



Office Use Only Application Number:

APPLICATION FOR RESOURCE CONSENT OR FAST-TRACK RESOURCE CONSENT

(Or Associated Consent Pursuant to the Resource Management Act 1991 (RMA))

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

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

1. Pre-Lodgement Meeting

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

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

- Land Use Fast Track Land Use* Subdivision Discharge
- Extension of time (s.125) Change of conditions (s.127) Change of Consent Notice (s.221(3))
- Consent under National Environmental Standard (e.g. Assessing and Managing Contaminants in Soil)
- Other (please specify) _____

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

3. Would you like to opt out of the Fast Track Process? Yes / No

4. Applicant Details:

Name/s: Taheke Marae

Electronic Address for Service (E-mail): _____

Phone Numbers: _____

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

Post Code: _____

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

Name/s: Steven Sanson - Sanson & Associates Limited

Electronic Address for Service (E-mail): steve@sansons.co.nz

Phone Numbers: Work: 0211606035 Home: _____

Postal Address: PO Box 318, Paihia, 0247
(or alternative method of service under section 352 of the Act)

Post Code: _____

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

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

Name/s: Refer Record of Titles appended to the AEE

Property Address/
Location: 3182 State Highway 12, Taheke RD3 Kaikohe

7. Application Site Details:

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

Site Address/
Location: 3182 State Highway 12, Taheke RD3 Kaikohe

Legal Description: Taheke B Block ML Plan 441020 Val Number: _____

Certificate of Title: 614381
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 call application - Eddie Morunga prior to a site visit

8. Description of the Proposal:

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

FNDC Resource Consent for upgrades and additions to the Taheke Marae.

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

9. Would you like to request Public Notification

Yes/No

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

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

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

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

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

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

12. Assessment of Environmental Effects:

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

Please attach your AEE to this application.

13. Billing Details:

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

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

Email: _____

Postal Address: _____

_____ Post Code: _____

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

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

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

Name: _____ (please print)

Signature: _____ (signature of bill payer – mandatory) Date: 29/10/23

14. Important Information:

Note to applicant

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

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

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

Fast-track application

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

Privacy Information:

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

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

Name: _____ (please print)

Signature: _____ (signature)

Date: _____

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

Checklist (please tick if information is provided)

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

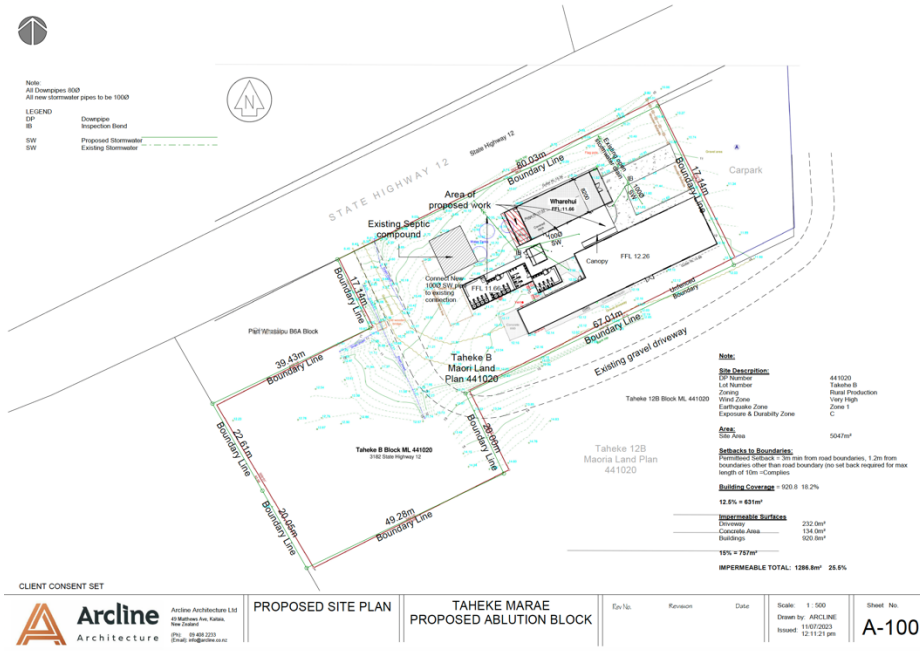
Please refer to Chapter 4 of the District Plan for details of the information that must be provided with an application. Please also refer to the RC Checklist available on the Council's website. This contains more helpful hints as to what information needs to be shown on plans.

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

UNBOUND

SINGLE SIDED

NO LARGER THAN A3 in SIZE



Assessment of Environmental Effects

Application for Resource Consent:

Taheke Marae Ablution Block, Wastewater System Replacement, & Mattress Room Development

Prepared for: Taheke Marae Trustees
Prepared by Steven Sanson | Consultant Planner
October 2023

1.0 APPLICANT & PROPERTY DETAILS

Applicant	Taheke Marae Trustees
Address for Service	Sanson & Associates Limited PO Box 318 PAIHIA 0247 C/O - Steven Sanson steve@sansons.co.nz 021-160-6035
Legal Description	Taheke B Block Maori Land Plan 441020
Record Of Title	614381
Physical Address	3182 State Highway 12, Taheke, Kaikohe
Site Area	5,047m ²
Owner of the Site	Various – Refer CT in Appendix 1 .
District Plan Zone	Rural Production (ODP) Maori Purpose Zone – Rural (PDP)
District Plan Features	Nil
Archaeology	Nil known
NRC Overlays	Nil
Soils	6e7
Protected Natural Area	Nil
HAIL	No

Schedule 1

2.0 SUMMARY OF PROPOSAL

Proposal	The proposal seeks alterations and additions to Taheke Marae through the addition of a new mattress storage room, new ablution block, new verandah and canopy and removal of concrete water tanks.
Reason for Application	<p>The proposal breaches:</p> <ul style="list-style-type: none"> • 8.6.5.1.3 – Stormwater Management; • 8.6.5.1.4 – Setback from Boundaries; • 8.6.5.1.10 Building Coverage. <p>Overall, the proposal is a <i>Discretionary Activity</i> under the ODP. No consents are required under the PDP.</p>
Appendices	<p>Appendix 1 – Record of Title & Instruments Appendix 2 – Architectural Drawings [Arcline] Appendix 3 – Topographical Survey Appendix 4 – Geotechnical Report [Geologix] Appendix 5 – Wastewater Report [Water Flow] Appendix 6 – Northland Regional Council Consent Application. Appendix 7 – Consultation with NZTA Appendix 8 – Stormwater Report [Geologix]</p>
Consultation	Nil
Pre Application Consultation	Nil
Relevant Applications	Nil

3.0 INTRODUCTION & PROPOSAL

3.1 Report Requirements

This report has been prepared for Taheke Marae in support of a land use consent application at 3182 State Highway 12, Taheke.

The application has been prepared in accordance with the provisions of Section 88 and the Fourth Schedule of the Resource Management Act 1991. This report serves as the Assessment of Environmental Effects required under both provisions.

The report also includes an analysis of the relevant provisions of the Far North District Plan, relevant National Policy Statements and Environmental Standards, as well as Part 2 of the Resource Management Act 1991.

3.2 Proposal

Application Site: A range of details regarding the site are outlined in Schedule 1 of this report. These details are supplemented by the Record of Title and relevant instruments located in Appendix 1. A broader description of the site is provided for in Section 4 of this Report.

Land Use Consent: The proposal seeks alterations and additions to Taheke Marae through the addition of a new mattress storage room, new ablution block, new verandah and canopy, and removal of concrete water tanks.

These proposal items are shown on the architectural drawings provided in Appendix 2.

Activity Status: The proposal is a Discretionary Activity.

4.0 SITE & SURROUNDING ENVIRONMENT

4.1 Zoning & Resource Features

The proposed activity is located in the Rural Production & Lakes & Rivers Zone under the Operative District Plan. The site is located in the Maori Purpose Zone – Rural under the Proposed District Plan. The zoning is outlined in [Figure 1](#). There are no resource features of relevance.

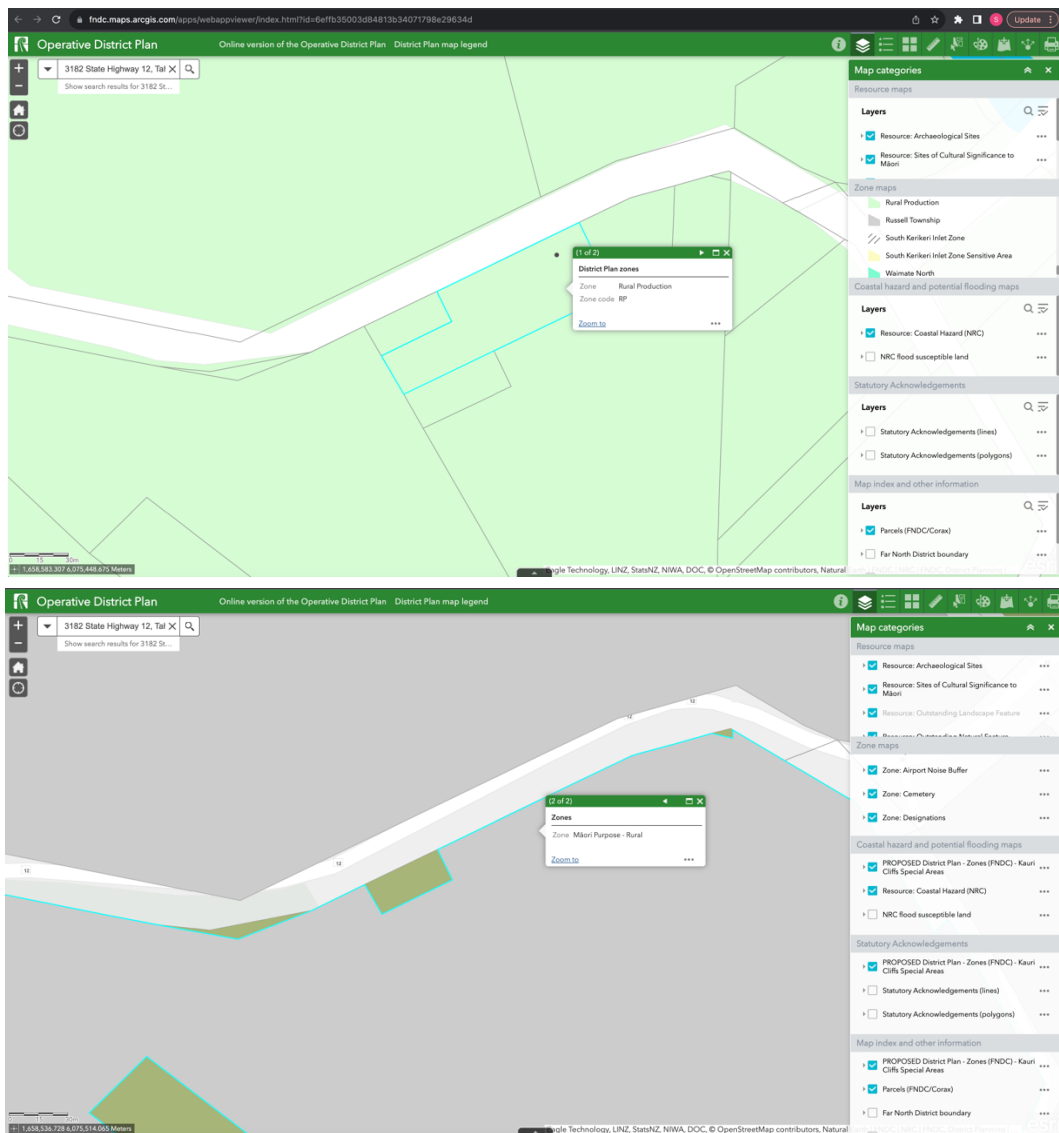


Figure 1 - Zone Maps (Source: Far North Maps)

The site is not implicated by flooding hazards, HAIL, or any known wetlands.

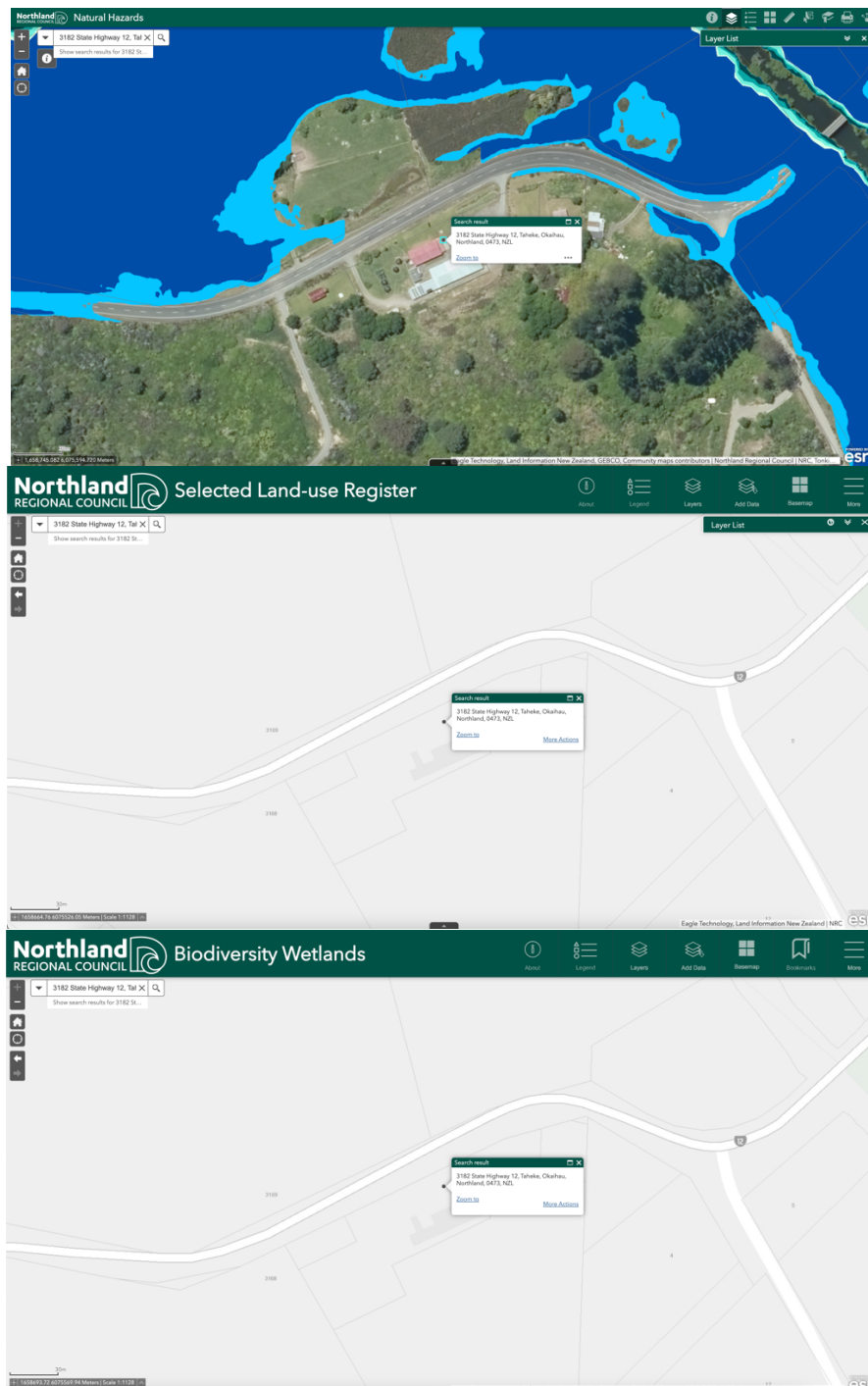


Figure 2 - NRC Maps (Source: NRC Local Maps)

4.2 Record of Title

The site is Maori Freehold Land and has a specific purpose as a Marae Reservation. There is one instrument on the title which relates to an easement granted across the neighbouring site to provide for car parking for the marae activity. This is provided in [Appendix 1](#).

4.4 Topography & Natural Features

The topographic survey found in [Appendix 3](#) details the contours of the site. The site outside of built development is grassed pasture and to the west includes a small bush area. This is outlined in [Figure 3](#) below. Geological features of the site are detailed in the Geotechnical Report found in [Appendix 4](#).

