



Our Reference: 10666.1 (FNDC)

17 February 2025

Resource Consents Department
Far North District Council
JB Centre
KERIKERI

Dear Sir/Madam

RE: Proposed 5 lot subdivision, Tunatahi Road, Panguru – Jogi Limited

I am pleased to submit application on behalf of Jogi Limited, for a proposed five lot subdivision of land at Tunatahi Road, Panguru, zoned Rural Production. The application is a restricted discretionary subdivision activity, but a discretionary activity overall due to the standard of the road from which the site gains access.

The application fee of \$4,910 has been paid separately via direct credit.

Regards

Lynley Newport
Senior Planner
THOMSON SURVEY LTD

Application for resource consent or fast-track resource consent

(Or Associated Consent Pursuant to the Resource Management Act 1991 (RMA)) (If applying for a Resource Consent pursuant to Section 87AAC or 88 of the RMA, this form can be used to satisfy the requirements of Schedule 4). Prior to, and during, completion of this application form, please refer to Resource Consent Guidance Notes and Schedule of Fees and Charges — [both available on the Council's web page](#).

1. Pre-Lodgement Meeting

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

2. Type of Consent being applied for

(more than one circle can be ticked):

- | | |
|---|---|
| <input type="radio"/> Land Use | <input type="radio"/> Discharge |
| <input type="radio"/> Fast Track Land Use* | <input type="radio"/> Change of Consent Notice (s.221(3)) |
| <input checked="" type="radio"/> Subdivision | <input type="radio"/> Extension of time (s.125) |
| <input type="radio"/> Consent under National Environmental Standard
(e.g. Assessing and Managing Contaminants in Soil) | |
| <input type="radio"/> Other (please specify) _____ | |

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

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

Yes No

4. Consultation

Have you consulted with Iwi/Hapū? Yes No

If yes, which groups have you consulted with?

Who else have you consulted with?

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

8. Application Site Details

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

Name/s:

Jogi Limited

Site Address/
Location:

169 Tunatahi Road

PANGURU

Postcode

0492

Legal Description:

Lot 8 DP 142376 & Lot 23

Val Number:

Certificate of title:

NA85C/202

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

Site visit requirements:

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

Is there a dog on the property? Yes No

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

Please contact applicant and/or agent in advance of any site visit to obtain instructions and gate code as to entry into site.

9. Description of the Proposal:

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

5 lot (4 additional) subdivision in the Rural Production Zone (title older than April 2000); includes consent for breaches of rules in Chapter 15.1.6C.1 in regard to access standards.

If this is an application for a Change or Cancellation of Consent Notice conditions (s.221(3)), please quote relevant existing Resource Consents and Consent Notice identifiers and provide details of the change(s), with reasons for requesting them.

10. Would you like to request Public Notification?

Yes No

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

(more than one circle can be ticked):

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

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

The site and proposal may be subject to the above NES. In order to determine whether regard needs to be had to the NES please answer the following:

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

Is the proposed activity an activity covered by the NES? Please tick if any of the following apply to your proposal, as the NESCS may apply as a result. Yes No Don't know

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

13. Assessment of Environmental Effects:

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

Your AEE is attached to this application Yes

13. Draft Conditions:

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

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

14. Billing Details:

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

Name/s: (please write in full)

Jogi Ltd

Email:

Phone number:

Postal address:

(or alternative method of service under section 35 of the act)

Fees Information

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

Declaration concerning Payment of Fees

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

Name: (please write in full)

Jogi Bishwanath

Signature:

(signature of bill payer)

Date 14-Feb-2025

MANDATORY

15. Important Information:

Note to applicant

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

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

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

Fast-track application

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

Privacy Information:

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

15. Important information continued...

Declaration

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

Name: (please write in full)

Jogi Bishwanath

Signature:

[Redacted Signature]

Date 14-Feb-2025

An electronic signature is made by electronic means

Checklist (please tick if information is provided)

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

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

Jogi Limited

Far North District Plan

PROPOSED SUBDIVISION

169 Tunatahi Road, Punguru

PLANNING REPORT AND ASSESSMENT OF ENVIRONMENTAL EFFECTS



Thomson Survey Ltd
Kerikeri

1.0 INTRODUCTION

1.1 The Proposal

The applicant proposes to carry out a subdivision of their property on Tunatahi Road, Punguru, to create five lots (four additional). The existing title consists of Lot 8 DP 142376 and Lot 23 DP 144062 combined. The proposal sees the former subdivided into Lots 1-5, and the latter continuing to be held with the largest of Lots 1-5, being Lot 1.

The proposed Amalgamation condition wording is:

That Lot 1 hereon & Lot 23 DP 144062 are to be held in the same Certificate of Title".

The site is accessed off the end of Tunatahi Road, legal paper road over which forestry access has been formed. None of this access is maintained by the Council. Tunatahi Road comes off Runaruna Road (Council maintained metal surface public road), about 5.5km south of the Runaruna Road/ West Coast Road intersection. Internal to the site, access is provided either via rights of way, or directly off unformed legal paper road (Lot 4).

The proposed lot sizes are:

Lot 1	11.229ha	to be held with Lot 23 DP 144062, making total 15.262ha
Lot 2	2.324ha	
Lot 3	2.49ha	
Lot 4	2.179ha	
Lot 5	2.014ha	

Refer to Appendix 1 for copies of the Scheme Plans.

1.2 Scope of this Report

This assessment and report accompanies the Resource Consent Application and is provided in accordance with Section 88 and Schedule 4 of the Resource Management Act 1991. The application seeks consent under the District Plan for a subdivision as a discretionary activity overall – refer to section 5.0 Activity Status. The name and address of the owner of the property is contained in the Form 9 Application form.

2.0 PROPERTY DETAILS

Location:	169 Tunatahi Road, Punguru. Location Plan is attached in Appendix 2.
Legal description:	Lot 8 DP 142376 & Lot 23 DP 144062
CT:	NA85C/202, 24.273ha in area (copy attached in Appendix 3).

3.0 SITE DESCRIPTION

3.1 Physical characteristics.

The site is located on 169 Tunatahi Road, Punguru. The site is irregular in shape and bounded by unformed paper road to the south and west, and with farmland and forestry in all other directions. The majority of the site is moderately steep and undulated.

The entire site is in forestry re-growth with occasional clearing in rough scrubland/grass. There is a residence with structures and sheds accessed via an existing accessway, to be located within the larger balance Lot 1.

The site is not serviced by Council 3 waters or road.

For geological setting, refer to the Site Suitability Report in Appendix 4 of this report.

The property is zoned Rural Production in both the Operative and Proposed District Plans. No high or outstanding landscape or natural features are identified within the site. The property contains LUC Class 6 soils. It is not mapped as containing any heritage/cultural sites, nor is the site mapped as kiwi present or high density kiwi, nor any Protected Natural Area (PNA).

The site is not mapped as being subject to river flood hazard and is not mapped as being Erosion Prone in the Regional Plan for Northland.

3.2 Legal Interests

The Title is subject to Section 308(4) LGA 1974. This is a repealed piece of legislation, but essentially provided for the current 'amalgamation' holding Lot 23 DP 144062 and Lot 8 DP 142376 together.

3.3 Consent History

SC-63, a subdivision, creating Lot 23, to be held with Lot 8 DP 14376 (1991).

4.0 SCHEDULE 4 – INFORMATION REQUIRED IN AN APPLICATION

Clauses 2 & 3: Information required in all applications

<i>(1) An application for a resource consent for an activity must include the following:</i>	
<i>(a) a description of the activity:</i>	Refer Sections 1 and 5 of this Planning Report.
<i>(b) an assessment of the actual or potential effect on the environment of the activity:</i>	Refer to Section 6 of this Planning Report.
<i>(b) a description of the site at which the activity is to occur:</i>	Refer to Section 3 of this Planning Report.
<i>(c) the full name and address of each owner or occupier of the site:</i>	This information is contained in the Form 9 attached to the application.
<i>(d) a description of any other activities that are part of the proposal to which the application relates:</i>	Refer to Sections 3 and 5 of this Planning Report for existing activities within the site. The application is for subdivision.
<i>(e) a description of any other resource consents required for the proposal to which the application relates:</i>	No other consents are required other than that being applied for pursuant to the Far North Operative District Plan.
<i>(f) an assessment of the activity against the matters set out in Part 2:</i>	Refer to Section 7 of this Planning Report.
<i>(g) an assessment of the activity against any relevant provisions of a document referred to in section 104(1)(b), including matters in Clause (2):</i>	Refer to Sections 5 & 7 of this Planning Report.

<p>(a) any relevant objectives, policies, or rules in a document; and (b) any relevant requirements, conditions, or permissions in any rules in a document; and (c) any other relevant requirements in a document (for example, in a national environmental standard or other regulations).</p>	
<p>(3) An application must also include any of the following that apply:</p>	
<p>(a) if any permitted activity is part of the proposal to which the application relates, a description of the permitted activity that demonstrates that it complies with the requirements, conditions, and permissions for the permitted activity (so that a resource consent is not required for that activity under section 87A(1));</p> <p>(b) if the application is affected by section 124 or 165ZH(1)(c) (which relate to existing resource consents), an assessment of the value of the investment of the existing consent holder (for the purposes of section 104(2A));</p> <p>(c) if the activity is to occur in an area within the scope of a planning document prepared by a customary marine title group under section 85 of the Marine and Coastal Area (Takutai Moana) Act 2011, an assessment of the activity against any resource management matters set out in that planning document (for the purposes of section 104(2B)).</p>	<p>Refer sections 3 and 5. The site is vacant.</p> <p>There is no existing resource consent. Not applicable.</p> <p>The site is not within an area subject to a customary marine title group. Not applicable.</p>

Clause 4: Additional information required in application for subdivision consent

<p>(4) An application for a subdivision consent must also include information that adequately defines the following:</p>	
<p>(a) the position of all new boundaries: (b) the areas of all new allotments, unless the subdivision involves a cross lease, company lease, or unit plan: (c) the locations and areas of new reserves to be created, including any esplanade reserves and esplanade strips: (d) the locations and areas of any existing esplanade reserves, esplanade strips, and access strips: (e) the locations and areas of any part of the bed of a river or lake to be vested in a territorial authority under section 237A:</p>	<p>Refer to Scheme Plans in Appendix 1.</p>

<p>(f) the locations and areas of any land within the coastal marine area (which is to become part of the common marine and coastal area under section 237A):</p> <p>(g) the locations and areas of land to be set aside as new roads.</p>	
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Clause 5: Additional information required for application for reclamation – not applicable.

Clause 6: Information required in assessment of environmental effects

<p>(1) An assessment of the activity's effects on the environment must include the following information:</p>	
<p>(a) if it is likely that the activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity:</p>	<p>Refer to Section 6 of this planning report. The activity will not result in any significant adverse effect on the environment.</p>
<p>(b) an assessment of the actual or potential effect on the environment of the activity:</p>	<p>Refer to Section 6 of this planning report.</p>
<p>(c) if the activity includes the use of hazardous installations, an assessment of any risks to the environment that are likely to arise from such use:</p>	<p>Not applicable as the application does not involve hazardous installations.</p>
<p>(d) if the activity includes the discharge of any contaminant, a description of—</p> <p>(i) the nature of the discharge and the sensitivity of the receiving environment to adverse effects;</p> <p>and</p> <p>(ii) any possible alternative methods of discharge, including discharge into any other receiving environment:</p>	<p>The subdivision does not involve any discharge of contaminant.</p>
<p>(e) a description of the mitigation measures (including safeguards and contingency plans where relevant) to be undertaken to help prevent or reduce the actual or potential effect:</p>	<p>Refer to Section 6 of this planning report.</p>
<p>(f) identification of the persons affected by the activity, any consultation undertaken, and any response to the views of any person consulted:</p>	<p>Refer to Section 8 of this planning report. No affected persons are identified.</p>
<p>(g) if the scale and significance of the activity's effects are such that monitoring is required, a description of how and by whom the effects will be monitored if the activity is approved:</p>	<p>No monitoring is required as the scale and significance of effects does not warrant any.</p>
<p>(h) if the activity will, or is likely to, have</p>	<p>No protected customary right is affected.</p>

<i>adverse effects that are more than minor on the exercise of a protected customary right, a description of possible alternative locations or methods for the exercise of the activity (unless written approval for the activity is given by the protected customary rights group).</i>	
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Clause 7: Matters that must be addressed by assessment of environmental effects (RMA)

<i>(1) An assessment of the activity's effects on the environment must address the following matters:</i>	
<i>(a) any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects:</i>	Refer to Sections 6 and 8 of this planning report and also to the assessment of objectives and policies in Section 7.
<i>(b) any physical effect on the locality, including any landscape and visual effects:</i>	Refer to Section 6. The proposed activity will have no adverse, effects on the physical environment and landscape and visual amenity values.
<i>(c) any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity:</i>	Refer to Section 6.0. The proposal will not result in adverse effects in regard to habitat and ecosystems.
<i>(d) any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural value, or other special value, for present or future generations:</i>	Refer to Section 6, and above comments
<i>(e) any discharge of contaminants into the environment, including any unreasonable emission of noise, and options for the treatment and disposal of contaminants:</i>	The subdivision will not result in the discharge of contaminants, nor any unreasonable emission of noise.
<i>(f) any risk to the neighbourhood, the wider community, or the environment through natural hazards or hazardous installations.</i>	The subdivision site is not subject to natural hazards and does not involve hazardous installations.

5.0 ACTIVITY STATUS**5.1 Operative District Plan Zoning**

The property is zoned Rural Production. No Resource features apply. The subdivision standards applying in the zone are contained in Table 13.7.2.1 as shown below.

TABLE 13.7.2.1: MINIMUM LOT SIZES**(i) RURAL PRODUCTION ZONE**

Controlled Activity Status (Refer also to 13.7.3)	Restricted Discretionary Activity Status (Refer also to 13.8)	Discretionary Activity Status (Refer also to 13.9)
The minimum lot size is 20ha.	1. Subdivision that complies with the controlled activity standard, but is within 100m of the	1. The minimum lot size is 4ha; or 2. A maximum of 3 lots in any subdivision, provided that the

	boundary of the Minerals Zone; 2. The minimum lot size is 12ha; or 3. A maximum of 3 lots in any subdivision, provided that the minimum lot size is 4,000m ² and there is at least 1 lot in the subdivision with a minimum lot size of 4ha, and provided further that the subdivision is of sites which existed at or prior to 28 April 2000, or which are amalgamated from titles existing at or prior to 28 April 2000; or 4. A maximum of 5 lots in a subdivision (including the parent lot) where the minimum size of the lots is 2ha, and where the subdivision is created from a site that existed at or prior to 28 April 2000;	minimum lot size is 2,000m ² and there is at least 1 lot in the subdivision with a minimum size of 4ha, and provided further that the subdivision is of sites which existed at or prior to 28 April 2000, or which are amalgamated from titles existing at or prior to 28 April 2000; or 3. A subdivision in terms of a management plan as per Rule 13.9.2 may be approved.
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The creation of five lots of greater than 2ha, where the title is older than April 2000, is a restricted discretionary subdivision activity pursuant to option 4 above (in bold). The proposal creates five lots and the title is dated 1991, therefore meets the requirements of option 4.

Zone Rules:

I have not identified any zone rule breaches.

District Wide Rules:

The site is not subject to chapters 12.1 or 12.2 (landscape and indigenous vegetation). In regard to Chapter 12.3, earthworks associated with subdivision site works will be restricted to access and crossings. The threshold applying to the Rural Production Zone is large, at 5000m³. The Site Suitability Report in Appendix 4 has calculated cut and fill volumes at a total 935m³ cut and 1567m³ fill, well within that threshold. The report also confirms there will not be any cut/fill face of more than average height of 1.5m.

Chapter 12.4 (Natural Hazards) is not relevant in regard to coastal hazards given the site is not located on the coast. Rule 12.4.6.1.2 Fire Risk to Residential units requires that residential units be located at least 20m away from the drip line of any trees in a naturally occurring or deliberately planted area of scrub or shrubland, woodlot or forest. There are existing buildings within the large balance lot. Lots 2-5 are vacant and all in pine woodlot/forest. Indicative and potential house sites are shown in the Site Suitability Report and it is likely that in all cases, clearance of existing pine forest would be required to ensure the 20m buffer. Such clearance is possible and is a permitted activity under the Operative District Plan.

The proposal is not subject to Chapter 12.5 (Heritage) as there are no heritage or cultural resources mapped for the site, nor Chapter 12.7 (Waterbodies) as there are no qualifying waterbodies from which setback is required, in terms of any proposed building or impermeable surface works, or on site wastewater. No works is proposed in any indigenous wetland.

Access to the site is via Tunatahi Road, formed within legal road, and not maintained by the Council. It is, in effect, a forestry road. Compliance is assessed on the basis of the access being private as opposed to 'public' given Tunatahi Road is not on the Council's maintenance schedule and the Council is highly unlikely to ever take it over for ongoing maintenance.

An assessment of the proposal against Chapter 15.1.6C.1.1 to 11 has been carried out, with breaches identified. The Site Suitability Report only addresses access internal to the site:

Rule 15.1.6C.1.1(a) – private accessway on internal ROW's A, B, C can be constructed in accordance with Appendix 3B-1 of the ODP as can access within legal road alignment, to Lot 4. However, it is unlikely that it is feasible in terms of cost to upgrade the entire length of the existing Tunatahi Road carriageway to 4.5m or 5m carriageway width with water tabling, thereby enabling two way traffic for its entire length.

(d) – No private accessway to serve 9 or more titles. Tunatahi Road is in legal road alignment but not maintained by Council. It serves a number of vacant titles already, and the four additional titles proposed in this subdivision would bring the total to more than 9. It is not intended, however, to Vest (and no requirement to Vest as such given it is already legal road), and no proposal to bring Tunatahi Road up to public road standard.

Consent is sought, therefore, for breaches of 15.1.6C.1.1(a) & (d) in regard to Tunatahi Road.

In regard to crossings, the Site Suitability Report suggests crossings be constructed pursuant to 2023 Engineering standards – Type 1A Light Vehicles (Sheet 21). It confirms sight distances are achievable.

Rule 15.1.6C.1.8(b) – requires that where a subdivision has frontage to a Council road that is not formed to the appropriate standard, then the subdivider upgrade that road. In terms of the roading network, however, Tunatahi Road is not a part of it, and therefore technically not a Council road as it is not within the Council's designated network. I do not believe 15.1.6C.1.8(b) therefore applies, other than to Runaruna Road, which is Council maintained road (metal surface) formed to the appropriate standard.

No other district wide rules in the ODP are applicable.

The application is a restricted discretionary subdivision activity and because of breaches of rules in 15.1.6C, as described above, a discretionary land use activity. The more restrictive category applies overall.

5.2 Proposed District Plan (PDP) Assessment

There are certain rules that have been identified in the PDP as having immediate legal effect and that may affect the category of activity under the Act. These include:

Rules HS-R2, R5, R6 and R9 in regard to hazardous substances on scheduled sites or areas of significance to Maori, significant natural areas or a scheduled heritage resource.

Proposed subdivision

There are no scheduled sites or areas of significance to Maori, significant natural areas or any scheduled heritage resource on the site, therefore these rules are not relevant to the proposal.

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

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

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

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

Ecosystems and Indigenous Biodiversity – Rules IB-R1 to R5 inclusive.
No indigenous vegetation clearance is proposed.

Subdivision (specific parts) – only subdivision provisions relating to land containing Significant Natural Area or Heritage Resources have immediate legal effect. The site contains no scheduled or mapped Significant Natural Areas or Heritage Resources.

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

Earthworks – Only some rules and standards have legal effect. These are Rules EW-R12 and R13 and related standards EW-S3 and ES-S5 respectively. EW-R12 and associated EW-S3 relate to the requirement to abide by Accidental Discovery Protocol if carrying out earthworks and artefacts are discovered. EW-R13 and associated EW-S5 refer to operating under appropriate Erosion and Sediment Control measures. The only earthworks required to give effect to the subdivision is the formation of access to the boundary of the proposed new lots. This can be carried out in compliance with the above referenced rules/standards.

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

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

There are no zone rules in the PDP with immediate legal effect that affect the proposal's activity status.

6.0 ASSESSMENT OF ENVIRONMENTAL EFFECTS

6.1 Allotment Sizes and Dimensions

Proposed Lot 1 of 11.229ha will contain all of the existing built development. The vacant lots have ample land area for a house site and associated on-site wastewater systems. They can be comfortably clear of any watercourses on the property to comply with existing rules. All lots can accommodate a 30m x 30m square building envelope complying with the zone's boundary setbacks.

6.2 Natural and Other Hazards

Refer to the Site Suitability Report in Appendix 4. The site walkover survey confirmed that suitable building envelopes can be formed on gently sloping land (<15°). A Natural Hazard Assessment is contained in section 9 of that Report. The only two types of hazard that may have relevance to the site are erosion and overland flow paths, flooding and inundation risk. It was not considered necessary to assess risk of other hazards as they were not applicable.

There is potential for erosion due to earthworks and creation of new accessways and drains. Mitigation can be provided, however, and resultant effects rendered less than minor. There are no flooding concerns. The proposal may affect receiving overland flow path systems. Mitigation can be provided with resultant effects rendered less than minor.

In summary there is no reason pursuant to s106 of the Act as to why this application should not be granted.

The property is not listed as a HAIL site by Northland Regional Council [source: NRC online maps], or on Far North Maps.

6.3 Water Supply

There is no Council reticulated water supply available to the property and the Council can impose its standard requirement in regard to potable and fire fighting water supply for Lots 2 through 5. Refer also to Section 7 of the Site Suitability Report in Appendix 4.

6.4 Energy Supply & Telecommunications

Energy supply and telecommunications are not a requirement of rural subdivisions. The Council can impose its standard consent notice as follows:

Electricity supply is not a condition of this consent and power has not been reticulated to the boundary of the lot. The lot owner is responsible for the provision of a power supply to operate the on-site aerobic wastewater treatment plant and any other device which requires electrical power to operate.

6.5 Stormwater Disposal

Refer to the Site Suitability Report in Appendix 4, specifically Section 6 of that report, and Table 15 in Appendix C of that Report. A reasonable level of development on each of the proposed vacant lifestyle lots would see an impermeable surface coverage of around 300m² for buildings and 200m² for driveways. This equates to only 2.5% of a 2ha lot. Impermeable coverage will easily remain within permitted activity status at time of each lot's development.

The Site Suitability Report provides commentary on stormwater management concept, design storm event, and concept stormwater attenuation for both house sites and access. It also addresses stormwater quality.

In summary the proposal, and future development of lots, will not create adverse stormwater runoff effects.

6.6 Sanitary Sewage Disposal

Refer to Section 5 of the Report in Appendix 4. The Report assumes that the proposed new lots may comprise up to a five bedroom dwelling with a peak occupancy of eight people. This equates to a maximum total daily wastewater generation of 160litres/day per/per person on each proposed lot. The report recommends an appropriate land disposal system, with primary disposal area of 640m² and 30% reserve field (if utilising secondary treatment).

The report provides a summary of concept wastewater design and assesses environmental effects. It also assesses proposed future systems against the criteria in the Regional Plan for compliance (Table 14 of Appendix C of the Site Suitability Report).

6.7 Easements for any purpose

The application site is not subject to any existing easements. It is proposed to create easements A-C internal to the site for right of way and future services, should these eventuate.

6.8 Property Access

Refer to Section 10 of the Site Suitability Report which addresses internal roading (not Tunatahi Road). There is an existing 268m long access from the end of Tunatahi Road to the existing built development within Lot 1. This is generally 3m width with a base of metal. It is extremely low usage. The Site Suitability report outlines the upgrading requirements on existing accessway within ROW's A, B and C. It also specifies the requirements for new accessway within ROW C, approximately 220m in length required to service Lot 5. Refer to Table 12 in the Site Suitability Report.

The Report proposes new vehicle crossings to be formed at subdivision stage. Refer Table 13 of the Report. The report is silent on the standard and treatment of Tunatahi Road. This is effectively a private road. It has metal surface/base of varying widths and in some places has a relatively steep gradient. At time of my site visit (January) it was readily traversed in two wheel drive mode. No other vehicles were encountered the entire duration of my visit. Some targeted upgrade/improvement at specific points would improve accessibility. I believe a reasonable (and affordable) amount of work would ensure physical access to an appropriate level for the very low volume of traffic anticipated.

6.9 Earthworks

Refer to Section 8 of the Site Suitability Report in Appendix 4. Subdivision works will require earthworks for vehicle crossings, upgrading existing internal rights of way and forming new accessway within right of way. Earthworks volumes have been conceptually sized in the report's Table 10, including earthworks for a stormwater pond.

The Report includes general recommendations along with commentary on appropriate erosion and sediment control.

6.10 Building Locations

All lots are capable of providing physically suitable building sites – refer to commentary in e Site Suitability Report in Appendix 4. All lots can accommodate buildings clear of overland flowpaths. The report concludes each lot has a feasible building site. Further site specific investigation should be undertaken at building consent stage by a professional geotechnical engineer.

All lots can provide for a building site that will not be subject to inundation. As such there is no need for minimum floor levels to be specified.

6.11 Preservation and enhancement of heritage resources (including cultural), vegetation, fauna and landscape, and land set aside for conservation purposes

Heritage Resources, including cultural values

The site contains no historic sites or sites of cultural significance to Māori as recorded on/in the District Plan's Resource Maps or Schedules. There are no NZAA archaeological sites mapped on the site.

Vegetation, Fauna and Landscape

The subdivision will not require the clearance of any indigenous vegetation on the application site. It is almost entirely in pine trees, with tracks and some small cleared areas, the largest of which contains the existing buildings within the site. There is no Protected Natural Areas (PNA's) within the site and the property is not in a high density or kiwi present area.

