23rd August 2024

District Services – Resource Consents
Far North District Council
Private Bag 752
Kaikohe 0440

Attention Team Leader Resource Consents

RESOURCE CONSENT APPLICATION BY GRAEME BELL FOR A PROPOSED SUBDIVISION BEING LOCATED AT 165 TAIPA HEIGHTS DRIVE, TAIPA.

Zenith Planning Consultants have been engaged by Graeme Bell to prepare a subdivision resource consent application for a property at 165 Taipa Heights Drive, Taipa.

I have attached the following information in support of the application:

- Completed Application Form
- Planning Report and Assessment of Effects
- Scheme Plan
- Engineering reports
- Current Certificate of Title and Legal Instruments

The applicant has paid the Council's estimated fees of $2967.00 using the reference G Bell via internet banking.

Should you have any queries in respect to this application please contact me.

Yours faithfully

Wayne Smith
Zenith Planning Consultants Ltd
Principal | Director
BPlan | BSocSci | MNZPI
wayne@zenithplanning.co.nz
mob: +64 (0) 21 202 3898

Far North District Council

Office Use Only
Application Number:

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Website: www.fndc.govt.nz

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? 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? No

4. Applicant Details:

Name/s: Graeme Bell _____

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

Phone Numbers:

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

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

Name/s: Zenith Planning Consultants Limited, Attention Wayne Smith

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

Phone Numbers:

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

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

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: Katherine Meadows, David Meadows, Maureen Bell and Michael Bell

Property Address/: Location 121 Devon Street, Hillcrest, Rotorua

7. Application Site Details:

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

Site Address/ Location: 165 Taipa Heights Drive, Taipa

Legal Description: Lot 1 Deposited Plan 190841 Val Number:

Certificate of Title: NA120C/707

Site Visit Requirements:

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

Is there a dog on the property? No

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

Access onto and around the property is unrestricted.

8. Description of the Proposal:

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

To subdivide Lot 1 DP 190841 to create three lots

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

9. Would you like to request Public Notification? No

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

O Building Consent (to be applied for)

O Regional Council Consent (see attached)

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)

O yes X 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).

X yes O no O don't know

X Subdividing land

X Changing the use of a piece of land

O 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) see separate sheet

Email: _____

Postal Address: _____

_____

_____ Post Code: _____

Phone Numbers: Work: _____ Home: _____ Fax: _____

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

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

Name: _____ (please print)

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

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: Wayne Smith _____(please print)

Signature:  (signature) Date: 23rd August 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) – Estimated fee of $2967 paid via online banking
- ✓ 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.

Digital Applications may be submitted via E- mail to: Planning.Support@fndc.govt.nz

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**

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) O 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). O yes O no O don't know

O Subdividing land

O Changing the use of a piece of land

O Disturbing, removing or sampling soil

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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) Graeme Bell

Email: [redacted]

Postal Address: [redacted]

Phone Numbers: [redacted]

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

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

Name: Graeme Bell (please print)

Signature: [redacted] (signature of bill payer – mandatory) Date: 1/8/24

ZENITH
Planning Consultants Ltd

Planning Report and Assessment of Effects

Proposed Subdivision Resource Consent

Graeme Bell

165 Taipa Heights Drive, Taipa

PLANNING REPORT AND ASSESSMENT OF EFFECTS

APPLICATION AND SITE DESCRIPTION

1.01 Zenith Planning Consultants have been engaged by Graeme Bell to prepare and lodge a subdivision resource consent for a property at 165 Taipa Heights Drive, Taipa.

1.02 The application seeks to create a total of three lots (two additional), all of which are vacant. The property is zoned Coastal Living under the Operative District Plan and Rural Lifestyle under the Proposed District Plan. There are no resource features or notations relevant under either plan which needs to be considered.

1.03 The proposal sees the following lot sizes

- Lot 1 – 8320m^2;
- Lot 2 – 8048m^2; and,
- Lot 3 of 2.42ha.

1.04 All lots will have frontage to Taipa Heights Drive, with proposed Lot 3 having an access leg which is located on the application site's northern boundary. Potential house sites for each lot are noted within the site suitability report prepared and included within the application. For the purposes of this application the house sites are not finalised.

1.05 There has been no recent subdivision of the application site and there have been no applications approved under the current Operative District Plan.

1.06 The application site is relatively flat adjacent to the road and then drops off steeply to the bulk of the site. The bulk of the property is of variable contour with scruffy pasture and vegetation. The land did not appear to have any stock present at the time of the site visit but is fenced for grazing. The site is arguably more suited to lifestyle properties as proposed especially given the landuse classification and site topography. There are mostly lifestyle properties located on Taipa Heights Drive and which exhibit similar characteristics to the application site with steep to undulating topography.

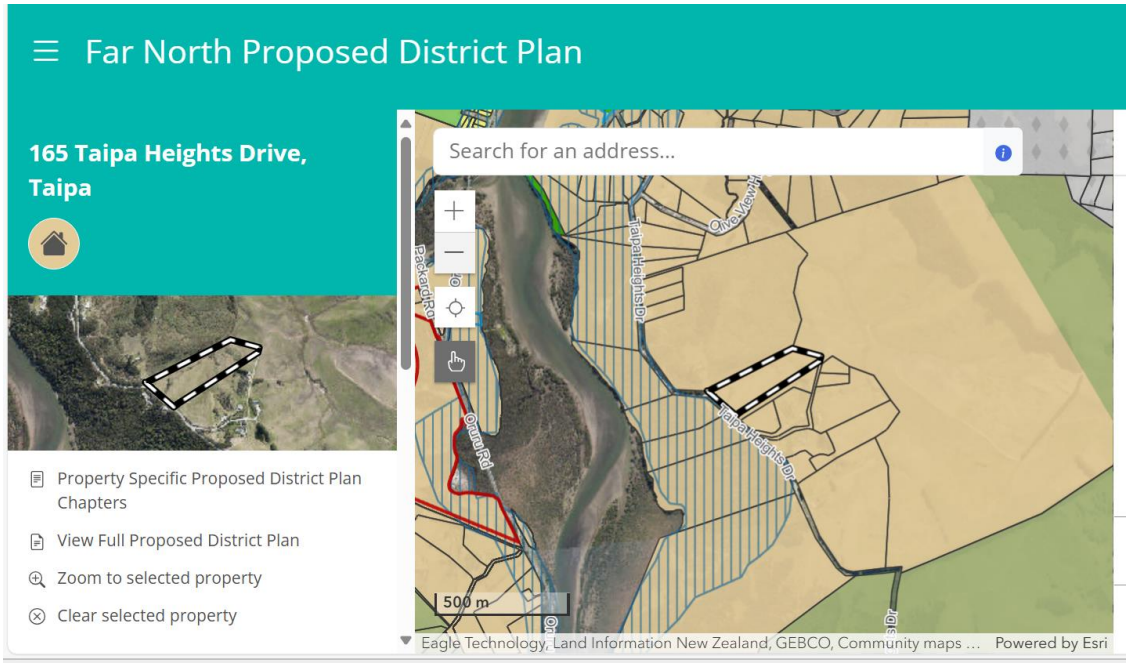
1.07 Within the general location there have been subdivision consents approved for lots of the restricted discretionary size (8000m^2) or potentially even discretionary lot size (5000m^2). The proposed density of development is reflective of the lifestyle zoning afforded to the surrounding area particularly as productive opportunities for the land are considered to be limited. Property sizes tend to be reflective of the zoning lot sizes allowed under current and the previous district plans.

1.08 The current Coastal Living zoning requires resource consent for a breach of visual amenity rules for any new dwelling that exceeds 50m^2 in size and which provides for a density of one dwelling per lot or one dwelling per 4ha. There are no landuse components are proposed under this application.

1.09 Taipa Heights Drive is of metalled formation as it passes the application site with the first portion up from State Highway 10 being sealed. The road is sealed where there is a higher density of housing and then reduces to a metalled formation with the road essentially following the ridgeline of the hillside. An entrance to each lot can be readily provided and this will be discussed in more detail later within this report.

1.10 The following maps identify the respective zonings under the operative and proposed district plans.

The application site located where the dot is positioned in the centre of the plan. The site is zoned Coastal Living under the Operative District Plan



The application site highlighted and zoned Rural Lifestyle under the Proposed District Plan. The site falls outside of the coastal environment (vertical stripe)

1.11 Council is in the process of preparing a new district plan to replace the current operative plan. The process is lengthy, but is progressing with the Proposed Far North District Plan first notified on 27th July 2022 when submissions were invited to be made. The Council has since produced a summary of submissions and closed the further submissions process. Council is currently holding hearings for submissions which will see the appointed Commissioners finalise the plan provisions via a series of scheduled hearings.

1.12 Under the Proposed District Plan, the site is zoned Rural Lifestyle with no coastal overlay (vertical hash) denoted over the application site. The property is no longer considered to be within the coastal environment, and this is an appropriate conclusion following a site visit completed. It is noted that there were only distant views of the coast possible from the site toward the Coopers Beach area.

1.13 Under present operative district plan rules, all Coastal Living zoned sites require a resource consent for dwellings under the visual amenity provisions. There may be other rules breached once the designs are finalised such as stormwater (impermeable surfaces). The proposed district plan may not require any resource consent for the likely dwelling locations as the site falls outside the identified Coastal Environment. There are no current plans to establish any dwelling(s) on the property and any proposed dwelling would be subject to the relevant rules at the time they are proposed.

1.14 The proposed lots all enjoy direct frontage on to Taipa Heights Drive and it is requested that any formation requirements for access be delayed until the site is developed with a dwelling. At this point in time the access can be positioned to make the best use of the available road frontage without limiting onsite development options. Where a crossing is not created as part of the subdivision, a future access would usually be subject to a Vehicle Crossing Permit which is not an uncommon request. A Section 221 Consent Notice condition can be imposed to not only advise the future owner of the access not currently formed, but also the standard to be applied to the access point when a dwelling is constructed.

1.15 The existing title has an existing Section 221 Consent notice condition which relates to the development of the site. This condition will “roll over” to the new title and has little impact on the proposed subdivision but rather references the wastewater requirements to be complied with for any future development.

1.16 For the purposes of the application, consultation with Chorus and Top Energy was completed with both agencies having no requirements for the proposed subdivision.

APPLICATION PROPOSAL

2.01 The application being considered only concerns the subdivision of land. The development options for the respective lots have been considered in assessing the

potential effects to ensure that any future dwelling would readily meet expectations for development within the zone. As noted previously the application is for subdivision only and includes no landuse components.

OPERATIVE PLAN

2.02 The site is zoned Coastal Living and the rules for subdivision are noted within Table 13.7.2.1 of the Far North Operative District Plan. The Proposed Plan is not applicable from a subdivision perspective with respect to lot size.

Coastal Living Zone

- Controlled Lot size – 4ha
- Restricted Discretionary – 8000m^2
- Discretionary – 5000m^2

The proposed lot sizes within the subdivision are follows:

- Proposed Lot 1 – 8320m^2
- Proposed Lot 2 – 8048m^2
- Proposed Lot 3 – 2.42ha

2.03 The proposed lots are all greater than the 8000m^2 minimum lot size for a Restricted Discretionary Activity and therefore from a lot size perspective the proposal complies with this requirement.

The Subdivision Application is a Restricted Discretionary Activity

PROPOSED DISTRICT PLAN

2.04 As noted previously, the majority of rules within the Proposed District Plan do not have legal effect until such time as Council publicly notifies its decisions on submissions. There are however certain rules that have been identified in the proposed plan which have immediate legal effect and that may therefore apply and need to be considered in assessing this application. Such rules may affect the activity status of the application.

2.05 The subdivision rules have no immediate legal effect and therefore cannot be considered in determining the activity status of the overall application.

2.06 In addition, rules which do have immediate legal effect such as those for hazardous substances, scheduled sites or areas of significance to Maori, significant natural areas, or a scheduled heritage resource do not apply as none of these aspects are applicable to the site. Additionally, Heritage Area Overlays, historic heritage rules, excavation and filling, and Notable Trees are also not applicable.

2.07 It is therefore contended that there are no rules which the application breaches or that is required to be considered.

ASSESSMENT OF EFFECTS

3.01 With the subdivision lot size being Restricted Discretionary, the Council has restricted its matters for consideration in terms of determining the outcome of the application to stormwater and wastewater matters. For the purposes of assessing the application and determining potential conditions, the district plan additionally requires the consideration of the proposal with respect to the assessment criteria within section 13.8.5 which is detailed below.

3.02 It is necessary to consider the potential of Permitted Baseline matters and the Existing Environment, in considering the relevant matters to be assessed.

PERMITTED BASELINE

3.03 Pursuant to section 104(2) of the Act, when forming an opinion for the purposes of section 104(1)(a) a council may disregard an adverse effect of the activity on the environment if the plan or a NES permits an activity with that effect (i.e. a council may consider the "permitted baseline"). When considering an application for resource consent it is important to reference and place some reliance on Permitted Baseline arguments. This provides the expectation for development proposals within the zone and enables the consideration of the differences between what could be undertaken “as of right” and that which is proposed. When referencing and using Permitted Baseline such arguments should not be fanciful but based on realistic proposals and expectations.

3.04 In addition to Permitted Baseline considerations, Existing Use Right considerations could also apply especially where the proposed activity is similar in nature and previously lawfully established.

3.05 In this circumstance, any subdivision proposal requires a resource consent application. On this basis it is considered that the Permitted Baseline consideration is not useful to this application although the activity status infers a degree of expectation for lots of this size based on meeting stormwater and wastewater expectations.

3.06 With respect to Existing Use Rights considerations there is no development on the application site to which applies. This consideration is also not particularly useful but notes that visual amenity applications are restricted discretionary and acceptable providing visual effects are minimised.

3.07 The likely future use for each of the proposed lots will be for a dwelling to be constructed on each lot. The probable locations for any new dwelling on the proposed lots are where the Engineering testing was completed. Any dwelling and most accessory buildings will require a resource consent with the current Coastal Living for built development exceeding $50m^2$. The entire application site falls outside of the recently mapped coastal environment as included within the Proposed District Plan. A preliminary assessment of this site identifies that it is blocked from views of the coast by topography.

3.08 Development would meet expectations for the zone from a visual amenity perspective and would result in less than minor effects from such development. The proposed plan may change this current consenting requirement depending on the decisions made through the hearings process and the timing for future development.

3.09 It is further noted that low density development is present within the surrounding area and that this existing development exhibits similar traits to the application site.

ASSESSMENT CRITERIA EVALUATION

SUBDIVISION

3.10 The following criteria applies to Restricted Discretionary subdivision applications.

The Council will restrict the exercise of its discretion and may impose conditions on restricted discretionary activity applications for subdivision in the Coastal Living and South Kerikeri Inlet Zones to the following matters:

(a) the location of access to the lots;

The site is located on Taipa Height Drive and has restricted and distant views of the coast as viewed from the more elevated portions of the site. Each lot will enjoy direct access off Taipa Heights Drive with proposed Lot 3 to have an access leg travelling along the northern boundary.

The applicant requests that any formation requirements for access for the proposed lots be tied to the development of the lots and not be required to be provided or completed in order to secure Section 224(c) completion certificates. The lots would have a Section 221 Consent Notice condition imposed reflective of this requirement to construct the access at time of building and which would also detail the expected formation standard. A search of the title would draw the attention of future owners to the access requirements and that formation is to be completed at the time a dwelling is constructed.

This requirement to delay the construction of an access to each lot is not an unusual request and there are many instances where this is appropriate. It is contended that this request is appropriate in the circumstances with few restrictions applicable and house site location options variable.

(b) the location of utility services;

There are existing connections to properties located along Taipa Heights Drive and the proposed lots can utilise those service utilities which are available within the road corridor. There is also the potential for an off-grid arrangement to apply to the respective lots with the connection only needing to be available. The plan does not require a connection to be provided and there remains no restrictions on the availability of services if required.

(c) the location of building envelopes;

There are no proposed building envelopes for any of the proposed lots although for engineering purposes indicative house site on the proposed lots have been noted. It is contended that there remain several different options for proposed Lot 3 while proposed Lots 1 & 2 have more restrictions due to the topography and smaller nature of the proposed lots. Any future applications will have specifically designed reports to meet expected loadings and other development requirements.

Each lot can comfortably comply with the shape factor even allowing for the required setbacks.

(d) the effect of earthworks and utilities;

There are no proposed earthworks proposed and no utility requirements required to be addressed.

With respect to utilities, they are not required to be installed to the property boundary. In the future if power supply was required, then it would be expected that power lines to the respective lots would be underground from their present locations. If new overhead lines are to be installed, then this would form part of the resource consent application (under current rules). Underground lines would not require resource consent. There is potential that off grid solutions could be explored but the future landowner will determine their preference.

(e) the location of lot boundaries;

Lot boundaries are detailed on the survey plan and reflective of the preferred allotment configurations. The lots are sized to ensure compliance is achieved with each lot meeting the restricted discretionary lot size of 8000m^2.

(f) the mitigation of fire hazards for health and safety of residents;

There is some vegetation within the immediate area which could be considered as a potential fire risk but this can be avoided with any potential house sites. For the future development, compliance with the fire risk to residential will be required should this rule remain relevant in the future. A source of water for fire fighting and potable purposes is required to be provided. Any sources can be required for any future development involving a residential use.

(g) the matters listed in 13.7.3;

The matters listed in in 13.7.3 replicate several areas within the matters to which Council has restricted its discretion. The following is a brief commentary on these aspects with the main assessment located in other parts of the report.

13.7.3.1 Property Access – see the assessment of the access provisions and the Engineer's report which broadly addresses this aspect. The most significant issue around the access considerations is delaying the construction of access until a dwelling is constructed on the respective lots. The additional traffic generated from an additional dwelling on each lot is less than minor.

13.7.3.2 Natural and Other Hazards – there are no known hazards relevant to the proposed subdivision. There are no other known risks within the site or near to the site which would affect the potential development of the site.

13.7.3.3 Water Supply – the assumption is that all roof water will be harvested as a potable water supply. There may be water bores used by landowners which could be a viable alternative. This option has not been considered at this point but

would be subject to a separate consent application from NRC should this be pursued.

If required, (to be confirmed at the building consent stage) a source of water dedicated for fire-fighting purposes can be provided. The expected demand for this aspect can be managed by the provision of a dedicated water tank for the proposed dwelling.

13.7.3.4 Stormwater Disposal – The proposed subdivision will not create an impermeable surfaces issue as the site is undeveloped. Future development will be required to comply with the relevant rules at the time. Roof water from the buildings will likely be harvested as a potable water supply and a potential source for firefighting required, it is contended that there are no issues with the current arrangements.

13.7.3.5 Sanitary Sewage Disposal – there is no reticulated wastewater on site and the applicant is required to provide their own provision based on a specific design. The site suitability report provides the details as to how this will be achieved and is reinforced by the Section 221 Consent notice which applies to the site.

13.7.3.6 Energy Supply – Electricity supply is not required to be provided for a Coastal Living zoned lot. All lots have road frontage so that a power supply could be installed if the lot owner decides to require it for the proposed development. The current zoning means that overhead supply would trigger a resource consent while underground supply would be permitted should a power supply be required.

13.7.3.7 Telecommunications – telecommunications are not required to be provided for a Coastal Living lot with connections available if required.

13.7.3.8 Easements for any Purpose – power and telecommunication are not required for this proposal. There are no easements required.

13.7.3.9 Preservation of Heritage Resources, Vegetation, Fauna and Landscape, and Land Set Aside for Conservation Purposes – There is no flora and fauna, cultural, or heritage resources within the site which require any protection.

13.7.3.10 Access to Reserves and Waterways – The application site does not adjoin any waterbodies or reserves.

13.7.3.11 Land Use Compatibility – The proposed subdivision is not located close to or near to any incompatible land uses which could impact on the use of the lots for lifestyle purposes.

13.7.3.12 Proximity to Airports – not applicable

(h) whether provision for access to the subdivision has been made in a manner that will avoid, remedy or mitigate adverse effects on the environment, including but

not limited to traffic effects, visual effects, effects on vegetation and habitats, and natural character;

The application site enjoys road frontage to Taipa Heights Drive although it is not intended that an access to each lot is provided. It is proposed that the formation of any access be delayed until the construction of a dwelling when the access can be located in a preferred location. This will not impact on any user of Taipa Heights road and future owners will be aware of the requirement to form access via a Section 221 Consent Notice which would detail both the timing of the required works (ie when a dwelling is constructed) and the formation expected to be provided.

The subdivision would generate additional traffic from the two additional lots however this can readily be absorbed by the servicing road.

(i) whether the effects of earthworks and the provision of services to the subdivision will have an adverse effect on the environment and whether these effects can be avoided, remedied or mitigated.

There are no earthworks proposed for this proposed subdivision.

ASSESSMENT OF EFFECTS CONCLUSION

3.11 The subdivision component is restricted discretionary activity and in this respect is considered to be an appropriate and adequate density.

3.12 The future development of the respective lots would trigger the need for resource consent on visual amenity grounds and may also breach other rules such as impermeable surfaces given the restrictive nature of some of the current rules. These breaches are the most common rules not complied with under the Coastal Living Zone within the operative district plan. The proposed district plan is not operative and is progressing and will eventually replace the current operative plan. Limited rules within the document have immediate legal effect and those that do have immediate effect are not applicable.

3.13 The site suitability supports the application with each lot having an appropriate dwelling site. In the conclusion of this reports the effects considered under these matters and assessment of the relevant district plan criteria concludes that effects are less than minor.

3.14 It is further contended that the development will blend into the location and have limited visual effects on the receiving environment. The request to delay the construction of any access will not impact on the safety of the road users or result in any future adverse effect.

3.15 The assessment of effects does not identify any matters of concern with effects able to be further mitigated via conditions of consent. The application is considered to represent a positive development for the immediate area with no adverse effects created or effects which could be considered as minor or more than minor.

3.16 The proposal provides an appropriate use of the land and offers an opportunity for new landowners in providing for their families social and economic well being.

4.0 OPERATIVE DISTRICT PLAN – OBJECTIVES AND POLICIES

4.01 The following assessment of objectives and policies is focused on the relevant subdivision considerations. In reviewing the objectives and policies subdivision section only those matters considered to be relevant have been evaluated. The assessment of effects has covered the specific matters in more detail but as stated there remains sufficient scope within the subdivision provisions to not be required to review other sections.

4.02 The following considerations will provide commentary and details as to how the proposal is generally consistent with key objectives and policies for the Subdivision chapter. The following Objectives and Policies are considered to be the most relevant to the application with consideration only of the subdivision chapter.

SUBDIVISION

13.3 OBJECTIVES

13.3.1 To provide for the subdivision of land in such a way as will be consistent with the purpose of the various zones in the Plan, and will promote the sustainable management of the natural and physical resources of the District, including airports and roads and the social, economic and cultural well being of people and communities.

13.3.2 To ensure that subdivision of land is appropriate and is carried out in a manner that does not compromise the life-supporting capacity of air, water, soil or ecosystems, and that any actual or potential adverse effects on the environment which result directly from subdivision, including reverse sensitivity effects and the creation or acceleration of natural hazards, are avoided, remedied or mitigated.

13.3.8 To ensure that all new subdivision provides an electricity supply sufficient to meet the needs of the activities that will establish on the new lots created.

13.3.9 To ensure, to the greatest extent possible, that all new subdivision supports energy efficient design through appropriate site layout and orientation in order to maximise the ability to provide light, heating, ventilation and cooling through passive design strategies for any buildings developed on the site(s).

13.3.10 To ensure that the design of all new subdivision promotes efficient provision of infrastructure, including access to alternative transport options, communications and local services.

13.4 POLICIES

13.4.1 That the sizes, dimensions and distribution of allotments created through the subdivision process be determined with regard to the potential effects including cumulative effects, of the use of those allotments on:

(a) natural character, particularly of the coastal environment;

(d) amenity values;

(g) existing land uses.

13.4.2 That standards be imposed upon the subdivision of land to require safe and effective vehicular and pedestrian access to new properties.

13.4.3 That natural and other hazards be taken into account in the design and location of any subdivision.

13.4.4 That in any subdivision where provision is made for connection to utility services, the potential adverse visual impacts of these services are avoided.

13.4.5 That access to, and servicing of, the new allotments be provided for in such a way as will avoid, remedy or mitigate any adverse effects on neighbouring property, public roads (including State Highways), and the natural and physical resources of the site caused by silt runoff, traffic, excavation and filling and removal of vegetation.

13.4.13 Subdivision, use and development shall preserve and where possible enhance, restore and rehabilitate the character of the applicable zone in regards to s6 matters. In addition subdivision, use and development shall avoid adverse effects as far as practicable by using techniques including:

(a) clustering or grouping development within areas where there is the least impact on natural character and its elements such as indigenous vegetation, landforms, rivers, streams and wetlands, and coherent natural patterns;

(b) minimising the visual impact of buildings, development, and associated vegetation clearance and earthworks, particularly as seen from public land and the coastal marine area;

(c) providing for, through siting of buildings and development and design of subdivisions, legal public right of access to and use of the foreshore and any esplanade areas;

(g) achieving hydraulic neutrality and ensuring that natural hazards will not be exacerbated or induced through the siting and design of buildings and development.

13.4.14 That the objectives and policies of the applicable environment and zone and relevant parts of Part 3 of the Plan will be taken into account when considering the intensity, design and layout of any subdivision.

13.4.15 That conditions be imposed upon the design of subdivision of land to require that the layout and orientation of all new lots and building platforms created include, as appropriate, provisions for achieving the following:

(a) development of energy efficient buildings and structures;

(e) domestic or community renewable electricity generation and renewable energy use.