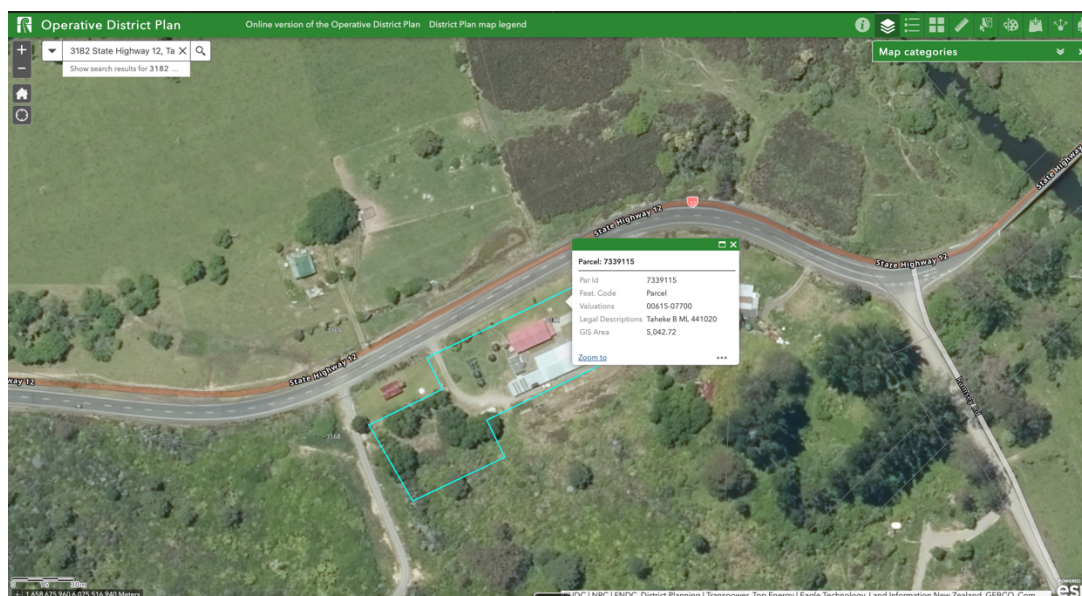


Figure 3 – Aerial Map (Source: NRC Local Maps)

4.5 Built Form & Access

The Topo Survey outlines the built development on the site, this includes the Wharehui, Wharekai, Kitchen, Ablution Blocks, Water, and Septic Tanks. A small shed and various concrete footpaths / paved areas also service the site.

The site gains access from SH 12, via two crossings. The first is from Taheke 12B ML 441020 and the second is via the site to the west of the septic tanks.

4.6 Surrounding Environment

The site is predominantly rural in nature. There are dispersed residential units located in the surrounds. The Taheke River is the predominant natural feature of the surrounds. Otherwise, the surrounds are largely in vegetation / pasture.

5.0 ASSESSMENT OF RELEVANT RULES

5.1 Assessment Summary

An assessment of the relevant rules of the Far North District Plan has been undertaken and this is provided in Table 1-3 below.

Table 1 - Rural Production Zone Rules

Rural Production Zone Standards		
Rule	Standards	Performance/Comments
Residential Intensity	Permitted – One unit per 12ha of land Restricted Discretionary - One unit per 4ha of land Discretionary – One unit per 2ha of land <ul style="list-style-type: none"> □ In all cases the land shall be developed in such a way that each unit shall have at least 2,000m² for its exclusive use surrounding the unit plus a minimum of 1.8ha elsewhere on the property. 	No residential units are proposed. Complies
Sunlight	Permitted - No part of any building shall project beyond a 45 degree recession plane as measured inwards from any point 2m vertically above ground level on any site boundary Restricted Discretionary – if permitted standard breached	The proposal does not breach sunlight rules. Complies
Stormwater Management	Permitted - The maximum proportion of the gross site area covered by buildings and other impermeable surfaces shall be 15%. Controlled - The maximum proportion of the gross site area covered by buildings and other impermeable surfaces shall be 20%.	Total impervious surfaces for the site are 1,286.8m ² (25.5%). <u>Discretionary Activity</u>
Setback from Boundaries	Permitted - No building shall be erected within 10m of any site boundary; Restricted Discretionary – if permitted standard breached	The proposed mattress room is located within the 10m setback from SH12. <u>Restricted Discretionary Activity</u>
Keeping of Animals		N/A. Complies
Noise		Not relevant

		Complies
Building Height	Permitted - The maximum height of any building shall be 12m. Restricted Discretionary - The maximum height of any building shall be 15m.	The proposal elements are all less than 12m in height. Complies
Helicopter Landing Area		N/A. Complies
Building Coverage	Permitted - Any new building or alteration/addition to an existing building is a permitted activity if the total Building Coverage of a site does not exceed 12.5% of the gross site area. Controlled - Any new building or alteration/addition to an existing building is a controlled activity if the total Building Coverage of a site does not exceed 15% of the gross site area.	Total building coverage for the site is 920.8m ² (18.2%). <u>Discretionary Activity</u>
Scale of Activities		Marae are exempt from the requirements of this rule. Complies
Temporary Events		N/A Complies

Table 2 - District Wide Standards

District Wide Standards		
Rule	Standard	Performance/Comments
Natural and Physical Resources		
12.1 Landscape & Natural Features	12.1.6.1.1 Protection of Outstanding Landscape Features 12.1.6.1.2 Indigenous Vegetation Clearance in Outstanding landscapes 12.1.6.1.3 Tree Planting in Outstanding Landscapes 12.1.6.1.4 Excavation and/or filling within an outstanding landscape 12.1.6.1.5 Buildings within outstanding landscapes 12.1.6.1.6 Utility Services in Outstanding Landscapes	N/A – None of these features apply to the site.

District Wide Standards		
Rule	Standard	Performance/Comments
12.2 Indigenous Flora and Fauna	12.2.6.1.1 Indigenous Vegetation Clearance Permitted Throughout the District 12.2.6.1.2 Indigenous Vegetation Clearance in the rural Production and Minerals Zones 12.2.6.1.3 Indigenous Vegetation Clearance in the General Coastal Zone 12.2.6.1.4 Indigenous Vegetation Clearance in Other Zones	N/A – No vegetation clearance is required.
12.3 Earthworks	12.3.6.1.1 Excavation and/or filling, excluding mining and quarrying, in the Rural Production Zone or Kauri Cliffs Zone Permitted – Maximum of 5,000m ³ within a 12-month period and cannot be higher than 1.5m cut or fill.	Total earthworks associated with the proposal will be less than the permitted maximum. No retaining walls are required. Complies
12.4 Natural Hazards	12.4.6.1.1 Coastal Hazard 2 Area 12.4.6.1.2 Fire Risk to Residential Units	There are no residential units proposed. Complies
12.5 Heritage	12.5.6.1.1 Notable Trees 12.5.6.1.2 Alterations to/and maintenance of historic sites, buildings and objects 12.5.6.1.3 Registered Archaeological Sites 12.5.6.2.2 Activities which could affect sites of cultural significance to maori	The site is not implicated by these features. Complies
12.5A Heritage Precincts	There are no Heritage Precincts that apply to the site.	N/A - None of these features apply to the site. Complies
12.6 Air	Not applicable	N/A

District Wide Standards		
Rule	Standard	Performance/Comments
12.7 Lakes, Rivers, Wetlands and the Coastline	12.7.6.1.1 Setback from lakes, rivers and the coastal marine area 12.7.6.1.2 Setback from smaller lakes, rivers and wetlands Permitted = for rivers minimum setback of 10 x the average width of the river where it passes through or past the site provided that the minimum setback is 10m and the maximum is no more than minimum required by Rule 12.7.6.1.1 12.7.6.1.4 Land Use Activities involving the Discharges of Human Sewage Effluent 12.7.6.1.5 Motorised Craft 12.7.6.1.6 Noise	N/A – None of these rules are implicated by the proposal.
12.8 Hazardous Substances		N/A Complies
12.9 Renewable Energy and Energy Efficiency		N/A Complies
13 Subdivision		N/A – No subdivision proposed.
14 Financial Contributions		N/A – No financial contributions required.

District Wide Standards		
Rule	Standard	Performance/Comments
15 Traffic, Parking and Access		<p>The wastewater report promotes a maximum use of the site to 150 people. The proposal items do not change this limit in terms of traffic generation. Thus the proposal is considered permitted.</p> <p>Similarly, for parking the changes are not considered to warrant an increase in parking demand.</p> <p>Access is existing to the site and no changes are proposed.</p> <p>Complies.</p>
16 Signs & Lighting		N/A – No signage is proposed.

Table 3 - PDP Rules

Proposed District Plan				
Matter	Rule/Std Ref	Relevance	Compliance	Evidence
Hazardous Substances Majority of rules relates to development within a site that has heritage or cultural items scheduled and mapped however Rule HS-R6 applies to any development within an SNA – which is not mapped	<p>Rule HS-R2 has immediate legal effect but only for a new significant hazardous facility located within a scheduled site and area of significance to Māori, significant natural area or a scheduled heritage resource</p> <p>HS-R5, HS-R6, HS-R9</p>	N/A	Yes	Not proposed.

<p>Heritage Area Overlays (Property specific) This chapter applies only to properties within identified heritage area overlays (e.g. in the operative plan they are called precincts for example)</p>	<p>All rules have immediate legal effect (HA-R1 to HA-R14) All standards have immediate legal effect (HA-S1 to HA-S3)</p>	<p>N/A</p>	<p>Yes</p>	<p>Not indicated on Far North Proposed District Plan</p>
<p>Historic Heritage (Property specific and applies to adjoining sites (if the boundary is within 20m of an identified heritage item)). Rule HH-R5 Earthworks within 20m of a scheduled heritage resource. Heritage resources are shown as a historic item on the maps) This chapter applies to scheduled heritage</p>	<p>All rules have immediate legal effect (HH-R1 to HH-R10) Schedule 2 has immediate legal effect</p>	<p>N/A</p>	<p>Yes</p>	<p>Not indicated on Far North Proposed District Plan</p>

resources – which are called heritage items in the map legend				
Notable Trees (Property specific) Applied when a property is showing a scheduled notable tree in the map	All rules have immediate legal effect (NT-R1 to NT-R9) All standards have legal effect (NT-S1 to NT-S2) Schedule 1 has immediate legal effect	N/A	Yes	Not indicated on Far North Proposed District Plan
Sites and Areas of Significance to Māori (Property specific) Applied when a property is showing a site / area of significance to Maori in the map or within the Te Oneroa-a Tohe Beach Management Area (in the operative plan they are called site of cultural significance to Maori)	All rules have immediate legal effect (SASM-R1 to SASM-R7) Schedule 3 has immediate legal effect	Yes	Yes	Not relevant.
Ecosystems and Indigenous Biodiversity	All rules have immediate legal effect (IB-R1 to IB-R5)	N/A	Yes	Not indicated on Far North Proposed District Plan

SNA are not mapped – will need to determine if indigenous vegetation on the site for example				
Activities on the Surface of Water	All rules have immediate legal effect (ASW-R1 to ASW-R4)	N/A	Yes	Not indicated on Far North Proposed District Plan
Earthworks all earthworks (refer to new definition) need to comply with this	The following rules have immediate legal effect: EW-R12, EW-R13 The following standards have immediate legal effect: EW-S3, EW-S5	Yes	Yes	With respect of EW-R12, this requires that the proposed earthworks comply with EW-S3. In effect, EW-S3 triggers the need for an ADP to be applied. It is confirmed that the proposed earthworks will comply with an ADP, and this is volunteered as a condition of consent. EW-R13 links to EW-S5. EW-S5 requires earthworks to be controlled in accordance with GD-05. It is confirmed here that the earthworks will be undertaken in accordance with GD-05.

Signs (Property specific) as rules only relate to situations where a sign is on a scheduled heritage resource (heritage item), or within the Kororareka Russell or Kerikeri Heritage Areas	The following rules have immediate legal effect: SIGN-R9, SIGN-R10 All standards have immediate legal effect but only for signs on or attached to a scheduled heritage resource or heritage area	N/A	Yes	Not indicated on Far North Proposed District Plan
Orongo Bay Zone (Property specific as rule relates to a zone only)	Rule OBZ-R14 has partial immediate legal effect because RD-1(5) relates to water	N/A	Yes	Not indicated on Far North Proposed District Plan
Comments:				
No consents are required under the PDP.				

Clause 2(1)(d) of Schedule 4 of the RMA requires applicants to identify other activities of the proposal with the intention of capturing activities which need permission or licensing under other enactments.

As outlined in the report prepared by Water Flow (Refer [Appendix 5](#)) a discharge consent is also required from the Northland Regional Council.

A separate application for consent has been prepared for these matters and forms part of [Appendix 6](#). Consents are being sought from both authorities concurrently.

[Section 9.4](#) provides a more considered assessment of relevant NPS's and NES's and in summary, no consents are required under these higher order documents.

6.0 NOTIFICATION ASSESSMENT

6.1 Public Notification

The table below outlines the steps associated with public notification insofar as it relates to s95 of the Act.

Table 4 – Notification Process

<u>Step 1</u>	<u>Mandatory public notification in certain circumstances</u>	
S95A(3)(a)	Has the applicant requested that the application be publicly notified?	No
S95A(3)(b)	Is public notification required under section 95C?(after a request for further information)	TBC
S95A(3)(c)	Has the application been made jointly with an application to exchange recreation reserve land under section 15AA of the Reserves Act 1977.	No
<u>Step 2</u>	<u>if not required by step 1, public notification precluded in certain circumstances</u>	
S95A(5)(a)	Is the application for a resource consent for 1 or more activities and each activity is subject to a rule or national environmental standard that precludes public notification?	No
S95A(5)(b)	Is the application for a resource consent for 1 or more of the following, but no other, activities; (i) a controlled activity; (ii) a restricted discretionary, discretionary, or non-complying activity, but only if the activity is a boundary activity;	No

The proposed development does not meet the tests for mandatory public notification, nor does it meet the tests for precluding public notification.

Therefore, an assessment of the proposals effects on the environment is required to ascertain the effects of the development and whether public notification is required.

The section below provides this assessment.

7.0 EFFECTS ON THE ENVIRONMENT

Effects on persons who are owners and occupiers of the land in, on, or over which the application relates, or of adjacent land must be disregarded when considering effects on the environment (s 95D(a)). Those adjoining properties are shown below in [Figure 4](#).

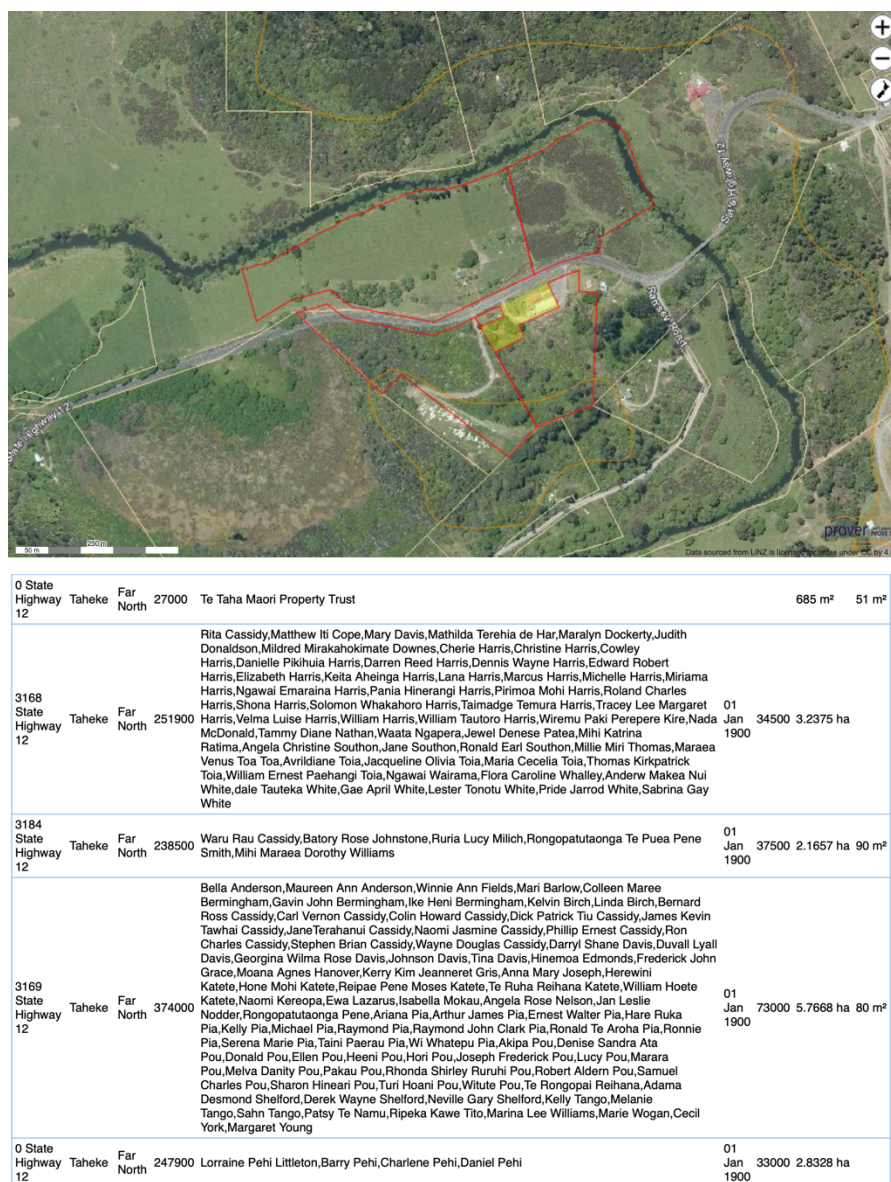


Figure 4 - Adjoining Properties (Source Prover)

7.1 Effects that May be Disregarded

The permitted baseline may be taken into account should the Council deem it relevant. Except for the proposal items, the majority of the site has consented and legally established items.

