Far North District Council

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Website: www.fndc.govt.nz

Office Use Only
Application Number:

APPLICATION FOR RESOURCE CONSENT OR FAST-TRACK RESOURCE CONSENT

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

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

1. Pre-Lodgement Meeting

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

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

O Land Use O Fast Track Land Use* (X) Subdivision O Discharge

O Extension of time (s.125) O Change of conditions (s.127) O Change of Consent Notice (s.221(3))

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

O Other (please specify) _____

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

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

~~Yes~~ / No

4. Applicant Details:

Name/s: [redacted]

Electronic Address for Service (E-mail): [redacted]

Phone Numbers: [redacted]

Postal Address: (*or* alternative method of service under section 352 of the Act) [redacted]

Post Code: 0293

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

Name/s: Williams & King, Attention: Natalie Watson

Electronic Address for Service (E-mail): nat@saps.co.nz

Phone Numbers: Work: 09 407 6030 Home: _____

Postal Address: (*or* alternative method of service under section 352 of the Act)
PO Box 937
Kerikeri

Post Code: 0245

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

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

Name/s: Messenger Gold Limited

Property Address/: Location
26 Tanekaha Lane
Kerikeri

7. Application Site Details:

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

Site Address/ Location:
26 Tanekaha Lane
Kerikeri

Legal Description: Lots 1 & 2 DP 199962 Val Number: 00213-34800, 34805 & 34806

Certificate of Title: NA126B/805 & NA126B/806

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.

Please phone Andy Smith on 027 495 4008 to arrange a site visit. Please follow all health and safety signage on the site.

The site is an operating orchard.

8. Description of the Proposal:

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

Proposed boundary adjustment between the two balance lots of current subdivision applications in the Rural Production Zone - discretionary activity.

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

9. Would you like to request Public Notification

~~Yes~~/No

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

O Building Consent (BC ref # if known)

O Regional Council Consent (ref # if known)

O National Environmental Standard consent

O Other (please specify)

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

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

Is the piece of land currently being used or has it historically ever been used for an activity or industry on the Hazardous Industries and Activities List (HAIL)

Ⓧ yes O no O don't know

Is the proposed activity an activity covered by the NES? (If the activity is any of the activities listed below, then you need to tick the 'yes' circle).

Ⓧ yes O no O don't know

Ⓧ Subdividing land

O Changing the use of a piece of land

Ⓧ Disturbing, removing or sampling soil

O Removing or replacing a fuel storage system

12. Assessment of Environmental Effects:

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

Please attach your AEE to this application.

13. Billing Details:

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

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

[redacted]

Email:

Postal Address:

Phone Numbers:

Fees Information: An instalment fee for processing this application is payable at the time of lodgement and must accompany your application in orde 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.

[redacted]

Na ease print)

Sig nature of bill payer – **mandatory**) Date: 13/6/24

14. Important Information:

Note to applicant
You must include all information required by this form. The information must be specified in sufficient detail to satisfy the purpose for which it is required.
You may apply for 2 or more resource consents that are needed for the same activity on the same form.
You must pay the charge payable to the consent authority for the resource consent application under the Resource Management Act 1991.

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

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

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

Name [redacted] (please print)

Signa [redacted] (signature) Date: 17/6/2024

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

Checklist (please tick if information is provided)

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

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

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

UNBOUND **SINGLE SIDED** **NO LARGER THAN A3 in SIZE**

Messenger Gold Limited

Proposed Boundary Adjustment
26 Tanekaha Lane, Kerikeri

Williams & King, Kerikeri[1]
17 June 2024

1.0 Overview

Messenger Gold Limited intend to adjust the common boundary between two balance horticultural lots (which are intended to be created by current subdivision applications) in order to rationalise the boundary alignment in relation to the existing planted gold kiwifruit and lemon horticultural crops. As a result, the new boundary will follow an existing shelterbelt between the two crops. No additional Records of Title will be created.

The application sites are Lot 2 RC XXXXXXX and Lot 5 RC XXXXXXX (underlying appellations and Records of Title are Lots 1 and 2 DP 199962 held in the Records of Title NA126B/805 & NA126B/806).

Vehicle access to each adjusted Record of Title from Tanekaha Lane will use the existing crossing place, with no increase in traffic resulting from the proposed activity. Proposed easements will provide access over the existing formed access carriageway.

The subject land is zoned Rural Production in the Far North Operative District Plan and the proposal has been assessed as being a discretionary activity.

The subject land is zoned Horticulture in the Far North Proposed District Plan, and the proposal is assessed as being a restricted discretionary activity.

This assessment accompanies the Resource Consent application made by the Applicant and is provided in accordance with Schedule 4 of the Resource Management Act 1991. It is intended to provide the necessary information, in sufficient detail, to provide an understanding of the proposal and any actual or potential effects the proposed activity may have on the environment.

[1] Williams & King - a Division of Survey & Planning Solutions (2010) Ltd
Surveyors, Planners, Resource Managers - Kerikeri and Kaitaia
PO Box 937 Kerikeri Phone (09) 407 6030 Email: nat@saps.co.nz

2.0 Description of Proposal

The purpose of the proposal is to adjust the common boundary between two balance horticultural lots (which are to be created by current subdivision applications) in order to rationalise the boundary alignment in relation to the existing planted gold kiwifruit and lemon horticultural crops. As a result, the new boundary will follow an existing shelterbelt between the two crop types. The boundary adjustment is between Lot 2 RC XXXXXXX and Lot 5 RC XXXXXXX (underlying appellations and Records of Title are Lots 1 and 2 DP 199962 held in the Records of Title NA126B/805 & NA126B/806). No additional Records of Title will be created.

The Scheme Plan is attached in **Appendix 1**. All areas and dimensions are subject to survey.

Property access to each adjusted Record of Title from Tanekaha Lane will remain unchanged, with Lot 11 having direct frontage to the legal road via its pan handle strip, and Lot 9 having access via rights of way from the same vehicle crossing and shared access over that pan handle strip. From the southern end of existing easement A, Lot 9 will be able to either travel north west or south east over the existing access formations. New easements for right of way and the right to convey water, electricity and telecommunications are proposed over Lot 11 to benefit Lot 9 to facilitate this. These easements are shown as areas 'C' and 'F' on the Scheme Plan.

3.0 Application Site Details and Description

3.1 Legal Details

Details of the underlying Records of Title involved in the proposed boundary adjustment are provided in Table 1, below. Records of Title are attached in **Appendix 2**.

Table 1: Legal Details of Subject Records of Title (Underlying)

RECORD OF TITLE	APPELLATION	TITLE AREA	INTERESTS
NA126B/805 (Date Issued: 06 January 2000)	Lot 1 DP 199962	7.7600ha more or less	Subject to Section 59 Land Act 1948 (Affects part) Easement Certificate C195850.3: Appurtenant hereto is a water right (Affects part formerly Lot 2 DP 171091. subject to Section 309 (1) (a) LGA 1974. Easement Certificate C662999.6: Appurtenant hereto is a right of way, and telecommunications and water supply rights (Affects part formerly Lot 2 DP 171091) . Subject to Section 243(a) RMA 1991. Easement Certificate C907091.9: Appurtenant hereto is a water supply right. Easement Certificate D468330.5: Subject to rights of way and an electricity and telecommunications rights over parts marked A and B on DP 197024 & Appurtenant hereto is a water supply right. Subject to Section 243 (a) RMA 1991. Easement Certificate D468330.8: Subject to a right of way and an electricity and telecommunications rights over part marked A on DP 199962. Subject to Section 243 (a) RMA 1991. Transfer D468330.9: Subject to an electricity right (in gross) over part marked A on DP 199962 in favour of Top Energy Ltd.

RECORD OF TITLE	APPELLATION	TITLE AREA	INTERESTS
NA126B/806 (Date Issued: 06 January 2000)	Lot 2 DP 199962	10.7100h a more or less	Easement Certificate C907091.9: Appurtenant hereto is a water supply right. Easement Certificate D468330.5: Subject to a water supply right. Subject to Section 243 (a) RMA 1991. Easement Certificate D468330.8: Appurtenant right of way and an electricity and telecommunications rights. Subject to Section 243 (a) RMA 1991.

3.2 Location

The subject land is located at 26 Tanekaha Lane, off Kapiro Road in Kerikeri. Refer to the Location and Cadastral Maps in **Figures 1** and **2.**

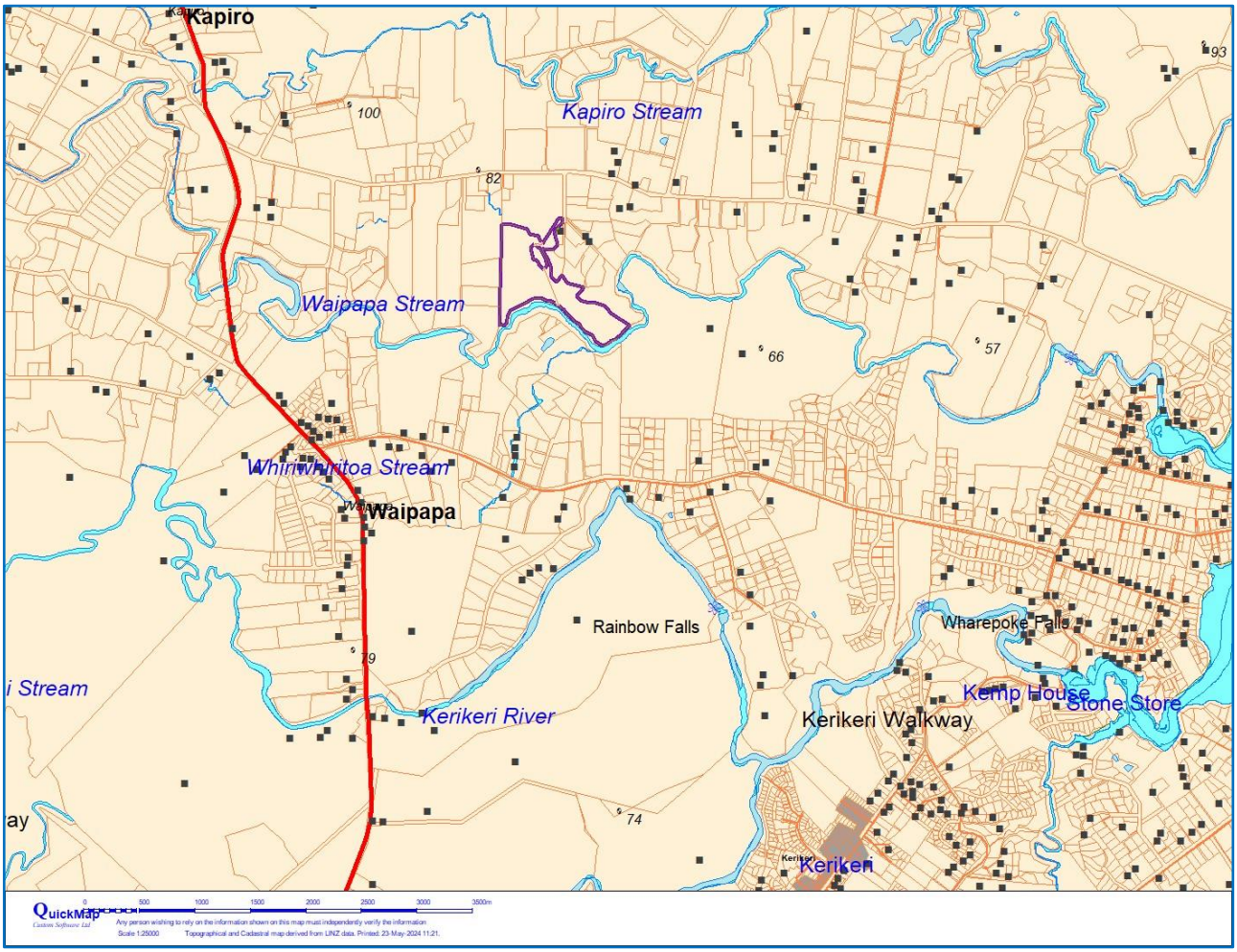


Figure 1: Quickmap Location Map

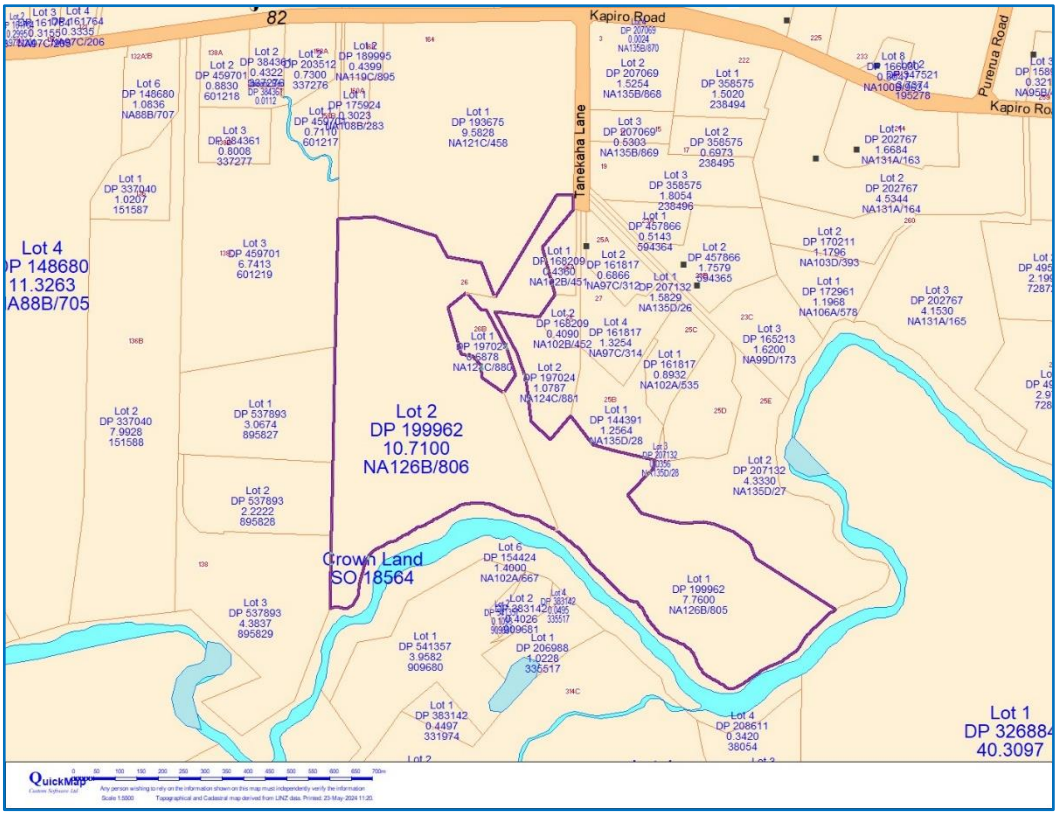


Figure 2: Quickmap Cadastral Map

3.3 Site Conditions

The subject land is developed for horticulture, including gold kiwifruit crops over Lot 9 and lemon crops over Lot 11. **Photograph 1** below shows the new boundary alignment between the two crops, with the boundary to follow the shelterbelt.

Photograph 1: Proposed adjusted boundary alignment, as viewed from the northern end of the new boundary.

Formed orchard access is present through the site, and includes a metalled loading area with adjacent storage barn within Lot 9 and a loading area within Lot 11.

The land is generally flat to undulating, becoming rolling to strongly rolling towards the west and south in the direction of Waipapa Stream. The Engineering Site Suitability Report prepared by Geologix Consulting Engineers for the underlying subdivisions includes a detailed description of soils, geology, and other topographical data, and is attached in **Appendix 3**.

3.4 Recorded Natural and Cultural Features

The Operative or Proposed District Plan does not record any Outstanding Natural Features, Outstanding Landscape Features, areas of High or Outstanding Natural Character, Notable Trees, Historic Sites, Buildings and Objects, Sites of Cultural Significance to Maori or Scheduled Registered Archaeological Sites.

The subject site is not part of the coastal environment and does not include any areas of high or outstanding natural character, or outstanding natural landscapes or features as recorded in the Regional Policy Statement.

The site is not part of any ecological unit recorded in the Department of Conservation Protected Natural Area mapping.

The subject land is recorded as part of a wider kiwi habitat in the Far North Maps "Species Distribution (DoC)" Map ("kiwi present" zoning).[2] This mapping is a non-statutory document.

4.0 District Plan Assessment

4.1 Operative Far North District Plan

The subject land is within the Rural Production Zone as recorded by the Operative Far North District Plan. The proposal is assessed against the relevant rules of the District Plan as follows.

4.1.1 Rural Production Zone

The proposal has no implications in terms of the Rural Production Zone rules.

4.1.2 Subdivision

The 'Context' section of the Subdivision chapter states that "boundary adjustments are a controlled activity throughout the District, subject to meeting specific criteria", being those listed in Rule 13.7.1.

[2] A map showing the distribution of Northland Brown Kiwi and Northland Mudfish in the Far North District. Kiwi habitat distribution based on call count monitoring in 2019 by Department of Conservation: Craig, E. (2020): *Call count monitoring of Northland brown kiwi 2019.* Department of Conservation, Whangarei, New Zealand.

Rule 13.7.1 Boundary Adjustments: All Zones Except the Recreational Activities and Conservation Zones

Rule 13.7.1 (Boundary Adjustments: All Zones ….) sets out the performance standards for boundary adjustments to be carried out as a controlled activity. Compliance is assessed as follows:

(a) there is no change in the number and location of any access to the lots involved
There is no change to existing access to the lots off Tanekaha Lane continuing to be used by each of the adjusted Records of Title.

(b) there is no increase in the number of certificates of title
No additional Records of Title will be created.

(c) the area of each adjusted lot complies with the allowable minimum lot sizes specified for the relevant zone, as a controlled activity in all zones except for General Coastal or as a restricted discretionary activity in the General Coastal Zone (refer Table 13.7.2.1); except that where an existing lot size is already non-complying the degree of non-compliance shall not be increased as a result of the boundary adjustment
The area of Lot 2 RC XXXXXXX and Lot 5 RC XXXXXXX will already be less than the controlled activity standard of 20ha. Lot 5 RC XXXXXXX is reducing in area by approximately 1.2ha to form proposed Lot 9. The proposal is therefore unable to comply with this rule.

(d) the area affected by the boundary adjustment is within or contiguous with the area of the original lots
The area of the boundary adjustment is contiguous with the area of the original lots.

(e) all boundary adjusted sites must be capable of complying with all relevant land use rules (e.g. building setbacks, effluent disposal)
No infringements to the permitted activity Rural Production Zone land use standards will occur.

(f) all existing on-site drainage systems (stormwater, effluent disposal, potable water) must be wholly contained within the boundary adjusted sites
Not applicable.

Applications under this rule will not be notified but where these conditions cannot be met the application will be considered under the relevant zone rules set out in Rules 13.7.2 to 13.7.10.
As condition (c) is not met, the application requires consideration under Rules 13.7.2 – 13.7.10.

Rule 13.7.2.1 Minimum Area for Vacant New Lots and New Lots Which Already Accommodate Structures
The proposal lot sizes meet the discretionary activity subdivision standards under this Rule, and as such, the proposal is a discretionary activity.

Rule 13.7.2.2 Allotment Dimensions
An allotment dimension of 30m by 30m that does not encroach into the permitted activity setbacks for the Rural Production Zone (10 metres from the road and other boundaries) is accommodated by each adjusted Record of Title in accordance with controlled activity Rule 13.7.2.2.

4.1.3 Summary of Activity Status

Overall, the proposal has been assessed as a discretionary activity under the Operative District Plan.

4.2 Proposed Far North District Plan

4.2.1 Subdivision

There are no applicable rules with immediate legal effect under the Proposed District Plan.

Under the Proposed District Plan, the proposed boundary adjustment is a restricted discretionary activity under Rule SUB-R1, as the following conditions are met, except as stated.

CON-1

1. ***The boundary adjustment complies with standards:***

SUB-S1 Minimum allotment sizes for controlled activities, except where an existing allotment size is already non-compliant, the degree of non-compliance shall not be increased.
SUB-S2 Requirements for building platforms on each allotment
SUB-S3 Water Supply
SUB-S4 Water supply
SUB-S5 Wastewater disposal
SUB-S6 Telecommunications and power supply
SUB-S7 Easements for any purpose

The proposal complies with the above standards with the exception of SUB-1, as the controlled activity minimum lot size of 8ha is not achieved. As such, the proposal is a restricted discretionary activity. Matters of discretion are listed as – a. matters of any infringed standard; and b. any matters of control. There are no listed matters for the allotment size infringement, however the matters of control listed under SUB-S1 are commented on in Section 5 of this Report.

CON-2

1. ***The boundary adjustment does not alter:***
   i. ***The ability of existing activities to continue to be permitted under the rules and standards in this District Plan;***
   ii. ***The degree of non compliance with zone or district wide standards;***
   iii. ***The number and location of any access.***
   iv. ***The number of certificates of title.***

   The boundary adjustment complies with the above conditions.

CON-3

1. ***The boundary adjustment complies with Standard: SUB-S8 Esplanades.***
   Not applicable.

5.0 Assessment of Environmental Effects

Clauses 6 and 7 of Schedule 4 of the RMA indicate the information requirements and matters that must be addressed in or by an assessment of environmental effects, both of which are subject to the provisions of any policy statement or plan. This assessment takes into account the assessment criteria listed under Rule 13.10 of the District Plan.

5.1 Allotment Sizes and Dimensions

The proposed boundary adjustment transfers approximately 1.2ha of land (subject to survey) to rationalise the lot boundaries to match the different horticultural crops within each property. It has no implications in terms of privacy or amenity values, and does not have any implications in terms of the Rural Production Zone land use standards.

5.2 Natural and Other Hazards

No new buildings are proposed, and the proposed boundary adjustment does not generate or increase any risks associated with natural and other hazards.

The proposal results in no adverse effects in terms of fire hazard.

The adverse effect of the proposal with respect to natural and other hazards is therefore considered to be nil.

5.3 Water Supply

The proposal has no adverse effects in terms of water supply.

5.4 Stormwater Disposal

The proposal creates no additional impermeable surfaces, stormwater runoff or discharge, and has no impact on drainage to or from adjoining properties. As such, nil adverse environmental effects related to stormwater disposal are anticipated as a result of the proposal.

5.5 Sanitary Sewage

The adjusted area is not used for wastewater disposal and the proposal does not result in any adverse effects in terms of the treatment or disposal of wastewater.

5.6 Energy Supply & Telecommunications

There is no requirement for new energy or telecommunications supply as part of this boundary adjustment, however new easements for electricity and telecommunications conveyance are proposed within easements C and F. The proposal does not result in any adverse effects in terms of the supply of power or telecommunication services.

5.7 Easements for any Purpose

Proposed easements are shown for the purpose of access and services. Refer to the proposed Scheme Plan.

5.8 Provision of Access

As the proposal is a boundary adjustment and no additional Records of Title area created, no additional traffic will be generated.

Each adjusted Record of Title retains the existing shared property access from Tanekaha Lane, with no increase in the traffic using this entrance point, and no new vehicle crossing points proposed.

Internal access will be shared by Lots 9 and 11 over easements C and F, and this is already suitable for the purpose of the lots. Lot 9 will also retain access via the formed access within this lot as well as Lots 3 & 4 RC XXXXXX as shown on the Scheme Plan.

The proposal therefore avoids adverse effects associated with traffic and vehicle access.

5.9 Effect of Earthworks and Utilities

None proposed to implement the proposed boundary adjustment.

5.10 Building Locations

The proposed boundary adjustment has no implications in terms of building locations.

5.11 Heritage Resources

The property does not contain any archaeological sites that are listed in Appendix 1G of the Operative District Plan and no sites of cultural significance listed in Appendix 1F of the Operative District Plan. No physical works are required to implement the proposed boundary adjustment, and no adverse effects on archaeological or cultural sites will arise.

5.12 Flora & Fauna

The proposal does not generate any adverse ecological effects.

5.13 Landscape & Visual Values

The application site does not include any outstanding landscapes or areas of high or outstanding natural character and is not within the coastal environment. The proposed boundary adjustment will not cause any alteration to the existing natural and physical resources or characteristics of the subject land. It has no adverse effects in terms of natural character and visual and landscape values.

5.14 Soil

All of the adjusted land is used for primary production, and the proposed boundary adjustment will adjust the common boundary between these sites to follow the existing boundary between crop types. It will not involve or facilitate the disturbance or reduction in primary production activities. As such, it is considered that the proposed boundary adjustment will not result in any adverse effects on the life supporting capacity of soils.

5.15 Access to Reserves and Waterways

No access to reserves or waterways is proposed, or necessary, as part of this boundary adjustment.

5.16 Land Use Compatibility

No new lots or building sites will result from the proposal, and the adjusted Records of Title will continue to exist as horticultural sites. The proposal has no adverse effect in terms of land use incompatibility.

6.0 Statutory Assessment

6.1 Objectives and Policies

6.1.1 Far North Operative District Plan

The boundary adjustment activity has been assessed as a discretionary activity under the Operative District Plan, and the objectives and policies of the Rural Environment, Rural Production Zone and Subdivision Sections of the District Plan are relevant to the proposal.

Rural Environment and Rural Production Zone

Comments on the relevant objectives and policies of the Rural Environment and Rural Production Zone have also been grouped together as they have many overlapping themes, which can be summarised as two main matters: protection and maintenance of natural and amenity values and managing effects on rural production; all with the goal of promoting sustainable management of natural and physical resources.

- ***Promote sustainable management.***
  Overall, the proposed boundary adjustment is considered to represent sustainable management, resulting in no adverse effects on natural and physical resources.

- ***Ensure that the life supporting capacity of soils is not compromised by inappropriate subdivision, use or development.***
  There will be no reduction in the availability of land for primary production. No earthworks are required. The life supporting capacity of soils will not be compromised.

- ***Avoid, remedy or mitigate adverse effects.***
  As outlined in Section 5 of this report, adverse effects are avoided, remedied or mitigated.

- ***Protect areas of significant indigenous vegetation and significant habitats of indigenous fauna / promote protection of significant natural values.***
  There are no features of this nature that require protection.

- ***Avoid conflicts between land use activities / reverse sensitivity.***
  There will be no change to existing land use activities, and no land use conflicts, or reverse sensitivity effects will arise.

- ***Promote maintenance and enhancement of amenity values.***
  The natural and amenity values of the site and its wider context can be maintained by the proposed boundary adjustment.

- ***Enable efficient use and development of the Rural Production Zone, enable people and communities to provide for their social, economic and cultural well being and for their health and safety.***
  The proposed boundary adjustment is an efficient use of the land, which retains the existing land use pattern.

Subdivision

- ***Provide for subdivision so as to be consistent with the purpose of the various zones and promote sustainable management of natural and physical resources.***
  As detailed previously, the proposed activity is considered consistent with the objectives and policies of the Rural Production Zone.

- ***Ensure subdivision is appropriate and does not compromise the life supporting capacity of air, water, soil or ecosystems. Avoid, remedy and mitigate adverse effects.***
  There will be no reduction in the availability of land for primary production. No earthworks are required. The life supporting capacity of soils will not be compromised.
  Overall, the proposed boundary adjustment is an appropriate use of the land, which represents sustainable management, having regard to the range and scale of adverse and positive effects identified.

- ***Provide sufficient water storage.***
- ***Provide electricity supply sufficient to meet the needs of activities that will establish on the lots created.***
- ***Support energy efficient design.***
- ***Promote efficient provision of infrastructure.***
- ***Take into account natural and other hazards.***
  Not relevant as no change to existing land use.

- ***Require safe and effective vehicular and pedestrian access. Provide in such a way as will avoid, remedy or mitigate adverse effects.***
  The proposal does not cause a change to existing property access provisions from Tanekaha Lane or an increase in traffic.
- ***Provide for the protection, restoration and enhancement of significant habitats of indigenous fauna, significant indigenous vegetation, natural character of riparian margins where appropriate.***
- ***Preserve, and where possible enhance, restore and rehabilitate the character of the zone in regards to s6 matters.***
  The proposed boundary adjustment retains the existing character of the environment and has no impact on significant flora and fauna.

6.1.2 Far North Proposed District Plan

As a restricted discretionary activity under the Proposed District Plan, where the matters of discretion have been adequately addressed by this application, it can also be assumed that the proposal is in accordance with the objectives and policies of the Proposed District Plan

6.1.3 Regional Policy Statement for Northland ("RPS")

The RPS provides broad direction and framework for managing the region's natural and physical resources. It identifies significant resource management issues for the region and sets out how resources such as land, water, soil, minerals, plants, animals and structures will be managed. The RPS Maps do not record any special features on the site. The relevant policy is commented on below.

5.1.1 Policy – Planned and coordinated development
The proposed boundary adjustment maintains sufficient adjusted Record of Title sizes, does not create any additional Records of Title, does not require any new infrastructure, and has no implications in terms of this policy. No change of land use on the adjusted Records of Title will result from the proposal and adverse effects on soils are avoided. The proposal is considered to be compatible with the above policy.

6.1.3 National Policy Statement for Highly Productive Land

The subject sites contain LUC 3 land, as mapped by the New Zealand Land Resource Inventory. This is indicated by the darker green coloured area in the maps in **Figures 3** and **4** below.

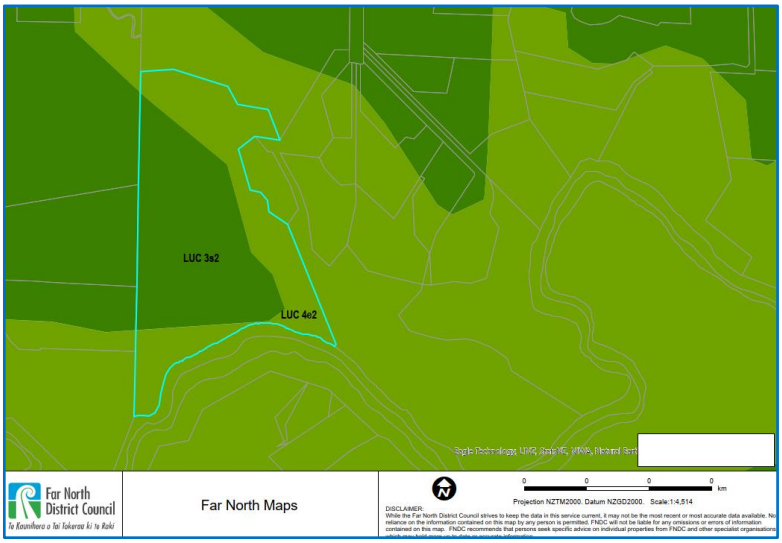


Figure 4: Far North Maps Land cover and land use Map (Lot 2 DP 199962)

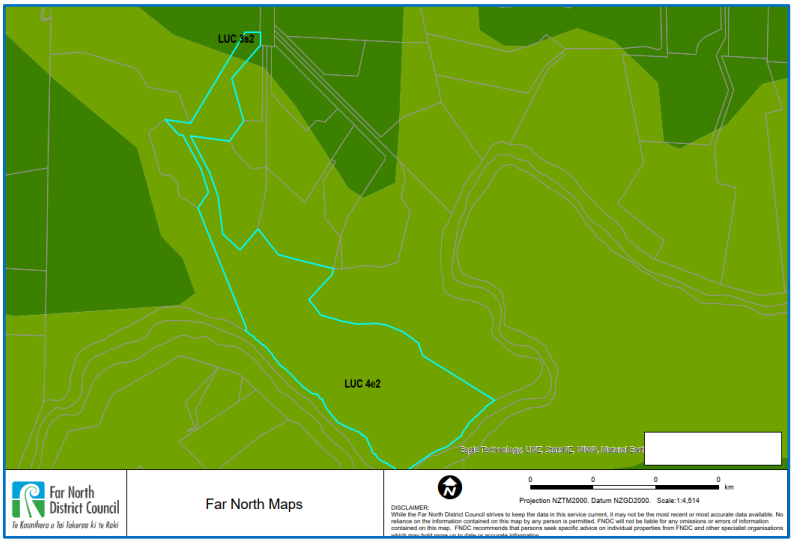


Figure 4: Far North Maps Land cover and land use Map (Lot 1 DP 199962)

Relevant parts of policies 3.8 and 3.10 are transcribed and commented on below.

3.8 Avoiding subdivision of highly productive land
(1) Territorial authorities must avoid the subdivision of highly productive land unless one of the following applies to the subdivision, and the measures in subclause (2) are applied:
(a) the applicant demonstrates that the proposed lots will retain the overall productive capacity of the subject land over the long term:

(2) Territorial authorities must take measures to ensure that any subdivision of highly productive land:
(a) avoids if possible, or otherwise mitigates, any potential cumulative loss of the availability and productive capacity of highly productive land in their district; and
(b) avoids if possible, or otherwise mitigates, any actual or potential reverse sensitivity effects on surrounding land-based primary production activities.

3.10 Exemption for highly productive land subject to permanent or long-term restraints
(1) Territorial authorities may only allow highly productive land to be subdivided, used, or developed for activities not otherwise enabled under clauses 3.7, 3.8, or 3.9 if satisfied that:
(a) there are permanent or long-term constraints on the land that mean the use of the highly productive land for land-based primary production is not able to be economically viable for at least 30 years; and
(b) the subdivision, use, or development:
(i) avoids any significant loss (either individually or cumulatively) of productive capacity of highly productive land in the district; and
(ii) avoids the fragmentation of large and geographically cohesive areas of highly productive land; and
(iii) avoids if possible, or otherwise mitigates, any potential reverse sensitivity effects on surrounding land-based primary production from the subdivision, use, or development; and
(c) the environmental, social, cultural and economic benefits of the subdivision, use, or development outweigh the long-term
environmental, social, cultural and economic costs associated with the loss of highly productive land for land-based primary production, taking into account both tangible and intangible values.

(2) In order to satisfy a territorial authority as required by subclause (1)(a), an applicant must demonstrate that the permanent or long-term constraints on economic viability cannot be addressed through any reasonably practicable options that would retain the productive capacity of the highly productive land, by evaluating options such as (without limitation):
(a) alternate forms of land-based primary production:
(b) improved land-management strategies:
(c) alternative production strategies:
(d) water efficiency or storage methods:
(e) reallocation or transfer of water and nutrient allocations:
(f) boundary adjustments (including amalgamations):
(g) lease arrangements.

(3) Any evaluation under subclause (2) of reasonably practicable options:
(a) must not take into account the potential economic benefit of using the highly productive land for purposes other than land-based primary production; and
(b) must consider the impact that the loss of the highly productive land would have on the landholding in which the highly productive land occurs; and
(c) must consider the future productive potential of land-based primary production on the highly productive land, not limited by its past or present uses.

(4) The size of a landholding in which the highly productive land occurs is not of itself a determinant of a permanent or long-term constraint.

Clause 3.8(1)(a) is met, as the boundary adjustment does not create any additional titles, does not change the established use of the sites from their existing horticultural use, and does not have any impact on the overall productive capacity of the land. No reverse sensitivity issues will arise in terms of 3.8(2)(b), meaning that these effects are avoided.

As the proposal is considered to satisfy policy 3.8(1)(a), it is considered that the exemption does not need to be applied.

6.2 Part 2 of the Resource Management Act 1991

An assessment of the proposal in relation to Part 2 of the Act is given below.

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

7 Other matters
In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development and protection of natural and physical resources, shall have particular regard to-
(b) The efficient use and development of natural and physical resources;
(c) The maintenance and enhancement of amenity values;
(f) Maintenance and enhancement of the quality of the environment;

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

The proposed boundary adjustment is considered to represent sustainable management of natural and physical resources as it:
- Does not affect the overall productive capacity of the land.
- Does not create any additional Records of Title.
- Supports the continued sustainable use of the lots and reflects existing physical arrangements.
- Does not impact any ecosystems of significance.

