1.2	4.30	0.62	0.64	0.51	

ATTENUATION ANALYSIS, VARIOUS DURATIONS

DURATION, min	OFFSET FLOW, Qoff, l/s	TANK INFLOW , Qin, l/s	ALLOWABLE TANK OUTFLOW, Qpre(80%) - Qoff, l/s	SELECTED TANK OUTFLOW, Qout, l/s	DIFFERENCE (Qin - Qout), l/s	Required Storage, litres	
10	14.70	7.19	0.51	0.51	6.68	4010	*Selected Tank Outflow is selected for critical duration (time of concentration).*
20	10.47	5.13	2.53	0.51	4.62	5539	
30	8.56	4.19	2.07	0.51	3.68	6626	
60	6.02	2.95	1.45	0.51	2.44	8766	
120	4.17	2.04	1.01	0.51	1.53	11007	*select largest required storage , regardless of duration, to avoid overflow for event of any duration*
360	2.23	1.09	0.54	0.51	0.58	12591	
720	1.46	0.71	0.35	0.51	0.20	8787	
1440	0.92	0.45	0.22	0.51	No Att. Req.	0	
2880	0.56	0.28	0.14	0.51	No Att. Req.	0	
4320	0.41	0.20	0.10	0.51	No Att. Req.	0	

ATTENUATION TANK DESIGN OUTPUT

Concept sizing for 5,000 litre tank



SPECIFICATION

TOTAL STORAGE REQUIRED	12.591	m3	Select largest storage as per analysis	
TANK HEIGHT, Htank	2.6	m	Concept sizing for 5,000 litre tank	
TANK DIAMETER, Dtank	3.5	m	No. of Tanks	2
TANK AREA, Atank	19.24	m2	Area of tank	
TANK MAX STORAGE VOLUME, Vtank	50030	litres		
REQUIRED STORAGE HEIGHT, Ddet	0.65	m	Below overflow	
DEAD STORAGE VOLUME, Dds	0.15	m	GD01 recommended minimum	
TOTAL WATER DEPTH REQUIRED	0.80	m		
SELECTED TANK OUTFLOW, Qout, l/s	0.00051	m3/s	Selected tank outflow	
AVERAGE HYDRAULIC HEAD, Hhy	0.33	m		
AREA OF ORIFICE, Aorifice	3.25E-04	m2		
ORIFICE DIAMETER, Dorifice	20	mm		
VELOCITY AT ORIFICE	3.58	m/s	At max. head level	

Project Ref:	C0564		**STORMWATER ATTENUATION TANK DESIGN**	geologix consulting engineers
Project Address:	45 Tauteihiihi Road, Kohukohu			
Design Case:	CONCEPT FUTURE DEVELOPMENT		TWO-BEDROOM 50 % AEP STORM EVENT, 80 % OF PRE DEVELOPMENT	
Date:	21 January 2025	REV 1		

ATTENUATION DESIGN PROVIDED IN ACCORDANCE WITH NEW ZEALAND BUILDING CODE E1 FOR THE RATIONALE METHOD ACCOUNTING FOR THE EFFECTS OF CLIMATE CHANGE (20% FACTOR AS PER 2023 FNDC ENGINEERING STANDARDS).
PRE-DEVELOPMENT RUNOFF IS FACTORED BY 80% TO SUIT FNDC STANDARDS
RUNOFF COEFFICIENTS DETERMINED FROM FNDC ENGINEERING STANDARDS 2023 TABLE 4-3.

PRE DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
IMPERVIOUS A	0	0.96	EXISTING ROOF
IMPERVIOUS B	0	0.8	DRIVEWAY - METAL
IMPERVIOUS C	0	0	
EX. PERVIOUS	65	0.67	PASTURE
TOTAL	**65**	TYPE D	

POST DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
TO TANK	65	0.96	ROOF
OFFSET	0	0.8	DRIVEWAY - METAL
PERVIOUS	0	0.67	PASTURE
EX. CONSENTED	0	0	
TOTAL	**65**	TYPE D	

RAINFALL INTENSITY, 50% AEP, 10MIN DURATION

50 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	56.1	mm/hr
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	20	%
50 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	67.32	mm/hr

* CLIMATE CHANGE FACTOR OF 20% APPLIED IN ACCORDANCE WITH FNDC ENGINEERING STANDARDS 4.3.9.1. NIWA HISTORIC RAINFALL INTENSITY DATA, 10MIN, IS MULTIPLIED BY CLIMATE CHANGE FACTOR.

PRE AND POST-DEVELOPMENT RUNOFF, 50%AEP, VARIOUS DURATIONS

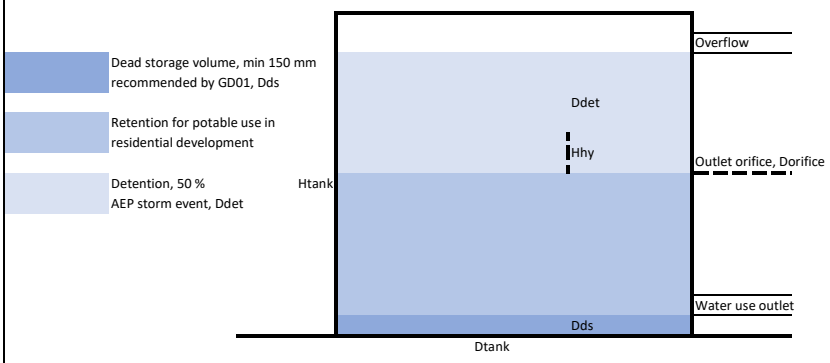
DURATION, min	INTENSITY, mm/hr	CC FACTOR	INTENSITY WITH CC, mm/hr	POST DEV RUNOFF, Qpost, l/s	PRE DEV RUNOFF, Qpre, l/s	80% of PRE DEV RUNOFF, Qpre(80%), l/s	COMMENTS
10	56.10	1.2	67.32	1.17	0.68	0.54	*Critical duration (time of concentration) for the catchments is 10min*
20	39.60	1.2	47.52	0.82	0.57	0.46	
30	32.30	1.2	38.76	0.67	0.47	0.38	
60	22.50	1.2	27.00	0.47	0.33	0.26	
120	15.50	1.2	18.60	0.32	0.23	0.18	*Pre-dev calculated on Intensity without CC factor*
360	8.22	1.2	9.86	0.17	0.12	0.10	
720	5.33	1.2	6.40	0.11	0.08	0.06	
1440	3.35	1.2	4.02	0.07	0.05	0.04	
2880	2.03	1.2	2.44	0.04	0.03	0.02	
4320	1.48	1.2	1.78	0.03	0.02	0.02	

ATTENUATION ANALYSIS, VARIOUS DURATIONS

DURATION, min	OFFSET FLOW, Qoff, l/s	TANK INFLOW , Qin, l/s	ALLOWABLE TANK OUTFLOW, Qpre(80%) - Qoff, l/s	SELECTED TANK OUTFLOW, Qout, l/s	DIFFERENCE (Qin - Qout), l/s	Required Storage, litres	
10	0.00	1.17	0.54	0.54	0.62	374	*Selected Tank Outflow is selected for critical duration (time of concentration).*
20	0.00	0.82	0.46	0.54	0.28	337	
30	0.00	0.67	0.38	0.54	0.13	232	
60	0.00	0.47	0.26	0.54	No Att. Req.	0	
120	0.00	0.32	0.18	0.54	No Att. Req.	0	*select largest required storage , regardless of duration, to avoid overflow for event of any duration*
360	0.00	0.17	0.10	0.54	No Att. Req.	0	
720	0.00	0.11	0.06	0.54	No Att. Req.	0	
1440	0.00	0.07	0.04	0.54	No Att. Req.	0	
2880	0.00	0.04	0.02	0.54	No Att. Req.	0	
4320	0.00	0.03	0.02	0.54	No Att. Req.	0	

ATTENUATION TANK DESIGN OUTPUT

Concept sizing for 5,000 litre tank



SPECIFICATION

TOTAL STORAGE REQUIRED	0.374	m3	Select largest storage as per analysis
TANK HEIGHT, Htank	2.6	m	Concept sizing for 5,000 litre tank
TANK DIAMETER, Dtank	3.5	m	No. of Tanks 2
TANK AREA, Atank	19.24	m2	Area of tank
TANK MAX STORAGE VOLUME, Vtank	50030	litres	
REQUIRED STORAGE HEIGHT, Ddet	0.02	m	Below overflow
DEAD STORAGE VOLUME, Dds	0.15	m	GD01 recommended minimum
TOTAL WATER DEPTH REQUIRED	0.17	m	
SELECTED TANK OUTFLOW, Qout, l/s	0.00054	m3/s	Selected tank outflow
AVERAGE HYDRAULIC HEAD, Hhy	0.01	m	
AREA OF ORIFICE, Aorifice	2.00E-03	m2	
ORIFICE DIAMETER, Dorifice	51	mm	
VELOCITY AT ORIFICE	0.62	m/s	At max. head level

Project Ref:	C0564		**STORMWATER ATTENUATION TANK DESIGN**	geologix consulting engineers
Project Address:	45 Tauteihiihi Road, Kohukohu			
Design Case:	CONCEPT FUTURE DEVELOPMENT		**TWO-BEDROOM 20 % AEP STORM EVENT, 80 % OF PRE DEVELOPMENT**	
Date:	21 January 2025	REV 1		

ATTENUATION DESIGN PROVIDED IN ACCORDANCE WITH NEW ZEALAND BUILDING CODE E1 FOR THE RATIONALE METHOD ACCOUNTING FOR THE EFFECTS OF CLIMATE CHANGE (20% FACTOR AS PER 2023 FNDC ENGINEERING STANDARDS).
PRE-DEVELOPMENT RUNOFF IS FACTORED BY 80% TO SUIT FNDC STANDARDS
RUNOFF COEFFICIENTS DETERMINED FROM FNDC ENGINEERING STANDARDS 2023 TABLE 4-3.

PRE DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
IMPERVIOUS A	0	0.96	EXISTING ROOF
IMPERVIOUS B	0	0.8	DRIVEWAY - METAL
IMPERVIOUS C	0	0	
EX. PERVIOUS	65	0.67	PASTURE
TOTAL	**65**	TYPE D	

POST DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
TO TANK	65	0.96	ROOF
OFFSET	0	0.8	DRIVEWAY - METAL
PERVIOUS	0	0.67	PASTURE
EX. CONSENTED	0	0	
0	0	0	
TOTAL	**65**	TYPE D	

RAINFALL INTENSITY, 20% AEP, 10MIN DURATION

20 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	72.6	mm/hr
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	20	%
20 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	87.1	mm/hr

* CLIMATE CHANGE FACTOR OF 20% APPLIED IN ACCORDANCE WITH FNDC ENGINEERING STANDARDS 4.3.9.1. NIWA HISTORIC RAINFALL INTENSITY DATA, 10MIN, IS MULTIPLIED BY CLIMATE CHANGE FACTOR.

PRE AND POST-DEVELOPMENT RUNOFF, 20%AEP, VARIOUS DURATIONS

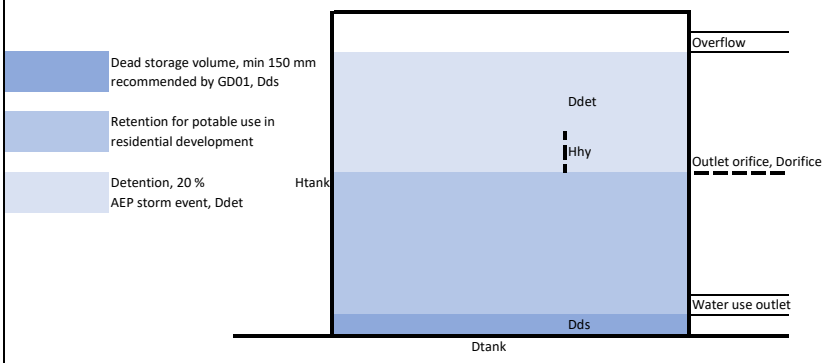
DURATION, min	INTENSITY, mm/hr	CC FACTOR	INTENSITY WITH CC, mm/hr	POST DEV RUNOFF, Qpost, l/s	PRE DEV RUNOFF, Qpre, l/s	80% of PRE DEV RUNOFF, Qpre(80%), l/s	COMMENTS
10	72.60	1.2	87.12	1.51	0.88	0.70	*Critical duration (time of concentration) for the catchments is 10min*
20	51.40	1.2	61.68	1.07	0.75	0.60	
30	41.90	1.2	50.28	0.87	0.61	0.49	
60	29.30	1.2	35.16	0.61	0.43	0.34	
120	20.20	1.2	24.24	0.42	0.29	0.23	*Pre-dev calculated on Intensity without CC factor*
360	10.70	1.2	12.84	0.22	0.16	0.12	
720	6.98	1.2	8.38	0.15	0.10	0.08	
1440	4.39	1.2	5.27	0.09	0.06	0.05	
2880	2.67	1.2	3.20	0.06	0.04	0.03	
4320	1.95	1.2	2.34	0.04	0.03	0.02	

ATTENUATION ANALYSIS, VARIOUS DURATIONS

DURATION, min	OFFSET FLOW, Qoff, l/s	TANK INFLOW , Qin, l/s	ALLOWABLE TANK OUTFLOW, Qpre(80%) - Qoff, l/s	SELECTED TANK OUTFLOW, Qout, l/s	DIFFERENCE (Qin - Qout), l/s	Required Storage, litres	
10	0.00	1.51	0.70	0.70	0.81	484	*Selected Tank Outflow is selected for critical duration (time of concentration).*
20	0.00	1.07	0.75	0.70	0.37	440	
30	0.00	0.87	0.61	0.70	0.17	304	
60	0.00	0.61	0.43	0.70	No Att. Req.	0	
120	0.00	0.42	0.29	0.70	No Att. Req.	0	*select largest required storage , regardless of duration, to avoid overflow for event of any duration*
360	0.00	0.22	0.16	0.70	No Att. Req.	0	
720	0.00	0.15	0.10	0.70	No Att. Req.	0	
1440	0.00	0.09	0.06	0.70	No Att. Req.	0	
2880	0.00	0.06	0.04	0.70	No Att. Req.	0	
4320	0.00	0.04	0.03	0.70	No Att. Req.	0	

ATTENUATION TANK DESIGN OUTPUT

Concept sizing for 5,000 litre tank



SPECIFICATION

TOTAL STORAGE REQUIRED	0.484	m3	Select largest storage as per analysis	
TANK HEIGHT, Htank	2.6	m	Concept sizing for 5,000 litre tank	
TANK DIAMETER, Dtank	3.5	m	No. of Tanks	2
TANK AREA, Atank	19.24	m2	Area of tank	
TANK MAX STORAGE VOLUME, Vtank	50030	litres		
REQUIRED STORAGE HEIGHT, Ddet	0.03	m	Below overflow	
DEAD STORAGE VOLUME, Dds	0.15	m	GD01 recommended minimum	
TOTAL WATER DEPTH REQUIRED	0.18	m		
SELECTED TANK OUTFLOW, Qout, l/s	0.00070	m3/s	Selected tank outflow	
AVERAGE HYDRAULIC HEAD, Hhy	0.01	m		
AREA OF ORIFICE, Aorifice	2.28E-03	m2		
ORIFICE DIAMETER, Dorifice	54	mm		
VELOCITY AT ORIFICE	0.70	m/s	At max. head level	

Project Ref:	C0564		**STORMWATER ATTENUATION TANK DESIGN**	geologix consulting engineers
Project Address:	45 Tauteihiihi Road, Kohukohu			
Design Case:	CONCEPT FUTURE DEVELOPMENT		**TWO-BEDROOM 1 % AEP STORM EVENT, 80 % OF PRE DEVELOPMENT**	
Date:	21 January 2025	REV 1		

ATTENUATION DESIGN PROVIDED IN ACCORDANCE WITH NEW ZEALAND BUILDING CODE E1 FOR THE RATIONALE METHOD ACCOUNTING FOR THE EFFECTS OF CLIMATE CHANGE (20% FACTOR AS PER 2023 FNDC ENGINEERING STANDARDS).
PRE-DEVELOPMENT RUNOFF IS FACTORED BY 80% TO SUIT FNDC STANDARDS
RUNOFF COEFFICIENTS DETERMINED FROM FNDC ENGINEERING STANDARDS 2023 TABLE 4-3.