The proposal breaches the setback allowances to a road frontage by not providing the full 10m setback. The difference between the full 10m setback and the roughly 8m provided should be assessed in relation to effects generated by the proposal.

In terms of building coverage, the proposal exceeds the 12.5% permitted baseline by 5.7%. In terms of stormwater management, the proposal exceeds the 15% permitted baseline by 10.5%. The scope of assessment in relation to these matters is therefore limited to the increase above the permitted baseline.

Earthworks (if any) for the proposal will be permitted as there will not be a need for 5,000m³ of works or any retaining walls. The site is not subject to flooding, so no NRC rules are of concern.

In terms of traffic, parking and access, it is argued that the proposal items do little to increase demand for traffic generation, parking demand and increased standards for access. The proposal has been existing for some time and storage space and a new ablution block do not correlate to increased use of the marae, rather this relates to an enhanced experience for users.

7.2 Written Approvals

Given the setback breach, the approval of NZTA has been sought for the proposal. Initial consultation is provided in [Appendix 7](#).

7.3 Effects Assessment

The following assessment has been prepared in accordance with Section 88 and Schedule 4 of the Act which specifies that the assessment of effects provided should correspond with the scale and significance of the proposal.

In terms of localised effects or Effects to People, this assessment is undertaken in Section 8 of this Report. Therefore, assessment criteria which refer to adjacent sites or properties, are addressed appropriately under that section of the report.

Table 5 – Effects Assessment

Item & Assessment Criteria	Comments
Positive Effects	<ul style="list-style-type: none"> <input type="checkbox"/> The proposal will provide for resilience and upgraded facilities for tangata whenua and other users of the Marae. <input type="checkbox"/> The proposal, from application through to development, employs a number of service providers and sellers of goods. <input type="checkbox"/> The proposal seeks to minimise the effects from earthworks and wastewater by considered engineering design and mitigation measures.
Stormwater Management (Derived from 11.3)	<ul style="list-style-type: none"> <input type="checkbox"/> The proposal is supplemented by a Stormwater Report found in <u>Appendix 8</u>. The primary mitigation measures for stormwater attenuation is the use of tanks to be retrofitted on the site to attenuate back to permitted activity levels. <input type="checkbox"/> In addition to the above, to limit scour and erosion a dispersion device is proposed and to be located down site of the tanks. <input type="checkbox"/> Stormwater quality management is likely to be minimal as per the report. However, mitigation measures such as leaf guards, the tanks, sedimentation storage, and reducing direct discharges are all promoted within the stormwater design.
Setback from Boundaries	<ul style="list-style-type: none"> <input type="checkbox"/> The mattress room being located <10m from the SH12 boundaries does not decrease outlook and privacy of

<p>(Derived from 8.6.5.3.4)</p>	<p>adjacent properties. The addition is within the same footprint as the Wharehui.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Access / egress to and through the site is not implicated by the location of the addition. <input type="checkbox"/> Planting is not proposed and there is no planting along the SH frontage currently. The entire Wharehui is visible and the mattress room will be no different to what is seen currently in terms of the existing shed and concrete tanks (i.e built development is being replaced by built development). <input type="checkbox"/> There are no adjoining esplanade reserves / strips in the surrounds impacted.
<p>Building Coverage</p> <p>Derived from 11.24</p>	<ul style="list-style-type: none"> <input type="checkbox"/> No landscaping is proposed for the application. The proposal seeks to enhance and upgrade facilities for the marae activity. The site has limited landscaping at present and the site is known for the activities undertaken. The use of landscaping is not considered appropriate in this instance to condition. <input type="checkbox"/> The marae is an existing activity on the site and surrounds and the proposal items are consistent with the underlying use / activity. Activities in the surrounds are low density (2 x dwellings). The proposal items seek to match existing character and appearance of the marae at present. <input type="checkbox"/> The scale and bulk of the proposal is outlined in the Site Plan found in Appendix 2. <input type="checkbox"/> There are no ONL / ONF on the sites or in the surrounds. Adjacent sites are not considered implicated by the increase of buildings as they are aware of the function and requirements of marae to be located where they are located. The positioning of each proposal item has considered surrounding parties / persons and are located in similar positions to existing built development. <input type="checkbox"/> For the same reasons as outlined above, the proposal has little need for landscaping or other visual mitigation measures.

	<input type="checkbox"/> Private open spaces of the 2 x dwellings in the surrounds are not implicated by the marae proposal items.
Effects Conclusion	Considering the assessment above and the mitigation measures proposed it is considered that the proposal results in effects which are less than minor.

8.0 EFFECTS TO PEOPLE

The table below outlines the steps associated with limited notification insofar as it relates to s95 of the Act.

Table 6 – Limited Notification Process

<u>Step 1</u>	<u>certain affected groups and affected persons must be notified</u>	
S95B(2)(a)	Are there any affected protected customary rights groups?	No
S95B(2)(b)	Are there any affected customary marine title groups (in the case of an application for a resource consent for an accommodated activity)?	No
S95B(3)(a)	Is the proposed activity on or adjacent to, or may affect, land that is the subject of a statutory acknowledgement made in accordance with an Act specified in Schedule 11?	No
S95B(3)(b)	Is the person to whom the statutory acknowledgement is made is an affected person under section 95E?	No
<u>Step 2</u>	<u>if not required by step 1, limited notification precluded in certain circumstances</u>	
S95B(6)(a)	the application is for a resource consent for 1 or more activities, and each activity is subject to a rule or national environmental standard that precludes limited notification:	No
S95B(6)(b)	the application is for a controlled activity (but no other activities) that requires a resource consent under a district plan (other than a subdivision of land)	No

8.1 Affected Person Determination

As the proposed activity does not trigger mandatory limited notification, nor is it precluded, an assessment of potential affected persons must be undertaken.

The consent authority has discretion to determine whether a person is an affected person. A person is affected if an activity's adverse effects are minor or more than

minor to them. The effects of the proposal on adjacent landowners has been undertaken below.

8.2 Written Approvals Received

NZTA approval has been sought and will be provided on receipt.

8.3 Localised Effects Assessment (Effects to Persons)

Section 7 of this report provides a graphic and table of the relevant adjacent properties that this assessment relates. The relevant persons associated with the assessment are found in [Figure 4](#) in Section 7.0 of this report.

For the following reasons, those parties and persons above not considered to be adversely affected by the proposal to a minor or more than minor level:

- All proposed works are situated within the confines of the site. All effects can be managed on site.
- The assessment found in [Section 7](#) of this report details that there are no effects to localized person in terms of setbacks, stormwater coverage and building coverage.
- The proposed works are essentially to replace and enhance existing buildings and infrastructure on site.

8.4 Effect to Persons Conclusion

Having considered the effects above, there are no adversely affected persons resulting from the proposal.

9.0 STATUTORY CONTEXT

9.1 Operative Far North District Plan

An assessment of the relevant objectives and policies associated with the Operative Far North District Plan has been undertaken below.

This application is subject to the provisions of the Operative Far North District Plan. The site is zoned Rural Production and is to be assessed in terms of the objectives and policies for the zone and the district-wide subdivision and environment provisions.

The proposal would achieve the purpose of the Rural Production zone which is to ensure its' ongoing rural productive purpose that encompasses a wide-range of compatible land use activities, including limited rural lifestyle and residential opportunities in a manner that avoids, remedies or mitigates adverse effects.

It is anticipated that the size and form of the proposal (which is in general accordance with Council standards) would:

- Promote the sustainable management of natural and physical resources in the RPZ (Obj 8.6.3.1);
- Enable the efficient use and development of the RPZ in a way that enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety (Obj 8.6.3.2);
- Promote the maintenance of amenity values of the RPZ to a level that is consistent with the productive intent of the zone (Obj 8.6.3.3);
- Avoid, remedy or mitigate the actual or potential conflicts between new land use activities and existing lawfully established activities (reverse sensitivity) within the RPZ (Obj 8.6.3.6);
- Avoid, remedy or mitigate the adverse effects of incompatible use or development on natural and physical resources (Obj 8.6.3.8);

Having considered these sections of the Plan, it is concluded that the proposal is not inconsistent with the relevant objectives and policies of the Far North District Plan.

9.2 Proposed Far North District Plan

The Far North District Council have released their Proposed District Plan.

Section 88A(2) provides that “any plan or proposed plan which exists when the application is considered must be had regard to in accordance with section 104(1)(b).” This requires applications to be assessed under both the operative and proposed objective and policy frameworks from the date of notification of the proposed district plan.

In the event of differing directives between objective and policy frameworks, it is well established by case law that the weight to be given to a proposed district plan depends on what stage the relevant provisions have reached, the weight generally being greater as a proposed plan move through the notification and hearing process. In *Keystone Ridge Ltd v Auckland City Council*, the High Court held that the extent to which the provisions of a proposed plan are relevant should be considered on a case by case basis and might include:

- The extent (if any) to which the proposed measure might have been exposed to testing and independent decision making;
- Circumstances of injustice; and
- The extent to which a new measure, or the absence of one, might implement a coherent pattern of objectives and policies in a plan.

In my view the PDP has not gone through the sufficient process to allow a considered view of the objectives and policies for the Maori Purpose – Rural Zone however this has still been provided below.

The proposed use ensures the viability of the marae for future generations (MPZ-01) and enables the ongoing use of the marae for social and cultural purposes (MPZ-02). The supporting engineering reports that the proposal reflects the carrying capacity of the land and surrounding environment (MPZ-03).

The land is maori freehold land and the development is also managed under Te Ture Whenua Maori Act 1993 (MPZ-P1). The proposal is considered compatible with the surrounds, doesn't compromise occupation of the land, rather reinforces it, doesn't impact adjoining sites, maintains existing character and amenity, provides for

community wellbeing and safety, and is serviced by the proposed infrastructure. Overall, all effects can be mitigated appropriately (MPZ-P3).

In terms of MPZ-P4, the proposal meets many of the requirements sought, within the confines of the scale and significance of the activity which is considered as reasonably low in nature. Overall, the proposal is not considered inconsistent with the Maori Purposes Zone.

9.3 Regional Policy Statement for Northland (RPS)

An assessment of the relevant objectives and policies associated with the RPS for Northland has been undertaken and is found in [Table 7](#) below. The RPS sets region wide objectives and policies for the environment.

Table 7 – NRC RPS Review

Objective / Policy	Comment
Integrated Catchment Management	Not relevant
Region Wide Water Quality	Not relevant
Ecological Flows and Water Quality	Not relevant
Indigenous Ecosystems & Biodiversity	There are no SNA's on the site.
Enabling Economic Wellbeing	The proposal allows for various goods/services in the land development sector in Taheke.
Economic Activities – Reverse Sensitivity And Sterilization	The proposal does not result in any reverse sensitivity or sterilization effects given the design and scale of the proposal.
Regionally Significant Infrastructure	The proposal does not impact any regionally significant infrastructure.
Efficient and Effective Infrastructure	The proposal seeks to use existing infrastructure i.e FNDC / NZTA roads. The proposal also seeks to upgrade on site infrastructure for future generations.

Security of Energy Supply	Power is provided to the site.
Use and Allocation of Common Resources	Not relevant.
Regional Form	The proposal does not result in any reverse sensitivity effects, or a change in character or sense of place. Versatile soils are not adversely affected.
Tangata Whenua Role in Decision Making	The Marae trustees are considered appropriate in this respect.
Natural Hazard Risk	Nil affecting the site.
Natural Character, Outstanding Natural Features, Outstanding Natural Landscapes And Historic Heritage	Not relevant.

Having considered the relevant components of the RPS, it is concluded that the proposal is not inconsistent with the relevant objectives and policies.

9.4 National Policy Statements and Plans

With respect to the National Environmental Standard – Soil Contamination, the property file has been reviewed which shows no known activities that are on the HAIL.

In terms of the NES – Freshwater Management, there are no wetlands located on the site. The NES is not considered relevant.

In terms of the NPS for Highly Productive Land. The site does not contain Class 1-3 soils.

The site is not located in the Coastal Environment. The NZCPS is not considered relevant.

10.0 PART 2 ASSESSMENT

10.1 Section 5 - Purpose of the Act

Section 5 in Part 2 of the Act identifies the purpose as being the sustainable management of natural and physical resources. This means managing the use of natural and physical resources in a way that enables people and communities to provide for their social, cultural and economic well-being which sustain those resources for future generations, protecting the life supporting capacity of ecosystems, and avoiding remedying or mitigating adverse effects on the environment.

It is considered that proposal represents Part 2, Section 5 of the Act.

10.2 Section 6 - Matters of National Importance

In achieving the purpose of the Act, a range of matters are required to be recognised and provided for. This includes:

- 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 Maori 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.

In context, the relevant items to the proposal and have been recognised and provided for. Section 6(e) is directly relevant to the proposal.

10.3 Section 7 - Other Matters

In achieving the purpose of the Act, a range of matters are to be given particular regard. This includes:

- (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.

These matters have been given particular regard through the design of the proposal.

10.4 Section 8 - Treaty of Waitangi

The Far North District Council is required to take into account the principles of the Treaty of Waitangi when processing this consent. This consent application may be sent to local iwi and hapū who may have an interest in this application.

10.5 Part 2 Conclusion

Given the above, it is considered that the proposal meets the purpose of the Act.

11.0 CONCLUSION

Discretionary Activity resource consent is sought from the Far North District Council to carry out the proposed development.

The proposal is considered to result in less than minor effects on the environment and through assessment, there are considered to be no affected persons.

The proposal is consistent with the objectives and policies of the Far North District Plans, the Regional Policy Statement for Northland, and achieves the purpose of the Act. Relevant NPS' and NES' have been considered with the proposal finding consistency with their general aims and intent.

Given the assessment carried out in this report, it is considered that this proposal can be determined non-notified under the RMA 1991.

We appreciate draft conditions to be supplied to us prior to decision being made.