The site is not mapped as containing any inland natural wetlands, nor any areas of high or outstanding natural character or landscape areas.

In short, there are no flora/fauna or landscape values worthy of identification and protection, and no justification for any ban or restriction on the keeping of dogs or cats.

6.12 Soil

The property contains poorer quality soils – primarily Class 6 LUC soils. The proposal is low density and will have very little, if any, impact on the life supporting capacity of soils.

6.13 Access to, and protection of, waterbodies

There are no qualifying waterbodies to which public access is required. The subdivision does not adversely affect waterbodies, including any wetlands (refer to comments under 6.11 above).

6.14 Land use compatibility (reverse sensitivity)

The property is vacant except for buildings within the balance lot. Settlement within the area is sparse, but not non-existent. Adjacent land is of a similar nature to the existing site. The only land use compatibility issue that I have identified is fire risk due to the proximity of pine

woodlot to a future dwelling and associated access and ancillary buildings within each vacant lot. However, given that it is a permitted activity to clear non indigenous vegetation, the risk of fire can be adequately mitigated by establishing a cleared area with buffer, prior to building.

6.15 Energy Efficiency and renewable Energy Development/Use

The proposal has not considered energy efficiency. This is an option for future lot owners, albeit the intention is that the lots be self sufficient in regard to power supply.

6.16 Effects on Rural Character and Amenity

All proposed lots are rural in nature/character. The proposal is low density, the size of the lots means that rural amenity will be maintained. In my opinion, the proposal will have no adverse effects on rural character.

6.17 Cumulative and Precedent Effects

The proposal will create four additional lots, however, all are large enough to maintain rural character and amenity and the density level does not create an adverse cumulative effect in terms of built development.

Determining whether there is an adverse precedent effect is generally reserved for non complying activities, which this is not. In any event, the proposed subdivision does not set an adverse precedent effect and does not threaten the integrity of the ODP or those parts of the PDP with legal effect.

7.0 STATUTORY ASSESSMENT

7.1 District Plan Objectives and Policies

I consider the subdivision to be consistent with the subdivision objectives and policies in Chapter 13. In particular I consider the proposal to be consistent with Objective 13.3.1 which provides for (enables) subdivision in a way that promotes sustainable management of natural and physical resources; and Objective 13.3.2 and associated Policy 13.4.1, which seek to ensure that the subdivision of land is appropriate and carried out in a manner that does not compromise air, water, soil or ecosystems, and that avoids, remedies or mitigates any adverse effects.

The Rural Production zone is an enabling zone, providing for a variety of activities subject to avoiding, remedying or mitigating adverse effects and compatibility with the amenity values of rural areas and rural production activities. I consider the proposed subdivision to be consistent with the zone's objectives and policies.

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

Proposed subdivision

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.

The subdivision is consistent with both the above objectives. It promotes sustainable management of the natural and physical resources of the District and provides for the applicants' social and economic well being. It is an appropriate subdivision that does not compromise the life-supporting capacity of air, water, soil or ecosystems, and adverse effects are minimal.

13.3.3 To ensure that the subdivision of land does not jeopardise the protection of outstanding landscapes or natural features in the coastal environment.

13.3.4 To ensure that subdivision does not adversely affect scheduled heritage resources through alienation of the resource from its immediate setting/context.

The property has no outstanding landscape values, and is not within the coastal environment. There are no 'scheduled heritage resources' identified in the District Plan on the property.

13.3.5 To ensure that all new subdivisions provide a reticulated water supply and/or on-site water storage and include storm water management sufficient to meet the needs of the activities that will establish all year round.

On-site water supply and on-site stormwater management can be achieved.

13.3.7 To ensure the relationship between Māori and their ancestral lands, water, sites, wahi tapu and other taonga is recognised and provided for and associated

Policy 13.4.11 That subdivision recognises and provides for the relationship of Māori and their culture and traditions, with their ancestral lands, water, sites, waahi tapu and other taonga and shall take into account the principles of the Treaty of Waitangi.

There are no 'scheduled' sites of significance to Māori affecting the property. The proposal is low density. The site is not known to have any special habitat values and there are no substantial waterbodies.

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.

Power supply is not a requirement of rural subdivision. The site is remote and, although physically possible, it is likely cost prohibitive to reticulate electricity. The expectation is that the lots will be self sufficient in regard to power (and 3 waters). House sites on future lots can be orientated to maximise access to sunlight, and existing vegetation can be cleared to enhance that exposure.

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; (b) ecological values; (c) landscape values; (d) amenity values; (e) cultural values; (f) heritage values; and (g) existing land uses.

I believe the subdivision has less than minor impact on the relevant matters listed in the above policy.

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.

Whilst not to the standard dictated in the District Plan, I believe that access to the site (Tunatahi Road) can be upgraded to a reasonable level, adequate for serving the subdivision. Internal access to individual lots will be 3m metal carriageway. The site is not subject to hazards. Provision of power and telecoms is not a requirement of rural subdivision.

13.4.6 That any subdivision proposal provides for the protection, restoration and enhancement of heritage resources, areas of significant indigenous vegetation and significant habitats of indigenous fauna, threatened species, the natural character of the coastal environment and riparian margins, and outstanding landscapes and natural features where appropriate.

There is no indigenous bush on the property. The site is not located within a kiwi present or high density kiwi zone. The property is not located within the coastal environment. No known heritage resources exist on or close to the application site. The site does not contain any outstanding natural landscape or features.

13.4.8 That the provision of water storage be taken into account in the design of any subdivision.

Future lots will be responsible for their own on-site water storage.

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.....

s6 matters are discussed elsewhere in this report. The subdivision does not adversely affect the character of the Rural Production Zone in regard to s6 matters, or any of those matters listed in 13.4.13.

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.

Proposed subdivision

The Objectives and Policies of the Rural Production Zone have been considered in the design and layout of the subdivision and I consider the subdivision to be consistent with those objectives and policies.

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

The proposal creates four 2ha lots in the Rural Production Zone, a scenario provided for in the District Plan. It leaves a large balance lot of 15ha. There are no areas of indigenous flora on the property that will be affected by the subdivision. I believe that this proposal represents sustainable management for the zone.

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

The proposal provides for an alternative lifestyle and/or investment opportunity (carbon emission trading). Whilst it may not be your standard run-of-the-mill lifestyle subdivision given the site's remoteness and features, I believe the zone is intended to provide for variety of lifestyle and activities such that people can make choices about their lifestyle.

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

The proposal does not adversely affect amenity values of the zone. The site contains no highly productive land.

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

The property does not contain any significant natural areas or indigenous biodiversity.

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

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

The proposal is not a land use activity. I have not identified any likely conflicting land uses that cannot be mitigated.

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

This policy relates to land use activities, not subdivisions. N/A.

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

Rural production activities can continue to be undertaken following the subdivision.

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

Proposed subdivision

The site is in pine trees. Other than a reasonable amount of clearance to provide for future house sites and access, I do not see the proposal adversely impacting on the site's productive capability.

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

Again, this policy is directed at land uses, not subdivisions.

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

The proposed subdivision scale and intensity meets restricted discretionary subdivision standards and is consistent with the requirements and expectations of the District Plan.

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

I believe the proposal represents efficient use and development of the physical and natural resources.

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

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

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

Refer to earlier comments in regard to reverse sensitivity. I believe any potential adverse effects can be readily avoided, remedied or mitigated. The proposal is not increasing the risk of reverse sensitivity issues to the local area. The proposal will not prevent existing lawfully established activities from continuing to operate.

15.1.3.1 To minimise the adverse effects of traffic on the natural and physical environment.

The proposal is low density, creating the number of lots provided for as a restricted discretionary activity. Tunatahi Road is extremely low usage with very little existing settlement between the top of the hill (where it intersects with Runaruna Road) and the site. I believe any adverse effects from additional traffic will be less than minor.

15.1.4.6 That the number, size, gradient and placement of vehicle access points be regulated to assist traffic safety and control, taking into consideration the requirements of both the New Zealand Transport Agency and the Far North District Council.

Entranceways into the lots can be, formed to Council standard.

7.2 Proposed District Plan Objectives and Policies

The property is zoned Rural Production under the PDP. An assessment of the proposal against the zone's Objectives and Policies follows:

Proposed subdivision

RPROZ-O1

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

The proposal does not impact unduly on the available of land for primary production. The land does not appear to have been in grazing for some time now, with pine plantation and re-growth having taken over as the predominant land use.

RPROZ-O2

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

This objective is in a zone chapter, not subdivision, and is aimed at 'activities'. The application is for a subdivision that does not pre-determine the activities to take place within each lot.

RPROZ-O3

Land use and subdivision in the Rural Production zone:

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

There is no highly productive land within the site. Any primary production activity within the site on adjacent sites will not be constrained as a result of the proposal. The site is not utilised for farming. The site is not subject to hazards. Sites will be fully self serviced.

RPROZ-O4

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

The subdivision will not adversely impact on rural character and amenity.

RPROZ-P1

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

The proposal is not for a primary production activity. It is a subdivision.

RPROZ-P2

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

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

Refer to earlier comments in regard to Objectives.

Proposed subdivision

RPROZ-P3

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

Refer to earlier comments in regard to reverse sensitivity.

RPROZ-P4

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

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

The subdivision is a low-density development, consistent with the level of density provided for by the ODP. The area is not dominated by high intensity agriculture or horticultural use – which are the type of uses that can generate reverse sensitivity issues if not managed. I believe the proposal will maintain the rural character and amenity of the area.

RPROZ-P5

Avoid land use that:

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

N/A. Activity is not a land use.

RPROZ-P6

Avoid subdivision that:

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

The subdivision will not result in the loss of highly productive land. The proposed lot sizes can continue to support pine trees along with limited built development. The site does not possess any special habitat, landscape or natural values. Strictly speaking, however, the proposal cannot be consistent with part (c) of RPROZ-P6, as no specific environmental 'benefit' is proposed.

RPROZ-P7

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

- a. whether the proposal will increase production potential in the zone;*
- b. whether the activity relies on the productive nature of the soil;*
- c. consistency with the scale and character of the rural environment;*
- d. location, scale and design of buildings or structures;*

Proposed subdivision

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

The subdivision does not require consent under the PDP so the policy is of limited relevance. Whilst the proposal will not increase productive potential, this is limited in any event. The proposal does not rely on the productive nature of the soil and the site contains no highly productive land. The proposal is low density and built environment will not dominate. Rural amenity will be maintained. There is no zone interface. The sites can cater for their on-site servicing. The site has no historic heritage or cultural values, there are no natural features or landscapes, and there are no areas of indigenous vegetation.

Subdivision objectives and policies:

SUB-O1

Subdivision results in the efficient use of land, which:

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

I believe that the proposed subdivision is more consistent than not with the zone's objectives and policies, and any relevant district wide objectives and policies. I believe it will result in the efficient use of land.

SUB-O2

Subdivision provides for the:

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

The site contains none of the above.

SUB-O3

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

Proposed subdivision

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

There is no planned infrastructure for the wider area. On-site infrastructure can be utilised for wastewater, stormwater and potable water supply.

SUB-O4

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

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

The site is rural and is not adjoining, nor contain, any qualifying waterbodies. It is not coastal and there are no nearby public open spaces.

SUB-P1

Enable boundary adjustments that:...

Not applicable.

SUB-P2

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

Not applicable.

SUB-P3

Provide for subdivision where it results in allotments that:

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

The subdivision is more consistent than not, with the purpose and qualities of the zone, largely because it is low density, maintains character, and the site contains no highly productive land, with poorer soils predominating. Whilst the proposed lots do not 'comply' with the PDP's minimum lot sizes for the zone, the lots are nonetheless easily able to provide for building platforms. They have / can 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

The subdivision does not adversely impact on natural environmental values, nor historical and cultural values. The site is not subject to hazards.

SUB-P5

Manage subdivision design and layout in the General Residential, Mixed Use and Settlement zone to

Not applicable.

Proposed subdivision

SUB-P6

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

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

This is a rural area with no planned infrastructure improvements on the part of the Council. Future lot owners will be responsible for on-site infrastructure of wastewater, stormwater and potable water. I believe the subdivision can be appropriately serviced.

SUB- P7

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

Not applicable. There are no waterbodies that require esplanade reserves.

SUB-P8

Avoid rural lifestyle subdivision in the Rural Production zone unless the subdivision:

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

There are no 'qualifying SNA's' and there are no versatile soils.

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.

The subdivision is not a management plan subdivision.

SUB-P10

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

Not applicable.

SUB-P11

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

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

The subdivision does not require consent under the PDP so the above policy is of limited relevance. Notwithstanding this, relevant matters in SUB-P11 have been considered.

7.3 Part 2 Matters

5 Purpose

(1)The purpose of this Act is to promote the sustainable management of natural and physical resources.

The proposal is considered to have had adequate regard to Part 2 matters. I believe the proposal fulfils the Purpose in s5.

6Matters of national importance

(a)the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:

(b)the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development:

(c)the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:

(d)the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:

(e)the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:

(f)the protection of historic heritage from inappropriate subdivision, use, and development:

(g)the protection of protected customary rights:

(h)the management of significant risks from natural hazards.

The site is not within the coastal environment and there are no known wetlands, lakes or rivers. The site does not have any outstanding landscape values. There is no significant indigenous bush on the property. No public access is required to any lake or river. There are no culturally significant areas on or near the application site, and no identified heritage values. There are no significant risks from natural hazards.

7 Other matters

(a)kaitiakitanga:

(aa) the ethic of stewardship:

(b)the efficient use and development of natural and physical resources:

(ba)the efficiency of the end use of energy:

(c)the maintenance and enhancement of amenity values:

(d)intrinsic values of ecosystems:

(e)[Repealed]

(f)maintenance and enhancement of the quality of the environment:

(g)any finite characteristics of natural and physical resources:

(h)the protection of the habitat of trout and salmon:

(i)the effects of climate change:

(j)the benefits to be derived from the use and development of renewable energy.

In regard to "other matters" (s7), I see (c) the maintenance and enhancement of amenity values; (d) intrinsic values of ecosystems; and (f) maintenance and enhancement of the quality of the environment as having relevance. All lots are large enough to provide for house sites and on-site services. The proposal represents the efficient use and development of resources. It has minimal, if any, adverse effect on amenity values or the intrinsic values of ecosystems.

8 Treaty of Waitangi

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

I have not identified anything in the proposal that gives offence to, or is contrary to, s8.

7.4 National Policy Statements & Standards

I have not identified any National Policy Statement relevant to the proposal, nor any National Environmental Standard.

7.5 Regional Policy Statement for Northland (RPS)

I do not consider the proposal to be inconsistent with any relevant objectives and policies in the RPS for Northland. The proposed lots will result in additional built development, but the proposal does not result in any material loss in productivity and does not result in reverse sensitivity effects.

The site is not subject to hazard. The site is not coastal and has no high or outstanding natural character or landscape values, and no heritage/cultural values.

The proposal does not, in my opinion, create any undue reverse sensitivity effects.

7.6 Regional Plan (Appeals Version)

The subdivision does not result in any breaches of rules in the Regional Plan.

8.0 NOTIFICATION ASSESSMENT & CONSULTATION

8.1 S95A Public Notification Assessment

A consent authority must follow the steps set out in s95A to determine whether to publicly notify an application for a resource consent. Step 1 specifies when public notification is mandatory in certain circumstances. None of these circumstances apply. Step 2 of s95A specifies the circumstances that preclude public notification. Neither circumstance exists therefore public notification is not precluded and Step 3 of s95A must be considered. This specifies that public notification is required in certain circumstances. The application is not subject to a rule or national environmental standard that requires public notification. This report and AEE concludes that the activity will not have, nor is it likely to have, adverse effects on the environment that are more than minor. In summary public notification is not required pursuant to Step 3 of s95A.

Step 4 of s95A states that the consent authority is to determine if there are any special circumstances under which public notification may be warranted. No such circumstances exist.

8.2 S95B Limited Notification Assessment

A consent authority must follow the steps set out in s95B to determine whether to give limited notification of an application for a resource consent, if the application is not publicly notified pursuant to s95A. Step 1 identifies certain affected groups and affected persons that must be notified. No such group or persons exist in this case. Step 2 of s95B specifies the circumstances that preclude limited notification. Neither circumstance applies and Step 3 of s95B must be considered. This specifies that certain other affected persons must be notified, in this case being any identified pursuant to s95E.

The s95E assessment below concludes that there are no affected persons to be notified.

Step 4 of s95B states that the consent authority is to determine if there are any special circumstances under which limited notification may be warranted. No such circumstances exist.

8.3 S95D Level of Adverse Effects

The AEE in this report assesses effects on the environment and concludes that these will be no more than minor, therefore no public notification is required.

8.4 S95E Affected Persons

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

The size and layout of the proposed lots is consistent with the zone's restricted discretionary activity threshold. Future house sites are well internalised within the application site's boundaries. I do not consider any adjacent properties to be affected by the creation of built development on four additional lots. The standard of Tunatahi Road will likely improve as a result of giving effect to the subdivision, albeit not to the full standard required by the District Plan. I have not identified any affected persons in regard to adjacent properties.

There are no identified Sites of Significance to Māori within or in the vicinity of the property, and no archaeological sites. With less than minor effects on any habitat, including water bodies, and no impact on DOC's ability to manage its resources, it has not been considered necessary to consult with DOC.

9.0 CONCLUSION

The effects of the subdivision on the wider environment are no more than minor, and no special circumstances exist that would suggest public notification is required. No affected persons have been identified and limited notification is not required.

Part 2 matters have been had regard to and the proposal is considered consistent with the objectives and policies of relevant planning provisions in the Operative and Proposed District Plans, relevant National Policy Statements and the Regional Policy Statement.

It is requested that the Council give favourable consideration to the application and grant approval, subject to appropriate conditions, under delegated authority.



Lynley Newport
Senior Planner
THOMSON SURVEY LTD

Dated 17th February 2025

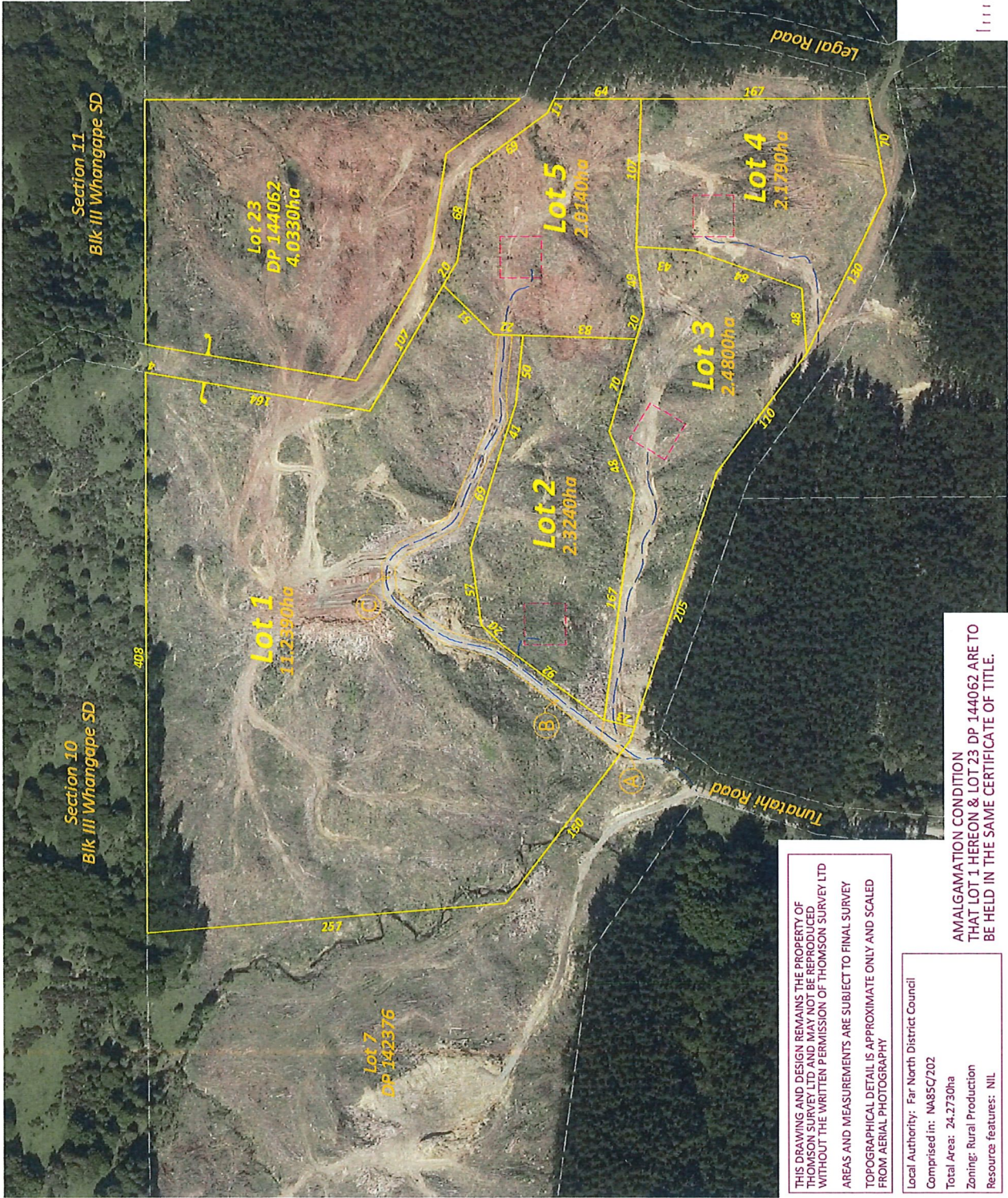
10.0 LIST OF APPENDICES

- | | |
|-------------------|---|
| Appendix 1 | Scheme Plan(s) |
| Appendix 2 | Locality Plan |
| Appendix 3 | Record of Title & Relevant Instruments |
| Appendix 4 | Subdivision Site Suitability Engineering Report |

Appendix 1

Scheme Plan(s)

MEMORANDUM OF EASEMENTS			
PURPOSE	SHOWN	SERVIENT TENEMENT	DOMINANT TENEMENT
RIGHT OF WAY TELECOMMUNICATIONS & ELECTRICITY	(A)	LOT 1 HEREON	LOTS 2, 3 & 5 HEREON
	(B)	LOT 1 HEREON	LOTS 2 & 5 HEREON
	(C)	LOT 1 HEREON	LOT 5 HEREON



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

0 30 150 300m
Bar Scale 1:3000 @ A3

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

Local Authority: Far North District Council
Comprised in: NA85C/202
Total Area: 24.2730ha
Zoning: Rural Production
Resources features: NIL

AMALGAMATION CONDITION THAT LOT 1 HEREON & LOT 23 DP 144062 ARE TO BE HELD IN THE SAME CERTIFICATE OF TITLE.