PRE DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
IMPERVIOUS A	0	0.96	EXISTING ROOF
IMPERVIOUS B	0	0.8	DRIVEWAY - METAL
IMPERVIOUS C	0	0	
EX. PERVIOUS	65	0.67	PASTURE
0	0	0	
TOTAL	**65**	TYPE D	

POST DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
TO TANK	65	0.96	ROOF
OFFSET	0	0.8	DRIVEWAY - METAL
PERVIOUS	0	0.67	PASTURE
EX. CONSENTED	0	0	
0	0	0	
TOTAL	**65**	TYPE D	

RAINFALL INTENSITY, 1% AEP, 10MIN DURATION

1 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	127.0	mm/hr
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	20	%
1 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	152.4	mm/hr

* CLIMATE CHANGE FACTOR OF 20% APPLIED IN ACCORDANCE WITH FNDC ENGINEERING STANDARDS 4.3.9.1. NIWA HISTORIC RAINFALL INTENSITY DATA, 10MIN, IS MULTIPLIED BY CLIMATE CHANGE FACTOR.

PRE AND POST-DEVELOPMENT RUNOFF, 1%AEP, VARIOUS DURATIONS

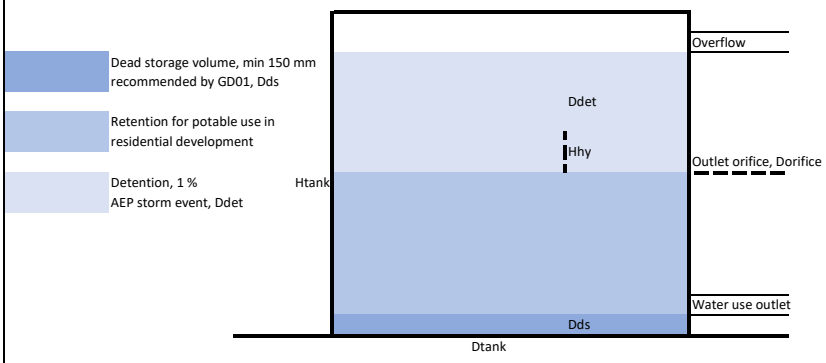
DURATION, min	INTENSITY, mm/hr	CC FACTOR	INTENSITY WITH CC, mm/hr	POST DEV RUNOFF, Qpost, l/s	PRE DEV RUNOFF, Qpre, l/s	80% of PRE DEV RUNOFF, Qpre(80%), l/s	COMMENTS
10	127.00	1.2	152.40	2.64	1.54	1.23	*Critical duration (time of concentration) for the catchments is 10min*
20	90.50	1.2	108.60	1.88	1.31	1.05	
30	74.00	1.2	88.80	1.54	1.07	0.86	
60	52.00	1.2	62.40	1.08	0.75	0.60	
120	36.00	1.2	43.20	0.75	0.52	0.42	*Pre-dev calculated on Intensity without CC factor*
360	19.30	1.2	23.16	0.40	0.28	0.22	
720	12.60	1.2	15.12	0.26	0.18	0.15	
1440	7.99	1.2	9.59	0.17	0.12	0.09	
2880	4.87	1.2	5.84	0.10	0.07	0.06	
4320	3.58	1.2	4.30	0.07	0.05	0.04	

ATTENUATION ANALYSIS, VARIOUS DURATIONS

DURATION, min	OFFSET FLOW, Qoff, l/s	TANK INFLOW , Qin, l/s	ALLOWABLE TANK OUTFLOW, Qpre(80%) - Qoff, l/s	SELECTED TANK OUTFLOW, Qout, l/s	DIFFERENCE (Qin - Qout), l/s	Required Storage, litres	
10	0.00	2.64	1.23	1.23	1.41	848	*Selected Tank Outflow is selected for critical duration (time of concentration).*
20	0.00	1.88	1.05	1.23	0.65	784	
30	0.00	1.54	0.86	1.23	0.31	558	
60	0.00	1.08	0.60	1.23	No Att. Req.	0	
120	0.00	0.75	0.42	1.23	No Att. Req.	0	*select largest required storage , regardless of duration, to avoid overflow for event of any duration*
360	0.00	0.40	0.22	1.23	No Att. Req.	0	
720	0.00	0.26	0.15	1.23	No Att. Req.	0	
1440	0.00	0.17	0.09	1.23	No Att. Req.	0	
2880	0.00	0.10	0.06	1.23	No Att. Req.	0	
4320	0.00	0.07	0.04	1.23	No Att. Req.	0	

ATTENUATION TANK DESIGN OUTPUT

Concept sizing for 5,000 litre tank



SPECIFICATION

TOTAL STORAGE REQUIRED	0.848	m3	Select largest storage as per analysis	
TANK HEIGHT, Htank	2.6	m	Concept sizing for 5,000 litre tank	
TANK DIAMETER, Dtank	3.5	m	No. of Tanks	2
TANK AREA, Atank	19.24	m2	Area of tank	
TANK MAX STORAGE VOLUME, Vtank	50030	litres		
REQUIRED STORAGE HEIGHT, Ddet	0.04	m	Below overflow	
DEAD STORAGE VOLUME, Dds	0.15	m	GD01 recommended minimum	
TOTAL WATER DEPTH REQUIRED	0.19	m		
SELECTED TANK OUTFLOW, Qout, l/s	0.00123	m3/s	Selected tank outflow	
AVERAGE HYDRAULIC HEAD, Hhy	0.02	m		
AREA OF ORIFICE, Aorifice	3.02E-03	m2		
ORIFICE DIAMETER, Dorifice	62	mm		
VELOCITY AT ORIFICE	0.93	m/s	At max. head level	

HIRDS V4 Intensity-Duration-Frequency Results
Sitename: ۷ Kohukohu
Coordinate system: WGS84
Longitude: 173.5343
Latitude: -35.3672
DDF Model Parameters: c d e f g h i
Values: 0.002469 0.470879 -0.015 -0.00239 0.252934 -0.01112 3.023371
Example: Duration (h ARI (yrs) x y Rainfall Rate (mm/hr)
24 100 3.178054 4.600149 7.98762

Rainfall intensities (mm/hr) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	51.2	36.2	29.5	20.5	14.1	7.48	4.85	3.04	1.84	1.35	1.07	0.89
2	0.5	56.1	39.6	32.3	22.5	15.5	8.22	5.33	3.35	2.03	1.48	1.18	0.98
5	0.2	72.6	51.4	41.9	29.3	20.2	10.7	6.98	4.39	2.67	1.95	1.55	1.29
10	0.1	84.8	60.1	49	34.3	23.7	12.6	8.21	5.18	3.15	2.31	1.83	1.53
20	0.05	97.2	69.1	56.4	39.5	27.3	14.6	9.49	5.99	3.64	2.67	2.13	1.77
30	0.033	105	74.4	60.7	42.6	29.5	15.8	10.3	6.48	3.95	2.9	2.31	1.92
40	0.025	110	78.2	63.9	44.8	31	16.6	10.8	6.83	4.16	3.06	2.43	2.03
50	0.02	114	81.2	66.3	46.6	32.2	17.3	11.3	7.11	4.33	3.18	2.53	2.11
60	0.017	118	83.6	68.3	48	33.2	17.8	11.6	7.34	4.47	3.29	2.62	2.18
80	0.013	123	87.5	71.5	50.3	34.8	18.7	12.2	7.7	4.7	3.45	2.75	2.29
100	0.01	127	90.5	74	52	36	19.3	12.6	7.99	4.87	3.58	2.85	2.38
250	0.004	144	103	84.1	59.2	41.1	22.1	14.4	9.15	5.59	4.12	3.28	2.74

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	6.4	4.2	3.1	2.2	1.6	0.97	0.68	0.31	0.14	0.064	0.066	0.091
2	0.5	7	4.6	3.3	2.5	1.7	1.1	0.75	0.35	0.16	0.07	0.073	0.1
5	0.2	9.6	6.5	4.7	3.5	2.3	1.4	1	0.48	0.22	0.1	0.11	0.14
10	0.1	12	8.4	6.2	4.5	3	1.8	1.2	0.59	0.28	0.14	0.14	0.17
20	0.05	16	11	8.2	5.7	3.9	2.3	1.5	0.73	0.35	0.2	0.18	0.21
30	0.033	18	13	9.7	6.7	4.5	2.6	1.8	0.83	0.4	0.23	0.21	0.23
40	0.025	20	14	11	7.4	5	2.9	1.9	0.9	0.45	0.26	0.24	0.25
50	0.02	21	16	12	8.1	5.5	3.1	2.1	0.97	0.48	0.29	0.26	0.27
60	0.017	23	17	13	8.6	5.9	3.3	2.2	1	0.51	0.31	0.28	0.29
80	0.013	25	19	14	9.6	6.6	3.7	2.4	1.1	0.56	0.35	0.31	0.31
100	0.01	27	20	16	10	7.2	4	2.6	1.2	0.6	0.38	0.33	0.33
250	0.004	38	28	22	15	10	5.6	3.6	1.6	0.82	0.54	0.46	0.44

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	54.8	38.7	31.5	22	15.1	7.9	5.08	3.17	1.91	1.39	1.1	0.914
2	0.5	60.1	42.5	34.6	24.1	16.6	8.69	5.59	3.49	2.1	1.53	1.21	1.01
5	0.2	78.1	55.3	45.1	31.5	21.7	11.4	7.36	4.59	2.77	2.02	1.6	1.33
10	0.1	91.3	64.8	52.8	37	25.5	13.4	8.68	5.42	3.28	2.4	1.9	1.58
20	0.05	105	74.5	60.8	42.6	29.4	15.5	10	6.28	3.8	2.78	2.21	1.83
30	0.033	113	80.3	65.5	46	31.7	16.8	10.9	6.8	4.12	3.01	2.39	1.99
40	0.025	119	84.4	68.9	48.4	33.4	17.7	11.5	7.17	4.34	3.18	2.52	2.1
50	0.02	123	87.7	71.6	50.3	34.7	18.4	11.9	7.46	4.52	3.31	2.63	2.19
60	0.017	127	90.3	73.8	51.8	35.8	19	12.3	7.71	4.67	3.42	2.72	2.26
80	0.013	133	94.5	77.3	54.3	37.5	19.9	12.9	8.09	4.91	3.59	2.85	2.38
100	0.01	137	97.8	79.9	56.2	38.8	20.6	13.4	8.39	5.09	3.73	2.96	2.46
250	0.004	156	111	90.8	63.9	44.2	23.6	15.3	9.62	5.84	4.28	3.41	2.83

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	54.8	38.7	31.5	22	15.1	7.9	5.08	3.17	1.91	1.39	1.1	0.914
2	0.5	60.1	42.5	34.6	24.1	16.6	8.69	5.59	3.49	2.1	1.53	1.21	1.01
5	0.2	78.1	55.3	45.1	31.5	21.7	11.4	7.36	4.59	2.77	2.02	1.6	1.33
10	0.1	91.3	64.8	52.8	37	25.5	13.4	8.68	5.42	3.28	2.4	1.9	1.58
20	0.05	105	74.5	60.8	42.6	29.4	15.5	10	6.28	3.8	2.78	2.21	1.83
30	0.033	113	80.3	65.5	46	31.7	16.8	10.9	6.8	4.12	3.01	2.39	1.99
40	0.025	119	84.4	68.9	48.4	33.4	17.7	11.5	7.17	4.34	3.18	2.52	2.1
50	0.02	123	87.7	71.6	50.3	34.7	18.4	11.9	7.46	4.52	3.31	2.63	2.19
60	0.017	127	90.3	73.8	51.8	35.8	19	12.3	7.71	4.67	3.42	2.72	2.26
80	0.013	133	94.5	77.3	54.3	37.5	19.9	12.9	8.09	4.91	3.59	2.85	2.38
100	0.01	137	97.8	79.9	56.2	38.8	20.6	13.4	8.39	5.09	3.73	2.96	2.46
250	0.004	156	111	90.8	63.9	44.2	23.6	15.3	9.62	5.84	4.28	3.41	2.83

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	55.8	39.4	32.1	22.4	15.3	8.01	5.14	3.2	1.92	1.4	1.11	0.92
2	0.5	61.1	43.2	35.2	24.6	16.8	8.81	5.66	3.52	2.12	1.54	1.22	1.01
5	0.2	79.5	56.3	45.9	32.1	22	11.6	7.45	4.65	2.8	2.04	1.62	1.34
10	0.1	93	66	53.8	37.7	25.9	13.6	8.79	5.49	3.31	2.42	1.92	1.59
20	0.05	107	75.8	61.9	43.4	29.9	15.8	10.2	6.35	3.84	2.8	2.23	1.85
30	0.033	115	81.8	66.8	46.8	32.3	17.1	11	6.88	4.16	3.04	2.41	2
40	0.025	121	86	70.2	49.3	34	18	11.6	7.26	4.39	3.21	2.55	2.12
50	0.02	126	89.3	73	51.2	35.3	18.7	12.1	7.55	4.57	3.34	2.65	2.21
60	0.017	129	92	75.2	52.8	36.4	19.3	12.5	7.8	4.72	3.46	2.74	2.28
80	0.013	135	96.3	78.7	55.3	38.2	20.2	13.1	8.19	4.96	3.63	2.88	2.4
100	0.01	140	99.6	81.4	57.3	39.5	21	13.6	8.5	5.14	3.77	2.99	2.49
250	0.004	159	113	92.5	65.1	45.1	24	15.5	9.74	5.9	4.33	3.44	2.86

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	58.6	41.4	33.7	23.5	16	8.34	5.32	3.3	1.97	1.43	1.13	0.938
2	0.5	64.3	45.5	37	25.8	17.7	9.19	5.87	3.64	2.18	1.58	1.25	1.04
5	0.2	83.8	59.4	48.4	33.8	23.2	12.1	7.76	4.81	2.88	2.1	1.66	1.38
10	0.1	98.2	69.7	56.8	39.8	27.3	14.3	9.16	5.68	3.41	2.49	1.97	1.63
20	0.05	113	80.2	65.4	45.9	31.5	16.5	10.6	6.58	3.96	2.89	2.29	1.9
30	0.033	122	86.4	70.6	49.5	34.1	17.9	11.5	7.13	4.29	3.13	2.48	2.06
40	0.025	128	90.9	74.2	52.1	35.9	18.9	12.1	7.53	4.53	3.31	2.62	2.18
50	0.02	133	94.5	77.2	54.2	37.3	19.6	12.6	7.84	4.72	3.45	2.73	2.27
60	0.017	137	97.3	79.5	55.8	38.5	20.3	13	8.1	4.88	3.56	2.82	2.34
80	0.013	143	102	83.3	58.5	40.3	21.2	13.7	8.5	5.12	3.74	2.96	2.46
100	0.01	148	105	86.2	60.6	41.8	22	14.2	8.82	5.32	3.88	3.08	2.55
250	0.004	168	120	97.9	68.9	47.6	25.2	16.2	10.1	6.1	4.46	3.54	2.94

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	55.4	39.1	31.8	22.2	15.2	7.96	5.11	3.19	1.91	1.39	1.1	0.917
2	0.5	60.7	42.9	35	24.4	16.7	8.76	5.63	3.51	2.11	1.54	1.22	1.01
5	0.2	78.9	55.9	45.6	31.9	21.9	11.5	7.41	4.62	2.79	2.04	1.61	1.34
10	0.1	92.3	65.5	53.4	37.4	25.7	13.6	8.75	5.46	3.3	2.41	1.91	1.59
20	0.05	106	75.3	61.5	43.1	29.7	15.7	10.1	6.32	3.82	2.79	2.22	1.84
30	0.033	114	81.2	66.3	46.5	32	17	10.9	6.85	4.14	3.03	2.4	2
40	0.025	120	85.3	69.7	48.9	33.7	17.9	11.5	7.22	4.37	3.2	2.54	2.11
50	0.02	125	88.6	72.4	50.8	35.1	18.6	12	7.52	4.55	3.33	2.64	2.2
60	0.017	128	91.3	74.6	52.4	36.2	19.2	12.4	7.77	4.7	3.44	2.73	2.27
80	0.013	134	95.6	78.1	54.9	37.9	20.1	13	8.15	4.94	3.61	2.87	2.39
100	0.01	139	98.9	80.8	56.8	39.3	20.8	13.5	8.45	5.12	3.75	2.98	2.48
250	0.004	157	112	91.8	64.7	44.7	23.8	15.4	9.69	5.88	4.31	3.43	2.85

Rainfall intensities (mm/hr) :: RCP6.0 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	61.2	43.2	35.2	24.5	16.7	8.63	5.48	3.39	2.02	1.46	1.15	0.955
2	0.5	67.2	47.5	38.7	27	18.4	9.53	6.06	3.74	2.23	1.62	1.28	1.06
5	0.2	87.7	62.1	50.7	35.4	24.2	12.6	8.02	4.95	2.96	2.15	1.7	1.41
10	0.1	103	73	59.5	41.7	28.6	14.9	9.49	5.86	3.5	2.55	2.01	1.67
20	0.05	118	84	68.6	48.1	33	17.2	11	6.79	4.07	2.96	2.34	1.94
30	0.033	128	90.6	74	51.9	35.7	18.6	11.9	7.36	4.41	3.21	2.54	2.11
40	0.025	134	95.3	77.8	54.6	37.5	19.7	12.6	7.77	4.66	3.4	2.68	2.23
50	0.02	139	99.1	80.9	56.8	39.1	20.4	13.1	8.09	4.86	3.54	2.8	2.32
60	0.017	143	102	83.4	58.6	40.3	21.1	13.5	8.36	5.01	3.66	2.89	2.4
80	0.013	150	107	87.4	61.4	42.2	22.1	14.2	8.77	5.27	3.84	3.04	2.52
100	0.01	155	111	90.4	63.6	43.7	23	14.7	9.11	5.47	3.99	3.16	2.62
250	0.004	176	126	103	72.3	49.8	26.2	16.8	10.4	6.28	4.58	3.63	3.01