Regards,



Steven Sanson BPlan (Hons)

Consultant Planner

NZPI Member No 4230



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

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




R. W. Muir
Registrar-General
of Land

Identifier 614381
Land Registration District North Auckland
Date Issued 19 March 2013

Prior References
614379

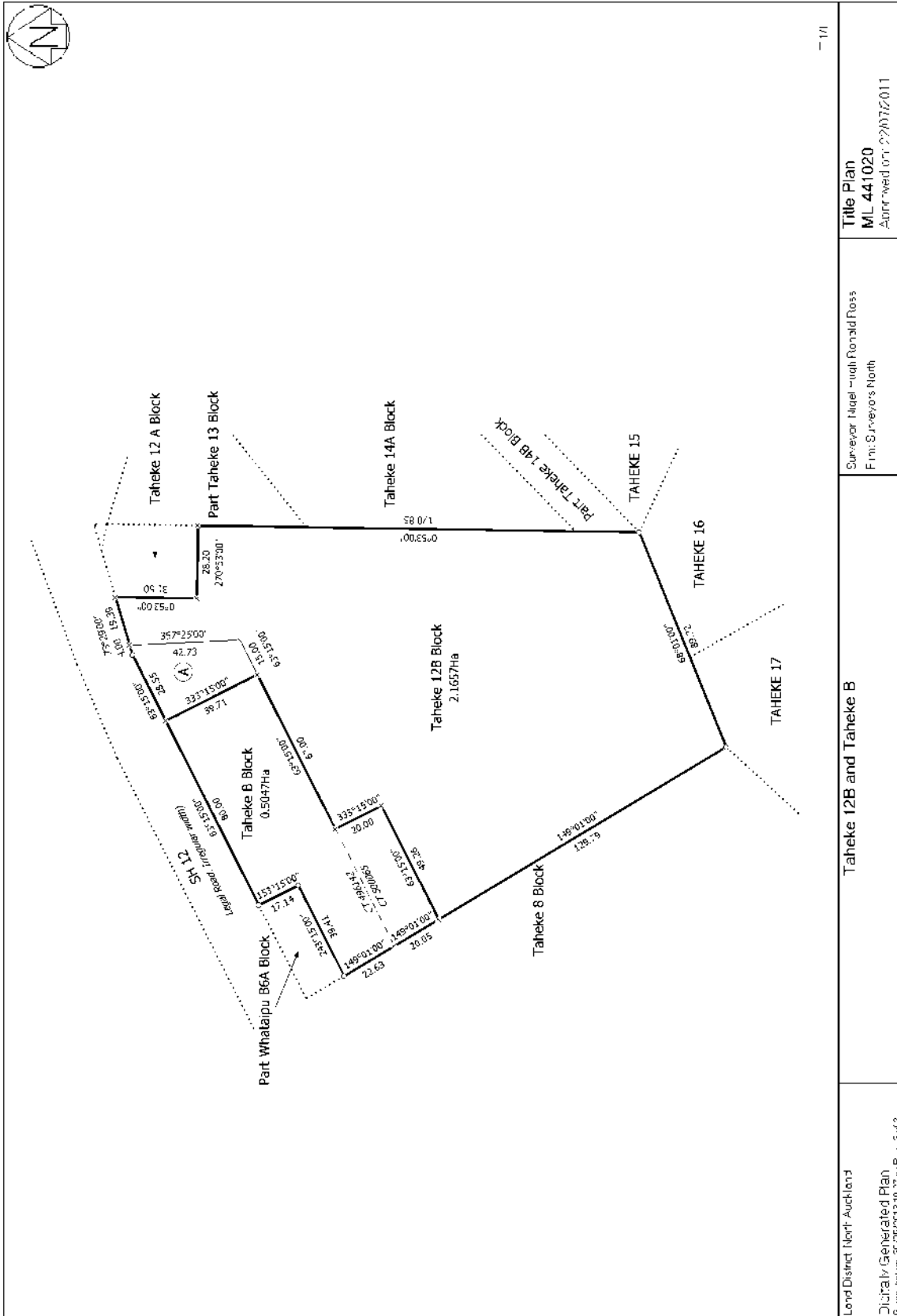
Estate Fee Simple
Area 5047 square metres more or less
Legal Description Taheke B Block Maori Land Plan 441020
Purpose for the common use of the Ngati Pakau
and Mahurehure Sub-tribes and for Maoris
living in and near Taheke as a marae

Registered Owners

Eddie Paul Morunga, Phillip Gordan Mitchell Reihana Ruka, Nicola Ann Birch, Candy Rangimarie Cassidy-Ellice, Agnes Alicia Tauiti, Morris Baker, Ewa Haua, Timi Tumanako Ngatai-Haenga, Hohepa Pene Joseph Henare, Paul Hugh Birch and Myrene Christiane Rakete as responsible trustees jointly, no survivorship

Interests

Appurtenant hereto is a carpark easement created by Maori Land Court Order 9344039.6 - 19.3.2013 at 7:00 am



- 1/1

Title Plan
ML 441020
 Approved on: 29/07/2011

Surveyor Nigel Hugh Ronald Ross
 F.M.S. Surveyors North

Taheke 12B and Taheke B

Land District North Auckland
 Digitally Generated Plan
 Generated on: 30/08/2013 10:27 am Page 5 of 3



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



Record(s) of Title

614381

Identified as potentially Maori Freehold Land

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

ORDER CREATING AN EASEMENT

Te Ture Whenua Māori Act 1993, Section 315

The Maori Land Court
of New Zealand
Taitokerau District

MLCO 9344039.6 Maori I

Copy - 01/01, Pgs - 006, 18/03/13, 13:28



DocID: 613908262

IN THE MATTER of the land known as Taheke
12B

At sittings of the Court held at Whangārei on the 20th day of May 2010 and on the 31st day of May 2012 before David John Ambler, Judge

WHEREAS application was filed by Kereama Maihi to create an easement over the said land

AND WHEREAS during the course of proceedings and considering all evidence adduced in support thereof the Court of its own motion pursuant to Section 37(3) and Section 71 of Te Ture Whenua Māori Act 1993 varied the said application to give effect to an arrangement in respect of the said land and Taheke B

NOW THEREFORE the Court upon reading and hearing all evidence adduced in support thereof and being satisfied on all matters upon which it is required to be so satisfied

HEREBY ORDERS pursuant to Section 315 of Te Ture Whenua Māori Act 1993 that an easement for the purpose of a carpark is created over area 'A' of Taheke 12 B on ML 441020 in favour of Taheke B, their invitees, service people, assignees or successors subject to the terms and conditions set out in the Third Schedule attached hereto

AND THE COURT DOTH HEREBY FURTHER DECLARE [REDACTED] rule 66(3) of the Māori Land Court Rules 1994 that this order do issue, [REDACTED] from the office of the Court

AS WITNESS the hand of the Judge and th



DUPLICATE ORDER
This is a duplicate of an original order of the Māori Land/Appellate Court and has been issued by me as a Deputy/Registrar of the Māori Land/Appellate Court under rule 7.12 of the Māori Land Court Rules 2011 .
[REDACTED]

FIRST SCHEDULE

<u>Blocks</u>		<u>Area</u>
Taheke 12B	Servient land	948m ² marked 'A' as defined on plan ML 441020

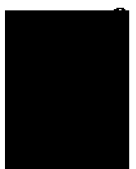
SECOND SCHEDULE

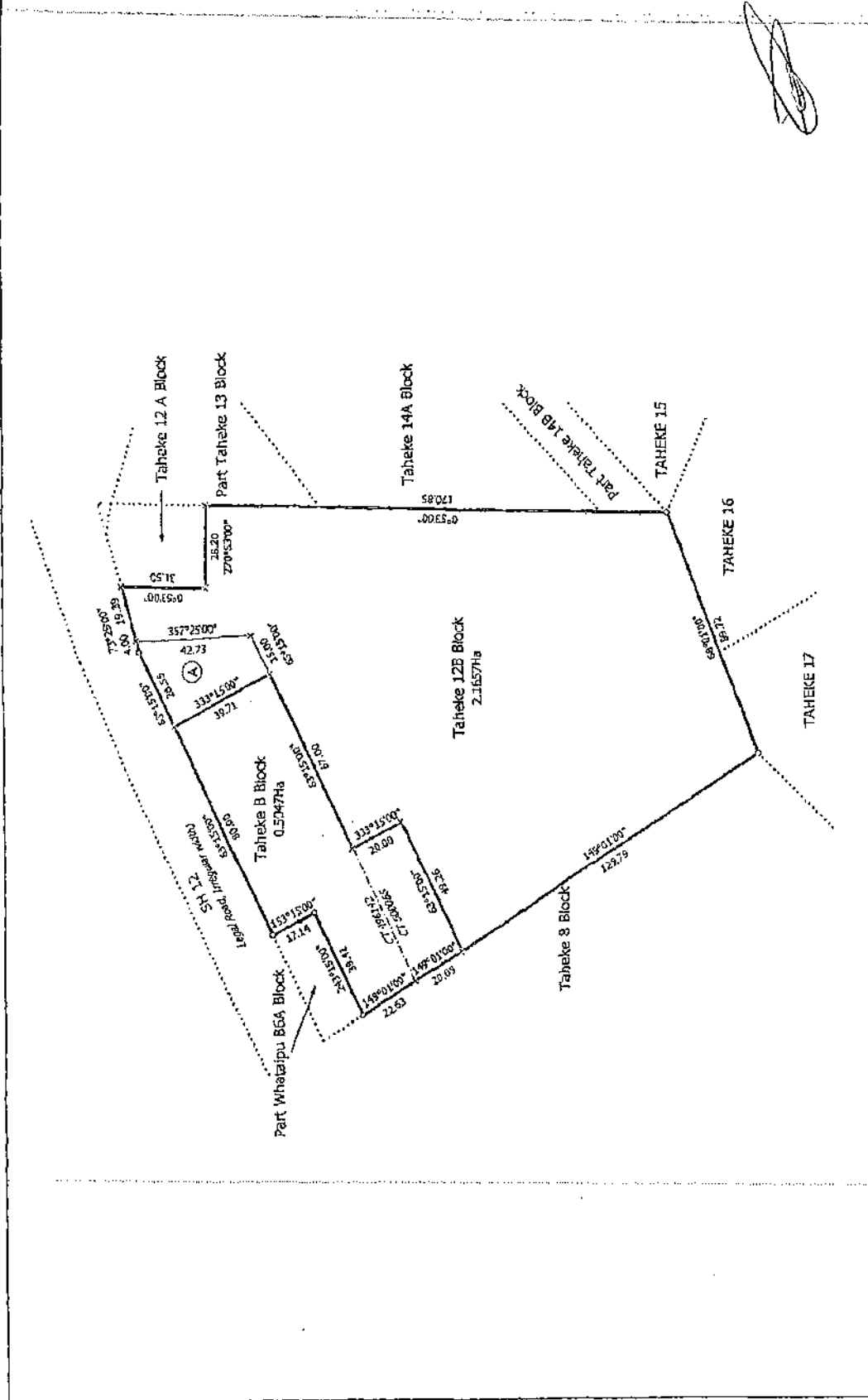
<u>Blocks</u>		<u>Area</u>
Taheke B	Dominant land	5047m ²

THIRD SCHEDULE**TERMS OF EASEMENT**

- 1 The trustees of Taheke B and their invitees shall be entitled to use area 'A' for the purpose of a marae carpark.
- 2 The easement shall be for a term of 10 years with a right for the Trustees of Taheke B to extend the easement for a further term of 10 years.
- 3 The trustees of Taheke B shall be responsible for the maintenance and upkeep of the carpark, driveways, culverts, crossings and overflow drains and for the erection and maintenance of any fences and gates and the costs thereof in respect of 'A'.
- 4 The trustees of Taheke B shall ensure that their use of area 'A' does not impede the access to and from State Highway 12 of the owners of Taheke 12B and their invitees.
- 5 Should the Maori Reservation in respect of Taheke B ever be permanently cancelled then this easement shall be cancelled.

LA
EF





<p>Land District: North Auckland</p> <p>Digitally Generated Plan</p> <p>Generated on: 22/07/2011 09:55am Page 3 of 3</p>	<p>Taheke 12B and Taheke B</p>	<p>Surveyor: Nigel Hugh Ronald Ross</p> <p>Firm: Surveyors North</p>	<p>Title Plan</p> <p>ML 441020</p> <p>Approved on: 22/07/2011</p>
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17A \ ~~17A~~ / 01

Schedule / Memorandum

Proposed Easement Schedule			
Shown	Purpose	Servient Tenement	Dominant Tenement
A	Right to Park Vehicles	Taheke 12B	Taheke B





Title Plan - ML 441020

Survey Number ML 441020
Surveyor Reference 6560 NRS 079 Taheke Marae
Surveyor Nigel Hugh Ronald Ross
Surveyor Firm Surveyors North
Surveyor Declaration I Nigel Hugh Ronald Ross, being a licensed cadastral surveyor, certify that:
(a) this dataset provided by me and its related survey are accurate, correct and in accordance with the Cadastral Survey Act 2002 and the Rules for Cadastral Survey 2010, and
(b) the survey was undertaken by me or under my personal direction.
Declared on 21 Jul 2011 05:20 PM

Survey Details

Dataset Description Taheke 12B and Taheke B
Status Approved as to Survey
Land District North Auckland
Submitted Date 21/07/2011
Survey Class Class B
Survey Approval Date 22/07/2011
Deposit Date

Territorial Authorities

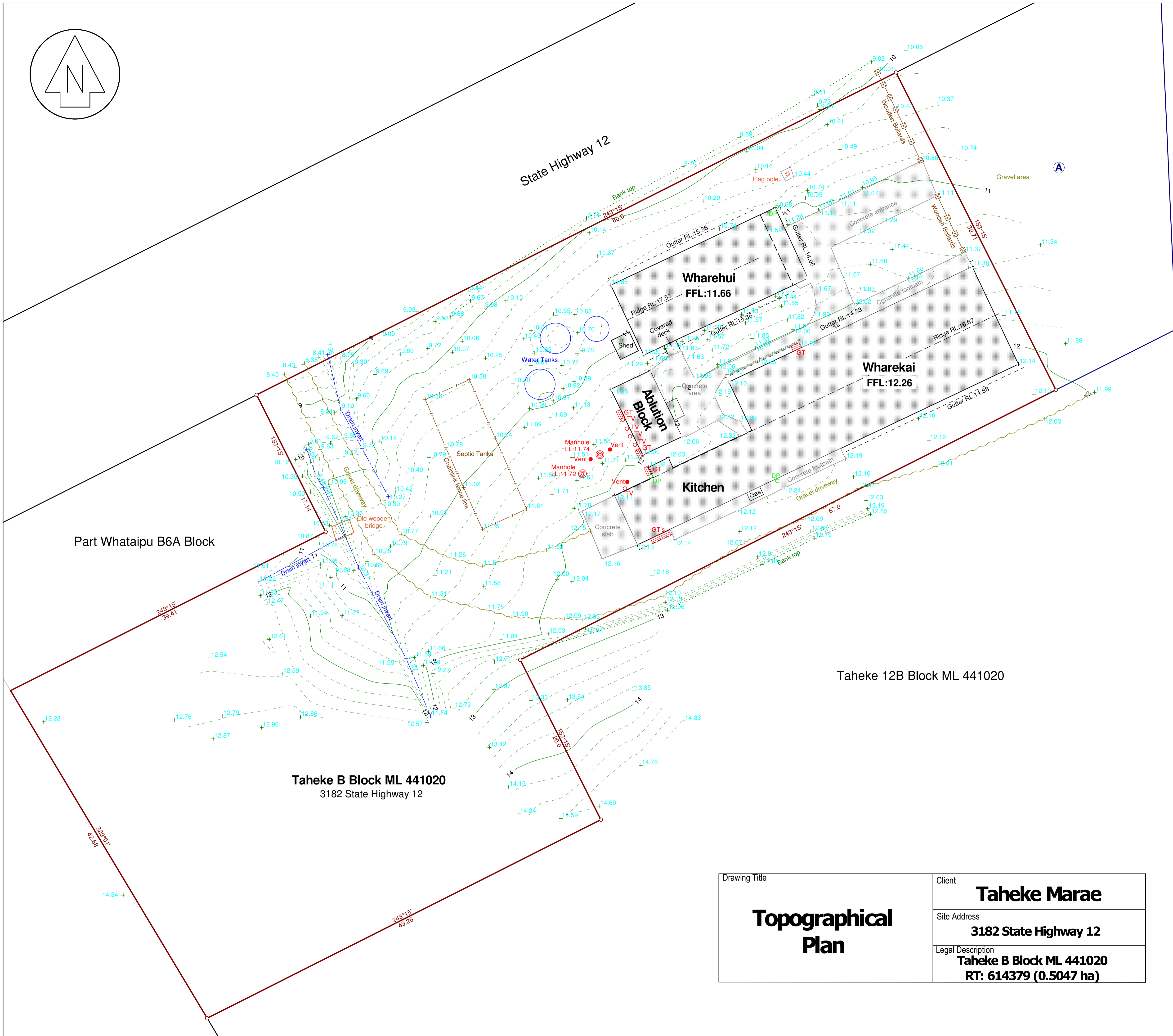
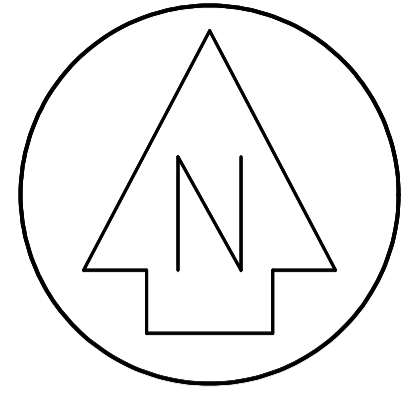
Far North District

Compulsed In

CT 500065
CT 496142

Created Parcels

Parcels	Parcel Intent	Area	CT Reference
Taheke B Block Maori Land Plan 441020	Maori	0.5047 Ha	
Taheke 12B Block Maori Land Plan 441020	Maori	2.1657 Ha	
Area A Maori Land Plan 441020	Easement		
Total Area		2.670416a	



NOTES:

Major Contours are at 1.0m intervals. Minor Contour are at 0.2m intervals. Contours are interpolated only.