COMMENTARY ON OBJECTIVES AND POLICIES

4.03 As previously noted, the proposed allotment configuration complies with the Restricted Discretionary requirements and subject to satisfactorily meeting the matters to which the Council's discretion is restricted, the application can be approved. Many of the above objectives reinforce the effects to be considered and ensures that the intent of the respective rules and their assessment thereof is complete. The applicant has provided an Engineers Site Suitability report to support the conclusions reached and this proposal not only meets the intent of the zone but also is acceptable within the receiving environment.

4.04 The proposed subdivision is assessed as being consistent with the pattern of development within the immediate area and beyond and is considered to satisfy the intent of the plan.

4.05 The proposed subdivision will create an opportunity for a dwelling to be established on each of the respective lots. The creation of the lot will contribute to the new lot owner's social and economic well-being. The property is not viable as a farming operation due to the topography and soil types. The future use of the site for housing will not result in the loss of productive land.

4.06 With the site being located within the Coastal Living zone it is important that the proposed subdivision and the development thereof does not compromise the attributes which are inherently important for coastal properties. However, the reclassification of the site to be outside of the Coastal Environment conflicts with the present zoning and several of the key considerations which now appear to be no longer applicable or redundant. It is contended that although the change will occur in the future, it remains necessary to observe the visual amenity considerations and criteria for built form moving forward. The timing of future development may be that no consent is required in the future, but this will depend on the hearings process and the eventual zoning and any overlays which may ultimately apply to the site via the proposed plan process.

4.07 Any dwelling would readily be able to comply with the visual amenity requirements for the Coastal Living zone. It is contended that any visual effects can be adequately mitigated using a combination of design, material selection, and landscaping. The additional point is that the likely house site falls outside of the recently redefined coastal environment and therefore visual amenity may not be a relevant consideration moving into the future.

4.08 Notwithstanding this recent change, Council may determine that the use of recessive colours and landscaping is still appropriate for any new dwelling on the proposed lots, and this could be secured by a Section 221 Consent Notice condition. Although this is not offered, the imposition of this would be acceptable if considered necessary.

4.09 The proposed subdivision will not create any reverse sensitivity concerns as the area is primarily a lifestyle area with a coastal influence and with limited rural activities which could impact on the daily lives of residents. There are no rural activities or uses identified such as milking sheds, silage pits, or other rural activities such as intensive horticultural activities which can create reverse sensitivity concerns for property owners.

4.10 The proposed access is sought to be delayed until a dwelling is constructed on the respective lots. It is considered that this will not impact on the functionality of the road or result in any adverse future effects from the delay in construction the access. A consent notice condition can be imposed which details the timing and formation standard required to be met. This approach is not inconsistent with the plan requirements or the Council's Engineering Standards.

4.11 The assessed traffic impacts from the additional dwellings are considered to be less than minor based.

4.12 Power and telecommunications can be accessed off the existing network located within Taipa Heights Drive.

4.13 The proposed subdivision is considered to be generally consistent with the relevant subdivision and zone objectives and policies.

PROPOSED FAR NORTH DISTRICT PLAN

4.14 The proposed district plan is presently progressing through the hearing of submissions phase which is expected to be completed in August 2025 based on the current timetable. Relevant reports and recommendations are being prepared by Council staff and consultants which include making recommendations on matters raised within the submissions. The subdivision rules for the Rural Living Zone and Coastal Environment overlay do not apply to the application because they have no immediate legal effect or no longer apply to the site.

4.15 With the application's status of Restricted Discretionary, it is unnecessary to fully consider and evaluate the relevant objectives and policies of the proposed plan. The weighting afforded to the proposed district plan with this application status is minor. However, for completeness and to confirm the appropriateness of the application moving forward, the proposal is considered to be generally consistent with the following matters although no detailed assessment is required.

Objectives and Policies

4.16 The objectives and policies for subdivision are noted as follows acknowledging that only those which are considered to be relevant have been included.

SUBDIVISION OBJECTIVES

SUB-01 Subdivision results in the efficient use of land, which:

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

SUB-02 Subdivision provides for the:

b. Protection, restoration, or enhancement of Outstanding Natural Features, Outstanding Natural Landscapes, Natural character of the Coastal Environment, Areas of High Natural Character, Outstanding Natural Character, wetland, lake and river margins, Significant Natural Areas, Site and Areas of Significance to Maori and Historic Heritage.

SUBDIVISION POLICIES

SUB-P3 Provide for subdivision where it results in allotments that:

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

SUB-P4 Manage subdivision of land as detailed in the district wide, natural environment values, historical and cultural values and hazard and risks sections of the plan

SUB-P9 Avoid subdivision rural lifestyle subdivision in the Rural Production zone and Rural Residential subdivision in the Rural Lifestyle zone unless the development achieves the environmental outcomes required in the management plan subdivision rule.

SUB-P11 Manage subdivision to address the effects of the activity requiring resource consent including (but not limited to) consideration of the following matters where relevant to the application:

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

4.17 The proposal is considered to be generally consistent with the relevant objectives and policies of the Proposed Far North District Plan.

Proposed District Plan – Rules with immediate legal effect

4.18 There are no rules which are legislated to have immediate legal effect which apply to the application or to the site.

5.0 REGIONAL POLICY STATEMENT CONSIDERATIONS

5.01 The subdivision of land can be inconsistent with key objectives and policies of the Northland Regional Policy Statement. In this instance, however the only consideration is the impact on the natural character of the coastal environment in which the site exists. There is a conflict between the proposed and operative district plan as far as the extent of the coastal environment. The application site demonstrates very limited coastal attributes and it is considered that the up to date mapping as completed by Northland Regional Council should be prioritized.

5.02 Notwithstanding this conclusion a resource consent will still be required until the proposed plan becomes operative.

5.03 With the site falling outside the re-defined coastal environment, the effects of the proposal are considered to be consistent with the Regional Policy Statement.

Policy 4.6.1 Managing effects on the characteristics and qualities natural character, natural features and landscape.
(1) In the coastal environment:

a) Avoid adverse effects of subdivision use and development on the characteristics and qualities which make up the outstanding values of areas of outstanding natural character, outstanding natural features and outstanding natural landscapes.

b) Where (a) does not apply, avoid significant adverse effects and avoid, remedy or mitigate other adverse effects of subdivision, use and development on natural character, natural features and natural landscapes.

Natural character, outstanding natural features, outstanding natural landscapes and historic heritage Identify and protect from inappropriate subdivision, use and development;

(a) The qualities and characteristics that make up the natural character of the coastal environment, and the natural character of freshwater bodies and their margins;

(b) The qualities and characteristics that make up outstanding natural features and outstanding natural landscapes;

5.04 None of these matters apply to the application site. The proposal is considered to be generally consistent with objective and policy considerations from the Regional Policy Statement.

6.0 PART 2 CONSIDERATIONS

6.01 The application does not conflict with any matter or consideration under Part 2 of the Act. The proposal provides for the social and economic well-being of the district by enabling appropriate development to be established all while resulting and ensuring the potential effects of the proposal are less than minor.

6.02 It is therefore contended that the proposed subdivision is appropriate and consistent with the purpose of the Act.

7.0 NOTIFICATION ASSESSMENT S95A TO 95G OF THE ACT

7.01 Sections 95A to 95G require Council to follow specific steps in determining whether to notify an application. In considering the conclusions findings within this report are relied upon.

7.02 Public Notification section 95A

Step 1
Mandatory public notification in certain circumstances

(a) the applicant has requested that the application be publicly notified:
(b) public notification is required under section 95C:
(c) the application is made jointly with an application to exchange recreation reserve land under section 15AA of the Reserves Act 1977.

The applicant has not requested public notification and none of the remaining matters as described are applicable.

Step 2 Public Notification precluded in certain circumstances

The criteria for step 2 are as follows:

(a) the application is for a resource consent for 1 or more activities, and each activity is subject to a rule or national environmental standard that precludes public notification:

(b) the application is for a resource consent for 1 or more of the following, but no other, activities:

  (i) a controlled activity:

  (ii) a restricted discretionary or discretionary activity, but only if the activity is a subdivision of land or a residential activity:

  (iii) a restricted discretionary, discretionary, or non-complying activity, but only if the activity is a boundary activity:

  (iv) a prescribed activity (*see* section 360H(1)(a)(i)).

The subdivision itself is assessed as a restricted discretionary activity in terms of lot size and is therefore precluded from public notification.

Step 3 – Public Notification required in certain circumstances

The criteria for Step 3 are as follows:

(a) the application is for a resource consent for 1 or more activities, and any of those activities is subject to a rule or national environmental standard that requires public notification:

(b) the consent authority decides, in accordance with section 95D, that the activity will have or is likely to have adverse effects on the environment that are more than minor.

The NES Regulation (contaminated land) is not relevant to this application as there has been no uses undertaken within the application site which qualify as an activity on the HAIL list. Furthermore, NRC records confirm there are no known contaminated sites within the application site.

The effects from the proposed subdivision are considered to be less than minor as concluded within earlier sections of this report. The proposal offers the opportunity for dwellings to be established within a lifestyle location. The potential effects from additional dwellings on the wider environment are concluded as being less than minor.

7.03 Affected Persons Assessment – Limited Notification Section 95B

If the application is not required to be publicly notified, a Council must follow the steps of section 95B to determine whether to limited notify the application.

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

(2) Determine whether there are any—

(a) affected protected customary rights groups; or
(b) affected customary marine title groups (in the case of an application for a resource consent for an accommodated activity).

There are no protected customary rights or customary marine titles which apply to the application site.

Step 2: if not required by step 1, limited notification precluded in certain circumstances
The criteria for step 2 are as follows:

(a) the application is for a resource consent for 1 or more activities, and each activity is subject to a rule or national environmental standard that precludes limited notification:
(b) the application is for a resource consent for either or both of the following, but no other, activities:
    (i) a controlled activity that requires consent under a district plan (other than a subdivision of land):
    (ii) a prescribed activity (*see* section 360H(1)(a)(ii)).

The application is not precluded from Limited Notification as neither of the exemptions as described above apply to the application.

Step 3: if not precluded by step 2, certain other affected persons must be notified

(7) Determine whether, in accordance with section 95E, the following persons are affected persons:
    (a) in the case of a boundary activity, an owner of an allotment with an infringed boundary; and
    (b) in the case of any activity prescribed under section 360H(1)(b), a prescribed person in respect of the proposed activity.

The subdivision does not result in any adverse effects or effects on the immediate neighbours. The potential visual effects of the development are concluded as being less than minor. It is also noted that the lot sizes are compliant with the restricted discretionary lot size which is consistent with other sites adjacent to and within the wider area.

The delaying of the construction of the access will not result in any impacts on neighbouring properties.

It is further acknowledged that during any construction phase for development within proposed Lot 2, that there will be additional loadings on the lane but this can be managed and addressed as required.

It is not considered necessary to secure landowner written approval or permission because the lot size and Council's discretion is limited to addressing stormwater and wastewater, both of which can be readily satisfied.

There are no persons deemed to be potentially affected by the proposed subdivision.

7.04 Notification Assessment Conclusion

Pursuant to sections 95A to 95G it is recommended that the Council determine that the application can be processed non-notified for the following reasons:

- In accordance with section 95A, public notification is not required because the application is Restricted Discretionary. In addition the adverse effects on the wider environment are considered to be less than minor;
- In accordance with section 95B, written approvals have not been sought as based on the matters of particular concern, the effects are less than minor and therefore no persons are considered to be affected persons; and,
- In accordance with section 95A(9) and 95B(10), there are no special circumstances to require public or limited notification.

8 SUMMARY

8.01 The application is for subdivision consent seeking to create two additional lots. There is no development presently on site so up to three dwellings could be constructed.

8.02 The property is within the Coastal Living Zone as denoted within the Far North District Plan. The lot sizes for this application meets the restricted discretionary threshold and need only address the matters to which Council's discretion is limited which relates to wastewater treatment and disposal and stormwater management.

8.03 There was no requirement to undertake a visual assessment given the likely location of the proposed dwellings however conditions could be imposed via a Section 221 Consent Notice which consider material selections and colours and landscaping.

8.04 The proposal is assessed as Restricted Discretionary with lots sizes all being greater than 8000m^2.

Coastal Living Zone

- Controlled Lot size – 4ha
- Restricted Discretionary – 8000m^2
- Discretionary – 5000m^2

The proposed lot sizes within the subdivision are follows:

- Lot 1 – 8320m^2;
- Lot 2 – 8048m^2; and,
- Lot 3 of 2.42ha.

8.05 Access is achieved off Taipa Heights Drive which provides road frontage to all of the proposed lots. The application seeks to defer the formation od=f any access requirements until the dwelling on each of the respective lots is constructed. This deferral will have no impact on any person and can be required in the future by a Section 221 Consent Notice condition. The consent notice would detail the timing and formation standard required to be complied with by the landowner.

8.06 The matters to which Council restricts its discretion (wastewater and stormwater) have been satisfied by the Engineer's report provided. The conclusion confirms that effects are less than minor.

8.07 The effects of this subdivision application have been assessed and concluded as being less than minor. No persons are considered to be affected by the proposed subdivision. The effects on the wider environment are considered to be less than minor with appropriate mitigation measures proposed.

8.08 The proposal is not contrary to relevant objectives and policies of the Far North District Plan and the Regional Policy Statement.

8.09 With respect to conditions of consent the applicant would appreciate sighting a draft set of conditions for review and comment (if necessary).

Should you have any queries in respect to this application please contact me.

Yours faithfully

Wayne Smith
Zenith Planning Consultants Ltd
Principal | Director
BPlan | BSocSci | MNZPI
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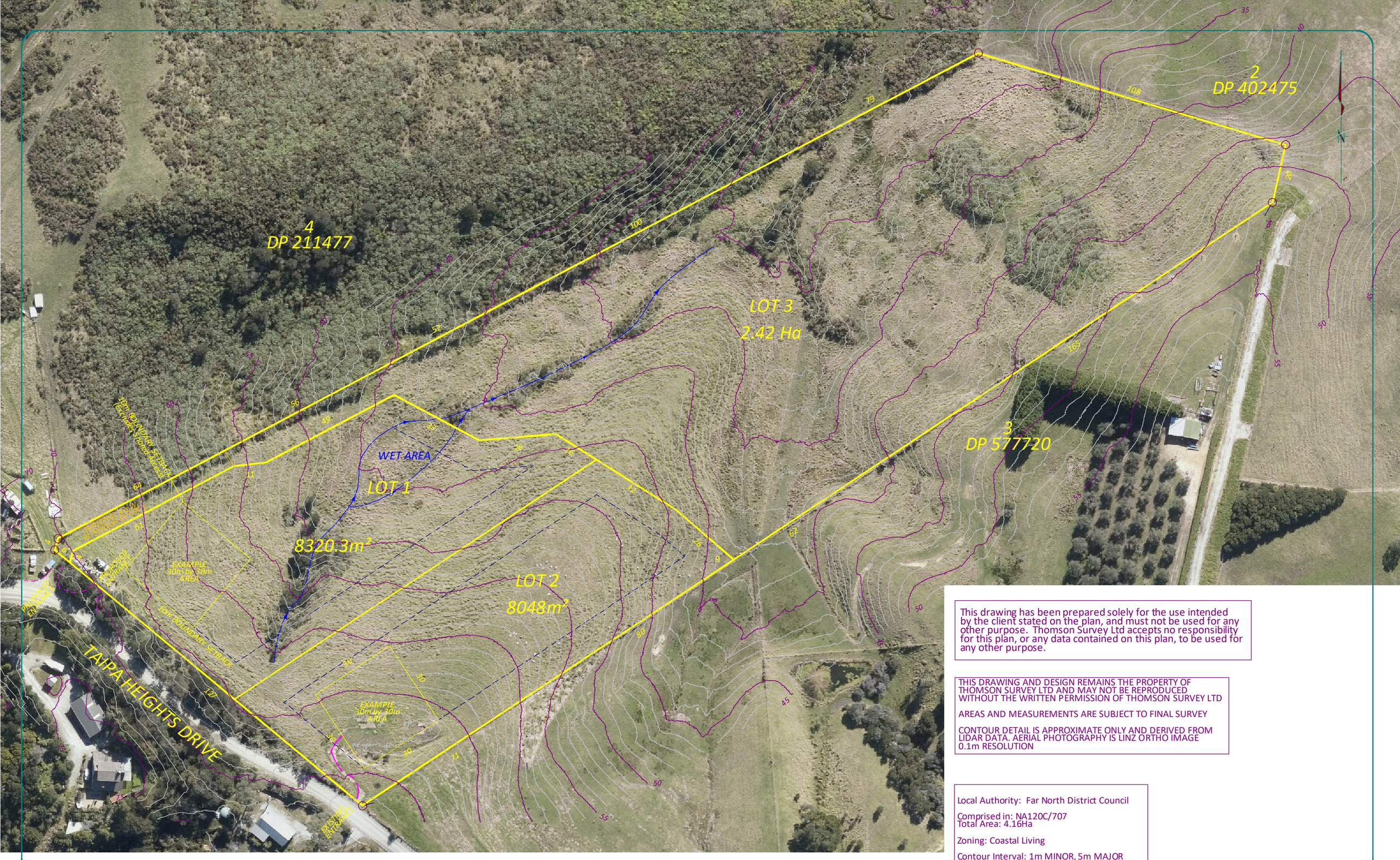

This drawing has been prepared solely for the use intended by the client stated on the plan, and must not be used for any other purpose. Thomson Survey Ltd accepts no responsibility for this plan, or any data contained on this plan, to be used for any other purpose.

AREAS AND MEASUREMENTS ARE SUBJECT TO FINAL SURVEY

CONTOUR DETAIL IS APPROXIMATE ONLY AND DERIVED FROM LIDAR DATA. AERIAL PHOTOGRAPHY IS LINZ ORTHO IMAGE 0.1m RESOLUTION

Local Authority: Far North District Council

Comprised in: NA120C/707
Total Area: 4.16Ha

Zoning: Coastal Living

Contour Interval: 1m MINOR, 5m MAJOR

THOMSON SURVEY LIMITED
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Ph: (09) 4077360 Fax (09) 4077322
Registered Land Surveyors, Planners & Land Development Consultants

PROPOSED SUBDIVISION OF LOT 1 DP 190841

165 Taipa Heights Drive

PREPARED FOR: BELL

	Name	Date
Survey		
Design		
Drawn	*SL*	*25.08.23*
Approved		
Rev		

ORIGINAL
SCALE *1:1125*
SHEET SIZE *A3*

10532 SCHEME OPTION 1 20230801

Surveyors Ref. No: *10532*
Series
Sheet of

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SUBDIVISION SITE SUITABILITY ENGINEERING REPORT

165 TAIPA HEIGHTS DRIVE, TAIPA

GRAEME & MICHAEL BELL

C0391-S-01
JANUARY 2024
REVISION 1

geologix
consulting engineers

DOCUMENT MANAGEMENT

Document Title	Subdivision Site Suitability Engineering Report
Site Reference	165 Taipa Heights Drive, Taipa
Client	Graeme & Michael Bell
Geologix Reference	C0391-S-01-R01
Issue Date	30 January 2024
Revision	01
Prepared by	Gong Chen Civil Design Engineer, BEng Civil, MEngNZ Ruifeng (Ray) Li Geotechnical Engineer, BE, MEngNZ
Approved by	Edward Collings Managing Director, CEnvP Reg. 0861, CPEng Reg. 1033153, CMEngNZ Signer ID: BVJRNOBNO9...
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REVISION HISTORY

Date	Issue	Prepared	Approved
January 2024	First Issue	GC, RL	EC

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TABLES

1 INTRODUCTION

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

The purpose of the report is to assist with Resource Consent application in relation to the proposed subdivision of a rural land at 165 Taipa Heights Drive, Taipa, the 'site'.

Specifically, this assessment addresses engineering elements of natural hazards, geotechnical, wastewater, stormwater, vehicle access 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

It is understood that the Client proposes to subdivide the site to create two new rural residential lots as summarised as Table 1 below. The site is presented across moderate and steep topography which imposes some development constraints.

This understanding has been established from a proposed scheme plan[1] supplied to Geologix at the time of writing. Amendments to the referenced scheme plan may require an update to the recommendations of this report.

Table 1: Summary of Proposed Development of the Site

Proposed Lots	Size	Purpose
1	8,320.3 m^2	New residential
2	8,048 m^2	New residential
3	2.42 ha	Balance lot

It is presumed that future individual site accesses will be provided from Taipa Heights Drive at the western boundary to all three lots. A specific Traffic Impact Assessment (TIA) is outside the scope of this report. Input by a suitably qualified traffic engineer may be required as part of Resource Consent application.

2 DESKTOP APPRAISAL

2.1 Site Description

The site is presented at a typical rural area to the south of Taipa as a large block of land to the northeast of Taipa Heights Drive. The site is legally described as Lot 1 DP 190841 and is irregular in shape with a gross site area of approximately 4.16 hectares. The site setting is presented schematically as Figure 1 below.

[1] *Thompson Survey Limited, Proposed Subdivision of Lot 1 DP 190841, 165 Taipa Heights Drive, Surveyors Reference Number 10532, dated 01 August 2023l.*

Figure 1: Site Setting[2]

Topographically, the site is located upon three distinct ridgelines and dips moderately from the southwestern corner towards the centre of the site at an average angle of 10 degrees. The proposed building sites at proposed lot 1 and lot 2 containing the building sites are located at the crest of the southwestern ridgeline and dips moderately at approximately 10 to 15 degrees.

The site is covered with grassed pasture and occasional natural bushes and there are no structures present on-site including retaining structures. The topography is consistent with the surrounding land at the boundaries of the site. Available LiDAR contours and the supplied surveying data indicate an average grade of the natural slope at proposed lot 1 is approximately 15 °, and the natural slope at proposed lots 2 is approximately 10°.

2.2 Existing Reticulated Networks

Available infrastructure information is provided by Far North District Council (FNDC)'s Far North Maps GIS system. According to the available data, no existing Council infrastructure is present within the site boundaries, and it is understood that the future dwellings will be serviced by an on-site 3 water infrastructures. Geotechnically, future building foundations will not be influenced by existing public pipelines according to available data.

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] *Source: https://app.grip.co.nz/*

2.3 Geological Setting

Available geological mapping[3] indicates the site to be underlain by Punakitere Sandstone (Mangakahia Complex) of the Northland Allochthon, described as weakly indurated metre-bedded quartzose, micaceous sandstone, with minor conglomerate, and interbeds of blue-grey mudstone.

The underlying Northland Allochthon formation is known for its instability over shallow depths from relatively shallow slope angles. Typical failures are known to occur on natural topography of 15 ° and above with evidence of soil creep forming on slopes as shallow as 10°.

The geological unit can be defined by three typical layers: an upper clayey/silty soil mantle with low permeability which is typically indicated by water tolerant species such as reeds. Below the soil mantle, there is a transitional zone where groundwater perches above a relatively impermeable, completely weathered parent rock.

Shallow slips and long-term soil creep typically occur within the transition zone above the parent rock as shown in Figure 2 below. The Geotechnical effective stress parameters for the soil strata are conservatively modelled to reflect the properties of the Northland Allochthon formation.

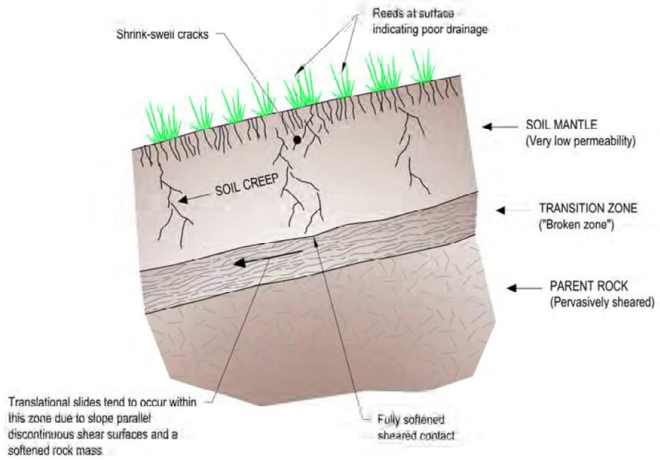

Figure 2 Typical Northland Allochthon soil profile

2.4 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

[3] *Geological & Nuclear Science, 1:250,000 scale Geological Map, Sheet 1, Kaitaia, 1996.*

the New Zealand Geotechnical Database[4] did not indicate borehole records within 500 m of the site.

3 SURFACE WATER FEATURES AND OVERLAND FLOWPATHS

During our site walkover and desktop appraisal of the supplied topographic data, Geologix have developed an understanding of the surface water features and overland flow paths influencing the site. The developed understanding summarised in the following sections is shown schematically on Drawing No. 400 with associated off-set requirements.

3.1 Surface Water Features

During our site walkover at the time of conducting the site investigation at the end of September, no evidence of on-site surface water features was observed. However, according to the scheme plan at the time of writing, it is noted that there is a marked wet area located at the northeast corner of the proposed Lot 1 boundary. It is anticipated that these low-lying areas will not form a pond due to the site's topography rolling from west to northeast. Water tends to flow as sheet runoff without accumulating within these low-lying areas. However, it is understood that the surface could become wet due to surface water impacts during frequent rainy season.

3.2 Sensitive Receptors

According to the site's topography, there are some low-lying areas within the site boundaries, but no evidence of sensitive receptors was observed. However, we are not providing an ecological assessment within this application as per our scope of work.