Rainfall intensities (mm/hr) :: RCP8.5 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	56.4	39.9	32.4	22.6	15.5	8.08	5.18	3.22	1.93	1.41	1.11	0.924
2	0.5	61.9	43.8	35.6	24.9	17	8.9	5.71	3.55	2.13	1.55	1.23	1.02
5	0.2	80.5	57	46.5	32.5	22.3	11.7	7.52	4.68	2.82	2.06	1.63	1.35
10	0.1	94.2	66.8	54.5	38.2	26.2	13.8	8.88	5.53	3.33	2.43	1.93	1.6
20	0.05	108	76.9	62.7	44	30.3	16	10.3	6.41	3.87	2.82	2.24	1.86
30	0.033	117	82.9	67.7	47.5	32.7	17.3	11.1	6.94	4.19	3.06	2.43	2.02
40	0.025	123	87.1	71.2	49.9	34.4	18.2	11.7	7.32	4.42	3.23	2.56	2.13
50	0.02	127	90.5	73.9	51.9	35.8	18.9	12.2	7.62	4.61	3.37	2.67	2.22
60	0.017	131	93.2	76.2	53.5	36.9	19.5	12.6	7.87	4.76	3.48	2.76	2.29
80	0.013	137	97.6	79.8	56.1	38.7	20.5	13.2	8.26	5	3.66	2.9	2.41
100	0.01	142	101	82.6	58	40.1	21.2	13.7	8.57	5.18	3.79	3.01	2.5
250	0.004	161	115	93.8	66	45.6	24.3	15.7	9.82	5.95	4.36	3.46	2.88

Rainfall intensities (mm/hr) :: RCP8.5 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	67	47.3	38.5	26.9	18.2	9.3	5.85	3.59	2.12	1.53	1.2	0.993
2	0.5	73.7	52.1	42.4	29.6	20.2	10.3	6.49	3.97	2.35	1.69	1.33	1.1
5	0.2	96.6	68.4	55.8	39	26.6	13.7	8.63	5.28	3.13	2.27	1.78	1.47
10	0.1	113	80.5	65.6	45.9	31.4	16.2	10.2	6.26	3.71	2.69	2.12	1.75
20	0.05	131	92.7	75.7	53.1	36.3	18.8	11.9	7.26	4.32	3.13	2.47	2.04
30	0.033	141	100	81.7	57.3	39.3	20.3	12.9	7.87	4.69	3.4	2.68	2.21
40	0.025	148	105	86	60.3	41.3	21.4	13.6	8.32	4.95	3.59	2.83	2.34
50	0.02	154	109	89.4	62.8	43	22.3	14.1	8.65	5.16	3.74	2.95	2.44
60	0.017	158	113	92.2	64.7	44.4	23	14.6	8.95	5.33	3.87	3.05	2.52
80	0.013	166	118	96.6	67.9	46.6	24.2	15.3	9.39	5.61	4.07	3.2	2.65
100	0.01	172	122	100	70.3	48.2	25.1	15.9	9.76	5.82	4.22	3.33	2.75
250	0.004	195	139	114	80	55	28.6	18.2	11.2	6.68	4.85	3.83	3.17

HIRDS V4 Depth-Duration-Frequency Results
Sitename: ∢ Kohukohu
Coordinate system: WGS84
Longitude: 173.5343
Latitude: -35.3672

DDF Model Parameters:	c	d	e	f	g	h	i
Values:	0.002469	0.470879	-0.015	-0.00239	0.252934	-0.01112	3.023371

Example: Duration (h) 24 | ARI (yrs) 100 | x 3.178054 | y 4.600149 | Rainfall Depth (mm) 191.7029

Rainfall depths (mm) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	8.54	12.1	14.7	20.5	28.3	44.9	58.2	73	88.4	97.1	103	107
2	0.5	9.35	13.2	16.1	22.5	31	49.3	63.9	80.3	97.3	107	113	118
5	0.2	12.1	17.1	21	29.3	40.4	64.5	83.7	105	128	141	149	155
10	0.1	14.1	20	24.5	34.3	47.4	75.8	98.6	124	151	166	176	183
20	0.05	16.2	23	28.2	39.5	54.6	87.5	114	144	175	193	204	213
30	0.033	17.4	24.8	30.4	42.6	58.9	94.5	123	156	189	209	221	230
40	0.025	18.3	26.1	31.9	44.8	62	99.6	130	164	200	220	234	243
50	0.02	19	27.1	33.2	46.6	64.5	104	135	171	208	229	243	253
60	0.017	19.6	27.9	34.2	48	66.5	107	139	176	215	237	251	262
80	0.013	20.5	29.2	35.8	50.3	69.6	112	146	185	226	249	264	275
100	0.01	21.2	30.2	37	52	72.1	116	152	192	234	258	274	285
250	0.004	24	34.2	42	59.2	82.1	133	173	220	268	296	315	328

Depth standard error (mm) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	1.1	1.4	1.6	2.2	3	5.7	7.8	7.8	6.8	4.5	6.2	11
2	0.5	1.2	1.5	1.7	2.4	3.3	6.3	8.6	8.7	7.6	5	6.8	12
5	0.2	1.6	2.2	2.5	3.3	4.6	8.6	12	12	11	7.7	9.7	17
10	0.1	2.1	2.8	3.2	4.2	5.8	11	15	15	13	11	13	20
20	0.05	2.6	3.6	4.3	5.3	7.5	13	18	18	17	14	17	25
30	0.033	3	4.2	5	6.2	8.6	15	21	21	20	17	20	28
40	0.025	3.3	4.7	5.6	6.8	9.6	17	23	23	22	19	22	31
50	0.02	3.6	5.1	6.1	7.4	10	18	25	24	23	21	24	33
60	0.017	3.8	5.4	6.5	7.9	11	20	26	26	25	23	26	35
80	0.013	4.2	6	7.3	8.8	12	22	29	28	27	26	29	38
100	0.01	4.6	6.5	7.9	9.5	13	24	31	30	30	28	31	41
250	0.004	6.3	9	11	13	19	33	43	40	40	40	44	54

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.14	12.9	15.8	22	30.1	47.4	60.9	76.1	91.5	100	106	110
2	0.5	10	14.2	17.3	24.1	33.1	52.2	67.1	83.7	101	110	116	121
5	0.2	13	18.4	22.5	31.5	43.3	68.5	88.3	110	133	146	154	160
10	0.1	15.2	21.6	26.4	37	50.9	80.6	104	130	157	172	182	189
20	0.05	17.5	24.8	30.4	42.6	58.7	93.2	120	151	182	200	212	220
30	0.033	18.8	26.8	32.8	46	63.4	101	130	163	198	217	230	239
40	0.025	19.8	28.1	34.5	48.4	66.8	106	137	172	208	229	242	252
50	0.02	20.5	29.2	35.8	50.3	69.4	110	143	179	217	238	253	262
60	0.017	21.2	30.1	36.9	51.8	71.6	114	148	185	224	246	261	271
80	0.013	22.1	31.5	38.6	54.3	75	120	155	194	236	259	274	285
100	0.01	22.9	32.6	40	56.2	77.7	124	161	201	244	268	284	296
250	0.004	25.9	37	45.4	63.9	88.5	142	184	231	280	308	327	340

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.14	12.9	15.8	22	30.1	47.4	60.9	76.1	91.5	100	106	110
2	0.5	10	14.2	17.3	24.1	33.1	52.2	67.1	83.7	101	110	116	121
5	0.2	13	18.4	22.5	31.5	43.3	68.5	88.3	110	133	146	154	160
10	0.1	15.2	21.6	26.4	37	50.9	80.6	104	130	157	172	182	189
20	0.05	17.5	24.8	30.4	42.6	58.7	93.2	120	151	182	200	212	220
30	0.033	18.8	26.8	32.8	46	63.4	101	130	163	198	217	230	239
40	0.025	19.8	28.1	34.5	48.4	66.8	106	137	172	208	229	242	252
50	0.02	20.5	29.2	35.8	50.3	69.4	110	143	179	217	238	253	262
60	0.017	21.2	30.1	36.9	51.8	71.6	114	148	185	224	246	261	271
80	0.013	22.1	31.5	38.6	54.3	75	120	155	194	236	259	274	285
100	0.01	22.9	32.6	40	56.2	77.7	124	161	201	244	268	284	296
250	0.004	25.9	37	45.4	63.9	88.5	142	184	231	280	308	327	340

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.29	13.1	16	22.4	30.6	48	61.6	76.8	92.2	101	106	110
2	0.5	10.2	14.4	17.6	24.6	33.7	52.9	67.9	84.6	102	111	117	122
5	0.2	13.2	18.8	22.9	32.1	44.1	69.5	89.4	111	134	147	155	161
10	0.1	15.5	22	26.9	37.7	51.8	81.9	106	132	159	174	184	191
20	0.05	17.8	25.3	31	43.4	59.8	94.7	122	152	184	202	214	222
30	0.033	19.2	27.3	33.4	46.8	64.5	102	132	165	200	219	232	241
40	0.025	20.1	28.7	35.1	49.3	68	108	139	174	211	231	245	254
50	0.02	20.9	29.8	36.5	51.2	70.7	112	145	181	219	241	255	265
60	0.017	21.5	30.7	37.6	52.8	72.9	116	150	187	227	249	263	273
80	0.013	22.5	32.1	39.4	55.3	76.4	121	157	197	238	261	277	288
100	0.01	23.3	33.2	40.7	57.3	79.1	126	163	204	247	271	287	298
250	0.004	26.4	37.7	46.3	65.1	90.1	144	186	234	283	311	330	343

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.77	13.8	16.9	23.5	32.1	50	63.8	79.2	94.6	103	109	113
2	0.5	10.7	15.2	18.5	25.8	35.4	55.1	70.5	87.3	104	114	120	124
5	0.2	14	19.8	24.2	33.8	46.4	72.7	93.1	115	138	151	159	165
10	0.1	16.4	23.2	28.4	39.8	54.6	85.7	110	136	164	179	189	196
20	0.05	18.8	26.7	32.7	45.9	63.1	99.2	127	158	190	208	220	228
30	0.033	20.3	28.8	35.3	49.5	68.1	107	138	171	206	225	238	247
40	0.025	21.3	30.3	37.1	52.1	71.7	113	145	181	217	238	251	261
50	0.02	22.1	31.5	38.6	54.2	74.6	118	151	188	227	248	262	272
60	0.017	22.8	32.4	39.8	55.8	76.9	122	156	194	234	256	271	281
80	0.013	23.9	34	41.7	58.5	80.7	127	164	204	246	269	284	295
100	0.01	24.7	35.1	43.1	60.6	83.5	132	170	212	255	279	295	307
250	0.004	28	39.9	49	68.9	95.2	151	195	243	293	321	340	353

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.23	13	15.9	22.2	30.4	47.8	61.3	76.5	91.9	100	106	110
2	0.5	10.1	14.3	17.5	24.4	33.5	52.6	67.6	84.2	101	111	117	121
5	0.2	13.2	18.6	22.8	31.9	43.8	69.1	89	111	134	147	155	161
10	0.1	15.4	21.8	26.7	37.4	51.5	81.4	105	131	158	173	183	190
20	0.05	17.7	25.1	30.7	43.1	59.4	94.1	121	152	183	201	213	221
30	0.033	19	27.1	33.1	46.5	64.1	102	131	164	199	218	231	240
40	0.025	20	28.4	34.9	48.9	67.5	107	139	173	210	230	244	253
50	0.02	20.8	29.5	36.2	50.8	70.2	112	144	180	218	240	254	264
60	0.017	21.4	30.4	37.3	52.4	72.3	115	149	186	226	248	262	273
80	0.013	22.4	31.9	39.1	54.9	75.8	121	156	196	237	260	275	287
100	0.01	23.1	33	40.4	56.8	78.5	125	162	203	246	270	286	297
250	0.004	26.2	37.4	45.9	64.7	89.5	143	185	233	282	310	329	342

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	10.2	14.4	17.6	24.5	33.4	51.8	65.8	81.4	96.8	105	111	115
2	0.5	11.2	15.8	19.3	27	36.9	57.2	72.8	89.7	107	116	122	127
5	0.2	14.6	20.7	25.3	35.4	48.5	75.5	96.3	119	142	155	163	169
10	0.1	17.1	24.3	29.8	41.7	57.1	89.1	114	141	168	184	193	200
20	0.05	19.7	28	34.3	48.1	66	103	132	163	195	213	225	233
30	0.033	21.3	30.2	37	51.9	71.3	112	143	177	212	231	244	253
40	0.025	22.3	31.8	38.9	54.6	75.1	118	151	186	224	245	258	267
50	0.02	23.2	33	40.5	56.8	78.1	123	157	194	233	255	269	278
60	0.017	23.9	34	41.7	58.6	80.5	127	162	201	241	263	278	287
80	0.013	25	35.6	43.7	61.4	84.5	133	170	211	253	277	292	302
100	0.01	25.9	36.9	45.2	63.6	87.5	138	176	219	263	287	303	314
250	0.004	29.3	41.8	51.4	72.3	99.7	157	202	250	301	330	348	361

Rainfall depths (mm) :: RCP8.5 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.4	13.3	16.2	22.6	30.9	48.5	62.1	77.4	92.8	101	107	111
2	0.5	10.3	14.6	17.8	24.9	34.1	53.4	68.5	85.2	102	112	118	122
5	0.2	13.4	19	23.2	32.5	44.6	70.2	90.3	112	135	148	156	162
10	0.1	15.7	22.3	27.3	38.2	52.5	82.8	107	133	160	175	185	192
20	0.05	18	25.6	31.4	44	60.5	95.7	123	154	186	203	215	223
30	0.033	19.4	27.6	33.8	47.5	65.4	104	133	166	201	220	233	242
40	0.025	20.4	29	35.6	49.9	68.8	109	141	176	212	233	246	256
50	0.02	21.2	30.2	37	51.9	71.6	113	146	183	221	242	257	266
60	0.017	21.8	31.1	38.1	53.5	73.8	117	151	189	228	251	265	275
80	0.013	22.9	32.5	39.9	56.1	77.4	123	159	198	240	263	278	289
100	0.01	23.6	33.7	41.3	58	80.1	127	165	206	249	273	289	300
250	0.004	26.8	38.2	46.9	66	91.3	146	188	236	286	314	332	345

Rainfall depths (mm) :: RCP8.5 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	11.2	15.8	19.3	26.9	36.4	55.8	70.2	86.2	102	110	115	119
2	0.5	12.3	17.4	21.2	29.6	40.3	61.8	77.9	95.2	113	122	128	132
5	0.2	16.1	22.8	27.9	39	53.2	81.9	104	127	150	163	171	177
10	0.1	18.9	26.8	32.8	45.9	62.8	96.9	123	150	178	194	203	210
20	0.05	21.8	30.9	37.9	53.1	72.6	113	142	174	207	225	237	245
30	0.033	23.5	33.4	40.9	57.3	78.5	122	154	189	225	245	257	266
40	0.025	24.7	35.1	43	60.3	82.7	129	163	200	237	259	272	281
50	0.02	25.6	36.5	44.7	62.8	86.1	134	170	208	248	269	284	293
60	0.017	26.4	37.6	46.1	64.7	88.8	138	175	215	256	279	293	302
80	0.013	27.7	39.4	48.3	67.9	93.2	145	184	225	269	293	308	318
100	0.01	28.6	40.8	50	70.3	96.5	150	191	234	279	304	320	330
250	0.004	32.4	46.3	56.8	80	110	172	219	268	320	349	368	380