This survey has been completed to standard topographical survey accuracies of approximately between +/- 0.03m to 0.05m. If a higher accuracy is required then further survey measurements will be necessary.

Bearing and Coordinate Datum: Mount Eden 2000
Levels are in terms of NZ Vertical Datum 2016
Origin of Levels: IS V SO 46034, RL:20.66.

Existing Easement			
Purpose	Shown	Servient Tenement	Dominant Tenement
Right to Park Vehicles	A	Taheke 12B	Taheke B

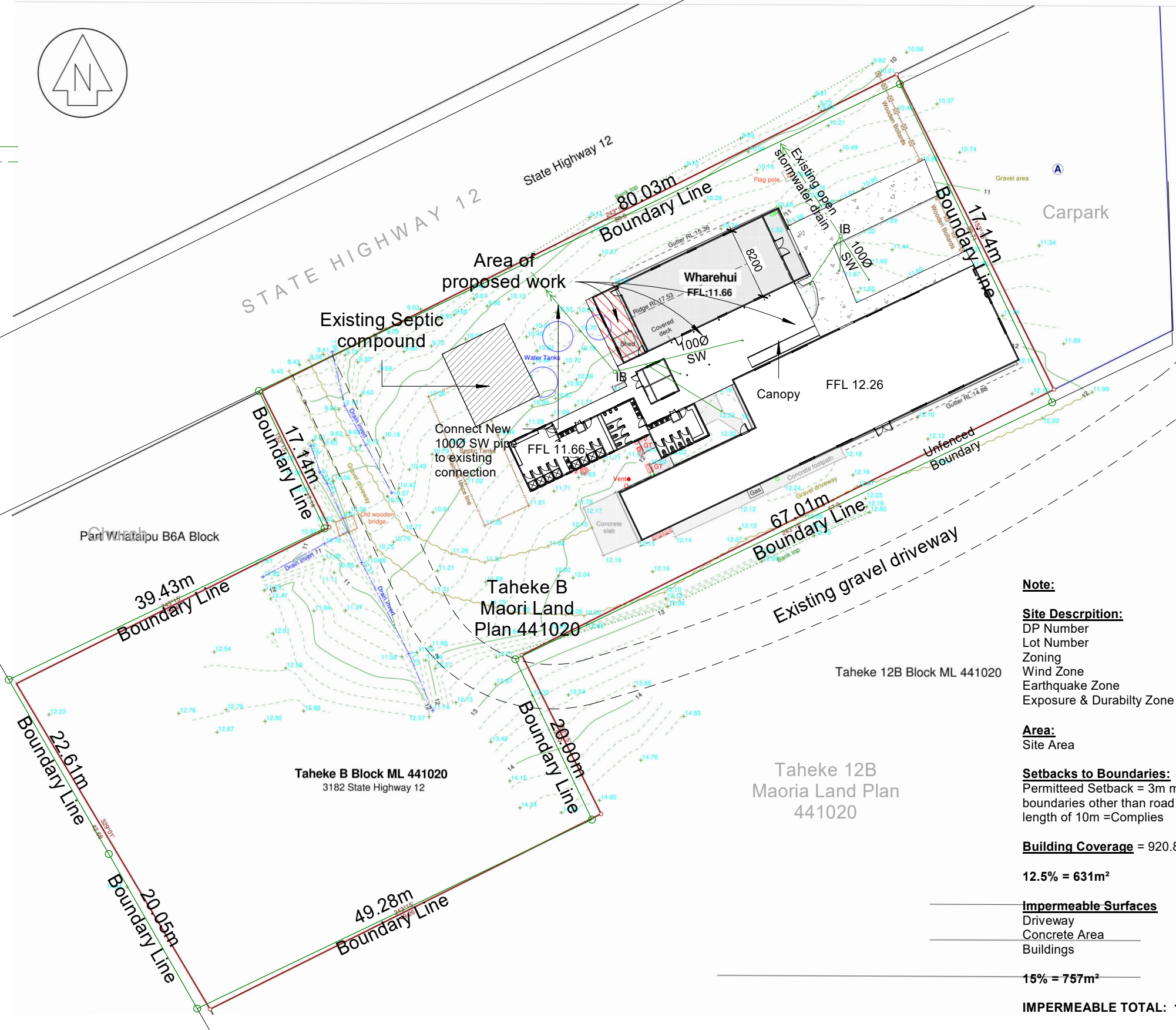
Drawing Title	Client
Topographical Plan	Taheke Marae
	Site Address
	3182 State Highway 12
Legal Description	
	Taheke B Block ML 441020 RT: 614379 (0.5047 ha)

Original Scale	Date	Revision No	00
1:200	A1 15/04/2023	Drawing No	TOPO
CAD File & Directory		Job No	Taheke
Taheke_Topo1 - Topo			



Note:
All Downpipes 80Ø
All new stormwater pipes to be 100Ø

LEGEND	
DP	Downpipe
IB	Inspection Bend
SW	Proposed Stormwater
SW	Existing Stormwater



Note:

Site Description:	
DP Number	441020
Lot Number	Takehe B
Zoning	Rural Production
Wind Zone	Very High
Earthquake Zone	Zone 1
Exposure & Durability Zone	C
Area:	
Site Area	5047m ²
Setbacks to Boundaries:	
Permitted Setback = 3m min from road boundaries, 1.2m from boundaries other than road boundary (no set back required for max length of 10m =Complies	
Building Coverage = 920.8	18.2%
12.5%	= 631m²
Impermeable Surfaces	
Driveway	232.0m ²
Concrete Area	134.0m ²
Buildings	920.8m ²
15%	= 757m²
IMPERMEABLE TOTAL: 1286.8m² 25.5%	

CLIENT CONSENT SET

Arcline
Architecture

Arcline Architecture Ltd
49 Matthews Ave, Kaitiaki,
New Zealand
(Ph): 09 408 2233
(Email): info@arcline.co.nz

PROPOSED SITE PLAN

**TAHEKE MARAE
PROPOSED ABLUTION BLOCK**

Rev No.	Revision	Date
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Scale: 1 : 500
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Issued: 11/07/2023
12:11:21 pm

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A-100



Note:

All eaves as shown on plans

Smoke Detectors: Installed throughout the dwelling complying with NZ Building Code NZBC F7/AS1

Mount detectors on ceilings, minimum 300mm from any adjacent walls

Lining

10mm standard GIB lining to walls
13mm standard GIB to ceilings
20mm strand board to floors

Doors

All internal door heights 1980 unless otherwise noted

Access Routes

To all access routes both external and internal, provide anti-slip surface complying with NZ BC D1/AS1

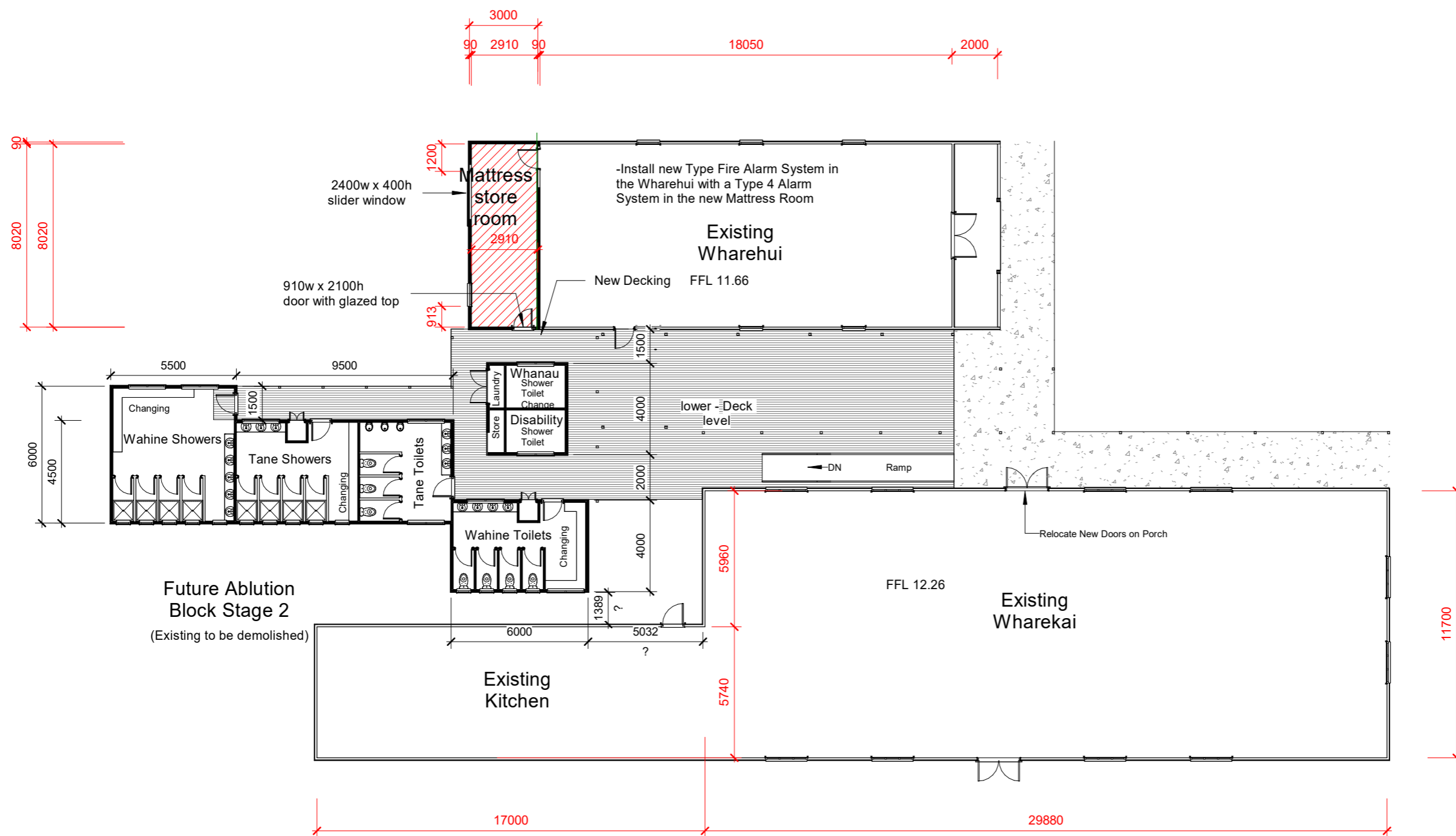
Fire Alarm

-All works in accordance to RJ Services Fire Report

-Install new Type 5 Fire Alarm System in the Wharehui with a Type 4 Alarm System in the new Mattress Room

-Wall between Wharehui and Mattress room to be fire rated FRR 60/60/60 to the roof of the Wharehui (GBTL60)

-Install compliant exit signage as per fire report



CLIENT CONSENT SET



Arcline Architecture Ltd
49 Matthews Ave, Kaitaia,
New Zealand
(Ph): 09 408 2233
(Email): info@arcline.co.nz

PROPOSED FLOOR
PLAN

TAHEKE MARAE
PROPOSED ABLUTION BLOCK

Rev No.

Revision

Date

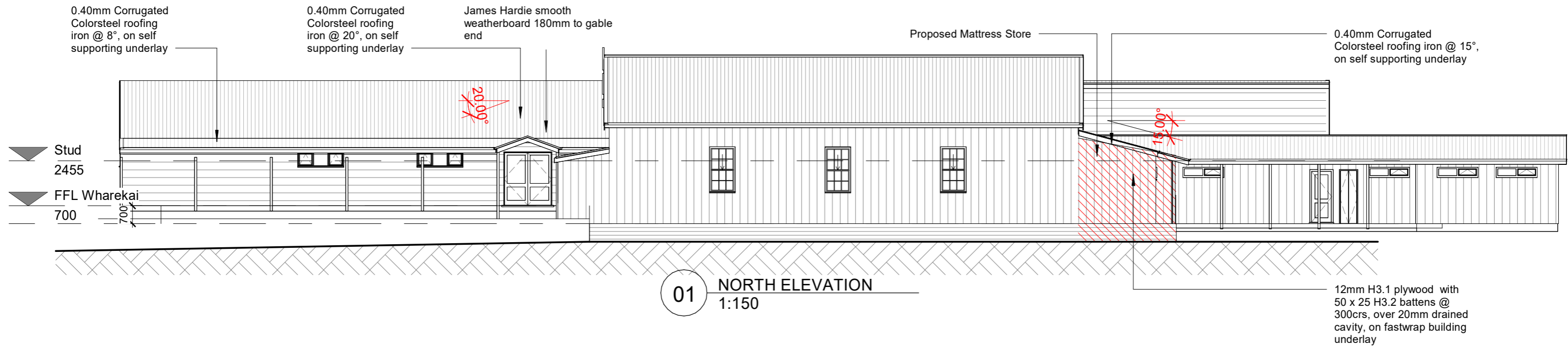
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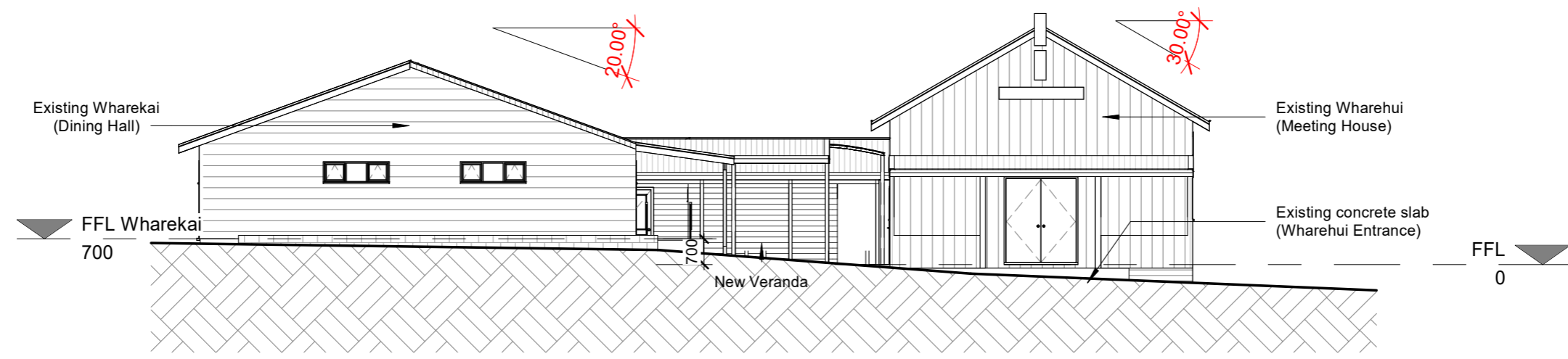
Sheet No.