The Taipa River is located to the west of the site, approximately 300 m away and the CMA is situated to the north of the site approximately 2.5 km away.

3.3 Overland Flow Paths

In general, it is expected that surface water will move as sheet flow following the site topography towards the northern corner of the site until intercepted by the existing wet area marked on the supplied topographic plan.

Available GIS information presented as Figure 2 below indicates that the mapped river flood hazard associated with an inlet at Cable Bay under the 1 % AEP event (marked by light blue area) is located around the north-eastern site boundary on a lower land between the two ridgelines.

The risk of encountering weak alluvial soil within the proposed building sites is considered low due to the above information and the building sites being located near the crest of the ridgeline. However, alluvial soils are expected around the base of the ridgeline especially around the northern site boundary.

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

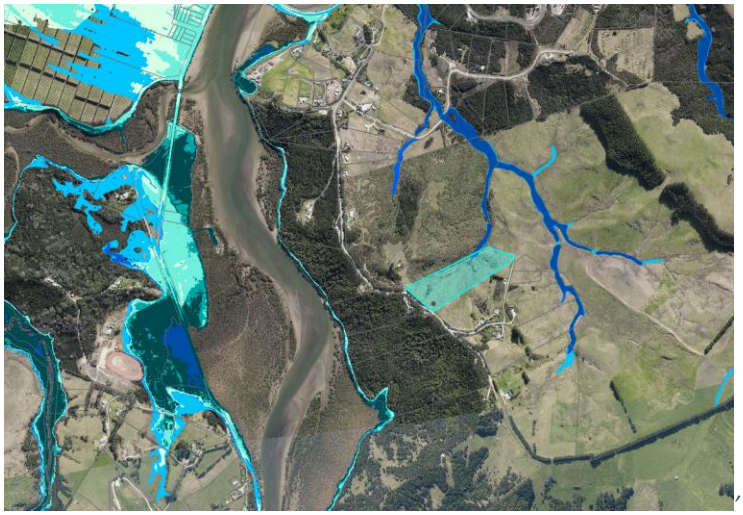

Figure 3: Mapped River Flood Hazard Zone of the Site[5]

Clearly defined overland flow paths are evident within the site boundaries upon relatively steep land. The site represents as upstream area of the catchment and it is expected that the overland flow paths within the site boundaries could be categorised as minor paths, covering less than 4 ha in total. It is anticipated that these overland flow paths originate at the west and southern boundaries of the site within gully areas and converge at the northeastern corner of the site. They then continue to flow north and discharge into the CMA.

According to the proposed scheme plan, the proposed building area will be situated outside of the overland flow path area and the required wastewater disposal field set-back distances from the overland flow paths can be achieved and detailed within Drawing No. 400.

4 GROUND INVESTIGATION

A site-specific walkover survey and intrusive ground investigation was undertaken by Geologix on 29 September 2023. The ground investigation was scoped to confirm the findings of the above information and to provide parameters for wastewater and geotechnical assessment. At the time of our ground investigation, originally four residential lots were proposed. However, at the time of preparation of this report, proposal changed to three residential lots with a different layout, with preliminary residential building footprints outlined on Lot 1 and Lot 2.

The ground investigation comprised:

- Four hand augered boreholes designated BH01 to BH04 inclusive, with a target depth of 5.0 m below ground level (bgl). However, refusals were encountered at BH02, BH03 and BH03 upon dense strata at depths of 3.2, 2.1 and 3.5 m bgl respectively.

[5] *Source: https://nrcgis.maps.arcgis.com/apps/webappviewer/index.html?id=81b958563a2c40ec89f2f60efc99b13b*

- BH02, BH03 and BH04 were extended with a scala penetrometer probing techniques to confirm the presence of dense material proving more than 20+ blows/ 100 mm. This stratum was identified at depths ranging from 2.4 to 3.7 m bgl.
- Monitoring of groundwater levels with a groundwater dip meter on the day of drilling. Measurements were taken at the time of drilling, and at the end of the day.

4.1 Site Walkover Survey

A visual walkover survey of the property confirmed:

- Topography is in general accordance with that outlined in Section 2 and the available GIS contours. The topographic profile comprises of three district ridgelines surrounding the site, and the site dips gently from the southwestern corner towards the centre of the site at approximately 10 to 15 degrees.
- The proposed building sites within lot 1 and lot 2 are located closely to the crest of the southwestern ridgeline.
- Taipa Heights Drive follows outside the southwestern site boundary. Land to the north and east includes dense trees with open pastures. Land to the west has a rural property with dense natural bush and trees and includes Taipa River further to the west of the property. Land to the south includes rural properties with various sizes with grassed pastureland.
- At and around the locations of the proposed dwelling locations, there were no obvious signs of either shallow instability such as tension cracks, hummocky and/ or terraced ground. Although terraced grounds were observed at neighbouring lands east of the property.
- There was no existing structure present on-site and at the boundaries, no retaining walls were noted with the site in general alignment with the neighbouring land.

4.2 Ground Conditions

Arisings recovered from the exploratory boreholes were logged by a suitably qualified geotechnical engineering professional in general accordance with New Zealand Geotechnical Society guidelines[6]. Engineering borehole logs are presented as Appendix B to this report and approximate borehole positions recorded on Drawing No. 200 within Appendix A.

A detailed ground model for four proposed building sites has been derived from the ground investigation, incorporating locally available GIS data, presented as Drawing No. 201 and 202

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

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

- **Topsoil to depths between 0.1 to 0.2 m bgl.** The overlying topsoil was described as a grassed topsoil containing organic silt, dark brown and moist with low plasticity.

  Topsoil is not considered consistent bearing strata for proposed future dwellings.

- **Northland Allochthon Residual Soil down to depths ranging from 2.1 m to >5.0 m bgl.**

  Northland Allochthon residual soils were encountered beneath the surficial topsoil veneer. The residual soils were typically cohesive, containing silt or clayey silt. The residual soil was generally encountered orange brown becoming grey mottled brown and orange at deeper depth. The residual soil was generally moist, low plasticity, with some regions of dry or friable.

  Shear vane tests within the Northland Allochthon residual soil recorded vane shear strengths ranging from 81kPa to >198 kPa, indicative of a generally stiff to very stiff residual soil. DCP probing within BH03 within the Northland Allochthon Residual Soil strata returned blow counts ranging between 5 to 9 blows per 100 mm penetration, indicating a hard layer. This aligned with the obtained field vane strengths, confirming the stiff to hard residual soil in consistency.

- **Northland Allochthon Completely Weathered to Highly Weathered Parent Rock from 2.1m to >5.0m bgl.**

  The Northland residual soils are in turn underlain by less weathered rock. Generally, we infer Scala per 100mm penetration blows over 10 to be considered as completely weathered rock layer and over 20 to be considered as highly weathered rock layer.

  Stiff to hard original Northland Allochthon residual soil and rock are considered consistent and suitable bearing strata for the proposed future dwellings.

A summary of the above strata horizons and wastewater properties is presented as Table 2 below.

Table 2: Summary of Ground Investigation[1]

Hole ID	Proposed Lot	Hole Depth	Fill Depth	Depth to Completely Weathered Parent Rock	Depth to Highly Weathered Parent Rock	Ground water[2]	Wastewater Category
BH01	1	5.0 m	NE	NE	NE	NE[3]	6 – Slowly Draining
BH02	2	3.5 m	NE	2.75 m	3.4 m	NE	6 – Slowly Draining
BH03	3	2.5 m	NE	2.1 m	2.4 m	NE	6 – Slowly Draining
BH04	3	3.8 m	NE	3.2 m	3.7 m	NE - rose to 2.03 m	6 – Slowly Draining

1. *All depths recorded in m bgl unless stated otherwise.*
2. *Groundwater measurements taken on day of drilling.*
3. *NE – Not Encountered.*

5 GEOTECHNICAL ASSESSMENT

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

Table 3: Geotechnical Effective Stress Parameters

Geological Unit	Unit Weight, kN/m^3	Effective Friction Angle, °	Effective Cohesion, kPa	Undrained Shear Strength, kPa
Northland Allochthon Residual Soil	17	20	5	95*
Completely to Highly Weathered Parent Rock	19	32	5	100+
** Adopting Bjerrum correction factor of 0.8 from lowest vane shear strength.*				

5.1 Seismic Hazard

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

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

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

The seismic hazard in terms of Peak Ground Acceleration (PGA) has been assessed based on the NZGS Module 1[7]. Table 4 presents the return periods for earthquakes with ULS and SLS 'unweighted' PGAs and design earthquake loads for the corresponding magnitude. The PGAs were determined using building Importance Level (IL) 2, defined by NZS1170.5:2004. Reference should be made to the structural designer's assessment for the final determination of building importance level.

[7] *New Zealand Geotechnical Society, Earthquake Geotechnical Engineering Practice, Module 1, November 2021, Appendix A, Table A1.*

Table 4: Summary of Seismic Hazard Parameters

Limit State	Effective Magnitude	Return Period (years)	Unweighted PGA	Horizontal Coefficient[1], K_h
ULS	6.5	500	0.19 g	0.1273 g
SLS	5.8	25	0.03 g	

K_h = PGA × 0.67 for slope stability analysis to represent pseudo static conditions.

5.2 Site Stability

At the time of writing, no obvious indications of major deep-seated instability were identified over the designated building platform areas and the risk of such deep-seated instability developing as a result of the development proposal is considered low. We have carried out desktop study of historical aerial photos on Retrolens and Google Earth and have not identified obvious signs of major landslides in the area from available photos. Site and surrounding sites are predominantly covered with vegetation of grass, shrubs, and trees. And no major exposed soil faces were observed.

Small hummocky grounds are observed within site and surrounding sites. Terraced ground is observed at neighbouring sites, indicating shallow instability from soil creep, and is inferred mostly likely within the residual soil layer. Interface between residual soils and parent rock, i.e. transition zone is also likely to prone to slippage.

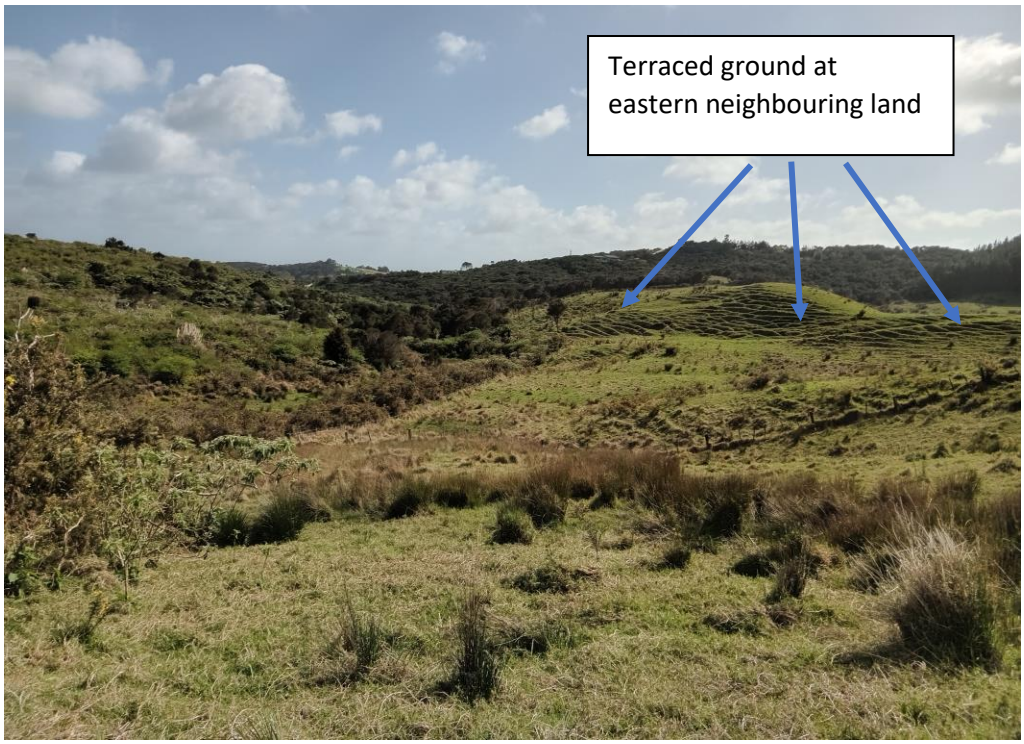

Figure 4 Site photo (prominent terraced ground can be seen to the far right)

No detailed architectural or earthworks plan is available during the preparation of this report, we have carried out quantitative slope stability analysis based on the concept scheme plan. The effects to slope stability from proposed dwelling surcharge is expected small but can potentially vary from proposed earthworks. Proposed slope stability is to be reviewed and refined, subject to detailed architectural and earthworks plans showing earthwork amount and locations, at the Building Consent stage.

Minimum FoS criteria have been developed for use in residential development by Auckland Council[8] which are widely adopted in the Far North region, refer to Table 5 below.

For the scenario, we have chosen non-circular surface option, GLE/Morgenstern-Price method.

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

- Section AA', most critical slope section through proposed Lot 1 building platform. Refer to drawings in Appendix A.
- Section BB', most critical slope section through proposed Lot 2 building platform. Refer to drawings in Appendix A.

The slope was analysed within propriety software Slide 2 Version 9.02, developed by RocScience Inc. The purpose of the stability assessment was to:

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

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

Limit equilibrium stability analysis was adopted in the analysis to express the results as a Factor of Safety (FS). When FS = 1.0, the represented mechanism is in equilibrium with the disturbing, active forces equal to the resisting, stabilising forces. A lower FS indicates that instability could occur under the modelled scenario whereas a higher FS demonstrates a margin of safety in respect of stability. Minimum FS criteria have been developed for use in residential development by Auckland Council[8] which are widely adopted in the Far North

[8] *Auckland Council, Code of Practice for Land Development and Subdivision, Chapter 2 Earthworks and Geotechnical Requirements, Version 2.0, May 2023.*

region. Modelling three separate event scenarios the accepted minimum FS are summarised as follows:

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

5.2.1 Stability Analysis Results

Slope stability analysis results are presented in full as Appendix E. and summarised below as Table 5.

Table 5: Summary of Stability Analysis Results

Profile	Scenario	Global Min FoS	Development Footprint (min FoS)	Result within Development Footprint
AA' (Lot 1)[4]	Static[1]	1.7	>1.5	Pass with support[5]
	Elevated GW[2]	1.4	>1.3	Pass with support[5]
	Seismic[3]	1.3	>1.0	Pass with support[5]
BB' (Lot 2)	Static	1.5	>1.5	Pass with support[5]
	Elevated GW	1.0	>1.3	Pass with support[5]
	Seismic	1.0	>1.0	Pass with support[5]

1. Static, normal groundwater minimum FS = 1.5
2. Static, elevated groundwater minimum FS = 1.3
3. Dynamic, seismic conditions minimum FS = 1.0
4. It should be noted for AA' section, no soil testing data was available. The section subsoil profile was inferred with conservatism from our tested data at boreholes at other locations. More subsoil testing shall be carried out prior to Building Consent stage to confirm our ground model.
5. See section 5.2.3

5.2.2 Stability Analysis Conclusions

The developed slope stability model is considered to be a reasonable representation of the observed conditions on site. It should be noted no ground investigation data was available for Lot 1, due to change of proposed subdivision lot layout after our site investigation. It is recommended further geotechnical investigations to be carried out to confirm subsoil conditions at Lot 1 during Building Consent stage.

In our analysis, failure planes were observed mostly within the residual soil layer, with critical ones that do not meet minimum FoS requirements extending into the proposed Lot 1 and Lot 2 building platforms. As such, stabilisation measures are required to protect the building platforms from slippage to negate a Section 72 notice under Building Act 2004 for building site subjecting to potential natural hazards and is to be further confirmed and analysed during Building Consent stage.

5.2.3 *Stability Controls*

We recommend the installation of downslope piles (either foundation edge beam piles or in-ground palisade wall) as slope stabilization measure. The detailed design of these piles shall be specifically engineer designed at Building Consent stage once detailed plans are available. These downslope piles should be designed according to the following minimum geotechnical design criteria within Table 6. These should be taken as absolute minimums and the elements may have an additional requirement based on the retaining wall models developed in specific engineering design. The location of proposed downslope piles is shown on Drawing No. 200.

Table 6 Summary of Preliminary Stabilisation Pile Design Parameters

Location	Minimum Nominal Depth	Minimum Stabilising Shear Force[1]
Lot 1 foundation downslope	6m[2]	85kN/m
Lot 2 foundation downslope	6m[2]	55kN/m

1. Stabilising shear forces, not structural section shear capacity.
2. Derived from slope stability analysis and is expected to socket into weathered rock at base. Minimum design depth is subject to final actual retained height, building and backslope surcharge, toe slope, etc., once detailed plans are available.

5.3 Soil Expansivity

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

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

Based on our experience with Northland Allochthon residual soil, laboratory analysis within the strata on other projects in the local area and site observations, the shallow soils are conservatively expected to meet the requirements of a highly expansive or Class H soil type. In accordance with New Zealand Building Code[9], Class H or Highly Expansive soils typically

[9] *https://www.building.govt.nz/assets/Uploads/building-code-compliance/b-stability/b1-structure/asvm/b1-structure-1st-edition-amendment-21.pdf*

have a soil stability index (I_{SS}) range of 3.8 to 6.5% and a 500-year design characteristic surface movement return (y_s) of 78 mm. A quantification of the expansive soil class assumptions can be made by geotechnical laboratory analysis.

5.4 Liquefaction Potential

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

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

5.5 Conceptual Foundations

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

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

Table 7: Deep Piled Foundation Geotechnical Parameters

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

1. *Based on S_u = 60 kPa for design purposes.*
2. *Adopting a geotechnical strength reduction factor of 0.5.*
3. *Adopting S_u * α. With α determined from Figure 5 of NZBC B1/ VM4.*

5.6 Conceptual Earthworks and Methodology

It is recommended that all proposed excavations and fills at the site are retained by specifically engineered retaining walls or battered slopes, subject to specific engineering design and assessment at the building consent stage.

5.6.1 Temporary Works

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

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

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

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

5.6.2 Fills

Due to the steep slope and the instability risks analysed, fill should be kept to a minimum. It is recommended that suitable selected GAP hard fill or certified earth filling is adopted at the site with fill batter slopes not exceeding 1V:4H or 14°.

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

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

6 WASTEWATER ASSESSMENT

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

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

6.1 Existing Wastewater Systems

There is no existing on-site wastewater treatment or disposal systems has been identified within the site boundaries.

6.2 Concept Future Development and Wastewater Generation Volume

The concept rural residential developments within this report assume that the proposed new lot may comprise up to a five-bedroom dwelling with a peak occupancy of eight people[10]. This considers the uncertainty of potential future Building Consent design. The number of usable bedrooms within a residential dwelling must consider that proposed offices, studies, gyms, or other similar spaces may be considered a potential bedroom by the Consent Authority.

In lieu of potable water infrastructure servicing the site, roof rainwater collection within on-lot tanks has been assumed for this assessment. The design water volume for roof water tank supply is estimated at 160 litres/ person/ day[11]. This assumes standard water saving fixtures[12] being installed within the proposed future developments. This should be reviewed for each proposed lot at the Building Consent stage within a development specific wastewater design by a suitably qualified professional.

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

6.3 Treatment Standard and System

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

It is recommended that to meet suitable minimum treated effluent output quality, secondary treatment systems are accounted for within future developments. Secondary treatment has

[10] *TP58 Table 6.1.*

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

[12] *Low water consumption dishwashers and no garbage grinders.*

been elected to provide compliance as a permitted activity of the proposed Northland Regional Plan considering the site topography and proximity to the erosion gully.

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

6.4 Soil Loading Rate

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

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

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

6.5 Concept Land Disposal System

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

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

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

Table 8: Disposal Field Design Criteria

Design Criteria	Site Conditions
Topography at the disposal areas shall not exceed 25°. Exceedances will require a Discharge Consent.	Concept design complies, sited on slopes approximately at 15 ° for lot 1 and 10 ° for lot 2. Refer Drawing No. 400.
On shallower slopes >10 ° compliance with Northland Regional Plan (NRP) rule C.6.1.3(6) is required.	Concept design complies, all disposal fields sited on slopes >10 ° and include cut-off drains. Refer Drawing No. 400.

On all terrain irrigation lines should be laid along contours.	Concept design complies, refer Drawing No. 400.
Disposal system situated no closer than 600 mm (vertically) from the winter groundwater table (secondary treated effluent).	Concept design complies, no groundwater detected at time of investigation.
Separation from surface water features such as stormwater flow paths (including road and kerb channels), rivers, lakes, ponds, dams, and natural wetlands according to Table 9, Appendix B of the NRP.	Concept design complies. Wastewater disposal fields can be designed to accommodate setbacks from on-site and adjacent surface water features. Refer Drawing No. 400.

6.5.1 Concept Disposal Field Sizing

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

- **Concept Primary Disposal Field.** A minimum PCDI primary disposal field of 427 m^2 laid parallel to the natural contours.
- **Concept Reserve Disposal Field.** A minimum reserve disposal field equivalent to 30 % of the primary disposal field is required under NRP rule C.6.1.3(9)(b) for secondary or tertiary treatment systems. The concept design has been increased to 50 % to accommodate note 3 of TP58 Table 9.2. It is recommended each proposed lot provides a 213.5 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 been identified within the site boundaries, however, it is anticipated that the site can provide freeboard above the 1 % AEP flood height to comply with this rule.

6.6 Summary of Concept Wastewater Design

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

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

Table 9: Concept Wastewater Design Summary

Design Element	Specification
Concept development	Five-bedroom, peak occupancy of 8 (per lot)
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 6, NZS1547 Category 5
Soil Loading Rate	3 mm/ day
Primary disposal field	Surface/ subsurface laid PCDI, min. 427 m^2
Reserve disposal field	Surface/ subsurface laid PCDI, min. 50 % or 214 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 are required. Stormwater management discharges downslope of all disposal fields.

1. Unless further water saving measures are included.

6.7 Assessment of Environmental Effects

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

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

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

7 STORMWATER ASSESSMENT

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

7.1 Regulatory Requirements

Stormwater management for the proposed activity is controlled by the FNDC Operative District Plan[13] and NRC Proposed Regional Plan[14]. The requirement for subdivision and probable future development under these legislations is summarised below.

7.1.1 Regional Provisions

The Proposed Regional Plan states the diversion and discharge of stormwater into water or onto or into land where it may enter water from an impervious area or by way of a stormwater collection system, is a permitted activity, provided the criteria of Rule C.6.4.2(1) to (8) are met. The proposed activity is considered to meet the requirements of a Permitted Activity. Assessment of the consent status is summarised in Section 7.7.2 and in full within Appendix C.

7.1.2 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.

7.1.3 Environmental Zone Provisions

Permitted activity status for proposed impervious surface areas within the coastal living zone is determined by Rule 10.7.5.1.6 which is presented below.

> *The maximum proportion or amount of the gross site area which may be covered by buildings and other impermeable surfaces shall be 10% or 600m^2 whichever is the lesser*

7.2 Impervious Surfaces and Activity Status

The proposed activity has been assessed as a Permitted Activity in accordance with rules outlined by Sections 7.1.1 to 7.1.3. A summary of this is provided as Table 10 below which have been developed from our observations and AutoCAD drawings in lieu of specific survey. For the proposed lot, this has been taken as conceptual, maximum probable development of typical rural residential scenarios. Refer Section 7.3.

Table 10: Summary of Impervious Surfaces

Surface	Proposed Lot 1		Proposed Lot 2		Proposed Lot 3 & 4	
Existing Condition	**NA**				**(41,600 m^2)**	
Roof					0 m^2	0 %
Driveway					0 m^2	0 %
Right of Way					0 m^2	0 %
Total impervious					0 m^2	0 %
Proposed Condition	**(8,320.3 m^2)**		**(8,048 m^2)**		**(24,200 m^2)**	
Roof (Concept)	300 m^2	3.16 %	300 m^2	3.73 %	0 m^2	0 %
Driveway (Concept)	200 m^2	2.40 %	200 m^2	2.49 %	0 m^2	0 %

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

Right of Way	0 m^2	0 %	0 m^2	0 %	0 m^2	0 %
Total	500 m^2	6.01 %	500 m^2	6.21 %	0 m^2	0 %
Activity Status	Permitted		Permitted		Permitted	

7.3 Stormwater Management Concept

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

- **Probable Future Development (Lots 1 and 2).** The proposed application includes subdivision formation only and not lot specific residential development at this stage. As such a conservative model of probable future on-lot development has been developed for this assessment considering variation of scale in typical rural residential development. The probable future on-lot development concept includes up to 300 m^2 potential roof area and up to 200 m^2 potential driveway or parking areas. No RoW areas are expected to be accounted for within the application.

  To comply with the NRC Proposed Regional Plan Rule C6.4.2(2) and FNDC Engineering Standards Table 4-1 for a site where downstream flooding hazard of 1 % AEP event has been identified, it is recommended future impermeable surfaces are attenuated to 80 % of the pre-development peak run-off condition for the design storm event which has been designated as the 1 % Annual Exceedance Probability (AEP) scenarios.

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

7.4 Design Storm Event

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

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

Relevant design rainfall intensity and depths have been ascertained for the site location from the NIWA HIRDS meteorological model[15]. NIWA provides guidelines for modelling the effects of potential climate change effects of rainfall intensity increase by applying a potential

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

change factor to historical data. This report has adopted potential change factors to account for a 2.1°c climate change increase scenario. NIWA HIRDS and climate change factor data is presented in full within Appendix D.