THOMSON SURVEY
LIMITED
315 Kerikeri Rd
P.O. Box 312, Kerikeri
Email: info@thomsonsurvey.co.nz
Ph: (09) 4077566
www.thomsonsurvey.co.nz

Registered Land Surveyors, Planners & Land Development Consultants

**PROPOSED SUBDIVISION OF
LOT 8 DP 142376 & LOT 23 DP 144062**
TUNATAHI ROAD, PUNGURU

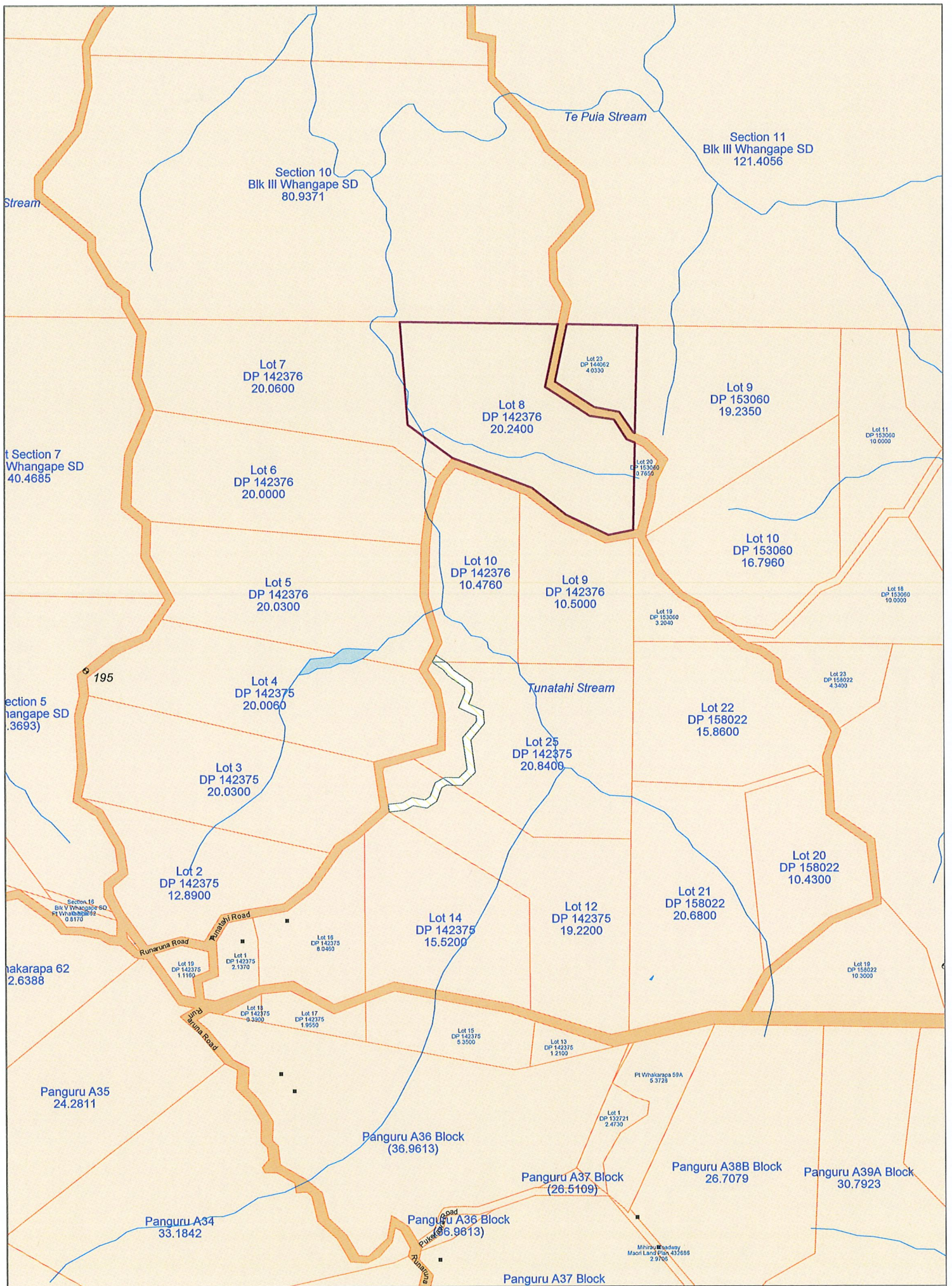
PREPARED FOR: JOGI LIMITED

Survey	Name	Date	ORIGINAL SCALE	SHEET SIZE
Design				
Drawn	KY	09.08.24	1:3000	A3
Approved				
Rev	KY	13.12.24		
10666 Scheme 20241213				

Surveyors Ref. No: 10666
Sheet 1 of 1

Appendix 2

Locality Plan




Appendix 3
Record of Title &
Relevant Instruments



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




R. W. Muir
Registrar-General
of Land

Identifier **NA85C/202**
Land Registration District **North Auckland**
Date Issued 12 April 1991

Prior References

NA80D/712 NA84B/860

Estate Fee Simple
Area 24.2730 hectares more or less
Legal Description Lot 23 Deposited Plan 144062 and Lot 8
 Deposited Plan 142376

Registered Owners

Jogi Limited

Interests

Subject to Section 308 (4) and (5) Local Government Act 1974
13136395.1 Mortgage to Finbase - 18.10.2024 at 2:51 pm

Approvals

THE FAR NORTH DISTRICT COUNCIL APPROVES THIS SURVEY PLAN PURSUANT TO SECTION 305 OF THE LOCAL GOVERNMENT ACT 1974 SUBJECT TO THE CONDITIONS OF AMALGAMATION SET OUT HEREON, AND CERTIFYING THAT THE SURVEY PLAN IS IN ACCORDANCE WITH THE REQUIREMENTS AND PROVISIONS OF THE OPERATIVE DISTRICT SCHEME IN FORCE FOR THE AREA TO WHICH THE SURVEY PLAN RELATES AT THE DATE OF APPROVAL OF THE SCHEME PLAN AND ACCORDINGLY THE COMMON SEAL OF THE FAR NORTH DISTRICT COUNCIL WAS AFFIXED IN THE PRESENCE OF:-

[Signature]
[Signature]

REGISTERED OWNERS:
 The Common Seal of the Far North District Council

THE FAR NORTH DISTRICT COUNCIL APPROVES THIS SURVEY PLAN PURSUANT TO SECTION 305 OF THE LOCAL GOVERNMENT ACT 1974 SUBJECT TO THE CONDITIONS OF AMALGAMATION SET OUT HEREON, AND CERTIFYING THAT THE SURVEY PLAN IS IN ACCORDANCE WITH THE REQUIREMENTS AND PROVISIONS OF THE OPERATIVE DISTRICT SCHEME IN FORCE FOR THE AREA TO WHICH THE SURVEY PLAN RELATES AT THE DATE OF APPROVAL OF THE SCHEME PLAN AND ACCORDINGLY THE COMMON SEAL OF THE FAR NORTH DISTRICT COUNCIL WAS AFFIXED IN THE PRESENCE OF:-

AMALGAMATION CONDITION
 THAT ONE CERTIFICATE OF TITLE BE ISSUED FOR SECTION 1 BLK VI WHANGAPE S.D. (CT 49A/572) AND PT SECTION 13 BLK V WHANGAPE S.D. (RESIDUE CT 49A/570)

SEE DOC. A 628382

NUMBER DESIGNATED AUTHORITY

Lot	CT
5	84B/857
6	84B/858
7	84B/859
8	84B/860
9	84B/861
10	84B/862

Total Area 103.4160 ha
 Comprised in ...CT. 49A/570 (pt.)
 49A/571 (bal)

I, Timothy James Smalley, being 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 plans have been approved by the Registrar of Land and the Survey Regulations 1972 or any regulations made in substitution thereof.

Dated at Auckland this 19th day of April 1991

[Signature]
 Chief Surveyor

Field Book
 Reference Plans
 Examined

Approved as to Survey

Deposited this 19th day of April 1991

Received
 Instructions

Approved as to Survey

Deposited this 19th day of April 1991

Received
 Instructions

LAND DISTRICT NORTH AUCKLAND
 SURVEY BLK. & DIST. V. Whangape, 005/193
 NZMS 261 SH. RECORD MAP No. 005/14-3

LOCAL AUTHORITY For North District
 Surveyed by GATO CONSULTANTS LTD
 Scale 1:4000 Date Aug 1990

DP142376

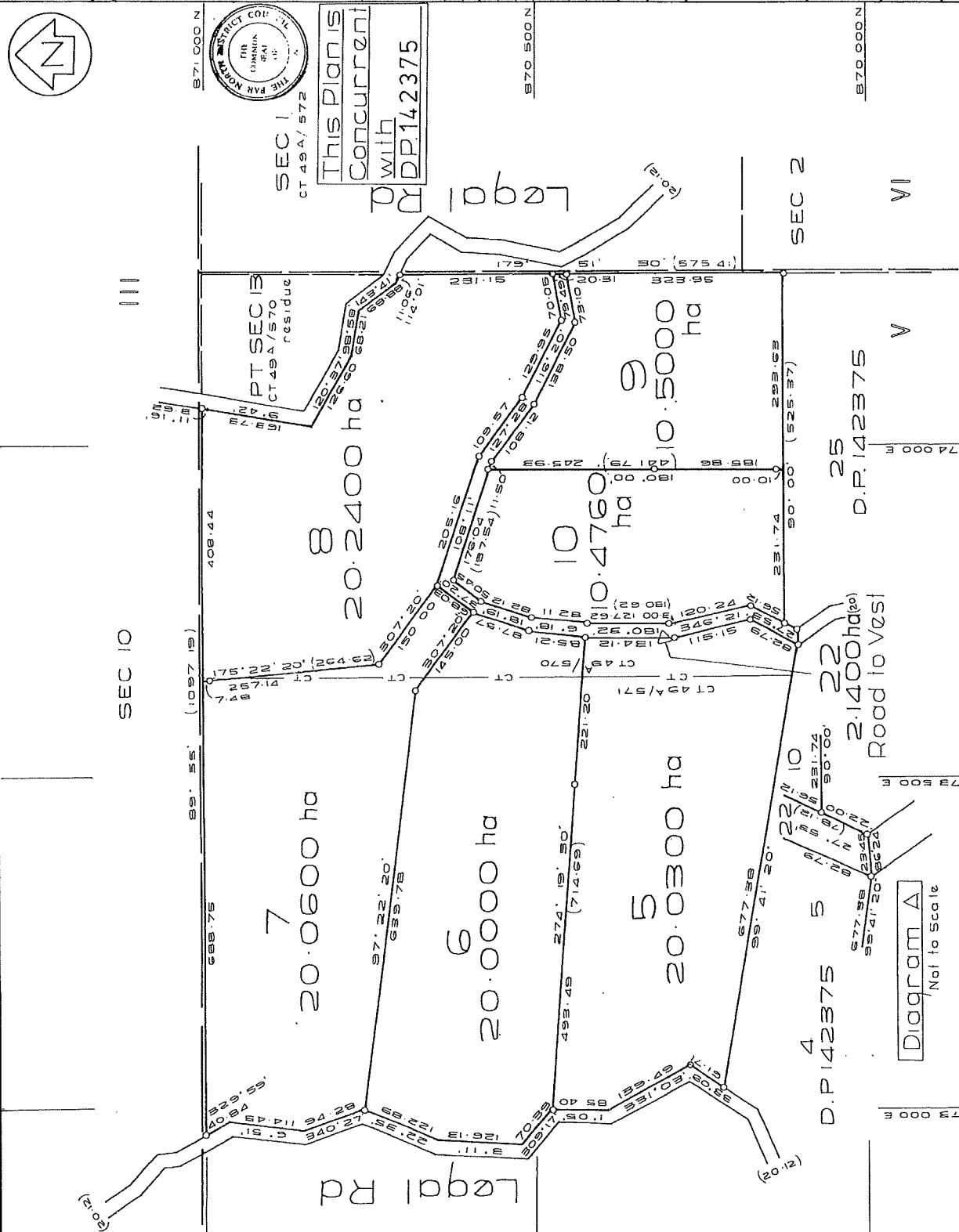


Diagram A
 Not to Scale

LAND DISTRICT NORTH AUCKLAND
 SURVEY BLK. & DIST. V. Whangape, 005/193
 NZMS 261 SH. RECORD MAP No. 005/14-3

LOCAL AUTHORITY For North District
 Surveyed by GATO CONSULTANTS LTD
 Scale 1:4000 Date Aug 1990

DP142376

Approvals

REGISTERED OWNERS:

THE FAR NORTH DISTRICT COUNCIL APPROVES THIS DAY OF 23rd January 1991 THIS SURVEY PLAN PURSUANT TO SECTION 305 OF THE LOCAL GOVERNMENT ACT 1974 SUBJECT TO THE CONDITIONS OF AMALGAMATION SET OUT HEREON AND CERTIFYING THAT THE SURVEY PLAN IS IN ACCORDANCE WITH THE REQUIREMENTS AND PROVISIONS OF THE OPERATIVE DISTRICT SCHEME IN FORCE FOR THE AREA TO WHICH THE SURVEY PLAN RELATES AT THE DATE OF APPROVAL OF THE SCHEME PLAN AND ACCORDINGLY THE COMMON SEAL OF THE FAR NORTH DISTRICT COUNCIL WAS AFFIXED IN THE PRESENCE OF:-

THE FAR NORTH DISTRICT COUNCIL APPROVES THIS DAY OF 23rd January 1991 THIS SURVEY PLAN PURSUANT TO SECTION 305 OF THE LOCAL GOVERNMENT ACT 1974 SUBJECT TO THE CONDITIONS OF AMALGAMATION SET OUT HEREON AND CERTIFYING THAT THE SURVEY PLAN IS IN ACCORDANCE WITH THE REQUIREMENTS AND PROVISIONS OF THE OPERATIVE DISTRICT SCHEME IN FORCE FOR THE AREA TO WHICH THE SURVEY PLAN RELATES AT THE DATE OF APPROVAL OF THE SCHEME PLAN AND ACCORDINGLY THE COMMON SEAL OF THE FAR NORTH DISTRICT COUNCIL WAS AFFIXED IN THE PRESENCE OF:-

(UNDER DESIGNATED AUTHORITY)

AMALGAMATION CONDITIONS:-
 (1) THAT LOT 23 HEREOF BE TRANSFERRED TO THE OWNER OF LOT 23 OF 142376 (C.T. 499/576) AND THAT ONE CERTIFICATE OF TITLE BE ISSUED WHICH INCLUDE BOTH PARCELS.
 SEE FILE A 22376

BEARING DATUM GEODETIC 1949
 COORDINATE DATUM GEODETIC 1949
 MT EDEN CIRCUIT COORDINATES.
 ORIGIN : MT EDEN : 700000N
 300000E

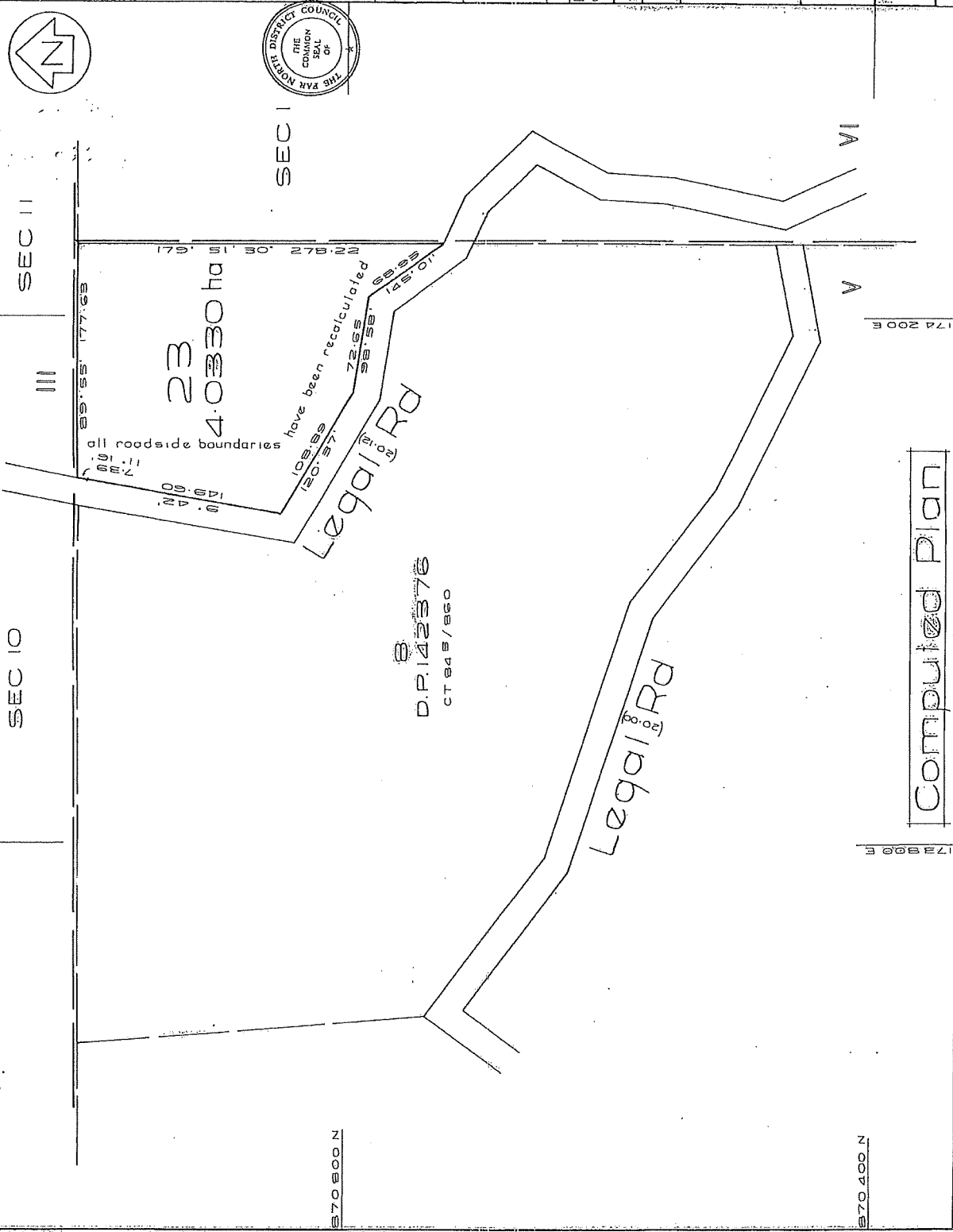
New CT Allocated:
 Lot 23 hereon 85C/202
 and Lot 23 D.P. 142376
 Total Area 4.0330 ha.
 Comprised in C.T. 499/576, PART.

Attested by J.M. Stoddart
 Registered Surveyor and holder of an annual practicing 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 in accordance with the provisions of the Survey Act 1986 and that the boundaries and areas shown hereon are correct and have been made in accordance with the Survey Regulations 1972 or any regulations made in substitution thereof.

Dated at Whangape this 23 day of January 1991.
 Signature [Signature]
 Field Book Traverse Book
 Reference Plans
 Examined X

Approved as to Survey
[Signature]
 Chief Surveyor

Deposited this 23 day of January 1991
[Signature]
 District Land Registrar
 File No.
 Registered Plan No. DP 144062



LOCAL AUTHORITY FOR NORTH DISTRICT
 Surveyed by CATO CONSULTANTS LTD
 Scale 1:1,200 Date Nov. 1990

Section 13 Blk V Whangape SD

LAND DISTRICT NORTH AUCKLAND
 SURVEY BLK. & DIST. V. Whangape
 NZMS 261 SHT.005. RECORD MAP No. H.3...

CENTIMETRES

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 26 APR 1991

27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51

L.S.F. FORM 102

Appendix 4
Subdivision Site Suitability
Engineering Report



geologix
consulting engineers

SUBDIVISION SITE SUITABILITY ENGINEERING REPORT

169 TUNATAHI ROAD
PANGURU

JOGI LIMITED

C0552-S-01
DECEMBER 2024
REVISION 2





DOCUMENT MANAGEMENT

Document Title	Subdivision Site Suitability Engineering Report
Site Reference	169 Tunatahi Road, Panguru
Client	Jogi Limited
Geologix Reference	C0552-S-01
Issue Date	December 2024
Revision	02
Prepared	Sander Derks Graduate Civil Engineer, Dip. Eng <i>p.p.</i>
Reviewed	Sebastian Hicks Principal Civil Engineer, CPEng Reg. 1168062, CMEngNZ, IntPE(NZ) /APEC Engineer
Approved	Edward Collings Managing Director, CEnvP Reg. 0861, CPEng Reg. 1033153, CMEngNZ
File Reference	Z:\Projects\C0500-C0599\C0552 - Tunatahi Road, Panguru\06 - Reports\C0552-S-01-R02.docx

REVISION HISTORY

Date	Issue	Prepared	Reviewed	Approved
December 2024	First Issue – For Resource Consent	SD	SH	EC
December 2024	Second Issue – For Resource Consent (Updated)	SD	SH	EC



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1 INTRODUCTION

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

Our scope of works has been undertaken to assist with the Resource Consent application in relation to the proposed subdivision of a rural property located at 169 Tunatahi Road, Panguru, the 'site'. Specifically, this assessment addresses engineering elements of natural hazards, wastewater, stormwater, access and internal roading and associated earthwork requirements to provide safe and stable building platforms with less than minor effects on the environment as a result of the proposed activities outlined in Section 1.1.

1.1 Proposal

A proposed scheme plan was presented to Geologix at the time of writing, prepared by Thomson Survey Limited¹ and has been provided within Appendix A as Drawing No 100. It is understood that the Client proposes to subdivide the site (Lot 8 DP 142376 and Lot 23 DP 144062 amalgamated) into five separate lots. This is summarised in Table 1 below. Any amendments to the referenced scheme plan may require an update to the recommendations of this report which are based on conservative, typical rural residential development concepts.

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

Table 1: Summary of Proposed Scheme.

Proposed Lot No.	Size	Purpose
1 (to be held with Lot 23 DP 144062)	15.2 ha	Existing residential
2	2.3240 ha	New residential
3	2.4900 ha	New residential
4	2.1790 ha	New residential
5	2.0140 ha	New residential

It should be noted that the site will contain three new easements, identified A, B and C within proposed Lot 1 for right of way, telecommunications and electricity. Refer to Appendix A, drawing No. 100.

Site access for proposed Lot 1 and 4 will be provided directly from Tunatahi Road. Lot 2, 3 and 5 will be accessed via Right of Way Easements A, B and C. Easement C comprises a new private access way to the site boundary of Lot 5. Each vehicle crossing has been considered from a safety aspect in relation to visibility of incoming and outgoing vehicle movements. A specific Traffic Impact Assessment (TIA) is not within the scope of this report.

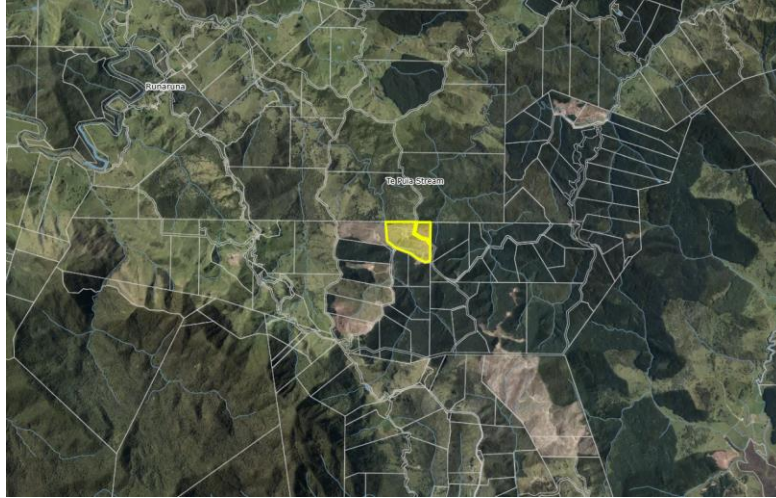
¹ Williams and King, Scheme Plan Ref. 9459, dated May 2024.



2 DESKTOP APPRAISAL

The site is located at 169 Tunatahi Road, Panguru, on a direct approach from the main road before terminating at the southern site boundary. The site is irregular in shape and bound by an extension of Tunatahi Road to the south and west with farmland and forestry in all other directions. Topographically, the majority of the site is moderately steep and undulating. The site setting is presented schematically as Figure 1 below.

Figure 1: Site Setting



The entire site is currently in established wild forestry regrowth with the occasional clearing in rough scrub.

An existing residence is located in proposed Lot 1. The residence comprises dwelling structures and sheds that are all accessed via an existing accessway that is largely surfaced in metal up to the residence area. This accessway is set within proposed Easements A, B & part of C, all of which are contained in Lot 1. Easement C continues eastward from the existing residence area towards lot 5 but there is no existing track within this section.

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

2.1 Existing Reticulated Networks

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

2.2 Geological Setting

Available geological mapping² indicates the site to be underlain by Northland Allochthon Group. These are primarily comprised micaceous sandstone, with minor conglomerate, and interbeds of blue-grey mudstone.

2.3 Existing Geotechnical Information

Existing subdivision and/ or Building Consent ground investigations were not made available to Geologix at the time of writing. Additionally, a review of available GIS databases, including the New Zealand Geotechnical Database³ did not indicate borehole records within 500 m of the site.

3 SURFACE WATER FEATURES AND OVERLAND FLOWPATHS

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

3.1 Surface Water Features

An intermittent water course was observed within the site near its southwest corner. This watercourse is intercepted close to the entrance of the site by an overland flow path incoming from the east, originating near the external boundary of Lot 5 and crossing through Lot 2.

There are no mapped flood hazards within the site or nearby downstream or upstream of the site.

3.2 Overland Flow Paths

There is only one clearly defined flow path evident within the site boundaries, that being in Lot 2 as mentioned above. Elsewhere, it should be considered for there to be other minor overland flow paths formed within the gullies of the site's undulating topography.

4 GROUND INVESTIGATION

A site-specific walkover survey and intrusive ground investigation was undertaken by Geologix on 26 September 2024. The ground investigation was scoped to confirm the findings of the above information and to provide parameters for wastewater assessment. The ground investigation comprised:

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

³ <https://www.nzgd.org.nz>



- Eight hand augered boreholes designated BH01 to BH08 inclusive, formed within suitable areas for wastewater disposal fields on each proposed residential lot with a target depth of 1.2m below ground level (bgl).

4.1 Site Walkover Survey

A visual walkover survey of the property confirmed:

- The topographical understanding of the site developed from our desktop study, as outlined in Section 2, is in general accordance with that observed on site.
- Suitable building envelopes⁴ can be formed on gently sloping land <15°.
- The site is bound by Tunatahi Road to the south, which serves as the access to the proposed subdivision. Nearby land in all directions includes similar rural forested plantation or natural re-growth where plantations have not been maintained.
- The site is found to be heavily forested in natural re-growth and many of the plantation tracks observed on aerial imagery are now covered in vegetation and difficult to access.
- Proposed Easement A, B & C comprises an existing formed access Right of Way (RoW) that currently provides access to a residence in Proposed Lot 1.
- An existing residential dwelling with outbuildings was observed on site, as per latest 2024 Google Map Imagery.

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 guidelines⁵. Engineering borehole logs are presented as Appendix B to this report and approximate borehole positions recorded on Drawing No. 100 within Appendix A. Strata identified during the ground investigation can be summarised as follows:

- **Topsoil encountered down to 0.2 m bgl.** Described as organic silt, dark brown and moist.
- **Northland Allochthon Group Residual Soil to depths of >1.2m bgl.** The Northland Allochthon residual soil encountered are generally silty with gravel and trace clay, low plasticity and highly permeability. Colour of the soil is brown to dark brown. The soil below 0.7m depth comprising orange fine gravel fragments and becomes more clayey.

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

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

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

Table 2: Summary of Ground Investigation

Hole ID	Lot	Hole Depth	Topsoil Depth	Groundwater ²	Wastewater Category ⁴
BH01	2	1.2 m	0.2 m	NE	6 – slow draining
BH02	2	1.2 m	0.05 m	NE	6 – slow draining
BH03	3	1.2 m	0.05 m	NE	6 – slow draining
BH04	3	1.2 m	0.0 m	NE	6 – slow draining
BH05	4	1.2 m	0.1 m	NE	6 – slow draining
BH06	4	1.2 m	0.0 m	NE	6 – slow draining
BH07	5	1.2 m	0.05 m	NE	6 – slow draining
BH08	5	1.2 m	0.0 m	NE	6 – slow draining

1. All depths recorded in m bgl unless stated.
2. Groundwater measurements taken on day of drilling.
3. NE – Not Encountered.
4. Wastewater category in accordance with Auckland Council TP58⁶.