A-102



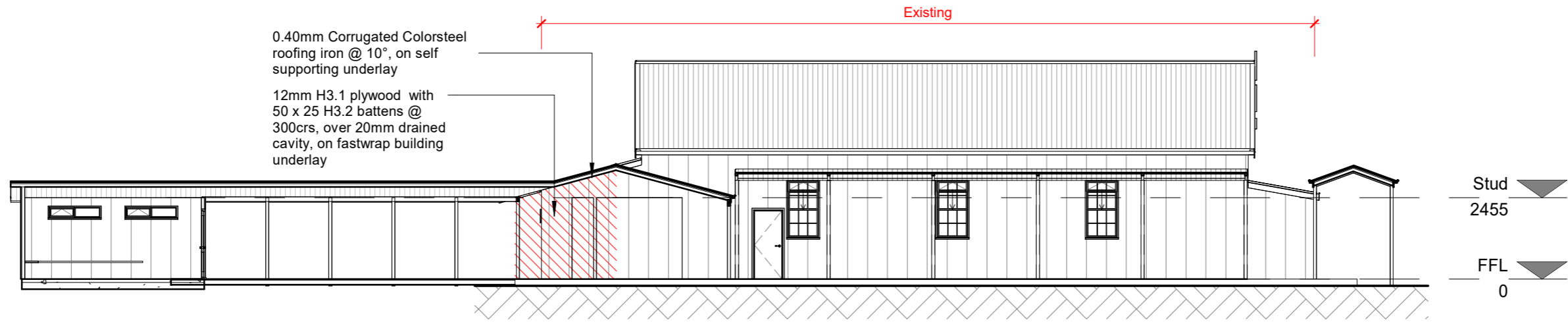
01 NORTH ELEVATION
1:150

12mm H3.1 plywood with
50 x 25 H3.2 battens @
300crs, over 20mm drained
cavity, on fastwrap building
underlay

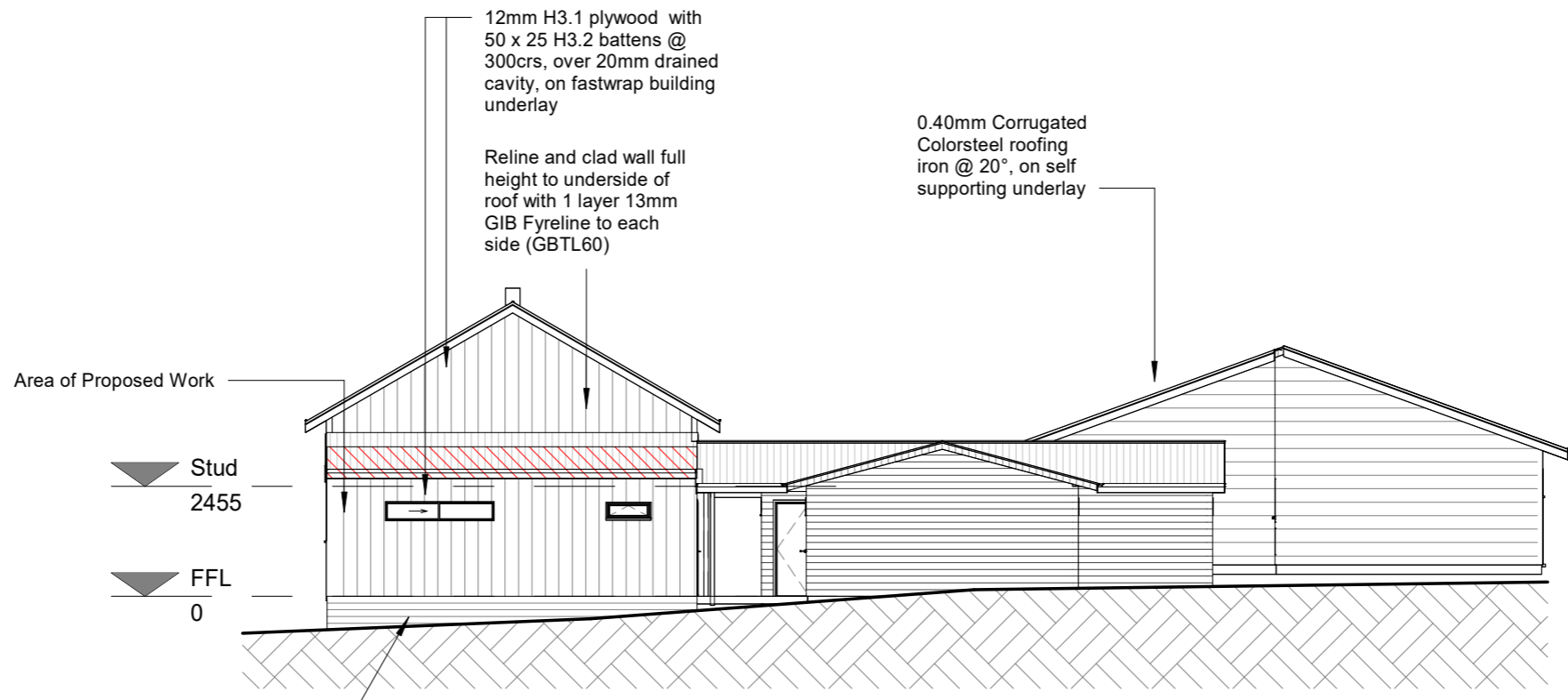


02 EAST ELEVATION
1:150

CLIENT CONSENT SET

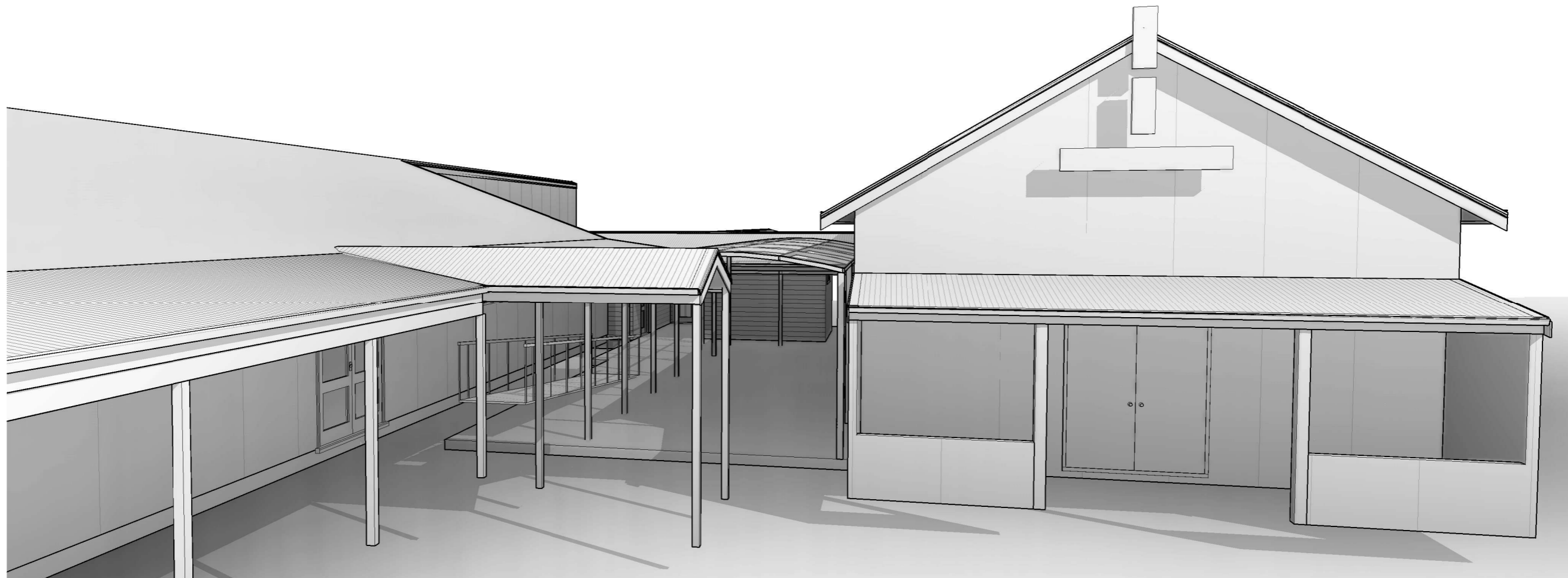


01 SOUTH ELEVATION
1:150



02 WEST ELEVATION
1:150

CLIENT CONSENT SET



CLIENT CONSENT SET



Arcline Architecture Ltd
 49 Matthews Ave, Kaitiaki,
 New Zealand
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PERSPECTIVES

TAHEKE MARAE
 PROPOSED ABLUTION BLOCK

Rev No.

Revision

Date

Scale:

Drawn by: ARCLINE

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A-900



geologix
consulting engineers

GEOTECHNICAL INVESTIGATION REPORT

3184 STATE HIGHWAY 12,
TĀHEKE, NORTHLAND

TAHEKE MARAE TRUSTEES

C0294-G-01
JULY 2023
REVISION 1





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1 INTRODUCTION

This Geotechnical Investigation Report has been prepared by Geologix Consulting Engineers Ltd (Geologix) for Taheke Marae Trustees as our Client in accordance with our standard short form agreement and general terms and conditions of engagement.

The purpose of this report is to assist with Building Consent application in relation to additions and upgrades to Taheke Marae, over a rural property at 3184 State Highway 12, Tāheke, Northland, the 'site'. Specifically, this report provides interpretation of a site-specific ground investigation and geotechnical assessment to provide recommendations for the proposed development. This report may be used to assist with detailed design and for Building Consent application.

1.1 Proposed Development

It is understood that the Client proposes to demolish and clear an existing concrete water tank and extend the existing Wharehui building towards the southwest, and to construct a new veranda and a canopy to the north and to the northwest of the existing Wharekai building. The client also proposes to demolish and clear the existing ablution block and construct a new ablution block at a future stage of the development.

The aforementioned understanding of the proposed development has been established from an initial development concept plan supplied to Geologix at the time of writing¹. Based on the supplied plans, we have considered a conservative assessment of potential development earthworks. It is recommended that this report is subject to review and necessary amendment once specific development plans are available.

2 SITE DESCRIPTION

The site is presented within a typical rural area to the south of State Highway 12 as a small block of land. The site is legally described as Taheke B Block ML 441020 and is irregular in shape with a gross site area of approximately 5047 m². The site setting is presented schematically as Figure 1 below.

Topographically, the site is located to the north-eastern slope of a larger hill, and dips gently at approximately 2 degrees from the southern boundary to the centre, then continues to dip gently at an average angle of approximately 6 degrees. Beyond the northern boundary, the land dips moderately towards State Highway 12 at

¹ Arcline Architecture, Taheke Marae Concept Plans.



approximately 16 degrees through a benched, suspected fill batter.

Figure 1: Site Setting²



There were multiple existing structures present on-site forming the established Marae including a single-storey Wharekai and Wharehui building connected by concrete pathways, a concrete water tank to the southwest of the Wharehui building, an ablution block, multiple septic tanks located to the west of the ablutions block, a gravel driveway running from the north-western corner along the southern side of the Wharehui building and ending at the north-western corner of the site.

Additionally, a fill rock wall (~0.5 m high) was seen approximately 25 m beyond the north-western corner of the site. Multiple water tanks were observed being placed at the time of our site visit, and two water tanks were seen located on a temporary cut platform near the north-western corner of the site.

Some minor disturbance to the natural profile is expected, with the existing Wharekai and Wharehui buildings expected to be formed by minor cut earthworks, the driveway was located on a cut platform and conventional cut earthworks were ongoing to install the water tanks.

3 DESKTOP APPRAISAL

To assist with our geotechnical appraisal, we have undertaken a detailed desktop

² Source:

<https://nrcgis.maps.arcgis.com/apps/webappviewer/index.html?id=81b958563a2c40ec89f2f60efc99b13b>



review of available information with a specific focus upon geotechnical influences.

3.1 Infrastructure Review

Available infrastructure information is provided by Far North District Council (FNDC) GIS system. According to the available data, no existing Council infrastructure is present within the site boundaries, and it is understood the site is serviced by an on-site 3 water infrastructure.

Geotechnically, the proposed structure foundations will not be influenced by existing public pipelines according to available data.

3.2 Overland Flow Path and Flood Plains

In general, it is expected that surface water will move as sheet flow following the site topography towards the northern boundary until intercepted by State Highway 12.

Available GIS information presented as Figure 2 below indicates that the nearest mapped river flood hazard zone associated with Takehe River under the 1 % AEP event (marked by light blue area) is located approximately 18 m to the north of the site, to the north of State Highway 12.

The risk of encountering weak alluvial soil is considered low due to the above information.

Figure 2: Mapped River Flood Hazard Zone of the Site³



³ Source:

<https://nrcgis.maps.arcgis.com/apps/webappviewer/index.html?id=81b958563a2c40ec89f2f60efc99b13b>



3.3 Geology

Available geological mapping⁴ indicates the site to be directly underlain by Punakitere Sandstone (Mangakahia Complex) in Northland Allochthon described as Weakly to moderately indurated, alternating thin- to thick-bedded, quartzo-feldspathic sandstone and mudstone. The Northland Allochthon geology extends away from the site towards the southwest covering the existing larger hill.

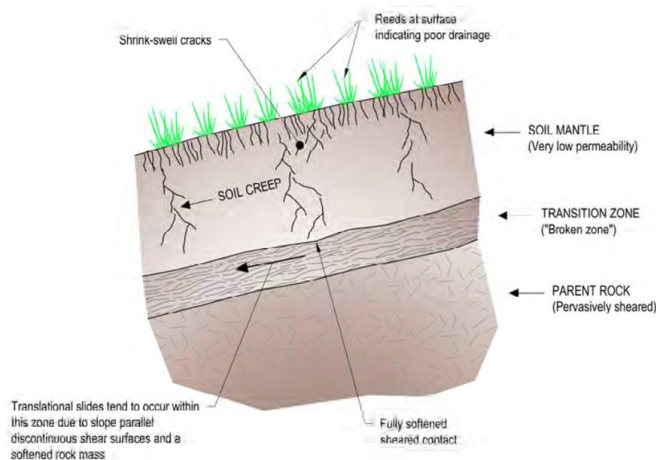
3.3.1 Geomorphology

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

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

Shallow slips and long-term soil creep typically occur within the transition zone above the parent rock as shown in Figure 3 below. The Geotechnical effective stress parameters for the soil strata are conservatively modelled to reflect the properties of the Northland Allochthon formation.

Figure 3: Northern Allochthon Soil Profile

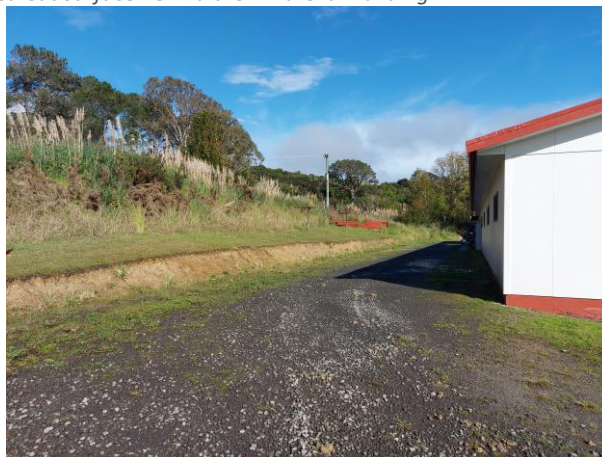


⁴ Geological & Nuclear Science, 1:250,000 scale Geological Map, Sheet 2, Whangarei, 2009.

3.4 Recent Earthworks

At the time of our ground investigation, an exposed cut face (approximately ~0.5 m in height) was visible on the southern side of the gravel driveway behind the Wharekai building as shown in Figure 4 below, indicating that the site is located on a cut platform. The cut batter exposed a thin layer of topsoil, followed by a layer of cohesive natural soil was observed.

Figure 4: Observed Exposed Cut Surface Behind the Wharekai Building.



Additionally, the site was also undergoing conventional cut earthworks to install the water tanks at the north-western corner facing State Highway 12. These earthworks exposed a cut face up to approximately 0.8 m in height as seen in Figure 5 which indicated presence of fill, potentially a site-won material, underlain by a layer of natural Northland Allochthon residual soil.

Figure 5: Observed Exposed Cut Surface at the North-eastern corner of the Site.



3.5 Existing Geotechnical Information

Existing subdivision and/or Building Consent ground investigations were not made available to Geologix at the time of writing. Additionally, a review of available GIS databases, including the New Zealand Geotechnical Database (NZGD) did not indicate borehole records within 500 m of the site. To improve the NZGD, exploratory records from our ground investigation were uploaded to the system.

4 GROUND INVESTIGATION

A site-specific walkover survey and intrusive ground investigation was undertaken by Geologix on 30 May 2023. The ground investigation was scoped to confirm the findings of the above information and to provide site-specific parameters for this geotechnical assessment and ground model. The ground investigation comprised:

- Two hand augered boreholes designated BH01 and BH02, formed as close as possible to the proposed development footprint with a target depth of 3.0 m below ground level (bgl). Refusal was encountered upon dense strata within BH02 at 2.6 m bgl.
- Both boreholes were extended with scala penetrometer probing techniques to a target depth of 5.0 m. Refusals were encountered at both BH01 and BH02 at similar depths ranging from 3.9 and 3.8 m bgl, respectively.
- Monitoring of groundwater levels with a groundwater dip meter on the day of drilling.