7.5 Concept Attenuation Model

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

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

The rational method has been adopted by Geologix with run-off coefficients as published by Auckland Council TP108[16] and FNDC Engineering Standards[17] to provide a suitable attenuation design to limit post development peak flows to 80 % of pre-development conditions.

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

Table 11: Probable Future Development Attenuation Concept

Design Parameter	10 % AEP	1 % AEP
Proposed Lots 1 & 2		
Regulatory Compliance	NRC Proposed Regional Plan	FNDC Engineering Standards
Pre-development peak flow	10.16 l/s	15.43 l/s
80 % pre-development peak flow	NA	12.34 l/s
Post-development peak flow	13.76 l/s	20.90 l/s
Total Storage Volume Required	6,986 litres	19,215 litres
Concept	Adopt attenuation to 80 % of pre-development condition for 1 % AEP storm as critical condition. Assuming 1 x 25,000 litre tank, install 10 mm orifice 2.00 m below overflow.	

7.5.1 On-Lot Discharge

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

---

[16] *Auckland Regional Council Technical Publication 108, Guidelines for stormwater runoff modelling in the Auckland Region, April 1999.*

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

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

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

Table 12: Summary of Concept Dispersion Devices

Concept Impervious Area to Tank	Dispersion Pipe/ Trench Length	Concept
Proposed Lot 1 & 2		
500 m^2	7.8 m	Above ground dispersion device or in-ground dispersion trench.

7.6 Stormwater Quality

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

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

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

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

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.

7.7 Assessment Criteria and Consent Status

7.7.1 District Plan

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

7.7.2 Regional Plan

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

8 POTABLE WATER & FIRE FIGHTING

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

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

8.1 Erosion and Sediment Control

Erosion and sediment control measures are not required within this application.

It is recognised that the associated earthworks are only related to the construction and upgrade of the existing vehicle crossings, which have a very limited earthworks area and volume. It is considered to have less than minor impacts on the surrounding area.

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, the Geologix GIR and considering the measures presented in this report, a summary of the proposed activities against defined natural hazards is presented as Table 13.

Table 13: Summary of Natural Hazards

Natural Hazard	Applicability	Mitigation & Effect on Environment
Erosion	NA	No mitigation required, less than minor.
Overland flow paths, flooding, inundation	NA	Proposed building is outside of these hazards, no mitigation required, less than minor.
Landslip	NA	No mitigation required, 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.*

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 Vehicle Crossings

Access to the proposed subdivision and to each of the proposed lots is recommended by standard domestic crossings according to current FNDC Engineering Standards. The access points to proposed lots may be determined at the Building Consent Stage according to NZS4404 Clause 3.3.17.2. A summary of proposed vehicle crossings is presented as Table 14.

Table 14: Summary of Proposed Vehicle Crossings

Location	Type	Detail	Formation
Proposed Lot 1 – Taipa Heights Drive	FNDC Type 1A, Light Vehicles	Provide new vehicle crossing to typical detail with new 375 mm dia. RCP culvert and 3.0 m width at boundary.	Subdivision
Proposed Lot 2 – Taipa Heights Drive	FNDC Type 1A, Light Vehicles	Upgrade existing site entrance to typical detail with new 375 mm dia. RCP culvert and 3.0 m width at boundary.	Subdivision
Proposed Lot 3 – Taipa Heights Drive	FNDC Type 1A, Light Vehicles	Upgrade existing vehicle crossing for serving two lots to typical detail with new 375 mm dia. RCP culvert and 3.0 m width at subject site boundary.	Subdivision

RCP – Reinforced Concrete Pipe

11 LIMITATIONS

This report has been prepared for Graeme & Michael Bell 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

GENERAL NOTES

1. DRAWING REPRODUCED FROM THOMSON SURVEY LTD REF.10532, DATED 25.08.23.
2. FOR INDICATION ONLY, NOT FOR CONSTRUCTION.
3. FEATURES PRESENTED ARE INDICATIVE AND HAVE NOT BEEN VERIFIED.
4. DO NOT SCALE FROM THIS DRAWING.

4
DP 211477

2
DP 402475

3
DP 577720

LOT 1
8320.3m²

LOT 2
8048m²

LOT 3
2.42 Ha

WET AREA

10m BOUNDARY SETBACK (Excludes Shared Access)

EXAMPLE 30m by 30m AREA

EXAMPLE 30m by 30m AREA

PROPOSED ENTRANCE

PROPOSED ENTRANCE

EXISTING ENTRANCE

TAIPA HEIGHTS DRIVE

Meters
12.5 0 12.5 25
1:1250

A	CONSENT	19/10/2023
Revision	Issue	Date

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consulting engineers
AUCKLAND | NORTHLAND

Project Name and Address
165 TAIPA HEIGHTS DRIVE
TAIPA
LOT 1 DP 190841

Project	Drawn By
C0391	GC

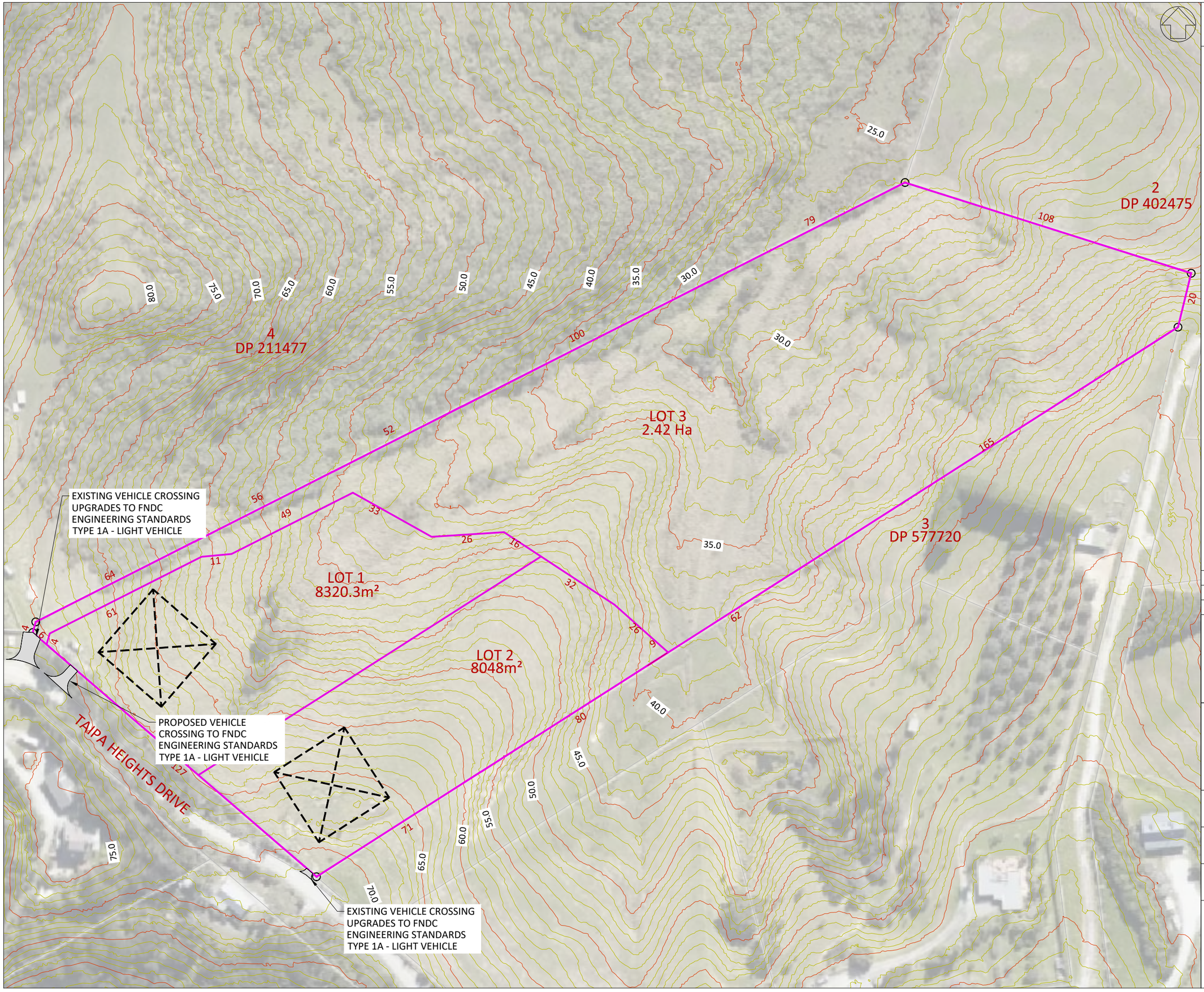
Client
GRAEME & MICHAEL BELL

Sheet Title
PROPOSED SCHEME PLAN

Sheet
100

FILE PATH: Z:\Projects\C0300-C0399\165 Taipa Heights Drive, Taipa - C0391\07 - Technical & Drawings\Drawings\C0391-S-01.dwgC0391-S-01.dwg

PLOTTED: 19/10/2023



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PROPOSED BUILDING SHAPE FACTOR

Meters 12.5 0 12.5 25

1:1250

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165 TAIPA HEIGHTS DRIVE
TAIPA
LOT 1 DP 190841

Project	Drawn By
C0391	GC

Client

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Sheet Title

PROPOSED ACCESSWAY PLAN

Sheet

101

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MINOR CONTOURS AT 0.5M INTERVALS
MAJOR CONTOURS AT 1.0M INTERVALS

PROPOSED BUILDING SHAPE FACTOR

BHXX GEOLOGIX HAND AUGER & DYNAMIC CONE PENETROMETER

DOWNSLOPE EDGE PILES

4
DP 211477

LOT 3
2.42 Ha

3
DP 577720

LOT 1
8320.3m²

LOT 2
8048m²

WET AREA

TAIPA HEIGHTS DRIVE

BH01
BH02
BH03
BH04

A
B
C

Meters
12.5 0 12.5 25
1:1250

Revision	Issue	Date
A	CONSENT	30/01/2024

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LOT 1 DP 190841

Project	Drawn By
C0391	GC

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Sheet Title
GEOTECHNICAL SITE PLAN

Sheet
200

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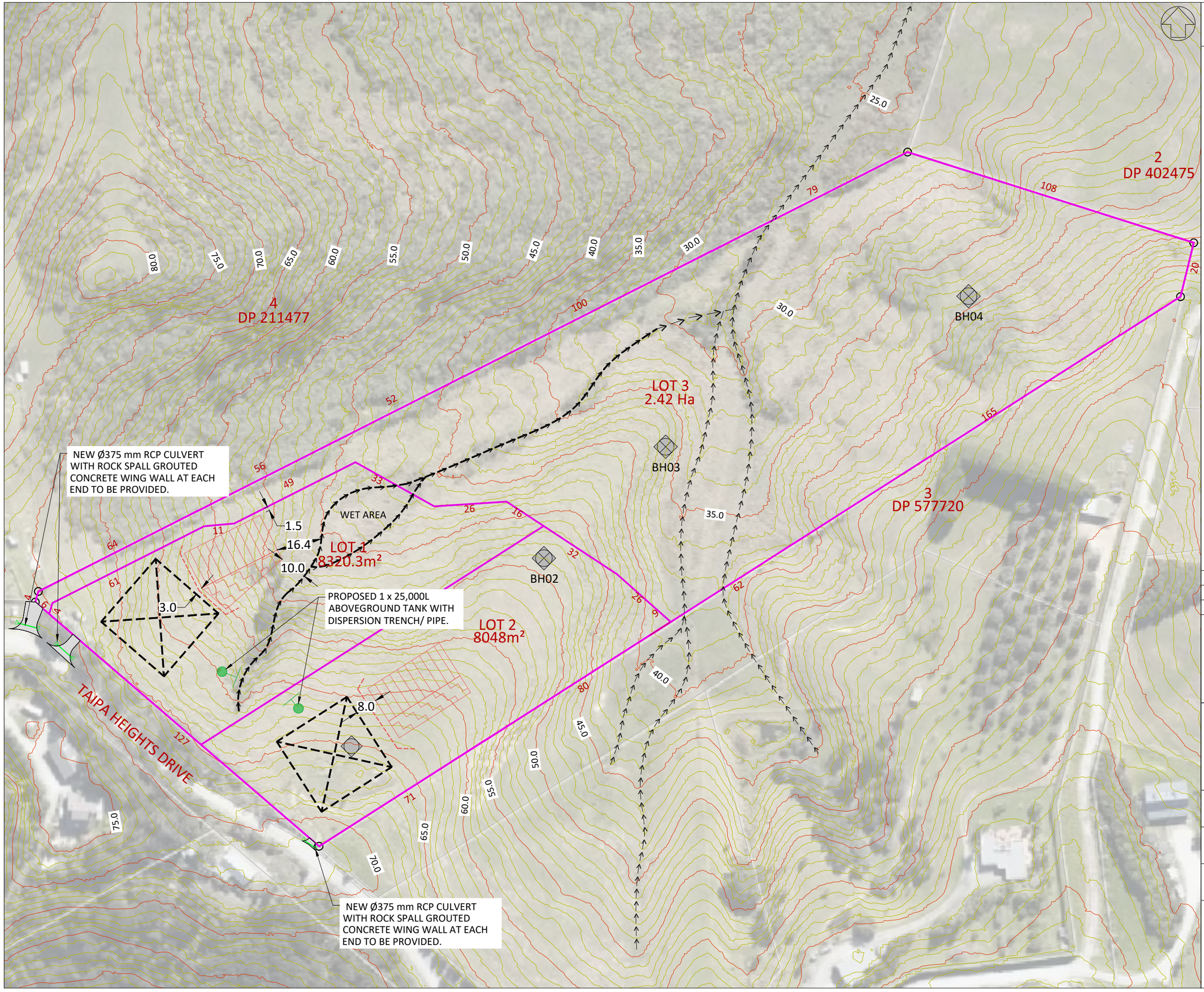

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PROPOSED BUILDING SHAPE FACTOR

BH01 GEOLOGIX HAND AUGER & DYNAMIC CONE PENETROMETER - SEPTEMBER 2023

EXISTING OVERLAND FLOW PATH

PROPOSED TANK WITH DISPERSION DEVICE

CONCEPT WASTEWATER PRIMARY DISPOSAL FIELD 427m²

CONCEPT WASTEWATER RESERVE DISPOSAL FIELD 214 m² (50%)

WASTEWATER FIELD CUT OFF DRAIN

Meters 12.5 0 12.5 25
1:1250

A	CONSENT	19/10/2023
Revision	Issue	Date

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Project	Drawn By
C0391	GC

Client
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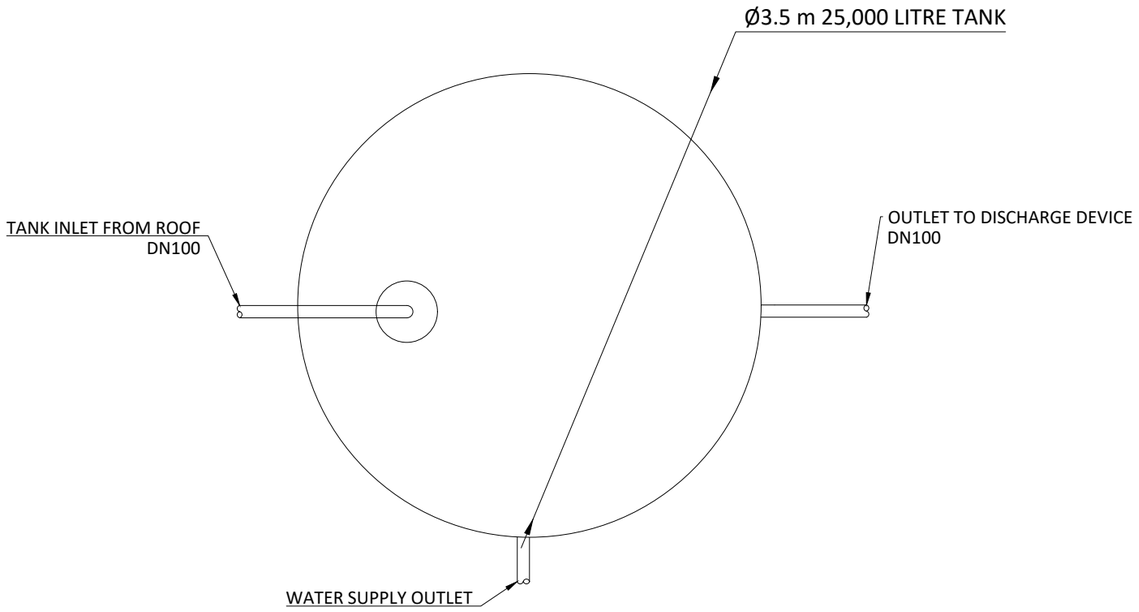
Sheet Title
3 WATERS PLAN

Sheet
400

PLOTTED: 19/10/2023

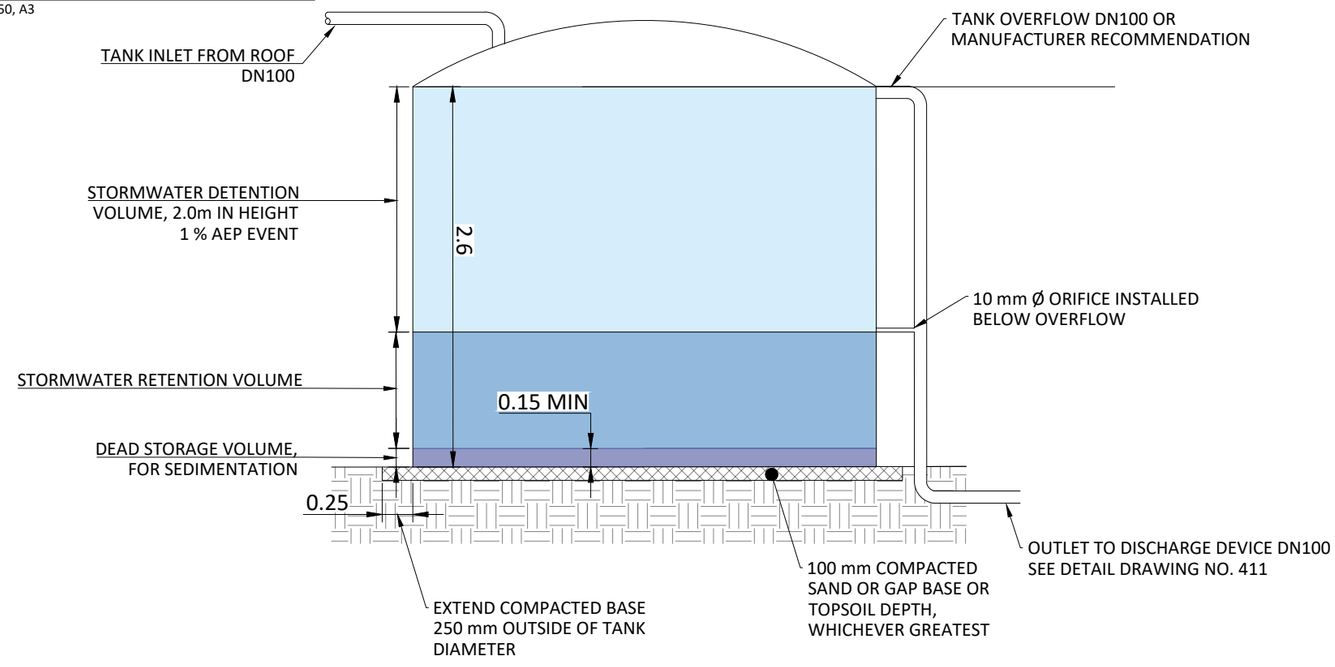
PROPOSED TANK PLAN VIEW

1:50, A3



PROPOSED TANK SIDE VIEW

1:50, A3



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Sheet Title

TYIPICAL WATER TANK DETAIL

Sheet

410

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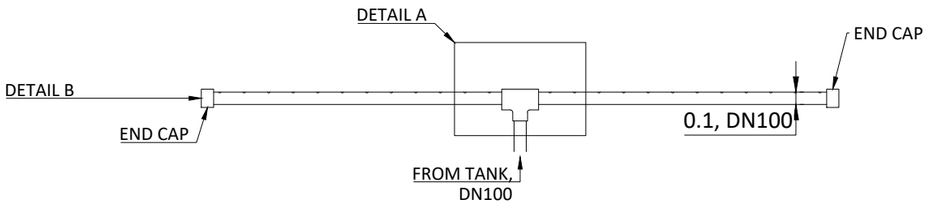
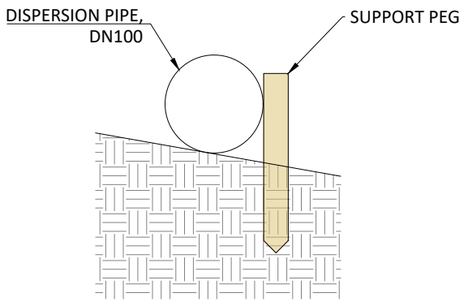
OPTION 1: DISPERSION VIA ABOVE GROUND PIPE

NOT TO SCALE



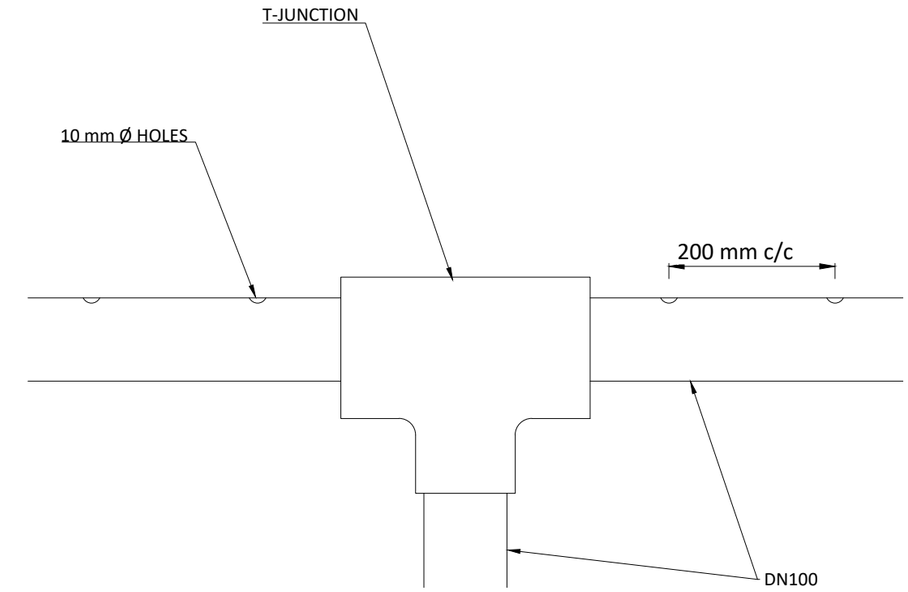
DETAIL B - SIDE VIEW

NOT TO SCALE



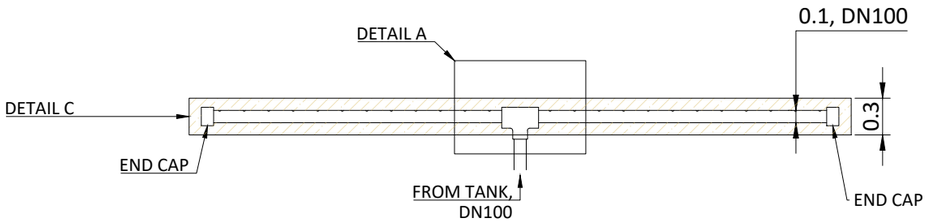
DETAIL A - T JUNCTION AND PERFORATIONS

NOT TO SCALE



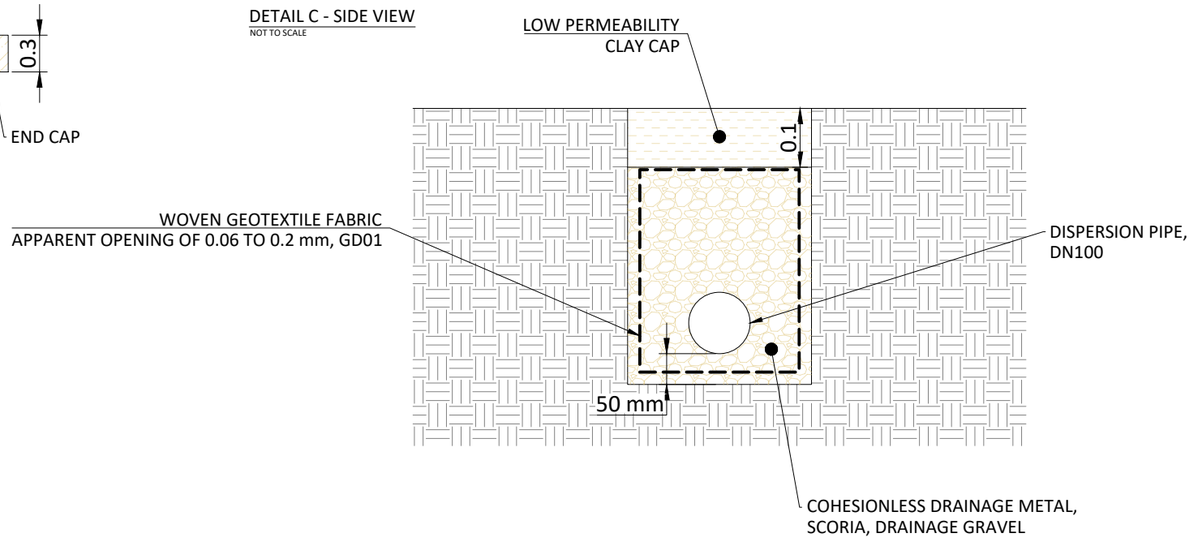
OPTION 2: DISPERSION VIA BELOW GROUND TRENCH