There are no relevant matters of national importance. Relevant matters listed under Section 7 have been given regard to, as amenity and ecological values can be maintained. The proposal will not detract from the quality of the environment. The proposal has no implications in terms of the Treaty of Waitangi.

6.3 National Environmental Standards

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

The subject land is production land. The proposed boundary adjustment (subdivision) will not subdivide the land in such a way that causes the piece of land to stop being production land. Therefore, the above regulations do not apply to the proposed activity, as per clause 5(8)(c).

6.3.2 Resource Management (National Environmental Standard for Freshwater) Regulations 2020

The boundary adjustment activity does not involve any earthworks, vegetation removal, or diversion or discharge of stormwater, and is considered to have no implications in terms of the above Regulations.

6.4 Regional Plans

The boundary adjustment activity does not require consent under the Proposed Regional Plan.

7.0 Notification Assessment

7.1 Public Notification Assessment

Department of Conservation have been contacted for their comments in relation to their ability to manage and administer the adjoining Marginal Strip adjacent to Waipapa Stream. Their RMA Team has responded that they have no comments. Refer to **Appendix 4**.

No other written approvals have been sought as part of the proposal.

7.2 Public Notification Assessment

Step 1: Public notification is not required in terms of the criteria listed in 95A(3).

Step 2: Public notification is not precluded*.*

Step 3: As outlined in Section 5.0 of this report, the proposed activity will not have adverse effects that are more than minor. There are no rules requiring public notification. Therefore, public notification is not required in terms of Step 3.

Step 4: No special circumstances are considered to exist that warrant the application being publicly notified in terms of 95A(9).

7.3 Limited Notification Assessment

Step 1: The proposal will not result in any adverse effects on the marine and coastal area, and there are no affected protected customary rights groups in terms of Section 95B(2)(a). The proposal is not an accommodated activity in terms of Section 95B(2)(b). The proposed activity is not on or adjacent to, or may affect, land that is the subject of a statutory acknowledgement in terms of Section 95B(3)(a).

Step 2: Limited notification is not precluded.

Step 3: The proposal will not adversely affect any person as per Section 95E of the Act. Limited notification is not necessary in terms of Step 3.

Step 4: No special circumstances are considered to exist that warrant notification of the application to any other persons in terms of Section 95B(10).

7.4 Notification Assessment Summary

As outlined above, we are of the opinion that the proposal satisfies the statutory requirements for non-notification, and we respectfully request that it be processed on that basis.

8.0 Conclusion

In terms of section 104 and 104B of the Resource Management Act 1991, we consider that:

- The adverse effects of the activity on the environment resulting from the proposed activity will be less than minor.
- The proposal is considered to be consistent with the objectives and policies of the Operative and Proposed District Plans.
- The proposal is consistent with the relevant objectives and policies of the Regional Policy Statement and National Policy Statement for Highly Productive Land.
- The proposal is in accordance with the Purpose and Principles of the Resource Management Act 1991.

We also note that:

- The proposal satisfies the statutory requirements to proceed as non-notified.

For these reasons it is requested this application be considered to be a non-notified application, and that the Council grant consent to the proposal, under delegated authority, as detailed in the application and supporting information.

Signed .....

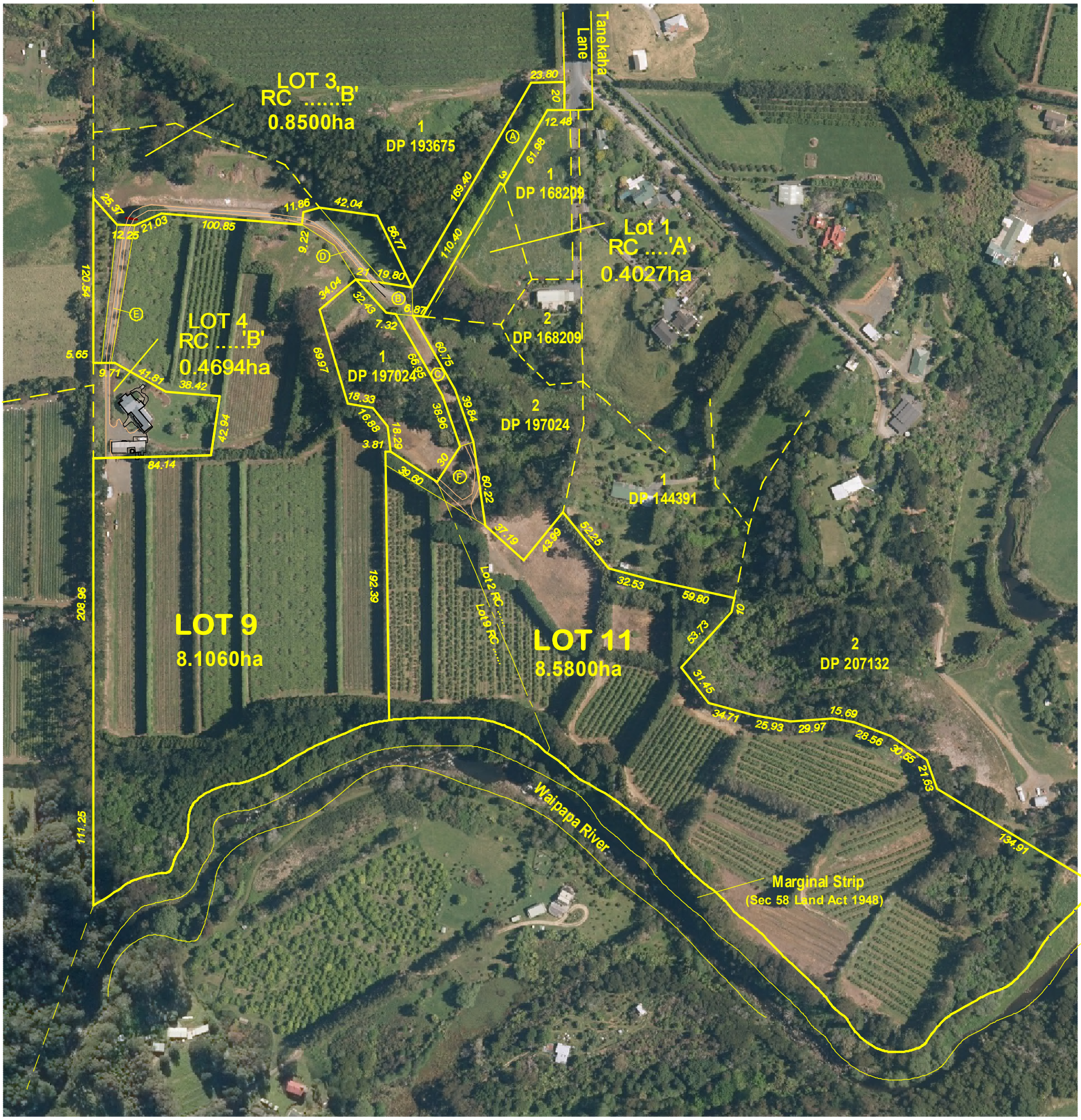
Date 17 June 2024

Natalie Watson,
Resource Planner

WILLIAMS & KING
Kerikeri

9.0 Appendices

Appendix 1: **Scheme Plan**
Appendix 2: **Records of Title**
Appendix 3: **Geologix Consulting Engineers Site Suitability Report**
Appendix 4: **Department of Conservation Correspondence**



Overall

EXISTING EASEMENTS

PURPOSE	SHOWN	BURDENED LAND	DOCUMENT
RIGHT OF WAY, RIGHT TO CONVEY ELECTRICITY AND TELECOMMUNI-CATIONS	A B C	LOT 11 HEREON	EC D468330.5
RIGHT OF WAY, RIGHT TO CONVEY ELECTRICITY AND TELECOMMUNI-CATIONS	A B	LOT 11 HEREON	EC D468330.5

EXISTING EASEMENTS IN GROSS

PURPOSE	SHOWN	BURDENED LAND	GRANTEE DOCUMENT
RIGHT OF WAY, RIGHT TO CONVEY WATER, RIGHT TO TRANSMIT ELECTRICITY AND TELECOMMUNI-CATIONS	A B	LOT 11 HEREON	TOP ENERGY LTD T D468330.9

EXISTING EASEMENTS

PURPOSE	SHOWN	BURDENED LAND	BENEFITED LAND
RIGHT OF WAY, RIGHT TO CONVEY WATER, ELECTRICITY AND TELECOMMUNI-CATIONS	D E	LOT 9 HEREON	RC .....

PROPOSED MEMORANDUM OF EASEMENTS

PURPOSE	SHOWN	BURDENED LAND	BENEFITED LAND
RIGHT OF WAY, RIGHT TO CONVEY WATER, ELECTRICITY AND TELECOMMUNI-CATIONS	C F	LOT 11 HEREON	LOT 9 HEREON

AREAS AND MEASUREMENTS SUBJECT TO FINAL SURVEY

Local Authority: Far North District Council

Total Area:16.6078ha
Comprised in: RC.....A & RC .....B

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

0 30 60 90 120 150 180 210 240m

Prepared for: MESSENGER GOLD LIMITED

WILLIAMS AND KING
Registered Land Surveyors, Planners & Land Development Consultants
Ph: (09) 407 6030
Email: kerikeri@saps.co.nz
27 Hobson Ave
PO Box 937 Kerikeri

Proposed Subdivision of
Lot 2 RC .....'A'..... & Lot 5 RC .....'B'.....
By way of Boundary Adjustment

	Name	Date
Survey		
Design		
Drawn	W & K	Jan 2024
Rev		May 2024

ORIGINAL SCALE 1:3000 SHEET SIZE A3

24107 C

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **NA126B/806**
Land Registration District **North Auckland**
Date Issued 06 January 2000

Prior References
NA102A/534

Estate	Fee Simple
Area	10.7100 hectares more or less
Legal Description	Lot 2 Deposited Plan 199962

Registered Owners
Messenger Gold Limited

Interests

Appurtenant hereto is a water supply right specified in Easement Certificate C907091.9 - 12.10.1995 at 2.05 pm

Subject to a water supply right over part marked D on DP 197024 specified in Easement Certificate D468330.5 - 6.1.2000 at 2.04 pm

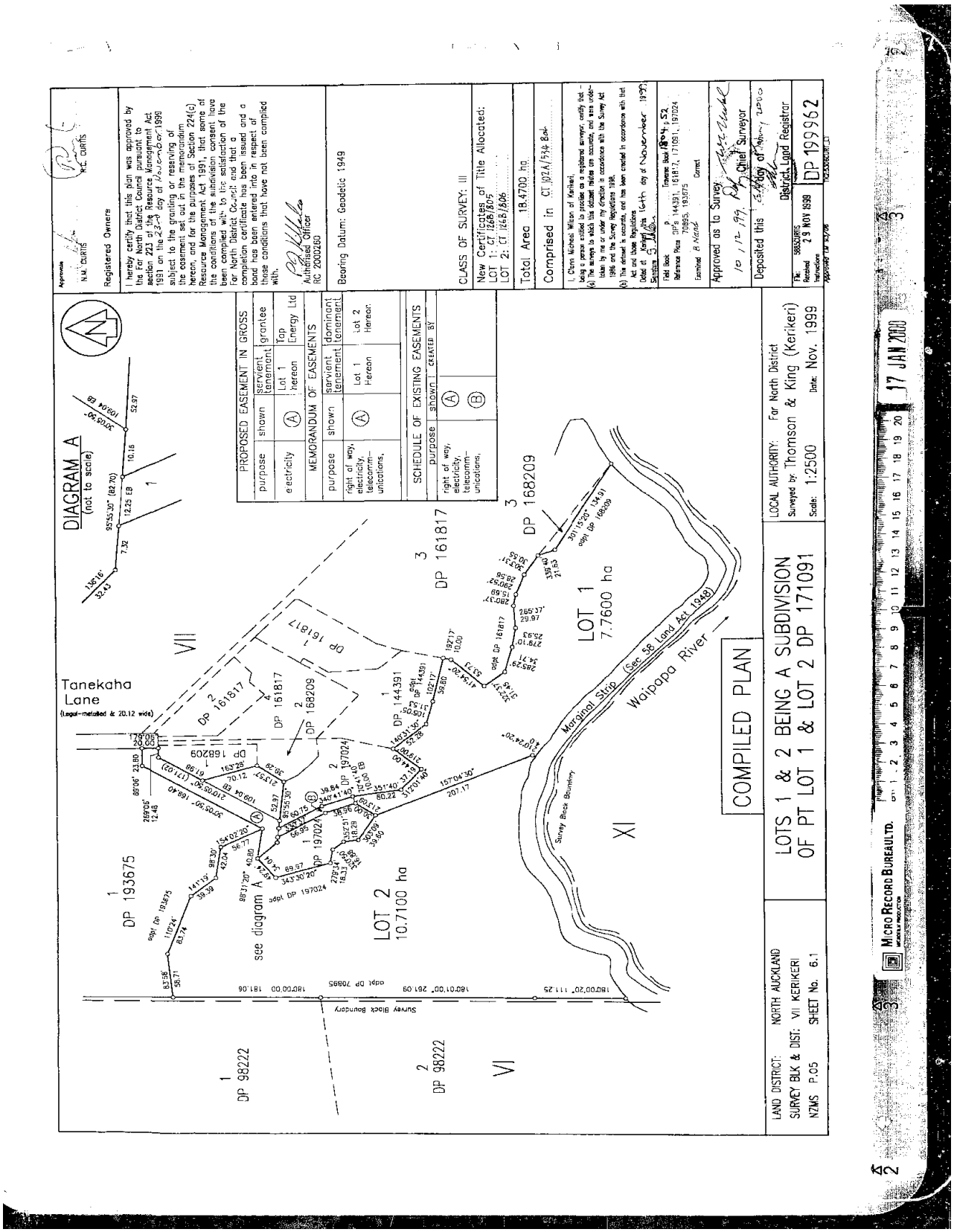
The easements specified in Easement Certificate D468330.5 are subject to Section 243 (a) Resource Management Act 1991

Appurtenant hereto is a right of way, and telecommunications and electricity rights specified in Easement Certificate D468330.8 - 6.1.2000 at 2.04 pm

The easements specified in Easement Certificate D468330.8 are subject to Section 243 (a) Resource Management Act 1991

11972968.4 Mortgage to Rabobank New Zealand Limited - 21.12.2020 at 2:26 pm

Identifier **NA126B/806**



D 468330.5 EC

EASEMENT CERTIFICATE

(**IMPORTANT:** Registration of this certificate does not of itself create any of the easements specified herein).

I/We RICHARD CHARLES **CURTIS** and NICOLA MARY **CURTIS**

being the registered proprietor(s) of the land described in the Schedule hereto hereby certify that the easements specified in that Schedule, the servient tenements in relation to which are shown on a plan of survey deposited in the Land Registry Office at Auckland
on the day of 1999 under No. 197024
are the easements which it is intended shall be created by the operation of section 90A of the Land Transfer Act 1952.

SCHEDULE

DEPOSITED PLAN NO. 197024

Nature of Easement (e.g., Right of Way, etc.)	Servient Tenement		Dominant Tenement Lot No.(s) or other Legal Description	Title Reference
	Lot No.(s) or other Legal Description	Colour, or Other Means of Identification, of Part Subject to Easement		
Right of Way Telecommunications and Electricity	Part Lot 1 Deposited Plan ~~171091~~ DP 199962 Lot 1	A	Lots 1 & 2 hereon	Part 102A/534 124C/880 124C/881
Right of Way Telecommunications and Electricity	Part Lot 1 Deposited Plan ~~171091~~ 199962	B	Lot 2 hereon	Part 102A/534 124C/881
Water Supply	Lot 2 hereon	D	Lot 1 Deposited Plan 171091 Pt new Lot 1 all Lot 2 DP 199962	124C/881 124C/880

State whether any rights or powers set out here are in addition to or in substitution for those set out in the Seventh Schedule to the Land Transfer Act 1952.

1. Rights and powers:

   (a) In addition the implied covenants of the Ninth Schedule of the Property Law Act 1952 shall apply;

   (b) See attached for Telecommunications and Electricity

RIGHTS AND POWERS

That in respect of the Telecommunications and Electricity Easements referred to in the Schedule hereto, the rights and powers applicable thereto are:

(a) The full free uninterrupted and unrestricted right liberty and privilege for the occupier and registered proprietor for the time being of the dominant tenement from time to time and at all times to take convey and lead electrical current or any other mode of transmitting telecommunications in a free and unimpeded flow (except where the flow is halted for any reasonable period necessary for essential repairs) for the purposes of telecommunications under or across the land over which the Easement is created and to erect, lay and maintain poles and cables for such purpose.

(b) The full free uninterrupted and unrestricted right liberty and privilege for the occupier and registered proprietor for the time being of the dominant tenement from time to time and at all times to take convey and lead electricity in a free and unimpeded flow (except where the flow is halted for any reasonable period necessary for essential repairs) under or across the land over which the Easement is created and to erect, lay and maintain poles and cables for such purpose.

TERMS CONDITIONS COVENANTS OR RESTRICTIONS IN RESPECT OF ABOVE EASEMENTS:

That in respect of the Electricity and Telecommunications Easements (hereinafter called "the Easements") referred to in the Schedule hereto the terms conditions covenants or restrictions applicable thereto are as follows:-

(a) All cables placed within or such poles and cable erected upon the servient tenements shall be maintained and as required repaired to a good and serviceable condition by the registered proprietors for the time being of the dominant tenements.

(b) All the costs and expenses of and incidental to the repairing and maintaining of the Easements herein specified shall be borne by the registered proprietor for the time being of the dominant tenements.

(c) Any person wishing to carry out any work whatsoever on the Easements herein specified shall first give to the registered proprietor of the servient tenement thereof notice of such intention and of the nature and expense of the said work prior to any such work being commenced.

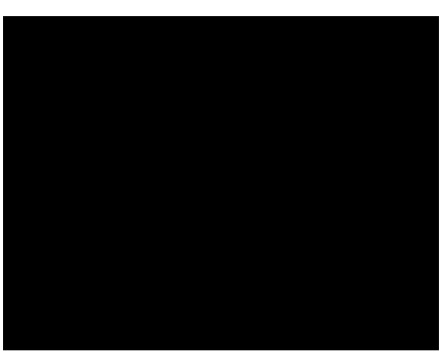
(d) Any person carrying out any work whatsoever on the Easements herein specified shall take all reasonable and proper action and care to interfere as little as possible with the comfort and convenience of the occupier or occupiers for the time being of the dominant and servient tenements and shall carry out such work or cause the same to be carried out with the utmost expedition and in a prudent manner and in particular shall during the course of such work:

(i) Shore up or cause to be shored up in a proper safe and workmanlike manner any part of the dominant or servient tenement affected thereby.

(ii) Take all reasonable and proper steps to preserve the said tenements and all parts thereof and all property and goods thereon from damage.

(e) Subject to the other terms and conditions covenants and restrictions contained in these presents any person carrying out any work as aforesaid shall have the right to enter and to bring machinery and workmen on to any part of the dominant or servient tenement as shall be necessary for the purposes of carrying out maintenance on the Easements referred to herein and shall have the right to remove all soil roading paving metalling fencing and all other things as shall be reasonably necessary to give unimpeded access to the said Easement PROVIDED HOWEVER that such soil roading paving metalling and fencing which is so removed shall be restored as nearly as possible to its original condition and that any other damage done by reason of the said maintenance is repaired and that as little disturbance as possible is caused to the surface of the land and to the enjoyment of the said tenements by the registered proprietors or occupiers.

(f) Where the maintenance work which is required to be carried out in terms of these presents involves the total or partial replacement of any cables this work shall be deemed to be maintenance work which may be carried out in accordance with these presents.



2. Terms, conditions, covenants, or restrictions in respect of any of the above easements:

   (a) In addition the implied covenants of the Ninth Schedule of the Property Law Act 1952 shall apply

   (b) See attached for Telecommunications and Electricity

Approved by Registrar-General
of Land under No. 1998/6031

EASEMENT CERTIFICATE

Land Transfer Act 1952

[redacted]

LINZ COPY

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PARTICULARS ENTERED IN THE REGISTER
LAND REGISTRY NORTH AUCKLAND
for REGISTRAR-GENERAL OF LAND
NEW ZEALAND

REGISTRAR-GENERAL OF LAND

1247/088

1024/532

Law Firm Acting
LAW NORTH PARTNERS SOLICITORS ***KERIKERI***

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Auckland District Law Society
REF: 4050

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D 468330.8 EC

EASEMENT CERTIFICATE

(**IMPORTANT:** Registration of this certificate does not of itself create any of the easements specified herein).

I/We RICHARD CHARLES CURTIS and NICOLA MARY CURTIS

being the registered proprietor(s) of the land described in the Schedule hereto hereby certify that the easements specified in that Schedule, the servient tenements in relation to which are shown on a plan of survey deposited in the Land Registry Office at Auckland on the day of 19 99 under No. ~~199XXX~~ 199962 are the easements which it is intended shall be created by the operation of section 90A of the Land Transfer Act 1952.

SCHEDULE

DEPOSITED PLAN NO. ~~199XXX~~ 199962

Nature of Easement (e.g., Right of Way, etc.)	Servient Tenement		Dominant Tenement Lot No.(s) or other Legal Description	Title Reference
	Lot No.(s) or other Legal Description	Colour, or Other Means of Identification, of Part Subject to Easement		
Right of Way electricity and telecommunications	Lot 1 hereon	A	LOT 2 hereon	~~126B/XXX~~ ~~126B/XXX~~ 126B/805 126B/806

State whether any rights or powers set out here are in addition to or in substitution for those set out in the Seventh Schedule to the Land Transfer Act 1952.

1. Rights and powers:

   (a) In addition the implied covenants of the Ninth Schedule of the Property Law Act 1952 shall apply;

   (b) See attached for Telecommunications and Electricity

TERMS CONDITIONS COVENANTS OR RESTRICTIONS IN RESPECT OF ABOVE EASEMENTS:

That in respect of the Electricity and Telecommunications Easements (hereinafter called "the Easements") referred to in the Schedule hereto the terms conditions covenants or restrictions applicable thereto are as follows:-

(a) All cables placed within or such poles and cable erected upon the servient tenements shall be maintained and as required repaired to a good and serviceable condition by the registered proprietors for the time being of the dominant tenements.

(b) All the costs and expenses of and incidental to the repairing and maintaining of the Easements herein specified shall be borne by the registered proprietor for the time being of the dominant tenements.

(c) Any person wishing to carry out any work whatsoever on the Easements herein specified shall first give to the registered proprietor of the servient tenement thereof notice of such intention and of the nature and expense of the said work prior to any such work being commenced.

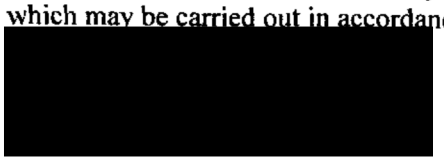
(d) Any person carrying out any work whatsoever on the Easements herein specified shall take all reasonable and proper action and care to interfere as little as possible with the comfort and convenience of the occupier or occupiers for the time being of the dominant and servient tenements and shall carry out such work or cause the same to be carried out with the utmost expedition and in a prudent manner and in particular shall during the course of such work:

(i) Shore up or cause to be shored up in a proper safe and workmanlike manner any part of the dominant or servient tenement affected thereby.

(ii) Take all reasonable and proper steps to preserve the said tenements and all parts thereof and all property and goods thereon from damage.

(e) Subject to the other terms and conditions covenants and restrictions contained in these presents any person carrying out any work as aforesaid shall have the right to enter and to bring machinery and workmen on to any part of the dominant or servient tenement as shall be necessary for the purposes of carrying out maintenance on the Easements referred to herein and shall have the right to remove all soil roading paving metalling fencing and all other things as shall be reasonably necessary to give unimpeded access to the said Easement PROVIDED HOWEVER that such soil roading paving metalling and fencing which is so removed shall be restored as nearly as possible to its original condition and that any other damage done by reason of the said maintenance is repaired and that as little disturbance as possible is caused to the surface of the land and to the enjoyment of the said tenements by the registered proprietors or occupiers.

(f) Where the maintenance work which is required to be carried out in terms of these presents involves the total or partial replacement of any cables this work shall be deemed to be maintenance work which may be carried out in accordance with these presents.

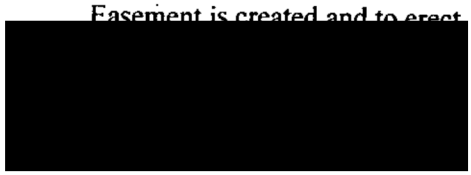


RIGHTS AND POWERS

That in respect of the Telecommunications and Electricity Easements referred to in the Schedule hereto, the rights and powers applicable thereto are:

(a) The full free uninterrupted and unrestricted right liberty and privilege for the occupier and registered proprietor for the time being of the dominant tenement from time to time and at all times to take convey and lead electrical current or any other mode of transmitting telecommunications in a free and unimpeded flow (except where the flow is halted for any reasonable period necessary for essential repairs) for the purposes of telecommunications under or across the land over which the Easement is created and to erect, lay and maintain poles and cables for such purpose.

(b) The full free uninterrupted and unrestricted right liberty and privilege for the occupier and registered proprietor for the time being of the dominant tenement from time to time and at all times to take convey and lead electricity in a free and unimpeded flow (except where the flow is halted for any reasonable period necessary for essential repairs) under or across the land over which the Easement is created and to erect, lay and maintain poles and cables for such purpose.



2. Terms, conditions, covenants, or restrictions in respect of any of the above easements:

Approved by Registrar-General
of Land under No. 1998/6031

EASEMENT CERTIFICATE

Land Transfer Act 1952

[redacted]

204 06.JAN00 D 468330.8

PARTICULARS ENTERED IN THE REGISTER
LAND REGISTRY NORTH AUCKLAND
for REGISTRAR-GENERAL OF LAND

REGISTRAR-GENERAL OF LAND

12/13/97

Law Firm Acting
LAW NORTH PARTNERS SOLICITORS KERIKERI

Auckland District Law Society
REF: 4050

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D 468330.9 TE

TRANSFER

Land Transfer Act 1952

This page does not form part of the Transfer.

TRANSFER

Land Transfer Act 1952

If there is not enough space in any of the panels below, cross-reference to and use the approved Annexure Schedule: no other format will be received.

Land Registration District

NORTH AUCKLAND

Certificate of Title No.	All or Part?	Area and legal description — ***Insert only when part or Stratum, CT***
126B 805 XXX XXX	All	

Transferor *Surnames must be underlined*

RICHARD CHARLES **CURTIS** and NICOLA MARY **CURTIS**

Transferee *Surnames must be underlined*

TOP ENERGY LIMITED

Estate or Interest or Easement to be created: *Insert e.g. Fee simple; Leasehold in Lease No. .....; Right of way etc.*

Easement in Gross for electricity purposes (continued on pages 2 to 9 annexure schedules)

Consideration

$1.00 (**ONE DOLLAR**)

Operative Clause

For the above consideration (receipt of which is acknowledged) the TRANSFEROR TRANSFERS to the TRANSFEREE all the transferor's estate and interest in the land in the above Certificate(s) of Title and if an easement is described above such is granted or created.

Dated this 16th **day of** December **1999**

[redacted]

1. **Transfer and Grant of Transmission Easement**

1.1. In consideration of the covenants on the part of the Transferee contained in this Memorandum, the Transferor **TRANSFERS AND GRANTS** to the Transferee and any other persons authorised (expressly or impliedly) by the Transferee an electricity transmission in gross over Lot 1 on Deposited Plan ~~XXXXX~~ 199962 with the following rights and interests as an easement in gross (the "Transmission Easement").

1.1. The right to survey and investigate in respect of, and to lay, construct, operate, inspect, use, cleanse, maintain, repair, renew, upgrade, change the size of and remove, the Transmission Line in, over, on, under or through that part of the Land marked "A" on Deposited Plan ~~XXXXX~~ 199962 ("the Servient Land").

1.1.1 The right to convey, send, transmit or transport electricity and telecommunications signals, waves or impulses in, over, on, under or through the Servient Land.

1.1.2 The right with any vehicles, equipment, aircraft and materials of any kind, to enter on the Servient Land for any and all purposes necessary or convenient for the Transferee to exercise its rights and interests granted under this memorandum (including the right to extinguish fires), but subject to the conditions that as little disturbance as is reasonably possible is caused to the Transferor, the Land, and the Transferor's stock and other property in doing so and that, where applicable, all gates on the Land are left as the Transferee and those other authorised persons find them.

1.1.3 The right to construct on the Servient Land whatever roads, tracks, access ways, fences, gates and other works deemed necessary by the Transferee for it to exercise its rights and interests granted under this memorandum and which are approved by the Transferor (that approval not to be unreasonably withheld), but subject to the condition that as little disturbance as possible is caused to the Transferor, the Land, and the Transferor's stock and other property in doing so.

1.1.4 The right to keep the Servient Land cleared of all buildings or structures (including any buildings or structures which overhang the Servient Land) by any means the Transferee may consider necessary.

1.1.5 The right to keep the Servient Land cleared of any fences or vegetation, both natural and cultivated, including trees and shrubs (including any fences, or vegetation which

[redacted]

overhang the Servient Land) by any means which the Transferee may consider necessary where such fences or vegetation:

(a) breach any statutory or regulatory requirements or standards or codes of practice or otherwise breach generally accepted engineering standards as to the minimum clearance of the Transmission Line;

(b) impedes the Transferee's access over the Servient Land; or

(c) inhibits the safe and efficient operation of the Transmission Line.

1.1.6 The right by whatever means or method as the Transferee considers necessary to level and grade any stockpiled soil, sand, gravel or other substance or any materials, walls or other earthworks that may exist on the Servient Land in order to ensure that the clearance above the ground level of the Transmission Line is maintained greater than any minimum clearance height that may exist from time to time in statute, regulations, code of practice or otherwise, subject to reasonable access being maintained through the Servient Land.

2. COVENANTS

2.1 Ownership of the Transmission Line

2.1.1 The Transmission Line will become and remain the property of the Transferee.

2.2 Buildings Structures Fences and Vegetation

2.2.1 The Transferee may consent in writing to certain existing buildings, structures, fences or vegetation upon or overhanging the Servient Land at the date of this Memorandum remaining there. If the existence of those buildings, structures, fences or vegetation so consented to, or any additional buildings, structures, fences or vegetation consented to pursuant to clause 2.2.3, subsequently results in a situation described in clause 1.1.5 (a) - (c) then such consent may be revoked by the Transferee but without compensation. If such consent is revoked the cost of removal of any buildings, structures, fences or vegetation shall be borne by the Transferee. Before removing any fence pursuant to this clause the Transferee shall consult with the Transferor so the Transferor is given a reasonable opportunity to co-ordinate the

[redacted]

erection of any necessary replacement fence. The erection of any such replacement fence and the cost of it will be the Transferor's responsibility.

2.2.2 The Transferee shall be responsible for the removal of any building, structures, fences or vegetation on or overhanging the Servient Land at the date of this Memorandum in respect of which no consent in writing has been sought or obtained pursuant to clause 2.2.1.

2.2.3 The Transferee may consent in writing to the construction after the date of this Memorandum of any buildings, structures, fences or the planting or cultivation of vegetation including trees and shrubs on the Servient Land, or on the land to the extent any buildings, structures, fences or vegetation overhangs the Servient Land.

2.2.4 The Transferee shall not be responsible for or be liable to contribute to the cost of removing any buildings, structures, fences or vegetation, built or cultivated on or overhanging the Servient Land after the date of this Memorandum in respect of which no consent in writing has been sought or obtained pursuant to clause 2.2.3.

2.3 **Restoration of Land**

2.3.1 The Transferee will be responsible for restoring any part of the Land affected by the Transferee exercising any of its rights under this Memorandum to a condition equivalent, as far is reasonably practicable, to that existing before the Transferee exercised those rights.

2.4 **Transferor's Continued Use of Servient Land**

2.4.1 The Transferor may use the Servient Land so long as that use does not unreasonably interfere with the enjoyment of the Transferee's rights and interests granted under this memorandum.

2.5 **Restrictions on Transferor's Use**

2.5.1 The Transferor must not at any time after the date of this memorandum, do permit or suffer to be done any act whereby the rights, powers, licences and liberties granted to the Transferee under this memorandum may be interfered with or affected in any

[redacted]

way and, in particular, the Transferor must not, without the consent in writing of the Transferee:

(a) make, or permit to be made, any alterations or additions to any buildings or structures existing on the Servient Land at the date of this Memorandum which affect the overall dimensions of those buildings or structures;

(b) erect, or permit the erection, of any buildings or structures on the Servient Land;

(c) stockpile or fill with, or permit the stockpiling of or filling with, any soil, sand, gravel or other substance or materials, or construct, or permit the construction of, any roads, dam walls or other earthworks on the Servient Land which would in any way reduce the clearance above the ground level of the Transmission Lines below the minimum clearance height that may exist, from time to time, in statute, regulations, code of practice or otherwise;

(d) remove, or permit the removal of, any soil, sand, gravel or other substance from the Servient Land;

(e) disturb the soil below a depth of 0.3 metres within a distance of 6 metres from the visible outer edge of any tower, pole, ground stay, support or foundation comprising part of the Transmission Line;

(f) cause or consent to acquiesce in the inundation of the Servient Land where any existing towers, poles, ground stays or supports comprising part of the Transmission Line are erected or located, or proposed to be erected or located, from the date of this memorandum **EXCEPT HOWEVER** nothing will require the Transferor to take any steps to do or construct anything to prevent that inundation caused by events beyond the reasonable control of the Transferor;

(g) burn off crops, trees or undergrowth within the Servient Land;

(h) operate, or permit to be operated, any machinery or equipment (including by way of example, but not in limitation, cranes, drilling-rigs, pile-drivers

[redacted]

and excavators) in close proximity to any tower, pole, ground stay or support comprising part of the Transmission Line;

(i) disturb any survey pegs or markers placed on the Servient Land by the Transferee; or

(j) do anything on or in the Servient Land which would or could damage or endanger the Transmission Line.

2.5.2 The consent of the Transferee required under clause 2.5.1 will not be unreasonably withheld, but may be given subject to reasonable conditions (including the power to revoke without compensation).

2.6 **Restrictions on Transferee's Use of Land**

2.6.1 The Transferee will erect the Transmission Line so as not to unreasonably interfere with the ordinary cultivation of the Land and in so doing, or in laying, constructing, operating, inspecting, using, cleansing, maintaining, repairing, renewing, upgrading, replacing, changing the size of or removing the Transmission Line, will cause as little damage as is reasonably possible to the surface of the Land.

2.7 **Statutes and Regulations**

2.7.1 It is acknowledged by the Transferee that its rights under the Transmission Easement are subject to the provisions of all applicable statutes, ordinances, regulations and by-laws.

2.7.2 The Transferee covenants with the Transferor that it will comply with the provisions of all statutes, ordinances, regulations and by-laws in any way relation or affecting the Transmission Easement, the Transmission Line or the exercise, or the attempted or intended exercise, by it or any of its rights under this memorandum, and will also comply with the provisions of all licences, requisitions and notices issued, made or given by any competent authority in respect of the Transmission Easement, the Transmission Line or the exercise, or attempted or intended exercise, by the Transferee of any of its rights under this memorandum.