5 WASTEWATER ASSESSMENT

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

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

The concept rural residential developments within this report assume that the proposed new lot may comprise up to a five-bedroom dwelling with a peak occupancy of eight people⁷. This considers the uncertainty of potential future Building Consent designs. The number of usable bedrooms within a residential dwelling must consider that proposed offices, studies, gyms, or other similar spaces maybe considered a potential bedroom by the Consent Authority.

5.1 Existing Wastewater Systems

No specific existing wastewater system was observed during the site visit. It is anticipated that an existing septic tank or other underground system is in place. The proximity of the system would be well within the confined on Lot 1, and not require further assessment with respect to position relative to proposed lot boundaries. No existing wastewater treatment or disposal systems have been identified or surveyed within other proposed lot boundaries.

5.2 Wastewater Generation Volume

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

⁶ Auckland Council, Technical Publication 58, On-site Wastewater Systems: Design and Management Manual, 2004, Table 5.1.

⁷ TP58 Table 6.1.

tank supply is estimated at 160 litres/ person/ day⁸. This assumes standard water saving fixtures⁹ being installed within the proposed future developments. This should be reviewed for each proposed lot at the Building Consent stage.

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

5.3 Treatment System

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

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

5.4 Land Disposal System

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

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

Table 3: Disposal Field Design Criteria

Design Criteria	Site Conditions
Topography at the disposal areas shall not exceed 25°. Exceedances will require a Discharge Consent.	Concept design complies
On shallower slopes <25 ° but >10 °, compliance with Northland Regional Plan (NRP) rule C.6.1.3(6) is required.	Disposal field sited on slopes >10 ° so final design will need to meet C.6.1.3(6)(a)-(f) inclusive in order to be permitted activity.
On all terrain irrigation lines should be laid along contours.	Concept design complies

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

⁹ Low water consumption dishwashers and no garbage grinders.



Disposal system situated no closer than 900 mm (vertically) from the winter groundwater table (secondary treated effluent).	Concept design complies
Separation from surface water features such as stormwater flow paths (including road and kerb channels), rivers, lakes, ponds, dams, and natural wetlands according to Table 9, Appendix B of the NRP.	Concept design complies. All overland flow paths separation distances to disposal areas are 15 m.
The effluent is treated and disposed of on-site such that each site has its own treatment and disposal system no part of which shall be located closer than 30m from the boundary of any river, lake, wetland, or the boundary of the coastal marine area. FNDC rule 12.7.6.1.4	Concept design complies.

5.4.1 Soil Loading Rate

Based on the results of the ground investigation, conservatively the shallow soils are inferred to meet the drainage characteristics of TP58 Category 6, sandy clay, non-swelling clay, and silty clay – slowly draining. This correlates to NZS1547 Category 5, poorly drained described as light clays. For a typical PCDI system, a Soil Loading Rate (SLR) of 2 mm/ day is recommended within NZS1547 Table 5.2 and TP58 Table 9.2.

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

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

5.4.2 Disposal Areas

The sizing of wastewater system disposal areas is a function of soil drainage, the loading rate and topographic relief. For each proposed lot a primary and reserve disposal field is required as follows. The recommendations below are presented on Drawing No. 100.

- **Primary Disposal Field.** A minimum PCDI primary disposal field of 640 m² laid parallel to the natural contours.
- **Reserve Disposal Field.** NRP rule C.6.1.3(9)(b) requires a minimum reserve disposal field equivalent to 30 % of the primary disposal field for secondary or tertiary treatment systems. It is recommended each proposed lot provides a 192 m² reserve disposal area to be laid parallel to the natural contours.
- Disposal fields discharging secondary treated effluent are to be set at the 20-year ARI (5% AEP) flood inundation height to comply with the above NRP rule. Flood hazard potential has not been identified within the site boundaries and as such the site can provide freeboard above the 1 % AEP flood height to comply with this rule.

5.5 Summary of Concept Wastewater Design

Based on the above design assumptions a concept wastewater design is presented in Table 4 and presented schematically upon Drawing No. 100 Appendix A. It is recommended that each lot is subject to Building Consent specific review and design amendment according to final development plans.

Table 4: Concept Wastewater Design Summary

Design Element	Specification
Concept development	Five-bedroom, peak occupancy of 8 (per lot)
Design generation volume	160 litres/ person/ day
Water saving measures	Standard. Combined use of 11 litre flush cisterns, automatic washing machine & dishwasher, no garbage grinder ¹
Water meter required?	No
Min. Treatment Quality	Secondary
Soil Drainage Category	TP58 Category 6, NZS1547 Category 5
Soil Loading Rate	2.0 mm/ day
Primary disposal field	Surface/ subsurface laid PCDI, min. 640 m ²
Reserve disposal field	Surface/ subsurface laid PCDI, min. 30 % or 192 m ²
Dosing Method	Pump with high water level visual and audible alarm. Minimum 24-hour emergency storage volume.
Stormwater Control	Divert surface/ stormwater drains away from disposal fields. Cut off drains required.

1. Unless further water saving measures are included.

5.6 Assessment of Environmental Effects

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

The scale of final development is unknown at the time of writing and building areas, impervious areas including driveways, ancillary buildings, landscaped gardens, and swimming pools may reduce the overall area for on-site wastewater disposal. For the purpose of this report, the above impervious features are considered to be comprised within the conceptual 30 x 30 m square building envelope shown on Drawing Sheet 100, Appendix A. The conceptual wastewater disposal field areas are clear of this indicative building envelope area.

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

6 STORMWATER ASSESSMENT

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

6.1 Impervious Surfaces and Activity Status

A summary of the impervious areas of the proposed lots is provided as Table 5 below which has been developed from our observations and the provided Scheme Plan. For the proposed lots, this has been taken as conceptual maximum probable development of typical rural residential scenarios. Refer Section 6.2.

The activity status reflected in Table 5 is with respect to Operative FNDC Plan Section 8.6.5.1.3 only. Furthermore, the subdivision stormwater proposal has been assessed in accordance with the Operative FNDC Plan Section 13.8 on the basis that the overall subdivision is determined to be a Restricted Discretionary Activity.

Table 5: Summary of Impervious Surfaces

Surface	Lot 1		Lot 2		Lot 3		Lot 4		Lot 5	
Existing Condition	(242,730 m²)		NA		NA		NA		NA	
Roof	200m ²	0.08%								
Driveway	0m ² (Note 1)	0%								
Right of Way (Easement A, B, C)	804m ²	3.31%								
Total impervious	1004 m ²	4.14%								
Proposed Condition	(152,720 m²)		(23,240 m²)		(24,800 m²)		(21,790 m²)		(20,140 m²)	
Roof	200m ²	0.13%	300m ²	1.3%	300m ²	1.2%	300m ²	1.4%	300m ²	1.5%
Driveway	0m ² (Note 1)	0%	200m ²	0.9%	200m ²	0.8%	200m ²	0.9%	200m ²	1.0%
Right of Way (Easement A, B, C)	1347 m ²	0.88%								
Total	1547 m ²	1.01%	500m ²	2.2%	500m ²	2.0%	500m ²	2.3%	500m ²	2.5%
Activity Status	Permitted		Permitted		Permitted		Permitted		Permitted	

¹The existing driveway within vicinity of Lot 1 existing residence is a natural clay with intermittent grass track. It is not considered impervious and the subdivision formation does not propose to upgrade its condition.

6.2 Stormwater Management Concept

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

- **Probable Future Development (Proposed Lots 2, 3, 4, 5).** The proposed application includes subdivision formation only and not lot-specific residential development at this stage. However, a conservative model of probable future on-lot development has been developed for this assessment considering variation of scale in typical rural residential development. The probable future on-lot development concept includes up to 300 m² potential roof area and up to 200 m² potential driveway or parking areas. The latter has been modelled as an offset within lot-specific attenuation devices.
- **Probable Future Development Lot 3 – Extended driveway.** The concept development within Lot 3 requires an extended driveway comprising 660m² new impervious area. This is proposed to be mitigated with attenuation of its runoff in a pond or tank at western end of the lot. The pond/tank will have a controlled outlet to the existing OLFP adjacent, with an energy dissipation outlet.
- **Existing On-site Development (Proposed Lot 1).** An existing residence including some accompanying minor dwellings and sheds with a total roof area of approximately 200 m² and impervious accessway area of approximately 804 m² is located within the boundaries of proposed lot 1. The existing driveway area in vicinity of the residence is formed in natural clay and grass and is considered pervious. There are two rainwater tanks servicing the property currently. Impervious areas are below the permitted activity threshold as indicated above in Table 5, therefore attenuation for compliance in this regard is not necessary.
- **Subdivision Development - ROW C Extended Accessway.** Access to proposed lots 1, 2 and 3 will be provided by an upgraded accessway (RoW within Easement A and B) that then continues past Lot 1's existing residence to provide access to proposed Lot 5. The upgrade of the accessway up to Lot 1 residence is not considered to require attenuation on the basis that its impervious condition is not changed or increased. However, the formation of the new 220m extension of accessway with Easement C will require attenuation as this is considered an increase in impervious area. It is proposed a pond is constructed for this purpose near the low point of the accessway in ROW C which will offer attenuation to mitigate the effect of the new impervious area within the catchment.
- **Subdivision Development – Vehicle Crossings.** The provision of vehicle crossings to access the lots is discussed in Section 10.2. These impervious surfaces will produce insignificant increase in runoff, with less than minor adverse effect on environment, therefore no attenuation of these areas is specifically allocated.

6.3 Design Storm Event

Relevant design rainfall intensity and depths have been ascertained for the site location from the NIWA HIRDS meteorological model¹⁰. The NIWA HIRDS rainfall data is presented in full within Appendix D. Provision for climate change has been adopted by means of applying a factor of 20 % to rainfall intensities used in the post-development condition only, in accordance with FNDC Engineering Standards 2023.

The FNDC Engineering Standards 2023 specify that the post-development stormwater runoff peak discharge is limited to 80 % of the pre-development condition for the 20 % and 50 % AEP storm event. This provision also complies with NRP Rule C6.4.2(2).

The attenuation modelling results are summarised in Table 7 and provided in full in Appendix D.

As discussed in Section 3.1, there is no anticipated increase to any flooding hazard on downstream property that has been identified with the future development of the site and therefore there is no requirement to provide flood control in compliance with FNDC Engineering Standard Table 4-1 (i.e. for the 1% AEP storm event).

Outlet dispersion devices have been designed to manage the 20 % AEP event to reduce scour and erosion at discharge locations. These are detailed further in Section 6.4.1 of this report.

6.4 Concept Stormwater Attenuation

The proposed attenuation concept limits the post-development peak discharge to 80 % of the pre-development condition for the 20 % AEP storm event – the most significant of the design storm events specified in Section 6.3, to validate the feasibility of the proposed activity only.

For the concept future developments in each of the lots, this is achievable by installing specifically sized low-flow orifices into the roof runoff tanks which comprise a detention volume and a retention volume. A typical schematic retention/ detention tank arrangement detail is presented as Drawing No. 401 within Appendix A.

For the proposed concept in Lot 3 with its extended impervious driveway, a pond is proposed.

A pond is also proposed in Easement C, to provide attenuation to mitigate the effects of the additional impervious accessway proposed in Easement C.

The concept design presented should be subject to verification and an updated design at Building Consent stage once final development plans are available. This is typically applied as a consent notice to the applicable titles. We note that the detailed design will be required to

¹⁰ NIWA High Intensity Rainfall Data System, <https://hirds.niwa.co.nz>.

provide appropriate orifices to ensure the 50 % and 20 % AEP events are both sufficiently mitigated.

The rational method has been adopted by Geologix with run-off coefficients as published by FNDC Engineering Standards¹¹ to provide a suitable attenuation design to limit post-development peak flows to 80 % of pre-development conditions.

Table 6: Summary of Probable Future and Existing Development Concept

Item	Pre-development Impervious Area	Post-development Impervious Area	Proposed Concept Attenuation Method
Future Concept Developments Lots 2, 4, 5			
Potential buildings	0 m ²	300 m ²	Detention within roof water tanks
Potential driveways	0 m ²	200 m ²	Off-set detention in roof water tanks
Total	0 m²	500 m²	
Future Concept Developments Lot 3			
Potential buildings	0 m ²	300 m ²	Detention within roof water tanks
Potential driveways	0 m ²	200 m ²	Off-set detention in roof water tanks
Potential extended driveway	0 m ²	515 m ²	Detention within Pond (Lot 3)
Total	0 m²	1015 m²	
Lot 1 (Existing)			
Existing developed condition	200 m ²	200 m ²	Not Required, impervious area < permitted activity
Easement A & B RoW (servicing proposed lot 1, 2, 3, 5)	465 m ²	465 m ²	Detention not required specifically, as remains impervious roadway.
Easement C RoW (servicing proposed lot 5)	339 m ²	999 m ²	Detention within Pond (ROW C)
Total	1004 m²	1547 m²	

Calculations to support the concept design are presented as Appendix D to this report. A summary of the proposed on-lot stormwater attenuation design is presented as Table 7 (Roofwater tanks) and Table 9 (Lot 3 Pond). As above, it is recommended that this concept design is refined at the Building Consent stage once final development plans are available. A Consent notice may be required to be applied to each title to ensure this is undertaken.

¹¹ FNDC Engineering Standards 2023, Version 0.6, Issued May 2023.

Table 7: Probable Future Development Attenuation Concept (Lot 2, 3, 4, 5)

Design Parameter	Flow Attenuation: 50 % AEP (80% of pre dev)	Flow Attenuation: 20 % AEP (80% of pre dev)	Flood Control: 10 % AEP
Regulatory Compliance	FNDC Engineering Standards Table 4-1	FNDC Engineering Standards Table 4-1	NRC Proposed Regional Plan
Pre-development peak flow	5.08 l/s	6.57 l/s	7.67 l/s
80 % pre-development peak flow	4.07 l/s	5.26 l/s	NA
Post-development peak flow	8.79 l/s	11.37 l/s	13.27 l/s
Total Storage Volume Required	5,892 litres	7,691 litres	3,960 litres
Concept Summary:	<ul style="list-style-type: none"> - Attenuation storage calculation accounts for offset flow from driveway (not indicated explicitly in summary above. Refer Appendix D for calcs in full) - Attenuation to 80 % of pre-development condition for 20 % AEP storm represents maximum storage requirement and is adopted for the concept design tank storage. - 1 x 25,000 litre tank is sufficient for attenuation (7,691l) + potable storage (17,309l) - 20 % AEP attenuation in isolation requires a 29 mm orifice 0.73 m below overflow. However regulatory requirements are to consider an additional orifice to control the 50 %. We note this may vary the concept orifice indicated above. This should be provided with detailed design for building consent approval. 		

Table 8: Probable Future Development Attenuation Concept – Pond (ROW C)

Design Parameter	Flow Attenuation: 50 % AEP (80% of pre dev)	Flow Attenuation: 20 % AEP (80% of pre dev)	Flood Control: 10 % AEP
Proposed Lot 1 RoW C – Pond			
Regulatory Compliance	FNDC Engineering Standards Table 4-1	FNDC Engineering Standards Table 4-1	NRC Proposed Regional Plan
Pre-development peak flow	6.71 l/s	8.67 l/s	10.13 l/s
80 % pre-development peak flow	5.37 l/s	6.94 l/s	NA
Post-development peak flow	10.61 l/s	13.71 l/s	16.01 l/s
Total Storage Volume Required	3792 litres	4926 litres	3531 litres
Concept Summary:	<ul style="list-style-type: none"> - Attenuation storage calculation accounts for runoff from 660 m² new impervious driveway. - Attenuation to 80 % of pre-development condition for 20 % AEP storm represents maximum storage requirement and is adopted for the concept design storage. - Conceptual pond detention capacity 4926 litres - Outlet arrangement to be finalised at detailed design. 		



Table 9: Probable Future Development Attenuation Concept – Pond (Lot 3 Driveway)

Design Parameter	Flow Attenuation: 50 % AEP (80% of pre dev)	Flow Attenuation: 20 % AEP (80% of pre dev)	Flood Control: 10 % AEP
Proposed Lot 3 Driveway – Pond			
Regulatory Compliance	FNDC Engineering Standards Table 4-1	FNDC Engineering Standards Table 4-1	NRC Proposed Regional Plan
Pre-development peak flow	5.24 l/s	6.77 l/s	7.90 l/s
80 % pre-development peak flow	4.19 l/s	5.41 l/s	NA
Post-development peak flow	8.28 l/s	10.70 l/s	12.50 l/s
Total Storage Volume Required	2454 litres	3171 litres	2755 litres
Concept Summary:	<ul style="list-style-type: none"> - Attenuation storage calculation accounts for runoff from 515 m² new impervious driveway. - Attenuation to 80 % of pre-development condition for 20 % AEP storm represents maximum storage requirement and is adopted for the concept design storage. - Conceptual pond detention capacity 3171 litres - Outlet arrangement to be finalised at detailed design. 		

6.4.1 Discharge Dispersion Management

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

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

For swales and ponds discharging directly to overland flow paths, rip rap aprons would be recommended dissipation device, to reduce velocity of water and therefore reduce potential for scour and erosion.

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



6.5 Subdivision Development Management

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

- Pipe culverts formed beneath new vehicle crossings for Lots 2, 3 and 4 to provide conveyance of drainage beneath the crossing.
- Suitably designed channels or swale drains designed to accommodate stormwater along the new and upgraded ROW accessways with in easement A, B and C. Incorporate check dams for steep gradients to suit FNDC Engineering Standards.
- Detention/retention pond structure with suitable outlet structure, within easement C RoW to attenuate stormwater runoff. Specific engineering design required to suitably advance concept presented in Section 6.4 and indicated in Drawing Sheet 100 in Appendix A.

6.6 Stormwater Quality

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

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

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

- Leaf guards on roof guttering and first flush devices on downpipes.
- Rainwater tank for potable use onsite only to be filled by roof runoff.
- Room for sedimentation (minimum 150 mm recommended as per Auckland Council GD01) within the base of the stormwater attenuation roof runoff tanks, or underground tanks, or ponds, as dead storage volume.
- Suitably lined swale drains from rainwater inception (road surfaces) to discharge points.

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



7 POTABLE WATER & FIRE FIGHTING

In the absence of potable water infrastructure within Tunatahi Road or within the site it is recommended that roof runoff water tanks are adopted for potable water supply with appropriate filtration and UV disinfection at point of use. The volume of potable water supply on each lot should consider the required stormwater detention volume identified within Table 7.

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

8 EARTHWORKS

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

- **Vehicle crossings.** Cut/ fill earthworks for construction of the vehicle crossings to current FNDC Engineering Standards, including trenching for pipe installation beneath the crossings.
- **Upgrading Accessway RoW.** Cut/ fill earthworks upgrading of the internal access way within Easement A, B and C to current Council Engineering Standards, including new swale on both sides of the road where required.
- **New Accessway RoW.** Cut/ fill earthworks constructing new internal access way within Easement C to current Council Engineering Standards, including new swale on northern side of the road and new pipe culvert as indicated on Drawing Sheet 100. There is evidence of a previous track along the proposed alignment which is considered in the required earthworks to form the subgrade.
- **New Pond or Tank Structure.** Cut/ fill earthworks constructing new pond or underground tank installation, to suit current Council Engineering Standards.

8.1 Earthworks Volumes

Earthworks volumes have been conceptually sized as outlined in Table 10 below.



Table 10: Summary of Proposed Earthwork Volumes

Item	Assessment	Comments
Easement C – New Accessway (220m)		
Length	220.0 m	Length of RoW easement C =- new accessway portion
Width	8.0 m	3.0m + 1.0m swale on northern edge + 2.0m batter adjustment on each side
Height/ Depth	0.4 m	Average 0.4m allowed for cut:fill subgrade preparation with allowance for adjusted batters
Area	1760.0 m ²	Length x width of anticipated earthworks
Cut Volume	352.0 m ³	50:50 cut:fill split estimated to subgrade preparation, incl. formation of 220 m swale drain, 0.5 m deep with 1:1 side slope
Fill Volume	616 m ³	50:50 cut:fill split estimated to subgrade preparation (352m ³) ; includes 0.3m import granular fill for base / subbase (4m wide formation -> 264m ³). Grade to 4 % across width of RoW
Easement A, B & C – Ex. Accessway Upgrade (268m)		
Length	268.0 m	Length of RoW easement A, B & C – existing accessway portion
Width	9.0 m	3.0m pavement replacement + 1.0m new swale on each side + 2.0m batter adjustment on each side
Height/ Depth	0.4 m	Average 0.4m allowed for cut:fill subgrade preparation with allowance for adjusted batters
Area	2412 m ²	Length x width of anticipated earthworks
Cut Volume	482.4 m ³	50:50 cut:fill split estimated to subgrade preparation, incl. formation of 268 m swale drain on each side, 0.5 m deep with 1:1 side slope
Fill Volume	804 m ³	50:50 cut:fill split estimated to subgrade preparation (482.4m ³) ; includes 0.3m import or re-use of granular fill for base / subbase (4m wide formation -> 321.6m ³). Grade to 4 % across width of RoW
Vehicle Crossings (Lots 2,3 &4)		
Area	150 m ²	Length x width of anticipated earthworks, 50m ² per crossing



Height/ Depth	1.0 m	Average 1.0m allowed for cut:fill subgrade preparation to suit FNDC standard gradients and widths, with allowance for 1:3 batters
Cut Volume	87 m ³	50:50 cut:fill split estimated to subgrade preparation + 12m long x 1m wide x 1m deep trench for pipe culvert
Fill Volume	132 m ³	50:50 cut:fill split estimated to subgrade preparation + 12m long x 1m wide x 1m deep trench for pipe culvert, + 0.3m import granular fill for pavement
Concept Pond – Easement C ROW		
Area	30 m ²	Length x width of anticipated earthworks, including pond basin and batters
Height/ Depth	1.0 m	Average 1.0m allowed for cut:fill pond preparation with allowance for 1:3 batters
Cut Volume	15 m ³	50:50 cut:fill split estimated
Fill Volume	15 m ³	50:50 cut:fill split estimated
Overall		
Area	4352 m ²	
Volume	2503 m ³	
Cut Volume	936 m ³	< 1.2m height max.
Fill Volume	1567 m ³	< 1.2 m height max. Includes import pavement layerworks

Proposed earthwork volumes are well within a 5,000 m³ Permitted Activity volume limit outlined by FNDC District Plan Rule 12.3.6.1.1(a) and the maximum cut and fill height is <3 m to comply with 12.3.6.1.1(b).

Rule C.8.3.1, Table 15 of the Proposed Regional Plan outlines a Permitted Activity as 5,000 m² of exposed earth at any time for ‘other areas’. Proposed earthwork areas to form the subdivision, are anticipated to comply with the Permitted Activity standard for other areas.

8.2 General Recommendations

Bulk fill with site-won earth can be moderately sensitive to disturbance when exposed to rain or runoff which may cause saturation or vehicle movements and trafficking during earthworks. Accordingly, care should be taken during construction, including probable future developments to minimise degradation of any earth fill due to construction traffic and to minimise machinery on site.



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

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

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

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

8.3 Erosion and Sediment Control

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

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

- Silt fence around the downslope face of the proposed vehicle crossing at each lot.
- Silt fence around the downslope face of the proposed accessway formations.
- Cleanwater diversion around the upslope face of earthworks area where considerable sheetflow or OLFPs are intercepted.
- Consideration for decanting earth bunds where temporary concentrated discharges from earthworks areas may be encountered, such as in the formation of new road-side swale drains.

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 Plan¹², Northland Regional Council (NRC) Proposed Regional

¹² Operative District Plan Rule 13.7.3.2.

Plan for Northland¹³ and Regional Water and Soil Plan for Northland. Following our ground investigation and considering the measures presented in this report, a summary of the proposed activities against defined natural hazards is presented as Table 11.

Table 11: Summary of Natural Hazards

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

NA – Not Applicable.

10 ACCESS AND INTERNAL ROADING

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

10.1 Right of Ways

There is an existing private accessway within proposed easement A, B and C commencing from Tunatahi Road that provides access to the existing residence in proposed Lot 1. This is approximately 268m in length, 3m wide and comprises a metal surface.

¹³ Proposed Regional Plan for Northland, Appeals Version, July 2021, Chapter D.6.



A new 220m extension of the accessway to service Lot 5 will be contained within Easement C.

In addition to serving Lot 1, the proposed subdivision utilises this existing RoW to service three proposed lots (Lot 2, 3 and 5) taking its total servient lots to 4. Appendix 3B-1 of the Operative District Plan requires that private accessways servicing 3 to 4 lots must be 3 m wide with passing bays if required.

Existing accessway within ROW A, B and C. This accessway needs to be upgraded to suit the current FNDC standards for private accessway, through its 268 m of length, as follows:

- Its pavement is proposed to be re-instated with suitable pavement layerworks atop confirmed subgrade specifications.
- Swales to be incorporated on each side of the road to manage runoff from the road and from minor adjacent catchments that it intercepts. On some extents, there may not necessarily be a need for swales on both sides (where road side falls away to natural ground).
- A single passing bay is proposed to be included as indicated in Drawing Sheet 100 in Appendix A.
- The existing accessway's gradients are less than the maximum allowable 22.2% and so the general vertical alignment of the road can be maintained.

New Accessway within ROW C. This accessway needs to be formed to suit the current FNDC standards for private accessway, through its 220m of length up to the Lot 5 boundary, as follows.