NOT TO SCALE



DETAIL C - SIDE VIEW

NOT TO SCALE



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Sheet Title

TYPICAL DISPERSION TRENCH DETAIL

Sheet

411

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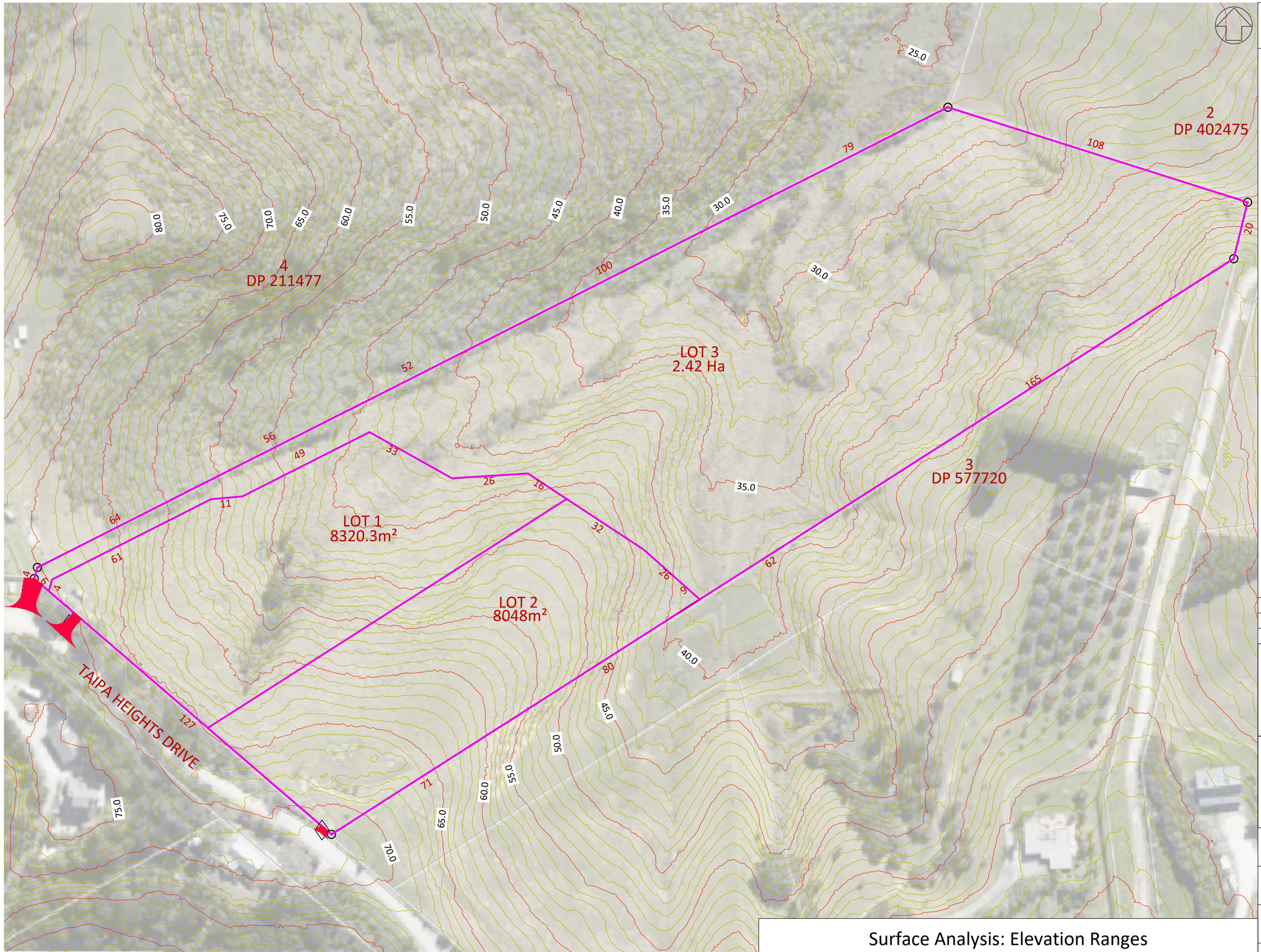

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Meters
12.5 0 12.5 25
1:1250

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LOT 1 DP 190841

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Sheet Title
EARTHWORKS PLAN

Sheet
600

Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Earthwork Calcs	**1.000**	**1.000**	115.15sq.m	36.06 Cu. M.	0.00 Cu. M.	36.06 Cu. M.<Cut>
Totals			115.15sq.m	36.06 Cu. M.	0.00 Cu. M.	36.06 Cu. M.<Cut>

Surface Analysis: Elevation Ranges

Number	Color	Minimum Elevation (m)	Maximum Elevation (m)	2D Area (m^2)	Volume (m^3)
1		-0.500	0.000	115.1	36.1

FILE PATH: Z:\Projects\C0300-C0399\165 Taipa Heights Drive, Taipa - C0391\07 - Technical & Drawings\Drawings\C0391-S-01.dwgC0391-S-01.dwg

PLOTTED: 19/10/2023

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APPENDIX B

Engineering Borehole Records

INVESTIGATION LOG

HOLE NO.: BH01

JOB NO.: C0391

CLIENT: Graeme & Michael Bell

PROJECT: 165 Taipa Heights Road, Taipa

SITE LOCATION: Northeast of Taipa Heights Drive

START DATE: 29/09/2023

CO-ORDINATES: 1643379mE, 6125984mN

ELEVATION: Ground

END DATE: 29/09/2023

CONTRACTOR: Internal

RIG: Hand Auger

DRILLER: TW

LOGGED BY: TW

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)
Grassed TOPSOIL comprising organic SILT, dark brown, moist, low plasticity.
Clayey SILT, stiff, orange brown, moist, low plasticity. (Northland Allochthon Residual Soil)
Clayey SILT with trace rootlets, stiff to very stiff, orange brown mottled dark brown, moist, low plasticity. (Northland Allochthon Residual Soil)
Clayey SILT with trace rootlets, stiff to very stiff, orange brown, moist, low plasticity. (Northland Allochthon Residual Soil)
SILT with some clay, very stiff, brown mottled grey and white, moist, low plasticity. (Northland Allochthon Residual Soil) 4.0m - 4.3m: becoming dark orange. 4.7m: becoming wet.
End Of Hole: 5.00m

SAMPLES | DEPTH (m): 0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.2, 3.4, 3.6, 3.8, 4.0, 4.2, 4.4, 4.6, 4.8, 5.0 | LEGEND

SCALA PENETROMETER (Blows / 0mm): 2, 4, 6, 8, 10, 12, 14, 16, 18

VANE SHEAR STRENGTH (kPa) Vane: 3282 — scale 50, 100, 150, 200

Values
98 / 28
81 / 28
87 / 31
195+ / -
173 / 89
195+ / -
195+ / -
195+ / -
195+ / -
195+ / -
195+ / -
195+ / -
195+ / -
195+ / -
195+ / -
195+ / -
195+ / -

WATER: Groundwater Not Encountered

PHOTO(S)

REMARKS

1. Hand auger completed at target depth.
2. Groundwater not encountered at the time of drilling and at the end of the day.

WATER

- Standing Water Level
- Out flow
- In flow

INVESTIGATION TYPE

- [x] Hand Auger
- [ ] Test Pit

INVESTIGATION LOG

HOLE NO.: BH02

JOB NO.: C0391

CLIENT: Graeme & Michael Bell

PROJECT: 165 Taipa Heights Road, Taipa

SITE LOCATION: Northeast of Taipa Heights Drive

START DATE: 29/09/2023

CO-ORDINATES: 1643428mE, 6126013mN

ELEVATION: Ground

END DATE: 29/09/2023

CONTRACTOR: Internal

RIG: Hand Auger + DCP

DRILLER: LW

LOGGED BY: LW

MATERIAL DESCRIPTION
(See Classification & Symbology sheet for details)

Depth (m)	Material Description
0.0 – 0.25	Grassed TOPSOIL comprising organic SILT, dark brown, moist, low plasticity.
0.25 – 2.2	Clayey SILT, very stiff, orange brown, moist, low plasticity. (Northland Allochthon Residual Soil)
2.2 – 2.5	SILT, very stiff, grey mottled brown and orange, moist, friable. (Northland Allochthon Residual Soil)
2.5 – 2.75	Clayey SILT, very stiff, grey and orange brown, moist, low plasticity. (Northland Allochthon Residual Soil)
2.75 – 3.2	SILT, very stiff to hard, grey mottled orange, moist, friable. (Northland Allochthon Completely Weathered Parent Rock)

End Of Hole: 3.20m

SCALA PENETROMETER (Blows / 100mm)

Depth (m)	Blows
3.2 – 3.3	13
3.3 – 3.4	12
3.4 – 3.5	25 >>

VANE SHEAR STRENGTH (kPa) Vane: 3467

Values
184 / 77
156 / 79
171 / 82
167 / 79
145 / 74
157 / 84
198+ / -
198+ / -
198+ / -
UTP / -
UTP / -

WATER: Groundwater Not Encountered

PHOTO(S)

REMARKS

1. Hand auger terminated at 3.2 m due to dense strata.
2. Continued with DCP from until refusal at 3.6 m.
3. Groundwater not encountered at the time of drilling and at the end of the day.

WATER

- Standing Water Level
- Out flow
- In flow

INVESTIGATION TYPE

- [x] Hand Auger
- [ ] Test Pit

INVESTIGATION LOG

HOLE NO.: BH03

CLIENT: Graeme & Michael Bell

PROJECT: 165 Taipa Heights Road, Taipa

JOB NO.: C0391

SITE LOCATION: Northeast of Taipa Heights Drive

START DATE: 29/09/2023

CO-ORDINATES: 1643460mE, 6126035mN

ELEVATION: Ground

END DATE: 29/09/2023

CONTRACTOR: Internal

RIG: Hand Auger + DCP

DRILLER: TW

LOGGED BY: TW

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER (Blows / 100mm)	VANE SHEAR STRENGTH (kPa) Vane: 3282	WATER
Grassed TOPSOIL comprising organic SILT, dark brown, moist, low plasticity.		0.0				
Clayey SILT, very stiff to hard, brown, moist, low plasticity. (Northland Allochthon Residual Soil)		0.2			184, 92	
		0.4				
		0.6			195+, -	
Clayey SILT, very stiff to hard, grey mottled orange, moist, low plasticity. (Northland Allochthon Residual Soil)		0.8			UTP, -	
0.7m: becoming grey mottled orange.		1.0				
0.9m: becoming dry and friable.		1.2		8	UTP, -	
		1.4		6, 9		
		1.6		8, 7	195+, -	
1.6m: becoming moist.		1.8		5, 6		
		2.0		8, 5, 9	195+, -	
End Of Hole: 2.10m		2.2		11, 16	UTP, -	
		2.4		21 >>, 25 >>		
		2.6				
		2.8				
		3.0				
		3.2				
		3.4				
		3.6				
		3.8				
		4.0				
		4.2				
		4.4				
		4.6				
		4.8				
		5.0				

Groundwater Not Encountered

PHOTO(S)

REMARKS

1. Hand auger terminated at 2.1 m due to dense strata.
2. Conducted DCP from 1.2 m until refusal at 2.5 m.
3. Groundwater not encountered at the time of drilling and at the end of the day.

WATER

- Standing Water Level
- Out flow
- In flow

INVESTIGATION TYPE

- [x] Hand Auger
- [ ] Test Pit

INVESTIGATION LOG

HOLE NO.: BH04

CLIENT: Graeme & Michael Bell

PROJECT: 165 Taipa Heights Road, Taipa

JOB NO.: C0391

SITE LOCATION: Northeast of Taipa Heights Drive

START DATE: 29/09/2023

CO-ORDINATES: 1643552mE, 6126100mN

ELEVATION: Ground

END DATE: 29/09/2023

CONTRACTOR: Internal

RIG: Hand Auger + DCP

DRILLER: LW

LOGGED BY: LW

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER (Blows / 100mm)	VANE SHEAR STRENGTH (kPa) Vane: 3467	Values	WATER
TOPSOIL comprising organic SILT; dark brown; moist; low plasticity.		0.0	TS				
Clayey SILT, stiff to very stiff, brown, moist, low plasticity. (Northland Allochthon Residual Soil)		0.2				85 27	
		0.4					
		0.6				99 47	
Clayey SILT, stiff to very stiff, grey mottled orange, moist to wet, low plasticity. (Northland Allochthon Residual Soil)		0.8				113 58	
		1.0					
		1.2				96 52	
Clayey SILT, stiff to very stiff, brown, wet, low plasticity. (Northland Allochthon Residual Soil)		1.4				102 48	
		1.6					
		1.8				163 60	
		2.0				198+ -	◁
		2.2					
2.5m - 2.7m: contains trace sand.		2.4				198+ -	
		2.6					
		2.8				198+ -	
		3.0				177 45	
Clayey SILT, stiff to very stiff, grey mottled orange, wet, low plasticity. (Northland Allochthon Completely Weathered Parent Rock)		3.2				198+ -	
		3.4				UTP -	
End Of Hole: 3.50m		3.6		18 14 25 >>			
		3.8					
		4.0					
		4.2					
		4.4					
		4.6					
		4.8					
		5.0					

PHOTO(S)

REMARKS

1. Hand auger terminated at 3.5 m due to dense strata.
2. Continued with DCP until refusal at 3.8 m.
3. Groundwater not encountered at the time of drilling and encountered at 2.03 m at the end of day.

WATER

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

INVESTIGATION TYPE

- ☑ Hand Auger
- ☐ Test Pit

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APPENDIX C

Assessment of Environmental Effects and Assessment Criteria

Table 15: Wastewater Assessment of Environmental Effects

Item	NRC Separation Requirement[2]	FNDC Separation Requirement	Site Assessment[3]
Individual System Effects			
Flood Plains	Above 5 % AEP	NR	Complies. Disposal field well above mapped flood hazard.
Stormwater Flowpath[4]	5 m	NR	Complies, see annotations on Drawing No. 400.
Surface water feature[5]	15 m	15 m, increased to 30 m in certain conditions	Complies.
Coastal Marine Area	15 m	30 m	Complies, not within site.
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	0.6 m	0.6 m	Complies.
Topography			Complies, >10 ° and <25 °.
Cut off drain required?			No.
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 16: 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
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.

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APPENDIX D

Stormwater Calculations

Project Ref:	C0391		**STORMWATER ATTENUATION TANK DESIGN**	geologix consulting engineers
Project Address:	165 TAIPA HEIGHTS DRIVE, TAIPA			
Design Case:	CONCEPT FUTURE DEVELOPMENT		**50 % AEP STORM EVENT, 80 % OF PRE DEVELOPMENT**	
Date:	18 October 2023	REV 1		

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

PREDEVELOPMENT SCENARIO				**POST DEVELOPMENT SCENARIO**			
ITEM	AREA, A, m2	COEFFICIENT, C	RUNOFF, l/s	ITEM	AREA, A, m2	COEFFICIENT, C	RUNOFF, l/s
IMPERVIOUS A	0	0	0.00	TO TANK	300	0.96	5.67
IMPERVIOUS B	0	0	0.00	OFFSET	200	0.83	3.27
IMPERVIOUS C	0	0	0.00	PERVIOUS	0	0.67	0.00
EX. PERVIOUS	500	0.67	6.59	EX. CONSENTED	0	0.96	0.00
TOTAL	**500**	TYPE D	**6.59**	**TOTAL**	**500**	TYPE D	**8.93**

PRE DEVELOPMENT RUNOFF			
50 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	56.4	mm/hr	* CLIMATE CHANGE FACTOR CALCULATED IN ACCORDANCE WITH NIWA HIRDS RECOMMENDATIONS. HISTORIC RAINFALL INTENSITY, 10 MINUTES IS MULTIPLIED BY POTENTIAL CLIMATE CHANGE FACTORS. NIWA RECOMMENDS THAT FOR 10 MINUTE TO 1 HOUR ADOPT THE 1 HR FACTOR.
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	25.62	%	
50 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	70.85	mm/hr	
50 % AEP PRE DEVELOPMENT PEAK FLOW	6.59	l/s	
80 % OF PRE DEVELOPMENT PEAK FLOW	**5.27**	**l/s**	

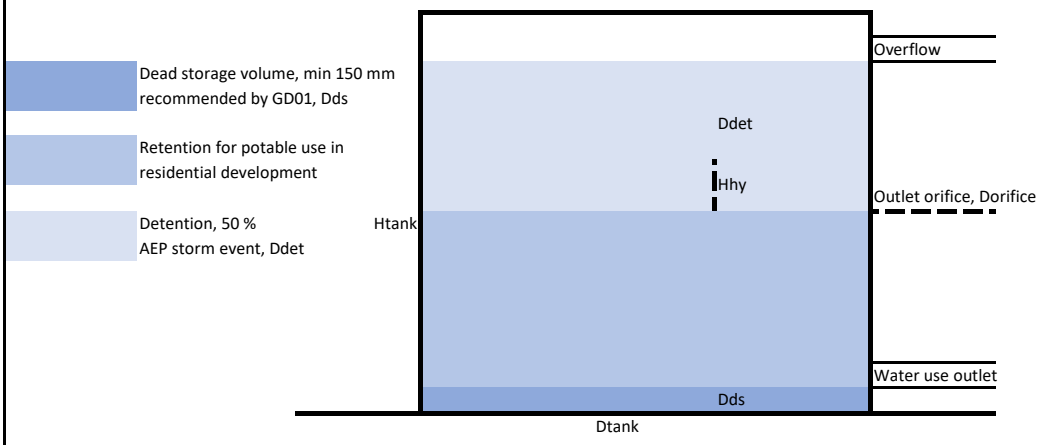
INCREASED POST DEVELOPMENT RUNOFF, 50 % AEP WITH CLIMATE CHANGE PROJECTION OF 2.1 DEGREES

TIME, min	INTENSITY, mm/hr	CC FACTOR	CC INTENSITY, mm/hr	RUNOFF, Q, l/s	Allowable flow, l/s	Difference, l/s	Required Storage, litres
10	56.40	1.2562	70.85	8.93	2.01	6.93	4157
20	43.50	1.2562	54.64	6.89	2.01	4.88	5861
30	36.80	1.2562	46.23	5.83	2.01	3.82	6880
60	26.70	1.2562	33.54	4.23	2.01	2.22	8001
120	18.70	1.2457	23.29	2.94	2.01	0.93	6698
360	9.79	1.2058	11.80	1.49	2.01	No Att. Req.	0
720	6.19	1.1785	7.29	0.92	2.01	No Att. Req.	0
1440	3.77	1.1512	4.34	0.55	2.01	No Att. Req.	0
2880	2.21	1.1281	2.49	0.31	2.01	No Att. Req.	0
4320	1.59	1.1155	1.77	0.22	2.01	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 assuming 25,000 litre tank



SPECIFICATION

			NOTES:
TOTAL STORAGE REQUIRED	8.001	m3	
TANK HEIGHT, Htank	2.6	m	Concept sizing assuming 25,000 litre tank
TANK DIAMTER, Dtank	3.5	m	No. of Tanks 1
TANK AREA, Atank	9.62	m2	Single tank area
TANK MAX STORAGE VOLUME, Vtank	25015	litres	
REQUIRED STORAGE HEIGHT, Ddet	0.83	m	Below overflow
DEAD STORAGE VOLUME, Dds	0.15	m	GD01 recommended minimum
TOTAL WATER DEPTH REQUIRED	0.98	m	
AVERAGE DISCHARGE RATE, Qavg	0.00009	m3/s	
AVERAGE HYDRAULIC HEAD, Hhy	0.42	m	
AREA OF ORIFICE, Aorifice	5.23E-05	m2	
ORIFICE DIAMETER, Dorifice	8	mm	**Minimum 10 mm diameter**
VELOCITY AT ORIFICE	4.04	m/s	
ACHIEVABLE STORAGE OF SURFACES TO TANK IN 24 HOURS	60985	litres/ 24hrs	
AREA TO TANK CAN SERVICE ATTENUATION?	YES		

Project Ref:	C0391		**STORMWATER ATTENUATION TANK DESIGN**	geologix consulting engineers
Project Address:	165 TAIPA HEIGHTS DRIVE, TAIPA			
Design Case:	CONCEPT FUTURE DEVELOPMENT		**20 % AEP STORM EVENT, 80 % OF PRE DEVELOPMENT**	
Date:	18 October 2023	REV 1		

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

PREDEVELOPMENT SCENARIO				**POST DEVELOPMENT SCENARIO**			
ITEM	AREA, A, m2	COEFFICIENT, C	RUNOFF, l/s	ITEM	AREA, A, m2	COEFFICIENT, C	RUNOFF, l/s
IMPERVIOUS A	0	0	0.00	TO TANK	300	0.96	7.42
IMPERVIOUS B	0	0	0.00	OFFSET	200	0.83	4.28
IMPERVIOUS C	0	0	0.00	PERVIOUS	0	0.67	0.00
EX. PERVIOUS	500	0.67	8.63	EX. CONSENTED	0	0.96	0.00
TOTAL	**500**	TYPE D	**8.63**	**TOTAL**	**500**	TYPE D	**11.70**

PRE DEVELOPMENT RUNOFF			
20 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	73.1	mm/hr	* CLIMATE CHANGE FACTOR CALCULATED IN ACCORDANCE WITH NIWA HIRDS RECOMMENDATIONS. HISTORIC RAINFALL INTENSITY, 10 MINUTES IS MULTIPLIED BY POTENTIAL CLIMATE CHANGE FACTORS. NIWA RECOMMENDS THAT FOR 10 MINUTE TO 1 HOUR ADOPT THE 1 HR FACTOR.
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	26.88	%	
20 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	92.7	mm/hr	
20 % AEP PRE DEVELOPMENT PEAK FLOW	8.63	l/s	
80 % OF PRE DEVELOPMENT PEAK FLOW	**6.90**	**l/s**	

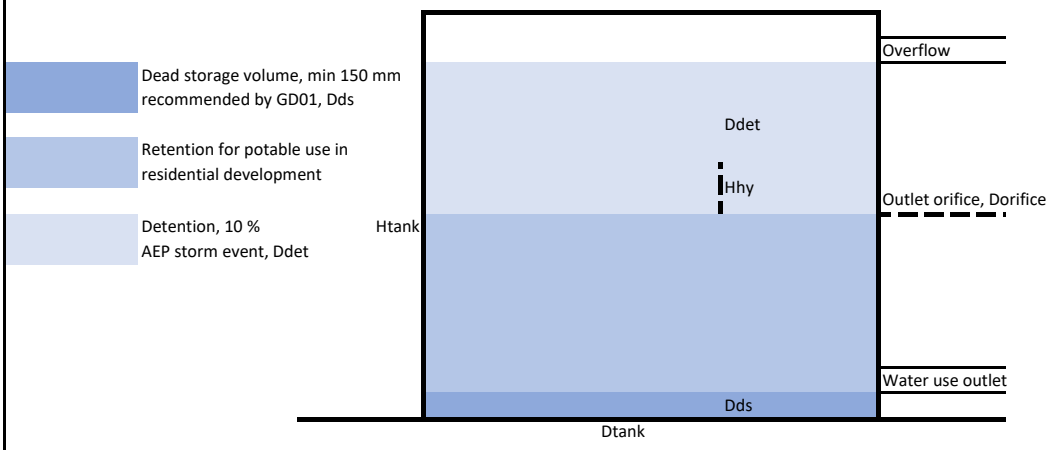
INCREASED POST DEVELOPMENT RUNOFF, 10 % AEP WITH CLIMATE CHANGE PROJECTION OF 2.1 DEGREES

TIME, min	INTENSITY, mm/hr	CC FACTOR	CC INTENSITY, mm/hr	RUNOFF, Q, l/s	Allowable flow, l/s	Difference, l/s	Required Storage, litres
10	73.10	1.2688	92.75	11.70	2.63	9.07	5441
20	56.60	1.2688	71.81	9.06	2.63	6.43	7714
30	47.80	1.2688	60.65	7.65	2.63	5.02	9037
60	34.80	1.2688	44.15	5.57	2.63	2.94	10586
120	24.40	1.2583	30.70	3.87	2.63	1.24	8957
360	12.80	1.2205	15.62	1.97	2.63	No Att. Req.	0
720	8.10	1.1932	9.66	1.22	2.63	No Att. Req.	0
1440	4.94	1.1638	5.75	0.73	2.63	No Att. Req.	0
2880	2.90	1.1407	3.31	0.42	2.63	No Att. Req.	0
4320	2.08	1.1302	2.35	0.30	2.63	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 assuming 25,000 litre tank



SPECIFICATION

TOTAL STORAGE REQUIRED	10.586	m3		
TANK HEIGHT, Htank	2.6	m	Concept sizing assuming 25,000 litre tank	
TANK DIAMETER, Dtank	3.5	m	No. of Tanks	1
TANK AREA, Atank	9.62	m2	Single tank area	
TANK MAX STORAGE VOLUME, Vtank	25015	litres		
REQUIRED STORAGE HEIGHT, Ddet	1.10	m	Below overflow	
DEAD STORAGE VOLUME, Dds	0.15	m	GD01 recommended minimum	
TOTAL WATER DEPTH REQUIRED	1.25	m		
AVERAGE DISCHARGE RATE, Qavg	0.00012	m3/s		
AVERAGE HYDRAULIC HEAD, Hhy	0.55	m		
AREA OF ORIFICE, Aorifice	6.01E-05	m2		
ORIFICE DIAMETER, Dorifice	9	mm	**Minimum 10 mm diameter**	
VELOCITY AT ORIFICE	4.65	m/s		
ACHIEVABLE STORAGE OF SURFACES	80578	litres/ 24hrs		
AREA TO TANK CAN SERVICE ATTENUATION?		YES		