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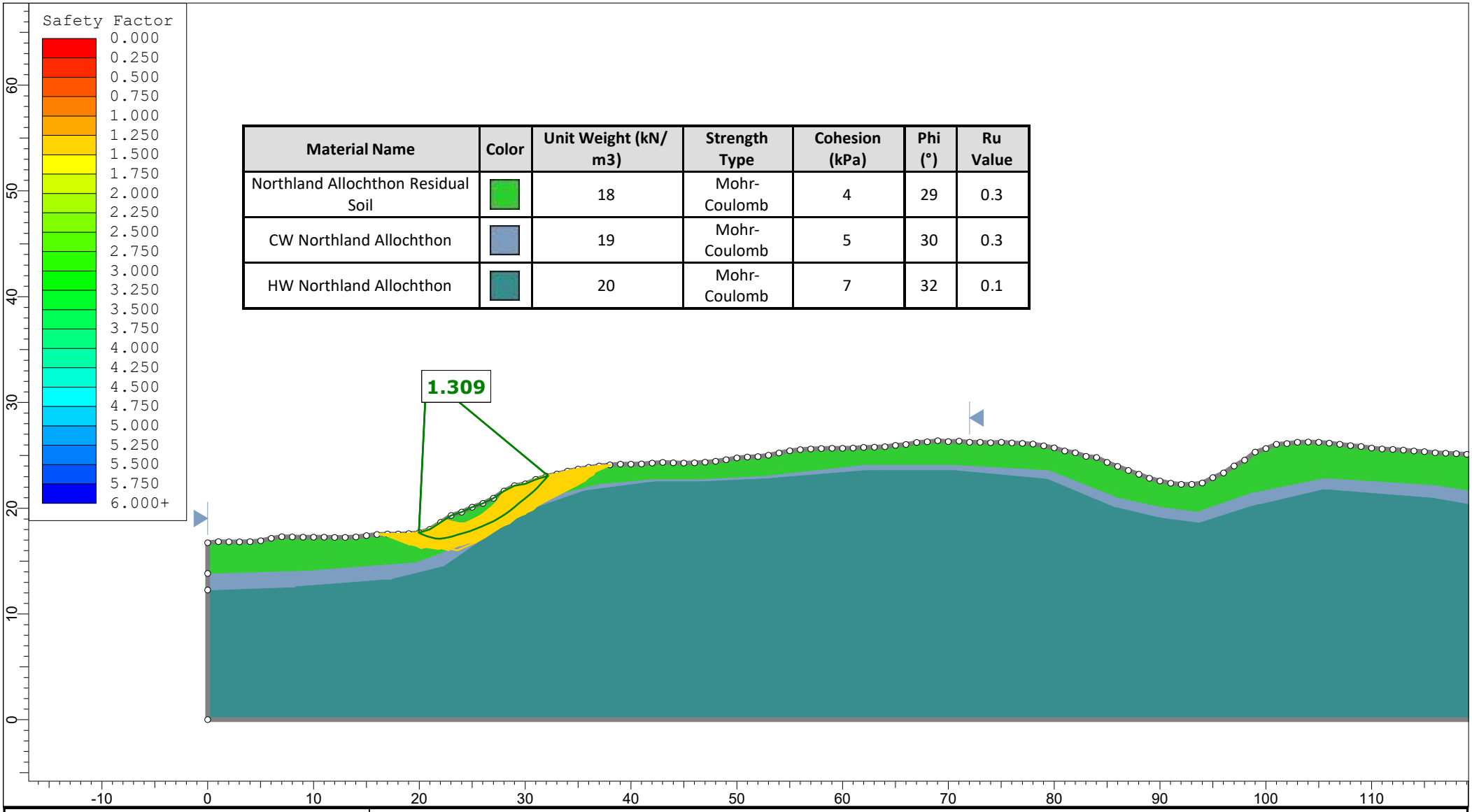
APPENDIX E

Slope Stability Analysis



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Ru Value
Northland Allochthon Residual Soil		18	Mohr-Coulomb	4	29	0.3
CW Northland Allochthon		19	Mohr-Coulomb	5	30	0.3
HW Northland Allochthon		20	Mohr-Coulomb	7	32	0.1

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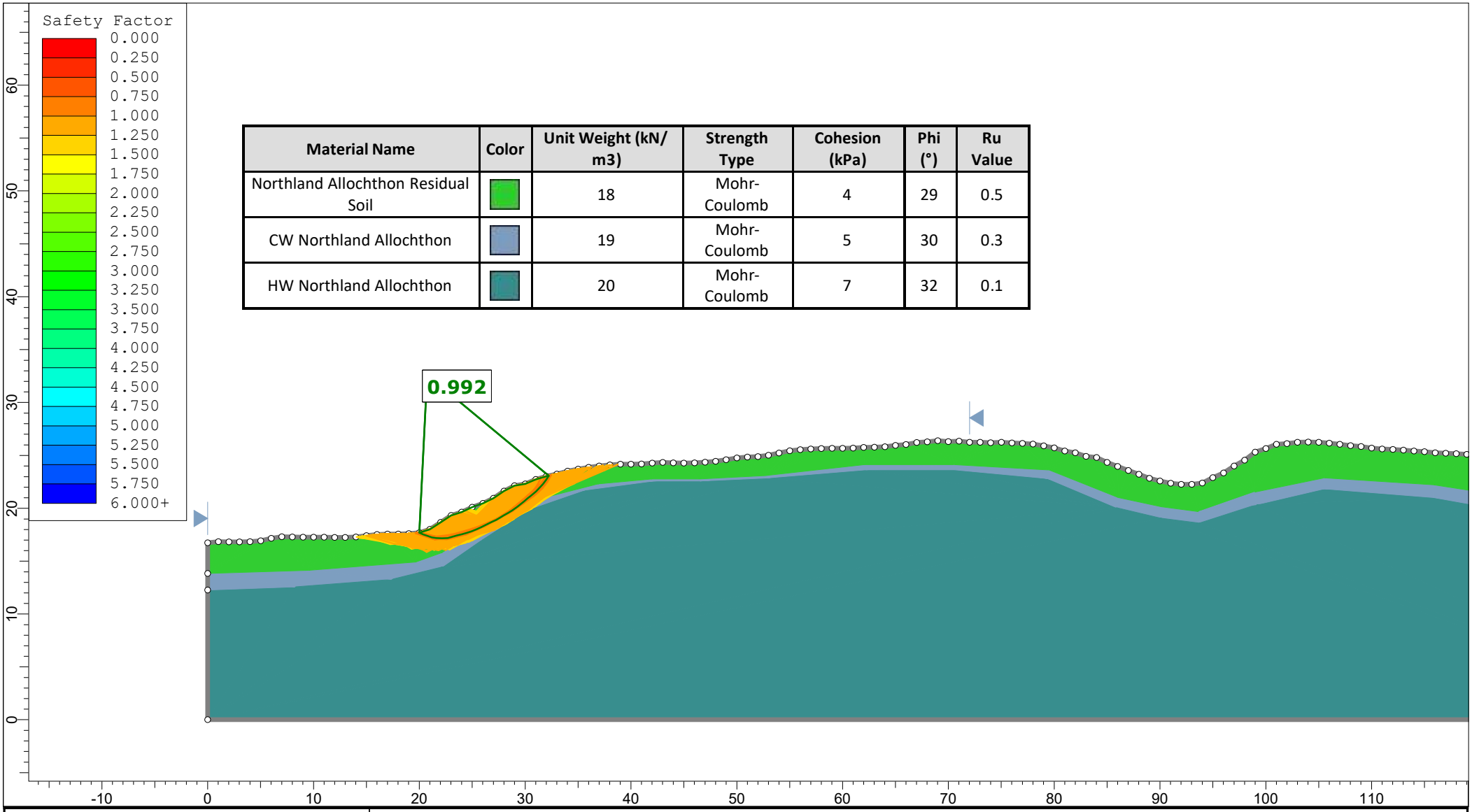
SLIDEINTERPRET 9.034

Project	45 Tauteihiihi Road, Kohukohu		
Group	Existing Condition	*Scenario*	Normal GW
Drawn By	DBT	*Company*	Geologix
Date	6/01/2025, 3:58:47 pm	*File Name*	Sections.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Ru Value
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CW Northland Allochthon		19	Mohr-Coulomb	5	30	0.3
HW Northland Allochthon		20	Mohr-Coulomb	7	32	0.1

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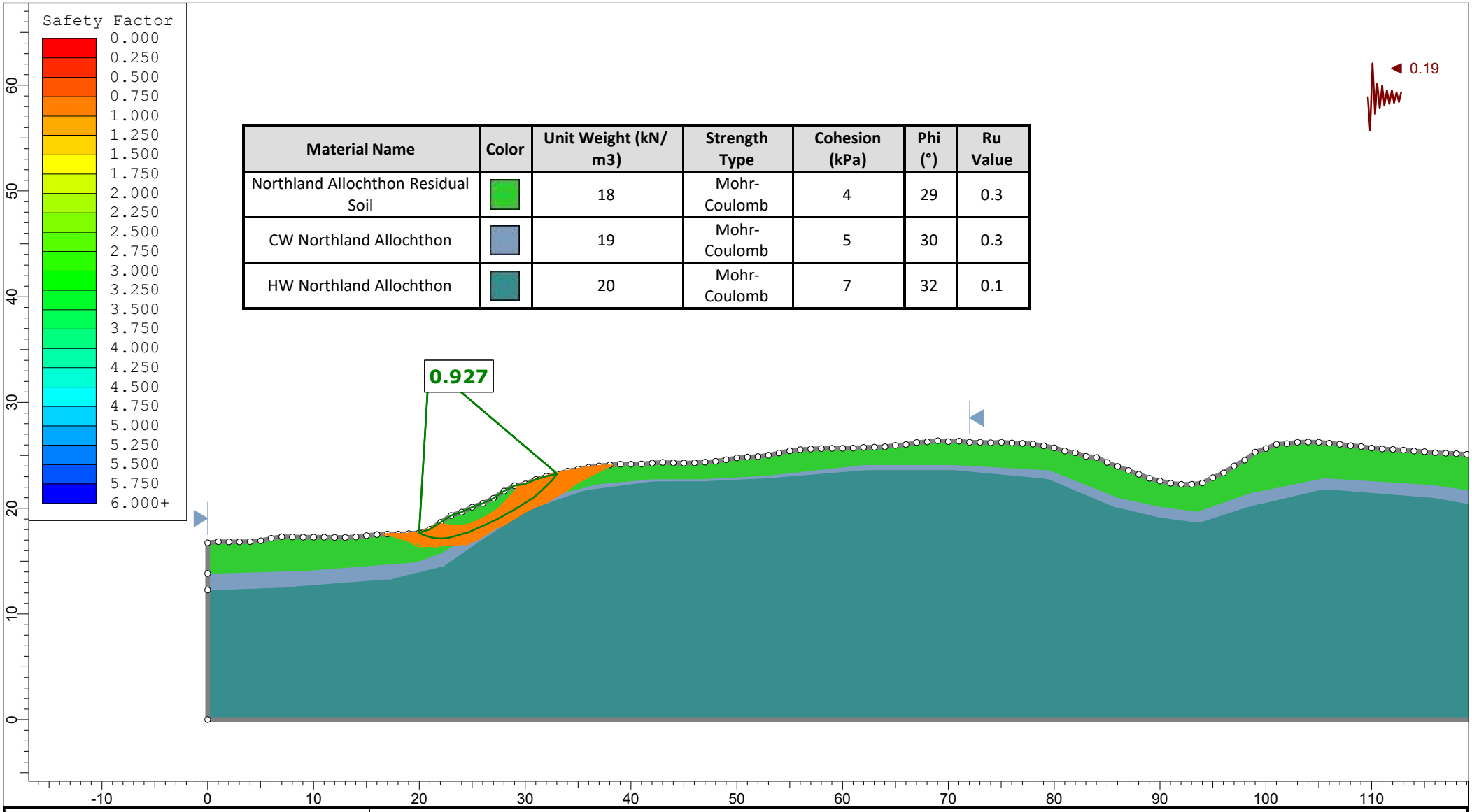
consulting engineers

SLIDEINTERPRET 9.034

Project	45 Tauteihiihi Road, Kohukohu		
Group	Existing Condition	*Scenario*	Elevated GW
Drawn By	DBT	*Company*	Geologix
Date	6/01/2025, 3:58:47 pm	*File Name*	Sections.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Ru Value
Northland Allochthon Residual Soil		18	Mohr-Coulomb	4	29	0.3
CW Northland Allochthon		19	Mohr-Coulomb	5	30	0.3
HW Northland Allochthon		20	Mohr-Coulomb	7	32	0.1

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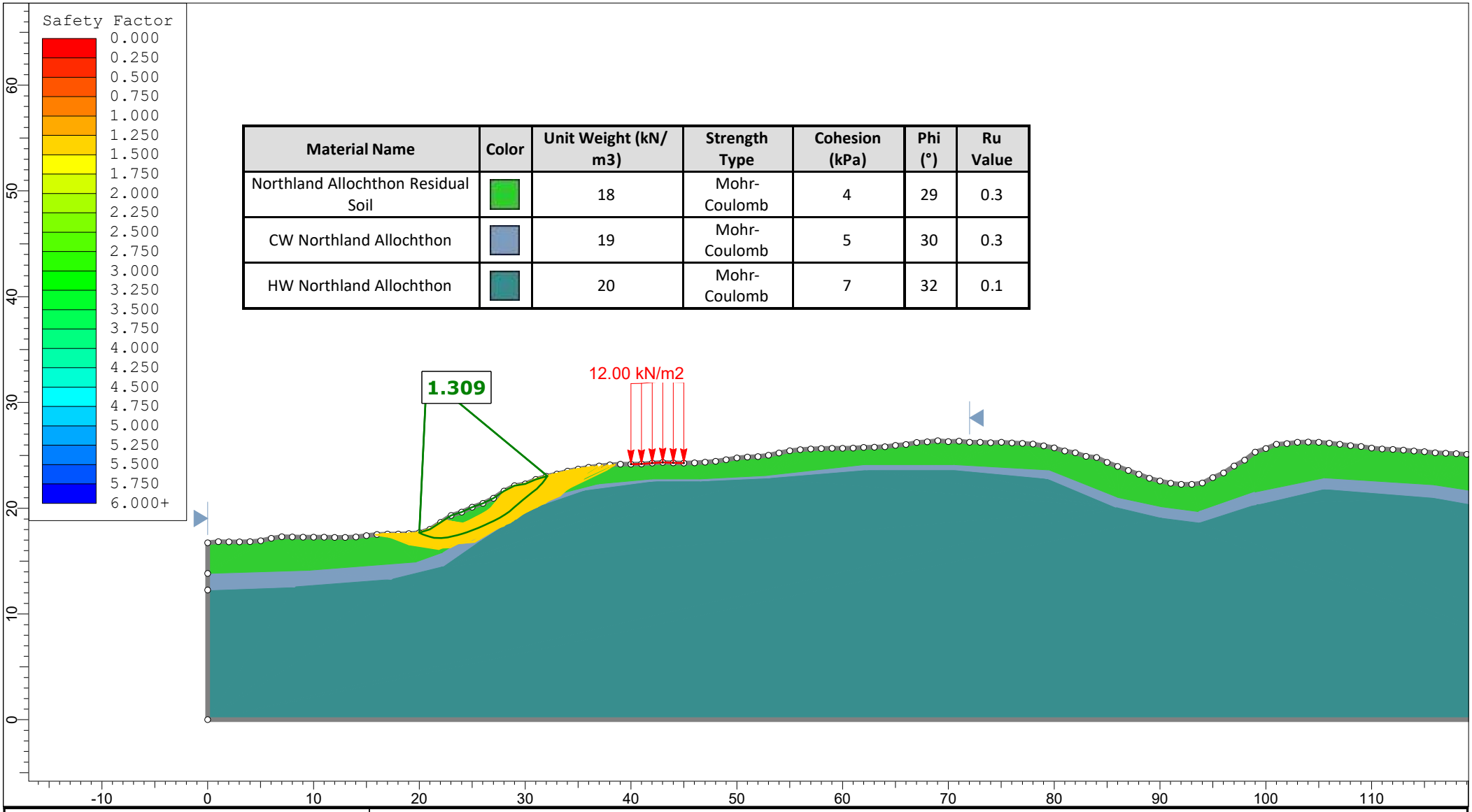
consulting engineers

SLIDEINTERPRET 9.034

Project	45 Tauteihiihi Road, Kohukohu		
Group	Existing Condition	*Scenario*	Sesimic
Drawn By	DBT	*Company*	Geologix
Date	6/01/2025, 3:58:47 pm	*File Name*	Sections.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Ru Value
Northland Allochthon Residual Soil		18	Mohr-Coulomb	4	29	0.3
CW Northland Allochthon		19	Mohr-Coulomb	5	30	0.3
HW Northland Allochthon		20	Mohr-Coulomb	7	32	0.1