- Designed with suitable pavement layerworks atop confirmed subgrade specifications.
- Swale to be incorporated on the northern edge of the road to manage runoff from the road and from minor adjacent catchments that it intercepts.
- It is noted that the proposed alignment is set atop an apparent old plantation track that is since overgrown with vegetation.
- The conceptual alignment proposes a feasible vertical and horizontal profile, based on LINZ Lidar contours. A final proposal is recommended to be included for detailed design by way of condition of the subdivision consent.

The proposed RoW accessways are summarised in Table 12.

Table 12: Summary of Proposed RoW Specification

Location	Servicing Lots	H.E.	Standard	Min. Legal Width	Min. Carriageway Width	Maximum Gradient
Upgrade Existing RoW, Easement A (up to Proposed Lot 3 access)	Lots 1, 2, 3 & 5	4	Private access 3-4 HE, unsealed with passing bays	7.5 m	3.0 m with swale	1:5
Upgrade Existing RoW, Easement B (up to Proposed Lot 2 access)	Lots 1, 2 & 5	3	Private access 3-4 HE, unsealed with passing bays	7.5 m	3.0 m with swale	1:5
Upgrade Existing RoW, Easement C (up to Lot 1 existing residence driveway)	Lots 1 & 5	2	Private access 2 HE, unsealed	5.0	3.0 m with swale	1:5
New RoW, Easement C (up to Lot 5 boundary)	Lot 5	1	Private access 1 HE, unsealed	-	3.0 m with swale	1:5

H.E – Household Equivalents

10.2 Vehicle Crossings

Vehicle crossings will be formed at subdivision stage. A summary of proposed vehicle crossings is presented as Table 13.

New vehicle crossings to lots 2 and 3 will be formed directly from easement A and B. No new vehicle crossing is required from Tunatahi Road directly to the boundary of Lot 1. A new vehicle crossing from Tunatahi Road is required for lot 4.

All of the new vehicle crossings shall require pipe culverts for conveyance of road-side channel flows.

Tunatahi Road should be considered to be a low speed environment given its metal surface and undulating alignment. The generally adopted speed is suggested to be well below 60 km/h. All new vehicle crossings are considered to have sufficient sight distance, greater than 80m in all cases, meeting the requirements set out within FNDC Engineering Standards 2023 – Sheet 4.

Table 13: Summary of Proposed Vehicle Crossings

Location	Type	Detail	Formation
Easement A/ Lot 3	FNDC Type 1A, Light Vehicles	To be constructed to FNDC Engineering Standards typical detail sheet 21. Width at boundary 3.0 m with min. Ø 300 mm pipe culvert.	Subdivision
Easement B/ Lot 2	FNDC Type 1A, Light Vehicles	To be constructed to FNDC Engineering Standards typical detail sheet 21. Width at boundary 3.0m. with min. Ø 300 mm pipe culvert.	Subdivision
Tunatahi Road/ Lot 4	FNDC Type 1A, Light Vehicles	To be constructed to FNDC Engineering Standards typical detail sheet 21. Width at boundary 3.0m with min. Ø 300 mm pipe culvert.	Subdivision

RCP – Reinforced Concrete Pipe

11 LIMITATIONS

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

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

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



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APPENDIX A

Drawings

GENERAL NOTES

1. CONTOURS AT 1 m INTERVALS.
2. CONTOURS INDICATED ARE ADAPTED FROM LINZ LIDAR 1m DEM.
3. FOR INDICATION ONLY, NOT FOR CONSTRUCTION.
4. FEATURES PRESENTED ARE INDICATIVE AND HAVE NOT BEEN VERIFIED.
5. DO NOT SCALE FROM THIS DRAWING.

CONCEPT WASTEWATER DESIGN

CONCEPT DEVELOPMENT 5 BEDROOM
 CONCEPT NO. OF OCCUPANTS 8 PERSONS
 DAILY WASTEWATER GEN. 160 LITRES/ PERSON/ DAY
 TOTAL WASTEWATER GEN. 1,280 LITRES/ DAY

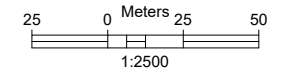
SOIL CATEGORY (TP58) CATEGORY 6
 SOIL CATEGORY (NZS1547) CATEGORY 5
 SOIL LOADING RATE 2.0 mm/ DAY

TREATMENT SYSTEM TBC AT BUILDING CONSENT

PRIMARY DISPOSAL AREA 640 m²
 RESERVE DISPOSAL AREA 192 m² (30 %)

FINAL DESIGN? NO - SUBJECT TO BUILDING CONSENT VERIFICATION

- GEOLOGIX HAND AUGER - DATE
- BH01
- PROPOSED IMPERVIOUS SURFACE
- WATERCOURSE
- OVERLAND FLOWPATH
- PRIMARY DISPOSAL FIELD
- RESERVE DISPOSAL FIELD
- PROPOSED SWALE DRAIN



A	CONSENT	19/12/2024
Revision	Issue	Date



AUCKLAND | NORTHLAND

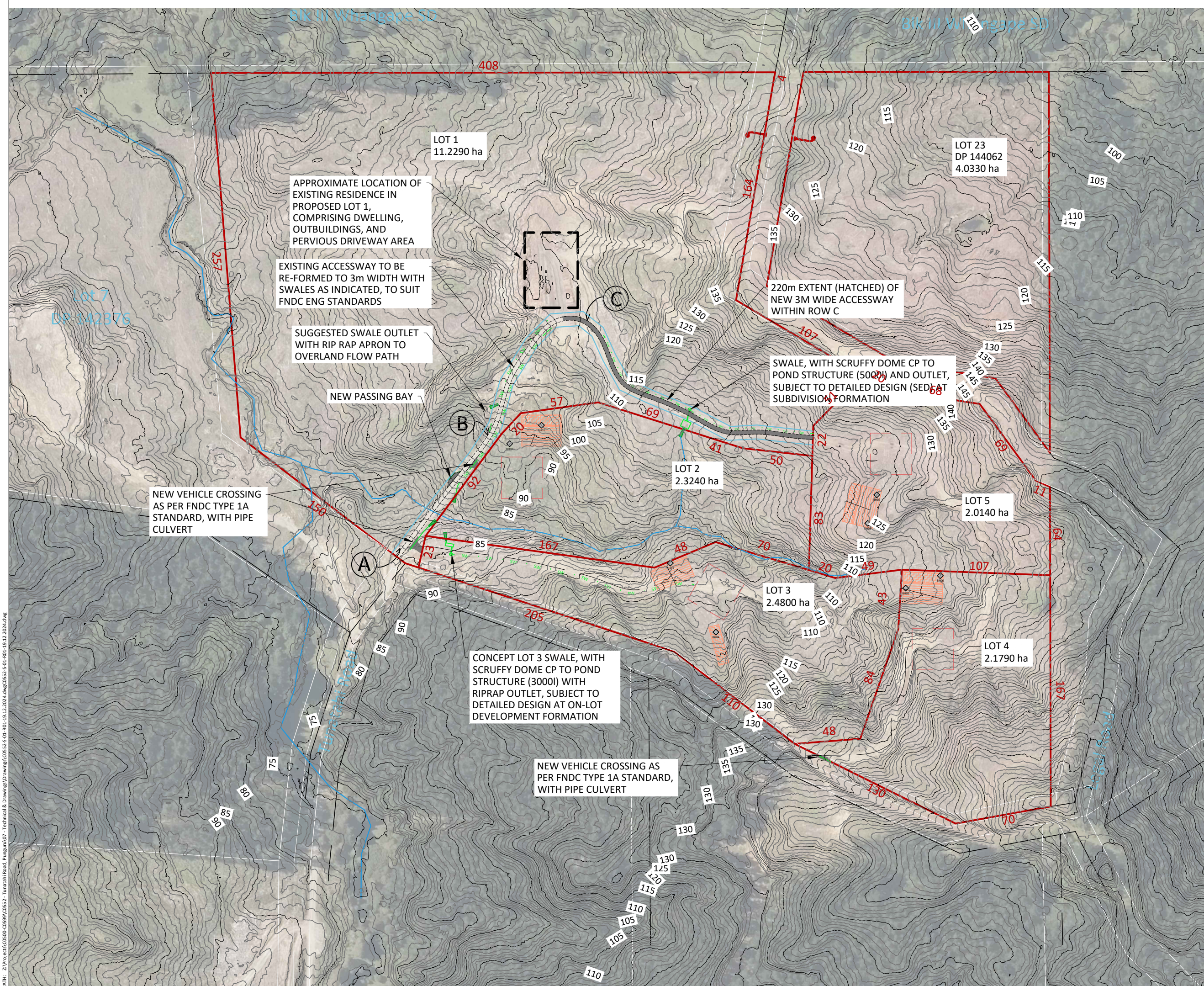
Project Name and Address
169 TUNATAHI ROAD
PANGURU
Lot 8 DP 142376

Project C0552 Drawn By SH

Client
JOGI LIMITED

Sheet Title
ENGINEERING PLAN

Sheet
100

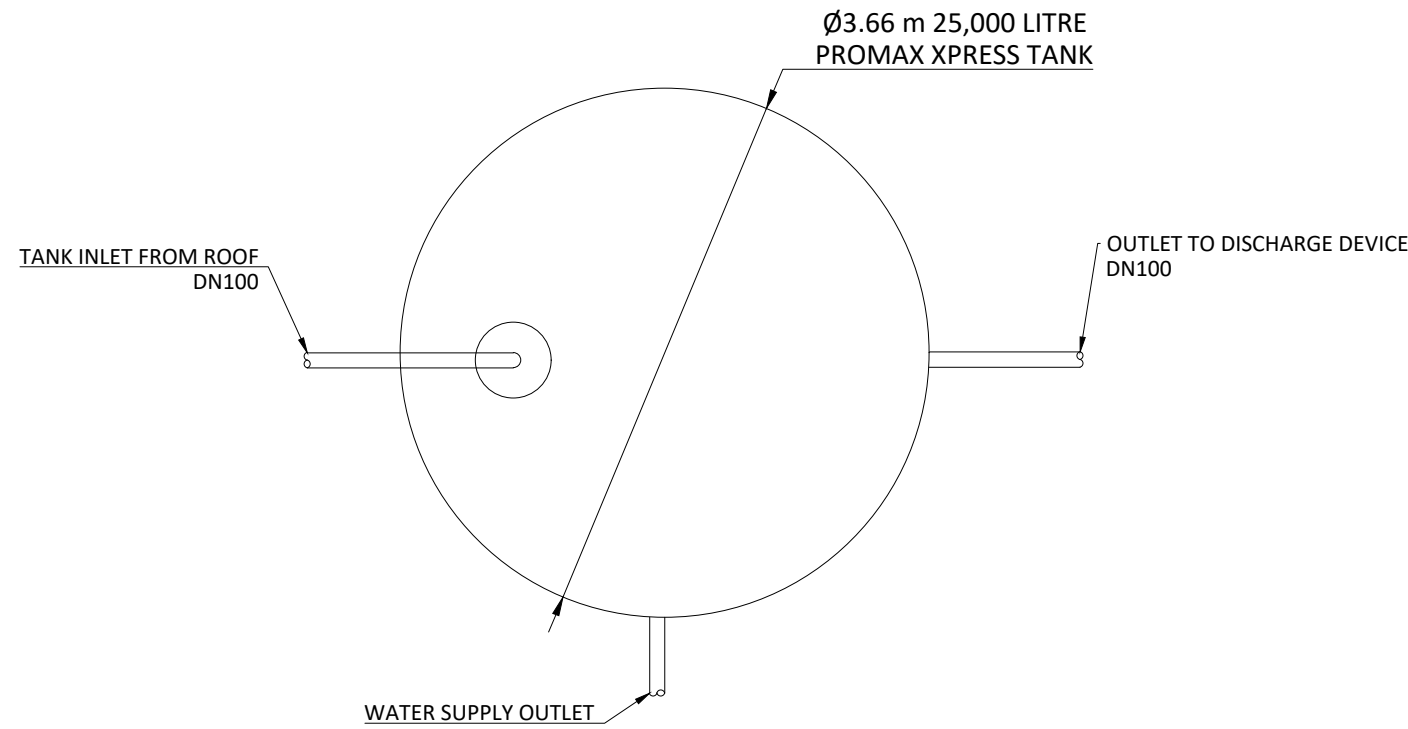


FILE PATH: Z:\Projects\C0552-C0599\C0552 - Tunatahi Road, Panguru\07 - Technical & Drawings\C0552-5-01-101-19-12-2024.dwg

PLOTED: 03/04/2022

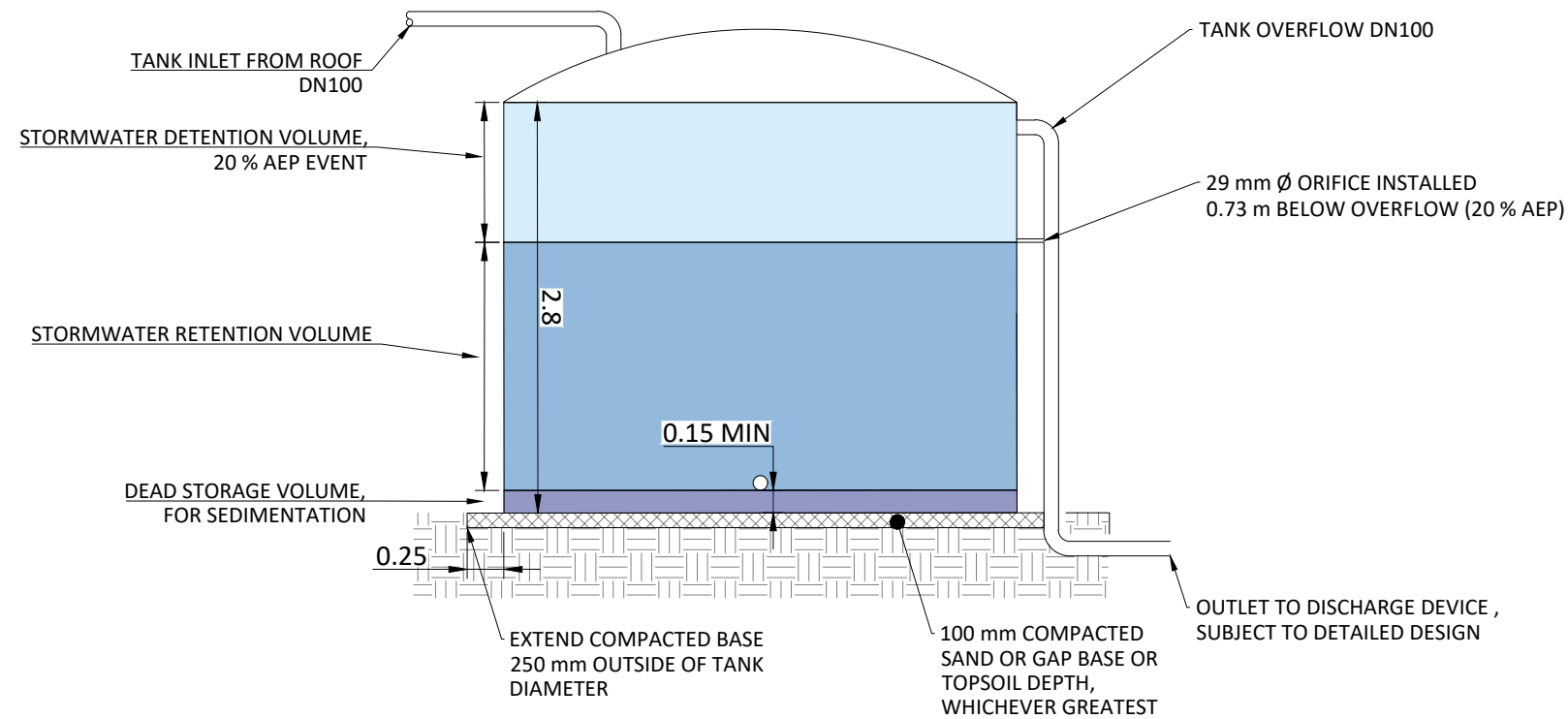
PROPOSED TANK PLAN VIEW

1:50, A3



PROPOSED TANK SIDE VIEW

1:50, A3



GENERAL NOTES

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

A	CONSENT	06/12/2024
Revision	Issue	Date



AUCKLAND | NORTHLAND

Project Name and Address
169 TUNATAHI ROAD
PUNGURU
LOT 8 DP 142376

Project C0552	Drawn By SD
-------------------------	-----------------------

Client
JOGI LIMITED

Sheet Title
CONCEPT TANK DETAIL

Sheet
401



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APPENDIX B

Engineering Borehole Records



INVESTIGATION LOG

HOLE NO.:
HA01

CLIENT: Jogi Bishwanath
PROJECT: 169 Tunatahi Road, Panguru

JOB NO.:
C0552

SITE LOCATION: North side of Tunatahi Road

START DATE: 26/09/2024

CO-ORDINATES:

ELEVATION: Ground

END DATE: 26/09/2024

CONTRACTOR: Internal

RIG: 50mm Hand Auger

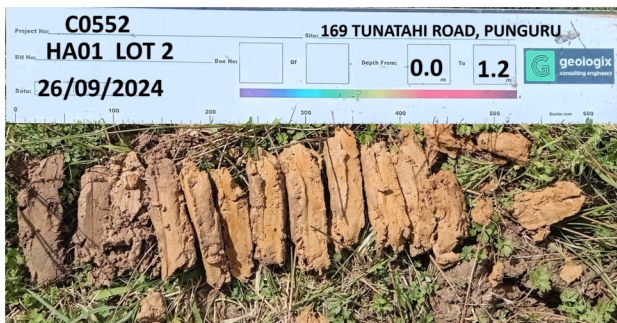
DRILLER: TW

LOGGED BY: TW

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER (Blows / 0mm)							VANE SHEAR STRENGTH (kPa)				WATER			
				2	4	6	8	10	12	14	16	18	50	100		150	200	Values
TOPSOIL comprising organic SILT; dark brown; moist; low plasticity.		0.0 - 0.2	TS															
Clayey SILT, with trace sand; brown. Moist; low plasticity; sand, fine; [Northland Allochthon Residual Soils].		0.2 - 1.2	TS															Groundwater Not Encountered
End Of Hole: 1.20m		1.2																

PHOTO(S)

REMARKS



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

WATER

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

INVESTIGATION TYPE

- Hand Auger
- Test Pit

INVESTIGATION LOG

HOLE NO.:
HA02

CLIENT: Jogi Bishwanath
PROJECT: 169 Tunatahi Road, Panguru

JOB NO.:
C0552

SITE LOCATION: North side of Tunatahi Road

START DATE: 26/09/2024

CO-ORDINATES:

ELEVATION: Ground

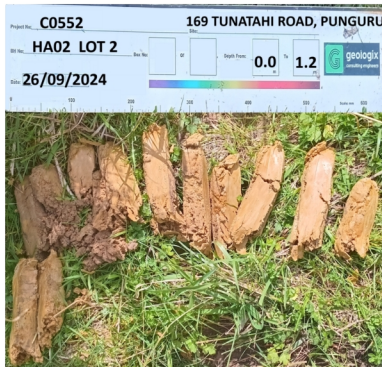
END DATE: 26/09/2024

CONTRACTOR: Internal RIG: 50mm Hand Auger DRILLER: GB LOGGED BY: GB

MATERIAL DESCRIPTION <small>(See Classification & Symbology sheet for details)</small>	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER <small>(Blows / 0mm)</small>							VANE SHEAR STRENGTH <small>(kPa)</small>				WATER			
				2	4	6	8	10	12	14	16	18	50	100		150	200	Values
TOPSOIL comprising organic SILT; dark brown; moist; low plasticity.																		
Clayey SILT, with trace sand; brownish orange with light grey and dark orange mottles. Moist; low plasticity; sand, fine; [Northland Allochthon Residual Soils].		0.2																
		0.4																
		0.6																
		0.8																
		1.0																
End Of Hole: 1.20m		1.2																

Groundwater Not Encountered

PHOTO(S)



REMARKS

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

WATER

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

INVESTIGATION TYPE

- Hand Auger
- Test Pit



INVESTIGATION LOG

HOLE NO.:
HA03

CLIENT: Jogi Bishwanath
PROJECT: 169 Tunatahi Road, Panguru

JOB NO.:
C0552

SITE LOCATION: North side of Tunatahi Road

START DATE: 26/09/2024

CO-ORDINATES:

ELEVATION: Ground

END DATE: 26/09/2024

CONTRACTOR: Internal

RIG: 50mm Hand Auger

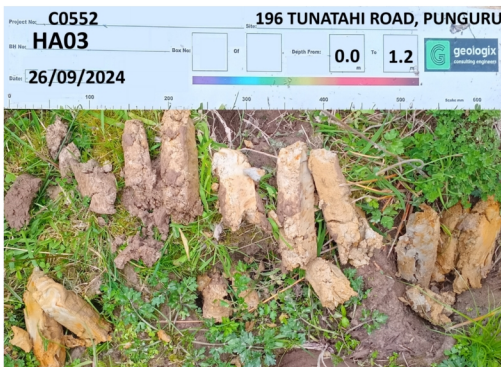
DRILLER: GB

LOGGED BY: GB

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER (Blows / 0mm)							VANE SHEAR STRENGTH (kPa)				WATER				
				2	4	6	8	10	12	14	16	18	50	100		150	200	Values	
TOPSOIL comprising organic SILT; dark brown; moist; low plasticity.		0.00 - 0.05	TS																
Clayey SILT, with minor sand; light grey with orange and brown mottles Moist to wet; low plasticity; sand, fine; [Northland Allochthon Residual Soils].		0.05 - 0.95	TS																
Silty CLAY, with trace sand; orange and light grey mixed with dark orange mottling. Moist to wet; high plasticity; sand, fine; [Northland Allochthon Residual Soils].		0.95 - 1.20	TS																
End Of Hole: 1.20m		1.20																	

Groundwater Not Encountered

PHOTO(S)



REMARKS

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

WATER

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

INVESTIGATION TYPE

- Hand Auger
- Test Pit



INVESTIGATION LOG

HOLE NO.:
HA04

CLIENT: Jogi Bishwanath
PROJECT: 169 Tunatahi Road, Panguru

JOB NO.:
C0552

SITE LOCATION: North side of Tunatahi Road

START DATE: 26/09/2024

CO-ORDINATES:

END DATE: 26/09/2024

ELEVATION: Ground

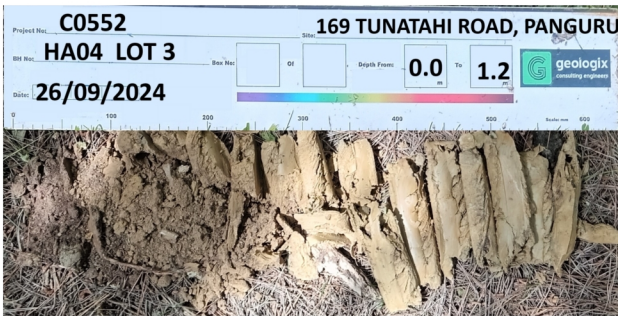
CONTRACTOR: Internal RIG: 50mm Hand Auger DRILLER: TW LOGGED BY: TW

MATERIAL DESCRIPTION <small>(See Classification & Symbology sheet for details)</small>	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER <small>(Blows / 0mm)</small>										VANE SHEAR STRENGTH <small>(kPa)</small>				WATER		
				2	4	6	8	10	12	14	16	18	50	100	150	200	Values			
Clayey SILT; brown mottled dark orange. Moist; low plasticity.		0.0 - 0.2	[Pattern]																	
Clayey SILT, with trace gravel; orange brown mottled light grey. Moist; low plasticity; gravel, fine to medium; [Northland Allochthon Residual Soils].		0.2 - 1.2	[Pattern]																	
End Of Hole: 1.20m		1.2																		

Groundwater Not Encountered

PHOTO(S)

REMARKS



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

WATER

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

INVESTIGATION TYPE

- Hand Auger
- Test Pit



INVESTIGATION LOG

HOLE NO.:
HA05

CLIENT: Jogi Bishwanath
PROJECT: 169 Tunatahi Road, Panguru

JOB NO.:
C0552

SITE LOCATION: North side of Tunatahi Road

START DATE: 26/09/2024

CO-ORDINATES:

ELEVATION: Ground

END DATE: 26/09/2024

CONTRACTOR: Internal

RIG: 50mm Hand Auger

DRILLER: TW

LOGGED BY: TW

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER (Blows / 0mm)								VANE SHEAR STRENGTH (kPa)				WATER		
				2	4	6	8	10	12	14	16	18	50	100	150		200	Values
TOPSOIL comprising organic SILT; dark brown; moist; low plasticity.			TS															
Clayey SILT, with trace sand; orange with dark orange mottles. Moist; low plasticity; sand, fine; [Northland Allochthon Residual Soils].		0.2	TS															
		0.4	TS															
		0.6	TS															
		0.8	TS															
		1.0	TS															
1.1m - 1.2m: Grades to have minor fine sand.			TS															
End Of Hole: 1.20m		1.2	TS															

Groundwater Not Encountered

PHOTO(S)

REMARKS

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

WATER

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

INVESTIGATION TYPE

- Hand Auger
- Test Pit



INVESTIGATION LOG

HOLE NO.:
HA06

CLIENT: Jogi Bishwanath
PROJECT: 169 Tunatahi Road, Panguru

JOB NO.:
C0552

SITE LOCATION: North side of Tunatahi Road

START DATE: 26/09/2024

CO-ORDINATES:

ELEVATION: Ground

END DATE: 26/09/2024

CONTRACTOR: Internal

RIG: 50mm Hand Auger

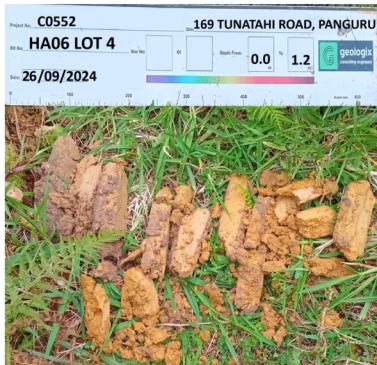
DRILLER: GB

LOGGED BY: GB

MATERIAL DESCRIPTION <small>(See Classification & Symbology sheet for details)</small>	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER <small>(Blows / 0mm)</small>							VANE SHEAR STRENGTH <small>(kPa)</small>				WATER				
				2	4	6	8	10	12	14	16	18	50	100		150	200	Values	
Clayey SILT, with trace black carbonaceous; brown . Moist; low plasticity. [Northland Allochthon Residual Soils].		0.0 - 0.2	[Pattern]																
Clayey SILT; orange brown. Moist; low plasticity; [Northland Allochthon Residual Soils].		0.2 - 0.4	[Pattern]																
		0.4 - 0.6	[Pattern]																
		0.6 - 0.8	[Pattern]																
		0.8 - 1.0	[Pattern]																
1.0m - 1.2m: Trace sand appears.		1.0 - 1.2	[Pattern]																
End Of Hole: 1.20m		1.2	[Pattern]																

Groundwater Not Encountered

PHOTO(S)



REMARKS

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

WATER

- Standing Water Level
- Out flow
- In flow

INVESTIGATION TYPE

- Hand Auger
- Test Pit



INVESTIGATION LOG

HOLE NO.:
HA07

CLIENT: Jogi Bishwanath
PROJECT: 169 Tunatahi Road, Panguru

JOB NO.:
C0552

SITE LOCATION: North side of Tunatahi Road

START DATE: 26/09/2024

CO-ORDINATES:

ELEVATION: Ground

END DATE: 26/09/2024

CONTRACTOR: Internal

RIG: 50mm Hand Auger

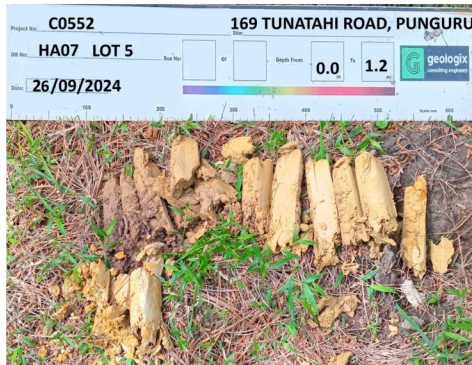
DRILLER: TW

LOGGED BY: TW

MATERIAL DESCRIPTION <small>(See Classification & Symbology sheet for details)</small>	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER <small>(Blows / 0mm)</small>							VANE SHEAR STRENGTH <small>(kPa)</small>				WATER		
				2	4	6	8	10	12	14	16	18	50	100		150	200
TOPSOIL comprising organic SILT; dark brown; moist; low plasticity.																	
Clayey SILT, with trace sand; brownish orange with light grey mottles. Moist; low plasticity; sand, fine; [Northland Allochthon Residual Soils].		0.2															
		0.4															
		0.6															
		0.8															
1.0m - 1.2m: Grades to have minor fine sand.		1.0															
End Of Hole: 1.20m		1.2															

Groundwater Not Encountered

PHOTO(S)



REMARKS

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

WATER

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

INVESTIGATION TYPE

- Hand Auger
- Test Pit



INVESTIGATION LOG

HOLE NO.:
HA08

CLIENT: Jogi Bishwanath
PROJECT: 169 Tunatahi Road, Panguru

JOB NO.:
C0552

SITE LOCATION: North side of Tunatahi Road

START DATE: 26/09/2024

CO-ORDINATES:

ELEVATION: Ground

END DATE: 26/09/2024

CONTRACTOR: Internal

RIG: 50mm Hand Auger

DRILLER: GB

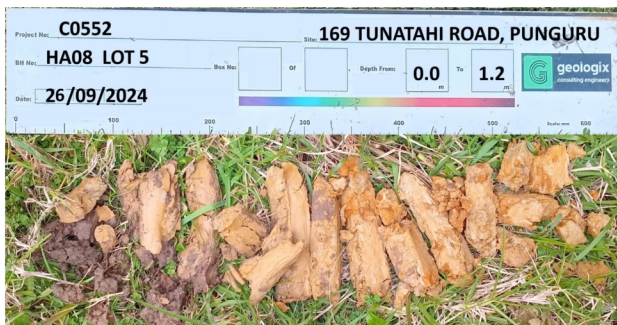
LOGGED BY: GB

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER (Blows / 0mm)								VANE SHEAR STRENGTH (kPa)				WATER		
				2	4	6	8	10	12	14	16	18	50	100	150		200	Values
SILT, with minor sand; brown. Moist; low plasticity; sand, fine; [Northland Allochthon Residual Soils].		0.0 - 0.4	[Cross-hatched pattern]															
Clayey SILT, with trace sand; light brown. Moist; low plasticity; sand, fine; [Northland Allochthon Residual Soils].		0.4 - 1.2	[Cross-hatched pattern]															
End Of Hole: 1.20m		1.2																

Groundwater Not Encountered

PHOTO(S)

REMARKS



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

WATER

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

INVESTIGATION TYPE

- Hand Auger
- Test Pit



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APPENDIX C

Assessment of Environmental Effects and Assessment Criteria



Table 14: Wastewater Assessment of Environmental Effects

Item	NRC Separation Requirement ²	FNDC Separation Requirement	Site Assessment ³
Individual System Effects			
Flood Plains	Above 5 % AEP	NR	Complies according to available GIS data and visual assessment.
Stormwater Flowpath ⁴	5 m	NR	Complies, see annotations on Drawing No. 100.
Surface water feature ⁵	15 m	30 m	Complies to both NRC and FNDC.
Coastal Marine Area	15 m	30 m	Complies, site is inland.
Existing water supply bore.	20 m	NR	Complies. None recorded within or within 20 m of the site boundaries.
Property boundary	1.5 m	1.5	Complies. Including proposed subdivision boundaries.
Winter groundwater table	0.9 m	0.9 m	Complies.
Topography			Ok – chosen disposal areas are flat and level to <15 °.
Cut off drain required?			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.			
<ol style="list-style-type: none"> 1. AEE based on proposed secondary treated effluent. 2. Northland Regional Plan Table 9. 3. Based on the recommendations of this report and Drawing No. 100. 4. Including any formed road with kerb and channel, and water-table drain that is down-slope of the disposal area. 5. River, lake, stream, pond, dam, or natural wetland. 			
AEP Annual Exceedance Probability.			
NR No Requirement.			

Table 15: Operative FNDC Subdivision Stormwater Assessment Criteria, to rule 13.10.4

Assessment Criteria	Comments
(a) Whether the application complies with any regional rules relating to any water or discharge permits required under the Act, and with any resource consent issued to the District Council in relation to any urban drainage area stormwater management plan or similar plan.	Complies.
(b) Whether the application complies with the provisions of the Council's "Engineering Standards and Guidelines" (2004) - Revised March 2009 (to be used in conjunction with NZS 4404:2004).	Concept design complies and has adopted latest FNDC engineering standards (2023) for runoff curves and proposed area within all undeveloped lots will be attenuated to 80 % of pre-development levels for specified design storms by FNDC standards and NRP. Existing development Lot 1 runoff below permitted activity threshold.
(c) Whether the application complies with the Far North District Council Strategic Plan - Drainage.	Complies.
(d) The degree to which Low Impact Design principles have been used to reduce site impermeability and to retain natural permeable areas.	Proposed impervious areas within subdivision proposal are limited to necessity only. Proposed impervious area (RoW Access) optimised to 3m. All impervious areas to attenuated by on site storage devices.
(e) The adequacy of the proposed means of disposing of collected stormwater from the roof of all potential or existing buildings and from all impervious surfaces.	Low impact design adopted – attenuation within on-site tanks for proposed lots 2,3,4,5. Efficient and controlled discharge outlets. Road side swales to be implemented on the internal accessways, with rip rap outlets to disperse concentrated flows. Lot 1 has no additional impervious surfaces proposed.
(f) The adequacy of any proposed means for screening out litter, the capture of chemical spillages, the containment of contamination from roads and paved areas, and of siltation.	Stormwater quality devices included in design to accommodate a rural residential subdivision.
(g) The practicality of retaining open natural waterway systems for stormwater disposal in preference to piped or canal systems and adverse effects on existing waterways.	Surface drainage preferred with road side swales adopted where practical and safe. Subject site is within a rural environment with an OLFP laterally through lot 2 receiving controlled attenuated flows from new impervious areas. No adverse effects anticipated on downstream environment.
(h) Whether there is sufficient capacity available in the Council's outfall stormwater system to cater for increased run-off from the proposed allotments.	No connection to public stormwater proposed.
(i) Where an existing outfall is not capable of accepting increased run-off, the adequacy of proposals and solutions for disposing of run-off.	NA.
(j) The necessity to provide on-site retention basins to contain surface run-off where the capacity of the outfall is incapable of accepting flows, and where the outfall has limited capacity, any need to restrict the rate of discharge from the subdivision to the same rate of discharge that existed on the land before the subdivision takes place.	Attenuation provided through storage ponds and on lot tanks to achieve 80% of pre-dev peak flows from new impervious areas.




	Receiving catchment remains the same.
(k) Any adverse effects of the proposed subdivision on drainage to, or from, adjoining properties and mitigation measures proposed to control any adverse effects.	No adverse effects anticipated on neighbouring properties or downstream environment.
(l) In accordance with sustainable management practices, the importance of disposing of stormwater by way of gravity pipelines. However, where topography dictates that this is not possible, the adequacy of proposed pumping stations put forward as a satisfactory alternative.	All devices adopt and are designed for gravity flows.
(m) The extent to which it is proposed to fill contrary to the natural fall of the country to obtain gravity outfall; the practicality of obtaining easements through adjoining owners' land to other outfall systems; and whether filling or pumping may constitute a satisfactory alternative.	No such proposals included within this activity.
(n) For stormwater pipes and open waterway systems, the provision of appropriate easements in favour of either the registered user or in the case of the Council, easements in gross, to be shown on the survey plan for the subdivision, including private connections passing over other land protected by easements in favour of the user.	All stormwater pipes and devices are within proposed easements as shown in scheme plan.
(o) Where an easement is defined as a line, being the centre line of a pipe already laid, the effect of any alteration of its size and the need to create a new easement.	NA.
(p) For any stormwater outfall pipeline through a reserve, the prior consent of the Council, and the need for an appropriate easement.	NA.
(q) The need for and extent of any financial contributions to achieve the above matters.	TBC.
(r) The need for a local purpose reserve to be set aside and vested in the Council as a site for any public utility required to be provided.	NA.



geologix
consulting engineers

APPENDIX D

Stormwater Calculations

Project Ref:	C0552	STORMWATER ATTENUATION TANK DESIGN	
Project Address:	TUNATAHI ROAD, PUNGURU		
Design Case:	CONCEPT ACCESSWAY (LOT 3)		
Date:	2 October 2024 REV 1		

ATTENUATION DESIGN PROVIDED IN ACCORDANCE WITH NEW ZEALAND BUILDING CODE E1 FOR THE RATIONALE METHOD ACCOUNTING FOR THE EFFECTS OF CLIMATE CHANGE (20% FACTOR AS PER FNDC ENGINEERING STANDARDS).
 THE 10% AEP SCENARIO IS PROVIDED TO SATISFY FNDC DISTRICT PLAN RULE 13.7.3.4. PRE-DEVELOPMENT RUNOFF REMAINS UNFACTORED IN THIS SCENARIO.
 RUNOFF COEFFICIENTS DETERMINED FROM FNDC ENGINEERING STANDARDS 2023 TABLE 4-3.

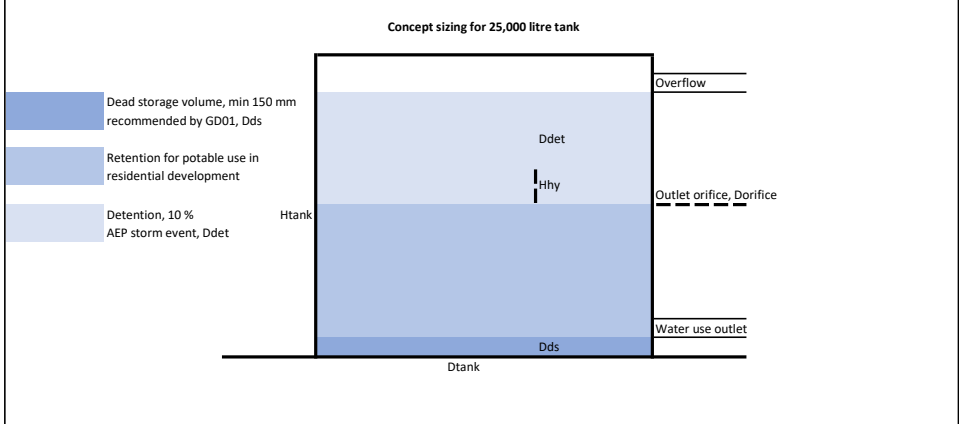
PRE DEVELOPMENT CATCHMENT PARAMETERS				POST DEVELOPMENT CATCHMENT PARAMETERS			
ITEM	AREA, A, m ²	COEFFICIENT, C	DESCRIPTION	ITEM	AREA, A, m ²	COEFFICIENT, C	DESCRIPTION
IMPERVIOUS A	0	0		TO TANK	515	0.83	EXTENDED DRIVEWAY METAL (LOT 3)
IMPERVIOUS B	0	0		OFFSET	0	0.00	
IMPERVIOUS C	0	0		PERVIOUS	0	0	
EX. PERVIOUS	515	0.63	FOREST	EX. CONSENTED	0	0	
	0	0			0	0	
TOTAL	515	TYPE D		TOTAL	515	TYPE D	

RAINFALL INTENSITY, 10% AEP, 10MIN DURATION			
10 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	87.7	mm/hr	* CLIMATE CHANGE FACTOR OF 20% APPLIED IN ACCORDANCE WITH FNDC ENGINEERING STANDARDS 4.3.9.1. NIWA HISTORIC RAINFALL INTENSITY DATA, 10MIN, IS MULTIPLIED BY CLIMATE CHANGE FACTOR.
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	20	%	
10 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	105.2	mm/hr	


PRE AND POST-DEVELOPMENT RUNOFF, 10%AEP WITH CC, VARIOUS DURATIONS						
DURATION, min	INTENSITY, mm/hr	CC FACTOR	INTENSITY WITH CC, mm/hr	POST DEV RUNOFF, Q _{post} , l/s	PRE DEV RUNOFF, Q _{pre} , l/s	COMMENTS
10	87.70	1.2	105.24	12.50	7.90	Critical duration (time of concentration) for the catchments is 10min
20	63.40	1.2	76.08	9.03	5.71	
30	52.30	1.2	62.76	7.45	4.71	
60	37.50	1.2	45.00	5.34	3.38	Pre-dev calculated on Intensity without CC factor
120	26.50	1.2	31.80	3.78	2.39	
360	14.80	1.2	17.76	2.11	1.33	
720	9.98	1.2	11.98	1.42	0.90	
1440	6.55	1.2	7.86	0.93	0.59	
2880	4.17	1.2	5.00	0.59	0.38	
4320	3.15	1.2	3.78	0.45	0.28	

ATTENUATION ANALYSIS, VARIOUS DURATIONS							
DURATION, min	OFFSET FLOW, Q _{off} , l/s	TANK INFLOW, Q _{in} , l/s	ALLOWABLE TANK OUTFLOW, Q _{pre} - Q _{off} , l/s	SELECTED TANK OUTFLOW, Q _{out} , l/s	DIFFERENCE (Q _{in} - Q _{out}), l/s	Required Storage, litres	
10	0.00	12.50	7.90	7.90	4.59	2755	select largest required storage, regardless of duration, to avoid overflow
20	0.00	9.03	5.71	7.90	1.13	1355	
30	0.00	7.45	4.71	7.90	No Att. Req.	0	
60	0.00	5.34	3.38	7.90	No Att. Req.	0	
120	0.00	3.78	2.39	7.90	No Att. Req.	0	
360	0.00	2.11	1.33	7.90	No Att. Req.	0	
720	0.00	1.42	0.90	7.90	No Att. Req.	0	
1440	0.00	0.93	0.59	7.90	No Att. Req.	0	
2880	0.00	0.59	0.38	7.90	No Att. Req.	0	
4320	0.00	0.45	0.28	7.90	No Att. Req.	0	

ATTENUATION TANK DESIGN OUTPUT



SPECIFICATION		
TOTAL STORAGE REQUIRED	2.755 m ³	Select largest storage as per analysis
TANK HEIGHT, H _{tank}	2.5 m	Concept sizing for 25,000 litre tank
TANK DIAMETER, D _{tank}	3.66 m	No. of Tanks 1
TANK AREA, A _{tank}	10.52 m ²	Area of ONE tank
TANK MAX STORAGE VOLUME, V _{tank}	26302 litres	
REQUIRED STORAGE HEIGHT, D _{det}	0.26 m	Below overflow
DEAD STORAGE VOLUME, D _{ds}	0.15 m	GD01 recommended minimum
TOTAL WATER DEPTH REQUIRED	0.41 m	
SELECTED TANK OUTFLOW, Q _{out} , l/s	0.00790 m ³ /s	Selected tank outflow
AVERAGE HYDRAULIC HEAD, H _{hy}	0.13 m	
AREA OF ORIFICE, A _{orifice}	7.95E-03 m ²	
ORIFICE DIAMETER, D _{orifice}	101 mm	
VELOCITY AT ORIFICE	2.27 m/s	At max. head level

Project Ref:	C0552	STORMWATER ATTENUATION TANK DESIGN	
Project Address:	TUNATAHI ROAD, PUNGURU		
Design Case:	CONCEPT ACCESSWAY (LOT 3)		
Date:	2 October 2024 REV 1		
20 % AEP STORM EVENT, TO 80 % OF PRE DEVELOPMENT			

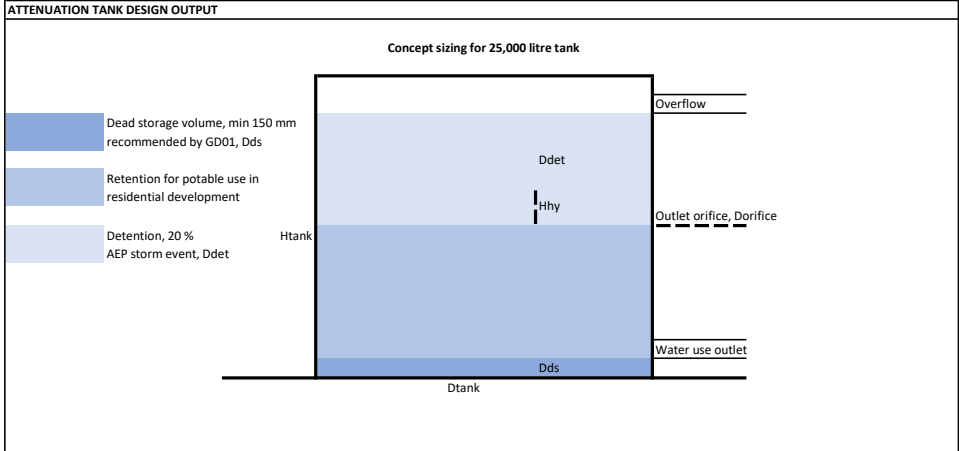
ATTENUATION DESIGN PROVIDED IN ACCORDANCE WITH NEW ZEALAND BUILDING CODE E1 FOR THE RATIONALE METHOD ACCOUNTING FOR THE EFFECTS OF CLIMATE CHANGE (20% FACTOR AS PER FNDC ENGINEERING STANDARDS).
 PRE-DEVELOPMENT RUNOFF IS FACTORED BY 80% TO SUIT FNDC STANDARDS
 RUNOFF COEFFICIENTS DETERMINED FROM FNDC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

PRE DEVELOPMENT CATCHMENT PARAMETERS				POST DEVELOPMENT CATCHMENT PARAMETERS			
ITEM	AREA, A, m ²	COEFFICIENT, C	DESCRIPTION	ITEM	AREA, A, m ²	COEFFICIENT, C	DESCRIPTION
IMPERVIOUS A	0	0		TO TANK	515	0.83	EXTENDED DRIVEWAY METAL (LOT 3)
IMPERVIOUS B	0	0		OFFSET	0	0.00	
IMPERVIOUS C	0	0		PERVIOUS	0	0	
EX. PERVIOUS	515	0.63	FOREST	EX. CONSENTED	0	0	
					0	0	
TOTAL	515	TYPE D		TOTAL	515	TYPE D	


RAINFALL INTENSITY, 20% AEP, 10MIN DURATION			
20 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	75.1	mm/hr	* CLIMATE CHANGE FACTOR OF 20% APPLIED IN ACCORDANCE WITH FNDC ENGINEERING STANDARDS 4.3.9.1. NIWA HISTORIC RAINFALL INTENSITY DATA, 10MIN, IS MULTIPLIED BY CLIMATE CHANGE FACTOR.
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	20	%	
20 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	90.1	mm/hr	

PRE AND POST-DEVELOPMENT RUNOFF, 20%AEP WITH CC, VARIOUS DURATIONS							
DURATION, min	INTENSITY, mm/hr	CC FACTOR	INTENSITY WITH CC, mm/hr	POST DEV RUNOFF, Q _{post} , l/s	PRE DEV RUNOFF, Q _{pre} , l/s	80% of PRE DEV RUNOFF, Q _{pre(80%)} , l/s	COMMENTS
10	75.10	1.2	90.12	10.70	6.77	5.41	Critical duration (time of concentration) for the catchments is 10min
20	54.20	1.2	65.04	7.72	4.88	3.91	
30	44.70	1.2	53.64	6.37	4.03	3.22	
60	32.00	1.2	38.40	4.56	2.88	2.31	Pre-dev calculated on Intensity without CC factor
120	22.60	1.2	27.12	3.22	2.04	1.63	
360	12.60	1.2	15.12	1.80	1.14	0.91	
720	8.49	1.2	10.19	1.21	0.77	0.61	
1440	5.57	1.2	6.68	0.79	0.50	0.40	
2880	3.54	1.2	4.25	0.50	0.32	0.26	
4320	2.68	1.2	3.22	0.38	0.24	0.19	

ATTENUATION ANALYSIS, VARIOUS DURATIONS							
DURATION, min	OFFSET FLOW, Q _{off} , l/s	TANK INFLOW, Q _{in} , l/s	ALLOWABLE TANK OUTFLOW, Q _{pre(80%)} - Q _{off} , l/s	SELECTED TANK OUTFLOW, Q _{out} , l/s	DIFFERENCE (Q _{in} - Q _{out}), l/s	Required Storage, litres	COMMENTS
10	0.00	10.70	5.41	5.41	5.29	3171	select largest required storage, regardless of duration, to avoid overflow
20	0.00	7.72	4.88	5.41	2.31	2769	
30	0.00	6.37	4.03	5.41	0.95	1718	
60	0.00	4.56	2.88	5.41	No Att. Req.	0	
120	0.00	3.22	2.04	5.41	No Att. Req.	0	
360	0.00	1.80	1.14	5.41	No Att. Req.	0	
720	0.00	1.21	0.77	5.41	No Att. Req.	0	
1440	0.00	0.79	0.50	5.41	No Att. Req.	0	
2880	0.00	0.50	0.32	5.41	No Att. Req.	0	
4320	0.00	0.38	0.24	5.41	No Att. Req.	0	



SPECIFICATION		
TOTAL STORAGE REQUIRED	3.171 m ³	Select largest storage as per analysis
TANK HEIGHT, H _{tank}	2.5 m	Concept sizing for 25,000 litre tank
TANK DIAMETER, D _{tank}	3.66 m	No. of Tanks 1
TANK AREA, A _{tank}	10.52 m ²	Area of ONE tank
TANK MAX STORAGE VOLUME, V _{tank}	26302 litres	
REQUIRED STORAGE HEIGHT, D _{det}	0.30 m	Below overflow
DEAD STORAGE VOLUME, D _{ds}	0.15 m	GD01 recommended minimum
TOTAL WATER DEPTH REQUIRED	0.45 m	
SELECTED TANK OUTFLOW, Q _{out} , l/s	0.00541 m ³ /s	Selected tank outflow
AVERAGE HYDRAULIC HEAD, H _{hy}	0.15 m	
AREA OF ORIFICE, A _{orifice}	5.08E-03 m ²	
ORIFICE DIAMETER, D _{orifice}	80 mm	
VELOCITY AT ORIFICE	2.43 m/s	At max. head level

Project Ref:	C0552	STORMWATER ATTENUATION TANK DESIGN	
Project Address:	TUNATAHI ROAD, PUNGURU		
Design Case:	CONCEPT ACCESSWAY (LOT 3)		
Date:	2 October 2024 REV 1		
50 % AEP STORM EVENT, TO 80 % OF PRE DEVELOPMENT			