Project Ref:	C0391		**STORMWATER ATTENUATION TANK DESIGN**	geologix consulting engineers
Project Address:	165 TAIPA HEIGHTS DRIVE, TAIPA			
Design Case:	CONCEPT FUTURE DEVELOPMENT		**10 % AEP STORM EVENT**	
Date:	18 October 2023	REV 1		

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

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

PREDEVELOPMENT SCENARIO				**POST DEVELOPMENT SCENARIO**			
ITEM	AREA, A, m2	COEFFICIENT, C	RUNOFF, l/s	ITEM	AREA, A, m2	COEFFICIENT, C	RUNOFF, l/s
IMPERVIOUS A	0	0	0.00	TO TANK	300	0.96	8.73
IMPERVIOUS B	0	0	0.00	OFFSET	200	0.83	5.03
IMPERVIOUS C	0	0	0.00	PERVIOUS	0	0.67	0.00
EX. PERVIOUS	500	0.67	10.16	EX. CONSENTED	0	0.96	0.00
TOTAL	**500**	TYPE D	**10.16**	**TOTAL**	**500**	TYPE D	**13.76**

PRE DEVELOPMENT RUNOFF			
10 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	85.6	mm/hr	* CLIMATE CHANGE FACTOR CALCULATED IN ACCORDANCE WITH NIWA
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	27.51	%	HIRDS RECOMMENDATIONS. HISTORIC RAINFALL INTENSITY, 10 MINUTES
10 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	109.1	mm/hr	IS MULTIPLIED BY POTENTIAL CLIMATE CHANGE FACTORS. NIWA
10 % AEP PRE DEVELOPMENT PEAK FLOW	10.16	l/s	RECOMMENDS THAT FOR 10 MINUTE TO 1 HOUR ADOPT 1 HR FACTOR

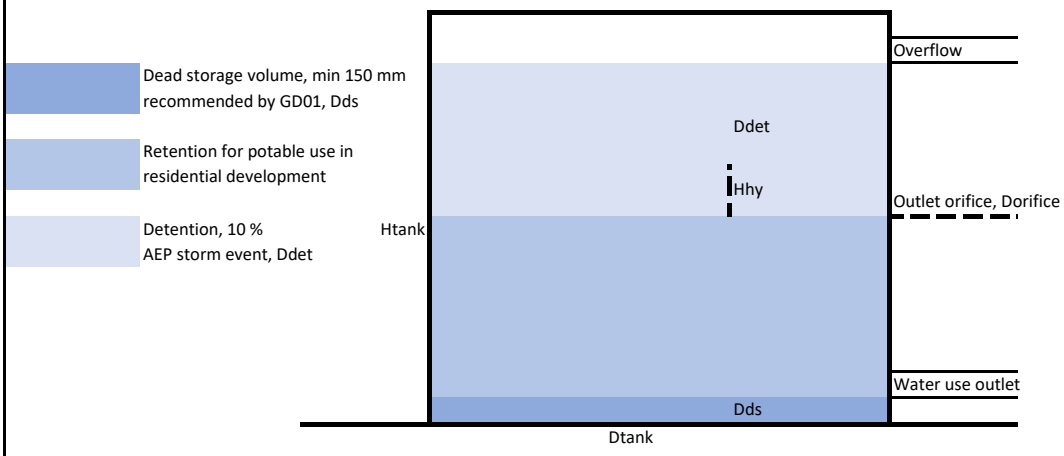
INCREASED POST DEVELOPMENT RUNOFF, 10 % AEP WITH CLIMATE CHANGE PROJECTION OF 2.1 DEGREES

TIME, min	INTENSITY, mm/hr	CC FACTOR	CC INTENSITY, mm/hr	RUNOFF, Q, l/s	Allowable flow, l/s	Difference, l/s	Required Storage, litres
10	85.60	1.2751	109.15	13.76	5.12	8.64	5185
20	66.30	1.2751	84.54	10.66	5.12	5.54	6645
30	56.00	1.2751	71.41	9.01	5.12	3.88	6986
60	40.80	1.2751	52.02	6.56	5.12	1.44	5173
120	28.60	1.2646	36.17	4.56	5.12	No Att. Req.	0
360	15.00	1.2268	18.40	2.32	5.12	No Att. Req.	0
720	9.54	1.1995	11.44	1.44	5.12	No Att. Req.	0
1440	5.82	1.1701	6.81	0.86	5.12	No Att. Req.	0
2880	3.42	1.147	3.92	0.49	5.12	No Att. Req.	0
4320	2.46	1.1365	2.80	0.35	5.12	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 assuming 25,000 litre tank



SPECIFICATION

TOTAL STORAGE REQUIRED	6.986	m3		
TANK HEIGHT, Htank	2.6	m	Concept sizing assuming 25,000 litre tank	
TANK DIAMETER, Dtank	3.5	m	No. of Tanks	1
TANK AREA, Atank	9.62	m2	Single tank area	
TANK MAX STORAGE VOLUME, Vtank	25015	litres		
REQUIRED STORAGE HEIGHT, Ddet	0.73	m	Below overflow	
DEAD STORAGE VOLUME, Dds	0.15	m	GD01 recommended minimum	
TOTAL WATER DEPTH REQUIRED	0.88	m		
AVERAGE DISCHARGE RATE, Qavg	0.00008	m3/s		
AVERAGE HYDRAULIC HEAD, Hhy	0.36	m		
AREA OF ORIFICE, Aorifice	4.89E-05	m2		
ORIFICE DIAMETER, Dorifice	8	mm	**Minimum 10 mm diameter**	
VELOCITY AT ORIFICE	3.77	m/s		
ACHIEVABLE STORAGE OF SURFACES	95141	litres/ 24hrs		
AREA TO TANK CAN SERVICE ATTENUATION?		YES		

Project Ref:	C0391		**STORMWATER ATTENUATION TANK DESIGN**	geologix consulting engineers
Project Address:	165 TAIPA HEIGHTS DRIVE, TAIPA			
Design Case:	CONCEPT FUTURE DEVELOPMENT		**1 % AEP STORM EVENT, 80 % OF PRE DEVELOPMENT**	
Date:	18 October 2023	REV 1		

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

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

PREDEVELOPMENT SCENARIO				**POST DEVELOPMENT SCENARIO**			
ITEM	AREA, A, m2	COEFFICIENT, C	RUNOFF, l/s	ITEM	AREA, A, m2	COEFFICIENT, C	RUNOFF, l/s
IMPERVIOUS A	0	0	0.00	TO TANK	300	0.96	13.26
IMPERVIOUS B	0	0	0.00	OFFSET	200	0.83	7.64
IMPERVIOUS C	0	0	0.00	PERVIOUS	0	0.67	0.00
EX. PERVIOUS	500	0.67	15.43	EX. CONSENTED	0	0.96	0.00
TOTAL	**500**	TYPE D	**15.43**	**TOTAL**	**500**	TYPE D	**20.90**

PRE DEVELOPMENT RUNOFF			
1 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	130.0	mm/hr	* CLIMATE CHANGE FACTOR CALCULATED IN ACCORDANCE WITH NIWA HIRDS RECOMMENDATIONS. HISTORIC RAINFALL INTENSITY, 10 MINUTES IS MULTIPLIED BY POTENTIAL CLIMATE CHANGE FACTORS. NIWA RECOMMENDS THAT FOR 10 MINUTE TO 1 HOUR ADOPT THE 1 HR FACTOR.
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	27.51	%	
1 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	165.8	mm/hr	
1 % AEP PRE DEVELOPMENT PEAK FLOW	15.43	l/s	
80 % OF PRE DEVELOPMENT PEAK FLOW	**12.34**	**l/s**	

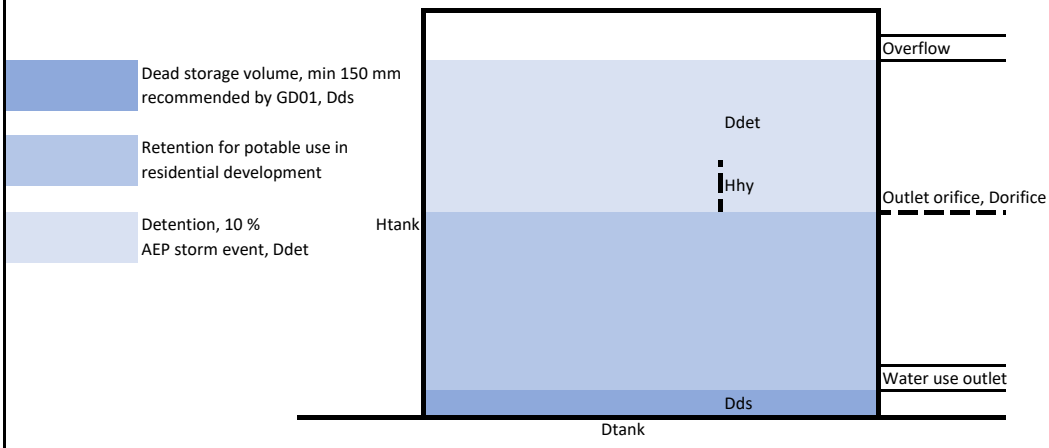
INCREASED POST DEVELOPMENT RUNOFF, 10 % AEP WITH CLIMATE CHANGE PROJECTION OF 2.1 DEGREES

TIME, min	INTENSITY, mm/hr	CC FACTOR	CC INTENSITY, mm/hr	RUNOFF, Q, l/s	Allowable flow, l/s	Difference, l/s	Required Storage, litres
10	130.00	1.2751	165.76	20.90	4.70	16.21	9725
20	101.00	1.2751	128.79	16.24	4.70	11.54	13854
30	85.40	1.2751	108.89	13.73	4.70	9.04	16265
60	62.40	1.2751	79.57	10.03	4.70	5.34	19215
120	43.80	1.2646	55.39	6.99	4.70	2.29	16478
360	23.10	1.2268	28.34	3.57	4.70	No Att. Req.	0
720	14.70	1.1995	17.63	2.22	4.70	No Att. Req.	0
1440	9.01	1.1701	10.54	1.33	4.70	No Att. Req.	0
2880	5.30	1.147	6.08	0.77	4.70	No Att. Req.	0
4320	3.82	1.1365	4.34	0.55	4.70	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 assuming 25,000 litre tank



SPECIFICATION

TOTAL STORAGE REQUIRED	19.215	m3		
TANK HEIGHT, Htank	2.6	m	Concept sizing assuming 25,000 litre tank	
TANK DIAMETER, Dtank	3.5	m	No. of Tanks	1
TANK AREA, Atank	9.62	m2	Single tank area	
TANK MAX STORAGE VOLUME, Vtank	25015	litres		
REQUIRED STORAGE HEIGHT, Ddet	2.00	m	Below overflow	
DEAD STORAGE VOLUME, Dds	0.15	m	GD01 recommended minimum	
TOTAL WATER DEPTH REQUIRED	2.15	m		
AVERAGE DISCHARGE RATE, Qavg	0.00022	m3/s		
AVERAGE HYDRAULIC HEAD, Hhy	1.00	m		
AREA OF ORIFICE, Aorifice	8.10E-05	m2		
ORIFICE DIAMETER, Dorifice	10	mm		
VELOCITY AT ORIFICE	6.26	m/s		
ACHIEVABLE STORAGE OF SURFACES	146326	litres/ 24hrs		
AREA TO TANK CAN SERVICE ATTENUATION?		YES		

Project Ref:	C0391		STORMWATER DISPERSION PIPE/ TRENCH	geologix consulting engineers
Project Address:	165 TAIPA HEIGHTS DRIVE, TAIPA			
Design Case:	CONCEPT FUTURE DEVELOPMENT		WEIGHTED RUNOFF	
Date:	18 October 2023	REV 1		

TP108 Worksheet 1 - Runoff curve number & Initial Abstraction

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

TP108, FIGURE 5.1

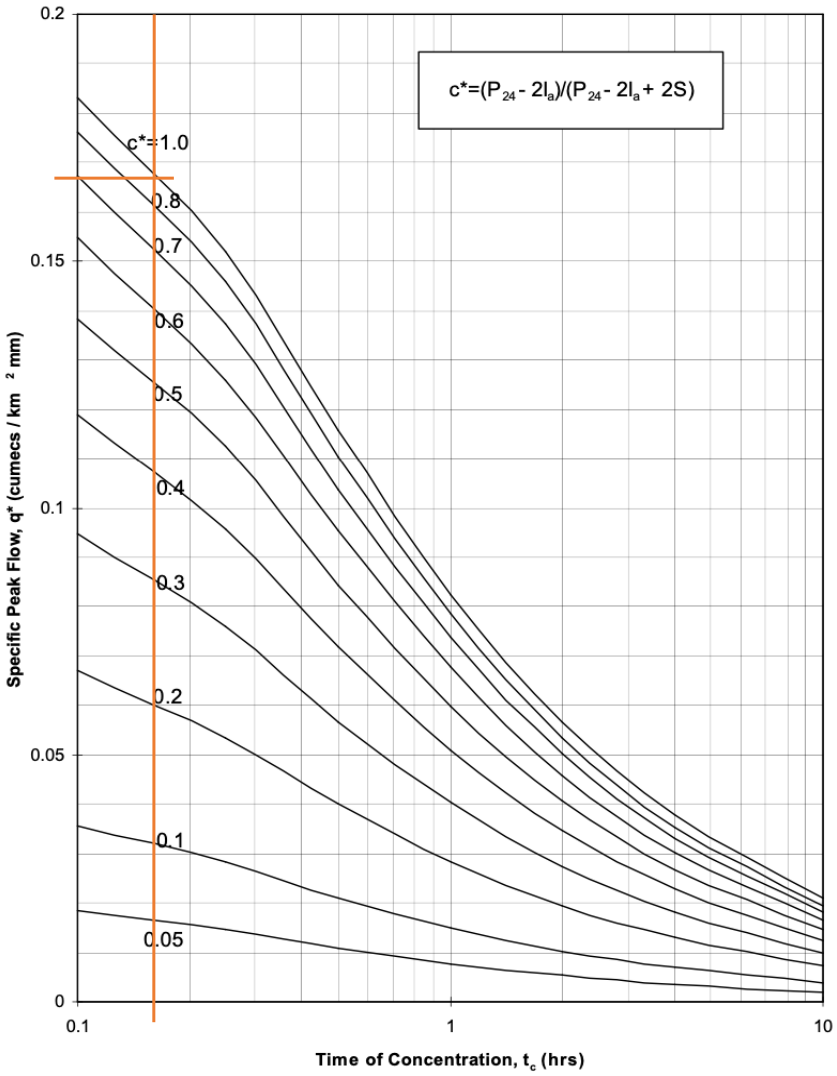


Figure 5.1 - Specific Peak Flow Rate

Project Ref:	C0391	**STORMWATER DISPERSION PIPE/ TRENCH**	geologix consulting engineers
Project Address:	165 TAIPA HEIGHTS DRIVE, TAIPA		
Design Case:	CONCEPT FUTURE DEVELOPMENT	**DISCHARGE DEVICE - LEVEL SPREADER OR TRENCH**	
Date:	18 October 2023 REV 1		

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

DESIGN STORM EVENT **1%** AEP EVENT

ESTIMATE DESIGN RAINFALL DEPTH, P24

RAINFALL DEPTH	24 HR DURATION	1%	216	mm
CLIMATE CHANGE FACTOR	2.1 DEGREE INCREASE,24 HR	1%	8.6	%
RAINFALL DEPTH WITH CC, P24			234.6	mm

ESTIMATE DETENTION VOLUME, TP108 GRAPHICAL METHOD

PEAK FLOW RATE, qp = q* x A x P24

WHERE,
- q*= SPECIFIC PEAK FLOW RATE (l/s)
- P24= 24 HR DESIGN RAINFALL DEPTH (mm)
- A= CATCHMENT AREA TO BE MITIGATED (m2)

CURVE NUMBER, CN (WEIGHTED)	94		See summary table.
INITIAL ABSTRACTION, Ia	0.00	mm	As TP108, adopt 0 mm impervious, 5 mm pervious, value adopted is weighted
MITIGATION AREA, Am	500	m2	Impervious areas within this design
SOIL STORAGE, S	15.1	mm	
RUNOFF INDEX, C*	0.89	mm	
TIME OF CONCENTRATION, tc	0.167	hrs	
SPECIFIC PEAK FLOWRATE, q*	0.167		TP108, Figure 5.1, see next page.
PEAK FLOWRATE, qp	19.59	l/s	
RUNOFF DEPTH, Q24	220.4	mm	
RUNOFF VOLUME, V24	110209	litres	

CONSTRUCTION OF DISPERSION ABOVE GROUND PIPE OR PIPE WITHIN TRENCH

DIA. OF ORIFICE, D	10	mm
AREA OF ORIFICE, A	78.54	mm2
DESIGN VELOCITY, Dv	6.26	m/s
NUMBER OF ORIFICES	40	No.
ORIFICE INTERVALS, C/C	200	mm
DISPERSION PIPE LENGTH	7.8	m

Project Ref:	C0391		STORMWATER ATTENUATION TANK DESIGN	geologix consulting engineers
Project Address:	165 TAIPA HEIGHTS DRIVE, TAIPA			
Design Case:	CONCEPT FUTURE DEVELOPMENT		CLIMATE CHANGE FACTORS	
Date:	18 October 2023	REV 1		

CLIMATE CHANGE PROJECTIONS

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

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

HIRDS V4 Intensity-Duration-Frequency Results
Sitename: 165 Taipa Heights Drive, Taipa
Coordinate system: WGS84
Longitude: 173.4756
Latitude: -35.0073

DDF Mode Parameters:	c	d	e	f	g	h	i
Values:	0.00171804	0.5108361	-0.0401779	0	0.25222469	-0.0104716	3.1944275

Example:	Duration (hrs)	ARI (yrs)	x	y	Rainfall Rate (mm/hr)
	24	100	3.17805383	4.60014923	9.005503594

Rainfall intensities (mm/hr) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	51.5	39.8	33.6	24.4	17	8.92	5.64	3.4	2	1.4	1.1	0.93
2	0.5	56.4	43.5	36.8	26.7	18.7	9.79	6.19	3.8	2.2	1.6	1.2	1.03
5	0.2	73.1	56.6	47.8	34.8	24.4	12.8	8.1	4.9	2.9	2.1	1.6	1.35
10	0.1	85.6	66.3	56	40.8	28.6	15	9.54	5.8	3.4	2.5	1.9	1.59
20	0.05	98.4	76.3	64.5	47	33	17.4	11	6.7	4	2.9	2.2	1.85
30	0.033	106	82.3	69.7	50.8	35.7	18.8	11.9	7.3	4.3	3.1	2.4	2
40	0.025	112	86.7	73.4	53.5	37.6	19.8	12.6	7.7	4.5	3.3	2.6	2.11
50	0.02	116	90.1	76.3	55.7	39.1	20.6	13.1	8	4.7	3.4	2.7	2.2
60	0.017	120	92.9	78.7	57.4	40.3	21.3	13.5	8.3	4.9	3.5	2.8	2.27
80	0.013	125	97.3	82.4	60.2	42.3	22.3	14.2	8.7	5.1	3.7	2.9	2.39
100	0.01	130	101	85.4	62.4	43.8	23.1	14.7	9	5.3	3.8	3	2.48
250	0.004	148	115	97.6	71.3	50.2	26.6	16.9	10	6.1	4.4	3.5	2.86

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	6.5	4.5	3.1	2.3	1.6	1	0.73	0.6	0.4	0.3	0.2	0.18
2	0.5	7.1	4.9	3.4	2.5	1.8	1.1	0.8	0.6	0.4	0.3	0.2	0.2
5	0.2	9.8	6.9	5	3.6	2.5	1.5	1.1	0.9	0.5	0.4	0.3	0.27
10	0.1	13	9.1	6.9	4.7	3.3	1.9	1.4	1	0.6	0.5	0.4	0.32
20	0.05	16	12	9.3	6.2	4.4	2.5	1.7	1.2	0.8	0.6	0.4	0.38
30	0.033	19	14	11	7.3	5.1	2.8	2	1.4	0.8	0.6	0.5	0.41
40	0.025	21	16	12	8.2	5.8	3.2	2.2	1.5	0.9	0.7	0.5	0.44
50	0.02	23	17	14	9	6.3	3.4	2.4	1.5	1	0.7	0.5	0.47
60	0.017	24	19	15	9.7	6.8	3.7	2.6	1.6	1	0.7	0.6	0.49
80	0.013	27	21	17	11	7.7	4.1	2.8	1.7	1.1	0.8	0.6	0.52
100	0.01	30	23	18	12	8.4	4.5	3.1	1.8	1.1	0.8	0.6	0.55
250	0.004	41	32	26	17	12	6.3	4.3	2.3	1.4	1	0.8	0.68

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	55.1	42.5	35.9	26.1	18.2	9.42	5.91	3.6	2.1	1.5	1.2	0.96
2	0.5	60.4	46.7	39.4	28.6	20	10.4	6.5	3.9	2.3	1.6	1.3	1.06
5	0.2	78.6	60.8	51.4	37.4	26.1	13.6	8.54	5.2	3	2.2	1.7	1.39
10	0.1	92.2	71.4	60.4	44	30.7	16	10.1	6.1	3.6	2.6	2	1.65
20	0.05	106	82.3	69.6	50.7	35.5	18.5	11.7	7.1	4.1	3	2.3	1.91
30	0.033	115	88.8	75.2	54.8	38.4	20	12.6	7.6	4.5	3.2	2.5	2.07
40	0.025	121	93.5	79.2	57.8	40.4	21.1	13.3	8.1	4.7	3.4	2.7	2.19
50	0.02	125	97.3	82.3	60.1	42.1	22	13.9	8.4	4.9	3.5	2.8	2.28
60	0.017	129	100	84.9	62	43.4	22.7	14.3	8.7	5.1	3.6	2.9	2.35
80	0.013	135	105	89.1	65	45.6	23.8	15	9.1	5.3	3.8	3	2.47
100	0.01	140	109	92.3	67.4	47.2	24.7	15.6	9.5	5.5	4	3.1	2.57
250	0.004	160	124	105	77.1	54.1	28.4	17.9	11	6.4	4.6	3.6	2.96

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	55.1	42.5	35.9	26.1	18.2	9.42	5.91	3.6	2.1	1.5	1.2	0.96
2	0.5	60.4	46.7	39.4	28.6	20	10.4	6.5	3.9	2.3	1.6	1.3	1.06
5	0.2	78.6	60.8	51.4	37.4	26.1	13.6	8.54	5.2	3	2.2	1.7	1.39
10	0.1	92.2	71.4	60.4	44	30.7	16	10.1	6.1	3.6	2.6	2	1.65
20	0.05	106	82.3	69.6	50.7	35.5	18.5	11.7	7.1	4.1	3	2.3	1.91
30	0.033	115	88.8	75.2	54.8	38.4	20	12.6	7.6	4.5	3.2	2.5	2.07
40	0.025	121	93.5	79.2	57.8	40.4	21.1	13.3	8.1	4.7	3.4	2.7	2.19
50	0.02	125	97.3	82.3	60.1	42.1	22	13.9	8.4	4.9	3.5	2.8	2.28
60	0.017	129	100	84.9	62	43.4	22.7	14.3	8.7	5.1	3.6	2.9	2.35
80	0.013	135	105	89.1	65	45.6	23.8	15	9.1	5.3	3.8	3	2.47
100	0.01	140	109	92.3	67.4	47.2	24.7	15.6	9.5	5.5	4	3.1	2.57
250	0.004	160	124	105	77.1	54.1	28.4	17.9	11	6.4	4.6	3.6	2.96

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	56	43.3	36.5	26.5	18.5	9.54	5.98	3.6	2.1	1.5	1.2	0.97
2	0.5	61.5	47.5	40.1	29.1	20.3	10.5	6.58	4	2.3	1.7	1.3	1.06
5	0.2	80	61.9	52.3	38.1	26.6	13.8	8.65	5.2	3	2.2	1.7	1.4
10	0.1	93.9	72.7	61.5	44.8	31.3	16.2	10.2	6.2	3.6	2.6	2	1.66
20	0.05	108	83.8	70.9	51.7	36.1	18.8	11.8	7.1	4.2	3	2.3	1.92
30	0.033	117	90.5	76.6	55.8	39.1	20.3	12.8	7.7	4.5	3.2	2.5	2.09
40	0.025	123	95.3	80.6	58.8	41.2	21.5	13.5	8.2	4.8	3.4	2.7	2.21
50	0.02	128	99.1	83.9	61.2	42.8	22.3	14.1	8.5	5	3.6	2.8	2.3
60	0.017	132	102	86.5	63.1	44.2	23.1	14.5	8.8	5.1	3.7	2.9	2.37
80	0.013	138	107	90.7	66.3	46.4	24.2	15.2	9.2	5.4	3.9	3	2.5
100	0.01	143	111	94	68.6	48.1	25.1	15.8	9.6	5.6	4	3.2	2.59
250	0.004	163	127	107	78.5	55.1	28.8	18.2	11	6.4	4.6	3.6	2.99