[redacted]

2.8 **Indemnity Against Third Party Claims**

2.8.1 Each party will indemnify the other against all claims or demands from third parties for any loss, damage or liability in respect of, or arising out of, the use of the land by that party (or any person authorised, whether expressly or impliedly by it) **EXCEPT THAT** it will not be liable to indemnify the other party in respect of claims or demands from third parties for any loss, damage or liability caused by the actions of the other party. Where the actions of the other party contribute to that loss, damage or liability, the indemnity given by the party to that other party in respect of that loss, damage and liability will be correspondingly reduced in proportion to that contribution.

2.8.2 The quantum of damages payable by either party pursuant to clause 2.8.1 will be determined by agreement between them or, if they fail to agree, then they will submit the matter to arbitration in accordance with clause 2.11.

2.9 **Licence and Assignment**

2.9.1 The Transferee may grant any licence or right of all or any part of any estate or interest conferred by this memorandum and may assign all or any part of that estate or interest.

2.10 **Perpetual Easement**

2.10.1 No power is implied for the Transferor to determine the Transmission Easement for any breach of covenant (express or implied) or for any causes whatever. It is the intention of the parties that the Transmission Easement will subsist forever or until duly surrendered.

2.11 **Arbitration**

2.11.1 All differences and disputes which may arise between the parties touching, concerning or arising out of this memorandum (except for proceedings relating to any unpaid moneys due under this memorandum or as otherwise expressly provided in this memorandum) shall be submitted to arbitration in accordance with the Arbitration Act 1996 ("Act"). The following provisions shall apply:

[redacted]

(a) There shall be a single arbitrator agreed upon by the parties or failing agreement, two arbitrators (one to be appointed by each party) and a third arbitrator to be appointed by the arbitrators appointed by the parties or if the arbitrators appointed by the parties cannot reach agreement, the third arbitrator shall be appointed by the President for the time being of the District Law Society within which the Servient Land is situated. If any party fails to act as required under this provision, or the President for the time being of the District Law Society fails to appoint a third arbitrator then the provisions of clause 1(4)(c) of the second schedule to the Act shall apply.

(b) Any notice to be given pursuant to the provisions of this clause may be given as provided in the first schedule to the Act.

(c) All arbitrators shall be ordinarily resident in New Zealand and any arbitration proceedings shall be conducted in the English language.

(d) Where three arbitrators are appointed the arbitrator not appointed by the parties shall be the presiding arbitrator.

(e) The sole arbitrator or presiding arbitrator shall determine all questions of procedure.

(f) Clause 5 of the second schedule to the Act shall not apply.

2.12 **Interpretation**

2.12.1 For the purpose of interpretation or construction of this memorandum, unless the context otherwise requires:

(a) the term "Transmission Line" means a wire or wires or a conductor of any other kind (including a fibre optic or coaxial cable) used or intended to be used for the transmission of electricity and/or telecommunication signals, waves or impulses; and includes any insulator, tower, pole, ground stay, supporting structure, crossarm, foundation, casing, tube, tunnel, minor fixture or other item, equipment or material used or intended to be used for supporting, securing, enclosing, surrounding and protecting a Transmission Line; and also

[redacted]

includes any building, tower or pole mounted transformers, fuses, fuse holder, automatic switches, voltage regulators, capacitors or other instrument, apparatus or device used in association with a Transmission Line for the purpose of protecting and facilitating the transmission of electricity and telecommunication signals, waves or impulses through the Transmission Line;

(b) references to clauses or a Schedule are references to clauses of, and a Schedule to, this memorandum;

(c) words importing the singular or plural number include the plural and singular number respectively;

(d) headings are inserted for the sake of convenience of reference only and do not affect the interpretation of this memorandum;

(e) reference to the parties include their respective successors and assigns; and

(f) references to a statue or statutory provision includes references to that statute or statutory provision (as the case may be) and to any regulations made pursuant to that statute or statutory provision (as the case may be) as from time to time modified, codified or re-enacted, whether before or after the date of this memorandum, so far as that modification, codification or re-enactment applies, or is capable of applying, to this memorandum and the transfer and grant of the Transmission Easement under it.

[redacted]

Annexure Schedule

TRANSFER Dated [ ] Page [ ] of [ ] Pages

[redacted]

Approved by Registrar-General
of Land under No. 1995/1004

TRANSFER

Land Transfer Act 1952

[redacted]

Law Firm Acting
LAW NORTH PARTNERS SOLICITORS KERIKERI

Auckland District Law Society
REF: 4135

This page is for Land I
(except for "L

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **NA126B/805**
Land Registration District **North Auckland**
Date Issued 06 January 2000

Prior References
NA102A/534

Estate	Fee Simple
Area	7.7600 hectares more or less
Legal Description	Lot 1 Deposited Plan 199962

Registered Owners
Messenger Gold Limited

Interests

Subject to Section 59 Land Act 1948 (Affects part)

Appurtenant hereto is a water right specified in Easement Certificate C195850.3 - 3.10.1990 at 2:14 pm (Affects part formerly Lot 2 DP 171091

The easements specified in Easement Certificate C195850.3 are subject to Section 309 (1) (a) Local Government Act 1974

Appurtenant hereto is a right of way, and telecommunications and water supply rights specified in Easement Certificate C662999.6 (Affects part formerly Lot 2 DP 171091)

The easements specified in Easement Certificate C662999.6 are subject to Section 243 (a) Resource Management Act 1991

Appurtenant hereto is a water supply right specified in Easement Certificate C907091.9 - 12.10.1995 at 2.05 pm

Subject to rights of way and an electricity and telecommunications rights over parts marked A and B on DP 197024 specified in Easement Certificate D468330.5 - 6.1.2000 at 2.04 pm

Appurtenant hereto is a water supply right specified in Easement Certificate D468330.5 - 6.1.2000 at 2.04 pm

The easements specified in Easement Certificate D468330.5 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right of way and an electricity and telecommunications rights over part marked A on DP 199962 specified in Easement Certificate D468330.8 - 6.1.2000 at 2.04 pm

The easements specified in Easement Certificate D468330.8 are subject to Section 243 (a) Resource Management Act 1991

Subject to an electricity right (in gross) over part marked A on DP 199962 in favour of Top Energy Limited created by Transfer D468330.9 - 6.1.2000 at 2.04 pm

11972968.4 Mortgage to Rabobank New Zealand Limited - 21.12.2020 at 2:26 pm

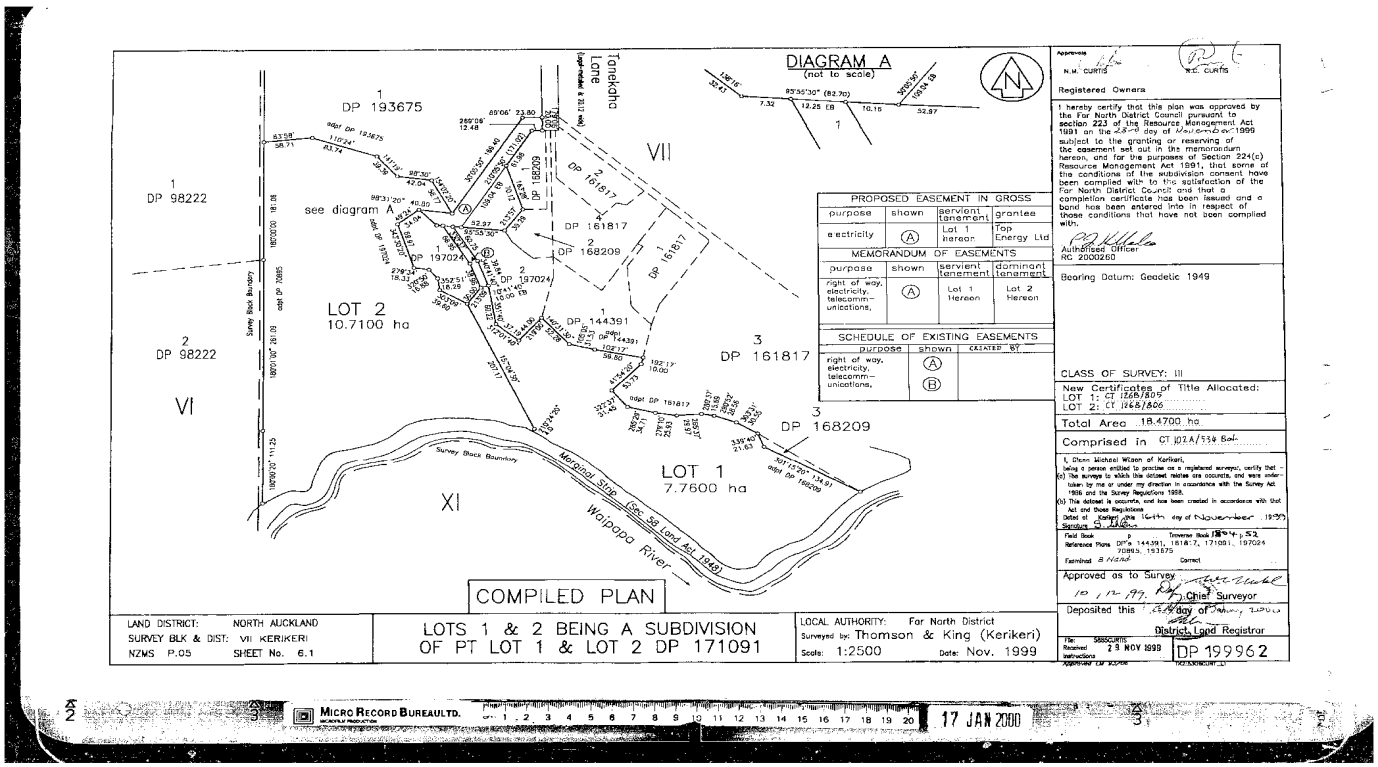


DIAGRAM A
(not to scale)
COMPILED PLAN
LOTS 1 & 2 BEING A SUBDIVISION OF PT LOT 1 & LOT 2 DP 171091
LOT 1
7.7600 ha
LOT 2
10.7100 ha
DP 193675
DP 98222
DP 161817
DP 168209
DP 144391
DP 197024
Tanekaha Lane
Waipapa River
Marginal Strip (Sec. 58 Land Act 1948)
Survey Block Boundary
see diagram A
PROPOSED EASEMENT IN GROSS
SCHEDULE OF EXISTING EASEMENTS
MEMORANDUM OF EASEMENTS
Registered Owners
CLASS OF SURVEY: III
Total Area 18.4700 ha
Bearing Datum: Geodetic 1949
LAND DISTRICT: NORTH AUCKLAND
SURVEY BLK & DIST: VII KERIKERI
NZMS P.05 SHEET No. 6.1
LOCAL AUTHORITY: Far North District
Surveyed by: Thomson & King (Kerikeri)
Scale: 1:2500 Date: Nov. 1999
DP 199962
MICRO RECORD BUREAU LTD.
17 JAN 2000

D 468330.5 EC

EASEMENT CERTIFICATE

(**IMPORTANT:** Registration of this certificate does not of itself create any of the easements specified herein).

I/We RICHARD CHARLES **CURTIS** and NICOLA MARY **CURTIS**

being the registered proprietor(s) of the land described in the Schedule hereto hereby certify that the easements specified in that Schedule, the servient tenements in relation to which are shown on a plan of survey deposited in the Land Registry Office at Auckland
on the day of 1999 under No. 197024
are the easements which it is intended shall be created by the operation of section 90A of the Land Transfer Act 1952.

SCHEDULE

DEPOSITED PLAN NO. 197024

Nature of Easement (e.g., Right of Way, etc.)	Servient Tenement		Dominant Tenement Lot No.(s) or other Legal Description	Title Reference
	Lot No.(s) or other Legal Description	Colour, or Other Means of Identification, of Part Subject to Easement		
Right of Way Telecommunications and Electricity	Part Lot 1 Deposited Plan ~~171091~~ DP 199962 Lot 1	A	Lots 1 & 2 hereon	Part 102A/534 124C/880 124C/881
Right of Way Telecommunications and Electricity	Part Lot 1 Deposited Plan ~~171091~~ 199962	B	Lot 2 hereon	Part 102A/534 124C/881
Water Supply	Lot 2 hereon	D	Lot 1 Deposited Plan 171091 Pt new Lot 1 all Lot 2 DP 199962	124C/881 124C/880

State whether any rights or powers set out here are in addition to or in substitution for those set out in the Seventh Schedule to the Land Transfer Act 1952.

1. Rights and powers:

   (a) In addition the implied covenants of the Ninth Schedule of the Property Law Act 1952 shall apply;

   (b) See attached for Telecommunications and Electricity

RIGHTS AND POWERS

That in respect of the Telecommunications and Electricity Easements referred to in the Schedule hereto, the rights and powers applicable thereto are:

(a) The full free uninterrupted and unrestricted right liberty and privilege for the occupier and registered proprietor for the time being of the dominant tenement from time to time and at all times to take convey and lead electrical current or any other mode of transmitting telecommunications in a free and unimpeded flow (except where the flow is halted for any reasonable period necessary for essential repairs) for the purposes of telecommunications under or across the land over which the Easement is created and to erect, lay and maintain poles and cables for such purpose.

(b) The full free uninterrupted and unrestricted right liberty and privilege for the occupier and registered proprietor for the time being of the dominant tenement from time to time and at all times to take convey and lead electricity in a free and unimpeded flow (except where the flow is halted for any reasonable period necessary for essential repairs) under or across the land over which the Easement is created and to erect, lay and maintain poles and cables for such purpose.

TERMS CONDITIONS COVENANTS OR RESTRICTIONS IN RESPECT OF ABOVE EASEMENTS:

That in respect of the Electricity and Telecommunications Easements (hereinafter called "the Easements") referred to in the Schedule hereto the terms conditions covenants or restrictions applicable thereto are as follows:-

(a) All cables placed within or such poles and cable erected upon the servient tenements shall be maintained and as required repaired to a good and serviceable condition by the registered proprietors for the time being of the dominant tenements.

(b) All the costs and expenses of and incidental to the repairing and maintaining of the Easements herein specified shall be borne by the registered proprietor for the time being of the dominant tenements.

(c) Any person wishing to carry out any work whatsoever on the Easements herein specified shall first give to the registered proprietor of the servient tenement thereof notice of such intention and of the nature and expense of the said work prior to any such work being commenced.

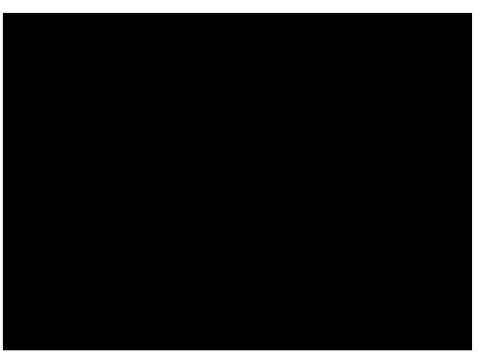
(d) Any person carrying out any work whatsoever on the Easements herein specified shall take all reasonable and proper action and care to interfere as little as possible with the comfort and convenience of the occupier or occupiers for the time being of the dominant and servient tenements and shall carry out such work or cause the same to be carried out with the utmost expedition and in a prudent manner and in particular shall during the course of such work:

(i) Shore up or cause to be shored up in a proper safe and workmanlike manner any part of the dominant or servient tenement affected thereby.

(ii) Take all reasonable and proper steps to preserve the said tenements and all parts thereof and all property and goods thereon from damage.

(e) Subject to the other terms and conditions covenants and restrictions contained in these presents any person carrying out any work as aforesaid shall have the right to enter and to bring machinery and workmen on to any part of the dominant or servient tenement as shall be necessary for the purposes of carrying out maintenance on the Easements referred to herein and shall have the right to remove all soil roading paving metalling fencing and all other things as shall be reasonably necessary to give unimpeded access to the said Easement PROVIDED HOWEVER that such soil roading paving metalling and fencing which is so removed shall be restored as nearly as possible to its original condition and that any other damage done by reason of the said maintenance is repaired and that as little disturbance as possible is caused to the surface of the land and to the enjoyment of the said tenements by the registered proprietors or occupiers.

(f) Where the maintenance work which is required to be carried out in terms of these presents involves the total or partial replacement of any cables this work shall be deemed to be maintenance work which may be carried out in accordance with these presents.



2. Terms, conditions, covenants, or restrictions in respect of any of the above easements:

   (a) In addition the implied covenants of the Ninth Schedule of the Property Law Act 1952 shall apply

   (b) See attached for Telecommunications and Electricity

Approved by Registrar-General
of Land under No. 1998/6031

EASEMENT CERTIFICATE

Land Transfer Act 1952

The ~~above~~/within easements when created will be/~~are~~ subject to Section 243(a) Resource Management Act 1991

for RGL

LINZ COPY
2.04 06.JAN 00 D 468330.5

PARTICULARS ENTERED IN THE REGISTER
LAND REGISTRY NORTH AUCKLAND
for REGISTRAR-GENERAL OF LAND
NEW ZEALAND

188-088/2421
(1024/532)

Law Firm Acting
LAW NORTH PARTNERS SOLICITORS KERIKERI

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Auckland District Law Society
REF: 4050

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(except for "Law Firm Acting")

D 468330.8 EC

EASEMENT CERTIFICATE

(**IMPORTANT:** Registration of this certificate does not of itself create any of the easements specified herein).

I/We RICHARD CHARLES CURTIS and NICOLA MARY CURTIS

being the registered proprietor(s) of the land described in the Schedule hereto hereby certify that the easements specified in that Schedule, the servient tenements in relation to which are shown on a plan of survey deposited in the Land Registry Office at Auckland on the day of 19 99 under No. ~~199XXX~~ 199962 are the easements which it is intended shall be created by the operation of section 90A of the Land Transfer Act 1952.

SCHEDULE

DEPOSITED PLAN NO. ~~199XXX~~ 199962

Nature of Easement (e.g., Right of Way, etc.)	Servient Tenement		Dominant Tenement Lot No.(s) or other Legal Description	Title Reference
	Lot No.(s) or other Legal Description	Colour, or Other Means of Identification, of Part Subject to Easement		
Right of Way electricity and telecommunications	Lot 1 hereon	A	LOT 2 hereon	~~126B/XXX~~ ~~126B/XXX~~ 126B/805 126B/806

State whether any rights or powers set out here are in addition to or in substitution for those set out in the Seventh Schedule to the Land Transfer Act 1952.

1. Rights and powers:

   (a) In addition the implied covenants of the Ninth Schedule of the Property Law Act 1952 shall apply;

   (b) See attached for Telecommunications and Electricity

TERMS CONDITIONS COVENANTS OR RESTRICTIONS IN RESPECT OF ABOVE EASEMENTS:

That in respect of the Electricity and Telecommunications Easements (hereinafter called "the Easements") referred to in the Schedule hereto the terms conditions covenants or restrictions applicable thereto are as follows:-

(a) All cables placed within or such poles and cable erected upon the servient tenements shall be maintained and as required repaired to a good and serviceable condition by the registered proprietors for the time being of the dominant tenements.

(b) All the costs and expenses of and incidental to the repairing and maintaining of the Easements herein specified shall be borne by the registered proprietor for the time being of the dominant tenements.

(c) Any person wishing to carry out any work whatsoever on the Easements herein specified shall first give to the registered proprietor of the servient tenement thereof notice of such intention and of the nature and expense of the said work prior to any such work being commenced.

(d) Any person carrying out any work whatsoever on the Easements herein specified shall take all reasonable and proper action and care to interfere as little as possible with the comfort and convenience of the occupier or occupiers for the time being of the dominant and servient tenements and shall carry out such work or cause the same to be carried out with the utmost expedition and in a prudent manner and in particular shall during the course of such work:

(i) Shore up or cause to be shored up in a proper safe and workmanlike manner any part of the dominant or servient tenement affected thereby.

(ii) Take all reasonable and proper steps to preserve the said tenements and all parts thereof and all property and goods thereon from damage.

(e) Subject to the other terms and conditions covenants and restrictions contained in these presents any person carrying out any work as aforesaid shall have the right to enter and to bring machinery and workmen on to any part of the dominant or servient tenement as shall be necessary for the purposes of carrying out maintenance on the Easements referred to herein and shall have the right to remove all soil roading paving metalling fencing and all other things as shall be reasonably necessary to give unimpeded access to the said Easement PROVIDED HOWEVER that such soil roading paving metalling and fencing which is so removed shall be restored as nearly as possible to its original condition and that any other damage done by reason of the said maintenance is repaired and that as little disturbance as possible is caused to the surface of the land and to the enjoyment of the said tenements by the registered proprietors or occupiers.

(f) Where the maintenance work which is required to be carried out in terms of these presents involves the total or partial replacement of any cables this work shall be deemed to be maintenance work which may be carried out in accordance with these presents.

[redacted]

RIGHTS AND POWERS

That in respect of the Telecommunications and Electricity Easements referred to in the Schedule hereto, the rights and powers applicable thereto are:

(a) The full free uninterrupted and unrestricted right liberty and privilege for the occupier and registered proprietor for the time being of the dominant tenement from time to time and at all times to take convey and lead electrical current or any other mode of transmitting telecommunications in a free and unimpeded flow (except where the flow is halted for any reasonable period necessary for essential repairs) for the purposes of telecommunications under or across the land over which the Easement is created and to erect, lay and maintain poles and cables for such purpose.

(b) The full free uninterrupted and unrestricted right liberty and privilege for the occupier and registered proprietor for the time being of the dominant tenement from time to time and at all times to take convey and lead electricity in a free and unimpeded flow (except where the flow is halted for any reasonable period necessary for essential repairs) under or across the land over which the Easement is created and to erect, lay and maintain poles and cables for such purpose.

2. Terms, conditions, covenants, or restrictions in respect of any of the above easements:

Approved by Registrar-General
of Land under No. 1998/6031

EASEMENT CERTIFICATE

Land Transfer Act 1952

[redacted]

204 06.JAN00 D 468330.8

PARTICULARS ENTERED IN REGISTER
LAND REGISTRY NORTH AUCKLAND
for REGISTRAR-GENERAL OF LAND

REGISTRAR-GENERAL OF LAND

Law Firm Acting
LAW NORTH PARTNERS SOLICITORS KERIKERI

Auckland District Law Society
REF: 4050

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D 468330.9 TE

TRANSFER

Land Transfer Act 1952

This page does not form part of the Transfer.

TRANSFER

Land Transfer Act 1952

If there is not enough space in any of the panels below, cross-reference to and use the approved Annexure Schedule: no other format will be received.

Land Registration District

NORTH AUCKLAND

Certificate of Title No.	All or Part?	Area and legal description — ***Insert only when part or Stratum, CT***
126B 805 XXX XXX	All	

Transferor *Surnames must be underlined*

RICHARD CHARLES **CURTIS** and NICOLA MARY **CURTIS**

Transferee *Surnames must be underlined*

TOP ENERGY LIMITED

Estate or Interest or Easement to be created: *Insert e.g. Fee simple; Leasehold in Lease No. .....; Right of way etc.*

Easement in Gross for electricity purposes (continued on pages 2 to 9 annexure schedules)

Consideration

$1.00 (**ONE DOLLAR**)

Operative Clause

For the above consideration (receipt of which is acknowledged) the TRANSFEROR TRANSFERS to the TRANSFEREE all the transferor's estate and interest in the land in the above Certificate(s) of Title and if an easement is described above such is granted or created.

[redacted]

1. **Transfer and Grant of Transmission Easement**

1.1. In consideration of the covenants on the part of the Transferee contained in this Memorandum, the Transferor **TRANSFERS AND GRANTS** to the Transferee and any other persons authorised (expressly or impliedly) by the Transferee an electricity transmission in gross over Lot 1 on Deposited Plan ~~XXXXX~~ 199962 with the following rights and interests as an easement in gross (the "Transmission Easement").

1.1. The right to survey and investigate in respect of, and to lay, construct, operate, inspect, use, cleanse, maintain, repair, renew, upgrade, change the size of and remove, the Transmission Line in, over, on, under or through that part of the Land marked "A" on Deposited Plan ~~XXXXX~~ 199962 ("the Servient Land").

1.1.1 The right to convey, send, transmit or transport electricity and telecommunications signals, waves or impulses in, over, on, under or through the Servient Land.

1.1.2 The right with any vehicles, equipment, aircraft and materials of any kind, to enter on the Servient Land for any and all purposes necessary or convenient for the Transferee to exercise its rights and interests granted under this memorandum (including the right to extinguish fires), but subject to the conditions that as little disturbance as is reasonably possible is caused to the Transferor, the Land, and the Transferor's stock and other property in doing so and that, where applicable, all gates on the Land are left as the Transferee and those other authorised persons find them.

1.1.3 The right to construct on the Servient Land whatever roads, tracks, access ways, fences, gates and other works deemed necessary by the Transferee for it to exercise its rights and interests granted under this memorandum and which are approved by the Transferor (that approval not to be unreasonably withheld), but subject to the condition that as little disturbance as possible is caused to the Transferor, the Land, and the Transferor's stock and other property in doing so.

1.1.4 The right to keep the Servient Land cleared of all buildings or structures (including any buildings or structures which overhang the Servient Land) by any means the Transferee may consider necessary.

1.1.5 The right to keep the Servient Land cleared of any fences or vegetation, both natural and cultivated, including trees and shrubs (including any fences, or vegetation which

[redacted]

overhang the Servient Land) by any means which the Transferee may consider necessary where such fences or vegetation:

(a) breach any statutory or regulatory requirements or standards or codes of practice or otherwise breach generally accepted engineering standards as to the minimum clearance of the Transmission Line;

(b) impedes the Transferee's access over the Servient Land; or

(c) inhibits the safe and efficient operation of the Transmission Line.

1.1.6 The right by whatever means or method as the Transferee considers necessary to level and grade any stockpiled soil, sand, gravel or other substance or any materials, walls or other earthworks that may exist on the Servient Land in order to ensure that the clearance above the ground level of the Transmission Line is maintained greater than any minimum clearance height that may exist from time to time in statute, regulations, code of practice or otherwise, subject to reasonable access being maintained through the Servient Land.

2. COVENANTS

2.1 Ownership of the Transmission Line

2.1.1 The Transmission Line will become and remain the property of the Transferee.

2.2 Buildings Structures Fences and Vegetation

2.2.1 The Transferee may consent in writing to certain existing buildings, structures, fences or vegetation upon or overhanging the Servient Land at the date of this Memorandum remaining there. If the existence of those buildings, structures, fences or vegetation so consented to, or any additional buildings, structures, fences or vegetation consented to pursuant to clause 2.2.3, subsequently results in a situation described in clause 1.1.5 (a) - (c) then such consent may be revoked by the Transferee but without compensation. If such consent is revoked the cost of removal of any buildings, structures, fences or vegetation shall be borne by the Transferee. Before removing any fence pursuant to this clause the Transferee shall consult with the Transferor so the Transferor is given a reasonable opportunity to co-ordinate the

[redacted]

erection of any necessary replacement fence. The erection of any such replacement fence and the cost of it will be the Transferor's responsibility.

2.2.2 The Transferee shall be responsible for the removal of any building, structures, fences or vegetation on or overhanging the Servient Land at the date of this Memorandum in respect of which no consent in writing has been sought or obtained pursuant to clause 2.2.1.

2.2.3 The Transferee may consent in writing to the construction after the date of this Memorandum of any buildings, structures, fences or the planting or cultivation of vegetation including trees and shrubs on the Servient Land, or on the land to the extent any buildings, structures, fences or vegetation overhangs the Servient Land.

2.2.4 The Transferee shall not be responsible for or be liable to contribute to the cost of removing any buildings, structures, fences or vegetation, built or cultivated on or overhanging the Servient Land after the date of this Memorandum in respect of which no consent in writing has been sought or obtained pursuant to clause 2.2.3.

2.3 **Restoration of Land**

2.3.1 The Transferee will be responsible for restoring any part of the Land affected by the Transferee exercising any of its rights under this Memorandum to a condition equivalent, as far is reasonably practicable, to that existing before the Transferee exercised those rights.

2.4 **Transferor's Continued Use of Servient Land**

2.4.1 The Transferor may use the Servient Land so long as that use does not unreasonably interfere with the enjoyment of the Transferee's rights and interests granted under this memorandum.

2.5 **Restrictions on Transferor's Use**

2.5.1 The Transferor must not at any time after the date of this memorandum, do permit or suffer to be done any act whereby the rights, powers, licences and liberties granted to the Transferee under this memorandum may be interfered with or affected in any

[redacted]

way and, in particular, the Transferor must not, without the consent in writing of the Transferee:

(a) make, or permit to be made, any alterations or additions to any buildings or structures existing on the Servient Land at the date of this Memorandum which affect the overall dimensions of those buildings or structures;

(b) erect, or permit the erection, of any buildings or structures on the Servient Land;

(c) stockpile or fill with, or permit the stockpiling of or filling with, any soil, sand, gravel or other substance or materials, or construct, or permit the construction of, any roads, dam walls or other earthworks on the Servient Land which would in any way reduce the clearance above the ground level of the Transmission Lines below the minimum clearance height that may exist, from time to time, in statute, regulations, code of practice or otherwise;

(d) remove, or permit the removal of, any soil, sand, gravel or other substance from the Servient Land;

(e) disturb the soil below a depth of 0.3 metres within a distance of 6 metres from the visible outer edge of any tower, pole, ground stay, support or foundation comprising part of the Transmission Line;

(f) cause or consent to acquiesce in the inundation of the Servient Land where any existing towers, poles, ground stays or supports comprising part of the Transmission Line are erected or located, or proposed to be erected or located, from the date of this memorandum **EXCEPT HOWEVER** nothing will require the Transferor to take any steps to do or construct anything to prevent that inundation caused by events beyond the reasonable control of the Transferor;

(g) burn off crops, trees or undergrowth within the Servient Land;

(h) operate, or permit to be operated, any machinery or equipment (including by way of example, but not in limitation, cranes, drilling-rigs, pile-drivers

[redacted]

and excavators) in close proximity to any tower, pole, ground stay or support comprising part of the Transmission Line;

(i) disturb any survey pegs or markers placed on the Servient Land by the Transferee; or

(j) do anything on or in the Servient Land which would or could damage or endanger the Transmission Line.

2.5.2 The consent of the Transferee required under clause 2.5.1 will not be unreasonably withheld, but may be given subject to reasonable conditions (including the power to revoke without compensation).

2.6 **Restrictions on Transferee's Use of Land**

2.6.1 The Transferee will erect the Transmission Line so as not to unreasonably interfere with the ordinary cultivation of the Land and in so doing, or in laying, constructing, operating, inspecting, using, cleansing, maintaining, repairing, renewing, upgrading, replacing, changing the size of or removing the Transmission Line, will cause as little damage as is reasonably possible to the surface of the Land.

2.7 **Statutes and Regulations**

2.7.1 It is acknowledged by the Transferee that its rights under the Transmission Easement are subject to the provisions of all applicable statutes, ordinances, regulations and by-laws.

2.7.2 The Transferee covenants with the Transferor that it will comply with the provisions of all statutes, ordinances, regulations and by-laws in any way relation or affecting the Transmission Easement, the Transmission Line or the exercise, or the attempted or intended exercise, by it or any of its rights under this memorandum, and will also comply with the provisions of all licences, requisitions and notices issued, made or given by any competent authority in respect of the Transmission Easement, the Transmission Line or the exercise, or attempted or intended exercise, by the Transferee of any of its rights under this memorandum.

[redacted]

2.8 **Indemnity Against Third Party Claims**

2.8.1 Each party will indemnify the other against all claims or demands from third parties for any loss, damage or liability in respect of, or arising out of, the use of the land by that party (or any person authorised, whether expressly or impliedly by it) **EXCEPT THAT** it will not be liable to indemnify the other party in respect of claims or demands from third parties for any loss, damage or liability caused by the actions of the other party. Where the actions of the other party contribute to that loss, damage or liability, the indemnity given by the party to that other party in respect of that loss, damage and liability will be correspondingly reduced in proportion to that contribution.

2.8.2 The quantum of damages payable by either party pursuant to clause 2.8.1 will be determined by agreement between them or, if they fail to agree, then they will submit the matter to arbitration in accordance with clause 2.11.

2.9 **Licence and Assignment**

2.9.1 The Transferee may grant any licence or right of all or any part of any estate or interest conferred by this memorandum and may assign all or any part of that estate or interest.

2.10 **Perpetual Easement**

2.10.1 No power is implied for the Transferor to determine the Transmission Easement for any breach of covenant (express or implied) or for any causes whatever. It is the intention of the parties that the Transmission Easement will subsist forever or until duly surrendered.

2.11 **Arbitration**

2.11.1 All differences and disputes which may arise between the parties touching, concerning or arising out of this memorandum (except for proceedings relating to any unpaid moneys due under this memorandum or as otherwise expressly provided in this memorandum) shall be submitted to arbitration in accordance with the Arbitration Act 1996 ("Act"). The following provisions shall apply:

[redacted]

(a) There shall be a single arbitrator agreed upon by the parties or failing agreement, two arbitrators (one to be appointed by each party) and a third arbitrator to be appointed by the arbitrators appointed by the parties or if the arbitrators appointed by the parties cannot reach agreement, the third arbitrator shall be appointed by the President for the time being of the District Law Society within which the Servient Land is situated. If any party fails to act as required under this provision, or the President for the time being of the District Law Society fails to appoint a third arbitrator then the provisions of clause 1(4)(c) of the second schedule to the Act shall apply.

(b) Any notice to be given pursuant to the provisions of this clause may be given as provided in the first schedule to the Act.

(c) All arbitrators shall be ordinarily resident in New Zealand and any arbitration proceedings shall be conducted in the English language.

(d) Where three arbitrators are appointed the arbitrator not appointed by the parties shall be the presiding arbitrator.

(e) The sole arbitrator or presiding arbitrator shall determine all questions of procedure.

(f) Clause 5 of the second schedule to the Act shall not apply.

2.12 **Interpretation**

2.12.1 For the purpose of interpretation or construction of this memorandum, unless the context otherwise requires:

(a) the term "Transmission Line" means a wire or wires or a conductor of any other kind (including a fibre optic or coaxial cable) used or intended to be used for the transmission of electricity and/or telecommunication signals, waves or impulses; and includes any insulator, tower, pole, ground stay, supporting structure, crossarm, foundation, casing, tube, tunnel, minor fixture or other item, equipment or material used or intended to be used for supporting, securing, enclosing, surrounding and protecting a Transmission Line; and also

[redacted]

includes any building, tower or pole mounted transformers, fuses, fuse holder, automatic switches, voltage regulators, capacitors or other instrument, apparatus or device used in association with a Transmission Line for the purpose of protecting and facilitating the transmission of electricity and telecommunication signals, waves or impulses through the Transmission Line;

(b) references to clauses or a Schedule are references to clauses of, and a Schedule to, this memorandum;

(c) words importing the singular or plural number include the plural and singular number respectively;

(d) headings are inserted for the sake of convenience of reference only and do not affect the interpretation of this memorandum;

(e) reference to the parties include their respective successors and assigns; and

(f) references to a statue or statutory provision includes references to that statute or statutory provision (as the case may be) and to any regulations made pursuant to that statute or statutory provision (as the case may be) as from time to time modified, codified or re-enacted, whether before or after the date of this memorandum, so far as that modification, codification or re-enactment applies, or is capable of applying, to this memorandum and the transfer and grant of the Transmission Easement under it.