4.1 Site Walkover Survey

A visual walkover survey of the property confirmed:

- Topography is in general accordance with that outlined in Section 2 and the available GIS contours. Topographically, the site dips gently at approximately 2 degrees from the southern boundary to the centre, then continues to dip gently at approximately 6 degrees. Then the land dips moderately towards State Highway 12 at approximately 16 degrees through a benched fill batter.
- State Highway 12 defines the northern site boundary. Land to the east includes rural property of various sizes, land to the north includes the Taheke River, and land in other directions included open pasture.
- Existing structures are present on site including a single-storey Wharekai and Wharehui building connected with concrete pathways, a concrete water tank, multiple new water tanks, an ablution block, a small carpark on the eastern boundary and a gravel driveway running from State Highway 12 along the



perimeter of the site. It is understood that the concrete water tank will be demolished, and the ablution block will be demolished and rebuilt at a future development stage.

- There were no obvious signs of either shallow or deep slope instability such as tension cracks, hummocky ground or terraced land visible around the site.
- At the boundaries, a cut batter (~2.5 m high in total) was noted to be present at the northern boundary with a fill rock wall (~0.5 m high) approximately 25 meters beyond the north-western corner of the site. There was an exposed cut face (~0.5 m high) to the south of the gravel driveway. The site to the west and to the east were in general alignment with the neighbouring properties.
- There were private wastewater and water pipes located to the west of the ablutions block with the pipe alignments visible from the western side of the ablutions block towards the existing septic tanks. Based on the observations of the cut platform containing a layer of fill, historic site-won cut materials may have been placed around the west of the existing structures as uncontrolled/ landscape fills to backfill the existing pipelines.

4.2 Ground Conditions

Arisings recovered from the exploratory boreholes were logged by a qualified geotechnical engineering professional in 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. 200 within Appendix A. A detailed ground model has been derived from the investigation and locally available GIS data and supplied development plan presented as Drawing No. 201.

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

- **Topsoil to depths of 0.1 m bgl.** The overlying topsoil was described as a grassed topsoil containing organic silt, dark brownish black and moist with low plasticity.
- **Non-engineered fill to depths ranging from 0.5 m to 0.6 m bgl.** Non-engineered fill was encountered locally within BH02, which matched the layer of fill seen at the recent cut platform for the water tanks. The fill was described as a cohesive soil consisting of a very stiff silt, dark brown, moist with low plasticity.

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



A single in-situ field vane test recorded 170kPa, indicative of a very stiff layer.

- **Northland Allochthon Residual Soil to depths ranging from 2.4 m to 3.3 m bgl.** The residual soil was typically cohesive, described as clayey silt or silt, very stiff, light orange brown mottled white or grey, friable to low plasticity and moist. The residual soil generally had consistent strength throughout the strata.

Fifteen in-situ field vane tests undertaken within the Northland Allochthon Residual Soil recorded shear strengths ranging from 142 kPa to Unable to Penetrate (UTP), or generally very stiff soil. Characteristic unit vane shear strength has been determined to be 160 kPa at 95% confidence, confirming a generally very stiff strata.

The DCP profile within BH01 showed the strength increasing with depth, returning blow counts ranging from 1 to 10 blows per 100 mm penetration, which is indicative of a stiff to very stiff soil which aligns with the observed shear strengths. It was conservatively assumed that DCP blow counts up to 10 blows per 100 mm penetration is indicative of Northland Allochthon Residual Soil.

- **Northland Allochthon Completely Weathered Parent Rock to a depth of 3.7 m bgl.** The completely weathered parent rock was locally retrieved within BH02, and was also cohesive, described as sandy silt with some fine gravel, very stiff to hard, grey streaked dark red and saturated.

Two in-situ field vane tests undertaken within the Northland Allochthon completely weathered parent rock returned two UTPs, indicative of a very stiff to hard soil.

DCP blow counts of 10 to 25 blows per 100 mm penetration has been taken as indicative of Northland Allochthon Completely Weathered Parent Rock below the depth of hand augering.

Northland Allochthon Highly Weathered Parent Rock to depths >3.8 and >3.9 m bgl. The final 100 mm of the DCP probing at both BH01 and BH02 returned refusal with DCP blow counts of >25 blows per 100 mm penetration. DCP blow counts exceeding 25 blows per 100 mm penetration has been taken as indicative of Northland Allochthon Highly Weathered Parent Rock.

A summary of the above information is presented as Table 1 below.



Table 1: Summary of Ground Investigation

Hole ID	Hole Depth	Fill Depth	Depth to Completely Weathered Parent Rock	Depth to Highly Weathered Parent Rock	Groundwater ²
BH01	3.9 m	NE	3.3 m	3.8 m	NE
BH02	3.8 m	0.4 m	3.3 m	3.7 m	2.4 m

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

4.2.1 Groundwater

The ground investigation was undertaken during autumn and formed exploratory boreholes to depths greater than any potential excavation. Groundwater levels were monitored utilising a groundwater dip meter on the day of drilling, and groundwater was only encountered within BH01 at 2.4 m above the completely weathered parent rock strata, indicative of the groundwater perching above the underlying hard strata which is commonly encountered within the Northland Allochthon terrain.

Groundwater levels commonly fluctuate according to the season and rainfall events. As the site investigation occurred immediately after a significant rainfall event at the Tāheke region, groundwater levels may vary and be identified at lower levels than monitored during this ground investigation.

It is recommended that during foundation formation should any water ingress be noted that further advice is sought from Geologix which may require amendments to the recommendations of this report.

5 GEOTECHNICAL ASSESSMENT

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

5.1 Geotechnical Design Parameters

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

Table 2: Geotechnical Effective Stress Parameters

Geological Unit	Unit Weight, kN/m ³	Effective Friction Angle, °	Effective Cohesion, kPa	Undrained shear strength, kPa
Northland Allochthon Residual Soil	18	14	6	95*
Completely Weathered Parent Rock	18	28	5	150
Highly Weathered Parent Rock	18	30	5	>200

* Adopting Bjerrum correction factor of 0.6 from the lowest vane shear strength.

5.2 Site Subsoil Class

The site has been designated as Site Subsoil Class C - shallow soil sites according to the provisions of NZS1170.5:2004⁶.

5.3 Seismic Hazard

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

1. *Ultimate Limit State (ULS) shall provide for... "avoidance of collapse of the structural system...or loss of support to parts... damage to non-structural systems necessary for emergency building evacuation that renders them inoperable".*
2. *Serviceability Limit State (SLS) are to avoid damage to... "the structure and non-structural components that would prevent the structure from being used as originally intended without repair after the SLS earthquake...".*

The seismic hazard in terms of Peak Ground Acceleration (PGA) has been assessed based on the NZGS Module 1⁷. Table 2 presents the return periods for earthquakes with ULS and SLS 'unweighted' PGAs and design earthquake loads for the corresponding magnitude. The PGAs were determined using building Importance Level (IL) 2, defined by NZS1170.5:2004. Reference should be made to the structural designer's assessment for the final determination of building importance level.

⁶ NZS1170.5:2004, *Structural Design Actions Part 5: Earthquake Actions Clause 3.1.3.4.*

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



Table 3: Summary of Seismic Hazard Parameters

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

5.4 Site Stability

At the time of writing, no obvious indications of major deep-seated instability were identified at the site, and the risk of such deep-seated instability developing as a result of the development proposal is low.

The gently to sloping natural terrain (approximately 2 to 6 °) is considered to lie within the natural equilibrium balance of the underlying Northland Allochthon residual soil. Additionally,

As the existing benched fill batter at the north of the Wharehui building lies closely the angle of friction of the underlying Northland Allochthon Residual Soil, shallow instabilities could potentially occur around this batter. Therefore, it is recommended that the proposed development is located outside the zone of influence of the cut batter, taken as a line drawn up at 45 ° from the bottom of the batter to existing ground level.

5.5 Soil Expansivity

Clay soil may undergo appreciable volume change in response to changes in moisture content and be classed as expansive. The reactivity and the typical range of movement that can be expected from potentially expansive soils underlying any given building site depends on the amount of clay present, the clay mineral type, and the proportion, depth, and distribution of clay throughout the soil profile.

Clay soils typically have a high porosity and low permeability causing moisture changes to occur slowly and produce swelling upon wetting and shrinkage upon drying. Apart from seasonal moisture changes (wet winters and dry summers) other factors that can influence soil moisture content include:

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

Based on our experience with Northland Allochthon residual soil, laboratory analysis within the strata on other projects in the local area and site observations, the shallow soils are conservatively expected to meet the requirements of a highly expansive or



Class H soil type. In accordance with AS2870:2011⁸ and New Zealand Building Code⁹, Class H or Highly Expansive soils typically have a soil stability index (I_{ss}) range of 3.8 to 6.5% and a 500-year design characteristic surface movement return (y_s) of 78 mm.

A quantification of the expansive soil class assumptions can be made by geotechnical laboratory analysis.

5.6 Liquefaction Potential

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

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

6 GEOTECHNICAL RECOMMENDATIONS

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

6.1 Foundations

It is understood that the future ablution block will be located inside the zone of influence of the former septic tank which is located directly to the southwest of the existing ablution block.

It is recommended the former septic tank is excavated and replaced with suitably selected GAP hard fill with an engineering producer statement for compaction standard if shallow foundations are proposed. Alternatively, if the septic tank is outside the building footprint, piling through the tank's zone of influence will be required, subject to specific engineering design by a professional structural engineer.

⁸ AS2870, *Residential Slabs and Footings*, 2011.

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

6.1.1 *Conventional Shallow Foundations*

The development platform for both Wharehui building and future ablutions block (outside the zone of influence of the former septic tank) can be formed by a minor topsoil/ unsuitable material strip to expose the natural undisturbed Northland Allochthon residual soil. It is recommended that the non-engineered fill, encountered up to 0.4 m bgl in our ground investigation, any underlying soft spots ($S_u < 60$ kPa) and any other unsuitable or deleterious materials (such as relic foundations, driveway hardstanding etc.) are sub-excavated and replaced with suitably selected and compacted materials such as GAP65 hard fill.

Based on the natural formation having an average undrained shear strength of 95kPa, given that a 300 mm layer of compacted GAP65 is placed on this formation to replace the non-engineered fill, either shallow standard raft or strip footing foundations can be adopted for the proposed Wharehui extension and future ablution block.

Such foundations may be designed by a professional structural engineer adopting an Ultimate Bearing Capacity of 300 kPa for a highly expansive soil type and a geotechnical reduction factor of 0.5. The use of deep piled foundations is not considered necessary.

6.1.2 *Shallow Piles*

Alternatively, shallow piles can be adopted for the proposed structures. Such foundations may be designed by a professional structural engineer adopting an Ultimate Bearing Capacity of 300 kPa for a highly expansive soil type and a geotechnical reduction factor of 0.5.

It is recommended that all piled foundations are taken down through the shallow non-engineered fill to found consistently into the underlying Northland Formation residual soils encountered at depths ranging from 0.1 m to 0.4 m bgl across the proposed building area.

If groundwater is encountered within the pile holes, tremie concrete pour methodology will most likely be required to displace groundwater and an allowance should be made for this by the Contractor.

Construction monitoring requirements of the above recommendations are detailed in Section 6.5 of this report.

6.2 **Earthworks and Methodology**

It is presumed from the proposed development concept that the proposed



earthworks will consist of a shallow topsoil/unsuitable material strip to form the proposed building platform. It is recommended that all permanent cuts are battered at 1V:3H or 18 degrees with heights less than 1.0 m to provide stability.

No earthwork concepts were provided to us at the time of writing. In addition, no permanent earthwork batters are considered necessary to form the building platform within the gently sloping area given that the building platform is located outside the zone of influence of the existing batter.

6.2.1 *Temporary Works*

To reduce the risk of temporary excavation instability, it is recommended that unsupported excavations have a maximum vertical height of 1.0 m. Temporary unsupported excavations exceeding this height (estimated to be 2 m) are expected during the removal of the septic tank and shall be battered at 1V:3H or 18°. It is expected that the above temporary works can be undertaken within the site boundaries.

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

6.2.2 *Fills*

All fills within the development footprints scheduled as bearing strata should be retained by specifically engineered retaining walls or form certified engineered fill. It is recommended that the proposed fills are subject to a specific engineering specification including compaction standards and construction monitoring at regular lift intervals (maximum 0.5 m).

Any unsuitable and/or deleterious materials such as organic pockets, non-engineered fill, relic topsoil and/or concrete hard standing and locally weaker spots ($< S_u$ 50 kPa) shall be cut to waste and not adopted for filling or placed within landscaped areas outside of the proposed dwelling footprint and shall be track rolled as a minimum.

For the replacement of the excavation of the septic tank, it is recommended that suitably selected GAP hard fill is used subject to an engineering specification including compaction standards (average Clegg Impact Value of 20) and construction monitoring at regular lift intervals (maximum 0.5 m).

6.3 Retaining Walls

No retaining walls are indicated on the initial development plan. However, if there is a change this assumption, retaining walls may be required to support the building platform.

It is recommended that all proposed retaining walls are designed by a professional engineer familiar with the findings and geotechnical parameters of this report. Timber pole cantilever retaining walls are considered the most feasible solution for the site.

Based on the results of the ground investigation and for a flat backslope above the retaining structure, earth pressure parameters for design are presented within Table 4 below.

Table 4: Earth Pressure Parameters

Strata	At Rest Pressure Coefficient, K_0	Active Pressure Coefficient, K_A	Passive Pressure Coefficient, K_P
Northland Allochthon Residual Soil	0.758	0.554	2.016
Northland Allochthon Completely Weathered Parent Rock	0.531	0.321	5.172

1. Adopts soil/ wall friction coefficient of 0.67 for timber according to NZBC B1/VM4 Table 2.
2. Considers a flat backslope only. Parameters to be modified by a design engineer for any sloping backfill/ ground with different angles.

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

6.4 Driveways and Car Parking

If changes to the existing driveway is required, it is recommended that all unsuitable and deleterious materials such as topsoil, vegetation, shallow fill, and any existing foundations/ concrete hardstanding is removed from any new proposed driveway and car parking area prior to filling. By doing so, it is expected that the shallow natural Northland Allochthon residual soil will achieve a typical subgrade CBR value of 4 % or greater according to Austroads Standards.

For driveway and parking areas it is recommended that carriageways include a minimum total thickness of 250 mm, comprising a minimum 150 mm sub-basecourse, typically AP65 or approved similar and minimum 100 mm basecourse, typically finer AP40 or approved similar.



6.5 Construction Monitoring

During site development works it is recommended that specific construction monitoring is undertaken by a professional engineer in accordance with the recommendations of this report and consent conditions. It is anticipated that a professional Geotechnical Engineer will be required to provide inspection of:

- Subgrade at the base of excavations within the footprint of buildings, driveways, and any other areas of structural or vehicle loading.
- Inspection of hard fill compaction where placed >300 mm in thickness and/ or within the footprint of imposed surcharges such as buildings, driveways and/ or septic tank replacement.
- Formation of the building platform to maintain geotechnical stability.
- Foundation inspection of proposed future structures to confirm embedment and bearing capacity according to specific structural design.

The above items are considered to be capable under CM2 level construction monitoring accompanied by appropriate Producer Statements. Monitoring should be undertaken or supervised by a chartered professional engineer.

7 LIMITATIONS

This report has been prepared for Taheke Marae Trustees 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



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ground condition and models away from these specific ground investigation locations are inferred. It must be appreciated that the actual conditions may vary based on the assumed ground model. Difference from the encountered ground conditions during subdivision construction may require an amendment to the recommendations of this report.




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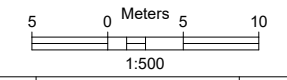
APPENDIX A

Drawings

GENERAL NOTES

1. DRAWINGS REPRODUCED FROM ARCLINE ARCHITECTURE, TAHEKE MARAE CONCEPT PLANS.
2. CONTOURS AT 1.0 m INTERVALS.
3. TOPOGRAPHIC SURVEY DATA CAPTURED FROM LINZ ON 23/06/2023.
4. FOR INDICATION ONLY, NOT FOR CONSTRUCTION.
5. FEATURES PRESENTED ARE INDICATIVE AND HAVE NOT BEEN VERIFIED.
6. DO NOT SCALE FROM THIS DRAWING.