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	58.9	45.5	38.4	27.9	19.3	9.94	6.19	3.7	2.2	1.5	1.2	0.98
2	0.5	64.7	50	42.2	30.7	21.3	10.9	6.83	4.1	2.4	1.7	1.3	1.09
5	0.2	84.4	65.3	55.2	40.2	28	14.4	9	5.4	3.1	2.2	1.8	1.44
10	0.1	99.2	76.8	64.9	47.3	33	17	10.6	6.4	3.7	2.7	2.1	1.7
20	0.05	114	88.6	74.9	54.6	38.1	19.7	12.3	7.4	4.3	3.1	2.4	1.98
30	0.033	123	95.7	81	59	41.2	21.3	13.3	8	4.7	3.3	2.6	2.14
40	0.025	130	101	85.3	62.2	43.4	22.5	14.1	8.5	4.9	3.5	2.8	2.27
50	0.02	135	105	88.7	64.7	45.2	23.4	14.7	8.8	5.1	3.7	2.9	2.36
60	0.017	139	108	91.5	66.8	46.7	24.2	15.2	9.1	5.3	3.8	3	2.44
80	0.013	146	113	96	70.1	49	25.4	15.9	9.6	5.6	4	3.1	2.57
100	0.01	151	117	99.5	72.6	50.8	26.4	16.5	9.9	5.8	4.1	3.2	2.66
250	0.004	172	134	114	83.1	58.1	30.2	19	11	6.7	4.8	3.7	3.07

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	55.7	43	36.3	26.4	18.3	9.49	5.95	3.6	2.1	1.5	1.2	0.96
2	0.5	61	47.2	39.8	28.9	20.2	10.4	6.55	4	2.3	1.7	1.3	1.06
5	0.2	79.5	61.5	52	37.8	26.4	13.7	8.61	5.2	3	2.2	1.7	1.4
10	0.1	93.2	72.2	61	44.4	31	16.1	10.2	6.1	3.6	2.6	2	1.65
20	0.05	107	83.2	70.4	51.3	35.9	18.7	11.8	7.1	4.2	3	2.3	1.92
30	0.033	116	89.8	76	55.4	38.8	20.2	12.7	7.7	4.5	3.2	2.5	2.08
40	0.025	122	94.6	80.1	58.4	40.9	21.3	13.4	8.1	4.8	3.4	2.7	2.2
50	0.02	127	98.4	83.3	60.8	42.5	22.2	14	8.5	5	3.6	2.8	2.29
60	0.017	131	101	85.9	62.7	43.9	22.9	14.4	8.7	5.1	3.7	2.9	2.37
80	0.013	137	106	90.1	65.8	46.1	24.1	15.2	9.2	5.4	3.9	3	2.49
100	0.01	142	110	93.3	68.1	47.7	25	15.7	9.5	5.6	4	3.1	2.58
250	0.004	162	126	107	77.9	54.7	28.6	18.1	11	6.4	4.6	3.6	2.98

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	61.5	47.5	40.1	29.1	20.1	10.3	6.38	3.8	2.2	1.6	1.2	1
2	0.5	67.6	52.2	44.1	32	22.2	11.4	7.05	4.2	2.4	1.7	1.4	1.11
5	0.2	88.4	68.4	57.8	42	29.2	15	9.32	5.6	3.2	2.3	1.8	1.47
10	0.1	104	80.4	68	49.5	34.5	17.7	11	6.6	3.8	2.7	2.1	1.74
20	0.05	120	92.8	78.5	57.2	39.9	20.5	12.8	7.6	4.4	3.2	2.5	2.02
30	0.033	129	100	84.9	61.9	43.1	22.2	13.8	8.3	4.8	3.4	2.7	2.19
40	0.025	136	106	89.4	65.2	45.5	23.5	14.6	8.7	5.1	3.6	2.8	2.32
50	0.02	142	110	93.1	67.9	47.4	24.4	15.2	9.1	5.3	3.8	2.9	2.42
60	0.017	146	113	96	70	48.9	25.2	15.7	9.4	5.5	3.9	3	2.5
80	0.013	153	119	101	73.5	51.3	26.5	16.5	9.9	5.7	4.1	3.2	2.63
100	0.01	159	123	104	76.2	53.2	27.5	17.1	10	6	4.3	3.3	2.73
250	0.004	181	141	119	87.2	60.9	31.5	19.7	12	6.9	4.9	3.8	3.14

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	56.7	43.8	37	26.8	18.7	9.63	6.03	3.6	2.1	1.5	1.2	0.97
2	0.5	62.2	48.1	40.6	29.5	20.5	10.6	6.64	4	2.3	1.7	1.3	1.07
5	0.2	81.1	62.7	53	38.6	26.9	13.9	8.73	5.3	3.1	2.2	1.7	1.41
10	0.1	95.1	73.6	62.3	45.4	31.7	16.4	10.3	6.2	3.6	2.6	2	1.67
20	0.05	110	84.9	71.8	52.4	36.6	19	11.9	7.2	4.2	3	2.4	1.94
30	0.033	118	91.7	77.6	56.6	39.6	20.6	12.9	7.8	4.6	3.3	2.6	2.1
40	0.025	124	96.5	81.7	59.6	41.7	21.7	13.6	8.2	4.8	3.4	2.7	2.22
50	0.02	129	100	85	62	43.4	22.6	14.2	8.6	5	3.6	2.8	2.31
60	0.017	133	104	87.7	64	44.8	23.3	14.7	8.9	5.2	3.7	2.9	2.39
80	0.013	140	109	92	67.2	47	24.5	15.4	9.3	5.4	3.9	3.1	2.51
100	0.01	145	112	95.3	69.6	48.7	25.4	16	9.7	5.6	4	3.2	2.61
250	0.004	165	128	109	79.6	55.8	29.1	18.4	11	6.5	4.7	3.7	3.01

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	67.3	52	43.9	31.9	22	11.1	6.81	4.1	2.3	1.6	1.3	1.04
2	0.5	74.1	57.2	48.3	35.1	24.3	12.3	7.55	4.5	2.6	1.8	1.4	1.15
5	0.2	97.3	75.2	63.6	46.3	32.1	16.2	10	5.9	3.4	2.4	1.9	1.54
10	0.1	115	88.7	75	54.6	37.9	19.2	11.9	7	4	2.9	2.2	1.83
20	0.05	132	102	86.7	63.2	43.9	22.3	13.8	8.2	4.7	3.3	2.6	2.12
30	0.033	143	111	93.8	68.4	47.5	24.2	14.9	8.9	5.1	3.6	2.8	2.3
40	0.025	150	117	98.7	72	50.1	25.6	15.8	9.4	5.4	3.8	3	2.44
50	0.02	157	121	103	75	52.2	26.6	16.4	9.7	5.6	4	3.1	2.54
60	0.017	161	125	106	77.4	53.8	27.5	17	10	5.8	4.1	3.2	2.62
80	0.013	169	131	111	81.3	56.6	28.9	17.9	11	6.1	4.3	3.4	2.76
100	0.01	175	136	115	84.3	58.6	30	18.6	11	6.3	4.5	3.5	2.87
250	0.004	200	156	132	96.4	67.1	34.4	21.3	13	7.3	5.2	4	3.31

HIRDS V4 Depth-Duration-Frequency Results
Sitename: 165 Taipa Heights Drive, Taipa
Coordinate system: WGS84
Longitude: 173.4756
Latitude: -35.0073
DDF Model

Parameters:	c	d	e	f	g	h	i
Values:	0.00171804	0.5108361	-0.0401779	0	0.25222469	-0.0104716	3.19443

Example:	Duration (hrs)	ARI (yrs)	x	y	Rainfall Depth (mm)
	24	100	3.17805383	4.60014923	216.1320863

Rainfall depths (mm) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	8.58	13.3	16.8	24.4	34.1	53.5	67.7	82	97	104	109	112
2	0.5	9.39	14.5	18.4	26.7	37.4	58.7	74.3	91	106	114	119	123
5	0.2	12.2	18.9	23.9	34.8	48.7	76.7	97.2	119	139	150	157	162
10	0.1	14.3	22.1	28	40.8	57.2	90.2	114	140	164	177	185	191
20	0.05	16.4	25.4	32.3	47	66	104	132	162	190	205	215	221
30	0.033	17.7	27.4	34.8	50.8	71.3	113	143	175	206	222	233	240
40	0.025	18.6	28.9	36.7	53.5	75.1	119	151	185	217	234	246	253
50	0.02	19.4	30	38.1	55.7	78.1	124	157	192	226	244	256	264
60	0.017	20	31	39.3	57.4	80.6	128	162	198	233	252	264	273
80	0.013	20.9	32.4	41.2	60.2	84.6	134	170	208	245	265	278	287
100	0.01	21.6	33.6	42.7	62.4	87.7	139	177	216	254	275	288	298
250	0.004	24.7	38.4	48.8	71.3	100	159	203	248	293	317	332	343

Depth standard error (mm) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	1.1	1.4	1.7	2.3	3.3	6.1	8.6	14	17	19	20	21
2	0.5	1.2	1.6	1.8	2.5	3.6	6.7	9.5	15	19	21	23	23
5	0.2	1.6	2.3	2.6	3.6	5.1	9.3	13	20	26	28	30	31
10	0.1	2.1	3.1	3.5	4.7	6.7	12	16	25	31	34	36	37
20	0.05	2.7	4.2	4.7	6.3	8.9	15	21	29	37	40	43	44
30	0.033	3.1	5	5.6	7.4	10	18	24	32	40	44	48	48
40	0.025	3.5	5.6	6.3	8.3	12	20	26	35	43	48	51	51
50	0.02	3.8	6.1	6.9	9.1	13	21	28	37	45	50	54	54
60	0.017	4	6.6	7.4	9.9	14	23	30	38	47	52	56	56
80	0.013	4.5	7.4	8.3	11	16	25	33	41	51	56	60	60
100	0.01	4.9	8	9.1	12	17	28	36	43	53	59	63	63
250	0.004	6.8	11	13	18	25	39	51	54	66	73	79	77

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.18	14.2	18	26.1	36.3	56.5	70.9	86	100	107	112	115
2	0.5	10.1	15.6	19.7	28.6	39.9	62.1	78	94	110	118	123	127
5	0.2	13.1	20.3	25.7	37.4	52.2	81.5	102	124	145	155	162	167
10	0.1	15.4	23.8	30.2	44	61.4	96	121	146	171	184	192	197
20	0.05	17.7	27.4	34.8	50.7	71	111	140	169	198	213	223	229
30	0.033	19.1	29.6	37.6	54.8	76.7	120	151	183	214	231	241	248
40	0.025	20.1	31.2	39.6	57.8	80.9	127	160	194	226	244	255	262
50	0.02	20.9	32.4	41.2	60.1	84.1	132	166	202	236	254	265	273
60	0.017	21.5	33.4	42.5	62	86.8	136	172	208	244	262	274	282
80	0.013	22.6	35.1	44.5	65	91.1	143	180	219	256	276	288	297
100	0.01	23.4	36.3	46.1	67.4	94.4	148	187	227	266	286	299	308
250	0.004	26.7	41.5	52.7	77.1	108	170	215	261	306	330	345	355

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.18	14.2	18	26.1	36.3	56.5	70.9	86	100	107	112	115
2	0.5	10.1	15.6	19.7	28.6	39.9	62.1	78	94	110	118	123	127
5	0.2	13.1	20.3	25.7	37.4	52.2	81.5	102	124	145	155	162	167
10	0.1	15.4	23.8	30.2	44	61.4	96	121	146	171	184	192	197
20	0.05	17.7	27.4	34.8	50.7	71	111	140	169	198	213	223	229
30	0.033	19.1	29.6	37.6	54.8	76.7	120	151	183	214	231	241	248
40	0.025	20.1	31.2	39.6	57.8	80.9	127	160	194	226	244	255	262
50	0.02	20.9	32.4	41.2	60.1	84.1	132	166	202	236	254	265	273
60	0.017	21.5	33.4	42.5	62	86.8	136	172	208	244	262	274	282
80	0.013	22.6	35.1	44.5	65	91.1	143	180	219	256	276	288	297
100	0.01	23.4	36.3	46.1	67.4	94.4	148	187	227	266	286	299	308
250	0.004	26.7	41.5	52.7	77.1	108	170	215	261	306	330	345	355

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.34	14.4	18.3	26.5	36.9	57.3	71.7	87	101	108	112	116
2	0.5	10.2	15.8	20	29.1	40.6	63	79	95	111	119	124	128
5	0.2	13.3	20.6	26.2	38.1	53.1	82.7	104	125	146	157	164	168
10	0.1	15.6	24.2	30.7	44.8	62.5	97.4	122	148	172	185	193	199
20	0.05	18	27.9	35.5	51.7	72.2	113	142	171	200	215	225	231
30	0.033	19.5	30.2	38.3	55.8	78.1	122	154	186	217	233	243	250
40	0.025	20.5	31.8	40.3	58.8	82.3	129	162	196	229	246	257	265
50	0.02	21.3	33	41.9	61.2	85.7	134	169	204	238	256	268	276
60	0.017	21.9	34.1	43.3	63.1	88.4	138	174	211	246	265	277	285
80	0.013	23	35.7	45.4	66.3	92.8	145	183	221	259	278	291	300
100	0.01	23.8	37	47	68.6	96.1	151	190	230	269	289	302	311
250	0.004	27.2	42.2	53.7	78.5	110	173	218	264	309	333	348	358

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.82	15.2	19.2	27.9	38.7	59.6	74.3	89	103	110	115	118
2	0.5	10.8	16.7	21.1	30.7	42.7	65.7	82	98	114	122	127	130
5	0.2	14.1	21.8	27.6	40.2	56	86.5	108	130	150	161	168	172
10	0.1	16.5	25.6	32.5	47.3	65.9	102	128	153	178	191	199	204
20	0.05	19	29.5	37.5	54.6	76.2	118	148	178	206	221	231	237
30	0.033	20.6	31.9	40.5	59	82.4	128	160	192	224	240	250	257
40	0.025	21.6	33.6	42.6	62.2	86.9	135	169	203	236	254	264	272
50	0.02	22.5	34.9	44.4	64.7	90.4	141	176	212	246	264	276	283
60	0.017	23.2	36	45.8	66.8	93.3	145	182	219	254	273	285	293
80	0.013	24.3	37.8	48	70.1	98	152	191	230	267	287	299	308
100	0.01	25.2	39.1	49.7	72.6	102	158	198	239	278	298	311	320
250	0.004	28.7	44.7	56.8	83.1	116	181	228	274	319	343	358	368

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.28	14.3	18.1	26.4	36.7	56.9	71.4	86	100	108	112	115
2	0.5	10.2	15.7	19.9	28.9	40.3	62.6	78.6	95	110	118	124	127
5	0.2	13.2	20.5	26	37.8	52.8	82.2	103	125	145	156	163	168
10	0.1	15.5	24.1	30.5	44.4	62.1	96.8	122	147	172	185	193	198
20	0.05	17.9	27.7	35.2	51.3	71.7	112	141	171	199	214	224	230
30	0.033	19.3	29.9	38	55.4	77.6	121	153	185	216	232	243	250
40	0.025	20.3	31.5	40	58.4	81.7	128	161	195	228	245	256	264
50	0.02	21.1	32.8	41.6	60.8	85.1	133	168	203	237	255	267	275
60	0.017	21.8	33.8	42.9	62.7	87.8	138	173	210	245	264	276	284
80	0.013	22.8	35.4	45	65.8	92.1	144	182	220	258	277	290	299
100	0.01	23.6	36.7	46.7	68.1	95.5	150	189	229	267	288	301	310
250	0.004	27	41.9	53.3	77.9	109	172	217	263	308	332	347	357

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	10.2	15.8	20	29.1	40.3	61.7	76.5	92	106	113	117	120
2	0.5	11.3	17.4	22	32	44.5	68.1	84.6	101	117	124	129	133
5	0.2	14.7	22.8	28.9	42	58.5	89.8	112	134	154	165	171	176
10	0.1	17.3	26.8	34	49.5	68.9	106	132	158	183	196	203	209
20	0.05	20	30.9	39.3	57.2	79.8	123	153	183	212	227	236	242
30	0.033	21.6	33.4	42.4	61.9	86.3	133	166	199	230	246	256	263
40	0.025	22.7	35.2	44.7	65.2	90.9	141	175	210	243	260	271	278
50	0.02	23.6	36.6	46.5	67.9	94.7	146	182	218	253	271	282	290
60	0.017	24.3	37.8	48	70	97.7	151	189	226	262	281	292	299
80	0.013	25.5	39.6	50.4	73.5	103	159	198	237	275	295	307	315
100	0.01	26.4	41.1	52.2	76.2	106	165	206	246	286	306	319	327
250	0.004	30.2	46.9	59.6	87.2	122	189	236	283	329	352	367	377

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.45	14.6	18.5	26.8	37.3	57.8	72.3	87	101	108	113	116
2	0.5	10.4	16	20.3	29.5	41.1	63.6	79.7	96	111	120	125	128
5	0.2	13.5	20.9	26.5	38.6	53.8	83.6	105	126	147	158	164	169
10	0.1	15.9	24.5	31.1	45.4	63.3	98.5	124	149	174	187	195	200
20	0.05	18.3	28.3	35.9	52.4	73.2	114	143	173	202	216	226	232
30	0.033	19.7	30.6	38.8	56.6	79.1	123	155	187	218	235	245	252
40	0.025	20.7	32.2	40.9	59.6	83.4	130	164	198	230	248	259	266
50	0.02	21.6	33.5	42.5	62	86.8	136	170	206	240	258	270	277
60	0.017	22.2	34.5	43.8	64	89.5	140	176	213	248	267	279	287
80	0.013	23.3	36.2	46	67.2	94	147	185	223	261	280	293	302
100	0.01	24.1	37.5	47.6	69.6	97.4	152	192	232	271	291	304	313
250	0.004	27.5	42.8	54.4	79.6	112	175	220	267	312	335	350	361

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	11.2	17.3	21.9	31.9	43.9	66.5	81.7	97	111	118	122	125
2	0.5	12.4	19.1	24.2	35.1	48.6	73.6	90.6	107	123	130	135	138
5	0.2	16.2	25.1	31.8	46.3	64.2	97.5	120	142	163	174	180	184
10	0.1	19.1	29.6	37.5	54.6	75.8	115	142	169	194	207	214	219
20	0.05	22	34.2	43.3	63.2	87.8	134	165	196	225	240	249	255
30	0.033	23.8	36.9	46.9	68.4	95	145	179	212	244	260	270	277
40	0.025	25.1	38.9	49.4	72	100	153	190	225	258	276	285	293
50	0.02	26.1	40.5	51.4	75	104	160	197	234	269	287	298	305
60	0.017	26.9	41.7	53	77.4	108	165	204	242	278	297	308	315
80	0.013	28.2	43.8	55.7	81.3	113	173	214	254	293	312	324	332
100	0.01	29.2	45.4	57.7	84.3	117	180	223	264	304	324	337	344
250	0.004	33.3	51.8	65.9	96.4	134	207	256	304	350	373	388	397

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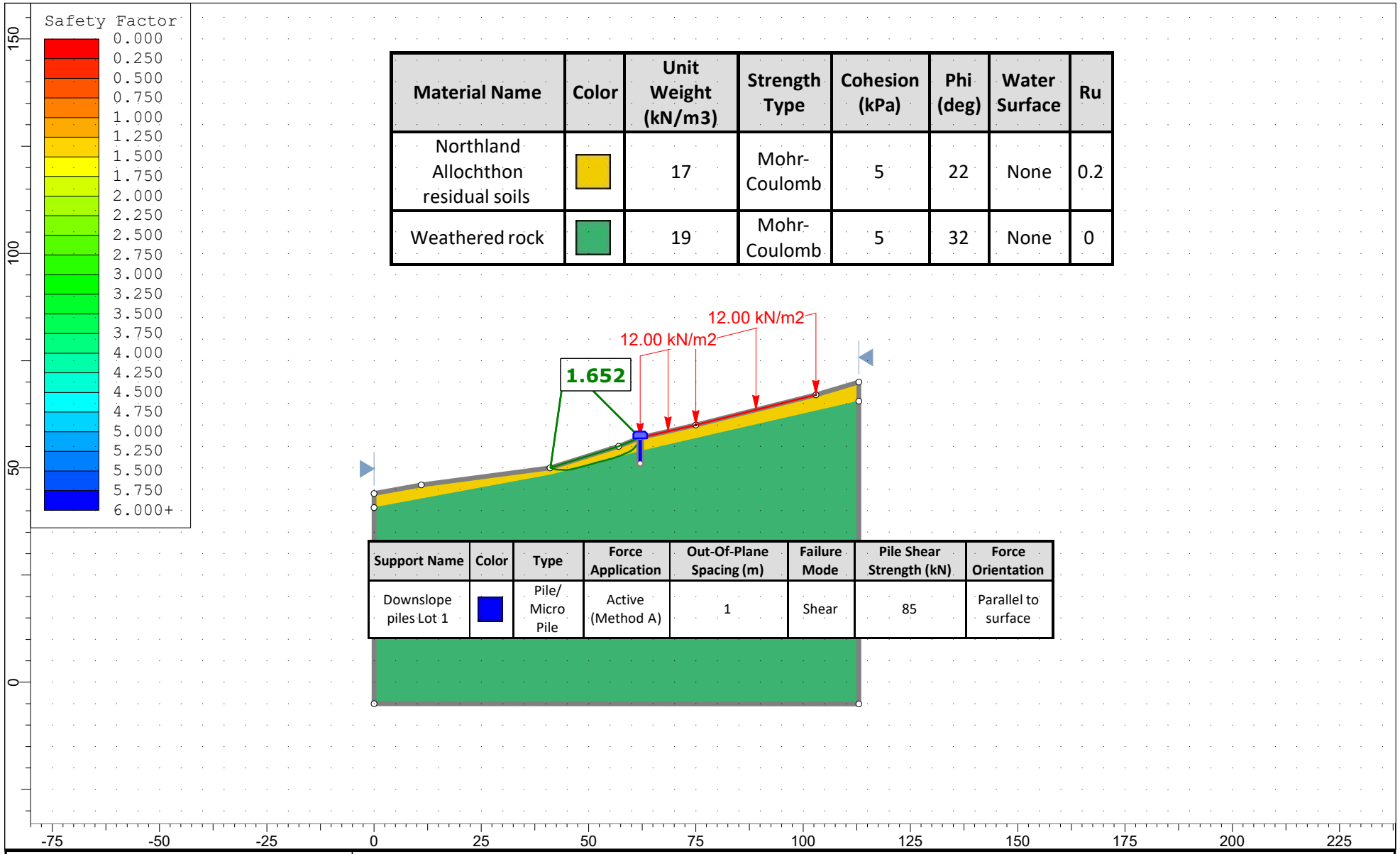
APPENDIX E

Stability Analysis Results



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Ru
Northland Allochthon residual soils		17	Mohr-Coulomb	5	22	None	0.2
Weathered rock		19	Mohr-Coulomb	5	32	None	0

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (m)	Failure Mode	Pile Shear Strength (kN)	Force Orientation
Downslope piles Lot 1		Pile/ Micro Pile	Active (Method A)	1	Shear	85	Parallel to surface

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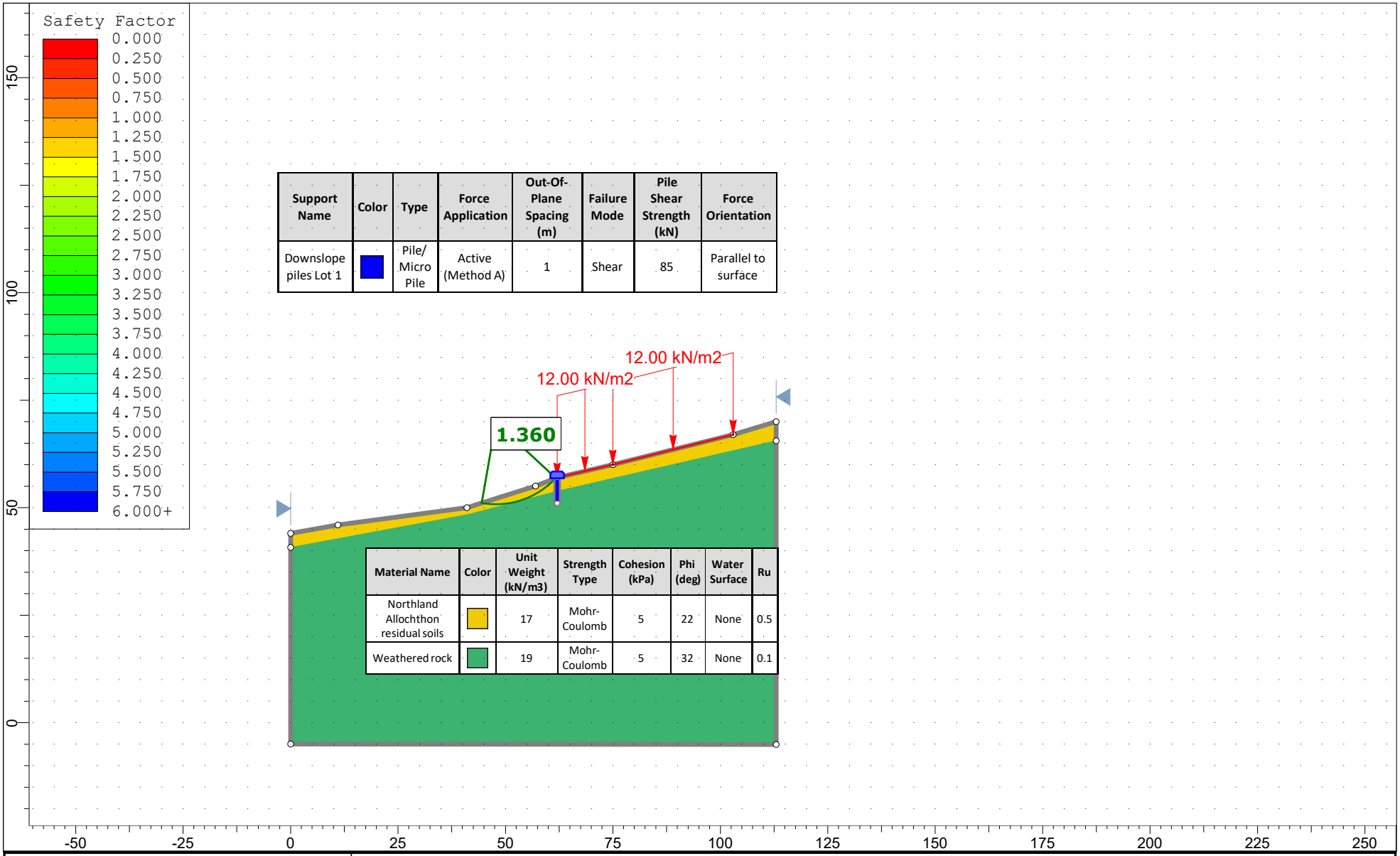
SLIDEINTERPRET 9.027