[redacted]

Annexure Schedule

TRANSFER Dated _____ Page ____ of ____ Pages

[redacted]

Approved by Registrar-General
of Land under No. 1995/1004

TRANSFER

Land Transfer Act 1952

[redacted]

Law Firm Acting
LAW NORTH PARTNERS SOLICITORS KERIKERI

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Auckland District Law Society
REF: 4135

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(except for "Law Firm Acting

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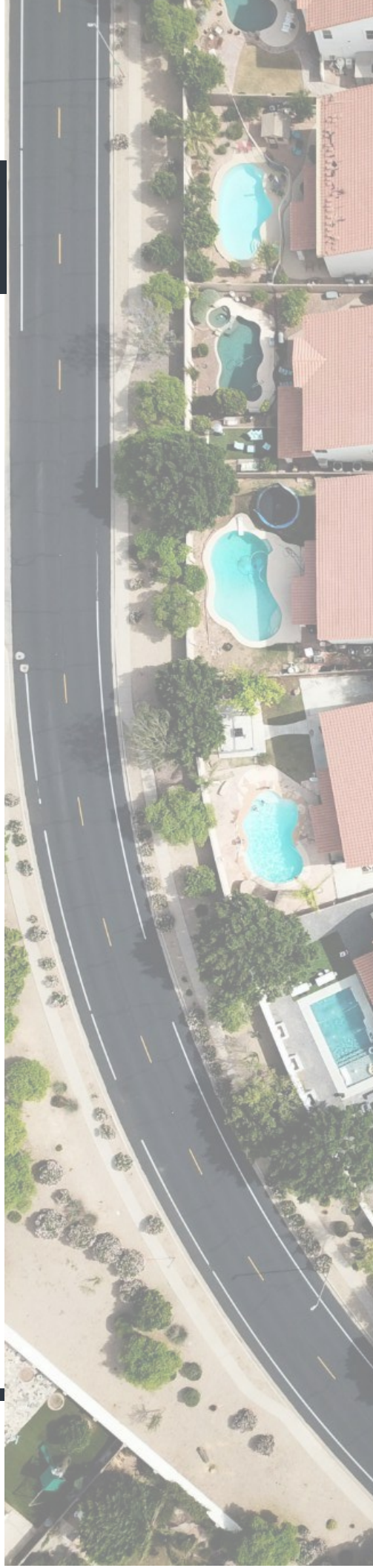
SUBDIVISION SITE SUITABILITY ENGINEERING REPORT

26 TANEKAHA LANE, KERIKERI

MESSENGER GOLD LIMITED

C0455-S-01
JUNE 2024
REVISION 1



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DOCUMENT MANAGEMENT

Document Title	Subdivision Site Suitability Engineering Report
Site Reference	26 Tanekaha Lane, Kerikeri
Client	Messenger Gold Limited
Geologix Reference	C0455-S-01
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REVISION HISTORY

Date	Issue	Prepared	Reviewed	Approved
June 2024	First Issue	SD	EC	EC

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TABLE OF CONTENTS

TABLES

1 INTRODUCTION

This Site Suitability Engineering Report has been prepared by Geologix Consulting Engineers Ltd (Geologix) for Messenger Gold 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 Resource Consent application in relation to the proposed subdivision of a rural property at 26 Tanekaha Lane, Kerikeri, the 'site'. Specifically, this assessment addresses engineering elements of natural hazards, wastewater, stormwater, 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 scheme plan was presented to Geologix at the time of writing, prepared by Williams and King[1] and has been reproduced within Appendix A as Drawing No 500. It is understood that the Client proposes to subdivide the site (Lots 1 and 2 DP 199962) into five separate Lots (proposed Lots 1 to 5) including three residential lots and two horticultural lots.

It is understood that following this, a boundary adjustment of proposed Lots 2 and 5 will create proposed lots 9 and 11. This is summarised in Table 1 below. Any amendments to the referenced scheme plan may require an update to the recommendations of this report which are based on conservative, typical rural residential development concepts.

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

Table 1: Summary of Proposed Scheme

Proposed Lot No.	Size	Purpose
Subdivision – Stage 1		
1	0.4027 ha	New residential
2	7.3573 ha	Production Land/ Balance
Subdivision – Stage 2		
3	0.8500 ha	New residential
4	0.4694 ha	Existing dwelling
5	9.2505 ha	Production Land/ Balance
Boundary Adjustment		
9	8.106 ha	Production Land
11	8.580 ha	Production Land

Site access for each lot will be provided from Tanekaha Lane and via private access way to the site boundaries. Access way and vehicle crossing considerations will be taken in account due to the increase of lot numbers occurring in this development. Each vehicle crossing has

[1] *Williams and King, Scheme Plan Ref. 24107A & 24107B, dated January 2024.*

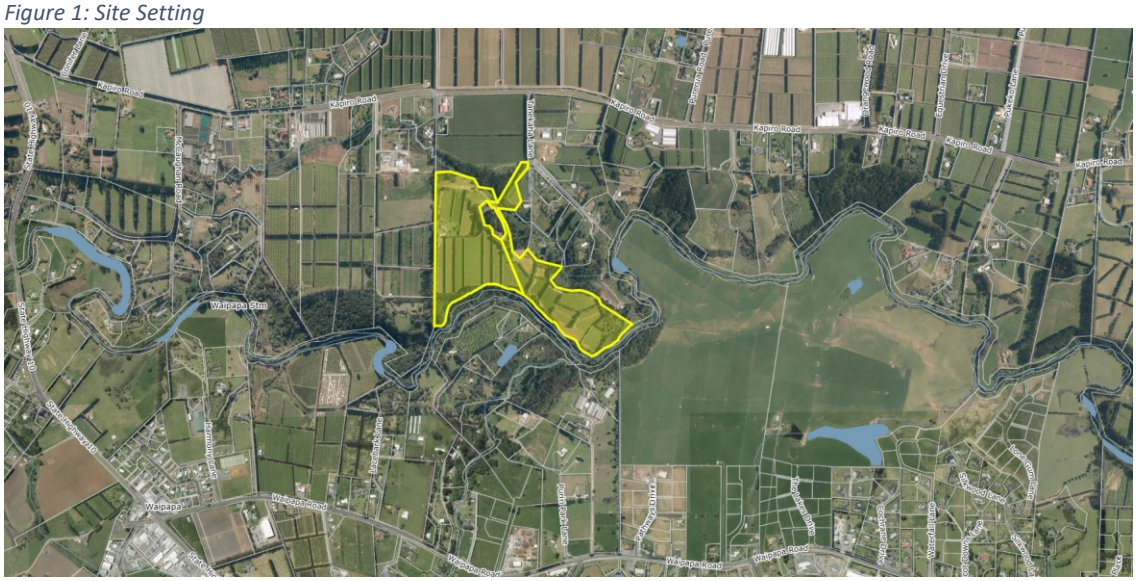
been considered with a safety aspect in relation to visibility of incoming and outgoing vehicle movements. A specific Traffic Impact Assessment (TIA) is not within the scope of this report.

2 DESKTOP APPRAISAL

The site is located at the termination of Tanekaha Road which runs perpendicular from Kapiro Road. The site is irregular in shape and is bound by a Marginal Strip which separates the site from Waipapa River to the south and rural agricultural lands to all other directions. Topographically, majority of the site is relatively flat with undulating characteristic in close approximately to the existing waterway to the northern boundary of Lot 2 and northern side of Lot 1.

The site setting is presented schematically as Figure 1 below.

Figure 1: Site Setting



The entire site area is currently in horticulture, rough grass with vegetation, and with existing buildings on proposed lot 4 and 9. A detailed review of existing watercourses and overland flow paths is presented in Section 3. In brief, the site is intersected by multiple small ditches, draining to a watercourse extending through and beyond the northeastern boundary as well as the Waipapa River bordering the Marginal Strip to the southern site boundary.

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 Tanekaha Road or the site boundaries. This report has been prepared with the goal of the subdivision being self-sufficient for the purpose of wastewater, stormwater, and potable water management.

2.2 Geological Setting

Available geological mapping[2] indicates the site to be underlain by the Kerikeri Volcanic group which occupies the wider Kerikeri area. The unit is typically consistent in nature across the local area and is commonly weathered to clay and silt residual soils. The geological mapping describes the strata as basalt lava flows with older flows and flow remnants.

With the Waipapa River and another minor stream located nearby. It should not be discounted some weaker alluvial soils may be present.

2.3 Existing Geotechnical Information

Existing subdivision and/ or Building Consent ground investigations were not made available to Geologix at the time of writing. Additionally, a review of available GIS databases, including the New Zealand Geotechnical 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 supplied 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. 500 with associated off-set requirements to hydrological features.

3.1 Surface Water Features

The site is at the lower elevations of a larger catchment that extends to the southeast which trends along the Waipapa River until ultimate discharge into the Kerikeri Inlet to the east. An unnamed watercourse trends southeast, adjacent to the northeastern boundary, intercepting the Waipapa River beyond the southeastern boundary. A natural pond within the path of the watercourse is situated just outside the boundary of proposed lot 3 within the northwest corner of the site.

3.2 Overland Flow Paths

Some clearly defined flow paths are evident within the site boundaries upon relatively flat to gently sloping land. However, well defined swale drains, and stormwater private infrastructure have been constructed prior to this current development plan and are generally fed from the upper elevations of the site. The minor overland flow paths are approximately 100 m in length and discharge to the stream via constructed swale drains along the access roads.

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

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

Our walkover survey was undertaken in late February during a relatively dry period and noted no flow through the overland flow paths. The above is indicated and detailed with associated off-sets on Drawing No. 500.

4 GROUND INVESTIGATION

A site-specific walkover survey and intrusive ground investigation was undertaken by Geologix on 20 February 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:

- Two hand augered boreholes designated BH01 and BH03, formed within suitable areas for wastewater disposal fields on each proposed residential lot with a target depth of 1.2m below ground level (bgl).

4.1 Site Walkover Survey

A visual walkover survey of the property confirmed:

- The topographical understanding of the site developed from our desktop study, as outlined in Section 2, is in general accordance with that observed on site.
- Suitable building envelopes[4] can be formed on gently sloping land <15°.
- Current horticultural activities were observed on much of existing Lot 2 (proposed Lot 9) and southern side of Lot 1 (proposed Lot 11). Refer to separately headed Geologix combined PSI and DSI.
- Tanekaha Road defines the access point to existing lot 1 and 2 DP 199962. Nearby land in all directions includes similar rural properties with open pasture and horticulture.
- The area of proposed lot 4 comprised an existing residential dwelling, associated garden area, gravelled driveway, shed and water tank.
- Overland flow paths extend throughout some lots and are captured suitably into driveway swales or stream.
- Existing structures are present on proposed lot 4 with self-supporting, onsite private infrastructure.
- Internal access ways and stormwater management devices are in good condition.

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

[4] *Measuring 30 m x 30 m according to FNDC District Plan Rule 13.7.2.2.*

Society guidelines[5]. Engineering borehole logs are presented as Appendix B to this report and approximate borehole positions recorded on Drawing No. 500 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, brown, stiff, dry.
- **Kerikeri Volcanics Group Residual Soil to depths of >1.2m bgl.** The Kerikeri volcanic residual soil encountered are generally silty with trace clay and gravel, low plasticity and highly permeability. They are brownish red to red in colour.

  In-situ field vane tests was taken at 0.3 m depth intervals to determine soil strength within this layer. All in-situ tests recorded vane shear strengths either exceeded peak of 195kPa or became Unable to Penetrate (UTP), indicative of very stiff strengths.

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

Table 2: Summary of Ground Investigation

Hole ID	Lot	Hole Depth	Topsoil Depth	Groundwater[2]	Wastewater Category[4]
BH01	1	1.2 m	0.2 m	NE	5 – moderate to slow draining
BH03	3	1.2 m	0.2 m	NE	5 – moderate to 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[6].*

5 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 may comprise up to a five-bedroom dwelling with a peak occupancy of eight people[7]. This considers the uncertainty of potential future Building Consent designs. The number of usable bedrooms within a residential dwelling must consider that proposed offices, studies,

[5] *New Zealand Geotechnical Society, Field Description of Soil and Rock, 2005.*
[6] *Auckland Council, Technical Publication 58, On-site Wastewater Systems: Design and Management Manual, 2004, Table 5.1.*
[7] *TP58 Table 6.1.*

gyms, or other similar spaces maybe considered a potential bedroom by the Consent Authority.

5.1 Existing Wastewater Systems

An existing wastewater treatment system was identified on proposed lot 4 in relation to the existing dwelling. The system tank is located under the driveway between the house and the shed as indicated on Drawing No. 500. Both system and associated disposal fields will be situated within the proposed lot boundaries. No other existing wastewater treatment or disposal systems have been identified or surveyed within proposed lot 1 and lot 3 the site boundaries.

5.2 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 160 litres/ person/ day[8]. This assumes standard water saving fixtures[9] being installed within the proposed future developments. This should be reviewed for each proposed lot at the Building Consent stage.

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

5.3 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 may be required.

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.

5.4 Land Disposal System

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

The proposed PCDI systems may be surface laid and covered with minimum 150 mm mulch and planted with specific evapotranspiration species with a minimum of 80 % species canopy

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

[9] Low water consumption dishwashers and no garbage grinders.

cover or subsurface laid to 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 compiled with for this report.

Table 3: Disposal Field Design Criteria

Design Criteria	Site Conditions
Topography at the disposal areas shall not exceed 25°. Exceedances will require a Discharge Consent.	Concept design complies
On shallower slopes <25 ° but >10 °, compliance with Northland Regional Plan (NRP) rule C.6.1.3(6) is required.	Concept design complies for lot 1 and 3, disposal fields sited on slopes >10 ° but <15 °, require cutoff drains.
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	Concept design complies.

5.4.1 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 5, sandy clay-loam, clay-loam, and silty clay loam – moderate to slow drainage. This correlates to NZS1547 Category 4, imperfectly drained described as clay loams. For a typical PCDI system, a Soil Loading Rate (SLR) of 3-4 mm/ day is recommended within NZS1547 Table 5.2 and TP58 Table 9.2. A SLR of 3.5 mm/ day has been adopted for this assessment.

5.4.2 Disposal Areas

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

- **Primary Disposal Field.** A minimum PCDI primary disposal field of 366 m^2 laid parallel to the natural contours.

- **Reserve Disposal Field.** A minimum reserve disposal field equivalent to 30 % of the primary disposal field is required under NRP rule C.6.1.3(9)(b) for secondary or tertiary treatment systems. It is recommended each proposed lot provides a 110 m^2 reserve disposal area to be laid parallel to the natural contours.
- Concept disposal field locations require the provision of surface water cut-off drains to meet the provisions of NRP rule C.6.1.3.
- Disposal fields discharging secondary treated effluent are to be set at the 20-year ARI (5% AEP) flood inundation height to comply with the above NRP rule. Flood hazard potential has not been identified within the site boundaries and as such the site can provide freeboard above the 1 % AEP flood height to comply with this rule.

5.5 Summary of Concept Wastewater Design

Based on the above design assumptions a concept wastewater design is presented in Table 4 and presented schematically upon Drawing No. 500. It is recommended that each lot is subject to Building Consent specific review and design amendment according to final development plans.

Table 4: Concept Wastewater Design Summary

Design Element	Specification
Concept development	Five-bedroom, peak occupancy of 8 (per lot)
Design generation volume	160 litres/ person/ day
Water saving measures	Standard. Combined use of 11 litre flush cisterns, automatic washing machine & dishwasher, no garbage grinder[1]
Water meter required?	No
Min. Treatment Quality	Secondary
Soil Drainage Category	TP58 Category 5, NZS1547 Category 4
Soil Loading Rate	3.5 mm/ day
Primary disposal field	Surface/ subsurface laid PCDI, min. 366 m^2
Reserve disposal field	Surface/ subsurface laid PCDI, min. 30 % or 110 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 for lot 1.

1. Unless further water saving measures are included.

5.6 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 lot and the cumulative or combined effect of multiple lots discharging treated wastewater to land as a result of subdivision.

The scale of final development is unknown at the time of writing and building areas, impervious areas including driveways, ancillary buildings, landscaped gardens, and swimming pools may reduce the overall area for on-site wastewater disposal. For the purpose of this

report the above features are likely to be included within a designated 30 x 30 m square building site area as required by FNDC District Plan Rule 13.7.2.2.

It is recommended that the AEE is reviewed at the time of Building Consent once specific development plans, final disposal field locations and treatment systems are established. The TP58 guideline document provides a detailed AEE for Building Consent application. Based on the proposed scheme, ground investigation, walkover inspection and Drawing No. 500, 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.

6 STORMWATER ASSESSMENT

Considering the nature of rural subdivision and 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.

6.1 Regulatory Requirements

Stormwater management for the proposed activity is controlled by the FNDC Operative District Plan[10] and NRC Proposed Regional Plan[11]. The requirement for subdivision and probable future development under these legislations is summarised below.

6.1.1 Regional Provisions

The Proposed Regional Plan states the diversion and discharge of stormwater into water or onto or into land where it may enter water from an impervious area or by way of a stormwater collection system, is a permitted activity, provided the criteria of Rule C.6.4.2(1) to (8) are met.

6.1.2 District Wide Provisions

Subdivision activity and provisions for probable future development within both urban and rural environments is controlled by District Plan Rule 13.7.3.4. In relation to rural subdivision the following apply which this concept design provisions for:

> *(a) All allotments shall be provided, within their net area, with a means for the disposal of collected stormwater from the roof of all potential or existing buildings and from all impervious surfaces, in such a way so as to avoid or mitigate any adverse effects of stormwater runoff on receiving environments, including downstream properties. This shall be done for a rainfall event with a 10% Annual Exceedance Probability (AEP).*

[10] *https://www.fndc.govt.nz/Your-Council/District-Plan/Operative-plan*
[11] *Proposed Regional Plan for Northland July 2021 – Appeals Version*

(c) The provision of grass swales and other water retention devices such as ponds and depressions in the land surface may be required by the Council in order to achieve adequate mitigation of the effects of stormwater runoff.

(d) All subdivision applications creating sites 2ha or less shall include a detailed report from a Chartered Professional Engineer or other suitably qualified person addressing stormwater disposal.

(d) Where flow rate control is required to protect downstream properties and/or the receiving environment then the stormwater disposal system shall be designed in accordance with the onsite control practices as contained in "Technical Publication 10, Stormwater Management Devices – Design Guidelines Manual" Auckland Regional Council (2003).

6.1.3 Environmental Zone Provisions

Permitted activity status for proposed impervious surface areas within the rural production zone is determined by Rule 8.6.5.1.3 which is presented below.

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

6.2 Impervious Surfaces and Activity Status

The proposed activity has been assessed as a Permitted Activity in accordance with rules outlined by Section 6.1. A summary of this is provided as Table 5 below which has been developed from our observations and the provided Scheme Plan. For the proposed lots, this has been taken as conceptual, maximum probable development of typical rural residential scenarios. Refer Section 6.3.

Table 5: Summary of Impervious Surfaces

Surface	Lot 1		Lot 3		Lot 4		Lot 11	
Existing Condition	**NA**		**NA**		**(107,100 m²)**		**NA**	
Roof					517 m²	0.5 %		
Driveway					422 m²	0.4 %		
Right of Way					0 m²	0.0 %		
Total impervious					939 m²	0.9 %		
Proposed Condition	**(4,027 m²)**		**(8,500 m²)**		**(4,694 m²)**		**(85,800 m²)**	
Roof	300 m²	7.4 %	300 m²	3.5 %	517 m²	11.0 %	0 m²	0 %
Driveway	100 m²	2.5 %	100 m²	1.2 %	422 m²	9.0 %	0 m²	0 %
Right of Way (Easement A & B Upgrade) Behalf of Lot 11	0 m²	0 %	0 m²	0 %	0 m²	0 %	400 m²	0.5 %

Total	400 m^2	9.9 %	400 m^2	4.7 %	939 m^2	20.0 %	400 m^2	0.5 %
Activity Status	Permitted		Permitted		Controlled		Permitted	

6.3 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:

- **Probable Future Development.** The proposed application includes subdivision formation only and not lot-specific residential development at this stage. However, a conservative model of probable future on-lot development has been developed for this assessment considering variation of scale in typical rural residential development. The probable future on-lot development concept includes up to 300 m^2 potential roof area and up to 100 m^2 potential driveway or parking areas. The latter has been modelled as an offset within lot-specific attenuation devices.

- **Existing On-site Development.** An existing dwelling with a total roof area of 517 m² and impervious driveway area of 422 m² accompanies the dwelling, shed to the north and east. Any additional impervious areas beyond the permitted activity level will be attenuated back to the Permitted Activity threshold. This will be done utilising a new 25,000l tank, collecting the total roof area for attenuation and potable water supply. The existing tank may also remain as additional potable storage and supply.

- **Subdivision Development.** Access to all proposed lots will be established by an upgraded vehicle crossing at Tanekaha Lane and RoW easements A and B from Tanekaha Lane to the vehicle crossing of Lot 1 DP 197024 approximately 200 m from the road. Lot 11 is the burdened land for easements A and B but is not scheduled for development as this lot is proposed to remain as rural production. Due to the geographical topography and separation between the easements and lot boundary further south, any impervious surfaces cannot be connected to any proposed attenuation devices on lot 11.

  Furthermore, it is preferable to provide offset attenuation within the same catchment to environmentally manage the effect of the new impervious area. With the additional 2 m width along 200 m of RoW it therefore proposed attenuation will be provided for by lot 1 and 3 in an equal split as an offset through their water tanks. In this manner, the mitigation provided by the offset attenuation is effected into the same catchment.

  New vehicle crossings to lots 1 and 3 will be formed from the upgraded/ existing RoW. There are additional impervious surfaces proposed along the upgraded section of the RoW and therefore an increase in runoff from subdivision development will occur and is managed by swale drain towards controlled discharge points.

6.4 Design Storm Event

It has been identified that development of the site poses an increase to flooding hazard on downstream property. Therefore, in order to provide flood control in compliance with FNDC Engineering Standard Table 4-1, the concept design attenuates the post-development stormwater runoff peak discharge to 80 % of the pre-development condition for the 1 % AEP storm event. This provision also complies with NRP Rule C6.4.2(2).

Furthermore, the Table 4-1 stipulates that flow attenuation controls reduce the post-development peak discharge to 80 % of the pre-development condition for the 50 % and 20 % AEP storm event.

To be compliant with the above rules, the attenuation modelling within this report has been undertaken for all of the above storm events. The results are summarised in Table 6 and provided in full in Appendix D.

Correctly sized discharge devices have adopted the 1 % AEP event to reduce scour and erosion at discharge locations which may otherwise result in concentrated discharge. These are detailed further in Section 6.5.1 of this report.

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, in accordance with FNDC Engineering Standards 2023.

6.5 Concept Stormwater Attenuation

Based on the design storm events indicated above and the corresponding modelling results (in Appendix D) an attenuation concept to suit the maximum storage requirement has been provided. In this case the concept limits the post-development peak discharge to 80 % of the pre-development condition for the 1% AEP storm event. This is achievable by installing specifically sized low-flow orifices into the attenuation tanks (for roofs or roadways) which provides sufficient detention volume. A typical schematic retention/ detention tank arrangement detail is presented as Drawing No. 401 within Appendix A.

The concept design presented in this report for the purposes of providing the above attenuation requirements 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 50% and 20% AEP events, in addition to the 1% AEP event, are specifically controlled within the tank.

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

The rational method has been adopted by Geologix with run-off coefficients as published by FNDC Engineering Standards[17] to provide a suitable attenuation design to limit post-development peak flows to 80 % of pre-development conditions.

Table 6: Summary of Probable Future and Existing Development Concept

Item	Pre-development Impervious Area	Post-development Impervious Area	Proposed Concept Attenuation Method
Future Concept Developments Lots 1 & 3			
Potential buildings	0 m^2	300 m^2	Detention within roof water tanks
Potential driveways	0 m^2	100 m^2	Off-set detention in roof water tanks
Lot 11 RoW Offset	0 m^2	200 m^2	Off-set detention in roof water tanks
Total	**0 m^2**	**600 m^2**	
Existing Development Concept Lot 4			
Existing buildings	517 m^2	517 m^2	Detention within roof water tanks
Existing driveway	422 m^2	422 m^2	Off-set detention in roof water tanks
Total	**939 m^2**	**939 m^2**	

Calculations to support the concept design are presented as Appendix D to this report. A summary of the proposed on-lot stormwater attenuation design is presented as Table 7. 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 each title to ensure this is undertaken.

Table 7: Probable Future Development Attenuation Concept

Design Parameter	Flow Attenuation: 50 % AEP (80% of pre dev)	Flow Attenuation: 20 % AEP (80% of pre dev)	Flood Control: 10 % AEP	Flood Control: 1 % AEP (80% of pre dev)
Proposed Lots 1 & 3				
Regulatory Compliance	FNDC Engineering Standards Table 4-1	FNDC Engineering Standards Table 4-1	NRC Proposed Regional Plan	FNDC Engineering Standards Table 4-1
Pre-development peak flow	7.02 l/s	9.09 l/s	10.61 l/s	15.79 l/s
80 % pre-development peak flow	5.62 l/s	7.28 l/s	NA	12.63 l/s
Post-development peak flow	11.04 l/s	14.29 l/s	16.67 l/s	24.82 l/s

[17] *FNDC Engineering Standards 2021, Version 0.6, Issued May 2023.*

Total Storage Volume Required	10223 litres	13437 litres	4585 litres	24676 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) - Attenuation to 80 % of pre-development condition for 1 % AEP storm represents maximum storage requirement and is adopted for the concept design tank storage. - 2 x 25,000 litre tank is sufficient for attenuation (24676l) + potable storage (25324l) - 1% AEP attenuation in isolation requires a 28 mm orifice 1.28 m below overflow. However regulatory requirements are to consider an additional orifice/s to control the 50%, 20% and 1% AEP events specifically. We note this may vary the concept orifice indicated above. This should be provided with detailed design for building consent approval.			
Proposed Lot 4 Existing development				
Regulatory Compliance	FNDC Engineering Standards Table 4-1	FNDC Engineering Standards Table 4-1	NRC Proposed Regional Plan	FNDC Engineering Standards Table 4-1
PA Threshold peak flow	14.13 l/s	18.30 l/s	21.34 l/s	31.77 l/s
Post-development peak flow	17.43 l/s	22.57 l/s	26.32 l/s	39.19 l/s
Total Storage Volume Required	1981 litres	2566 litres	2992 litres	4455 litres
Concept Summary:	- Attenuation storage calculation represents 234.9 m^2 area over the permitted activity threshold of 15 % impervious area to total site area. (not indicated explicitly in summary above. Refer Appendix D for calcs in full) - Attenuation to pre-development condition for 1 % AEP storm represents maximum storage requirement and is adopted for the concept design tank storage. - 1 x 25,000 litre tank is sufficient for attenuation (4455l) + potable storage (20545l) - 1% AEP attenuation in isolation requires a 127 mm orifice 0.42 m below overflow. However regulatory requirements are to consider an additional orifice/s to control the 50%, 20% and 1% AEP events specifically. We note this may vary the concept orifice indicated above. This should be provided with detailed design for building consent approval.			

6.5.1 On-Lot Discharge Dispersion

The direct discharge of rainwater tank overflow in a concentrated manner can cause scour and erosion in addition to saturation of shallow soils. It is recommended that overflow from rainwater detention tanks is conveyed in sealed pipes to a designated discharge point with suitable dispersion devices downslope of proposed building footprints and wastewater disposal fields. A concept design accommodating this is presented within Appendix A on Drawing Nos. 401 and 402.

It is recommended that the conceptually sized dispersion devices are subject to specific assessment at the Building Consent stage to limit scour and erosion from tank overflows.

Typical rural residential developments construct either above or below ground discharge dispersion pipes. Feeding pipes can be either buried or pinned to the surface as desired. It is recommended that all pipes are designed to accommodate the design storm event peak flows from the attenuation tank and including minimum 100 mm dia. PVC piping. A concept dispersion pipe or trench length is presented in Table 8. Calculations to derive this are presented within Appendix D, based on the NIWA HIRDS Depth-Duration data and

TR2013/018 document. Typical details of these options are presented within Appendix A as Drawing No. 402.

Table 8: Summary of Concept Dispersion Devices

Concept Impervious Area to Tank	Tank Outlet Velocity (at spreader orifices)	Tank outlet pipe diameter	Spreader pipe diameter	Dispersion Pipe/ Trench Length	Spreader orifice size	Concept
Proposed Lot 1						
600 m^2	0.019 m/s	0.1 m	0.2 m	9.8 m	20 mm	Above ground dispersion device or in-ground dispersion trench.
Proposed Lot 3						
600 m^2	0.019 m/s	0.1 m	0.2 m	9.8 m	20 mm	Above ground dispersion device or in-ground dispersion trench.
Proposed Lot 4 (Existing development)						
517 m^2	0.019 m/s	0.15 m	0.25 m	9.6 m	25 mm	Above ground dispersion device or in-ground dispersion trench.

6.6 Subdivision Development Management

The above stormwater concept does not provide specific attenuation of subdivision vehicle crossing impermeable surface areas due to the relatively minor catchments and effects on the downstream environment.

All stormwater conveyance devices must be suitably sized to accommodate peak run-off flows from the design storm event. Stormwater conveyance of the subdivision development is proposed to include:

- RC pipe culverts upgraded as required at intersection between the RoW vehicle crossing and Tanekaha Lane, to provide conveyance of drainage beneath the accessway.
- RC pipe culverts formed at each intersection between the proposed lot vehicle crossings of lot 1 and 3 to provide conveyance of drainage beneath the lot accessway.
- Grass lined swale designed to accommodate stormwater along upgraded RoW section directly off Tanekaha Lane.

6.7 Stormwater Quality

The proposed application is for a rural residential subdivision and future 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 good quality stormwater discharge. Stormwater quality will be provided by:

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

6.8 Assessment Criteria and Consent Status

Assessment criteria are presented in full within Appendix C. A summary of the assessment is presented below:

6.8.1 District Plan

The proposed activity has been assessed as a **Restricted Discretionary Activity** according to FNDC Operative Plan Rule 13.7.2, where a maximum of 3 lots in any subdivision, provided that the minimum lot size is 4,000m2 and there is at least 1 lot in the subdivision with a minimum lot size of 4ha, and provided further that the subdivision is of sites which existed at or prior to 28 April 2000.

6.8.2 Regional Plan

The proposed activity is determined to meet the requirements of a **Permitted Activity** according to the provisions of Proposed Regional Plan Rule C.6.4.2, on the basis that sufficient attenuation measures have been provided as presented in this report.

7 POTABLE WATER & FIRE FIGHTING

In the absence of potable water infrastructure within Tanekaha Lane 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 7.

Furthermore, the absence of potable water infrastructure and fire hydrants within Tanekaha Lane 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.

8 EARTHWORKS

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

- **Vehicle crossings.** Cut/ fill earthworks for construction of the vehicle crossings to current Council Engineering Standards.
- **Upgrading RoW.** Cut/ fill earthworks upgrading of the internal access way to current Council Engineering Standards.
- **Upgrading swale.** Earthworks upgrading of the swale along internal access way to current Council Engineering Standards.

8.1 Earthwork Volumes

Considering a 200 m length of RoW within easement A and B to be constructed, earthwork volumes have been conceptually sized as outlined in Table 9.

Table 9: Summary of Proposed Earthwork Volumes

Item	Assessment	Comments
Length	200.0 m	Length of RoW requiring upgrade
Width	2.0 m	Upgrade from 3 m to 5 m.
Height/ Depth	0.4 m	
Area	400.0 m^2	Area of RoW
Cut Volume	245.0 m^3	Incl. 170 m swale drain, 0.5 m deep with 1:1 side slope
Fill Volume	160.0 m^3	Grade to 3 % across width of RoW

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 13 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 subdivision, are anticipated to comply with the Permitted Activity standard for other areas.

8.2 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.

8.3 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 subdivision the following erosion and sediment control measures are recommended:

• Silt fence around the downslope face of the proposed vehicle crossing at each lot.

9 NATURAL HAZARD ASSESSMENT

To satisfy the Resource Management Act, 1991 the proposed subdivision must plan for and manage the risk from natural hazards to reduce the potential adverse effects to less than minor. Regulatory assessment of natural hazards at the site location are managed under the jurisdiction of the FNDC District Plan[18], Northland Regional Council (NRC) Proposed Regional Plan for Northland[19] 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 10.

Table 10: Summary of Natural Hazards

Natural Hazard	Applicability	Mitigation & Effect on Environment
Erosion	Yes	Mitigation provided, resultant effects are less than minor.

[18] *Operative District Plan Rule 13.7.3.2.*

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

Overland flow paths, flooding, inundation	Yes	Mitigation provided, resultant effects are less than minor.
Landslip	NA	No mitigation required, less than minor.
Rockfall	NA	No mitigation required, less than minor.
Alluvion	NA	No mitigation required, less than minor.
Avulsion	NA	No mitigation required, less than minor.
Unconsolidated fill	NA	No mitigation required, less than minor.
Soil contamination	NA	No mitigation required, less than minor.
Subsidence	NA	No mitigation required, less than minor.
Fire hazard	NA	No mitigation required, less than minor.
Sea level rise	NA	No mitigation required, less than minor.

NA – Not Applicable.

10 INTERNAL ROADING AND VEHICLE CROSSINGS

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 required, it is recommended that advice is sought from a chartered traffic engineer.

10.1 Traffic Intensity Factor and Household Equivalents

According to Appendix 3A of the Operative District Plan, providing for one standard residential unit per lot, each accounting for up to 10 traffic movements per unit per day the following Traffic Intensity Factor (TIF) and Household Equivalents have been calculated. This analysis has been taken at the existing vehicle crossing to Tanekaha Lane.

- **Existing Condition:** TIF of 40 from four HE.
- **Proposed Condition:** TIF of 70 from seven HE.

10.2 Right of Way

An existing private accessway (Right of Way) intersecting Tanekaha Lane provides access for all existing lots within the site. This existing RoW will be required to be upgraded through the easements designated RoW A and RoW B to service the proposed subdivision. It will be constructed to the standards specified in Appendix 3B-1 of the Operative District Plan, as summarised in Table 11.

Table 11: Summary of Proposed RoW Specification

Location	Servicing Lots	H.E.	Standard	Min. Legal Width	Min. Carriageway Width	Maximum Gradient
RoW, Easement A & B	1, 3, 4, 9, 11, Lot 1 & 2 of DP197024	7	Private access 5-8 HE, unsealed	7.5 m	5.0 m with swale	1:5
RoW, Easement C	11, 9, Lot 2 of DP197024	3	Private access 3 HE, unsealed – with passing bays if required	7.5 m	3.0 m with swale	1:5

RoW, Easement D	9, 3, 4	3	Private access 3-4 HE, unsealed – with passing bays if required	7.5 m	3.0 m with swale	1:5
RoW, lot 3	3, 4, 9	3	Private access 3-4 HE, unsealed – with passing bays if required	7.5 m	3.0 m with swale	1:5
RoW, Easement E	4, 9	2	Private access 2 HE, unsealed	5.0 m	3.0 m with swale	1:5
RoW, Easement F	9, 11	2	Private access 2 HE, unsealed	5.0 m	3.0 m with swale	1:5

H.E – Household Equivalents

RoW length of approximately 200 m from Tanekaha Lane requiring upgrade will involve some tree removal along either side of the RoW and Geologix recommend an arborist is consulted before final alignment is confirmed.

It is proposed to construct a swale drain along the southeastern face of the proposed RoW. The proposed RoW shall be graded with a 3 % cross fall to direct stormwater runoff to discharge into the watercourse with water control measures.

All other easement RoW's as part of the development do not require upgrading due to their current condition meeting the standards for private access and stormwater management structures in place.

10.3 Vehicle Crossings

Vehicle crossings will be formed at subdivision stage. A summary of proposed vehicle crossings is presented as Table 12.