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

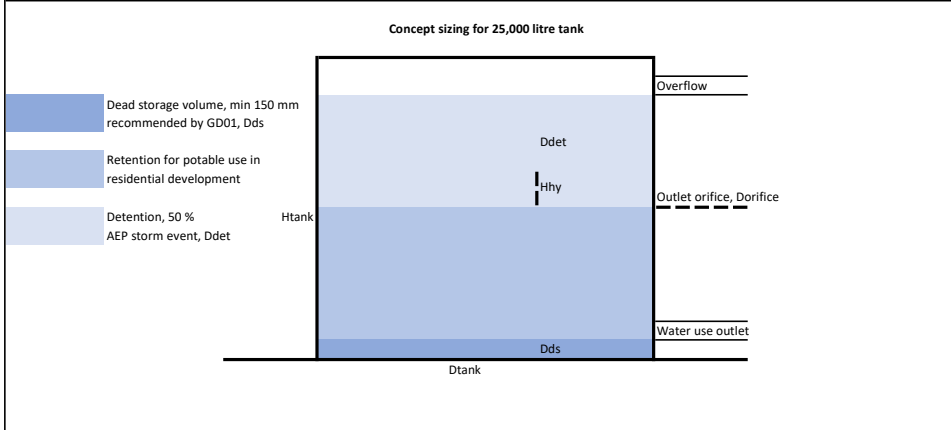
PRE DEVELOPMENT CATCHMENT PARAMETERS				POST DEVELOPMENT CATCHMENT PARAMETERS			
ITEM	AREA, A, m ²	COEFFICIENT, C	DESCRIPTION	ITEM	AREA, A, m ²	COEFFICIENT, C	DESCRIPTION
IMPERVIOUS A				TO TANK	515	0.83	EXTENDED DRIVEWAY METAL (LOT 3)
IMPERVIOUS B				OFFSET			
IMPERVIOUS C				PERVIOUS	0	0	
EX. PERVIOUS	515	0.63	FOREST	EX. CONSENTED	0	0	
TOTAL	515	TYPE D		TOTAL	515	TYPE D	

RAINFALL INTENSITY, 50% AEP, 10MIN DURATION			
50 % AEP RAINFALL INTENSITY, 10 MIN, 1, mm/hr	58.1	mm/hr	* CLIMATE CHANGE FACTOR OF 20% APPLIED IN ACCORDANCE WITH FNDC ENGINEERING STANDARDS 4.3.9.1. NIWA HISTORIC RAINFALL INTENSITY DATA, 10MIN, IS MULTIPLIED BY CLIMATE CHANGE FACTOR.
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN**	20	%	
50 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	69.72	mm/hr	


PRE AND POST-DEVELOPMENT RUNOFF, 50%AEP WITH CC, VARIOUS DURATIONS							
DURATION, min	INTENSITY, mm/hr	CC FACTOR	INTENSITY WITH CC, mm/hr	POST DEV RUNOFF, Q _{post} , l/s	PRE DEV RUNOFF, Q _{pre} , l/s	80% of PRE DEV RUNOFF, Q _{pre(80%)} , l/s	COMMENTS
10	58.10	1.2	69.72	8.28	5.24	4.19	Critical duration (time of concentration) for the catchments is 10min Pre-dev calculated on Intensity without CC factor
20	41.90	1.2	50.28	5.97	3.78	3.02	
30	34.50	1.2	41.40	4.92	3.11	2.49	
60	24.70	1.2	29.64	3.52	2.23	1.78	
120	17.40	1.2	20.88	2.48	1.57	1.25	
360	9.69	1.2	11.63	1.38	0.87	0.70	
720	6.51	1.2	7.81	0.93	0.59	0.47	
1440	4.26	1.2	5.11	0.61	0.38	0.31	
2880	2.71	1.2	3.25	0.39	0.24	0.20	
4320	2.04	1.2	2.45	0.29	0.18	0.15	

ATTENUATION ANALYSIS, VARIOUS DURATIONS							
DURATION, min	OFFSET FLOW, Q _{off} , l/s	TANK INFLOW, Q _{in} , l/s	ALLOWABLE TANK OUTFLOW, Q _{pre(80%)} - Q _{off} , l/s	SELECTED TANK OUTFLOW, Q _{out} , l/s	DIFFERENCE (Q _{in} - Q _{out}), l/s	Required Storage, litres	COMMENTS
10	0.00	8.28	4.19	4.19	4.09	2454	select largest required storage, regardless of duration, to avoid overflow
20	0.00	5.97	3.02	4.19	1.78	2137	
30	0.00	4.92	2.49	4.19	0.73	1308	
60	0.00	3.52	1.78	4.19	No Att. Req.	0	
120	0.00	2.48	1.25	4.19	No Att. Req.	0	
360	0.00	1.38	0.70	4.19	No Att. Req.	0	
720	0.00	0.93	0.47	4.19	No Att. Req.	0	
1440	0.00	0.61	0.31	4.19	No Att. Req.	0	
2880	0.00	0.39	0.20	4.19	No Att. Req.	0	
4320	0.00	0.29	0.15	4.19	No Att. Req.	0	

ATTENUATION TANK DESIGN OUTPUT



SPECIFICATION		
TOTAL STORAGE REQUIRED	2.454 m ³	Select largest storage as per analysis
TANK HEIGHT, H _{tank}	2.5 m	Concept sizing for 25,000 litre tank
TANK DIAMETER, D _{tank}	3.66 m	No. of Tanks 1
TANK AREA, A _{tank}	10.52 m ²	Area of ONE tank
TANK MAX STORAGE VOLUME, V _{tank}	26302 litres	
REQUIRED STORAGE HEIGHT, D _{det}	0.23 m	Below overflow
DEAD STORAGE VOLUME, D _{ds}	0.15 m	GD01 recommended minimum
TOTAL WATER DEPTH REQUIRED	0.38 m	
SELECTED TANK OUTFLOW, Q _{out} , l/s	0.00419 m ³ /s	Selected tank outflow
AVERAGE HYDRAULIC HEAD, H _{hy}	0.12 m	
AREA OF ORIFICE, A _{orifice}	4.47E-03 m ²	
ORIFICE DIAMETER, D _{orifice}	75 mm	
VELOCITY AT ORIFICE	2.14 m/s	At max. head level

Project Ref:	C0552	STORMWATER ATTENUATION TANK DESIGN	
Project Address:	TUNATAHI ROAD, PUNGURU		
Design Case:	CONCEPT FUTURE DEVELOPMENT		
Date:	2 October 2024 REV 1		

ATTENUATION DESIGN PROVIDED IN ACCORDANCE WITH NEW ZEALAND BUILDING CODE E1 FOR THE RATIONALE METHOD ACCOUNTING FOR THE EFFECTS OF CLIMATE CHANGE (20% FACTOR AS PER FNDC ENGINEERING STANDARDS).
 THE 10% AEP SCENARIO IS PROVIDED TO SATISFY FNDC DISTRICT PLAN RULE 13.7.3.4. PRE-DEVELOPMENT RUNOFF REMAINS UNFACTORED IN THIS SCENARIO.
 RUNOFF COEFFICIENTS DETERMINED FROM FNDC ENGINEERING STANDARDS 2023 TABLE 4-3.

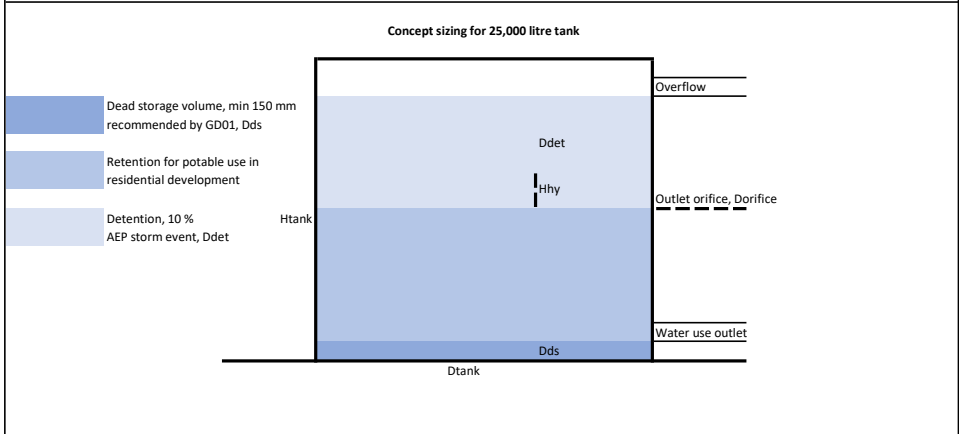
PRE DEVELOPMENT CATCHMENT PARAMETERS				POST DEVELOPMENT CATCHMENT PARAMETERS			
ITEM	AREA, A, m ²	COEFFICIENT, C	DESCRIPTION	ITEM	AREA, A, m ²	COEFFICIENT, C	DESCRIPTION
IMPERVIOUS A	0	0		TO TANK	300	0.96	ROOF
IMPERVIOUS B	0	0		OFFSET	200	0.83	DRIVEWAY - METAL
IMPERVIOUS C	0	0		PERVIOUS	0	0	
EX. PERVIOUS	500	0.63	FOREST	EX. CONSENTED	0	0	
	0	0			0	0	
TOTAL	500	TYPE D		TOTAL	500	TYPE D	

RAINFALL INTENSITY, 10% AEP, 10MIN DURATION			
10 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	87.7	mm/hr	* CLIMATE CHANGE FACTOR OF 20% APPLIED IN ACCORDANCE WITH FNDC ENGINEERING STANDARDS 4.3.9.1. NIWA HISTORIC RAINFALL INTENSITY DATA, 10MIN, IS MULTIPLIED BY CLIMATE CHANGE FACTOR.
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	20	%	
10 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	105.2	mm/hr	

PRE AND POST-DEVELOPMENT RUNOFF, 10%AEP WITH CC, VARIOUS DURATIONS						
DURATION, min	INTENSITY, mm/hr	CC FACTOR	INTENSITY WITH CC, mm/hr	POST DEV RUNOFF, Q _{post} , l/s	PRE DEV RUNOFF, Q _{pre} , l/s	COMMENTS
10	87.70	1.2	105.24	13.27	7.67	Critical duration (time of concentration) for the catchments is 10min
20	63.40	1.2	76.08	9.59	5.55	
30	52.30	1.2	62.76	7.91	4.58	
60	37.50	1.2	45.00	5.68	3.28	Pre-dev calculated on Intensity without CC factor
120	26.50	1.2	31.80	4.01	2.32	
360	14.80	1.2	17.76	2.24	1.30	
720	9.98	1.2	11.98	1.51	0.87	
1440	6.55	1.2	7.86	0.99	0.57	
2880	4.17	1.2	5.00	0.63	0.36	
4320	3.15	1.2	3.78	0.48	0.28	


ATTENUATION ANALYSIS, VARIOUS DURATIONS							
DURATION, min	OFFSET FLOW, Q _{off} , l/s	TANK INFLOW, Q _{in} , l/s	ALLOWABLE TANK OUTFLOW, Q _{pre} - Q _{off} , l/s	SELECTED TANK OUTFLOW, Q _{out} , l/s	DIFFERENCE (Q _{in} - Q _{out}), l/s	Required Storage, litres	COMMENTS
10	4.85	8.42	2.82	2.82	5.60	3359	select largest required storage, regardless of duration, to avoid overflow
20	3.51	6.09	2.04	2.82	3.27	3918	
30	2.89	5.02	1.68	2.82	2.20	3960	
60	2.08	3.60	1.21	2.82	0.78	2804	
120	1.47	2.54	0.85	2.82	No Att. Req.	0	
360	0.82	1.42	0.48	2.82	No Att. Req.	0	
720	0.55	0.96	0.32	2.82	No Att. Req.	0	
1440	0.36	0.63	0.21	2.82	No Att. Req.	0	
2880	0.23	0.40	0.13	2.82	No Att. Req.	0	
4320	0.17	0.30	0.10	2.82	No Att. Req.	0	

ATTENUATION TANK DESIGN OUTPUT



SPECIFICATION

TOTAL STORAGE REQUIRED	3,960 m ³	Select largest storage as per analysis
TANK HEIGHT, H _{tank}	2.5 m	Concept sizing for 25,000 litre tank
TANK DIAMETER, D _{tank}	3.66 m	No. of Tanks 1
TANK AREA, A _{tank}	10.52 m ²	Area of ONE tank
TANK MAX STORAGE VOLUME, V _{tank}	26302 litres	
REQUIRED STORAGE HEIGHT, D _{det}	0.38 m	Below overflow
DEAD STORAGE VOLUME, D _{ds}	0.15 m	GD01 recommended minimum
TOTAL WATER DEPTH REQUIRED	0.53 m	
SELECTED TANK OUTFLOW, Q _{out} , l/s	0.00282 m ³ /s	Selected tank outflow
AVERAGE HYDRAULIC HEAD, H _{hy}	0.19 m	
AREA OF ORIFICE, A _{orifice}	2.37E-03 m ²	
ORIFICE DIAMETER, D _{orifice}	55 mm	
VELOCITY AT ORIFICE	2.72 m/s	At max. head level

Project Ref:	C0552	STORMWATER ATTENUATION TANK DESIGN	
Project Address:	TUNATAHI ROAD, PUNGURU		
Design Case:	CONCEPT FUTURE DEVELOPMENT		
Date:	2 October 2024 REV 1		

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

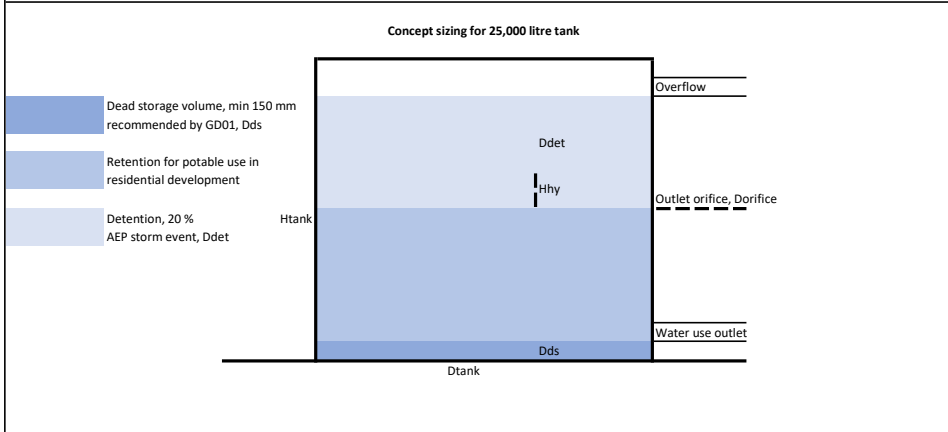
PRE DEVELOPMENT CATCHMENT PARAMETERS				POST DEVELOPMENT CATCHMENT PARAMETERS			
ITEM	AREA, A, m ²	COEFFICIENT, C	DESCRIPTION	ITEM	AREA, A, m ²	COEFFICIENT, C	DESCRIPTION
IMPERVIOUS A	0	0		TO TANK	300	0.96	ROOF
IMPERVIOUS B	0	0		OFFSET	200	0.83	DRIVEWAY - METAL
IMPERVIOUS C	0	0		PERVIOUS	0	0	
EX. PERVIOUS	500	0.63	FOREST	EX. CONSENTED	0	0	
TOTAL	500	TYPE D		TOTAL	500	TYPE D	

RAINFALL INTENSITY, 20% AEP, 10MIN DURATION			
20 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	75.1	mm/hr	* CLIMATE CHANGE FACTOR OF 20% APPLIED IN ACCORDANCE WITH FNDC ENGINEERING STANDARDS 4.3.9.1. NIWA HISTORIC RAINFALL INTENSITY DATA, 10MIN, IS MULTIPLIED BY CLIMATE CHANGE FACTOR.
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	20	%	
20 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	90.1	mm/hr	

PRE AND POST-DEVELOPMENT RUNOFF, 20%AEP WITH CC, VARIOUS DURATIONS							
DURATION, min	INTENSITY, mm/hr	CC FACTOR	INTENSITY WITH CC, mm/hr	POST DEV RUNOFF, Q _{post} , l/s	PRE DEV RUNOFF, Q _{pre} , l/s	80% of PRE DEV RUNOFF, Q _{pre(80%)} , l/s	COMMENTS
10	75.10	1.2	90.12	11.37	6.57	5.26	Critical duration (time of concentration) for the catchments is 10min
20	54.20	1.2	65.04	8.20	4.74	3.79	
30	44.70	1.2	53.64	6.76	3.91	3.13	
60	32.00	1.2	38.40	4.84	2.80	2.24	Pre-dev calculated on Intensity without CC factor
120	22.60	1.2	27.12	3.42	1.98	1.58	
360	12.60	1.2	15.12	1.91	1.10	0.88	
720	8.49	1.2	10.19	1.28	0.74	0.59	
1440	5.57	1.2	6.68	0.84	0.49	0.39	
2880	3.54	1.2	4.25	0.54	0.31	0.25	
4320	2.68	1.2	3.22	0.41	0.23	0.19	


ATTENUATION ANALYSIS, VARIOUS DURATIONS							
DURATION, min	OFFSET FLOW, Q _{off} , l/s	TANK INFLOW, Q _{in} , l/s	ALLOWABLE TANK OUTFLOW, Q _{pre(80%)} - Q _{off} , l/s	SELECTED TANK OUTFLOW, Q _{out} , l/s	DIFFERENCE (Q _{in} - Q _{out}), l/s	Required Storage, litres	COMMENTS
10	4.16	7.21	1.10	1.10	6.11	3665	select largest required storage, regardless of duration, to avoid overflow
20	3.00	5.20	1.74	1.10	4.10	4922	
30	2.47	4.29	1.44	1.10	3.19	5742	
60	1.77	3.07	1.03	1.10	1.97	7094	
120	1.25	2.17	0.73	1.10	1.07	7691	
360	0.70	1.21	0.41	1.10	0.11	2336	
720	0.47	0.82	0.27	1.10	No Att. Req.	0	
1440	0.31	0.53	0.18	1.10	No Att. Req.	0	
2880	0.20	0.34	0.11	1.10	No Att. Req.	0	
4320	0.15	0.26	0.09	1.10	No Att. Req.	0	

ATTENUATION TANK DESIGN OUTPUT



SPECIFICATION

TOTAL STORAGE REQUIRED	7,691 m ³	Select largest storage as per analysis
TANK HEIGHT, H _{tank}	2.5 m	Concept sizing for 25,000 litre tank
TANK DIAMETER, D _{tank}	3.66 m	No. of Tanks 1
TANK AREA, A _{tank}	10.52 m ²	Area of ONE tank
TANK MAX STORAGE VOLUME, V _{tank}	26302 litres	
REQUIRED STORAGE HEIGHT, D _{det}	0.73 m	Below overflow
DEAD STORAGE VOLUME, D _{ds}	0.15 m	GD01 recommended minimum
TOTAL WATER DEPTH REQUIRED	0.88 m	
SELECTED TANK OUTFLOW, Q _{out} , l/s	0.00110 m ³ /s	Selected tank outflow
AVERAGE HYDRAULIC HEAD, H _{hy}	0.37 m	
AREA OF ORIFICE, A _{orifice}	6.63E-04 m ²	
ORIFICE DIAMETER, D _{orifice}	29 mm	
VELOCITY AT ORIFICE	3.79 m/s	At max. head level

Project Ref:	C0552	STORMWATER ATTENUATION TANK DESIGN	
Project Address:	TUNATAHI ROAD, PUNGURU		
Design Case:	CONCEPT FUTURE DEVELOPMENT		
Date:	2 October 2024 REV 1		

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

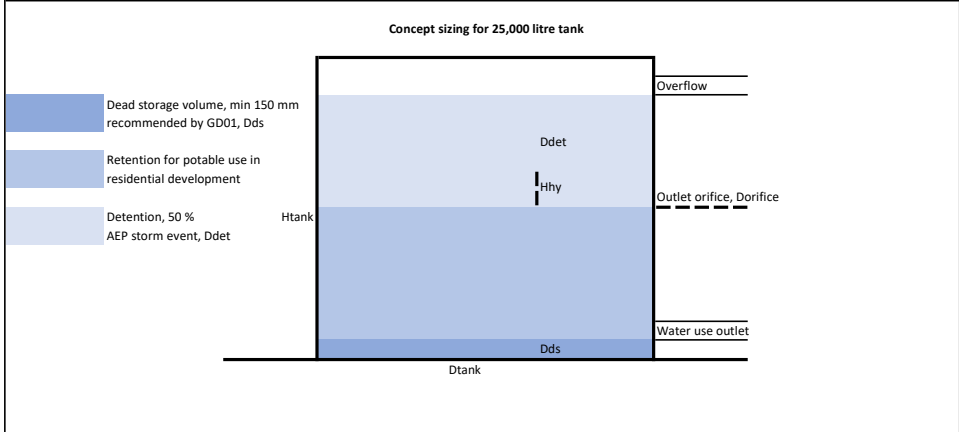
PRE DEVELOPMENT CATCHMENT PARAMETERS				POST DEVELOPMENT CATCHMENT PARAMETERS			
ITEM	AREA, A, m ²	COEFFICIENT, C	DESCRIPTION	ITEM	AREA, A, m ²	COEFFICIENT, C	DESCRIPTION
IMPERVIOUS A				TO TANK	300	0.96	ROOF
IMPERVIOUS B	0	0		OFFSET	200	0.83	DRIVEWAY - METAL
IMPERVIOUS C	0	0		PERVIOUS	0	0	
EX. PERVIOUS	500	0.63	FOREST	EX. CONSENTED	0	0	
TOTAL	500	TYPE D		TOTAL	500	TYPE D	

RAINFALL INTENSITY, 50% AEP, 10MIN DURATION			
50 % AEP RAINFALL INTENSITY, 10 MIN, 1, mm/hr	58.1	mm/hr	* CLIMATE CHANGE FACTOR OF 20% APPLIED IN ACCORDANCE WITH FNDC ENGINEERING STANDARDS 4.3.9.1. NIWA HISTORIC RAINFALL INTENSITY DATA, 10MIN, IS MULTIPLIED BY CLIMATE CHANGE FACTOR.
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN**	20	%	
50 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	69.72	mm/hr	

PRE AND POST-DEVELOPMENT RUNOFF, 50%AEP WITH CC, VARIOUS DURATIONS							
DURATION, min	INTENSITY, mm/hr	CC FACTOR	INTENSITY WITH CC, mm/hr	POST DEV RUNOFF, Qpost, l/s	PRE DEV RUNOFF, Qpre, l/s	80% of PRE DEV RUNOFF, Qpre(80%), l/s	COMMENTS
10	58.10	1.2	69.72	8.79	5.08	4.07	Critical duration (time of concentration) for the catchments is 10min
20	41.90	1.2	50.28	6.34	4.40	3.52	
30	34.50	1.2	41.40	5.22	3.62	2.90	
60	24.70	1.2	29.64	3.74	2.59	2.07	Pre-dev calculated on Intensity without CC factor
120	17.40	1.2	20.88	2.63	1.83	1.46	
360	9.69	1.2	11.63	1.47	1.02	0.81	
720	6.51	1.2	7.81	0.99	0.68	0.55	
1440	4.26	1.2	5.11	0.64	0.45	0.36	
2880	2.71	1.2	3.25	0.41	0.28	0.23	
4320	2.04	1.2	2.45	0.31	0.21	0.17	


ATTENUATION ANALYSIS, VARIOUS DURATIONS							
DURATION, min	OFFSET FLOW, Qoff, l/s	TANK INFLOW, Qin, l/s	ALLOWABLE TANK OUTFLOW, Qpre(80%) - Qoff, l/s	SELECTED TANK OUTFLOW, Qout, l/s	DIFFERENCE (Qin - Qout), l/s	Required Storage, litres	
10	3.21	5.58	0.85	0.85	4.73	2835	select largest required storage, regardless of duration, to avoid overflow
20	2.32	4.02	1.20	0.85	3.17	3804	
30	1.91	3.31	0.99	0.85	2.46	4428	
60	1.37	2.37	0.71	0.85	1.52	5469	
120	0.96	1.67	0.50	0.85	0.82	5892	
360	0.54	0.93	0.28	0.85	0.08	1687	
720	0.36	0.62	0.19	0.85	No Att. Req.	0	
1440	0.24	0.41	0.12	0.85	No Att. Req.	0	
2880	0.15	0.26	0.08	0.85	No Att. Req.	0	
4320	0.11	0.20	0.06	0.85	No Att. Req.	0	

ATTENUATION TANK DESIGN OUTPUT



SPECIFICATION

TOTAL STORAGE REQUIRED	5.892 m ³	Select largest storage as per analysis
TANK HEIGHT, Htank	2.5 m	Concept sizing for 25,000 litre tank
TANK DIAMETER, Dtank	3.66 m	No. of Tanks 1
TANK AREA, Atank	10.52 m ²	Area of ONE tank
TANK MAX STORAGE VOLUME, Vtank	26302 litres	
REQUIRED STORAGE HEIGHT, Ddet	0.56 m	Below overflow
DEAD STORAGE VOLUME, Dds	0.15 m	GD01 recommended minimum
TOTAL WATER DEPTH REQUIRED	0.71 m	
SELECTED TANK OUTFLOW, Qout, l/s	0.00085 m ³ /s	Selected tank outflow
AVERAGE HYDRAULIC HEAD, Hhy	0.28 m	
AREA OF ORIFICE, Aorifice	5.86E-04 m ²	
ORIFICE DIAMETER, Dorifice	27 mm	
VELOCITY AT ORIFICE	3.31 m/s	At max. head level

Project Ref:	C0552	STORMWATER ATTENUATION TANK DESIGN	
Project Address:	TUNATAHI ROAD, PUNGURU		
Design Case:	CONCEPT (ROW C - NEW PORTION)		
Date:	2 October 2024 REV 1		

ATTENUATION DESIGN PROVIDED IN ACCORDANCE WITH NEW ZEALAND BUILDING CODE E1 FOR THE RATIONALE METHOD ACCOUNTING FOR THE EFFECTS OF CLIMATE CHANGE (20% FACTOR AS PER FNDC ENGINEERING STANDARDS).
 THE 10% AEP SCENARIO IS PROVIDED TO SATISFY FNDC DISTRICT PLAN RULE 13.7.3.4. PRE-DEVELOPMENT RUNOFF REMAINS UNFACTORED IN THIS SCENARIO.
 RUNOFF COEFFICIENTS DETERMINED FROM FNDC ENGINEERING STANDARDS 2023 TABLE 4-3.