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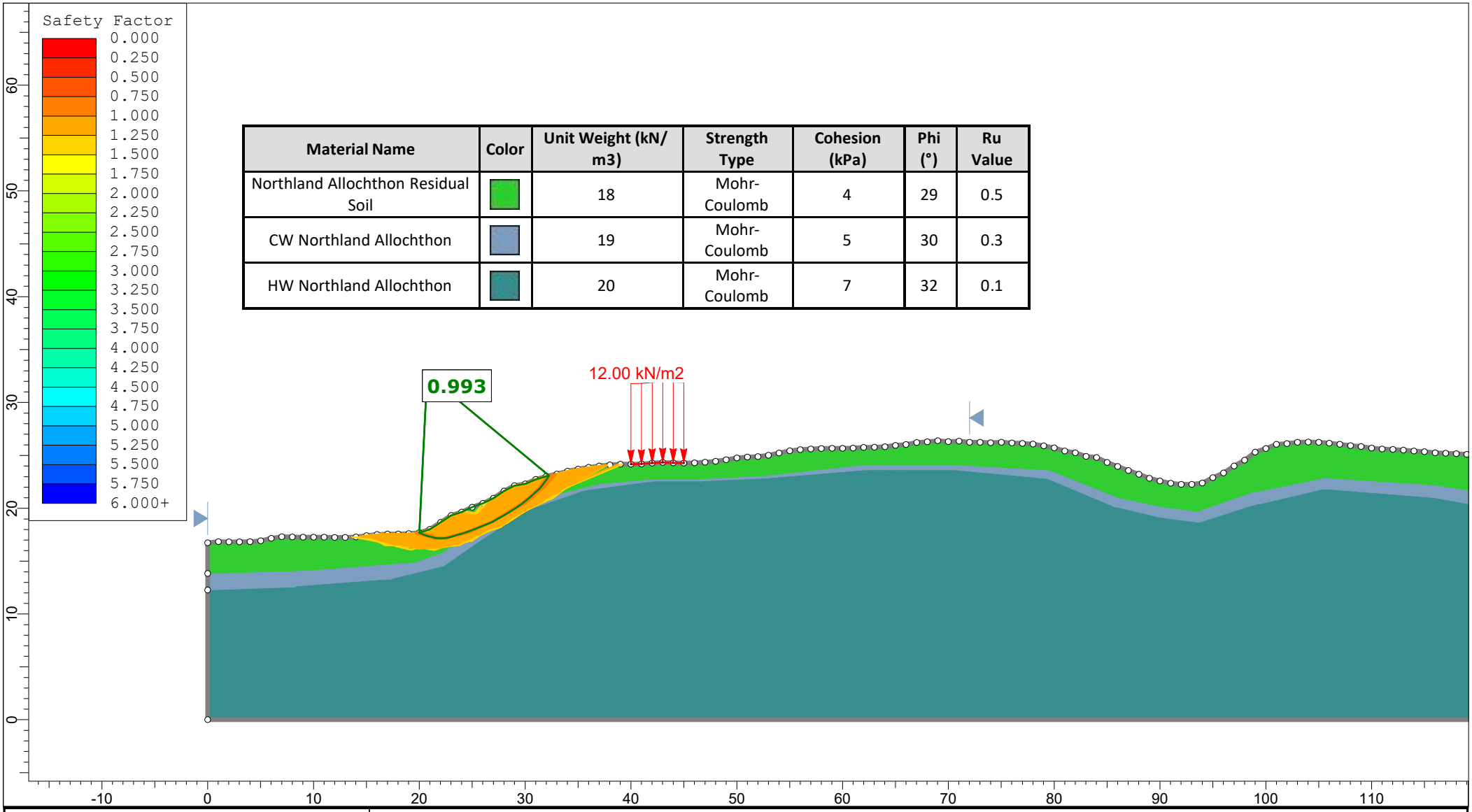
SLIDEINTERPRET 9.034

Project	45 Tauteihiihi Road, Kohukohu		
Group	Proposed Condition	*Scenario*	Normal GW
Drawn By	DBT	*Company*	Geologix
Date	6/01/2025, 3:58:47 pm	*File Name*	Sections.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Ru Value
Northland Allochthon Residual Soil		18	Mohr-Coulomb	4	29	0.5
CW Northland Allochthon		19	Mohr-Coulomb	5	30	0.3
HW Northland Allochthon		20	Mohr-Coulomb	7	32	0.1

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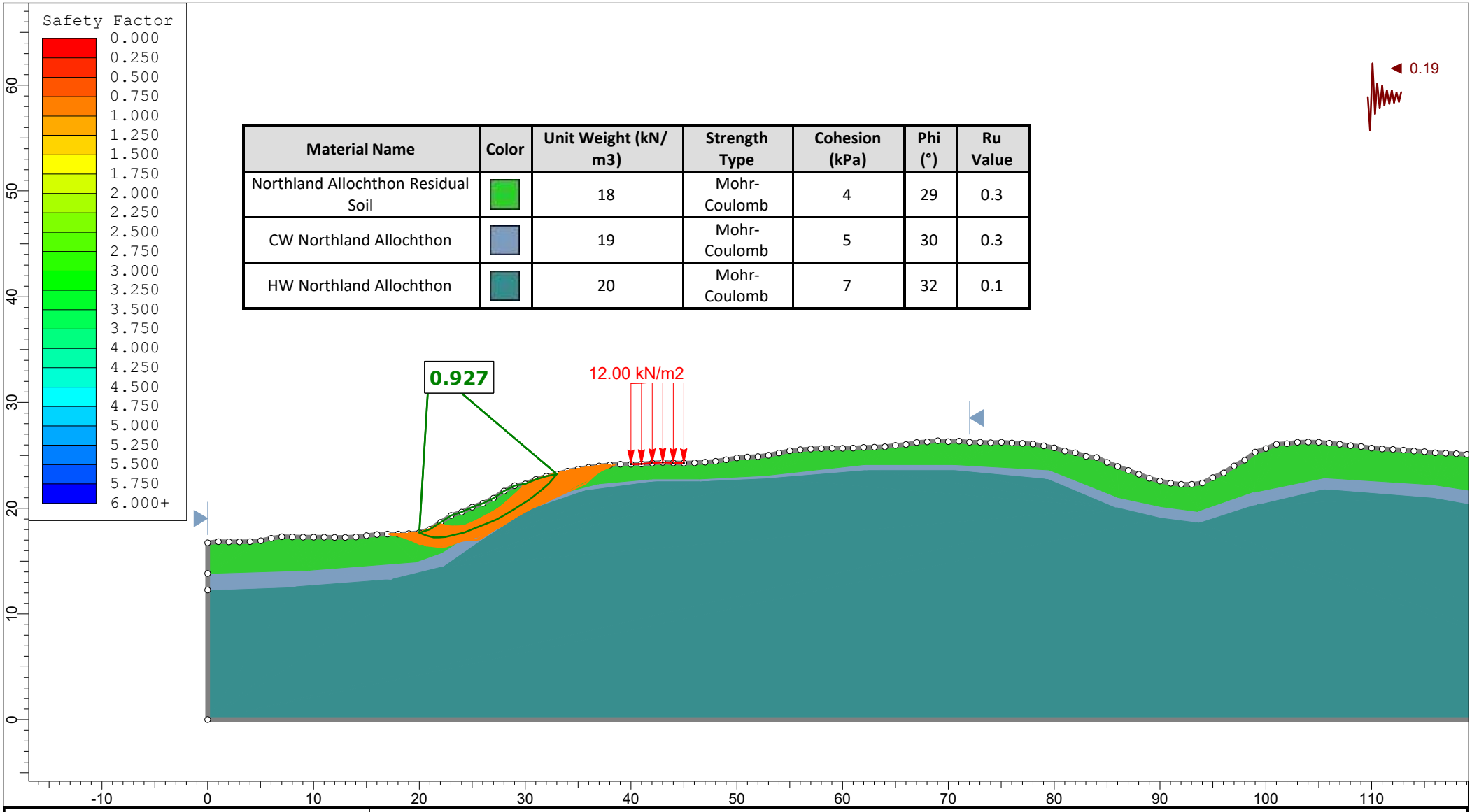
consulting engineers

SLIDEINTERPRET 9.034

Project	45 Tauteihiihi Road, Kohukohu		
Group	Proposed Condition	*Scenario*	Elevated GW
Drawn By	DBT	*Company*	Geologix
Date	6/01/2025, 3:58:47 pm	*File Name*	Sections.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Ru Value
Northland Allochthon Residual Soil		18	Mohr-Coulomb	4	29	0.3
CW Northland Allochthon		19	Mohr-Coulomb	5	30	0.3
HW Northland Allochthon		20	Mohr-Coulomb	7	32	0.1

geologix
consulting engineers

SLIDEINTERPRET 9.034

Project	45 Tauteihiihi Road, Kohukohu		
Group	Proposed Condition	*Scenario*	Sesimic
Drawn By	DBT	*Company*	Geologix
Date	6/01/2025, 3:58:47 pm	*File Name*	Sections.slmd

Non-Reticulated Firefighting Water Supplies, Vehicular Access & Vegetation Risk Reduction Application for New and Existing Residential Dwellings and Sub-Divisions

Contents

Section A - Firefighting Water Supplies and Vegetation Risk Reduction Waiver

"Fire and Emergency New Zealand strongly recommends the installation of automatic fire detection system devices such as smoke alarms for early warning of a fire and fire suppression systems such as sprinklers in buildings (irrespective of the water supply) to provide maximum protection to life and property".

Waiver Explanation Intent

Fire and Emergency New Zealand [FENZ] use the New Zealand Fire Service [NZFS] Code of Practice for firefighting water supplies (SNZ PAS 5409:2008) (The Code) as a tool to establish the quantity of water required for firefighting purposes in relation to a specific hazard (Dwelling, Building) based on its fire hazard classification regardless if they are located within urban fire districts with a reticulated water supply or a non-reticulated water supply in rural areas. The code has been adopted by the Territorial Authorities and Water Supply Authorities. The code can be used by developers and property owners to assess the adequacy of the firefighting water supply for new or existing buildings.

The Area Manager under the delegated authority of the Fire Region Manager is responsible for approving applications in relation to firefighting water supplies. The Area Manager may accept a variation or reduction in the amount of water required for firefighting for example; a single level dwelling measuring 200^{m2} requires 45,000L of firefighter water under the code, however the Area Managers in Northland have excepted a reduction to 10,000L.

This application form is used for the assessment of proposed water supplies for firefighting in non-reticulated areas only and is referenced from (Appendix B – Alternative Firefighting Water Sources) of the code. This application also provides fire risk reduction guidance in relation to vegetation and the 20-metre dripline rule under the Territorial Authority's District Plan. Fire and Emergency New Zealand are not a consenting authority and the final determination rests with the Territorial Authority.

For more information in relation to the code of practice for Firefighting Water supplies, Emergency Vehicle Access requirements, Home Fire Safety advice and Vegetation Risk Reduction Strategies visit www.fireandemergency.nz

Section B – Applicant Information

Applicants Information	
Name:	Rihari Wirihiona & Maggie Smith Whanau Trust
Address:	45 Tauteihiihi Road, Kohukohu
Contact Details:	021 376 983 - Nik Morrison (Project Manager)
Return Email Address:	info@northplanner.co.nz

Section C – Property Details

Property Details	
Address of Property:	45 Tauteihiihi Road, Kohukohu
Lot Number/s:	Tauteihiihi 2B4A & C
Dwelling Size: (Area = Length & Width)	65m2
Number of levels: (Single / Multiple)	Single

1. Fire Appliance Access to alternative firefighting water sources - Expected Parking Place & Turning circle

Fire and Emergency have specific requirements for fire appliance access to buildings and the firefighting water supply. This area is termed the hard stand. The roading gradient should not exceed 16%. The roading surface should be sealed, able to take the weight of a 14 to 20-tonne truck and trafficable at all times. The minimum roading width should not be less than 4 m and the property entrance no less 3.5 metres wide. The height clearance along access ways must exceed 4 metres with no obstructions for example; trees, hanging cables, and overhanging eaves.

1 (a) Fire Appliance Access / Right of Way	
Is there at least 4 metres clearance overhead free from obstructions?	☒YES ☐NO
Is the access at least 4 metres wide?	☐YES ☒NO
Is the surface designed to support a 20-tonne truck?	☒YES ☐NO
Are the gradients less than 16%	☒YES ☐NO
Fire Appliance parking distance from the proposed water supply is Parking will be available immediately outside the locations of the proposed dwellings. 2m metres	

If access to the proposed firefighting water supply is not achievable using a fire appliance, firefighters will need to use portable fire pumps. Firefighters will require at least a one-metre wide clear path / walkway to carry equipment to the water supply, and a working area of two metres by two metres for firefighting equipment to be set up and operated.

1 (b) Restricted access to firefighting water supply, portable pumps required
Has suitable access been provided? ☒YES ☐ NO
Comments: Fire fighting water supply is available at the road and via water tanks on site.

Internal FENZ Risk Reduction comments only:

Click or tap here to enter text.

2. Firefighting Water Supplies (FFWS)

What are you proposing to use as your firefighting water supply?

2 (a) Water Supply Single Dwelling	
Tank	☐ Concrete Tank ☒ Plastic Tank ☒ Above Ground (Fire Service coupling is required - 100mm screw thread suction coupling) ☐ Part Buried (max exposed 1.500 mm above ground) ☐ Fully Buried (access through filler spout) Volume of dedicated firefighting water 10,000L litres

2 (b) Water Supply Multi-Title Subdivision Lots / Communal Supply	
Tank Farm	☐ Concrete Tank ☐ Plastic Tank ☐ Above Ground (Fire Service coupling is required - 100mm screw thread suction coupling) ☐ Part Buried (max exposed 1.500mm above ground) ☐ Fully Buried (access through filler spout) Number of tanks provided Click or tap here to enter text. Number of Tank Farms provided Click or tap here to enter text. Water volume at each Tank Farm Click or tap here to enter text. Litres Volume of dedicated firefighting water Click or tap here to enter text. litres

2 (c) Alternative Water Supply	
Pond:	Volume of water: Unknown
Pool:	Volume of water: Click or tap here to enter text.
Other:	Specify: River adjacent to site / road
	Volume of water: Unknown

Internal FENZ Risk Reduction comments only:

Click or tap here to enter text.

3. Water Supply Location

The code requires the available water supply to be at least 6 metres from a building for firefighter safety, with a maximum distance of 90 metres from any building. This is the same for a single dwelling or a Multi-Lot residential subdivision. Is the proposed water supply within these requirements?

3 (a) Water Supply Location	
Minimum Distance:	*Is your water supply at least 6 metres from the building?* ☐YES ☒ NO
Maximum Distance	*Is your water supply no more than 90 metres from the building?* ☒YES ☐ NO

3 (b) Visibility
How will the water supply be readily identifiable to responding firefighters? E.g.: tank is visible to arriving firefighters or, there are signs / markers posts visible from the parking place directing them to the tank etc.
Comments: Both the river and water tanks will be visible to firefighters.

3 (c) Security
How will the FFWS be reasonably protected from tampering? E.g.: light chain and padlock or, cable tie on the valve etc.
Explain how this will be achieved: This is not of a concern

Internal FENZ Risk Reduction comments only:

Click or tap here to enter text.

4. Adequacy of Supply

The volume of storage that is reserved for firefighting purposes must not be used for normal operational requirements. Additional storage must be provided to balance diurnal peak demand, seasonal peak demand and normal system failures, for instance power outages. The intent is that there should always be sufficient volumes of water available for firefighting, except during Civil Défense emergencies or by prior arrangement with the Fire Region Manager.

4 (a) Adequacy of Water supply
Note: *The owner must maintain the firefighting water supply all year round. How will the usable capacity proposed be reliably maintained? E.g. automatically keep the tank topped up, drip feed, rain water, ballcock system, or manual refilling after use etc.*
Comments: Tanks will be drip fed with rain water, the river will be naturally filled with rain and spring water the dam is also naturally filled.

Internal FENZ Risk Reduction comments only:

Click or tap here to enter text.

5. Alternative Method using Appendix's H & J

If Table 1 + 2 from the Code of Practice is not being used for the calculation of the Firefighting Water Supply, a competent person using appendix H and J from the Code of Practice can propose an alternative method to determine firefighting water supply adequacy.