Table 12: Summary of Proposed Vehicle Crossings

Location	Type	Detail	Formation
Tanehaka Lane/ RoW A	FNDC Type 1A, Light Vehicles	Construct to typical detail. 5.5 m width at boundary.	Subdivision
All lots	FNDC Type 1A, Light Vehicles	Construct to typical detail with 375mm dia. RC pipe culvert and 3.0 m width at boundary.	Subdivision

RCP – Reinforced Concrete Pipe

11 LIMITATIONS

This report has been prepared for Messenger Gold 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 subdivision construction may require an amendment to the recommendations of this report.

APPENDIX A

Drawings

VEHICLE CROSSING AS PER FNDC TYPE 1A STANDARD WITH MIN. 375 mm Ø. RCP CULVERT

VEHICLE CROSSING AS PER FNDC TYPE 1A STANDARD. ENTRANCE SHALL BE SEALED TO THE ROAD BOUNDARY OR MINIMUM DISTANCE OF 10 m

UPGRADED PRIVATE ACCESS WAY TO MINIMUM WIDTH 5 m CARRIAGEWAY WITH GRASSED SWALE AS PER FNDC STANDARD

EXISTING Ø 600 mm HDPE CULVERT

EXISTING Ø 600 mm RCP CULVERT

EXISTING Ø 1000 mm RCP CULVERT

INDICATIVE VEHICLE CROSSING LOCATION FOR FUTURE DEVELOPMENT. NOT PART OF THIS CONSENT

EXISTING SEPTIC TO REMAIN IN USE

EXISTING BUILDINGS TO REMAIN

EXISTING CATCH PIT TO BE USED AS IS, COLLECTING STORM WATER FROM DRIVEWAY/ PARKING AREA

EXISTING 12,500L WATER TANK

PROPOSED LOT 3 0.8500 ha

PROPOSED LOT 4 0.4694 ha

PROPOSED LOT 1 0.4027 ha

PROPOSED LOT 9 8.1060 ha

PROPOSED LOT 11 8.5800 ha

LOT 1 DP 197024

LOT 2 DP 197024

WAIPAPARIVER

BH01

BH03

GENERAL NOTES

1. DRAWING REPRODUCED FROM WILLIAMS AND KING PROPOSED SCHEME PLAN REF. 24107, DATED JANUARY 2024.
3. HORIZONTAL CO ORDINATE SYSTEM = NZTM.
4. VERTICAL DATUM = NZVD.
5. MAJOR INTERVALS 5.0 m.
6. MINOR INTERVALS 1.0 m.
7. FOR INDICATION ONLY, NOT FOR CONSTRUCTION.
8. DO NOT SCALE FROM THIS DRAWING.

CONCEPT WASTEWATER DESIGN

CONCEPT DEVELOPMENT	5 BEDROOM
CONCEPT NO. OF OCCUPANTS	8 PERSONS
DAILY WASTEWATER GEN.	160 LITRES/PERSON/ DAY
TOTAL WASTEWATER GEN.	1,280 LITRES/ DAY
SOIL CATEGORY (TP58)	CATEGORY 5
SOIL CATEGORY (NZS1547)	CATEGORY 4
SOIL LOADING RATE	3.5 mm/ DAY
TREATMENT SYSTEM	NO - SUBJECT TO BUILDING CONSENT DESIGN
PRIMARY DISPOSAL AREA	366 m²
RESERVE DISPOSAL AREA	110 m² 30 %)
FINAL DESIGN?	NO - SUBJECT TO BUILDING CONSENT DESIGN
CUT OFF DRAINS?	YES
DISCHARGE CONSENT?	NO

PROPOSED BUILDING PLATFORM

BHXX GEOLOGIX HAND AUGER LOCATION - FEBRUARY 2024

WATERCOURSE

POND

OVERLAND FLOWPATH

SW EXISTING ROADSIDE GRASSED SWALE DRAIN

SW PROPOSED ROADSIDE GRASSED SWALE DRAIN

PRIMARY DISPOSAL FIELD

RESERVE DISPOSAL FIELD

WASTEWATER FEILD CUTOFF DRAIN

CONCEPT 2X 25,000 LITRE WATER TANK ATTENUATING TO DISPERSION DEVICE TO CONTROL 600 m² AREA

25 0 Meters 25 50

1:2500

Revision	Issue	Date
A	CONSENT	24/05/2024

geologix consulting engineers

AUCKLAND | NORTHLAND

Project Name and Address

26 TANEKAHA LANE
KERIKERI, FAR NORTH
LOTS 1 & 2 DP 199962

Project	Drawn By
C0455	SD

Client

MESSENGER GOLD LIMITED

Sheet Title

ENGINEERING PLAN

Sheet

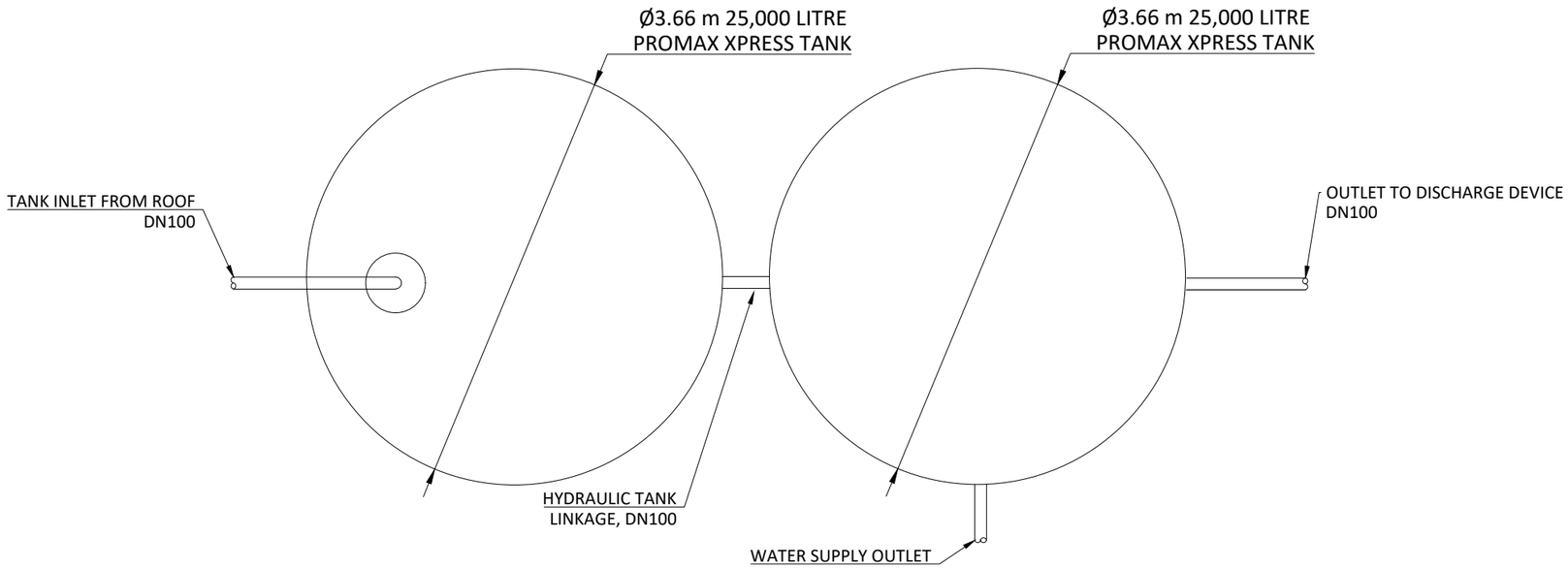
500

FILE PATH: Z:\Projects\C0400-C0499\26 Tanekaha Lane, Kerikeri (Lots 1 & 2 DP 199962) - C0455\07 - Technical & Drawings\Drawings\C0455-S-01-R01.dwg|C0455-S-01-R01.dwg

PLOTTED: 03/04/2022

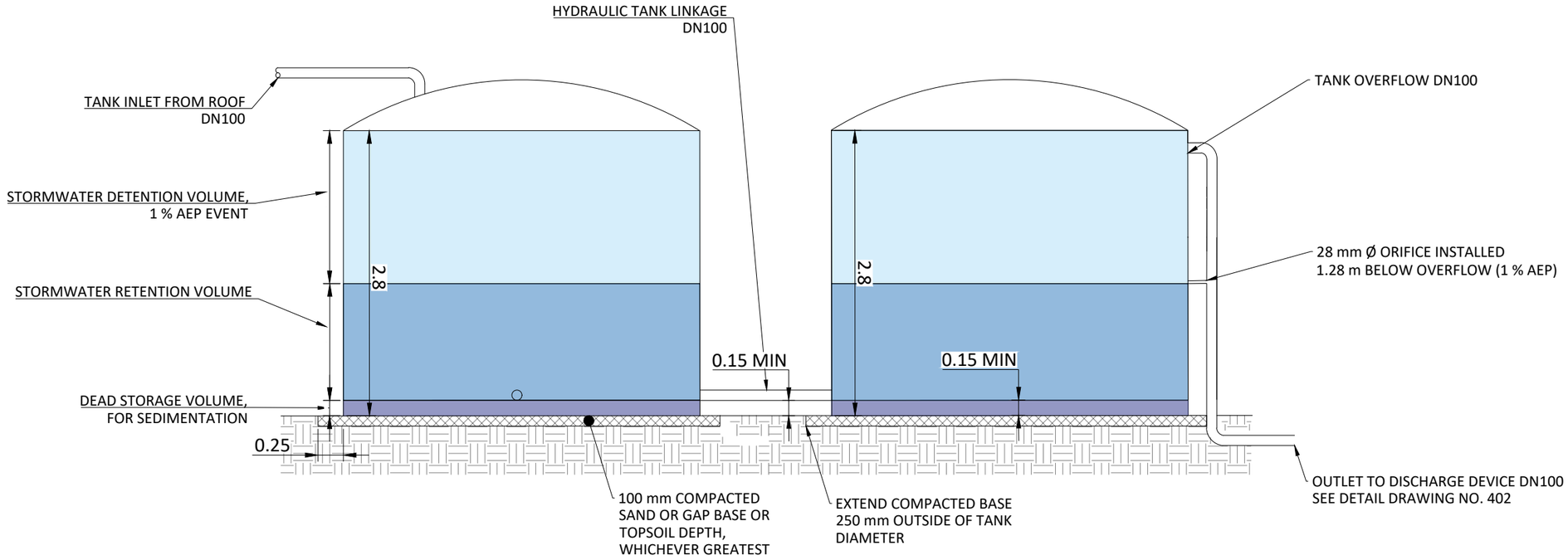
PROPOSED TANK PLAN VIEW

1:50, A3



PROPOSED TANK SIDE VIEW

1:50, A3



GENERAL NOTES

1. TANK, PIPING AND FITTINGS TO BE INSTALLED AS PER MANUFACTURERS RECOMMENDATIONS AND IN ACCORDANCE WITH NZBC E1, UNLESS SPECIFICALLY STATED OTHERWISE.
2. ALL WORK TO BE UNDERTAKEN IN ACCORDANCE WITH NEW ZEALAND BUILDING CODE E1 ACCEPTABLE SOLUTIONS, RELEVANT STANDARDS AND GUIDELINES.
3. DO NOT SCALE FROM THIS DRAWING.
4. CONTRACTOR IS TO ORGANISE ALL SET OUT, INSPECTIONS AND MONITORING AS REQUIRED TO MEET CONSENT CONDITIONS.

1	CONSENT	27/05/2024
Revision	Issue	Date

geologix consulting engineers

AUCKLAND | NORTHLAND

Project Name and Address

26 TANEKAHA LANE
KERIKERI
LOTS 1 & 2 DP 199962

Project	Drawn By
C0455	SD

Client

MESSENGER GOLD LIMITED

Sheet Title

TYPICAL TANK DETAIL (LOT 1 & 3)

Sheet

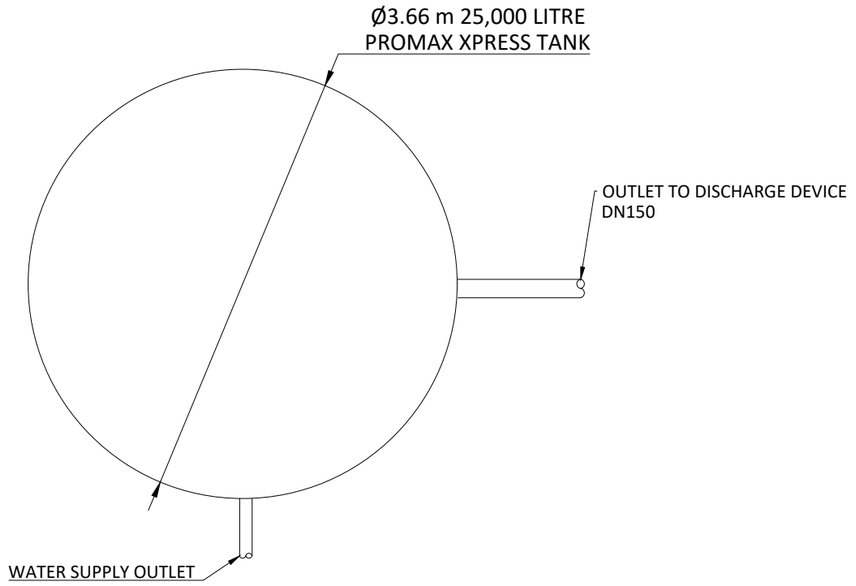
401

FILE PATH: Z:\Projects\C0400-C0499\26 Tanekaha Lane, Kerikeri (Lots 1 & 2 DP 199962) - C0455\07 - Technical & Drawings\Drawings\C0455-SW-DETAILS.dwgC0455-SW-DETAILS.dwg

PLOTTED: 03/05/2022

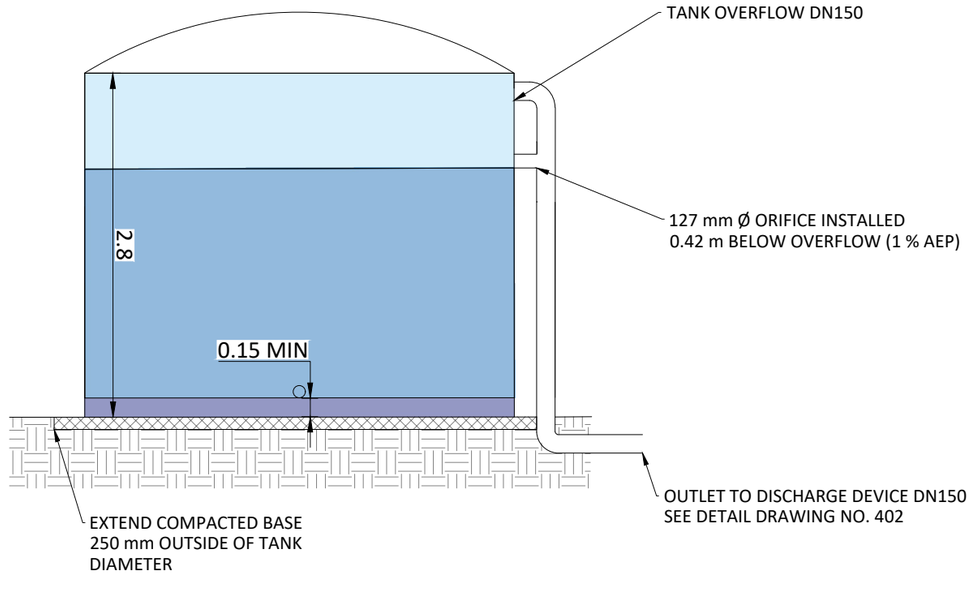
PROPOSED TANK PLAN VIEW

1:50, A3



PROPOSED TANK SIDE VIEW

1:50, A3



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Project Name and Address

26 TANEKAHA LANE
KERIKERI
LOTS 1 & 2 DP 199962

Project	Drawn By
C0455	SD

Client

MESSENGER GOLD LIMITED

Sheet Title

TYPICAL TANK DETAIL (LOT 4)

Sheet

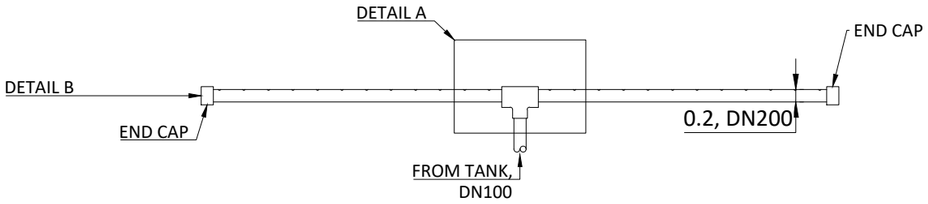
401

FILE PATH: Z:\Projects\C0400-C0499\26 Tanekaha Lane, Kerikeri (Lots 1 & 2 DP 199962) - C0455\07 - Technical & Drawings\Drawings\C0455-SW-DETAILS.dwgC0455-SW-DETAILS.dwg

PLOTTED: 03/05/2022

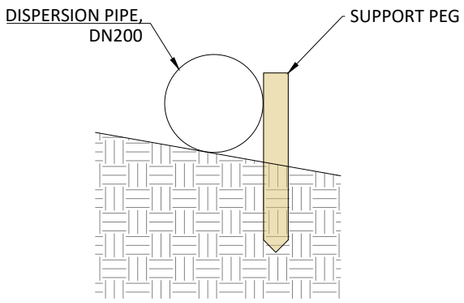
OPTION 1: DISPERSION VIA ABOVE GROUND PIPE

NOT TO SCALE



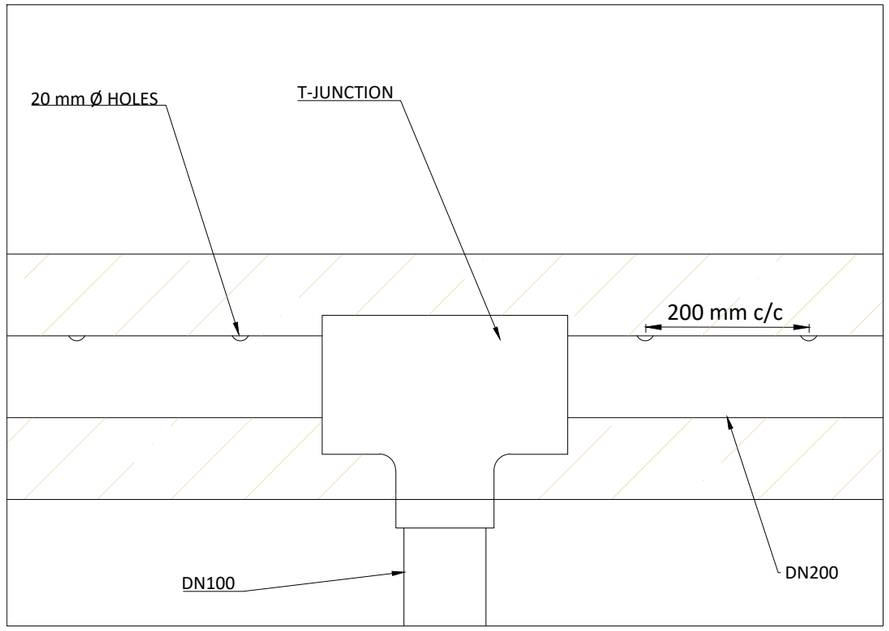
DETAIL B - SIDE VIEW

NOT TO SCALE



DETAIL A - T JUNCTION AND PERFORATIONS

NOT TO SCALE



OPTION 2: DISPERSION VIA BELOW GROUND TRENCH

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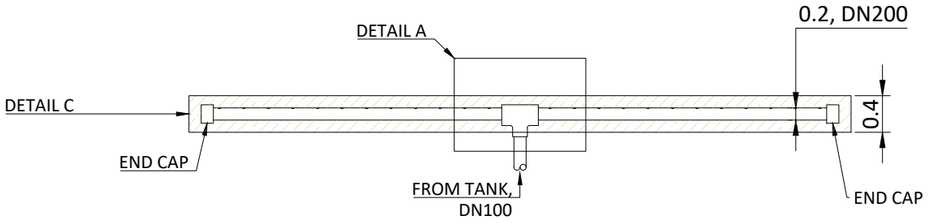
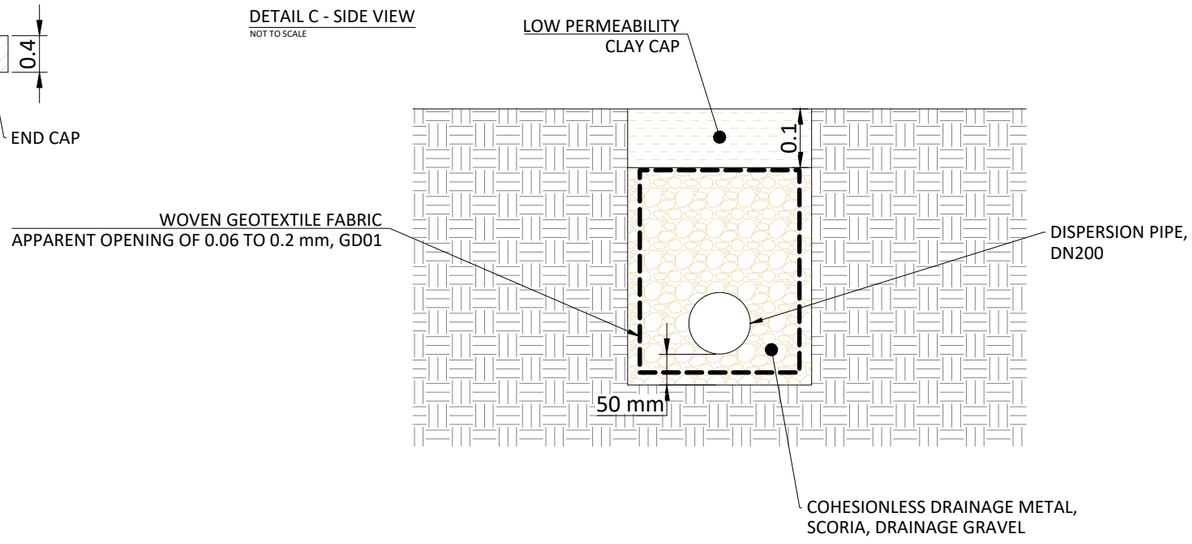


DETAIL C - SIDE VIEW

NOT TO SCALE



GENERAL NOTES

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1	CONSENT	24/05/2024
Revision	Issue	Date

geologix consulting engineers

AUCKLAND | NORTHLAND

Project Name and Address

26 TANEKAHA LANE
KERIKERI
LOTS 1 & 2 DP 199962

Project	Drawn By
C0455	SD

Client

MESSENGER GOLD LIMITED

Sheet Title

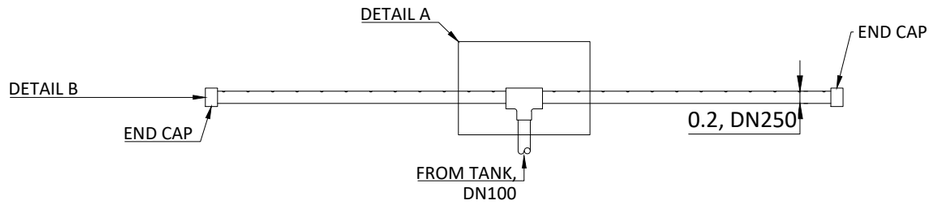
TYPICAL DISPERSION PIPE DETAIL (LOT 1 & 3)

Sheet

402

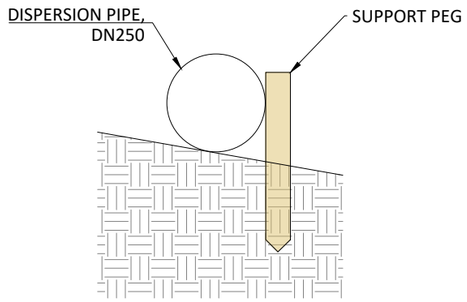
OPTION 1: DISPERSION VIA ABOVE GROUND PIPE

NOT TO SCALE



DETAIL B - SIDE VIEW

NOT TO SCALE



DETAIL A - T JUNCTION AND PERFORATIONS

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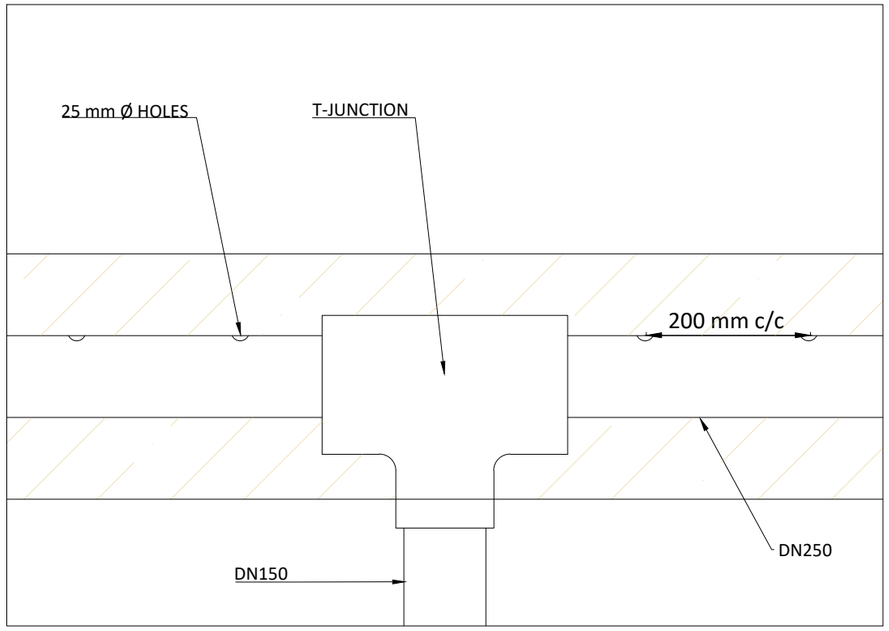

OPTION 2: DISPERSION VIA BELOW GROUND TRENCH

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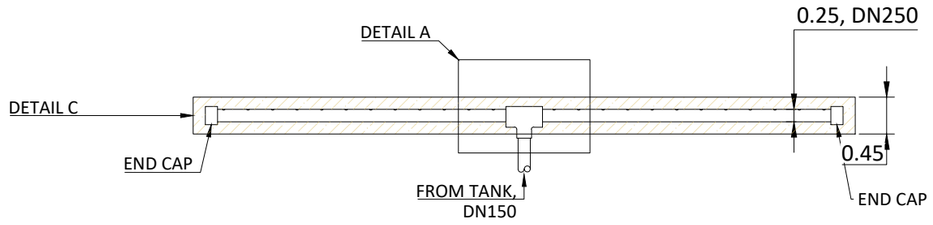
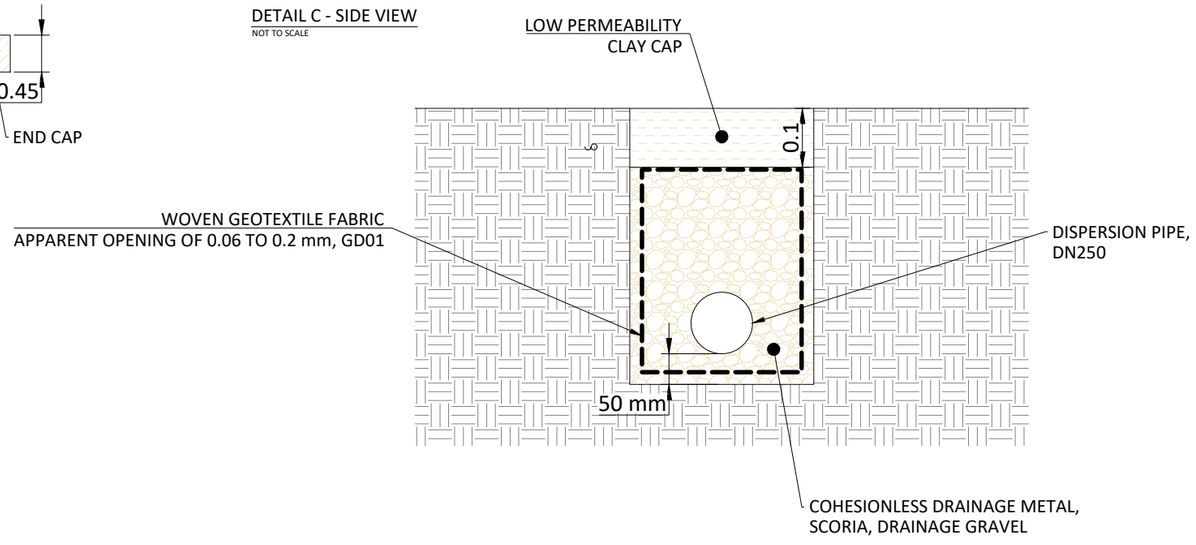


DETAIL C - SIDE VIEW

NOT TO SCALE



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1	CONSENT	24/05/2024
Revision	Issue	Date

geologix consulting engineers

AUCKLAND | NORTHLAND

Project Name and Address

26 TANEKAHA LANE
KERIKERI
LOTS 1 & 2 DP 199962

Project	Drawn By
C0455	SD

Client

MESSENGER GOLD LIMITED

Sheet Title

TYPICAL DISPERSION PIPE DETAIL (LOT 4)

Sheet

402

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APPENDIX B

Engineering Borehole Records

INVESTIGATION LOG

HOLE NO.: BH01

CLIENT: Messenger Gold Limited
PROJECT: 26 Tanekaha Lane, Kerikeri
JOB NO.: C0455

SITE LOCATION: South of Kapiro Road
CO-ORDINATES:
CONTRACTOR: Internal **RIG:** HAND AUGER
ELEVATION: Ground
DRILLER: SD
START DATE: 20/02/2024
END DATE: 20/02/2024
LOGGED BY: SD

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER (Blows / 0mm)	VANE SHEAR STRENGTH (kPa) Vane: 3282	Values	WATER
TOPSOIL comprising organic SILT; brown; moist; low plasticity.		0.0	TS	2 4 6 8 10 12 14 16 18	50 100 150 200		Groundwater Not Encountered
SILT, with trace clay; brownish red volcanic. Very stiff; moist; low plasticity; [Kerikeri Volcanic Group].		0.2				195+	
SILT, with trace clay and gravel; red volcanic. Very stiff; moist; low plasticity; gravel, fine; [Kerikeri Volcanic Group].		0.4				-	
		0.6				195+	
		0.8				-	
		1.0				UTP	
		1.2				-	
End Of Hole: 1.20m		1.4				UTP	
						-	

PHOTO(S)

REMARKS

1. Hand auger completed at target depth 1.2m bgl.
2. Groundwater not encountered at the time of drilling.

WATER

- Standing Water Level
- Out flow
- In flow

INVESTIGATION TYPE

- [x] Hand Auger
- [ ] Test Pit

INVESTIGATION LOG

HOLE NO.: BH03

CLIENT: Messenger Gold Limited

PROJECT: 26 Tanekaha Lane, Kerikeri

JOB NO.: C0455

SITE LOCATION: South of Kapiro Road

START DATE: 20/02/2024

CO-ORDINATES:

ELEVATION: Ground

END DATE: 20/02/2024

CONTRACTOR: Internal

RIG: HAND AUGER

DRILLER: SD

LOGGED BY: SD

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER (Blows / 0mm)	VANE SHEAR STRENGTH (kPa) Vane: 3282	Values	WATER
TOPSOIL comprising organic SILT; brown; dry; low plasticity.		0.0	TS	2 4 6 8 10 12 14 16 18	50 100 150 200		Groundwater Not Encountered
SILT, with trace clay; light brown. Very stiff; dry; low plasticity.		0.2				195+	
SILT, with some clay; redish brown volcanic. Very stiff; moist; low plasticity; [Kerikeri Volcanic Group].		0.4				UTP	
SILT; dark brown. Very stiff; moist; low plasticity; [Kerikeri Volcanic Group].		0.8				UTP	
End Of Hole: 1.20m		1.2				UTP	
		1.4					

PHOTO(S)

REMARKS

1. Hand auger completed at target depth 1.2m bgl.
2. Groundwater not encountered at the time of 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 13: 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. 500.
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 subdivision 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, lot 1 and 3.
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. 500.
4. Including any formed road with kerb and channel, and water-table drain that is down-slope of the disposal area.
5. River, lake, stream, pond, dam, or natural wetland.

AEP Annual Exceedance Probability.
NR No Requirement.

Table 14: Proposed Northland Regional Plan Stormwater Assessment Criteria, to rule C.6.4.2

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

Table 15: Proposed Northland Regional Plan Stormwater Assessment Criteria, to rule C.8.3.1

Assessment Criteria		Comments
1)	the area and volume of earthworks at a particular location or associated with a project complies with the thresholds in Table 13.	Complies – classed as 'other areas'.
2)	the discharge is not within 20 metres of a geothermal surface feature.	Complies.
3)	except for coastal dune restoration activities, good management practice erosion and sediment control measures equivalent to those set out in the Erosion and Sediment Control Guidelines for Land Disturbing Activities in the Auckland Region 2016 (Auckland Council Guideline Document GD2016/005), are implemented for the duration of the activity	Complies. See specific erosion and sediment control details, concept plan and typical details.
4)	batters and side castings are stabilised to prevent slumping	Complies.
5)	exposed earth is stabilised upon completion of the earthworks to minimise erosion and avoid slope failure	Complies. Earthworks form road area to be stabilised with a gravelled surface.
6)	earth and debris are not deposited into, or in a position where they can enter, a natural wetland, a continually or intermittently flowing river, a lake, an artificial watercourse, or the coastal marine	Complies. Additional erosion and sediment control measures have been implemented to control this. Refer erosion and sediment control measures, concept plan.
7)	the earthworks activity does not: a) reduce the height of a dune crest in a coastal riparian and foredune management area, except where dunes are recontoured to remove introduced materials or to remediate dune blow-outs as part of coastal dune restoration work, or b) exacerbate flood or coastal hazard risk on any other property, or c) create or contribute to the instability or subsidence of land on other property, or d) divert flood flow onto other property, and 216	Complies provided recommendations in this report and any accompanying detailed design is adhered to.
8)	any associated damming, diversion and discharge of stormwater does not give rise to any of the following effects in the receiving waters beyond the zone of reasonable mixing: a) any conspicuous change in colour or visual clarity, or b) the rendering of fresh water unsuitable for consumption by farm animals, or c) contamination which may render freshwater taken from a mapped priority drinking water abstraction point (refer I Maps | Ngā mahere matawhenua) unsuitable for human consumption after existing treatment	Complies provided recommendations in this report and any accompanying detailed design is adhered to.
9)	information on the source and composition of any clean fill material and its location within the disposal site are recorded and provided to the Regional Council on request	Can comply. Materials are anticipated to be either site won or imported from a registered quarry facility. Details TBC according to an earthworks specification completed during a detailed design phase.
10)	the Regional Council's Compliance Manager is given at least five working days' notice (in writing or by email) of any earthworks activity being undertaken within a high-risk flood hazard area, flood hazard area, where contaminated land will be exposed, or in sand dunes within a coastal riparian and foredune management area.	Can comply, if required.