Project	C0391-Lot1		
Group	Lot 1 proposed	*Scenario*	normal gw
Drawn By	RL	*Company*	Geologix Consulting Engineers Ltd
Date	14/12/2023	*File Name*	proposed.slmd



Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (m)	Failure Mode	Pile Shear Strength (kN)	Force Orientation
Downslope piles Lot 1		Pile/ Micro Pile	Active (Method A)	1	Shear	85	Parallel to surface

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Ru
Northland Allochthon residual soils		17	Mohr-Coulomb	5	22	None	0.5
Weathered rock		19	Mohr-Coulomb	5	32	None	0.1

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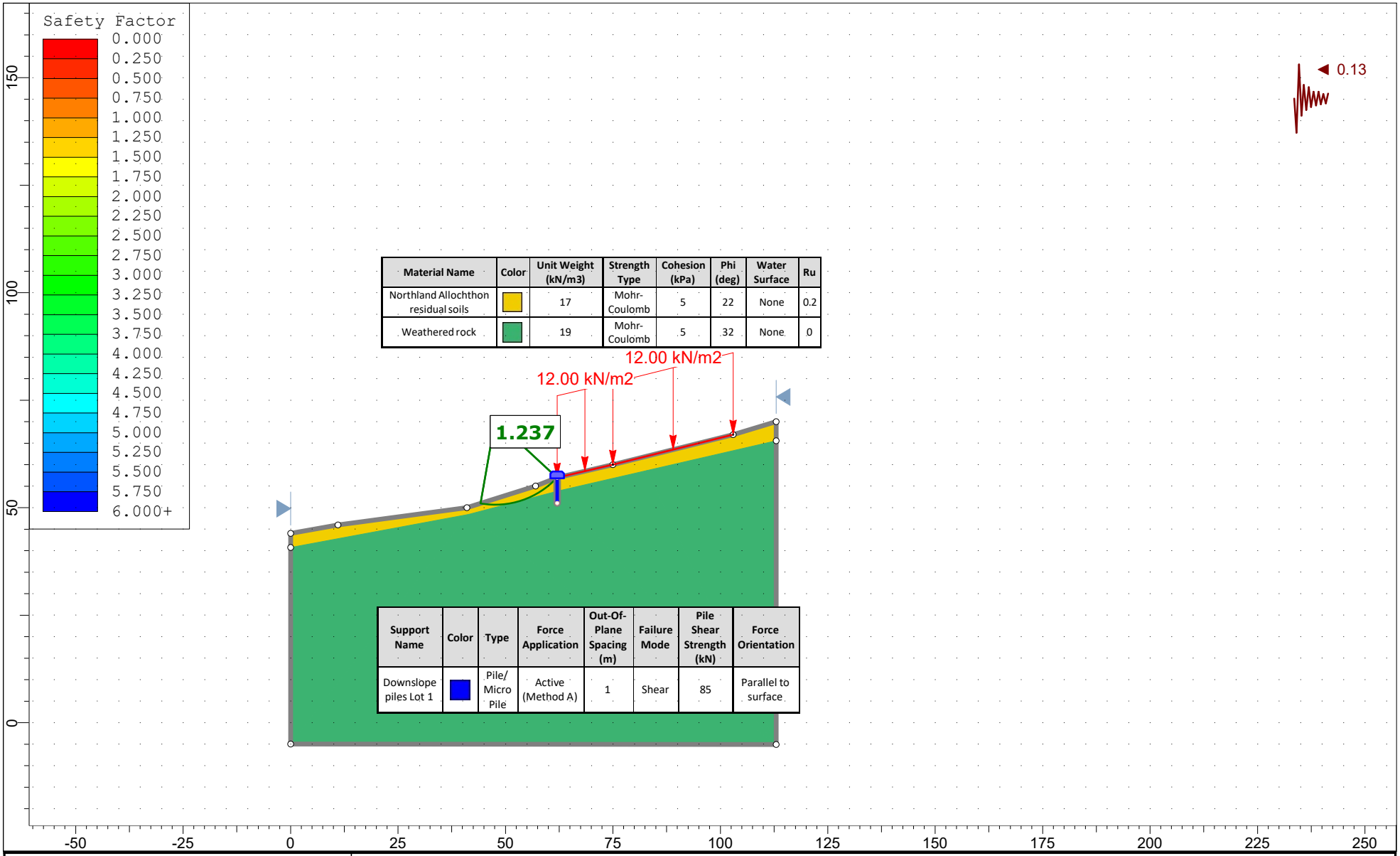
SLIDEINTERPRET 9.027

Project	C0391-Lot1		
Group	Lot 1 proposed	*Scenario*	elevated gw
Drawn By	RL	*Company*	Geologix Consulting Engineers Ltd
Date	14/12/2023	*File Name*	proposed.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Ru
Northland Allochthon residual soils		17	Mohr-Coulomb	5	22	None	0.2
Weathered rock		19	Mohr-Coulomb	5	32	None	0

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (m)	Failure Mode	Pile Shear Strength (kN)	Force Orientation
Downslope piles Lot 1		Pile/ Micro Pile	Active (Method A)	1	Shear	85	Parallel to surface

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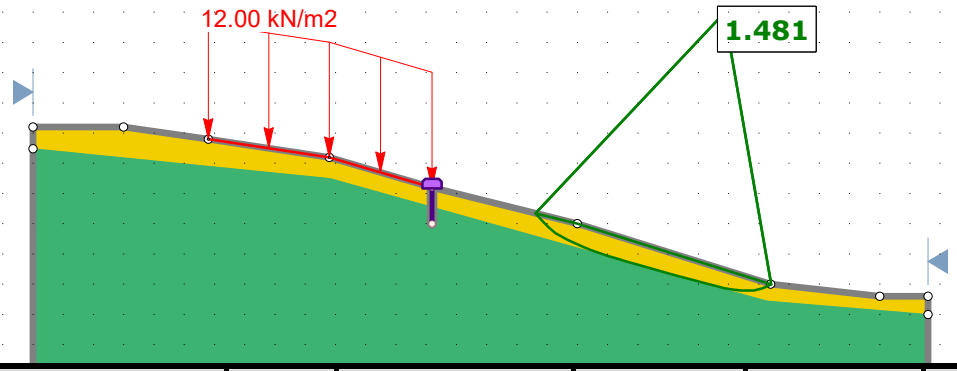
SLIDEINTERPRET 9.027

Project	C0391-Lot1		
Group	Lot 1 proposed	*Scenario*	normal gw seismic
Drawn By	RL	*Company*	Geologix Consulting Engineers Ltd
Date	14/12/2023	*File Name*	proposed.slmd

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (m)	Failure Mode	Pile Shear Strength (kN)	Force Orientation
Downslope piles Lot 2		Pile/ Micro Pile	Active (Method A)	1	Shear	55	Parallel to surface



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Ru
Northland Allochthon residual soils		17	Mohr-Coulomb	5	22	None	0.2
Weathered rock		19	Mohr-Coulomb	5	32	None	0

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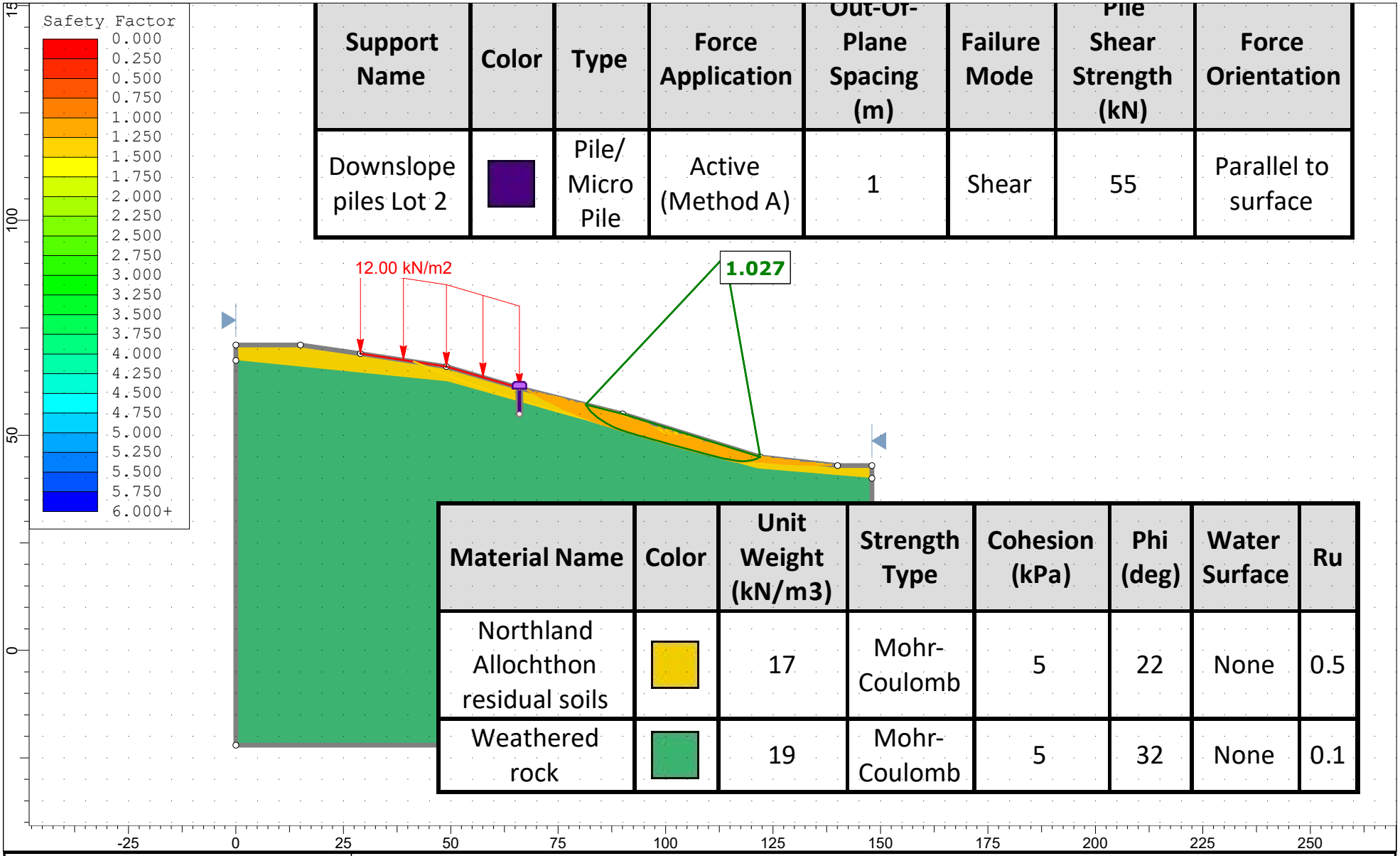
SLIDEINTERPRET 9.027

Project	C0391-Lot2		
Group	Lot 2 proposed	Scenario	normal gw
Drawn By	RL	Company	Geologix Consulting Engineers Ltd
Date	14/12/2023	File Name	proposed.slmd

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (m)	Failure Mode	Pile Shear Strength (kN)	Force Orientation
Downslope piles Lot 2		Pile/ Micro Pile	Active (Method A)	1	Shear	55	Parallel to surface



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Ru
Northland Allochthon residual soils		17	Mohr-Coulomb	5	22	None	0.5
Weathered rock		19	Mohr-Coulomb	5	32	None	0.1

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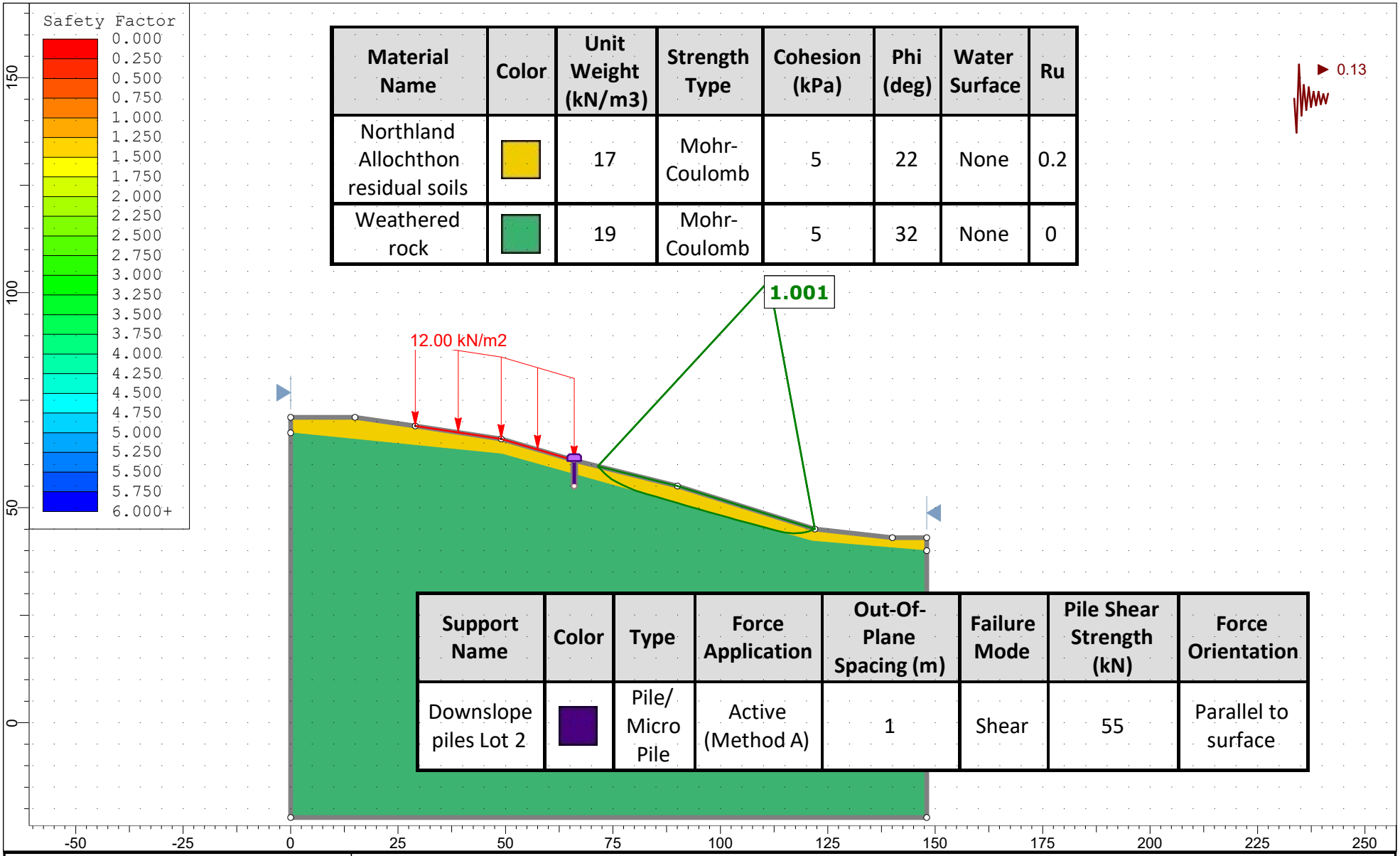
SLIDEINTERPRET 9.027

Project	C0391-Lot2		
Group	Lot 2 proposed	Scenario	elevated gw
Drawn By	RL	Company	Geologix Consulting Engineers Ltd
Date	14/12/2023	File Name	proposed.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Ru
Northland Allochthon residual soils		17	Mohr-Coulomb	5	22	None	0.2
Weathered rock		19	Mohr-Coulomb	5	32	None	0

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (m)	Failure Mode	Pile Shear Strength (kN)	Force Orientation
Downslope piles Lot 2		Pile/ Micro Pile	Active (Method A)	1	Shear	55	Parallel to surface

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consulting engineers

SLIDEINTERPRET 9.027

Project	C0391-Lot2		
Group	Lot 2 proposed	Scenario	normal gw, seismic
Drawn By	RL	Company	Geologix Consulting Engineers Ltd
Date	14/12/2023	File Name	proposed.slmd

D324021.2 COND

THE RESOURCE MANAGEMENT ACT 1991

SECTION 221 : CONSENT NOTICE

REGARDING:
The Subdivision of
Lot 1 DP 167063
Pt Section 36 Mangonui SD
North Auckland Registry

PURSUANT to Section 221 and for the purposes of Section 224 of the Resource Management Act 1991, this Consent Notice is issued by the **FAR NORTH DISTRICT COUNCIL** to the effect that conditions described in Schedule 1 below are to be complied with on a continuing basis by the subdividing owner and the subsequent owners after the deposit of the survey plan, and this Notice is to be registered on the new titles, as set out in Schedule 2 herein.

SCHEDULE 1

(1) Prior to lodging a building consent for a dwelling on Lots 1 - 4, the applicant shall submit a satisfactory on-site effluent disposal report, in respect of a selected building site on Lots 1 - 4 which has been indicated on a copy of the subdivision plan, carried out by a Registered Engineer, a Registered Drainlayer or other suitably qualified person, in accordance with the terms and criteria of the Auckland Regional Council Technical Publication 58, to prove that adequate capability for effluent disposal is available and can be contained within the respective boundaries of the proposed allotment; and that such discharge would be in compliance with the Regional Council discharge rules and permitted activity criteria.

SCHEDULE 2

(1) Condition (1) in Schedule 1 refers to Lots 1 - 4 DP190841 being contained in CsT 120C/707 - 710.

SIGNED: _____

ENVIRONMENTAL SERVICES MANAGER for the Far North District Council

DATE: 24th August 1998

SIGNED by _____

as registered proprietor(s)

in the presence of:

_____

Name

Artist

Occupation

P\3PCN8822.doc

D 324021

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**NA120C/707**
Land Registration District	**North Auckland**
Date Issued	27 October 1998

Prior References
NA97B/633

Estate	Fee Simple
Area	4.1600 hectares more or less
Legal Description	Lot 1 Deposited Plan 190841

Registered Owners

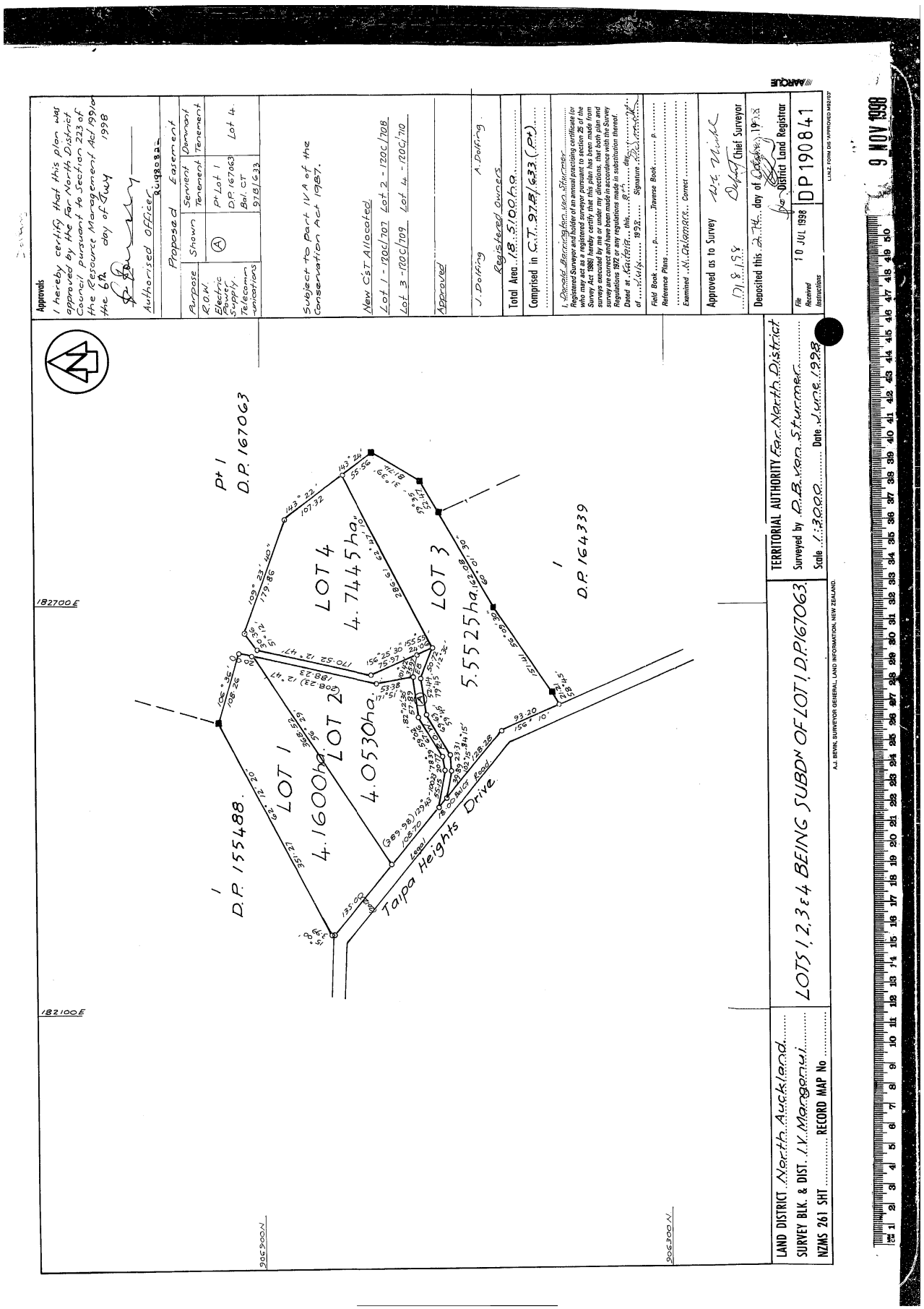
Katherine Louise Meadows, David John Meadows, Maureen Kaydee Bell and Michael Robert Bell

Interests

Subject to Part IV A Conservation Act 1987

D324021.2 Consent Notice pursuant to Section 221(1) Resource Management Act 1991 by Far North District Council - 27.10.1998 at 2.37 pm

5226535.3 Mortgage to Kiwibank Limited - 22.5.2002 at 9:00 am


Approvals
I hereby certify that this plan was approved by the Far North District Council pursuant to Section 223 of the Resource Management Act 1991 on the 6th day of July 1998
Authorised Officer
Proposed Easement
Purpose | Shown | Servient Tenement | Dominant Tenement
R.O.W. Electric Power Supply. Telecommunications | A | Pt Lot 1 D.P. 167063 Bal. CT 91B/1033 | Lot 4
Subject to Part IVA of the Conservation Act 1987.
New C/T Allocated
Lot 1 - 120C/707 Lot 2 - 120C/708
Lot 3 - 120C/709 Lot 4 - 120C/710
Approved
J. Dolfing
Registered Owners
Total Area 18.5100ha
Comprised in C.T. 97B/1033 (Pt)
I, Donald Barrington van Sturmer being a Registered Surveyor and holder of an annual practising certificate (or who may act as a registered surveyor pursuant to section 25 of the Survey Act 1986) hereby certify that this plan has been made from surveys executed by me or under my directions, that both plan and survey are correct and have been made in accordance with the Survey Regulations 1972 or any regulations made in substitution thereof.
Dated at Kaitaia this 2nd day of July 1998
Signature
Field Book ... p. ... Traverse Book ... p. ...
Reference Plans ...
Examined ... Correct ...
Approved as to Survey
Chief Surveyor
Deposited this 2nd day of July 1998
District Land Registrar
File Reference
10 JUL 1998
DP 190841
Instructions
L.I.N.Z. FORM DW /APPROVED MSD/ST
ARGUE
9 NOV 1998
TERRITORIAL AUTHORITY Far North District
Surveyed by D.B. van Sturmer
Scale 1:3000 Date June 1998
LOTS 1, 2, 3 & 4 BEING SUBDN OF LOT 1 D.P. 167063
A.J. BEVIN, SURVEYOR GENERAL, LAND INFORMATION, NEW ZEALAND.
LAND DISTRICT North Auckland
SURVEY BLK. & DIST. I.V. Mangonui
NZMS 261 SHT
RECORD MAP No
Pt 1 D.P. 167063
1 D.P. 155488
1 D.P. 164339
LOT 1 4.1600ha
LOT 2 4.0530ha
LOT 4 4.7445ha
LOT 3 5.5525ha
Taipa Heights Drive
18.00 Metal Road
1827000E
1821000E
9063000N
9062900N