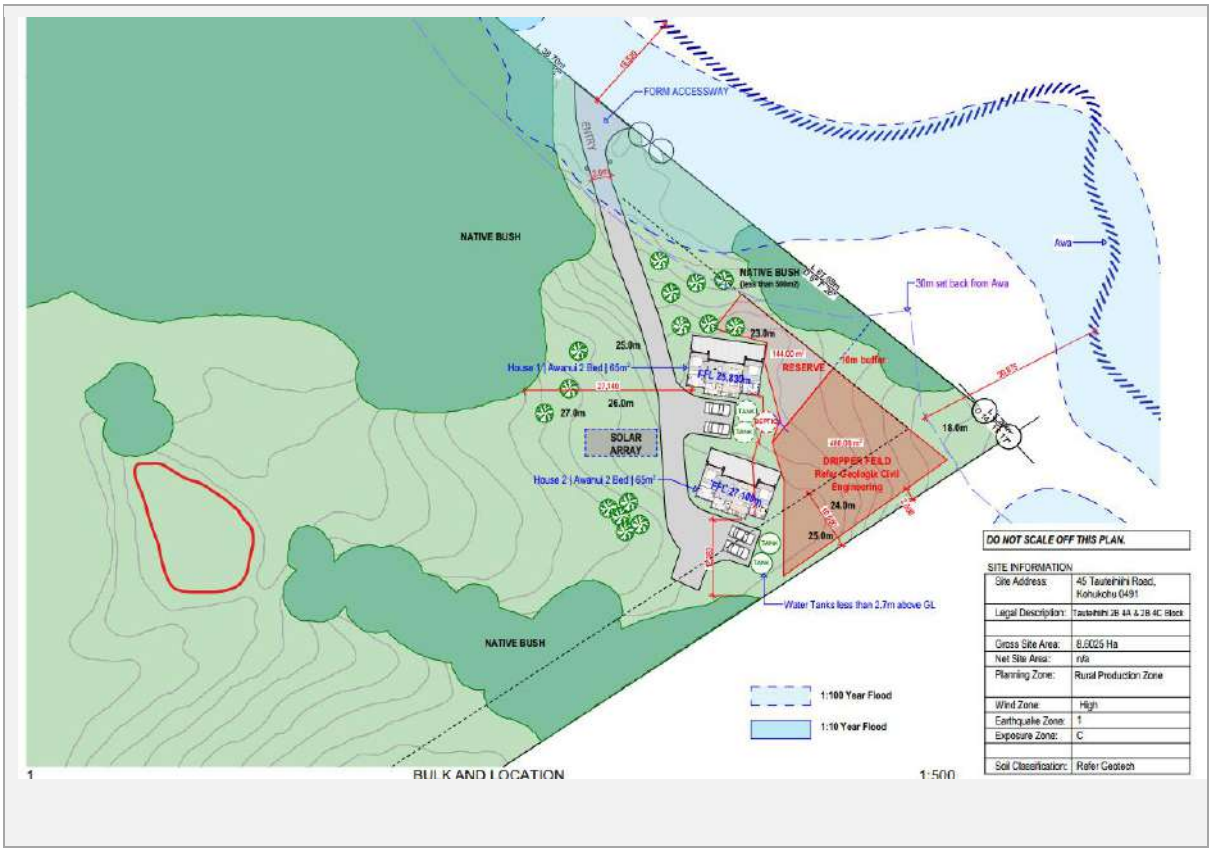
Appendix H describes a method for determining the maximum fire size in a structure. Appendix J describes a method for assessing the adequacy of the firefighting water supply to the premises.

5 (a) Alternative Method Appendix H & J	
If an alternative method of determining the FFWS has been proposed, who proposed it? Name: Click or tap here to enter text.	
Contact Details: Click or tap here to enter text.	
Proposed volume of storage?	Litres: Click or tap here to enter text.
Comments: Click or tap here to enter text. ** Please provide a copy of the calculations for consideration.*	

Internal FENZ Risk Reduction comments only: Click or tap here to enter text.

6. Diagram

Please provide a diagram identifying the location of the dwelling/s, the proposed firefighting water supply and the attendance point of the fire appliance to support your application.



Internal FENZ Risk Reduction comments only:

Click or tap here to enter text.

7. Vegetation Risk Reduction - Fire + Fuel = Why Homes Burn

Properties that are residential, industrial or agricultural, are on the urban–rural interface if they are next to vegetation, whether it is forest, scrubland, or in a rural setting. Properties in these areas are at greater risk of wildfire due to the increased presence of nearby vegetation.

In order to mitigate the risk of fire spread from surrounding vegetation to the proposed building and vice-versa, Fire Emergency New Zealand recommends the following;

I. *Fire safe construction*

Spouting and gutters – Clear regularly and consider screening with metal mesh. Embers can easily ignite dry material that collects in gutters.

Roof – Use fire resistant material such as steel or tile. Avoid butanol and rubber compounds.

Cladding – Stucco, metal sidings, brick, concrete, and fibre cement cladding are more fire resistant than wood or vinyl cladding.

II. *Establish Safety Zones around your home.*

Safety Zone 1 is your most import line of defence and requires the most consideration. Safety Zone 1 extends to 10 metres from your home, you should;

a) *Mow lawn and plant low-growing fire-resistant plants; and*
b) *Thin and prune trees and shrubs; and*
c) *Avoid tall trees close to the house; and*
d) *Use gravel or decorative crushed rock instead of bark or wood chip mulch; and*
e) *Remove flammable debris like twigs, pine needles and dead leaves from the roof and around and under the house and decks; and*
f) *Remove dead plant material along the fence lines and keep the grass short; and*
g) *Remove over hanging branches near powerlines in both Zone 1 and 2.*

III. *Safety Zone 2 extends from 10 – 30 metres of your home.*

a) *Remove scrub and dead or dying plants and trees; and*
b) *Thin excess trees; and*
c) *Evenly space remaining trees so the crowns are separated by 3-6 metres; and*
d) *Avoid planting clusters of highly flammable trees and shrubs*
e) *Prune tree branches to a height of 2 metres from the ground.*

IV. *Choose Fire Resistant Plants*

Fire resistant plants aren't fire proof, but they do not readily ignite. Most deciduous trees and shrubs are fire resistant. Some of these include: poplar, maple, ash, birch and willow. Install domestic sprinklers on the exterior of the sides of the building that are less 20 metres from the vegetation. Examples of highly flammable plants are: pine, cypress, cedar, fir, larch, redwood, spruce, kanuka, manuka.

For more information please go to https://www.fireandemergency.nz/at-home/the-threat-of-rural-fire/

If your building or dwelling is next to vegetation, whether it is forest, scrubland, or in a rural setting, please detail below what Risk Reduction measures you will take to mitigate the risk of fire development and spread involving vegetation?

7 (a) Vegetation Risk Reduction Strategy
On this allotment 2 dwellings are proposed. One of which will be within 20m of an area of native bush which exceeds 500m2. This vegetation is located on the southern and western portion of the affected house. There will be a 12m setback to bush.

Internal FENZ Risk Reduction comments only:

Click or tap here to enter text.

8. Applicant

Checklist	
☒	Site plan (scale drawing) – including; where to park a fire appliance, water supply, any other relevant information.
☒	Any other supporting documentation (diagrams, consent).

I submit this proposal for assessment.

Name: Rochelle Jacobs Dated: 5/03/2025

Contact No.: 027 449 8813

Email: info@northplanner.co.nz

Signature: Rochelle Jacobs

9. Approval

In reviewing the information that you have provided in relation to your application being approximately a Click or tap here to enter text. *square metre,* Choose an item. *dwelling/sub division, and non-sprinkler protected.*

The Area Manager of Fire and Emergency New Zealand under delegated authority from the Fire Region Manager, Te Hiku, has assessed the proposal in relation to firefighting water supplies and the vegetation risk strategy. The Manager Choose an item. *agree with the proposed alternate method of Fire Fighting Water Supplies. Furthermore; the Manager agrees with the Vegetation Risk Reduction strategies proposed by the applicant.*

Name: Click or tap here to enter text.

Signature: Click or tap here to enter text. Dated: Click or tap to enter a date.

P.P on behalf of the Area Mana

Fire and Emergency New Zealand
Te Tai Tokerau / Northland District

APPROVED
By GoffinJ at 9:59 am, Mar 05, 2025

Jason Goffin- Advisor Risk Reduction

Rochelle

From: Rochelle
Sent: Wednesday, 19 February 2025 10:50 am
To: Property Legalisation
Subject: RE: Licence to occupy for bridge replacement

Good Morning,

The existing bridge has failed, so the clients are now looking at options to replace access as soon as possible.

The resource consent is still a little while away given other reports we are waiting on. Is there another option to go through outside of RC to cover this structure within legal road?

The clients are now looking at a culvert, they are designing this to be permitted under the NES Freshwater and the regional plan. From a district council perspective what information would you require and under what application? A culvert would not trigger resource consent under the operative or proposed district plan.

Regards,

NORTHLAND
PLANNING & DEVELOPMENT

Rochelle Jacobs
Director / Senior Planner

Offices in Kaitaia & Kerikeri
09 408 1866 | 027 449 8813
Northland Planning & Development 2020 Limited

From: Rochelle
Sent: Wednesday, February 12, 2025 1:25 PM
To: Property Legalisation <propertylegalisation@fndc.govt.nz>
Subject: RE: Licence to occupy for bridge replacement

Cheers thanks for this. Also good to know as we normally receive LTO's for items such as retaining walls which are also permanent.

I'll assess this as a building under the DP and apply for any relevant rules which trigger the need for consent.

Regards,

NORTHLAND
PLANNING & DEVELOPMENT

Rochelle Jacobs
Director / Senior Planner

Offices in Kaitaia & Kerikeri
09 408 1866 | 027 449 8813
Northland Planning & Development 2020 Limited

From: Property Legalisation <propertylegalisation@fndc.govt.nz>
Sent: Wednesday, February 12, 2025 10:01 AM
To: Rochelle <rochelle@northplanner.co.nz>
Subject: RE: Licence to occupy for bridge replacement

Morning Rochelle,

I have researched our records and found no information on the existing bridge, its history or an existing licence to occupy.

I have also spoken with our Senior Asset Manager – Transportation Services (Roading).
She has advised that an LTO will not be granted. The proposal is for works of a permanent nature as its required to maintain access to this property.
LTO's are temporary, issued to the person and not the property. They can be revoked at Councils pleasure, as and when required.

Consideration should be made by our resource consents, building consents and/or vehicle crossing departments.

Regards

Property Legalisation

propertylegalisation@fndc.govt.nz
Te Kaunihera o Te Hiku o te Ika | Far North District Council

Pokapū Kōrero 24-hāora | 24-hour Contact Centre 0800 920 029
fndc.govt.nz

From: Rochelle <rochelle@northplanner.co.nz>
Sent: Tuesday, 11 February 2025 1:05 pm
To: Property Legalisation <propertylegalisation@fndc.govt.nz>
Subject: RE: Licence to occupy for bridge replacement

Cheers thank you.

I am completing a resource consent for a Papakainga which will use this bridge so I can include this as part of the RC application.

Is there an existing LTO for this bridge?

Adjacent property legal description - Tauteihiihi 2B4A & 2B4C

Regards,

NORTHLAND
PLANNING & DEVELOPMENT

Rochelle Jacobs
Director / Senior Planner

Offices in Kaitaia & Kerikeri
09 408 1866 | 027 449 8813
Northland Planning & Development 2020 Limited

From: Property Legalisation <propertylegalisation@fndc.govt.nz>
Sent: Tuesday, February 11, 2025 12:42 PM
To: Rochelle <rochelle@northplanner.co.nz>
Subject: Re: Licence to occupy for bridge replacement

Kia ora Rochelle,

Your enquiry was forwarded to Property Legalisation for action.

Is the proposed works part of an resource and/or building application? If so, it will likely be assessed as part of that application and forwarded onto our team for lodgement.
It will then be considered by Transportation Services – Roading team for review and consideration as the asset holder.

If it is outside of the scope of an RC or BC then I have attached a copy of our Licence to occupy road application for your information.

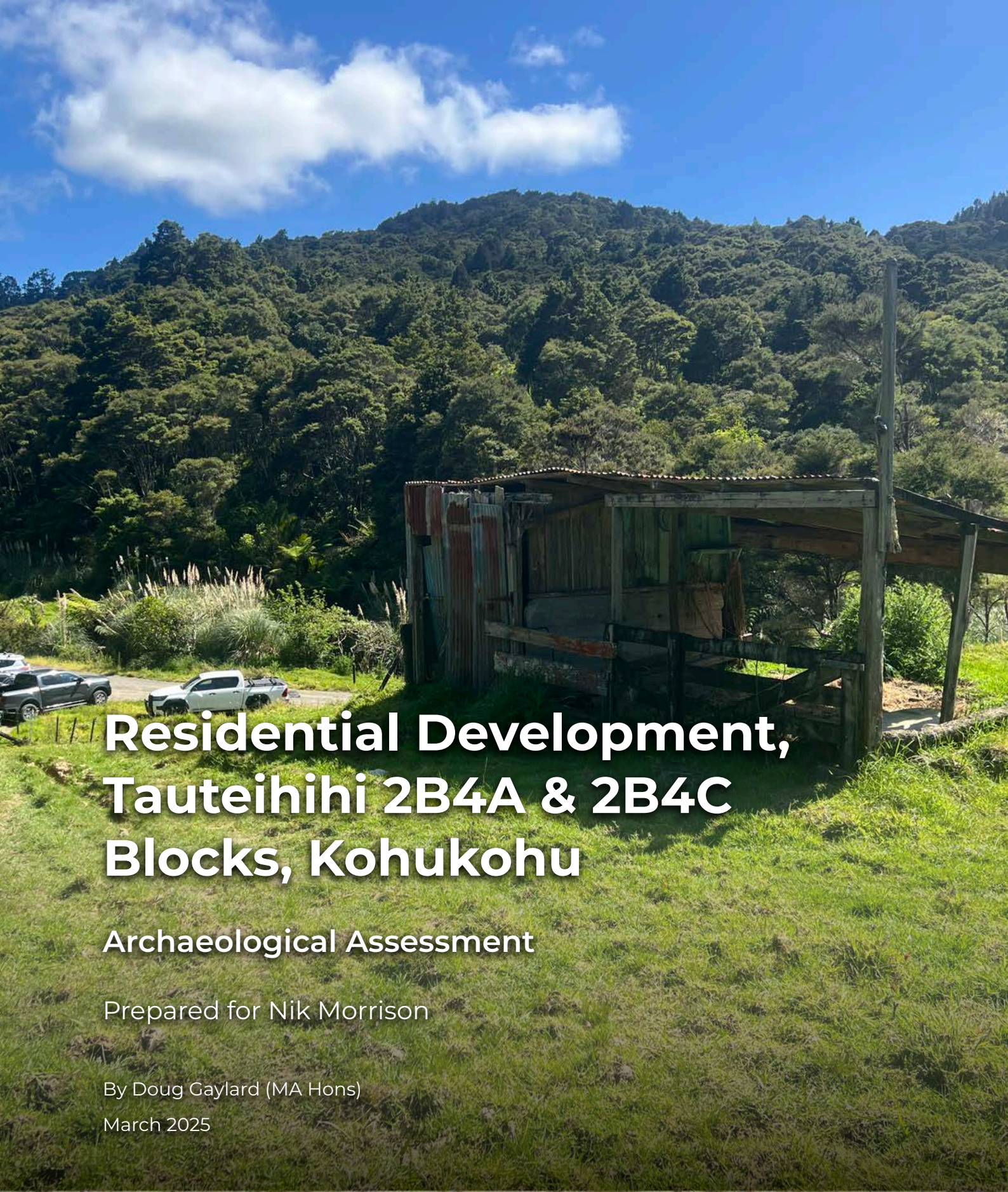
Please come back to us if you require anything further.

Nga mihi

Property Legalisation

propertylegalisation@fndc.govt.nz
Te Kaunihera o Te Hiku o te Ika | Far North District Council

Pokapū Kōrero 24-hāora | 24-hour Contact Centre 0800 920 029
fndc.govt.nz



Residential Development, Tauteihihi 2B4A & 2B4C Blocks, Kohukohu

Archaeological Assessment

Prepared for Nik Morrison

By Doug Gaylard (MA Hons)

March 2025

CONTEXT ARCHAEOLOGY

4 Poronui Street
Mount Eden
Auckland

021 258 4699
www.contextarchaeology.co.nz

Contents

Introduction

Laminata are proposing residential developments within the both the Tauteihihi 2B4A and 2B4C Blocks, Kohukohu (Figure 1, Figure 2).

Development for the 2B4A Block includes the below (Figure 3):

- Upgrades to existing vehicle access from Tauteihihi Road
- Replacement of an existing timber bridge with a culvert
- Construction of one 112m^2 dwelling, and one 65m^2 dwelling
- Installation of wastewater systems and water storage tanks for both dwellings

Development for the 2B4C Block includes the following (Figure 4):

- A new vehicle access from Tauteihihi Road
- Construction of two 65m^2 dwellings
- Installation of solar arrays, wastewater systems, and water tanks for both dwellings

An archaeological and heritage impact assessment was commissioned by Nik Morrison of Laminata to establish whether construction of the dwellings and associated infrastructure is likely to impact archaeological or heritage values. Recommendations have been made in accordance with the statutory requirements of the Resource Management Act 1991 (RMA) and the Heritage New Zealand Pouhere Taonga Act 2014.

Methodology

As part of this assessment the New Zealand Archaeological Association's (NZAA) site record database (ArchSite), District Plan schedules and the Heritage New Zealand Pouhere Taonga (Heritage NZ) New Zealand Heritage List/Rārangi Kōrero were searched to determine whether any archaeological sites have been recorded on or near the area of pine forest planting. Relevant literature and archaeological reports were also consulted. Early survey plans and aerial photographs from the area were checked for information relating to past activities or modifications.