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APPENDIX D

Stormwater Calculations

Project Ref:	C0455		**STORMWATER ATTENUATION TANK DESIGN**	geologix consulting engineers
Project Address:	26 TANEKAHA LANE, KERIKERI			
Design Case:	CONCEPT FUTURE DEVELOPMENT (LOT 1 & 3)		**50 % AEP STORM EVENT, 80 % OF PRE DEVELOPMENT**	
Date:	5 June 2024	REV 1		

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

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

PRE DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
IMPERVIOUS A	0	0	
IMPERVIOUS B	0	0	
IMPERVIOUS C	0	0	
EX. PERVIOUS	600	0.56	ORCHARD
TOTAL	**600**	TYPE C	

POST DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
TO TANK	300	0.96	ROOF
OFFSET	100	0.8	DRIVEWAY - METAL
OFFSET RoW	200	0.8	DRIVEWAY - METAL
EX. CONSENTED	0	0	
TOTAL	**600**	TYPE C	

RAINFALL INTENSITY, 50% AEP, 10MIN DURATION

50 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	62.7	mm/hr
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	20	%
50 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	75.24	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 WITH CC, VARIOUS DURATIONS

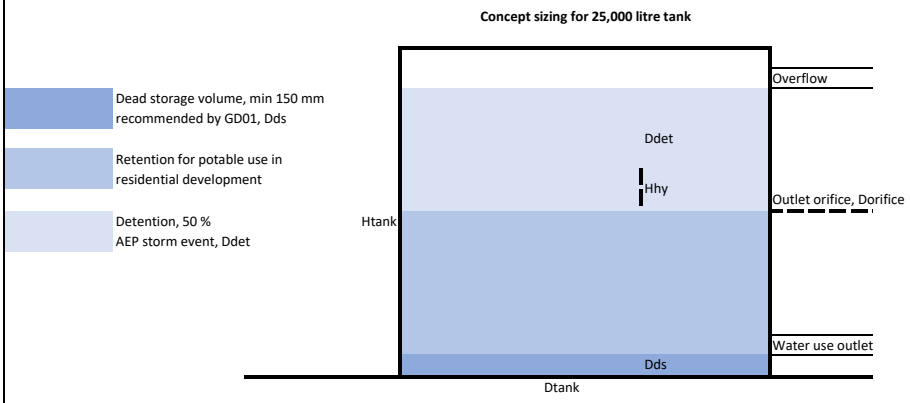
DURATION, min	INTENSITY, mm/hr	CC FACTOR	INTENSITY WITH CC, mm/hr	POST DEV RUNOFF, Qpost, l/s	PRE DEV RUNOFF, Qpre, l/s	80% of PRE DEV RUNOFF, Q, l/s	COMMENTS
10	62.70	1.2	75.24	11.04	7.02	5.62	*Critical duration (time of concentration) for the catchments is 10min*
20	46.00	1.2	55.20	8.10	5.15	4.12	
30	38.30	1.2	45.96	6.74	4.29	3.43	
60	27.80	1.2	33.36	4.89	3.11	2.49	
120	19.90	1.2	23.88	3.50	2.23	1.78	
360	11.20	1.2	13.44	1.97	1.25	1.00	
720	7.41	1.2	8.89	1.30	0.83	0.66	
1440	4.71	1.2	5.65	0.83	0.53	0.42	
2880	2.84	1.2	3.41	0.50	0.32	0.25	
4320	2.06	1.2	2.47	0.36	0.23	0.18	

ATTENUATION ANALYSIS, VARIOUS DURATIONS

DURATION, min	OFFSET FLOW, Qoff, l/s	TANK INFLOW , Qin, l/s	ALLOWABLE TANK OUTFLOW, Qpre - Qoff, l/s	SELECTED TANK OUTFLOW, Qout, l/s	DIFFERENCE (Qin - Qout), l/s	Required Storage, litres	
10	5.02	6.02	0.60	0.60	5.42	3250	*select largest required storage , regardless of duration, to avoid overflow*
20	3.68	4.42	0.44	0.60	3.81	4577	
30	3.06	3.68	0.37	0.60	3.07	5535	
60	2.22	2.67	0.27	0.60	2.07	7441	
120	1.59	1.91	0.19	0.60	1.31	9421	
360	0.90	1.08	0.11	0.60	0.47	10223	
720	0.59	0.71	0.07	0.60	0.11	4728	
1440	0.38	0.45	0.05	0.60	No Att. Req.	0	
2880	0.23	0.27	0.03	0.60	No Att. Req.	0	
4320	0.16	0.20	0.02	0.60	No Att. Req.	0	

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

ATTENUATION TANK DESIGN OUTPUT



SPECIFICATION

TOTAL STORAGE REQUIRED	10.223	m3	Select largest storage as per analysis
TANK HEIGHT, Htank	2.6	m	Concept sizing for 25,000 litre tank
TANK DIAMETER, Dtank	3.5	m	No. of Tanks 2
TANK AREA, Atank	19.24	m2	Area of two tanks hydraulically linked
TANK MAX STORAGE VOLUME, Vtank	50030	litres	
REQUIRED STORAGE HEIGHT, Ddet	0.53	m	Below overflow
DEAD STORAGE VOLUME, Dds	0.15	m	GD01 recommended minimum
TOTAL WATER DEPTH REQUIRED	0.68	m	
SELECTED TANK OUTFLOW, Qout, l/s	0.00060	m3/s	Selected tank outflow
AVERAGE HYDRAULIC HEAD, Hhy	0.27	m	
AREA OF ORIFICE, Aorifice	4.25E-04	m2	
ORIFICE DIAMETER, Dorifice	23	mm	
VELOCITY AT ORIFICE	3.23	m/s	At max. head level

Project Ref:	C0455		**STORMWATER ATTENUATION TANK DESIGN**	geologix consulting engineers
Project Address:	26 TANEKAHA LANE, KERIKERI			
Design Case:	CONCEPT FUTURE DEVELOPMENT (LOT 1 & 3)		**20 % AEP STORM EVENT, 80 % OF PRE DEVELOPMENT**	
Date:	5 June 2024	REV 1		

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

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

PRE DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
IMPERVIOUS A	0	0	
IMPERVIOUS B	0	0	
IMPERVIOUS C	0	0	
EX. PERVIOUS	600	0.56	ORCHARD
TOTAL	**600**	TYPE C	

POST DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
TO TANK	300	0.96	ROOF
OFFSET	100	0.8	DRIVEWAY - METAL
OFFSET RoW	200	0.8	DRIVEWAY - METAL
EX. CONSENTED	0	0	
TOTAL	**600**	TYPE C	

RAINFALL INTENSITY, 20% AEP, 10MIN DURATION

20 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	81.2	mm/hr
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	20	%
20 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	97.4	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, 20%AEP WITH CC, 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, Q, l/s	COMMENTS
10	81.20	1.2	97.44	14.29	9.09	7.28	*Critical duration (time of concentration) for the catchments is 10min*
20	59.60	1.2	71.52	10.49	6.68	5.34	
30	49.70	1.2	59.64	8.75	5.57	4.45	
60	36.20	1.2	43.44	6.37	4.05	3.24	
120	26.00	1.2	31.20	4.58	2.91	2.33	
360	14.60	1.2	17.52	2.57	1.64	1.31	
720	9.71	1.2	11.65	1.71	1.09	0.87	
1440	6.18	1.2	7.42	1.09	0.69	0.55	
2880	3.73	1.2	4.48	0.66	0.42	0.33	
4320	2.71	1.2	3.25	0.48	0.30	0.24	

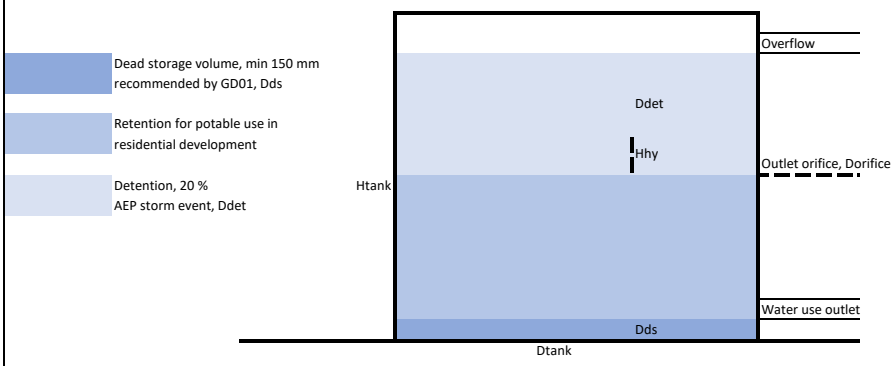
ATTENUATION ANALYSIS, VARIOUS DURATIONS

DURATION, min	OFFSET FLOW, Qoff, l/s	TANK INFLOW , Qin, l/s	ALLOWABLE TANK OUTFLOW, Qpre - Qoff, l/s	SELECTED TANK OUTFLOW, Qout, l/s	DIFFERENCE (Qin - Qout), l/s	Required Storage, litres	
10	6.50	7.80	0.78	0.78	7.02	4209	*select largest required storage , regardless of duration, to avoid overflow*
20	4.77	5.72	0.57	0.78	4.94	5930	
30	3.98	4.77	0.48	0.78	3.99	7185	
60	2.90	3.48	0.35	0.78	2.70	9704	
120	2.08	2.50	0.25	0.78	1.72	12359	
360	1.17	1.40	0.14	0.78	0.62	13437	
720	0.78	0.93	0.09	0.78	0.15	6594	
1440	0.49	0.59	0.06	0.78	No Att. Req.	0	
2880	0.30	0.36	0.04	0.78	No Att. Req.	0	
4320	0.22	0.26	0.03	0.78	No Att. Req.	0	

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

ATTENUATION TANK DESIGN OUTPUT

Concept sizing for 25,000 litre tank



SPECIFICATION

TOTAL STORAGE REQUIRED	13.437	m3	Select largest storage as per analysis	
TANK HEIGHT, Htank	2.6	m	Concept sizing for 25,000 litre tank	
TANK DIAMETER, Dtank	3.5	m	No. of Tanks	2
TANK AREA, Atank	19.24	m2	Area of two tanks hydraulically linked	
TANK MAX STORAGE VOLUME, Vtank	50030	litres		
REQUIRED STORAGE HEIGHT, Ddet	0.70	m	Below overflow	
DEAD STORAGE VOLUME, Dds	0.15	m	GD01 recommended minimum	
TOTAL WATER DEPTH REQUIRED	0.85	m		
SELECTED TANK OUTFLOW, Qout, l/s	0.00078	m3/s	Selected tank outflow	
AVERAGE HYDRAULIC HEAD, Hhy	0.35	m		
AREA OF ORIFICE, Aorifice	4.80E-04	m2		
ORIFICE DIAMETER, Dorifice	25	mm		
VELOCITY AT ORIFICE	3.70	m/s	At max. head level	

Project Ref:	C0455		**STORMWATER ATTENUATION TANK DESIGN**
Project Address:	26 TANEKAHA LANE, KERIKERI		
Design Case:	CONCEPT FUTURE DEVELOPMENT (LOT 1 & 3)		
Date:	5 June 2024	REV 1	

geologix consulting engineers

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

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

PRE DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
IMPERVIOUS A	0	0	
IMPERVIOUS B	0	0	
IMPERVIOUS C	0	0	
EX. PERVIOUS	600	0.56	ORCHARD
TOTAL	**600**	TYPE C	

POST DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
TO TANK	300	0.96	ROOF
OFFSET	100	0.8	DRIVEWAY - METAL
OFFSET RoW	200	0.8	DRIVEWAY - METAL
EX. CONSENTED	0	0	
TOTAL	**600**	TYPE C	

RAINFALL INTENSITY, 10% AEP, 10MIN DURATION

10 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	94.7	mm/hr
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	20	%
10 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	113.6	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, 10%AEP WITH CC, 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		COMMENTS
10	94.70	1.2	113.64	16.67	10.61		*Critical duration (time of concentration) for the catchments is 10min*
20	69.70	1.2	83.64	12.27	7.81		
30	58.10	1.2	69.72	10.23	6.51		
60	42.40	1.2	50.88	7.46	4.75		
120	30.50	1.2	36.60	5.37	3.42		
360	17.10	1.2	20.52	3.01	1.92		
720	11.40	1.2	13.68	2.01	1.28		
1440	7.27	1.2	8.72	1.28	0.81		
2880	4.40	1.2	5.28	0.77	0.49		
4320	3.19	1.2	3.83	0.56	0.36		

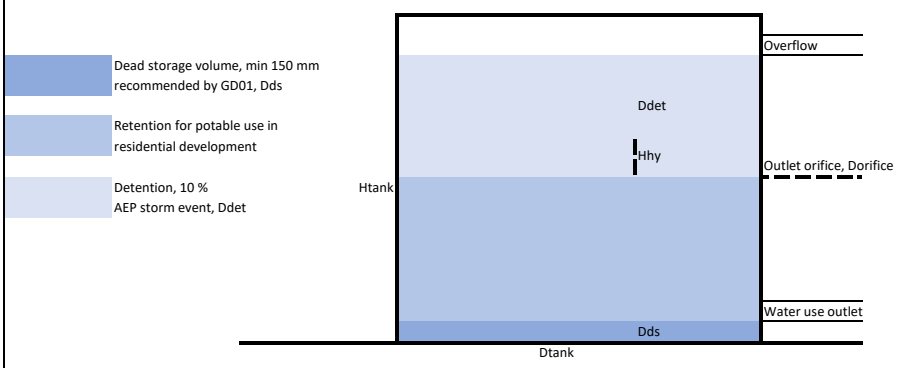
ATTENUATION ANALYSIS, VARIOUS DURATIONS

DURATION, min	OFFSET FLOW, Qoff, l/s	TANK INFLOW , Qin, l/s	ALLOWABLE TANK OUTFLOW, Qpre - Qoff, l/s	SELECTED TANK OUTFLOW, Qout, l/s	DIFFERENCE (Qin - Qout), l/s	Required Storage, litres	
10	7.58	9.09	3.03	3.03	6.06	3636	*select largest required storage , regardless of duration, to avoid overflow*
20	5.58	6.69	2.23	3.03	3.66	4393	
30	4.65	5.58	1.86	3.03	2.55	4585	
60	3.39	4.07	1.36	3.03	1.04	3744	
120	2.44	2.93	0.98	3.03	No Att. Req.	0	
360	1.37	1.64	0.55	3.03	No Att. Req.	0	
720	0.91	1.09	0.36	3.03	No Att. Req.	0	
1440	0.58	0.70	0.23	3.03	No Att. Req.	0	
2880	0.35	0.42	0.14	3.03	No Att. Req.	0	
4320	0.26	0.31	0.10	3.03	No Att. Req.	0	

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

ATTENUATION TANK DESIGN OUTPUT

Concept sizing for 25,000 litre tank



SPECIFICATION

TOTAL STORAGE REQUIRED	4.585	m3	Select largest storage as per analysis
TANK HEIGHT, Htank	2.6	m	Concept sizing for 25,000 litre tank
TANK DIAMETER, Dtank	3.5	m	No. of Tanks 2
TANK AREA, Atank	19.24	m2	Area of two tanks hydraulically linked
TANK MAX STORAGE VOLUME, Vtank	50030	litres	
REQUIRED STORAGE HEIGHT, Ddet	0.24	m	Below overflow
DEAD STORAGE VOLUME, Dds	0.15	m	GD01 recommended minimum
TOTAL WATER DEPTH REQUIRED	0.39	m	
SELECTED TANK OUTFLOW, Qout, l/s	0.00303	m3/s	Selected tank outflow
AVERAGE HYDRAULIC HEAD, Hhy	0.12	m	
AREA OF ORIFICE, Aorifice	3.20E-03	m2	
ORIFICE DIAMETER, Dorifice	64	mm	
VELOCITY AT ORIFICE	2.16	m/s	At max. head level

Project Ref:	C0455		**STORMWATER ATTENUATION TANK DESIGN**	geologix consulting engineers
Project Address:	26 TANEKAHA LANE, KERIKERI			
Design Case:	CONCEPT FUTURE DEVELOPMENT (LOT 1 & 3)		**1 % AEP STORM EVENT, 80 % OF PRE DEVELOPMENT**	
Date:	5 June 2024	REV 1		

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

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

PRE DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
IMPERVIOUS A	0	0	
IMPERVIOUS B	0	0	
IMPERVIOUS C	0	0	
EX. PERVIOUS	600	0.56	ORCHARD
TOTAL	**600**	TYPE C	

POST DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
TO TANK	300	0.96	ROOF
OFFSET	100	0.8	DRIVEWAY - METAL
OFFSET RoW	200	0.8	DRIVEWAY - METAL
EX. CONSENTED	0	0	
TOTAL	**600**	TYPE C	

RAINFALL INTENSITY, 1% AEP, 10MIN DURATION

1 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	141.0	mm/hr
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	20	%
1 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	169.2	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 WITH CC, 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, Q, l/s	COMMENTS
10	141.00	1.2	169.20	24.82	15.79	12.63	*Critical duration (time of concentration) for the catchments is 10min*
20	104.00	1.2	124.80	18.30	11.65	9.32	
30	87.10	1.2	104.52	15.33	9.76	7.80	
60	63.80	1.2	76.56	11.23	7.15	5.72	
120	46.00	1.2	55.20	8.10	5.15	4.12	
360	26.00	1.2	31.20	4.58	2.91	2.33	
720	17.40	1.2	20.88	3.06	1.95	1.56	
1440	11.10	1.2	13.32	1.95	1.24	0.99	
2880	6.75	1.2	8.10	1.19	0.76	0.60	
4320	4.91	1.2	5.89	0.86	0.55	0.44	

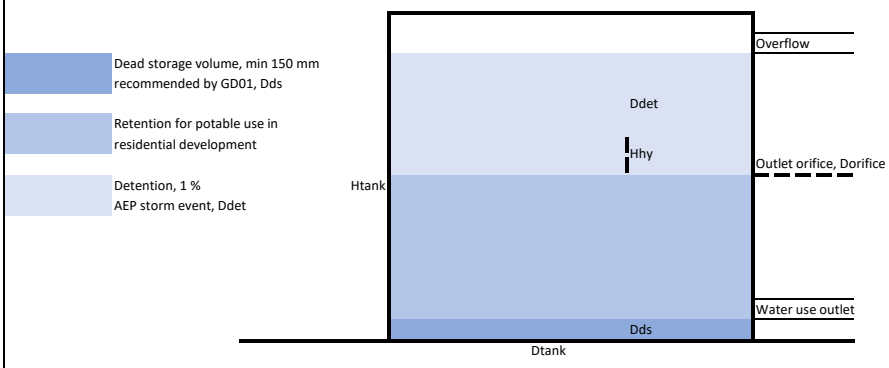
ATTENUATION ANALYSIS, VARIOUS DURATIONS

DURATION, min	OFFSET FLOW, Qoff, l/s	TANK INFLOW , Qin, l/s	ALLOWABLE TANK OUTFLOW, Qpre - Qoff, l/s	SELECTED TANK OUTFLOW, Qout, l/s	DIFFERENCE (Qin - Qout), l/s	Required Storage, litres	
10	11.28	13.54	1.35	1.35	12.18	7309	*select largest required storage , regardless of duration, to avoid overflow*
20	8.32	9.98	1.00	1.35	8.63	10356	
30	6.97	8.36	0.84	1.35	7.01	12614	
60	5.10	6.12	0.61	1.35	4.77	17176	
120	3.68	4.42	0.44	1.35	3.06	22049	
360	2.08	2.50	0.25	1.35	1.14	24676	
720	1.39	1.67	0.17	1.35	0.32	13686	
1440	0.89	1.07	0.11	1.35	No Att. Req.	0	
2880	0.54	0.65	0.06	1.35	No Att. Req.	0	
4320	0.39	0.47	0.05	1.35	No Att. Req.	0	

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

ATTENUATION TANK DESIGN OUTPUT

Concept sizing for 25,000 litre tank



SPECIFICATION

TOTAL STORAGE REQUIRED	24.676	m3	Select largest storage as per analysis	
TANK HEIGHT, Htank	2.6	m	Concept sizing for 25,000 litre tank	
TANK DIAMETER, Dtank	3.5	m	No. of Tanks	2
TANK AREA, Atank	19.24	m2	Area of two tanks hydraulically linked	
TANK MAX STORAGE VOLUME, Vtank	50030	litres		
REQUIRED STORAGE HEIGHT, Ddet	1.28	m	Below overflow	
DEAD STORAGE VOLUME, Dds	0.15	m	GD01 recommended minimum	
TOTAL WATER DEPTH REQUIRED	1.43	m		
SELECTED TANK OUTFLOW, Qout, l/s	0.00135	m3/s	Selected tank outflow	
AVERAGE HYDRAULIC HEAD, Hhy	0.64	m		
AREA OF ORIFICE, Aorifice	6.16E-04	m2		
ORIFICE DIAMETER, Dorifice	28	mm		
VELOCITY AT ORIFICE	5.02	m/s	At max. head level	

HIRDS V4 Intensity-Duration-Frequency Results
Sitename: Kerikeri
Coordinate system: WGS84
Longitude: 173.9304
Latitude: -35.1959

DDF Mode Parameters:	c	d	e	f	g	h	i
Values:	0.00223873	0.5306876	-0.0158656	-0.00398527	0.25389346	-0.0117081	3.2352587

Example:	Duration (hrs)	ARI (yrs)	x	y	Rainfall Rate (mm/hr)
	24	100	3.17805383	4.60014923	11.11740696

Rainfall intensities (mm/hr) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	57.3	41.9	34.9	25.4	18.2	10.2	6.75	4.3	2.6	1.9	1.5	1.21
2	0.5	62.7	46	38.3	27.8	19.9	11.2	7.41	4.7	2.8	2.1	1.6	1.33
5	0.2	81.2	59.6	49.7	36.2	26	14.6	9.71	6.2	3.7	2.7	2.1	1.75
10	0.1	94.7	69.7	58.1	42.4	30.5	17.1	11.4	7.3	4.4	3.2	2.5	2.06
20	0.05	109	79.9	66.7	48.7	35	19.8	13.2	8.4	5.1	3.7	2.9	2.39
30	0.033	117	86	71.8	52.5	37.8	21.3	14.2	9.1	5.5	4	3.1	2.58
40	0.025	123	90.3	75.5	55.2	39.7	22.4	15	9.6	5.8	4.2	3.3	2.72
50	0.02	127	93.7	78.3	57.3	41.2	23.3	15.6	9.9	6	4.4	3.4	2.83
60	0.017	131	96.4	80.6	59	42.5	24	16	10	6.2	4.5	3.6	2.92
80	0.013	137	101	84.3	61.7	44.5	25.1	16.8	11	6.5	4.7	3.7	3.07
100	0.01	141	104	87.1	63.8	46	26	17.4	11	6.8	4.9	3.9	3.18
250	0.004	159	118	98.5	72.2	52.2	29.6	19.8	13	7.7	5.6	4.4	3.64

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	5.3	3.5	2.7	1.8	1.3	0.8	0.55	0.4	0.2	0.2	0	0.07
2	0.5	5.9	3.7	2.9	1.9	1.4	0.88	0.6	0.5	0.3	0.2	0	0.08
5	0.2	8.8	5.6	4.6	2.9	2.1	1.3	0.85	0.6	0.4	0.2	0.1	0.12
10	0.1	12	7.9	6.7	3.9	2.9	1.7	1.1	0.8	0.4	0.3	0.1	0.16
20	0.05	15	11	9.3	5.4	4.1	2.4	1.6	0.9	0.5	0.4	0.2	0.21
30	0.033	18	13	11	6.5	4.9	2.8	1.9	1.1	0.6	0.4	0.2	0.24
40	0.025	20	15	13	7.4	5.6	3.2	2.2	1.2	0.7	0.5	0.3	0.27
50	0.02	22	16	14	8.2	6.2	3.6	2.4	1.2	0.7	0.5	0.3	0.29
60	0.017	24	17	15	8.9	6.8	3.9	2.6	1.3	0.8	0.6	0.3	0.31
80	0.013	26	20	17	10	7.7	4.4	3	1.4	0.8	0.6	0.4	0.34
100	0.01	28	22	19	11	8.4	4.8	3.3	1.5	0.9	0.7	0.4	0.37
250	0.004	39	31	27	16	12	7.1	5	2	1.2	0.9	0.6	0.51

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	61.3	44.9	37.4	27.2	19.4	10.7	7.07	4.5	2.7	1.9	1.5	1.24
2	0.5	67.2	49.3	41	29.9	21.3	11.8	7.79	4.9	2.9	2.1	1.7	1.36
5	0.2	87.3	64.1	53.5	39	27.9	15.5	10.2	6.5	3.9	2.8	2.2	1.8
10	0.1	102	75	62.6	45.7	32.7	18.2	12	7.6	4.6	3.3	2.6	2.13
20	0.05	117	86.1	72	52.5	37.7	21	13.9	8.8	5.3	3.8	3	2.47
30	0.033	126	92.7	77.5	56.6	40.6	22.7	15	9.5	5.7	4.2	3.3	2.67
40	0.025	132	97.4	81.4	59.5	42.7	23.9	15.8	10	6	4.4	3.4	2.82
50	0.02	137	101	84.5	61.8	44.4	24.9	16.5	10	6.3	4.6	3.6	2.93
60	0.017	141	104	87.1	63.7	45.7	25.6	17	11	6.5	4.7	3.7	3.03
80	0.013	148	109	91.1	66.6	47.9	26.8	17.8	11	6.8	4.9	3.9	3.18
100	0.01	152	113	94.1	68.9	49.5	27.8	18.4	12	7.1	5.1	4	3.29
250	0.004	172	127	106	78	56.2	31.6	21	13	8.1	5.8	4.6	3.77

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	61.3	44.9	37.4	27.2	19.4	10.7	7.07	4.5	2.7	1.9	1.5	1.24
2	0.5	67.2	49.3	41	29.9	21.3	11.8	7.79	4.9	2.9	2.1	1.7	1.36
5	0.2	87.3	64.1	53.5	39	27.9	15.5	10.2	6.5	3.9	2.8	2.2	1.8
10	0.1	102	75	62.6	45.7	32.7	18.2	12	7.6	4.6	3.3	2.6	2.13
20	0.05	117	86.1	72	52.5	37.7	21	13.9	8.8	5.3	3.8	3	2.47
30	0.033	126	92.7	77.5	56.6	40.6	22.7	15	9.5	5.7	4.2	3.3	2.67
40	0.025	132	97.4	81.4	59.5	42.7	23.9	15.8	10	6	4.4	3.4	2.82
50	0.02	137	101	84.5	61.8	44.4	24.9	16.5	10	6.3	4.6	3.6	2.93
60	0.017	141	104	87.1	63.7	45.7	25.6	17	11	6.5	4.7	3.7	3.03
80	0.013	148	109	91.1	66.6	47.9	26.8	17.8	11	6.8	4.9	3.9	3.18
100	0.01	152	113	94.1	68.9	49.5	27.8	18.4	12	7.1	5.1	4	3.29
250	0.004	172	127	106	78	56.2	31.6	21	13	8.1	5.8	4.6	3.77

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	62.3	45.6	38	27.6	19.7	10.9	7.15	4.5	2.7	1.9	1.5	1.25
2	0.5	68.3	50.1	41.7	30.4	21.7	12	7.88	5	3	2.1	1.7	1.37
5	0.2	88.9	65.3	54.4	39.7	28.4	15.7	10.4	6.5	3.9	2.8	2.2	1.82
10	0.1	104	76.4	63.8	46.5	33.3	18.5	12.2	7.7	4.6	3.3	2.6	2.15
20	0.05	119	87.7	73.3	53.5	38.4	21.4	14.1	8.9	5.4	3.9	3	2.49
30	0.033	128	94.5	78.9	57.7	41.4	23.1	15.2	9.6	5.8	4.2	3.3	2.7
40	0.025	135	99.2	83	60.6	43.5	24.3	16.1	10	6.1	4.4	3.5	2.84
50	0.02	140	103	86.1	63	45.2	25.3	16.7	11	6.4	4.6	3.6	2.96
60	0.017	144	106	88.7	64.9	46.6	26	17.2	11	6.6	4.8	3.7	3.05
80	0.013	150	111	92.8	67.9	48.8	27.3	18	11	6.9	5	3.9	3.21
100	0.01	155	115	95.9	70.2	50.4	28.2	18.7	12	7.1	5.2	4.1	3.32
250	0.004	175	130	108	79.5	57.2	32.1	21.3	14	8.1	5.9	4.6	3.8

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	65.5	48	40	29.1	20.6	11.3	7.4	4.7	2.8	2	1.6	1.27
2	0.5	71.9	52.7	43.9	32	22.8	12.5	8.18	5.1	3.1	2.2	1.7	1.4
5	0.2	93.7	68.8	57.4	41.8	29.9	16.5	10.8	6.8	4	2.9	2.3	1.86
10	0.1	110	80.7	67.4	49.1	35.1	19.4	12.7	8	4.8	3.4	2.7	2.2
20	0.05	126	92.7	77.5	56.6	40.5	22.4	14.7	9.2	5.5	4	3.1	2.55
30	0.033	136	99.9	83.5	61	43.7	24.2	15.9	10	6	4.3	3.4	2.77
40	0.025	142	105	87.7	64.1	45.9	25.5	16.8	11	6.3	4.6	3.6	2.92
50	0.02	148	109	91.1	66.6	47.7	26.5	17.4	11	6.6	4.7	3.7	3.04
60	0.017	152	112	93.8	68.6	49.2	27.3	18	11	6.8	4.9	3.8	3.14
80	0.013	159	117	98.2	71.8	51.5	28.6	18.8	12	7.1	5.1	4	3.29
100	0.01	164	121	101	74.3	53.3	29.6	19.5	12	7.4	5.3	4.2	3.42
250	0.004	185	137	115	84.1	60.4	33.7	22.2	14	8.4	6.1	4.8	3.91

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	61.9	45.3	37.8	27.5	19.6	10.8	7.12	4.5	2.7	1.9	1.5	1.24
2	0.5	67.9	49.8	41.5	30.2	21.5	11.9	7.84	4.9	3	2.1	1.7	1.37
5	0.2	88.2	64.8	54	39.4	28.2	15.6	10.3	6.5	3.9	2.8	2.2	1.81
10	0.1	103	75.9	63.3	46.2	33.1	18.4	12.1	7.7	4.6	3.3	2.6	2.14
20	0.05	118	87.1	72.8	53.1	38.1	21.2	14	8.9	5.3	3.9	3	2.48
30	0.033	127	93.8	78.4	57.3	41.1	22.9	15.2	9.6	5.8	4.2	3.3	2.69
40	0.025	134	98.5	82.3	60.2	43.2	24.2	16	10	6.1	4.4	3.5	2.83
50	0.02	139	102	85.5	62.5	44.9	25.1	16.6	11	6.3	4.6	3.6	2.95
60	0.017	143	105	88	64.4	46.2	25.9	17.1	11	6.5	4.7	3.7	3.04
80	0.013	149	110	92.1	67.4	48.4	27.1	17.9	11	6.9	5	3.9	3.2
100	0.01	154	114	95.2	69.7	50.1	28.1	18.6	12	7.1	5.1	4	3.31
250	0.004	174	129	108	78.9	56.8	31.9	21.2	13	8.1	5.9	4.6	3.79

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	68.4	50.1	41.7	30.3	21.5	11.7	7.63	4.8	2.8	2	1.6	1.29
2	0.5	75.2	55.1	45.9	33.4	23.8	13	8.44	5.3	3.1	2.2	1.8	1.43
5	0.2	98.1	72	60.1	43.8	31.2	17.1	11.2	7	4.1	3	2.3	1.9
10	0.1	115	84.5	70.6	51.5	36.7	20.2	13.2	8.2	4.9	3.5	2.8	2.25
20	0.05	132	97.2	81.2	59.3	42.3	23.3	15.2	9.5	5.7	4.1	3.2	2.61
30	0.033	142	105	87.5	63.9	45.7	25.2	16.5	10	6.2	4.4	3.5	2.83
40	0.025	149	110	92	67.2	48.1	26.6	17.4	11	6.5	4.7	3.7	2.99
50	0.02	155	114	95.5	69.9	50	27.6	18.1	11	6.8	4.9	3.8	3.11
60	0.017	160	118	98.4	72	51.5	28.5	18.6	12	7	5	3.9	3.21
80	0.013	167	123	103	75.4	54	29.8	19.5	12	7.3	5.3	4.1	3.37
100	0.01	172	127	106	77.9	55.8	30.9	20.2	13	7.6	5.5	4.3	3.5
250	0.004	195	144	120	88.2	63.3	35.1	23.1	15	8.7	6.2	4.9	4

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	63.1	46.2	38.5	28	19.9	11	7.21	4.5	2.7	2	1.5	1.25
2	0.5	69.2	50.7	42.3	30.7	21.9	12.1	7.95	5	3	2.2	1.7	1.38
5	0.2	90	66.1	55.1	40.2	28.7	15.9	10.5	6.6	3.9	2.9	2.2	1.83
10	0.1	105	77.4	64.6	47.1	33.7	18.7	12.3	7.8	4.7	3.4	2.6	2.16
20	0.05	121	88.9	74.3	54.2	38.9	21.6	14.2	9	5.4	3.9	3.1	2.5
30	0.033	130	95.7	80	58.5	41.9	23.3	15.4	9.7	5.8	4.2	3.3	2.71
40	0.025	137	101	84.1	61.5	44.1	24.6	16.2	10	6.2	4.5	3.5	2.86
50	0.02	142	104	87.3	63.8	45.8	25.5	16.9	11	6.4	4.6	3.6	2.98
60	0.017	146	108	89.9	65.7	47.2	26.3	17.4	11	6.6	4.8	3.7	3.07
80	0.013	152	112	94	68.8	49.4	27.6	18.2	12	6.9	5	3.9	3.23
100	0.01	157	116	97.2	71.2	51.1	28.6	18.9	12	7.2	5.2	4.1	3.35
250	0.004	178	131	110	80.6	58	32.5	21.5	14	8.2	5.9	4.7	3.83

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	74.8	54.8	45.7	33.2	23.4	12.6	8.14	5.1	3	2.1	1.6	1.35
2	0.5	82.4	60.4	50.3	36.6	26	14	9.04	5.6	3.3	2.4	1.8	1.49
5	0.2	108	79.3	66.1	48.2	34.2	18.6	12	7.4	4.4	3.1	2.4	1.99
10	0.1	127	93.2	77.8	56.7	40.4	21.9	14.2	8.8	5.2	3.7	2.9	2.37
20	0.05	146	107	89.6	65.4	46.6	25.4	16.5	10	6	4.3	3.4	2.74
30	0.033	157	116	96.6	70.6	50.3	27.5	17.8	11	6.5	4.7	3.7	2.98
40	0.025	165	122	102	74.2	52.9	29	18.8	12	6.9	4.9	3.9	3.15
50	0.02	171	126	106	77.2	55.1	30.1	19.5	12	7.2	5.1	4	3.27
60	0.017	176	130	109	79.5	56.7	31.1	20.2	13	7.4	5.3	4.1	3.38
80	0.013	185	136	114	83.3	59.5	32.5	21.1	13	7.8	5.6	4.3	3.55
100	0.01	191	141	118	86.2	61.5	33.7	21.9	14	8.1	5.8	4.5	3.68
250	0.004	215	159	133	97.6	69.8	38.4	25	16	9.2	6.6	5.2	4.21

HIRDS V4 Depth-Duration-Frequency Results
Sitename: 26 Tanekaha Lane Kerikeri
Coordinate system: WGS84
Longitude: 173.9304
Latitude: -35.1959
DDF Model

Parameters:	c	d	e	f	g	h	i
Values:	0.00223873	0.5306876	-0.0158656	-0.00398527	0.25389346	-0.0117081	3.23526
Example:	Duration (hrs)	ARI (yrs)	x	y	Rainfall Depth (mm)		
	24	100	3.17805383	4.60014923	266.817767		