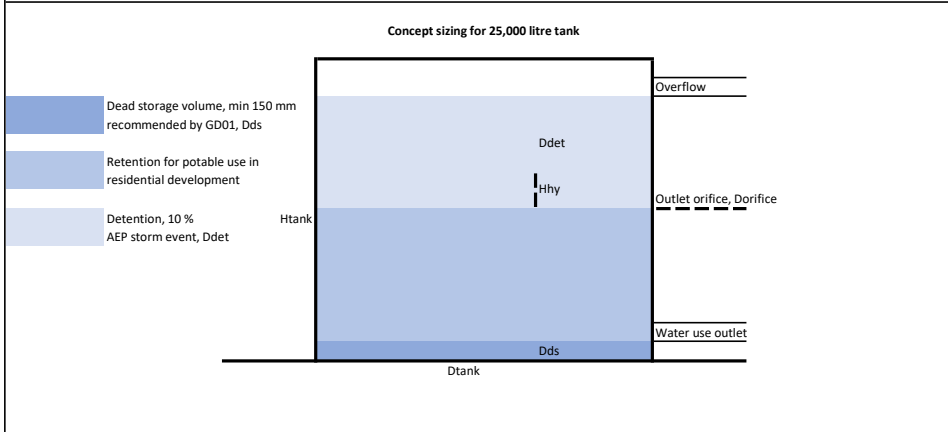
PRE DEVELOPMENT CATCHMENT PARAMETERS				POST DEVELOPMENT CATCHMENT PARAMETERS			
ITEM	AREA, A, m ²	COEFFICIENT, C	DESCRIPTION	ITEM	AREA, A, m ²	COEFFICIENT, C	DESCRIPTION
IMPERVIOUS A	0	0		TO TANK	480	0.83	NEW ACCESS (new part of C)
IMPERVIOUS B	0	0		OFFSET	180	0.83	NEW ACCESS (new part of C)
IMPERVIOUS C	0	0		PERVIOUS	0	0	
EX. PERVIOUS	660	0.63	FOREST	EX. CONSENTED	0	0	
TOTAL	660	TYPE D		TOTAL	660	TYPE D	

RAINFALL INTENSITY, 10% AEP, 10MIN DURATION			
10 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	87.7	mm/hr	* CLIMATE CHANGE FACTOR OF 20% APPLIED IN ACCORDANCE WITH FNDC ENGINEERING STANDARDS 4.3.9.1. NIWA HISTORIC RAINFALL INTENSITY DATA, 10MIN, IS MULTIPLIED BY CLIMATE CHANGE FACTOR.
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	20	%	
10 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	105.2	mm/hr	


PRE AND POST-DEVELOPMENT RUNOFF, 10%AEP WITH CC, VARIOUS DURATIONS						
DURATION, min	INTENSITY, mm/hr	CC FACTOR	INTENSITY WITH CC, mm/hr	POST DEV RUNOFF, Q _{post} , l/s	PRE DEV RUNOFF, Q _{pre} , l/s	COMMENTS
10	87.70	1.2	105.24	16.01	10.13	Critical duration (time of concentration) for the catchments is 10min
20	63.40	1.2	76.08	11.58	7.32	
30	52.30	1.2	62.76	9.55	6.04	
60	37.50	1.2	45.00	6.85	4.33	Pre-dev calculated on Intensity without CC factor
120	26.50	1.2	31.80	4.84	3.06	
360	14.80	1.2	17.76	2.70	1.71	
720	9.98	1.2	11.98	1.82	1.15	
1440	6.55	1.2	7.86	1.20	0.76	
2880	4.17	1.2	5.00	0.76	0.48	
4320	3.15	1.2	3.78	0.58	0.36	

ATTENUATION ANALYSIS, VARIOUS DURATIONS							
DURATION, min	OFFSET FLOW, Q _{off} , l/s	TANK INFLOW, Q _{in} , l/s	ALLOWABLE TANK OUTFLOW, Q _{pre} - Q _{off} , l/s	SELECTED TANK OUTFLOW, Q _{out} , l/s	DIFFERENCE (Q _{in} - Q _{out}), l/s	Required Storage, litres	COMMENTS
10	4.37	11.65	5.76	5.76	5.88	3531	select largest required storage, regardless of duration, to avoid overflow
20	3.16	8.42	4.17	5.76	2.66	3189	
30	2.60	6.95	3.44	5.76	1.18	2130	
60	1.87	4.98	2.46	5.76	No Att. Req.	0	
120	1.32	3.52	1.74	5.76	No Att. Req.	0	
360	0.74	1.97	0.97	5.76	No Att. Req.	0	
720	0.50	1.33	0.66	5.76	No Att. Req.	0	
1440	0.33	0.87	0.43	5.76	No Att. Req.	0	
2880	0.21	0.55	0.27	5.76	No Att. Req.	0	
4320	0.16	0.42	0.21	5.76	No Att. Req.	0	

ATTENUATION TANK DESIGN OUTPUT



SPECIFICATION		
TOTAL STORAGE REQUIRED	3.531 m ³	Select largest storage as per analysis
TANK HEIGHT, H _{tank}	2.5 m	Concept sizing for 25,000 litre tank
TANK DIAMETER, D _{tank}	3.66 m	No. of Tanks 1
TANK AREA, A _{tank}	10.52 m ²	Area of ONE tank
TANK MAX STORAGE VOLUME, V _{tank}	26302 litres	
REQUIRED STORAGE HEIGHT, D _{det}	0.34 m	Below overflow
DEAD STORAGE VOLUME, D _{ds}	0.15 m	GD01 recommended minimum
TOTAL WATER DEPTH REQUIRED	0.49 m	
SELECTED TANK OUTFLOW, Q _{out} , l/s	0.00576 m ³ /s	Selected tank outflow
AVERAGE HYDRAULIC HEAD, H _{hy}	0.17 m	
AREA OF ORIFICE, A _{orifice}	5.12E-03 m ²	
ORIFICE DIAMETER, D _{orifice}	81 mm	
VELOCITY AT ORIFICE	2.57 m/s	At max. head level

Project Ref:	C0552	STORMWATER ATTENUATION TANK DESIGN	
Project Address:	TUNATAHI ROAD, PUNGURU		
Design Case:	CONCEPT (ROW C - NEW PORTION)		
Date:	2 October 2024 REV 1		

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

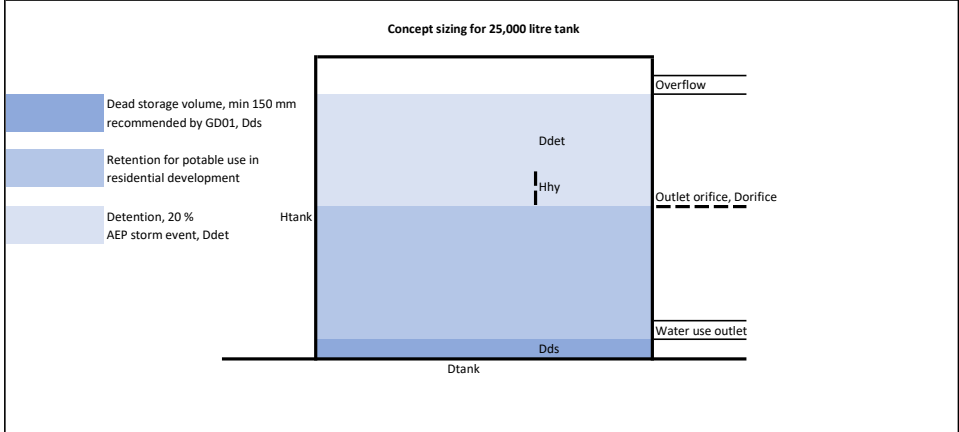
PRE DEVELOPMENT CATCHMENT PARAMETERS				POST DEVELOPMENT CATCHMENT PARAMETERS			
ITEM	AREA, A, m ²	COEFFICIENT, C	DESCRIPTION	ITEM	AREA, A, m ²	COEFFICIENT, C	DESCRIPTION
IMPERVIOUS A	0	0		TO TANK	480	0.83	NEW ACCESS (new part of C)
IMPERVIOUS B	0	0		OFFSET	180	0.83	NEW ACCESS (new part of C)
IMPERVIOUS C	0	0		PERVIOUS	0	0	
EX. PERVIOUS	660	0.63	FOREST	EX. CONSENTED	0	0	
TOTAL	660	TYPE D		TOTAL	660	TYPE D	

RAINFALL INTENSITY, 20% AEP, 10MIN DURATION			
20 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	75.1	mm/hr	* CLIMATE CHANGE FACTOR OF 20% APPLIED IN ACCORDANCE WITH FNDC ENGINEERING STANDARDS 4.3.9.1. NIWA HISTORIC RAINFALL INTENSITY DATA, 10MIN, IS MULTIPLIED BY CLIMATE CHANGE FACTOR.
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	20	%	
20 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	90.1	mm/hr	

PRE AND POST-DEVELOPMENT RUNOFF, 20%AEP WITH CC, VARIOUS DURATIONS							
DURATION, min	INTENSITY, mm/hr	CC FACTOR	INTENSITY WITH CC, mm/hr	POST DEV RUNOFF, Qpost, l/s	PRE DEV RUNOFF, Qpre, l/s	80% of PRE DEV RUNOFF, Qpre(80%), l/s	COMMENTS
10	75.10	1.2	90.12	13.71	8.67	6.94	Critical duration (time of concentration) for the catchments is 10min
20	54.20	1.2	65.04	9.90	6.26	5.01	
30	44.70	1.2	53.64	8.56	5.16	4.13	
60	32.00	1.2	38.40	5.84	3.70	2.96	Pre-dev calculated on Intensity without CC factor
120	22.60	1.2	27.12	4.13	2.61	2.09	
360	12.60	1.2	15.12	2.30	1.46	1.16	
720	8.49	1.2	10.19	1.55	0.98	0.78	
1440	5.57	1.2	6.68	1.02	0.64	0.51	
2880	3.54	1.2	4.25	0.65	0.41	0.33	
4320	2.68	1.2	3.22	0.49	0.31	0.25	

ATTENUATION ANALYSIS, VARIOUS DURATIONS							
DURATION, min	OFFSET FLOW, Q _{off} , l/s	TANK INFLOW, Q _{in} , l/s	ALLOWABLE TANK OUTFLOW, Q _{pre(80%)} - Q _{off} , l/s	SELECTED TANK OUTFLOW, Q _{out} , l/s	DIFFERENCE (Q _{in} - Q _{out}), l/s	Required Storage, litres	
10	3.74	9.97	3.20	3.20	6.77	4064	select largest required storage, regardless of duration, to avoid overflow
20	2.70	7.20	2.31	3.20	4.00	4798	
30	2.23	5.94	1.90	3.20	2.74	4926	
60	1.59	4.25	1.36	3.20	1.05	3781	
120	1.13	3.00	0.96	3.20	No Att. Req.	0	
360	0.63	1.67	0.54	3.20	No Att. Req.	0	
720	0.42	1.13	0.36	3.20	No Att. Req.	0	
1440	0.28	0.74	0.24	3.20	No Att. Req.	0	
2880	0.18	0.47	0.15	3.20	No Att. Req.	0	
4320	0.13	0.36	0.11	3.20	No Att. Req.	0	

ATTENUATION TANK DESIGN OUTPUT



SPECIFICATION

TOTAL STORAGE REQUIRED	4.926 m ³	Select largest storage as per analysis
TANK HEIGHT, H _{tank}	2.5 m	Concept sizing for 25,000 litre tank
TANK DIAMETER, D _{tank}	3.66 m	No. of Tanks 1
TANK AREA, A _{tank}	10.52 m ²	Area of ONE tank
TANK MAX STORAGE VOLUME, V _{tank}	26302 litres	
REQUIRED STORAGE HEIGHT, D _{det}	0.47 m	Below overflow
DEAD STORAGE VOLUME, D _{ds}	0.15 m	G001 recommended minimum
TOTAL WATER DEPTH REQUIRED	0.62 m	
SELECTED TANK OUTFLOW, Q _{out} , l/s	0.00320 m ³ /s	Selected tank outflow
AVERAGE HYDRAULIC HEAD, H _{hy}	0.23 m	
AREA OF ORIFICE, A _{orifice}	2.41E-03 m ²	
ORIFICE DIAMETER, D _{orifice}	55 mm	
VELOCITY AT ORIFICE	3.03 m/s	At max. head level

Project Ref:	C0552	STORMWATER ATTENUATION TANK DESIGN	
Project Address:	TUNATAHI ROAD, PUNGURU		
Design Case:	CONCEPT (ROW C - NEW PORTION)		
Date:	2 October 2024 REV 1		

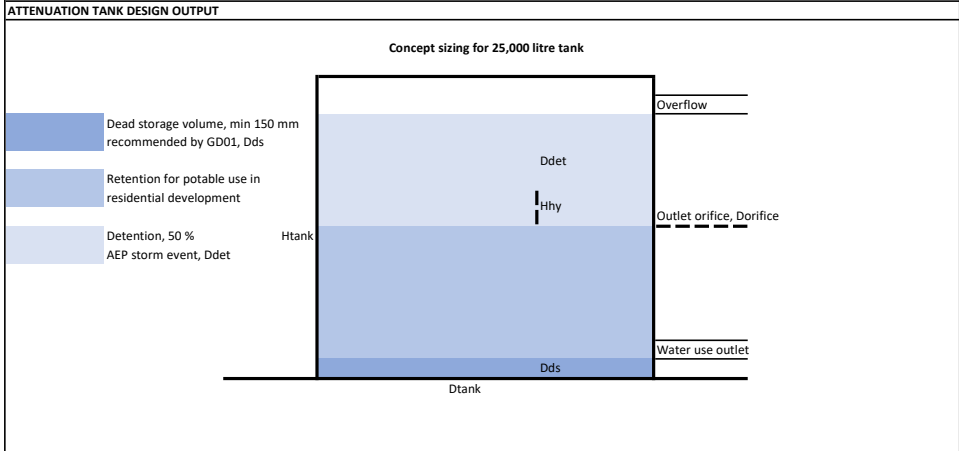
ATTENUATION DESIGN PROVIDED IN ACCORDANCE WITH NEW ZEALAND BUILDING CODE E1 FOR THE RATIONALE METHOD ACCOUNTING FOR THE EFFECTS OF CLIMATE CHANGE (20% FACTOR AS PER FNDC ENGINEERING STANDARDS).
 PRE-DEVELOPMENT RUNOFF IS FACTORED BY 80% TO SUIT FNDC STANDARDS
 RUNOFF COEFFICIENTS DETERMINED FROM FNDC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

PRE DEVELOPMENT CATCHMENT PARAMETERS				POST DEVELOPMENT CATCHMENT PARAMETERS			
ITEM	AREA, A, m ²	COEFFICIENT, C	DESCRIPTION	ITEM	AREA, A, m ²	COEFFICIENT, C	DESCRIPTION
IMPERVIOUS A				TO TANK	480	0.83	NEW ACCESS (new part of C)
IMPERVIOUS B				OFFSET	180	0.83	NEW ACCESS (new part of C)
IMPERVIOUS C				PERVIOUS	0	0	
EX. PERVIOUS	660	0.63	FOREST	EX. CONSENTED	0	0	
TOTAL	660	TYPE D		TOTAL	660	TYPE D	

RAINFALL INTENSITY, 50% AEP, 10MIN DURATION			
50 % AEP RAINFALL INTENSITY, 10 MIN, 1, mm/hr	58.1	mm/hr	* CLIMATE CHANGE FACTOR OF 20% APPLIED IN ACCORDANCE WITH FNDC ENGINEERING STANDARDS 4.3.9.1. NIWA HISTORIC RAINFALL INTENSITY DATA, 10MIN, IS MULTIPLIED BY CLIMATE CHANGE FACTOR.
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN**	20	%	
50 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	69.72	mm/hr	

PRE AND POST-DEVELOPMENT RUNOFF, 50%AEP WITH CC, VARIOUS DURATIONS							
DURATION, min	INTENSITY, mm/hr	CC FACTOR	INTENSITY WITH CC, mm/hr	POST DEV RUNOFF, Qpost, l/s	PRE DEV RUNOFF, Qpre, l/s	80% of PRE DEV RUNOFF, Qpre(80%), l/s	COMMENTS
10	58.10	1.2	69.72	10.61	6.71	5.37	Critical duration (time of concentration) for the catchments is 10min
20	41.90	1.2	50.28	7.65	4.84	3.87	
30	34.50	1.2	41.40	6.30	3.98	3.19	
60	24.70	1.2	29.64	4.51	2.85	2.28	Pre-dev calculated on Intensity without CC factor
120	17.40	1.2	20.88	3.18	2.01	1.61	
360	9.69	1.2	11.63	1.77	1.12	0.90	
720	6.51	1.2	7.81	1.19	0.75	0.60	
1440	4.26	1.2	5.11	0.78	0.49	0.39	
2880	2.71	1.2	3.25	0.49	0.31	0.25	
4320	2.04	1.2	2.45	0.37	0.24	0.19	

ATTENUATION ANALYSIS, VARIOUS DURATIONS							
DURATION, min	OFFSET FLOW, Qoff, l/s	TANK INFLOW, Qin, l/s	ALLOWABLE TANK OUTFLOW, Qpre(80%) - Qoff, l/s	SELECTED TANK OUTFLOW, Qout, l/s	DIFFERENCE (Qin - Qout), l/s	Required Storage, litres	
10	2.89	7.72	2.48	2.48	5.24	3144	select largest required storage, regardless of duration, to avoid overflow
20	2.09	5.56	1.78	2.48	3.09	3707	
30	1.72	4.58	1.47	2.48	2.11	3792	
60	1.23	3.28	1.05	2.48	0.81	2898	
120	0.87	2.31	0.74	2.48	No Att. Req.	0	
360	0.48	1.29	0.41	2.48	No Att. Req.	0	
720	0.32	0.86	0.28	2.48	No Att. Req.	0	
1440	0.21	0.57	0.18	2.48	No Att. Req.	0	
2880	0.13	0.36	0.12	2.48	No Att. Req.	0	
4320	0.10	0.27	0.09	2.48	No Att. Req.	0	



SPECIFICATION		
TOTAL STORAGE REQUIRED	3.792 m ³	Select largest storage as per analysis
TANK HEIGHT, Htank	2.5 m	Concept sizing for 25,000 litre tank
TANK DIAMETER, Dtank	3.66 m	No. of Tanks 1
TANK AREA, Atank	10.52 m ²	Area of ONE tank
TANK MAX STORAGE VOLUME, Vtank	26302 litres	
REQUIRED STORAGE HEIGHT, Ddet	0.36 m	Below overflow
DEAD STORAGE VOLUME, Dds	0.15 m	GD01 recommended minimum
TOTAL WATER DEPTH REQUIRED	0.51 m	
SELECTED TANK OUTFLOW, Qout, l/s	0.00248 m ³ /s	Selected tank outflow
AVERAGE HYDRAULIC HEAD, Hhy	0.18 m	
AREA OF ORIFICE, Aorifice	2.12E-03 m ²	
ORIFICE DIAMETER, Dorifice	52 mm	
VELOCITY AT ORIFICE	2.66 m/s	At max. head level

HIRDS V4 Intensity-Duration-Frequency Results

Sitename: Tunatahi Road

Coordinate system: WGS84

Longitude: 173.3768

Latitude: -35.3315

DDF Mode Parameters: c d e f g h i

Values: 0.00183763 0.50611174 -0.01205284 -0.00204641 0.24911828 -0.0103495 3.11521555

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

24 100 3.17805383 4.600149227 10.09488075

Rainfall intensities (mm/hr) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	53.1	38.3	31.6	22.5	15.9	8.84	5.94	3.89	2.47	1.86	1.51	1.28
2	0.5	58.1	41.9	34.5	24.7	17.4	9.69	6.51	4.26	2.71	2.04	1.66	1.41
5	0.2	75.1	54.2	44.7	32	22.6	12.6	8.49	5.57	3.54	2.68	2.18	1.85
10	0.1	87.7	63.4	52.3	37.5	26.5	14.8	9.98	6.55	4.17	3.15	2.57	2.18
20	0.05	101	72.9	60.2	43.1	30.5	17.1	11.5	7.57	4.82	3.65	2.97	2.52
30	0.033	108	78.5	64.9	46.5	33	18.5	12.5	8.19	5.22	3.95	3.22	2.73
40	0.025	114	82.6	68.3	49	34.7	19.5	13.1	8.63	5.51	4.17	3.39	2.88
50	0.02	118	85.8	70.9	50.9	36.1	20.2	13.7	8.98	5.73	4.34	3.53	3
60	0.017	122	88.5	73.1	52.5	37.2	20.9	14.1	9.27	5.92	4.48	3.65	3.1
80	0.013	128	92.7	76.6	55	39	21.9	14.8	9.73	6.22	4.71	3.83	3.26
100	0.01	132	95.9	79.3	57	40.4	22.7	15.3	10.1	6.45	4.88	3.98	3.38
250	0.004	151	109	90.5	65	46.2	26	17.6	11.6	7.41	5.62	4.58	3.89

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	6.8	4.4	3.2	2.2	1.6	1.1	0.73	0.64	0.4	0.29	0.23	0.2
2	0.5	7.4	4.8	3.5	2.5	1.8	1.2	0.8	0.71	0.45	0.32	0.26	0.23
5	0.2	9.8	6.7	5.2	3.5	2.5	1.5	1.1	0.96	0.6	0.44	0.35	0.3
10	0.1	12	8.6	7	4.5	3.3	1.9	1.3	1.2	0.72	0.53	0.42	0.37
20	0.05	16	11	9.4	5.9	4.3	2.4	1.7	1.4	0.86	0.63	0.5	0.44
30	0.033	18	13	11	6.9	5	2.7	1.9	1.5	0.95	0.69	0.55	0.48
40	0.025	20	15	12	7.7	5.6	3	2.1	1.6	1	0.75	0.59	0.52
50	0.02	22	16	14	8.5	6.1	3.2	2.3	1.7	1.1	0.79	0.62	0.54
60	0.017	23	17	15	9.1	6.5	3.5	2.4	1.8	1.1	0.83	0.65	0.57
80	0.013	26	20	16	10	7.2	3.8	2.7	1.9	1.2	0.89	0.69	0.61
100	0.01	28	21	18	11	7.9	4.2	2.9	2.1	1.3	0.94	0.73	0.65
250	0.004	38	31	26	16	11	5.8	4.1	2.6	1.6	1.2	0.91	0.81

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	56.9	41	33.8	24.1	16.9	9.33	6.22	4.05	2.55	1.92	1.56	1.32
2	0.5	62.3	44.9	37	26.4	18.6	10.2	6.84	4.45	2.81	2.11	1.71	1.45
5	0.2	80.8	58.3	48.1	34.4	24.3	13.4	8.95	5.83	3.68	2.77	2.25	1.91
10	0.1	94.5	68.3	56.4	40.4	28.5	15.8	10.5	6.86	4.34	3.27	2.66	2.25
20	0.05	109	78.6	64.9	46.5	32.8	18.2	12.2	7.94	5.03	3.79	3.08	2.61
30	0.033	117	84.8	70	50.2	35.5	19.7	13.2	8.59	5.45	4.11	3.34	2.82
40	0.025	123	89.2	73.7	52.8	37.4	20.7	13.9	9.06	5.74	4.33	3.52	2.98
50	0.02	128	92.7	76.6	54.9	38.9	21.6	14.5	9.43	5.98	4.51	3.67	3.11
60	0.017	132	95.5	79	56.7	40.1	22.3	14.9	9.74	6.18	4.66	3.79	3.21
80	0.013	138	100	82.8	59.4	42	23.4	15.7	10.2	6.49	4.9	3.98	3.37
100	0.01	143	104	85.7	61.5	43.5	24.2	16.2	10.6	6.73	5.08	4.13	3.5
250	0.004	163	118	97.7	70.3	49.8	27.8	18.6	12.2	7.74	5.84	4.75	4.03

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	56.9	41	33.8	24.1	16.9	9.33	6.22	4.05	2.55	1.92	1.56	1.32
2	0.5	62.3	44.9	37	26.4	18.6	10.2	6.84	4.45	2.81	2.11	1.71	1.45
5	0.2	80.8	58.3	48.1	34.4	24.3	13.4	8.95	5.83	3.68	2.77	2.25	1.91
10	0.1	94.5	68.3	56.4	40.4	28.5	15.8	10.5	6.86	4.34	3.27	2.66	2.25
20	0.05	109	78.6	64.9	46.5	32.8	18.2	12.2	7.94	5.03	3.79	3.08	2.61
30	0.033	117	84.8	70	50.2	35.5	19.7	13.2	8.59	5.45	4.11	3.34	2.82
40	0.025	123	89.2	73.7	52.8	37.4	20.7	13.9	9.06	5.74	4.33	3.52	2.98
50	0.02	128	92.7	76.6	54.9	38.9	21.6	14.5	9.43	5.98	4.51	3.67	3.11
60	0.017	132	95.5	79	56.7	40.1	22.3	14.9	9.74	6.18	4.66	3.79	3.21
80	0.013	138	100	82.8	59.4	42	23.4	15.7	10.2	6.49	4.9	3.98	3.37
100	0.01	143	104	85.7	61.5	43.5	24.2	16.2	10.6	6.73	5.08	4.13	3.5
250	0.004	163	118	97.7	70.3	49.8	27.8	18.6	12.2	7.74	5.84	4.75	4.03

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	57.8	41.7	34.3	24.5	17.2	9.45	6.29	4.09	2.57	1.93	1.57	1.33
2	0.5	63.3	45.7	37.6	26.9	18.9	10.4	6.92	4.49	2.83	2.13	1.73	1.46