Constraints and Limitations

This report does not reflect the perspectives of tangata whenua concerning the importance of the place to mana whenua. The cultural significance of the place to tangata whenua and the potential presence of wāhi tapu can only be evaluated by mana whenua.

Traditional archaeological survey methods, which rely on visual inspection and limited subsurface testing, are not always capable of identifying all sub-surface archaeological features. Furthermore, they cannot identify wahi tapu and other sites of traditional importance to Māori, especially if these sites lack physical remains.

Figure 1. General Location of Tauteihihi 2B4A & 2B4C Blocks, Kohukohu (indicated by white dot)

Source: NRC Local Maps (2024)

Figure 2. Detailed location of Tauteihihi 2B4A and 2B4C Blocks, Kohukohu (indicated by white broken line)

Source: NRC Local Maps (2024)

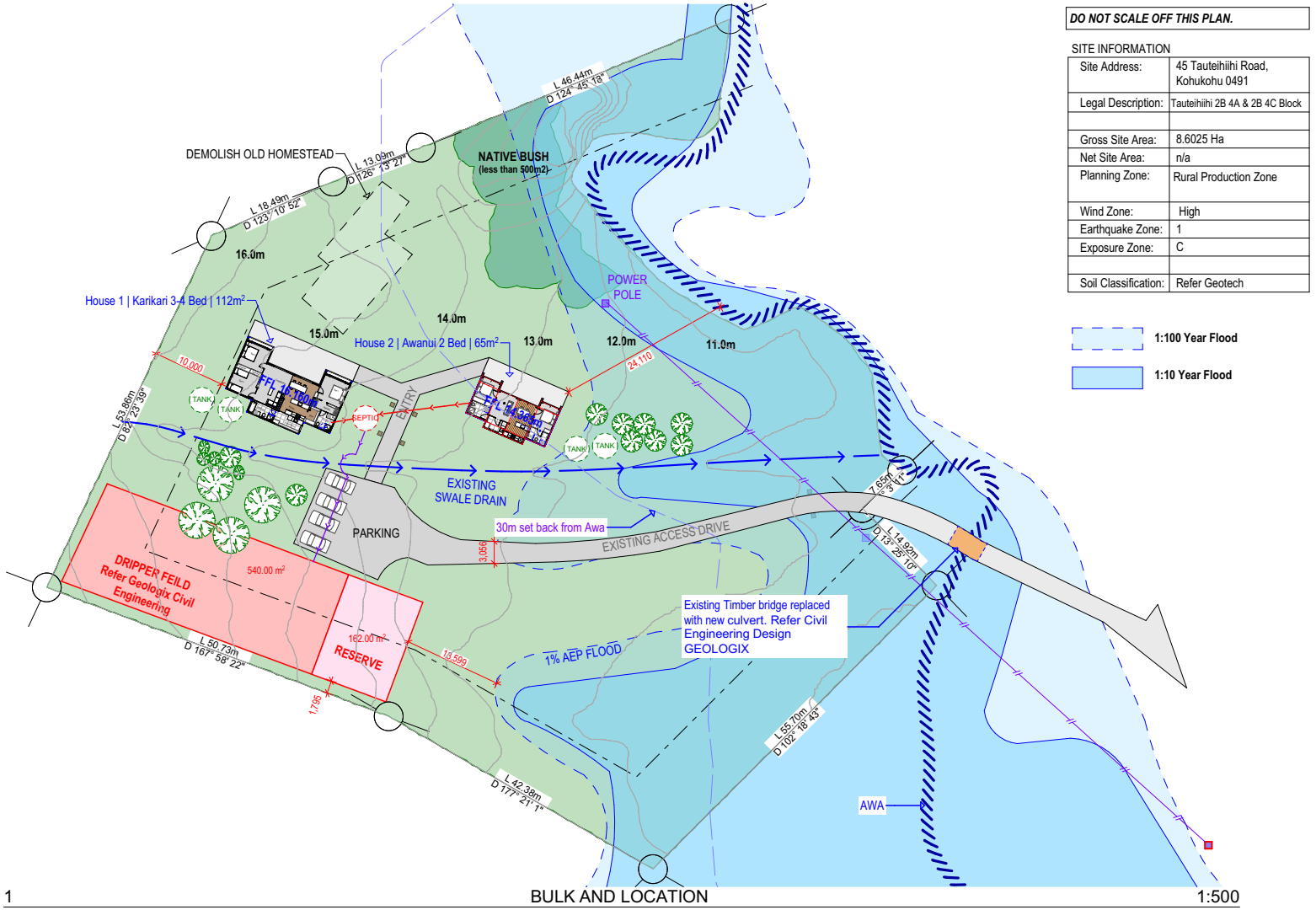


Figure 3. Development plans for the Tauteihihi 2B4A block

Source: Laminata 2025

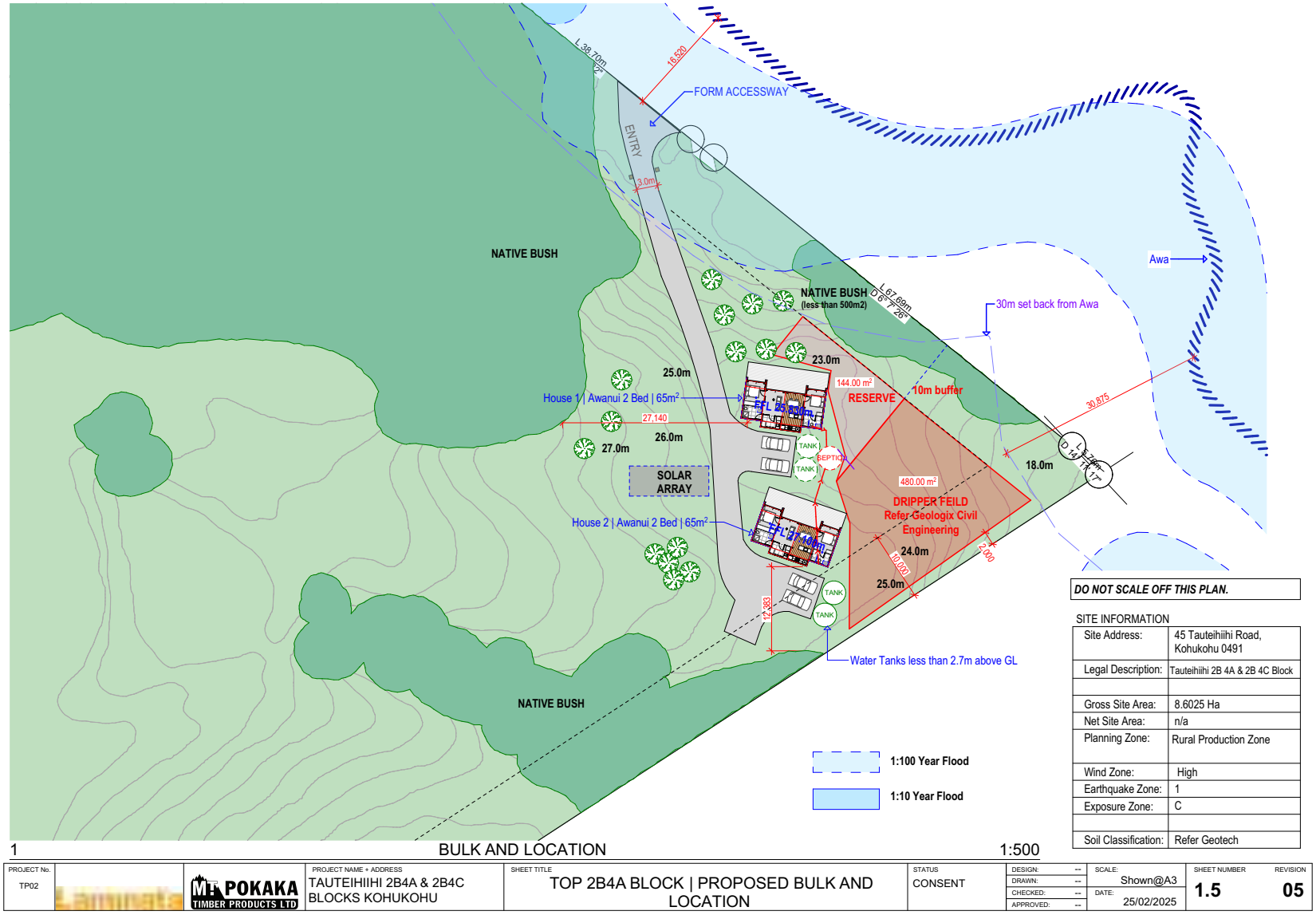


Figure 4. Development plans for the Tauteihihi 2B4C block

Source: Laminata 2025

Summary Historical Background

Kohukohu is a small but historically rich settlement located on the northern shore of Hokianga Harbour in Northland, New Zealand. It holds significant cultural and historical importance, particularly for Māori and early European settlers. The area is steeped in stories that date back to the earliest days of human settlement in the wider Hokianga area and the arrival of European traders and missionaries.

Kohukohu is part of the Hokianga region, often referred to as the "Birthplace of Aotearoa," as it is believed to be where the Polynesian explorer Kupe made landfall over 1,000 years ago. The name "Kohukohu" is thought to refer to the mist or steam rising from the land. It was a thriving Māori community long before European contact, with fertile lands and abundant marine resources supporting several iwi and hapū.

European settlers began arriving in the Hokianga in the early 19th century, with Kohukohu becoming one of the first places in New Zealand where Europeans established a presence. The settlement served as a hub for the kauri timber industry, which dominated the Hokianga economy during the 19th century. Kohukohu became known for its bustling sawmills, with logs transported from the dense kauri forests surrounding the harbour. Missionaries, including those from the Church Missionary Society, also arrived in the area, bringing Christianity and European education to Māori populations.

By the mid-19th century, Kohukohu was one of the most important settlements in Northland. It had a significant population, with Māori and European settlers working together in the timber trade. A school was established in the 1870s, followed by a post office and other services, marking Kohukohu as a growing community. The settlement was also a centre of social and political change. This period saw tensions rise between Māori and European populations over land ownership and governance, reflecting wider issues across Northland.

By the early 20th century, the kauri timber industry began to decline as resources were exhausted and logging operations relocated elsewhere. Like many other timber towns, Kohukohu faced economic challenges as its primary industry declined. As such, the population began to decline, and the town transitioned into a quieter rural settlement. Despite this, Kohukohu remained an important cultural site. The Māori community maintained their presence, and marae continued to play a central role in social and cultural life.

Today, Kohukohu is a small village known for its rich history, vibrant arts community, and strong connection to its Māori heritage. Its historic buildings, including early 20th-century architecture and remnants of the kauri industry, are key attractions. The town also serves as a gateway to Hokianga, with a ferry service connecting Kohukohu to Rawene on the southern shore of the harbour.

Archaeological Background and Survey

In general, the Hokianga area has received more interest in its historical locales, as opposed to its archaeological sites (Maingay 1986, Harrison 1983, Brownson 1984). Nevertheless, extensive archaeological surveys have been undertaken within the northern areas of the Hokianga harbour, particularly during the 1970s (Figure 5). These surveys have covered the area between Kohukohu and Broadwood, but intensive recording of sites has largely been restricted to a the coastal margins and areas immediately inland (Maingay 1986).

What is clear, is that coastal areas to the west were well populated, in contrast to the inner reaches of the Hokianga harbour which appear to have been sparsely populated. Despite the lack of intensive population towards the harbour's eastern reaches, most islands and headlands appear to have been well defended (Maingay 1986).

More recently, archaeological investigations within the wider Kohukohu area have been largely restricted to forestry blocks (Taylor 1997), and infrastructure projects within the coastal margins (Munro 2011, Johnson 2009).

Records within the NZAA database show no recorded archaeological sites within – or immediately adjacent – to either the 2B4A or 2B4C blocks (Figure 6).

A pedestrian archaeological survey within the area of the proposed residential development was undertaken on 5 November 2024. This survey focussed on the footprints of the proposed residential dwellings, solar arrays, and associated infrastructure (ie. septic tanks and water collection systems). Replacement of a small bridge over a stream within the 2B4A block will also be required, and the area around a proposed new bridge was also assessed.

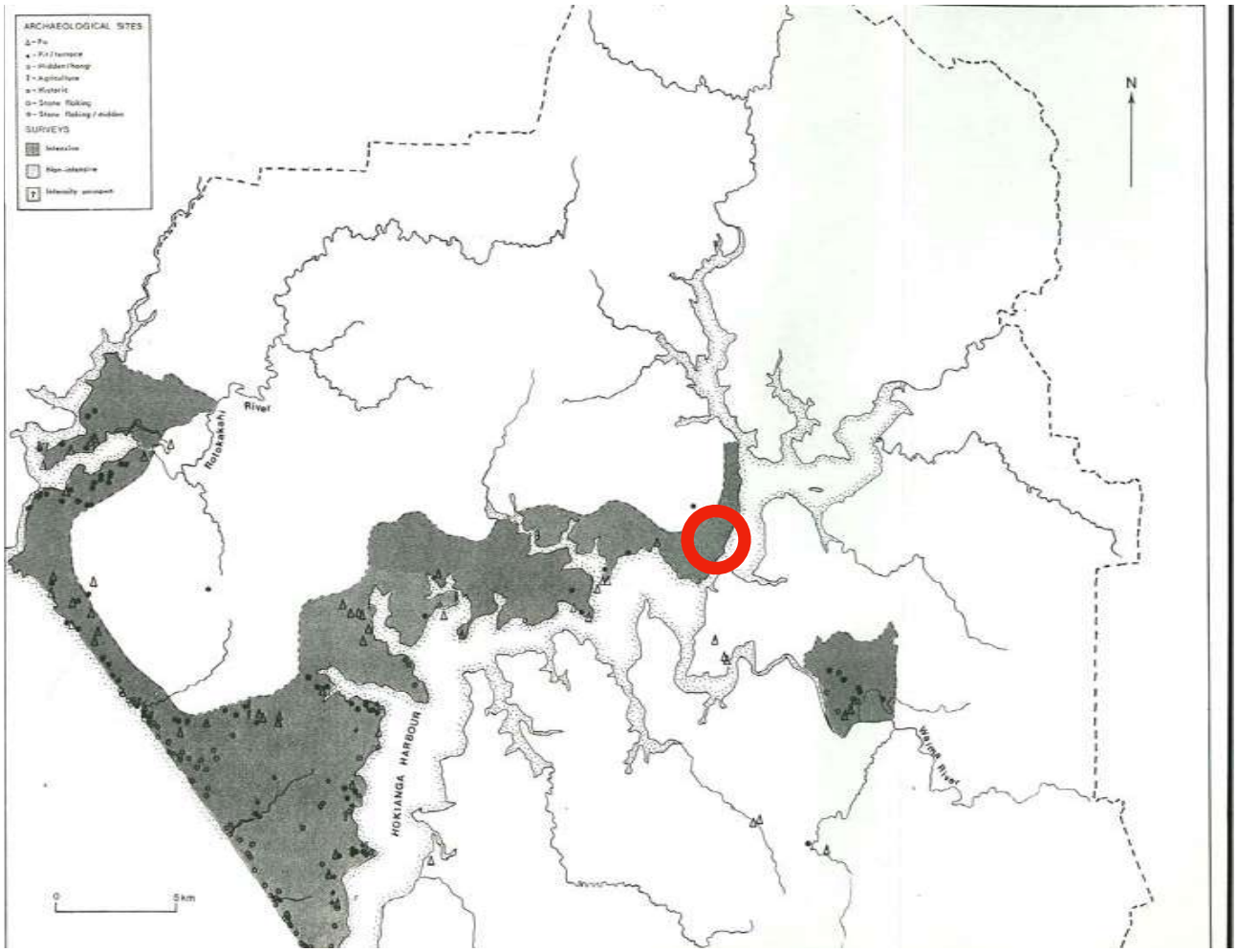


Figure 5. Detail of the northern Hokianga Harbour subject to previous archaeological survey. The location of the Tauteihihi 2B4A & 2B4C blocks are indicated by the red outline

Source: Maingay (1986)