Rainfall depths (mm) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.54	14	17.5	25.4	36.4	61.1	81	103	124	135	141	145
2	0.5	10.4	15.3	19.1	27.8	39.9	67	89	113	136	148	155	159
5	0.2	13.5	19.9	24.9	36.2	52	87.6	116	148	179	195	204	210
10	0.1	15.8	23.2	29.1	42.4	60.9	103	137	174	211	230	241	247
20	0.05	18.1	26.6	33.4	48.7	70.1	119	158	201	244	266	278	286
30	0.033	19.5	28.7	35.9	52.5	75.5	128	171	218	264	287	301	310
40	0.025	20.4	30.1	37.7	55.2	79.4	135	180	229	278	303	318	327
50	0.02	21.2	31.2	39.2	57.3	82.5	140	187	238	289	315	330	340
60	0.017	21.8	32.1	40.3	59	85	144	192	246	298	325	341	351
80	0.013	22.8	33.6	42.1	61.7	88.9	151	202	258	313	341	358	368
100	0.01	23.5	34.7	43.6	63.8	92	156	209	267	324	353	371	382
250	0.004	26.5	39.2	49.3	72.2	104	178	238	304	370	404	424	437

Depth standard error (mm) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	0.9	1.2	1.3	1.8	2.6	4.7	6.6	9.6	11	11	4.2	9.2
2	0.5	0.96	1.3	1.4	1.9	2.8	5.1	7.2	11	12	13	4.5	10
5	0.2	1.3	1.9	2.2	2.9	4.2	7.1	10	15	17	17	8.1	15
10	0.1	1.8	2.7	3.1	4	6	9.6	14	19	21	22	13	19
20	0.05	2.3	3.7	4.3	5.5	8.4	13	19	23	26	27	18	25
30	0.033	2.7	4.4	5.1	6.7	10	16	23	27	29	31	22	30
40	0.025	3	4.9	5.7	7.7	12	18	26	29	32	34	26	33
50	0.02	3.3	5.4	6.3	8.5	13	20	29	31	34	37	29	36
60	0.017	3.5	5.8	6.8	9.2	14	22	32	33	36	39	31	39
80	0.013	3.9	6.4	7.6	11	16	25	36	37	40	43	35	43
100	0.01	4.3	7	8.3	12	17	28	40	39	43	46	38	47
250	0.004	6	9.8	12	17	25	41	61	52	57	61	55	65

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	10.2	15	18.7	27.2	38.8	64.4	84.8	107	128	139	145	149
2	0.5	11.2	16.4	20.5	29.9	42.6	70.9	93.4	118	141	153	160	164
5	0.2	14.6	21.4	26.7	39	55.8	93	123	155	186	202	211	216
10	0.1	17	25	31.3	45.7	65.5	109	145	183	220	238	249	256
20	0.05	19.5	28.7	36	52.5	75.4	126	167	211	254	276	289	296
30	0.033	21	30.9	38.7	56.6	81.3	136	180	228	275	299	312	321
40	0.025	22	32.5	40.7	59.5	85.5	144	190	241	290	315	329	338
50	0.02	22.9	33.7	42.3	61.8	88.8	149	198	250	302	328	343	352
60	0.017	23.5	34.7	43.5	63.7	91.5	154	204	258	311	338	354	363
80	0.013	24.6	36.3	45.5	66.6	95.8	161	213	271	327	355	371	381
100	0.01	25.4	37.5	47.1	68.9	99.1	167	221	280	338	368	385	395
250	0.004	28.7	42.4	53.2	78	112	190	252	320	386	420	440	452

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	10.2	15	18.7	27.2	38.8	64.4	84.8	107	128	139	145	149
2	0.5	11.2	16.4	20.5	29.9	42.6	70.9	93.4	118	141	153	160	164
5	0.2	14.6	21.4	26.7	39	55.8	93	123	155	186	202	211	216
10	0.1	17	25	31.3	45.7	65.5	109	145	183	220	238	249	256
20	0.05	19.5	28.7	36	52.5	75.4	126	167	211	254	276	289	296
30	0.033	21	30.9	38.7	56.6	81.3	136	180	228	275	299	312	321
40	0.025	22	32.5	40.7	59.5	85.5	144	190	241	290	315	329	338
50	0.02	22.9	33.7	42.3	61.8	88.8	149	198	250	302	328	343	352
60	0.017	23.5	34.7	43.5	63.7	91.5	154	204	258	311	338	354	363
80	0.013	24.6	36.3	45.5	66.6	95.8	161	213	271	327	355	371	381
100	0.01	25.4	37.5	47.1	68.9	99.1	167	221	280	338	368	385	395
250	0.004	28.7	42.4	53.2	78	112	190	252	320	386	420	440	452

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	10.4	15.2	19	27.6	39.4	65.3	85.8	108	129	140	146	149
2	0.5	11.4	16.7	20.9	30.4	43.3	71.9	94.6	119	143	154	161	165
5	0.2	14.8	21.8	27.2	39.7	56.7	94.4	124	157	188	204	213	218
10	0.1	17.3	25.5	31.9	46.5	66.6	111	147	185	222	241	251	258
20	0.05	19.9	29.2	36.6	53.5	76.7	128	169	214	257	279	291	299
30	0.033	21.4	31.5	39.5	57.7	82.7	138	183	231	278	302	315	323
40	0.025	22.5	33.1	41.5	60.6	87	146	193	244	293	318	332	341
50	0.02	23.3	34.3	43.1	63	90.4	152	200	253	305	331	346	355
60	0.017	24	35.4	44.3	64.9	93.2	156	207	261	315	342	357	367
80	0.013	25.1	37	46.4	67.9	97.5	164	216	274	330	358	375	385
100	0.01	25.9	38.2	47.9	70.2	101	169	224	284	342	371	388	399
250	0.004	29.2	43.2	54.2	79.5	114	193	255	324	390	424	444	456

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	10.9	16	20	29.1	41.3	68	88.8	112	133	143	149	153
2	0.5	12	17.6	22	32	45.5	75	98.1	123	146	158	165	168
5	0.2	15.6	22.9	28.7	41.8	59.7	98.7	129	162	194	209	218	223
10	0.1	18.3	26.9	33.7	49.1	70.2	116	153	192	229	248	258	265
20	0.05	21	30.9	38.7	56.6	80.9	134	176	221	265	287	299	307
30	0.033	22.6	33.3	41.7	61	87.3	145	191	240	287	311	324	332
40	0.025	23.7	35	43.9	64.1	91.8	153	201	253	303	328	342	351
50	0.02	24.6	36.3	45.5	66.6	95.5	159	209	263	315	341	356	365
60	0.017	25.4	37.4	46.9	68.6	98.3	164	216	271	325	352	367	376
80	0.013	26.5	39.1	49.1	71.8	103	172	226	284	341	369	385	395
100	0.01	27.4	40.4	50.7	74.3	107	178	234	295	353	383	400	410
250	0.004	30.9	45.7	57.4	84.1	121	202	267	336	403	437	457	469

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	10.3	15.1	18.9	27.5	39.1	65	85.4	108	129	139	145	149
2	0.5	11.3	16.6	20.7	30.2	43.1	71.5	94.1	119	142	154	160	164
5	0.2	14.7	21.6	27	39.4	56.3	93.9	124	156	187	203	212	217
10	0.1	17.2	25.3	31.7	46.2	66.1	110	146	184	221	240	250	257
20	0.05	19.7	29	36.4	53.1	76.2	127	168	213	256	278	290	298
30	0.033	21.2	31.3	39.2	57.3	82.2	138	182	230	277	300	314	322
40	0.025	22.3	32.8	41.2	60.2	86.4	145	192	242	292	317	331	340
50	0.02	23.1	34.1	42.7	62.5	89.8	151	199	252	304	330	345	354
60	0.017	23.8	35.1	44	64.4	92.5	155	205	260	313	340	356	365
80	0.013	24.9	36.7	46	67.4	96.8	163	215	273	329	357	373	383
100	0.01	25.7	37.9	47.6	69.7	100	168	223	282	341	370	387	397
250	0.004	29	42.9	53.8	78.9	114	191	254	322	389	423	442	455

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	11.4	16.7	20.9	30.3	43	70.4	91.5	115	136	146	152	155
2	0.5	12.5	18.4	23	33.4	47.5	77.7	101	126	150	161	168	172
5	0.2	16.4	24	30	43.8	62.4	103	134	167	199	214	223	228
10	0.1	19.2	28.2	35.3	51.5	73.4	121	158	197	235	254	264	270
20	0.05	22	32.4	40.6	59.3	84.7	140	183	228	273	294	307	314
30	0.033	23.7	34.9	43.8	63.9	91.4	151	198	247	295	319	332	340
40	0.025	24.9	36.7	46	67.2	96.1	159	209	261	311	336	350	359
50	0.02	25.8	38.1	47.8	69.9	100	166	217	271	324	350	365	373
60	0.017	26.6	39.2	49.2	72	103	171	224	280	334	362	377	385
80	0.013	27.8	41	51.5	75.4	108	179	234	293	351	379	395	405
100	0.01	28.7	42.4	53.2	77.9	112	185	243	304	364	393	410	420
250	0.004	32.4	47.9	60.2	88.2	127	211	277	347	415	449	469	480

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	10.5	15.4	19.2	28	39.8	65.9	86.5	109	130	140	146	150
2	0.5	11.5	16.9	21.1	30.7	43.9	72.6	95.4	120	143	155	162	166
5	0.2	15	22	27.6	40.2	57.4	95.4	126	158	189	205	214	219
10	0.1	17.5	25.8	32.3	47.1	67.5	112	148	186	224	242	253	259
20	0.05	20.1	29.6	37.1	54.2	77.7	130	171	216	259	281	293	301
30	0.033	21.7	31.9	40	58.5	83.8	140	185	233	280	304	317	325
40	0.025	22.8	33.5	42	61.5	88.2	148	195	246	295	320	335	344
50	0.02	23.6	34.8	43.6	63.8	91.6	153	202	255	307	333	348	357
60	0.017	24.3	35.8	44.9	65.7	94.4	158	209	264	317	344	359	369
80	0.013	25.4	37.5	47	68.8	98.8	166	219	276	333	361	377	387
100	0.01	26.2	38.7	48.6	71.2	102	171	227	286	345	374	391	401
250	0.004	29.6	43.8	55	80.6	116	195	258	326	393	427	447	459

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	12.5	18.3	22.8	33.2	46.9	75.9	97.7	121	143	152	158	161
2	0.5	13.7	20.1	25.2	36.6	51.9	84	108	134	158	169	175	179
5	0.2	18	26.4	33.1	48.2	68.5	111	144	178	210	226	234	239
10	0.1	21.1	31.1	38.9	56.7	80.7	132	170	211	249	268	278	284
20	0.05	24.3	35.8	44.8	65.4	93.2	152	197	244	289	311	323	329
30	0.033	26.2	38.6	48.3	70.6	101	165	214	264	313	337	350	357
40	0.025	27.5	40.5	50.8	74.2	106	174	225	279	330	356	369	377
50	0.02	28.6	42.1	52.8	77.2	110	181	234	290	344	370	385	393
60	0.017	29.4	43.3	54.4	79.5	113	186	242	300	355	383	397	405
80	0.013	30.8	45.4	56.9	83.3	119	195	254	314	373	402	417	426
100	0.01	31.8	46.9	58.8	86.2	123	202	263	326	387	416	433	442
250	0.004	35.9	53	66.6	97.6	140	230	299	372	441	475	495	505

Project Ref:	C0455		**STORMWATER ATTENUATION TANK DESIGN**	geologix consulting engineers
Project Address:	26 TANEKAHA LANE, KERIKERI			
Design Case:	EXISTING DEVELOPMENT, LOT 4		**50 % AEP STORM EVENT, TO PERMITTED ACTIVITY THRESHOLD**	
Date:	5 June 2024	REV 1		

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

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

PERMITTED ACTIVITY (PA) CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
PA THRESHOLD	704.1	0.96	PA = 15% OF SITE
IMPERVIOUS B	0	0	
IMPERVIOUS C	0	0	
EX. PERVIOUS	0	0	GARDEN (RESIDENTIAL
TOTAL	**704.1**	TYPE C	

POST DEVELOPMENT CATCHMENT PARAMETERS

ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
TO TANK	517	0.96	ROOF
OFFSET	0	0	RoW - SEALED
OFFSET	422	0.8	DRIVEWAY - SEALED
TOTAL	**939**	TYPE C	

RAINFALL INTENSITY, 50% AEP, 10MIN DURATION

50 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	62.7	mm/hr
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	20	%
50 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	75.24	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 WITH CC, VARIOUS DURATIONS

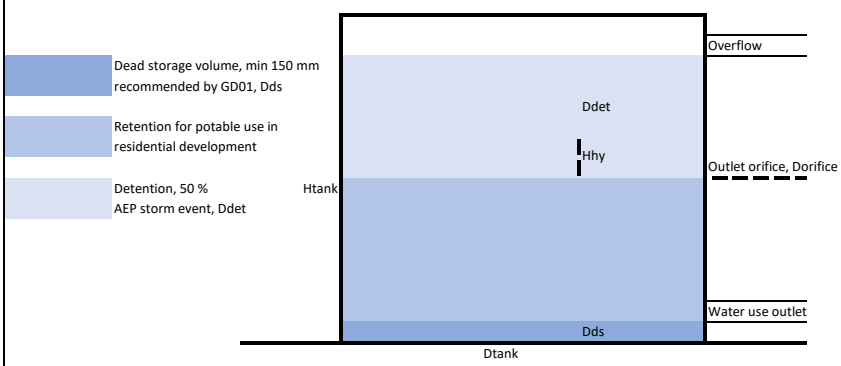
DURATION, min	INTENSITY, mm/hr	CC FACTOR	INTENSITY WITH CC, mm/hr	POST DEV RUNOFF, Qpost, l/s	PA RUNOFF, Qpa, l/s		COMMENTS
10	62.70	1.2	75.24	17.43	14.13		*Critical duration (time of concentration) for the catchments is 10min*
20	46.00	1.2	55.20	12.79	10.36		
30	38.30	1.2	45.96	10.65	8.63		
60	27.80	1.2	33.36	7.73	6.26		
120	19.90	1.2	23.88	5.53	4.48		
360	11.20	1.2	13.44	3.11	2.52		
720	7.41	1.2	8.89	2.06	1.67		
1440	4.71	1.2	5.65	1.31	1.06		
2880	2.84	1.2	3.41	0.79	0.64		
4320	2.06	1.2	2.47	0.57	0.46		

ATTENUATION ANALYSIS, VARIOUS DURATIONS

DURATION, min	OFFSET FLOW, Qoff, l/s	TANK INFLOW , Qin, l/s	ALLOWABLE TANK OUTFLOW, Qpre - Qoff, l/s	SELECTED TANK OUTFLOW, Qout, l/s	DIFFERENCE (Qin - Qout), l/s	Required Storage, litres	
10	7.06	10.37	7.07	7.07	3.30	1981	*select largest required storage , regardless of duration, to avoid overflow*
20	5.18	7.61	5.19	7.07	0.54	647	
30	4.31	6.34	4.32	7.07	No Att. Req.	0	
60	3.13	4.60	3.14	7.07	No Att. Req.	0	
120	2.24	3.29	2.24	7.07	No Att. Req.	0	
360	1.26	1.85	1.26	7.07	No Att. Req.	0	
720	0.83	1.23	0.84	7.07	No Att. Req.	0	
1440	0.53	0.78	0.53	7.07	No Att. Req.	0	
2880	0.32	0.47	0.32	7.07	No Att. Req.	0	
4320	0.23	0.34	0.23	7.07	No Att. Req.	0	

ATTENUATION TANK DESIGN OUTPUT

Concept sizing for 25,000 litre tank



SPECIFICATION

TOTAL STORAGE REQUIRED	1.981	m3	Select largest storage as per analysis
TANK HEIGHT, Htank	2.6	m	Concept sizing for 25,000 litre tank
TANK DIAMETER, Dtank	3.66	m	No. of Tanks 1
TANK AREA, Atank	10.52	m2	Area of ONE tank
TANK MAX STORAGE VOLUME, Vtank	27354	litres	
REQUIRED STORAGE HEIGHT, Ddet	0.19	m	Below overflow
DEAD STORAGE VOLUME, Dds	0.15	m	GD01 recommended minimum
TOTAL WATER DEPTH REQUIRED	0.34	m	
SELECTED TANK OUTFLOW, Qout, l/s	0.00707	m3/s	Selected tank outflow
AVERAGE HYDRAULIC HEAD, Hhy	0.09	m	
AREA OF ORIFICE, Aorifice	8.39E-03	m2	
ORIFICE DIAMETER, Dorifice	103	mm	
VELOCITY AT ORIFICE	1.92	m/s	At max. head level

Project Ref:	C0455		**STORMWATER ATTENUATION TANK DESIGN**	geologix consulting engineers
Project Address:	26 TANEKAHA LANE, KERIKERI			
Design Case:	EXISTING DEVELOPMENT, LOT 4		**20 % AEP STORM EVENT, TO PERMITTED ACTIVITY THRESHOLD**	
Date:	5 June 2024	REV 1		

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

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

PERMITTED ACTIVITY (PA) CATCHMENT PARAMETERS				**POST DEVELOPMENT CATCHMENT PARAMETERS**			
ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION	ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
PA THRESHOLD	704.1	0.96	PA = 15% OF SITE	TO TANK	517	0.96	ROOF
IMPERVIOUS B	0	0		0	0	0	
IMPERVIOUS C	0	0	GARDEN (RESIDENTIAL)	OFFSET	0	0	RoW - SEALED
EX. PERVIOUS	0	0		OFFSET	422	0.8	DRIVEWAY - SEALED
				0	0	0	
TOTAL	**704.1**	TYPE C		**TOTAL**	**939**	TYPE C	

RAINFALL INTENSITY, 20% AEP, 10MIN DURATION

20 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	81.2	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.
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	20	%	
20 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	97.4	mm/hr	

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

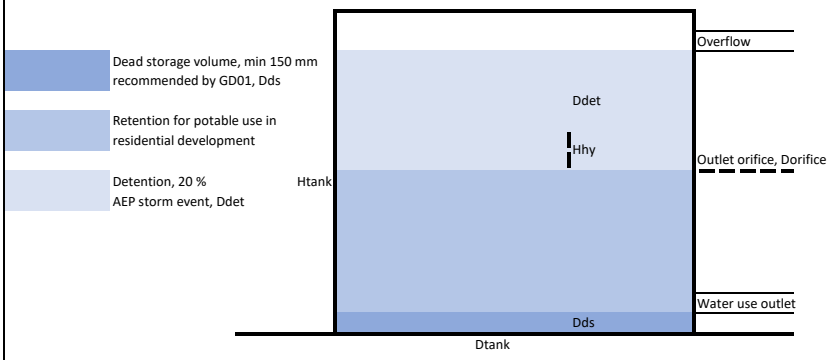
DURATION, min	INTENSITY, mm/hr	CC FACTOR	INTENSITY WITH CC, mm/hr	POST DEV RUNOFF, Qpost, l/s	PA RUNOFF, Qpa, l/s		COMMENTS
10	81.20	1.2	97.44	22.57	18.30		*Critical duration (time of concentration) for the catchments is 10min*
20	59.60	1.2	71.52	16.57	13.43		
30	49.70	1.2	59.64	13.82	11.20		
60	36.20	1.2	43.44	10.06	8.16		
120	26.00	1.2	31.20	7.23	5.86		
360	14.60	1.2	17.52	4.06	3.29		
720	9.71	1.2	11.65	2.70	2.19		
1440	6.18	1.2	7.42	1.72	1.39		
2880	3.73	1.2	4.48	1.04	0.84		
4320	2.71	1.2	3.25	0.75	0.61		

ATTENUATION ANALYSIS, VARIOUS DURATIONS

DURATION, min	OFFSET FLOW, Qoff, l/s	TANK INFLOW , Qin, l/s	ALLOWABLE TANK OUTFLOW, Qpre - Qoff, l/s	SELECTED TANK OUTFLOW, Qout, l/s	DIFFERENCE (Qin - Qout), l/s	Required Storage, litres	
10	9.14	13.43	9.16	9.16	4.28	2566	*select largest required storage , regardless of duration, to avoid overflow*
20	6.71	9.86	6.72	9.16	0.70	843	
30	5.59	8.22	5.61	9.16	No Att. Req.	0	
60	4.07	5.99	4.08	9.16	No Att. Req.	0	
120	2.93	4.30	2.93	9.16	No Att. Req.	0	
360	1.64	2.42	1.65	9.16	No Att. Req.	0	
720	1.09	1.61	1.10	9.16	No Att. Req.	0	
1440	0.70	1.02	0.70	9.16	No Att. Req.	0	
2880	0.42	0.62	0.42	9.16	No Att. Req.	0	
4320	0.30	0.45	0.31	9.16	No Att. Req.	0	

ATTENUATION TANK DESIGN OUTPUT

Concept sizing for 25,000 litre tank



SPECIFICATION

TOTAL STORAGE REQUIRED	2.566	m3	Select largest storage as per analysis	
TANK HEIGHT, Htank	2.6	m	Concept sizing for 25,000 litre tank	
TANK DIAMETER, Dtank	3.66	m	No. of Tanks	1
TANK AREA, Atank	10.52	m2	Area of ONE tank	
TANK MAX STORAGE VOLUME, Vtank	27354	litres		
REQUIRED STORAGE HEIGHT, Ddet	0.24	m	Below overflow	
DEAD STORAGE VOLUME, Dds	0.15	m	GD01 recommended minimum	
TOTAL WATER DEPTH REQUIRED	0.39	m		
SELECTED TANK OUTFLOW, Qout, l/s	0.00916	m3/s	Selected tank outflow	
AVERAGE HYDRAULIC HEAD, Hhy	0.12	m		
AREA OF ORIFICE, Aorifice	9.55E-03	m2		
ORIFICE DIAMETER, Dorifice	110	mm		
VELOCITY AT ORIFICE	2.19	m/s	At max. head level	

Project Ref:	C0455		**STORMWATER ATTENUATION TANK DESIGN**	geologix consulting engineers
Project Address:	26 TANEKAHA LANE, KERIKERI			
Design Case:	EXISTING DEVELOPMENT, LOT 4		**10 % AEP STORM EVENT, TO PERMITTED ACTIVITY THRESHOLD**	
Date:	5 June 2024	REV 1		

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

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

PERMITTED ACTIVITY (PA) CATCHMENT PARAMETERS				**POST DEVELOPMENT CATCHMENT PARAMETERS**			
ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION	ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
PA THRESHOLD	704.1	0.96	PA = 15% OF SITE	TO TANK	517	0.96	ROOF
IMPERVIOUS B	0	0		0	0	0	
IMPERVIOUS C	0	0		OFFSET	0	0	RoW - SEALED
EX. PERVIOUS	0	0	GARDEN (RESIDENTIAL	OFFSET	422	0.8	DRIVEWAY - SEALED
0	0	0		0	0	0	
TOTAL	**704.1**	TYPE C		**TOTAL**	**939**	TYPE C	

RAINFALL INTENSITY, 10% AEP, 10MIN DURATION

10 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	94.7	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.
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	20	%	
10 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	113.6	mm/hr	

PRE AND POST-DEVELOPMENT RUNOFF, 10%AEP WITH CC, VARIOUS DURATIONS

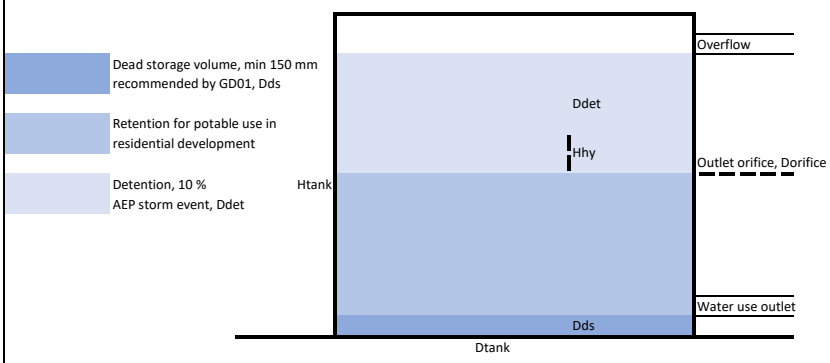
DURATION, min	INTENSITY, mm/hr	CC FACTOR	INTENSITY WITH CC, mm/hr	POST DEV RUNOFF, Qpost, l/s	PA RUNOFF, Qpa, l/s		COMMENTS
10	94.70	1.2	113.64	26.32	21.34		*Critical duration (time of concentration) for the catchments is 10min*
20	69.70	1.2	83.64	19.37	15.70		
30	58.10	1.2	69.72	16.15	13.09		
60	42.40	1.2	50.88	11.79	9.55		
120	30.50	1.2	36.60	8.48	6.87		
360	17.10	1.2	20.52	4.75	3.85		
720	11.40	1.2	13.68	3.17	2.57		
1440	7.27	1.2	8.72	2.02	1.64		
2880	4.40	1.2	5.28	1.22	0.99		
4320	3.19	1.2	3.83	0.89	0.72		

ATTENUATION ANALYSIS, VARIOUS DURATIONS

DURATION, min	OFFSET FLOW, Qoff, l/s	TANK INFLOW , Qin, l/s	ALLOWABLE TANK OUTFLOW, Qpre - Qoff, l/s	SELECTED TANK OUTFLOW, Qout, l/s	DIFFERENCE (Qin - Qout), l/s	Required Storage, litres	
10	10.66	15.67	10.68	10.68	4.99	2992	*select largest required storage , regardless of duration, to avoid overflow*
20	7.84	11.53	7.86	10.68	0.85	1021	
30	6.54	9.61	6.55	10.68	No Att. Req.	0	
60	4.77	7.01	4.78	10.68	No Att. Req.	0	
120	3.43	5.05	3.44	10.68	No Att. Req.	0	
360	1.92	2.83	1.93	10.68	No Att. Req.	0	
720	1.28	1.89	1.29	10.68	No Att. Req.	0	
1440	0.82	1.20	0.82	10.68	No Att. Req.	0	
2880	0.50	0.73	0.50	10.68	No Att. Req.	0	
4320	0.36	0.53	0.36	10.68	No Att. Req.	0	

ATTENUATION TANK DESIGN OUTPUT

Concept sizing for 25,000 litre tank



SPECIFICATION

TOTAL STORAGE REQUIRED	2.992	m3	Select largest storage as per analysis	
TANK HEIGHT, Htank	2.6	m	Concept sizing for 25,000 litre tank	
TANK DIAMETER, Dtank	3.66	m	No. of Tanks	1
TANK AREA, Atank	10.52	m2	Area of ONE tank	
TANK MAX STORAGE VOLUME, Vtank	27354	litres		
REQUIRED STORAGE HEIGHT, Ddet	0.28	m	Below overflow	
DEAD STORAGE VOLUME, Dds	0.15	m	GD01 recommended minimum	
TOTAL WATER DEPTH REQUIRED	0.43	m		
SELECTED TANK OUTFLOW, Qout, l/s	0.01068	m3/s	Selected tank outflow	
AVERAGE HYDRAULIC HEAD, Hhy	0.14	m		
AREA OF ORIFICE, Aorifice	1.03E-02	m2		
ORIFICE DIAMETER, Dorifice	115	mm		
VELOCITY AT ORIFICE	2.36	m/s	At max. head level	

Project Ref:	C0455		**STORMWATER ATTENUATION TANK DESIGN**	geologix consulting engineers
Project Address:	26 TANEKAHA LANE, KERIKERI			
Design Case:	EXISTING DEVELOPMENT, LOT 4		**1 % AEP STORM EVENT, TO PERMITTED ACTIVITY THRESHOLD**	
Date:	5 June 2024	REV 1		

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

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

PERMITTED ACTIVITY (PA) CATCHMENT PARAMETERS				**POST DEVELOPMENT CATCHMENT PARAMETERS**			
ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION	ITEM	AREA, A, m2	COEFFICIENT, C	DESCRIPTION
PA THRESHOLD	704.1	0.96	PA = 15% OF SITE	TO TANK	517	0.96	ROOF
IMPERVIOUS B	0	0		0	0	0	
IMPERVIOUS C	0	0		OFFSET	0	0	RoW - SEALED
EX. PERVIOUS	0	0	GARDEN (RESIDENTIAL	OFFSET	422	0.8	DRIVEWAY - SEALED
0	0	0		0	0	0	
TOTAL	**704.1**	TYPE C		**TOTAL**	**939**	TYPE C	

RAINFALL INTENSITY, 1% AEP, 10MIN DURATION

1 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	141.0	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.
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	20	%	
1 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	169.2	mm/hr	

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

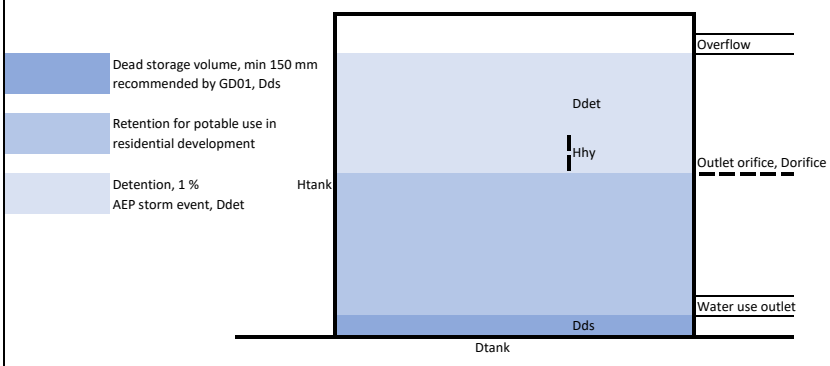
DURATION, min	INTENSITY, mm/hr	CC FACTOR	INTENSITY WITH CC, mm/hr	POST DEV RUNOFF, Qpost, l/s	PA RUNOFF, Qpa, l/s		COMMENTS
10	141.00	1.2	169.20	39.19	31.77		*Critical duration (time of concentration) for the catchments is 10min*
20	104.00	1.2	124.80	28.91	23.43		
30	87.10	1.2	104.52	24.21	19.62		
60	63.80	1.2	76.56	17.73	14.37		
120	46.00	1.2	55.20	12.79	10.36		
360	26.00	1.2	31.20	7.23	5.86		
720	17.40	1.2	20.88	4.84	3.92		
1440	11.10	1.2	13.32	3.09	2.50		
2880	6.75	1.2	8.10	1.88	1.52		
4320	4.91	1.2	5.89	1.36	1.11		

ATTENUATION ANALYSIS, VARIOUS DURATIONS

DURATION, min	OFFSET FLOW, Qoff, l/s	TANK INFLOW , Qin, l/s	ALLOWABLE TANK OUTFLOW, Qpre - Qoff, l/s	SELECTED TANK OUTFLOW, Qout, l/s	DIFFERENCE (Qin - Qout), l/s	Required Storage, litres	
10	15.87	23.33	15.90	15.90	7.43	4455	*select largest required storage , regardless of duration, to avoid overflow*
20	11.70	17.21	11.73	15.90	1.30	1565	
30	9.80	14.41	9.82	15.90	No Att. Req.	0	
60	7.18	10.56	7.20	15.90	No Att. Req.	0	
120	5.18	7.61	5.19	15.90	No Att. Req.	0	
360	2.93	4.30	2.93	15.90	No Att. Req.	0	
720	1.96	2.88	1.96	15.90	No Att. Req.	0	
1440	1.25	1.84	1.25	15.90	No Att. Req.	0	
2880	0.76	1.12	0.76	15.90	No Att. Req.	0	
4320	0.55	0.81	0.55	15.90	No Att. Req.	0	

ATTENUATION TANK DESIGN OUTPUT

Concept sizing for 25,000 litre tank



SPECIFICATION

TOTAL STORAGE REQUIRED	4.455	m3	Select largest storage as per analysis	
TANK HEIGHT, Htank	2.6	m	Concept sizing for 25,000 litre tank	
TANK DIAMETER, Dtank	3.66	m	No. of Tanks	1
TANK AREA, Atank	10.52	m2	Area of ONE tank	
TANK MAX STORAGE VOLUME, Vtank	27354	litres		
REQUIRED STORAGE HEIGHT, Ddet	0.42	m	Below overflow	
DEAD STORAGE VOLUME, Dds	0.15	m	GD01 recommended minimum	
TOTAL WATER DEPTH REQUIRED	0.57	m		
SELECTED TANK OUTFLOW, Qout, l/s	0.01590	m3/s	Selected tank outflow	
AVERAGE HYDRAULIC HEAD, Hhy	0.21	m		
AREA OF ORIFICE, Aorifice	1.26E-02	m2		
ORIFICE DIAMETER, Dorifice	127	mm		
VELOCITY AT ORIFICE	2.88	m/s	At max. head level	

HIRDS V4 Intensity-Duration-Frequency Results
Sitename: Kerikeri
Coordinate system: WGS84
Longitude: 173.9304
Latitude: -35.1959

DDF Mode Parameters:	c	d	e	f	g	h	i
Values:	0.00223873	0.5306876	-0.0158656	-0.00398527	0.25389346	-0.0117081	3.2352587

Example:	Duration (hrs)	ARI (yrs)	x	y	Rainfall Rate (mm/hr)
	24	100	3.17805383	4.60014923	11.11740696

Rainfall intensities (mm/hr) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	57.3	41.9	34.9	25.4	18.2	10.2	6.75	4.3	2.6	1.9	1.5	1.21
2	0.5	62.7	46	38.3	27.8	19.9	11.2	7.41	4.7	2.8	2.1	1.6	1.33
5	0.2	81.2	59.6	49.7	36.2	26	14.6	9.71	6.2	3.7	2.7	2.1	1.75
10	0.1	94.7	69.7	58.1	42.4	30.5	17.1	11.4	7.3	4.4	3.2	2.5	2.06
20	0.05	109	79.9	66.7	48.7	35	19.8	13.2	8.4	5.1	3.7	2.9	2.39
30	0.033	117	86	71.8	52.5	37.8	21.3	14.2	9.1	5.5	4	3.1	2.58
40	0.025	123	90.3	75.5	55.2	39.7	22.4	15	9.6	5.8	4.2	3.3	2.72
50	0.02	127	93.7	78.3	57.3	41.2	23.3	15.6	9.9	6	4.4	3.4	2.83
60	0.017	131	96.4	80.6	59	42.5	24	16	10	6.2	4.5	3.6	2.92
80	0.013	137	101	84.3	61.7	44.5	25.1	16.8	11	6.5	4.7	3.7	3.07
100	0.01	141	104	87.1	63.8	46	26	17.4	11	6.8	4.9	3.9	3.18
250	0.004	159	118	98.5	72.2	52.2	29.6	19.8	13	7.7	5.6	4.4	3.64

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	5.3	3.5	2.7	1.8	1.3	0.8	0.55	0.4	0.2	0.2	0	0.07
2	0.5	5.9	3.7	2.9	1.9	1.4	0.88	0.6	0.5	0.3	0.2	0	0.08
5	0.2	8.8	5.6	4.6	2.9	2.1	1.3	0.85	0.6	0.4	0.2	0.1	0.12
10	0.1	12	7.9	6.7	3.9	2.9	1.7	1.1	0.8	0.4	0.3	0.1	0.16
20	0.05	15	11	9.3	5.4	4.1	2.4	1.6	0.9	0.5	0.4	0.2	0.21
30	0.033	18	13	11	6.5	4.9	2.8	1.9	1.1	0.6	0.4	0.2	0.24
40	0.025	20	15	13	7.4	5.6	3.2	2.2	1.2	0.7	0.5	0.3	0.27
50	0.02	22	16	14	8.2	6.2	3.6	2.4	1.2	0.7	0.5	0.3	0.29
60	0.017	24	17	15	8.9	6.8	3.9	2.6	1.3	0.8	0.6	0.3	0.31
80	0.013	26	20	17	10	7.7	4.4	3	1.4	0.8	0.6	0.4	0.34
100	0.01	28	22	19	11	8.4	4.8	3.3	1.5	0.9	0.7	0.4	0.37
250	0.004	39	31	27	16	12	7.1	5	2	1.2	0.9	0.6	0.51