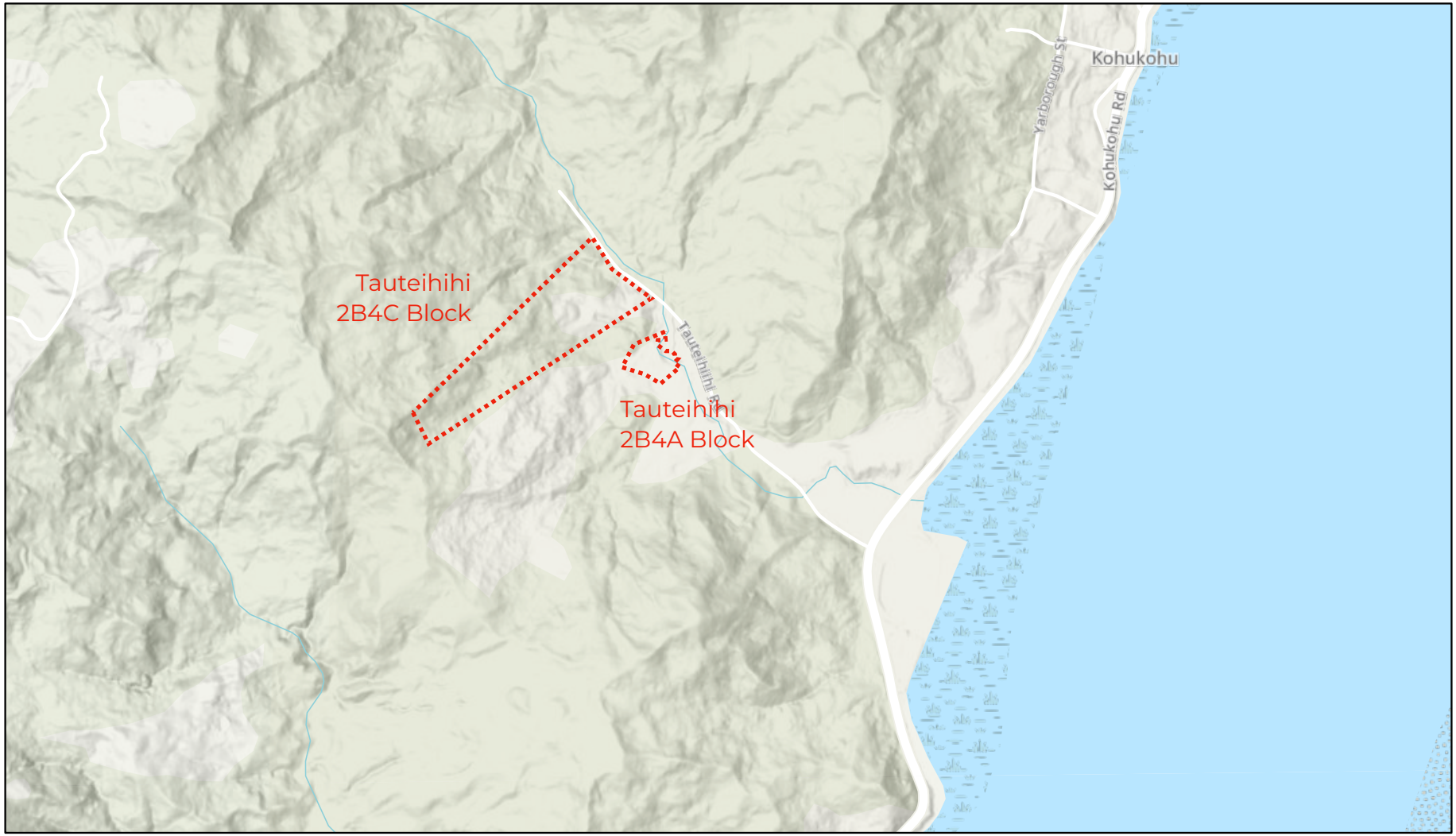


Figure 6. Recorded archaeological sites adjacent to the Tauteihihi 2B4A & 2B4C blocks (indicated by the red broken line). Note boundaries are approximate

Source: ArchSite 2025

The 2B4A Block

Overall, the area of the 2B4A block subject to development is located on a low flood plain, with ground surfaces rising gradually towards the west. An existing dwelling occupies the property in addition to a large corrugated iron farm shed (Figure 7 - Figure 12). Subsurface probing of the area around the existing dwelling revealed compact conditions subsurface, suggesting a large amount of past vehicle movement. Three test pits were excavated within the footprints of the proposed residential developments, and an additional test pit was excavated adjacent to the proposed bridge replacement (Figure 13). Test Pit 1 displayed compact brown silts - consistent with the results of probing (Figure 14). No inclusions were noted within Test Pit 1. Test Pit 2 also revealed brown silt with a compaction slightly higher than that of Test Pit 1 (Figure 15). Test Pit 3 – located on the flood plain – displayed moderately compacted brown silt with a low moisture content (Figure 16). Test Pit 4 – located adjacent to the existing bridge – displayed compact brown silts consistent with those within Test Pits 1 and 2 (Figure 17).

No inclusions were noted within any of the four test pits. Likewise, no suspected archaeological deposits or features were noted within the development area of the 2B4A block.

Figure 7. General view west over the Tauteihihi 2B4A block

Figure 8. View north over the Tauteihihi 2B4A block development area

Figure 9. View east over the Tauteihihi 2B4A block development area

Figure 10. View northeast over the Tauteihihi 2B4A block development area

Figure 11. View adjacent to proposed bridge replacement

Figure 12. View adjacent to proposed bridge replacement

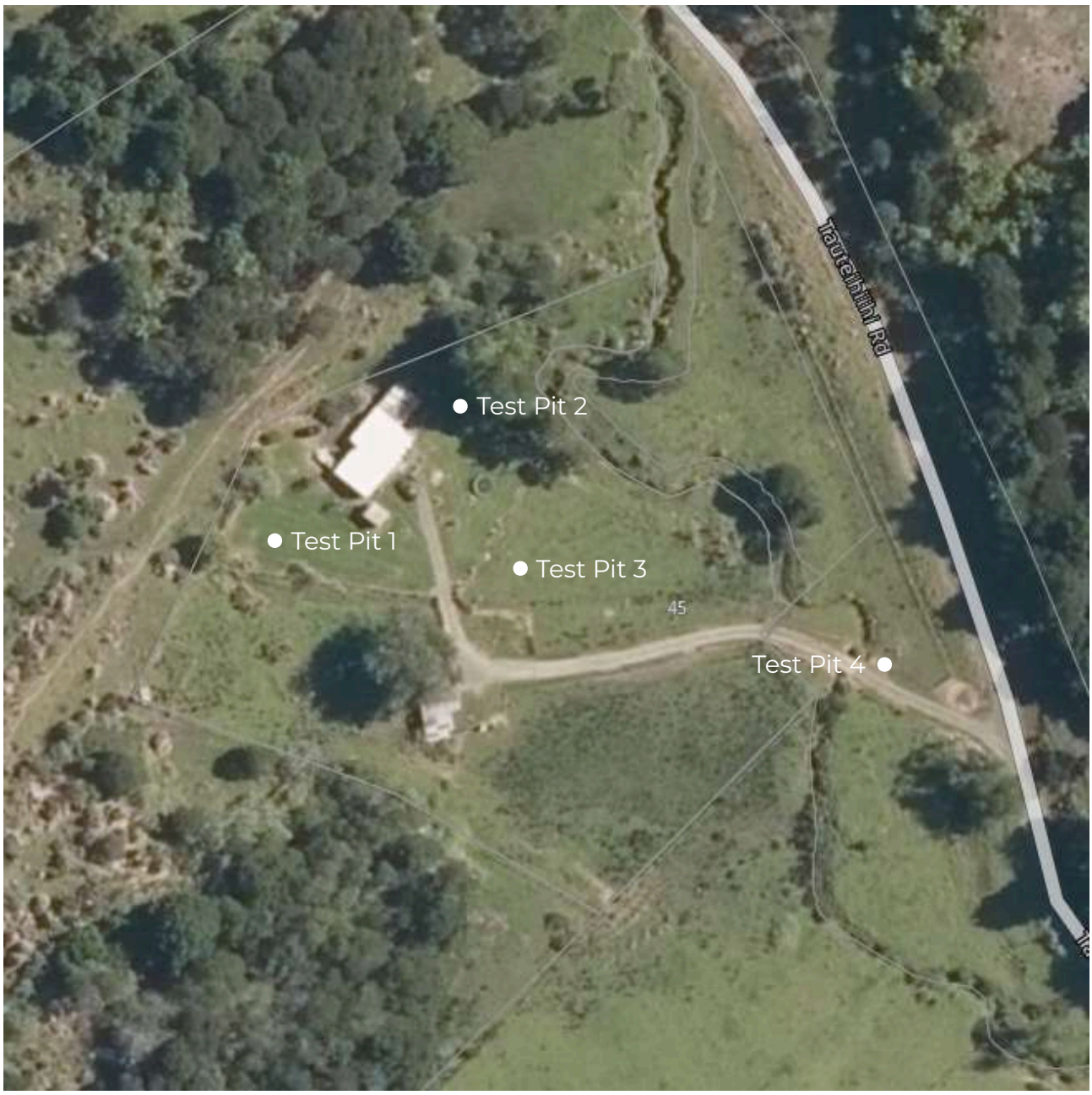


Figure 13. Test pit locations within the Tauteihihi 2B4A block

Source: NRC Local Maps 2024

Figure 14. Detail of Test Pit 1

Figure 15. Detail of Test Pit 2

Figure 16. Detail of Test Pit 3

Figure 17. Detail of Test Pit 4

The 2B4C Block

The development area of the 2B4C block is located on a ridge line with east/west orientation, and the ridge slopes gradually toward the east (Figure 18, Figure 19). The extreme east of the ridge toe has been previously modified during construction of the existing roading corridor. A derelict milking shed and concrete foundations occupy a position at the end of the ridge toe (Figure 20). Three test pits were opened within the development area of the the 2B4C block (Figure 21). Test Pits 1 and 2 were consistent displaying moderately compacted mid-brown silts. Test Pit 3 displayed evidence of prior landscape modification in the form of clumpy orange fill in the lower 5cm of the test pit. No inclusions were noted within any of the three test pits. Likewise, no suspected archaeological deposits or features were noted within the development area of the 2B4C block.

Figure 18. General view east over the 2B4C block

Figure 19. General view east over the 2B4C block

Figure 20. Derelict milking shed within the 2B4C block

Figure 21. Test pit locations within the Tauteihihi 2B4C block

Source: NRC Local Maps 2024

Figure 22. Detail of Test Pit 1

Figure 23. Detail of Test Pit 2

Figure 24. Detail of Test Pit 3. Note evidence of prior modification in base of test pit

Summary and Discussion

Summary of Results

No recorded archaeological sites exist within the boundaries of either the 2B4A or 2B4C blocks, and no previously unrecorded or suspected archaeological features or deposits were noted during the course of this survey. Therefore, it is assumed that there is a low risk of encountering previously unrecorded archaeological deposits or features during the course of the proposed residential development.

Māori Cultural Values

This assessment considers the impact on archaeological values only and does not assess the impact on Māori cultural values. Only the tangata whenua should carry out such assessments. Māori cultural concerns may include a wider range of values than those associated with archaeological sites. The strong historical connection of the general area with the tangata whenua is apparent from the documented sites, traditional histories, and known Māori place names.

Effects of the Proposal

In any area where archaeological sites have been documented in the general vicinity, there is a possibility of encountering unrecorded subsurface remains. Although this is considered unlikely in this instance, as the removal of pines will not disturb existing ground surfaces, procedures should be in place to ensure that the Council and Heritage NZ are notified if such remains are discovered.

These remains may include burnt and fire-cracked stone, charcoal, rubbish heaps containing shell, bone, and/or 19th-century glass and crockery, ditches, banks, pits, old building foundations, artefacts of Māori and/or early European origin, or human burials.

Legislation and Policy

There are two main pieces of legislation in New Zealand that govern work affecting archaeological and other significant historic heritage sites: the Resource Management Act 1991 (RMA) and the Heritage New Zealand Pouhere Taonga Act (2014).

1. Resource Management Act 1991 (RMA)

This act provides a framework for managing the use of natural and physical resources, including historic heritage. It requires local authorities to consider the effects of land use and development on heritage sites, and to provide protection for historic heritage as part of the sustainable management of resources. The RMA empowers local councils to develop district and regional plans that include rules and provisions to protect heritage sites.

2. Heritage New Zealand Pouhere Taonga Act 2014

This act is specifically focused on heritage protection and management. It establishes Heritage New Zealand Pouhere Taonga (formerly known as the New Zealand Historic Places Trust) as the main organisation responsible for identifying, protecting, and conserving New Zealand's historic places. The Act requires that any work on archaeological sites – defined as any site associated with human activity before 1900 – must have an archaeological authority from Heritage New Zealand Pouhere Taonga, regardless of whether the site is recorded or not.

Together, these two pieces of legislation play a significant role in safeguarding New Zealand's archaeological and historic heritage sites.

Resource Management Act 1991 (RMA)

Section 6 of the RMA recognises as matters of national importance: "the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, wāhi tapu, and other taonga" (S6(e)); and "the protection of historic heritage from inappropriate subdivision, use, and development" (S6(f)).

All individuals carrying out responsibilities and exercising authority under the Resource Management Act (RMA) must acknowledge and address these significant national matters when overseeing the utilisation, development, and safeguarding of natural and physical resources, as outlined in Section 6. There is an obligation to prevent, rectify, or alleviate any negative environmental impacts resulting from an activity (Section 17), including those affecting historic heritage.

Historic heritage is defined (S2) as 'those natural and physical resources that contribute to an understanding and appreciation of New Zealand's history and cultures, deriving from any of the following qualities: (i) archaeological; (ii) architectural; (iii) cultural; (iv) historic; (v) scientific; (vi) technological'. Historic heritage includes: '(i) historic sites, structures, places, and areas; (ii) archaeological sites; (iii) sites of significance to Māori,

including wahi tapu; (iv) surroundings associated with the natural and physical resources'.

Regional, district, and local plans include sections that aid in the identification, protection, and management of archaeological and other heritage sites. These plans are developed in accordance with the provisions of the Resource Management Act (RMA).

This assessment has established that the proposed residential development has little potential to affect archaeological values.

Heritage New Zealand Pouhere Taonga Act 2014 Requirements

The Heritage New Zealand Pouhere Taonga Act (HNZPTA) protects all archaeological sites, whether they have been officially recorded or not. These sites cannot be damaged or destroyed without prior authorisation from Heritage NZ, as outlined in Section 42 of the Act, in addition to any requirements set forth in the Resource Management Act (RMA).

HNZPTA Section 6 defines an archaeological site as follows:

'**archaeological site** means, subject to section 42(3), –

(a) any place in New Zealand, including any building or structure (or part of a building or structure) that –

(i) was associated with human activity that occurred before 1900 or is the site of the wreck of any vessel where the wreck occurred before 1900; and

(ii) provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand; and

(b) includes a site for which a declaration is made under section 43(1)'

Under Section 43(1) a place post-dating 1900 (including the site of a wreck that occurred after 1900) that could provide 'significant evidence relating to the historical and cultural heritage of New Zealand' can be declared by Heritage NZ to be an archaeological site.

Authorities to modify archaeological sites can be applied for either in respect to archaeological sites within a specified area of land (Section 44(a)), or to modify a specific archaeological site where the effects will be no more than minor (Section 44(b)), or for the purpose of conducting a scientific investigation (Section 44(c)). Applications that relate to sites of Māori interest require consultation with (and in the case of scientific investigations the consent of) the appropriate iwi or hapū and are subject to the recommendations of the Māori Heritage Council of Heritage NZ. In addition, an application may be made to carry out an exploratory investigation of any site or locality under Section 56, to confirm the presence, extent and nature of a site or suspected site.

An archaeological authority will not be required for this project as the risk of encountering previously unrecorded archaeological deposits or features is considered to be low.

Conclusions

No previously recorded archaeological sites exist within, or adjacent to, either the Tauteihihi 2B4A or 2B4C blocks. Nor were any suspected archaeological features or deposits encountered during the course of field survey.

It is therefore considered appropriate for the proposed residential development to proceed under the provisions provided by the Accidental Discovery Protocol (ADP).

Recommendations

- There should be no major restrictions on the proposed residential development based on archaeological grounds as archaeological survey within the project area has established it is unlikely that any will be encountered or exposed during project works.
- If any suspected archaeological artefacts, deposits, or features are found during remediation works (such as intact shell middens, hāngi, or storage pits related to Māori occupation, or cobbled floors, brick or stone foundations, and rubbish pits related to 19th-century European occupation) work should stop immediately in the area, and both Heritage NZ and the Council should be notified. If changes to an archaeological site become necessary, an Authority must be applied for under Section 44(a) of the HNZPTA and granted before any further work that will impact the site. **This is a legal requirement.**
- Alternatively, applying for an Authority in advance of works could be considered as a precaution to minimise delays if archaeological remains are uncovered once the works are underway.
- In the event of human remains being uncovered, work should be stopped immediately in the area, and tangata whenua, Heritage NZ, NZ Police, and the Council should be contacted to make appropriate arrangements.
- Since archaeological surveying cannot always detect sites of traditional importance to Māori, such as wahi tapu, tangata whenua should be consulted about the potential existence of such sites within the project footprint.

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