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	61.3	44.9	37.4	27.2	19.4	10.7	7.07	4.5	2.7	1.9	1.5	1.24
2	0.5	67.2	49.3	41	29.9	21.3	11.8	7.79	4.9	2.9	2.1	1.7	1.36
5	0.2	87.3	64.1	53.5	39	27.9	15.5	10.2	6.5	3.9	2.8	2.2	1.8
10	0.1	102	75	62.6	45.7	32.7	18.2	12	7.6	4.6	3.3	2.6	2.13
20	0.05	117	86.1	72	52.5	37.7	21	13.9	8.8	5.3	3.8	3	2.47
30	0.033	126	92.7	77.5	56.6	40.6	22.7	15	9.5	5.7	4.2	3.3	2.67
40	0.025	132	97.4	81.4	59.5	42.7	23.9	15.8	10	6	4.4	3.4	2.82
50	0.02	137	101	84.5	61.8	44.4	24.9	16.5	10	6.3	4.6	3.6	2.93
60	0.017	141	104	87.1	63.7	45.7	25.6	17	11	6.5	4.7	3.7	3.03
80	0.013	148	109	91.1	66.6	47.9	26.8	17.8	11	6.8	4.9	3.9	3.18
100	0.01	152	113	94.1	68.9	49.5	27.8	18.4	12	7.1	5.1	4	3.29
250	0.004	172	127	106	78	56.2	31.6	21	13	8.1	5.8	4.6	3.77

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	61.3	44.9	37.4	27.2	19.4	10.7	7.07	4.5	2.7	1.9	1.5	1.24
2	0.5	67.2	49.3	41	29.9	21.3	11.8	7.79	4.9	2.9	2.1	1.7	1.36
5	0.2	87.3	64.1	53.5	39	27.9	15.5	10.2	6.5	3.9	2.8	2.2	1.8
10	0.1	102	75	62.6	45.7	32.7	18.2	12	7.6	4.6	3.3	2.6	2.13
20	0.05	117	86.1	72	52.5	37.7	21	13.9	8.8	5.3	3.8	3	2.47
30	0.033	126	92.7	77.5	56.6	40.6	22.7	15	9.5	5.7	4.2	3.3	2.67
40	0.025	132	97.4	81.4	59.5	42.7	23.9	15.8	10	6	4.4	3.4	2.82
50	0.02	137	101	84.5	61.8	44.4	24.9	16.5	10	6.3	4.6	3.6	2.93
60	0.017	141	104	87.1	63.7	45.7	25.6	17	11	6.5	4.7	3.7	3.03
80	0.013	148	109	91.1	66.6	47.9	26.8	17.8	11	6.8	4.9	3.9	3.18
100	0.01	152	113	94.1	68.9	49.5	27.8	18.4	12	7.1	5.1	4	3.29
250	0.004	172	127	106	78	56.2	31.6	21	13	8.1	5.8	4.6	3.77

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	62.3	45.6	38	27.6	19.7	10.9	7.15	4.5	2.7	1.9	1.5	1.25
2	0.5	68.3	50.1	41.7	30.4	21.7	12	7.88	5	3	2.1	1.7	1.37
5	0.2	88.9	65.3	54.4	39.7	28.4	15.7	10.4	6.5	3.9	2.8	2.2	1.82
10	0.1	104	76.4	63.8	46.5	33.3	18.5	12.2	7.7	4.6	3.3	2.6	2.15
20	0.05	119	87.7	73.3	53.5	38.4	21.4	14.1	8.9	5.4	3.9	3	2.49
30	0.033	128	94.5	78.9	57.7	41.4	23.1	15.2	9.6	5.8	4.2	3.3	2.7
40	0.025	135	99.2	83	60.6	43.5	24.3	16.1	10	6.1	4.4	3.5	2.84
50	0.02	140	103	86.1	63	45.2	25.3	16.7	11	6.4	4.6	3.6	2.96
60	0.017	144	106	88.7	64.9	46.6	26	17.2	11	6.6	4.8	3.7	3.05
80	0.013	150	111	92.8	67.9	48.8	27.3	18	11	6.9	5	3.9	3.21
100	0.01	155	115	95.9	70.2	50.4	28.2	18.7	12	7.1	5.2	4.1	3.32
250	0.004	175	130	108	79.5	57.2	32.1	21.3	14	8.1	5.9	4.6	3.8

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	65.5	48	40	29.1	20.6	11.3	7.4	4.7	2.8	2	1.6	1.27
2	0.5	71.9	52.7	43.9	32	22.8	12.5	8.18	5.1	3.1	2.2	1.7	1.4
5	0.2	93.7	68.8	57.4	41.8	29.9	16.5	10.8	6.8	4	2.9	2.3	1.86
10	0.1	110	80.7	67.4	49.1	35.1	19.4	12.7	8	4.8	3.4	2.7	2.2
20	0.05	126	92.7	77.5	56.6	40.5	22.4	14.7	9.2	5.5	4	3.1	2.55
30	0.033	136	99.9	83.5	61	43.7	24.2	15.9	10	6	4.3	3.4	2.77
40	0.025	142	105	87.7	64.1	45.9	25.5	16.8	11	6.3	4.6	3.6	2.92
50	0.02	148	109	91.1	66.6	47.7	26.5	17.4	11	6.6	4.7	3.7	3.04
60	0.017	152	112	93.8	68.6	49.2	27.3	18	11	6.8	4.9	3.8	3.14
80	0.013	159	117	98.2	71.8	51.5	28.6	18.8	12	7.1	5.1	4	3.29
100	0.01	164	121	101	74.3	53.3	29.6	19.5	12	7.4	5.3	4.2	3.42
250	0.004	185	137	115	84.1	60.4	33.7	22.2	14	8.4	6.1	4.8	3.91

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	61.9	45.3	37.8	27.5	19.6	10.8	7.12	4.5	2.7	1.9	1.5	1.24
2	0.5	67.9	49.8	41.5	30.2	21.5	11.9	7.84	4.9	3	2.1	1.7	1.37
5	0.2	88.2	64.8	54	39.4	28.2	15.6	10.3	6.5	3.9	2.8	2.2	1.81
10	0.1	103	75.9	63.3	46.2	33.1	18.4	12.1	7.7	4.6	3.3	2.6	2.14
20	0.05	118	87.1	72.8	53.1	38.1	21.2	14	8.9	5.3	3.9	3	2.48
30	0.033	127	93.8	78.4	57.3	41.1	22.9	15.2	9.6	5.8	4.2	3.3	2.69
40	0.025	134	98.5	82.3	60.2	43.2	24.2	16	10	6.1	4.4	3.5	2.83
50	0.02	139	102	85.5	62.5	44.9	25.1	16.6	11	6.3	4.6	3.6	2.95
60	0.017	143	105	88	64.4	46.2	25.9	17.1	11	6.5	4.7	3.7	3.04
80	0.013	149	110	92.1	67.4	48.4	27.1	17.9	11	6.9	5	3.9	3.2
100	0.01	154	114	95.2	69.7	50.1	28.1	18.6	12	7.1	5.1	4	3.31
250	0.004	174	129	108	78.9	56.8	31.9	21.2	13	8.1	5.9	4.6	3.79

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	68.4	50.1	41.7	30.3	21.5	11.7	7.63	4.8	2.8	2	1.6	1.29
2	0.5	75.2	55.1	45.9	33.4	23.8	13	8.44	5.3	3.1	2.2	1.8	1.43
5	0.2	98.1	72	60.1	43.8	31.2	17.1	11.2	7	4.1	3	2.3	1.9
10	0.1	115	84.5	70.6	51.5	36.7	20.2	13.2	8.2	4.9	3.5	2.8	2.25
20	0.05	132	97.2	81.2	59.3	42.3	23.3	15.2	9.5	5.7	4.1	3.2	2.61
30	0.033	142	105	87.5	63.9	45.7	25.2	16.5	10	6.2	4.4	3.5	2.83
40	0.025	149	110	92	67.2	48.1	26.6	17.4	11	6.5	4.7	3.7	2.99
50	0.02	155	114	95.5	69.9	50	27.6	18.1	11	6.8	4.9	3.8	3.11
60	0.017	160	118	98.4	72	51.5	28.5	18.6	12	7	5	3.9	3.21
80	0.013	167	123	103	75.4	54	29.8	19.5	12	7.3	5.3	4.1	3.37
100	0.01	172	127	106	77.9	55.8	30.9	20.2	13	7.6	5.5	4.3	3.5
250	0.004	195	144	120	88.2	63.3	35.1	23.1	15	8.7	6.2	4.9	4

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	63.1	46.2	38.5	28	19.9	11	7.21	4.5	2.7	2	1.5	1.25
2	0.5	69.2	50.7	42.3	30.7	21.9	12.1	7.95	5	3	2.2	1.7	1.38
5	0.2	90	66.1	55.1	40.2	28.7	15.9	10.5	6.6	3.9	2.9	2.2	1.83
10	0.1	105	77.4	64.6	47.1	33.7	18.7	12.3	7.8	4.7	3.4	2.6	2.16
20	0.05	121	88.9	74.3	54.2	38.9	21.6	14.2	9	5.4	3.9	3.1	2.5
30	0.033	130	95.7	80	58.5	41.9	23.3	15.4	9.7	5.8	4.2	3.3	2.71
40	0.025	137	101	84.1	61.5	44.1	24.6	16.2	10	6.2	4.5	3.5	2.86
50	0.02	142	104	87.3	63.8	45.8	25.5	16.9	11	6.4	4.6	3.6	2.98
60	0.017	146	108	89.9	65.7	47.2	26.3	17.4	11	6.6	4.8	3.7	3.07
80	0.013	152	112	94	68.8	49.4	27.6	18.2	12	6.9	5	3.9	3.23
100	0.01	157	116	97.2	71.2	51.1	28.6	18.9	12	7.2	5.2	4.1	3.35
250	0.004	178	131	110	80.6	58	32.5	21.5	14	8.2	5.9	4.7	3.83

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	74.8	54.8	45.7	33.2	23.4	12.6	8.14	5.1	3	2.1	1.6	1.35
2	0.5	82.4	60.4	50.3	36.6	26	14	9.04	5.6	3.3	2.4	1.8	1.49
5	0.2	108	79.3	66.1	48.2	34.2	18.6	12	7.4	4.4	3.1	2.4	1.99
10	0.1	127	93.2	77.8	56.7	40.4	21.9	14.2	8.8	5.2	3.7	2.9	2.37
20	0.05	146	107	89.6	65.4	46.6	25.4	16.5	10	6	4.3	3.4	2.74
30	0.033	157	116	96.6	70.6	50.3	27.5	17.8	11	6.5	4.7	3.7	2.98
40	0.025	165	122	102	74.2	52.9	29	18.8	12	6.9	4.9	3.9	3.15
50	0.02	171	126	106	77.2	55.1	30.1	19.5	12	7.2	5.1	4	3.27
60	0.017	176	130	109	79.5	56.7	31.1	20.2	13	7.4	5.3	4.1	3.38
80	0.013	185	136	114	83.3	59.5	32.5	21.1	13	7.8	5.6	4.3	3.55
100	0.01	191	141	118	86.2	61.5	33.7	21.9	14	8.1	5.8	4.5	3.68
250	0.004	215	159	133	97.6	69.8	38.4	25	16	9.2	6.6	5.2	4.21

HIRDS V4 Depth-Duration-Frequency Results
Sitename: 26 Tanekaha Lane Kerikeri
Coordinate system: WGS84
Longitude: 173.9304
Latitude: -35.1959
DDF Model

Parameters:	c	d	e	f	g	h	i
Values:	0.00223873	0.5306876	-0.0158656	-0.00398527	0.25389346	-0.0117081	3.23526
Example:	Duration (hrs)	ARI (yrs)	x	y	Rainfall Depth (mm)		
	24	100	3.17805383	4.60014923	266.817767		

Rainfall depths (mm) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.54	14	17.5	25.4	36.4	61.1	81	103	124	135	141	145
2	0.5	10.4	15.3	19.1	27.8	39.9	67	89	113	136	148	155	159
5	0.2	13.5	19.9	24.9	36.2	52	87.6	116	148	179	195	204	210
10	0.1	15.8	23.2	29.1	42.4	60.9	103	137	174	211	230	241	247
20	0.05	18.1	26.6	33.4	48.7	70.1	119	158	201	244	266	278	286
30	0.033	19.5	28.7	35.9	52.5	75.5	128	171	218	264	287	301	310
40	0.025	20.4	30.1	37.7	55.2	79.4	135	180	229	278	303	318	327
50	0.02	21.2	31.2	39.2	57.3	82.5	140	187	238	289	315	330	340
60	0.017	21.8	32.1	40.3	59	85	144	192	246	298	325	341	351
80	0.013	22.8	33.6	42.1	61.7	88.9	151	202	258	313	341	358	368
100	0.01	23.5	34.7	43.6	63.8	92	156	209	267	324	353	371	382
250	0.004	26.5	39.2	49.3	72.2	104	178	238	304	370	404	424	437

Depth standard error (mm) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	0.9	1.2	1.3	1.8	2.6	4.7	6.6	9.6	11	11	4.2	9.2
2	0.5	0.96	1.3	1.4	1.9	2.8	5.1	7.2	11	12	13	4.5	10
5	0.2	1.3	1.9	2.2	2.9	4.2	7.1	10	15	17	17	8.1	15
10	0.1	1.8	2.7	3.1	4	6	9.6	14	19	21	22	13	19
20	0.05	2.3	3.7	4.3	5.5	8.4	13	19	23	26	27	18	25
30	0.033	2.7	4.4	5.1	6.7	10	16	23	27	29	31	22	30
40	0.025	3	4.9	5.7	7.7	12	18	26	29	32	34	26	33
50	0.02	3.3	5.4	6.3	8.5	13	20	29	31	34	37	29	36
60	0.017	3.5	5.8	6.8	9.2	14	22	32	33	36	39	31	39
80	0.013	3.9	6.4	7.6	11	16	25	36	37	40	43	35	43
100	0.01	4.3	7	8.3	12	17	28	40	39	43	46	38	47
250	0.004	6	9.8	12	17	25	41	61	52	57	61	55	65

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	10.2	15	18.7	27.2	38.8	64.4	84.8	107	128	139	145	149
2	0.5	11.2	16.4	20.5	29.9	42.6	70.9	93.4	118	141	153	160	164
5	0.2	14.6	21.4	26.7	39	55.8	93	123	155	186	202	211	216
10	0.1	17	25	31.3	45.7	65.5	109	145	183	220	238	249	256
20	0.05	19.5	28.7	36	52.5	75.4	126	167	211	254	276	289	296
30	0.033	21	30.9	38.7	56.6	81.3	136	180	228	275	299	312	321
40	0.025	22	32.5	40.7	59.5	85.5	144	190	241	290	315	329	338
50	0.02	22.9	33.7	42.3	61.8	88.8	149	198	250	302	328	343	352
60	0.017	23.5	34.7	43.5	63.7	91.5	154	204	258	311	338	354	363
80	0.013	24.6	36.3	45.5	66.6	95.8	161	213	271	327	355	371	381
100	0.01	25.4	37.5	47.1	68.9	99.1	167	221	280	338	368	385	395
250	0.004	28.7	42.4	53.2	78	112	190	252	320	386	420	440	452

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	10.2	15	18.7	27.2	38.8	64.4	84.8	107	128	139	145	149
2	0.5	11.2	16.4	20.5	29.9	42.6	70.9	93.4	118	141	153	160	164
5	0.2	14.6	21.4	26.7	39	55.8	93	123	155	186	202	211	216
10	0.1	17	25	31.3	45.7	65.5	109	145	183	220	238	249	256
20	0.05	19.5	28.7	36	52.5	75.4	126	167	211	254	276	289	296
30	0.033	21	30.9	38.7	56.6	81.3	136	180	228	275	299	312	321
40	0.025	22	32.5	40.7	59.5	85.5	144	190	241	290	315	329	338
50	0.02	22.9	33.7	42.3	61.8	88.8	149	198	250	302	328	343	352
60	0.017	23.5	34.7	43.5	63.7	91.5	154	204	258	311	338	354	363
80	0.013	24.6	36.3	45.5	66.6	95.8	161	213	271	327	355	371	381
100	0.01	25.4	37.5	47.1	68.9	99.1	167	221	280	338	368	385	395
250	0.004	28.7	42.4	53.2	78	112	190	252	320	386	420	440	452

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	10.4	15.2	19	27.6	39.4	65.3	85.8	108	129	140	146	149
2	0.5	11.4	16.7	20.9	30.4	43.3	71.9	94.6	119	143	154	161	165
5	0.2	14.8	21.8	27.2	39.7	56.7	94.4	124	157	188	204	213	218
10	0.1	17.3	25.5	31.9	46.5	66.6	111	147	185	222	241	251	258
20	0.05	19.9	29.2	36.6	53.5	76.7	128	169	214	257	279	291	299
30	0.033	21.4	31.5	39.5	57.7	82.7	138	183	231	278	302	315	323
40	0.025	22.5	33.1	41.5	60.6	87	146	193	244	293	318	332	341
50	0.02	23.3	34.3	43.1	63	90.4	152	200	253	305	331	346	355
60	0.017	24	35.4	44.3	64.9	93.2	156	207	261	315	342	357	367
80	0.013	25.1	37	46.4	67.9	97.5	164	216	274	330	358	375	385
100	0.01	25.9	38.2	47.9	70.2	101	169	224	284	342	371	388	399
250	0.004	29.2	43.2	54.2	79.5	114	193	255	324	390	424	444	456

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	10.9	16	20	29.1	41.3	68	88.8	112	133	143	149	153
2	0.5	12	17.6	22	32	45.5	75	98.1	123	146	158	165	168
5	0.2	15.6	22.9	28.7	41.8	59.7	98.7	129	162	194	209	218	223
10	0.1	18.3	26.9	33.7	49.1	70.2	116	153	192	229	248	258	265
20	0.05	21	30.9	38.7	56.6	80.9	134	176	221	265	287	299	307
30	0.033	22.6	33.3	41.7	61	87.3	145	191	240	287	311	324	332
40	0.025	23.7	35	43.9	64.1	91.8	153	201	253	303	328	342	351
50	0.02	24.6	36.3	45.5	66.6	95.5	159	209	263	315	341	356	365
60	0.017	25.4	37.4	46.9	68.6	98.3	164	216	271	325	352	367	376
80	0.013	26.5	39.1	49.1	71.8	103	172	226	284	341	369	385	395
100	0.01	27.4	40.4	50.7	74.3	107	178	234	295	353	383	400	410
250	0.004	30.9	45.7	57.4	84.1	121	202	267	336	403	437	457	469

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	10.3	15.1	18.9	27.5	39.1	65	85.4	108	129	139	145	149
2	0.5	11.3	16.6	20.7	30.2	43.1	71.5	94.1	119	142	154	160	164
5	0.2	14.7	21.6	27	39.4	56.3	93.9	124	156	187	203	212	217
10	0.1	17.2	25.3	31.7	46.2	66.1	110	146	184	221	240	250	257
20	0.05	19.7	29	36.4	53.1	76.2	127	168	213	256	278	290	298
30	0.033	21.2	31.3	39.2	57.3	82.2	138	182	230	277	300	314	322
40	0.025	22.3	32.8	41.2	60.2	86.4	145	192	242	292	317	331	340
50	0.02	23.1	34.1	42.7	62.5	89.8	151	199	252	304	330	345	354
60	0.017	23.8	35.1	44	64.4	92.5	155	205	260	313	340	356	365
80	0.013	24.9	36.7	46	67.4	96.8	163	215	273	329	357	373	383
100	0.01	25.7	37.9	47.6	69.7	100	168	223	282	341	370	387	397
250	0.004	29	42.9	53.8	78.9	114	191	254	322	389	423	442	455

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	11.4	16.7	20.9	30.3	43	70.4	91.5	115	136	146	152	155
2	0.5	12.5	18.4	23	33.4	47.5	77.7	101	126	150	161	168	172
5	0.2	16.4	24	30	43.8	62.4	103	134	167	199	214	223	228
10	0.1	19.2	28.2	35.3	51.5	73.4	121	158	197	235	254	264	270
20	0.05	22	32.4	40.6	59.3	84.7	140	183	228	273	294	307	314
30	0.033	23.7	34.9	43.8	63.9	91.4	151	198	247	295	319	332	340
40	0.025	24.9	36.7	46	67.2	96.1	159	209	261	311	336	350	359
50	0.02	25.8	38.1	47.8	69.9	100	166	217	271	324	350	365	373
60	0.017	26.6	39.2	49.2	72	103	171	224	280	334	362	377	385
80	0.013	27.8	41	51.5	75.4	108	179	234	293	351	379	395	405
100	0.01	28.7	42.4	53.2	77.9	112	185	243	304	364	393	410	420
250	0.004	32.4	47.9	60.2	88.2	127	211	277	347	415	449	469	480

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	10.5	15.4	19.2	28	39.8	65.9	86.5	109	130	140	146	150
2	0.5	11.5	16.9	21.1	30.7	43.9	72.6	95.4	120	143	155	162	166
5	0.2	15	22	27.6	40.2	57.4	95.4	126	158	189	205	214	219
10	0.1	17.5	25.8	32.3	47.1	67.5	112	148	186	224	242	253	259
20	0.05	20.1	29.6	37.1	54.2	77.7	130	171	216	259	281	293	301
30	0.033	21.7	31.9	40	58.5	83.8	140	185	233	280	304	317	325
40	0.025	22.8	33.5	42	61.5	88.2	148	195	246	295	320	335	344
50	0.02	23.6	34.8	43.6	63.8	91.6	153	202	255	307	333	348	357
60	0.017	24.3	35.8	44.9	65.7	94.4	158	209	264	317	344	359	369
80	0.013	25.4	37.5	47	68.8	98.8	166	219	276	333	361	377	387
100	0.01	26.2	38.7	48.6	71.2	102	171	227	286	345	374	391	401
250	0.004	29.6	43.8	55	80.6	116	195	258	326	393	427	447	459

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	12.5	18.3	22.8	33.2	46.9	75.9	97.7	121	143	152	158	161
2	0.5	13.7	20.1	25.2	36.6	51.9	84	108	134	158	169	175	179
5	0.2	18	26.4	33.1	48.2	68.5	111	144	178	210	226	234	239
10	0.1	21.1	31.1	38.9	56.7	80.7	132	170	211	249	268	278	284
20	0.05	24.3	35.8	44.8	65.4	93.2	152	197	244	289	311	323	329
30	0.033	26.2	38.6	48.3	70.6	101	165	214	264	313	337	350	357
40	0.025	27.5	40.5	50.8	74.2	106	174	225	279	330	356	369	377
50	0.02	28.6	42.1	52.8	77.2	110	181	234	290	344	370	385	393
60	0.017	29.4	43.3	54.4	79.5	113	186	242	300	355	383	397	405
80	0.013	30.8	45.4	56.9	83.3	119	195	254	314	373	402	417	426
100	0.01	31.8	46.9	58.8	86.2	123	202	263	326	387	416	433	442
250	0.004	35.9	53	66.6	97.6	140	230	299	372	441	475	495	505

Project Ref:	C0455	STORMWATER DISPERSION PIPE/ TRENCH	geologix consulting engineers
Project Address:	26 Tanekaha Lane, Kerikeri		
Design Case:	DISPERSION DEVICE SIZING	DISCHARGE DEVICE - LEVEL SPREADER OR TRENCH	
Date:	5 June 2024 REV 1		

DESIGN BASED ON REFERENCED DEVELOPMENT PLANS TO PROVIDE A MINIMUM LENGTH OF ABOVE OR BELOW GROUND STORMWATER TANK OVERFLOW DISCHARGE DISPERSION DEVICE. IN GENERAL ACCORDANCE WITH MODIFIED RATIONAL METHOD AND AUCKLAND COUNCIL TR2013/018.

DESIGN STORM EVENT **1%** AEP EVENT

SLOPE BETWEEN SOURCE & DISPERSION DEVICE

ELEVATION	h	CHAINAGE, x	Δ x	h bar	Δ A
m	m	m	m	m	m2
77	0	0	0	0	0
77.3	0.3	6	6	0.15	0.9
	TOTALS	6	6		0.9
	SLOPE, Sc	0.050	m/m		

MANNINGS PIPE FLOW - INCOMING PIPE

Dia, m	d/D	α, rad	P, m	A, m^2	R	1:S	n	V, m/s	Q, m^3/s	Q, l/s	
0.15	0.000	6.283	0.0000	0.0000	0.000	20	0.009	0.000	0.0000	0.000	**0 % full**
0.150	0.050	5.381	0.0677	0.0003	0.005	20	0.0090	0.715	0.0002	0.236	
0.150	0.100	4.996	0.0965	0.0009	0.010	20	0.0090	1.117	0.0010	1.027	
0.150	0.150	4.692	0.1193	0.0017	0.014	20	0.0090	1.439	0.0024	2.391	
0.150	0.200	4.429	0.1391	0.0025	0.018	20	0.0090	1.712	0.0043	4.308	
0.150	0.250	4.189	0.1571	0.0035	0.022	20	0.0090	1.950	0.0067	6.738	
0.150	0.300	3.965	0.1739	0.0045	0.026	20	0.0090	2.160	0.0096	9.633	
0.150	0.350	3.751	0.1899	0.0055	0.029	20	0.0090	2.346	0.0129	12.934	
0.150	0.400	3.544	0.2054	0.0066	0.032	20	0.0090	2.511	0.0166	16.576	
0.150	0.450	3.342	0.2206	0.0077	0.035	20	0.0090	2.657	0.0205	20.489	
0.150	0.500	3.142	0.2356	0.0088	0.038	20	0.0090	2.784	0.0246	24.595	**50 % full**
0.150	0.550	2.941	0.2506	0.0100	0.040	20	0.0090	2.893	0.0288	28.811	
0.150	0.600	2.739	0.2658	0.0111	0.042	20	0.0090	2.985	0.0330	33.047	
0.150	0.650	2.532	0.2813	0.0122	0.043	20	0.0090	3.060	0.0372	37.207	
0.150	0.700	2.319	0.2973	0.0132	0.044	20	0.0090	3.117	0.0412	41.183	
0.150	0.750	2.094	0.3142	0.0142	0.045	20	0.0090	3.155	0.0449	44.854	
0.150	0.800	1.855	0.3321	0.0152	0.046	20	0.0090	3.173	0.0481	48.081	
0.150	0.850	1.591	0.3519	0.0160	0.045	20	0.0090	3.166	0.0507	50.686	
0.150	0.900	1.287	0.3747	0.0168	0.045	20	0.0090	3.130	0.0524	52.426	
0.150	0.950	0.902	0.4036	0.0173	0.043	20	0.0090	3.048	0.0529	52.854	
0.150	1.000	0.000	0.4712	0.0177	0.038	20	0.0090	2.784	0.0492	49.189	**Flowing full**

DISPERSION SPECIFICATION

INCOMING PIPE PROPERTIES:

TANK OUTFLOW, 1 % AEP	23.33	l/s		
MAXIMUM PIPE FLOW	52.85	l/s		**DESIGN OK**
SUFFICIENT CAPACITY IN PIPE	YES			
LONGITUDINAL SLOPE	0.050	m/m		
DESIGN VELOCITY, Dv	3.173	m/s		

LEVEL SPREADER SPECIFICATIONS:

PIPE DIAMETER, m	0.25	m
MANNINGS PIPE ROUGHNESS	0.009	
NUMBER OF ORIFICES	49	No.
DIA. OF ORIFICE, D	25	mm
ORIFICE INTERVALS, C/C	200	mm
DISPERSION PIPE LENGTH, L	**9.6**	**m**

ORIFICE DESIGN FLOW CHECK:

AREA OF SINGLE ORIFICE, A	0.00049	m2			
FLOW OUT OF 1 ORIFICE	0.000476613	m3/s	0.48	l/s	
FLOW OUT OF ALL ORIFICES	0.02335405	m3/s	23.35	l/s	**DESIGN OK**
VELOCITY FROM SINGLE ORIFICE	0.97	m/s			

BROAD CRESTED WEIR DESIGN FLOW CHECK:

FLOW DEPTH, h	0.125	m			
BASE WIDTH = L	9.6	m			
FLOW AREA	1.20	m2			
WEIR FLOW	0.03499	m3/s	34.99	l/s	**DESIGN OK**
WEIR VELOCITY	0.029	m/s			

INCOMING PIPE & SPREADER SUMARY:

	LOT 1		LOT 3		LOT 4	
INCOMING PIPE DIAMETER, m	0.100	m	0.100	m	0.150	m
SPREADER PIPE DIAMETER, m	0.200	m	0.200	m	0.250	m
MANNINGS PIPE ROUGHNESS	0.009		0.009		0.009	
NUMBER OF ORIFICES	50	No.	50	No.	49	No.
DIA. OF ORIFICE, D	20	mm	20	mm	25	mm
ORIFICE INTERVALS, C/C	200	mm	200	mm	200	mm
DISPERSION PIPE LENGTH, L	**9.8**	**m**	**9.8**	**m**	**9.6**	**m**

Natalie Watson

From: RMA <RMA@doc.govt.nz>
Sent: Friday, 17 May 2024 11:54 am
To: Natalie Watson
Subject: RE: Messenger Gold Ltd Subdivisions and Boundary Adjustment at 26 Tanekaha Lane, Kerikeri

Kia Ora Natalie,

Your request for comments on the Resource Consent application from Messenger Gold Ltd was sent to RMA@doc.govt.nz with DOC reference RC3240.

The RMA team considered there are **no comments** regarding the proposal as described on 16th May 2024.

Thank you for your consideration for best interests of the Department.

If you have any questions regarding this email, please contact RMA@doc.govt.nz using the DOC reference number.

Ngā mihi

Trix Heigan
Statutory Process Team - RMA
Department of Conservation | Te Papa Atawhai

www.doc.govt.nz

Department of Conservation
Te Papa Atawhai

From: Natalie Watson <nat@saps.co.nz>
Sent: Wednesday, May 15, 2024 2:53 PM
To: RMA <RMA@doc.govt.nz>
Subject: Messenger Gold Ltd Subdivisions and Boundary Adjustment at 26 Tanekaha Lane, Kerikeri

Good afternoon,

On behalf of our client, Messenger Gold Ltd, I write to ask whether the Department of Conservation has any comment to make with respect to their proposed subdivisions and boundary adjustment.

The three proposals can be described as:

- Subdivision of Lot 1 DP 199962 to create one additional allotment (Lot 1: 4027m² and Lot 2: 7.3573ha)
- Subdivision of Lot 2 DP 199962 to create two additional allotments (Lot 3: 8500m², Lot 4: 4694m² and Lot 5: 9.2505ha)
- Boundary adjustment between balance lots (Lots 2 & 5) of the above two subdivisions to match the planting alignments of the horticultural crops.

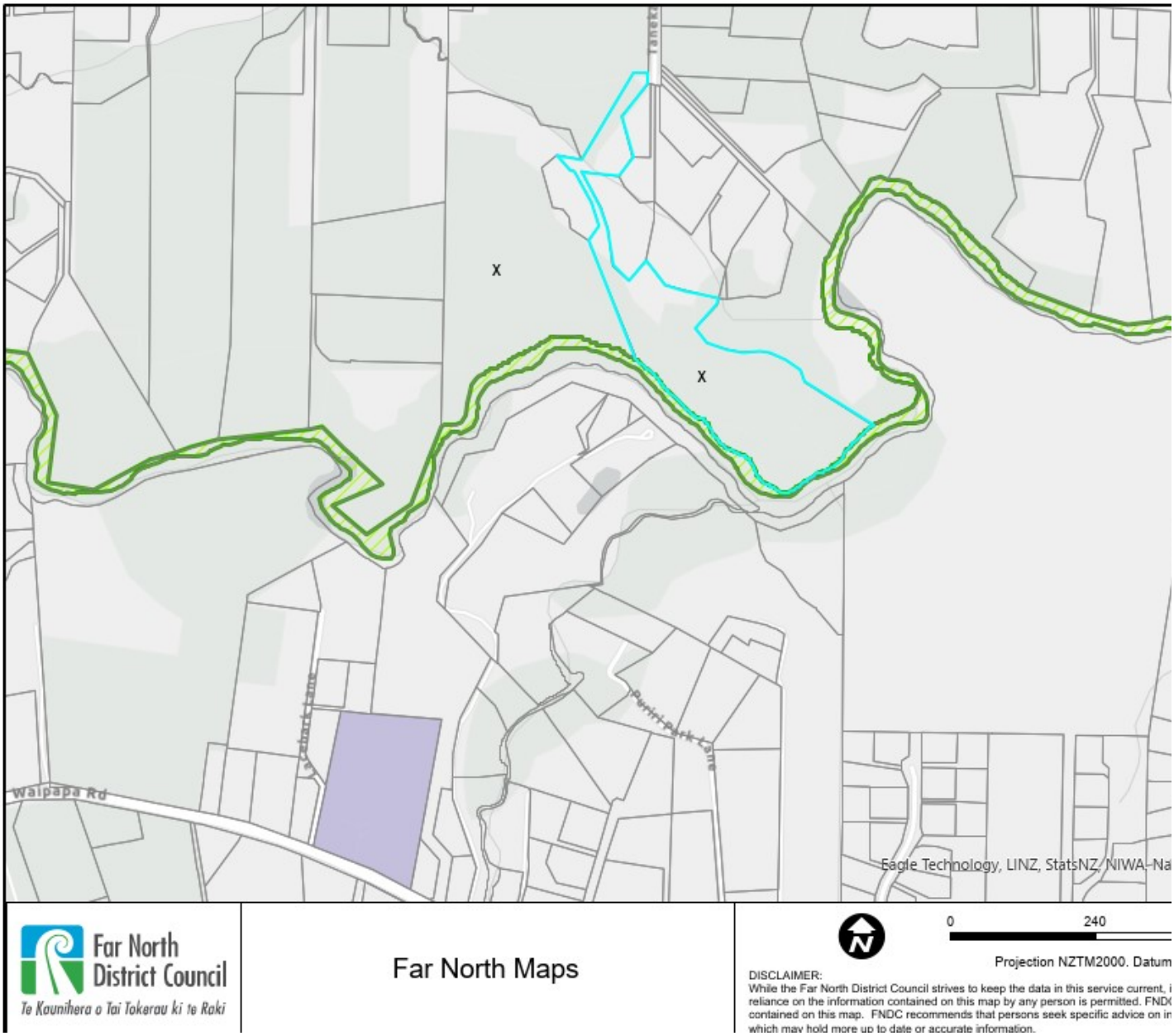
I have marked the application sites with an x on the image below. The subject sites are adjacent to a crown owned Marginal Strip, which separates the land from Waipapa Stream. I don't anticipate any adverse effects on the ability of the Department of Conservation to manage or administer this land as a result of the proposed subdivision.

The site is within a 'kiwi present' mapped habitat area (Far North Maps). Suitable conditions have been proposed to manage the keeping of animals that have the potential to be kiwi predators, in accordance with Far North District Council's standard wording / policy (i.e. kept under control, fenced off or indoors at night etc).

There are no mapped PNAs over this land.

Please get in touch if you have any queries.

Kind regards,
Natalie Watson



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