 GEOLOGIX HAND AUGER & DYNAMIC CONE PENETROMETER
BH01 - JUNE 2023



A	CONSENT	23/06/2023
Revision	Issue	Date



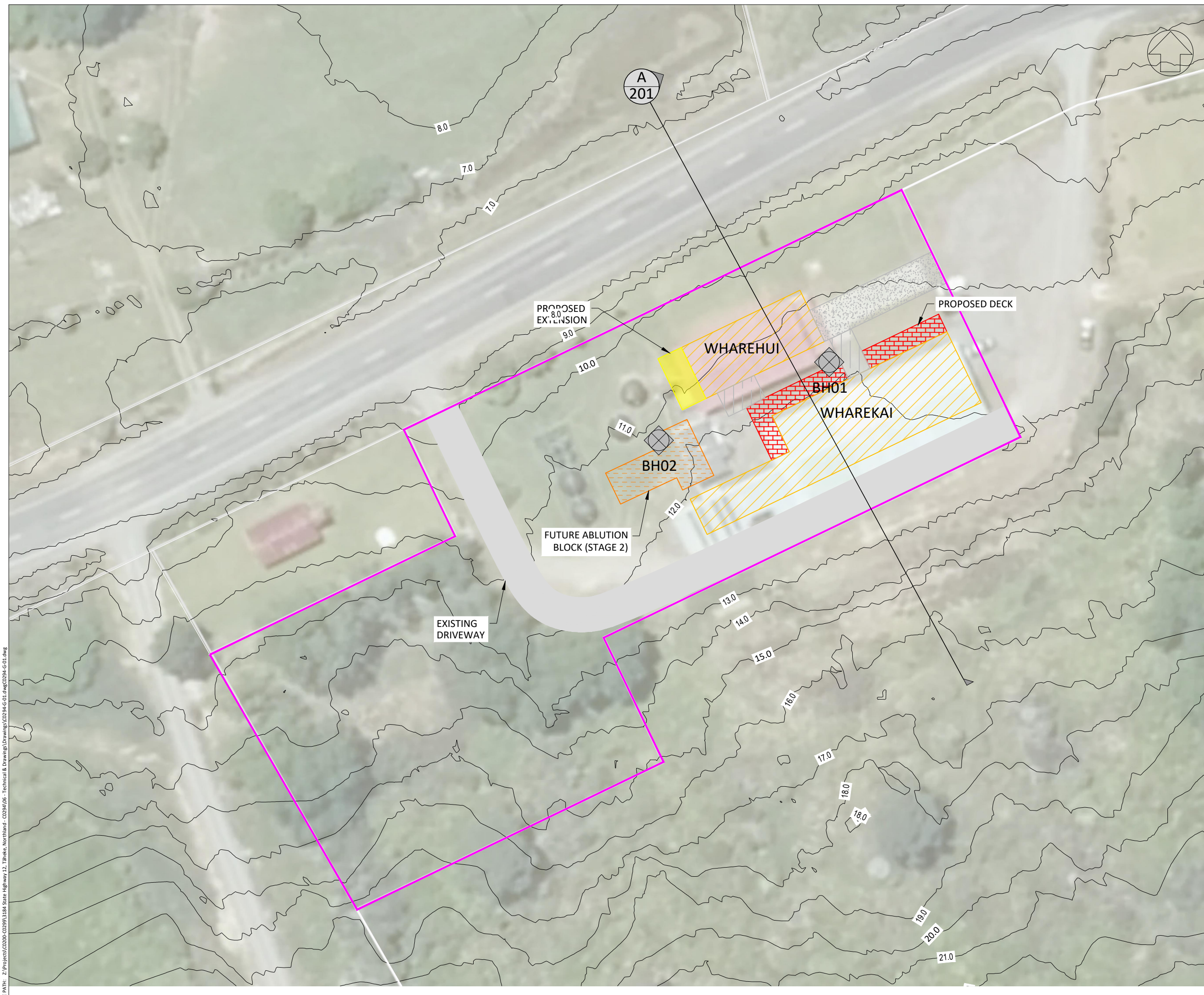
Project Name and Address
**3184 STATE HIGHWAY 12
 TAHEKE
 TAHEKE B BLOCK ML 441020**

Project C0294	Drawn By TI, GC, SBS
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Client
TAHEKE MARAE TRUSTEES

Sheet Title
GEOTECHNICAL SITE PLAN

Sheet
200



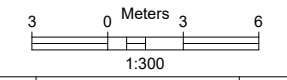
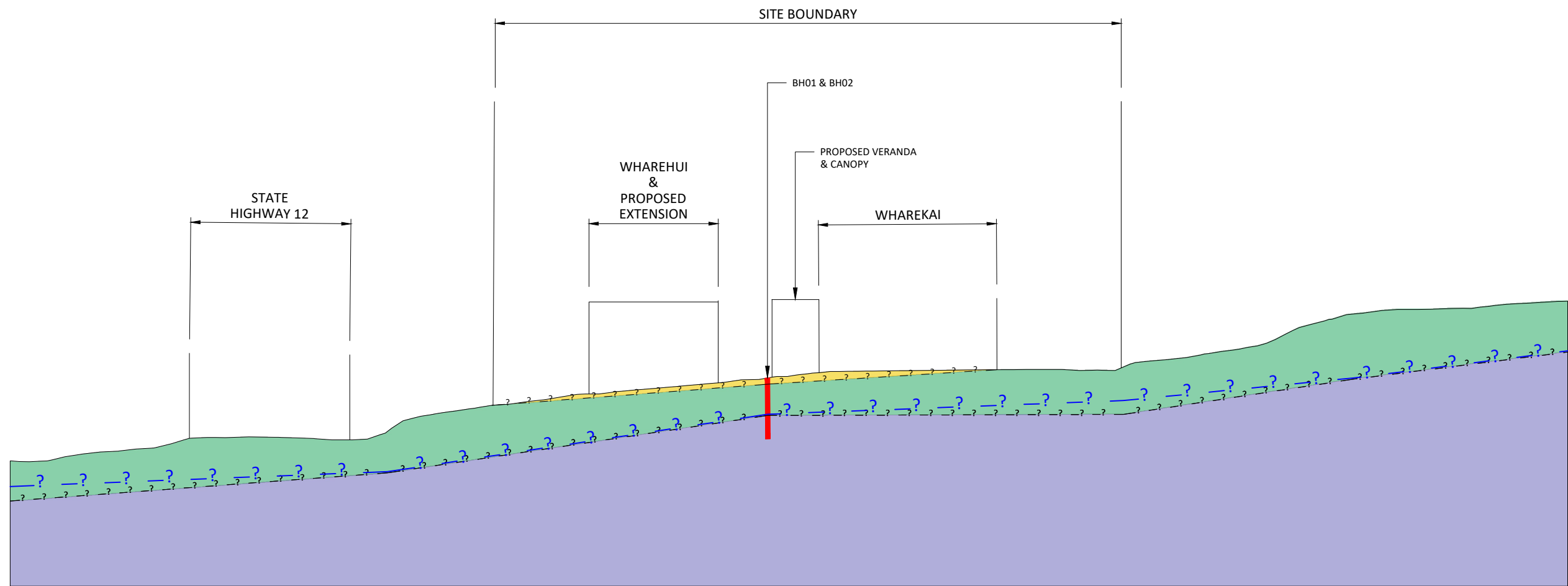
FILE PATH: Z:\Projects\C0200-C0299\3184 State Highway 12, Taheke, Northland - C0294\06 - Technical & Drawings\Drawings\C0294-G-01.dwg; C0294-G-01.dwg

PLOTED: 03/06/2023

GENERAL NOTES

1. TOPOGRAPHIC SURVEY DATA CAPTURED FROM LINZ ON 23/06/2023.
2. FOR INDICATION ONLY, NOT FOR CONSTRUCTION.
3. FEATURES PRESENTED ARE INDICATIVE AND HAVE NOT BEEN VERIFIED.
4. DO NOT SCALE FROM THIS DRAWING.

- TOPSOIL/ NON-ENGINEERED FILL
- NORTHLAND ALLOCHTHON RESIDUAL SOIL
- NORTHLAND ALLOCHTHON COMPLETELY WEATHERED PARENT ROCK
- ? — STRATA BOUNDARY
- ? — GROUNDWATER TABLE (MEASURED)



A	CONSENT	23/06/2023
Revision	Issue	Date



Project Name and Address
**3184 STATE HIGHWAY 12
 TAHEKE
 TAHEKE B BLOCK ML 441020**

Project C0294	Drawn By TI, GC, SBS
-------------------------	--------------------------------

Client
TAHEKE MARAE TRUSTEES

Sheet Title
GEOTECHNICAL CROSS-SECTION

Sheet
201

FILE PATH: Z:\Projects\C0200-C0299\3184 State Highway 12, Taheke, Northland - C0294\06 - Technical & Drawings\Drawings\C0294-G-01.dwg; C0294-G-01.dwg

PLOTED: 03/06/2023



geologix
consulting engineers

APPENDIX B

Borehole Records

INVESTIGATION LOG

HOLE NO.:
BH01

CLIENT: Taheke Marae Trustees
PROJECT: 3184 State Highway 12, Tāheke, Northland

JOB NO.:
C0294

SITE LOCATION: South of State highway 12
CO-ORDINATES: 1658520mE, 6075479mN

START DATE: 31/05/2023
END DATE: 31/05/2023

CONTRACTOR: Internal RIG: Hand Auger & DCP

ELEVATION: Ground
DRILLER: SBS

LOGGED BY: SBS

MATERIAL DESCRIPTION <small>(See Classification & Symbology sheet for details)</small>	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER <small>(Blows / 100mm)</small>	VANE SHEAR STRENGTH <small>(kPa)</small> Vane: 3467	WATER
				2 4 6 8 10 12 14 16 18	50 100 150 200 Values	
TOPSOIL comprising organic SILT, dark blackish brown, moist, low plasticity.		0.0 - 0.2	[Pattern]			
Silty CLAY, very stiff, light brown, moist, low plasticity. (Northland Allochthon Residual Soil)		0.2 - 0.6	[Pattern]		142, 71, 142, 71	
Silty CLAY, very stiff, light brown mottled white, moist, low plasticity. (Northland Allochthon Residual Soil)		0.6 - 1.2	[Pattern]		170, 88, 184, 71	
Clayey SILT, very stiff, greyish white and brown, moist, low plasticity. (Northland Allochthon Residual Soil)		1.2 - 2.6	[Pattern]		142, 74, 179, 57, 156, 91	
SILT, very stiff, grey, moist, friable. (Northland Allochthon Residual Soil)		2.6 - 3.0	[Pattern]		198+, 184	
End Of Hole: 3.90m		3.0 - 4.0	[Pattern]	1, .5, .6, 10, 12, 14, 15, 20, 25 >>	113	

Groundwater Not Encountered

PHOTO(S)



REMARKS

- Hand auger completed at target depth.
- Continued with DCP to until refusal at 3.9 m.
- 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.:
BH02

CLIENT: Taheke Marae Trustees
PROJECT: 3184 State Highway 12, Tāheke, Northland

JOB NO.:
C0294

SITE LOCATION: South of State highway 12
CO-ORDINATES: 1658524mE, 6075464mN

START DATE: 31/05/2023
END DATE: 31/05/2023

CONTRACTOR: Internal RIG: Hand Auger & DCP

ELEVATION: Ground
DRILLER: SBS

LOGGED BY: SBS

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER (Blows / 100mm)						VANE SHEAR STRENGTH (kPa) Vane: 3467				WATER				
				2	4	6	8	10	12	14	16	18	50		100	150	200	
TOPSOIL comprising organic SILT, dark blackish brown, moist, low plasticity. FILL: SILT, very stiff, dark brown, moist, low plasticity.		0.0 - 0.2	[Cross-hatch pattern]															
Clayey SILT, very stiff, light orange brown mottled orange brown, moist, low plasticity. (Northland Allochthon Residual Soil)		0.2 - 0.4	[Cross-hatch pattern]															170
		0.4 - 0.6	[Cross-hatch pattern]															99
		0.6 - 0.8	[Cross-hatch pattern]															170
		0.8 - 1.0	[Cross-hatch pattern]															111
		1.0 - 1.2	[Cross-hatch pattern]															170
SILT, very stiff, light orange brown streaked white, moist, low plasticity. (Northland Allochthon Residual Soil)		1.2 - 1.4	[Cross-hatch pattern]															85
		1.4 - 1.6	[Cross-hatch pattern]															UTP
		1.6 - 1.8	[Cross-hatch pattern]															-
		1.8 - 2.0	[Cross-hatch pattern]															170
		2.0 - 2.2	[Cross-hatch pattern]															91
Sandy SILT with some fine gravel, very stiff, grey streaked dark red, saturated, low plasticity. (Northland Allochthon Completely Weathered Parent Rock) End Of Hole: 3.80m		2.2 - 2.4	[Cross-hatch pattern]															170
		2.4 - 2.6	[Cross-hatch pattern]															68
		2.6 - 2.8	[Cross-hatch pattern]															UTP
		2.8 - 3.0	[Cross-hatch pattern]															-
		3.0 - 3.2	[Cross-hatch pattern]															UTP
		3.2 - 3.4	[Cross-hatch pattern]															-
		3.4 - 3.6	[Cross-hatch pattern]															UTP
		3.6 - 3.8	[Cross-hatch pattern]															-
		3.8 - 4.0	[Cross-hatch pattern]															UTP
		4.0 - 4.2	[Cross-hatch pattern]															-

31/05/2023

PHOTO(S)



REMARKS

- Hand auger terminated at 2.6 m due to dense strata.
- Continued with DCP until refusal at 3.8 m.
- Groundwater encountered at 2.4 m at the time of drilling.

WATER

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

INVESTIGATION TYPE

- Hand Auger
- Test Pit

STATEMENT OF DESIGN - PS1

Issued by: Dean Hoyle

To: Taheke Marae

Copy to be supplied to: Far North District Council

In Respect of: Econotreat Domestic Onsite Wastewater and Sewage System Design

At: 3182 State Highway 12 , Taheke

Legal Description: Taheke B Block Maori Land Plan 441020

Waterflow NZ Ltd has been engaged by Taheke Marae to provide the technical design services and details in respect of the requirements of G13/VM4 and B2 Durability of the Building Code 2004, for an Onsite Wastewater and Sewage System for their building at the above location.

The Design has been carried out in accordance with Auckland Council TP-58 Guidelines and Clause B2, G13 and G14 of the Building Regulations 2004.

The proposed building work covered by this producer statement is described on the drawings titled: Taheke Marae Onsite Wastewater Design Report, and numbered 1-42 together with the specification, and other documents set out in the schedule attached to this statement.

On behalf of the Design Firm, and subject to:

- (i) Site verification of the following design assumptions: correct installation of the system and drainage fields
- (ii) All proprietary products meeting their performance specification requirements;

As an independent design professional covered by a current policy for Professional Indemnity Insurance, no less than \$200,000*, I **believe on reasonable grounds** the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building Code.

Signed by: Dean Hoyle – PS Author '3037' Auckland Council, NZQA Onsite Wastewater Training/Opus, BOINZ OWM, HBRC & FNDC Approved Designer

Date: 10.05.23

Signature: 

Waterflow NZ Ltd
1160 State Highway 12
Maungaturoto 0520

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of \$200,000.*

Project location – Wastewater Treatment System for Taheke Marae at 3182 State Highway

As requested by the Taheke Marae Trustees, we (Waterflow NZ Ltd), are engaged to assess the stability and the soil condition for a suitable Onsite Wastewater Treatment System and Disposal field system for the Taheke Marae at 3182 State Highway.

We understand it is proposed to renovate / build a Marae used for Tangihanga events (day+ overnight) max of 3 days fortnightly, potable water for use across the site is collected via rainwater tanks.

Is the site suitable for an on-site effluent treatment and disposal system?

Yes, the site is suitable for the discharge of the wastewater production as per AS/NZS 1547:2012 Table H4 of:

- Tangi day visitor 3-days every fortnight of 150ppl at 40l per person per day
- Tangi overnight visitor 3-days every fortnight of 50ppl, at 150L wastewater production per person per day
- Max Wastewater production per day is 12000L buffered to a daily discharge of 4500L/per day
- Disposal system to be PCDI dripper lines in Class 5 Soils, (as per AC TP-58, Table 5.1) with a DLR of 3.5mm taking in consideration the advanced secondary treatment level of the effluent

What are the disposal field requirements?

We recommend an EconoTreat VBB-C-3000-Triple including a 22500l Buffer tanks and a Grease Trap, an advanced secondary Treatment System with de-nitrification to PCDI dripper lines at a recommended loading rate of 3.5l/m²/day for silty clay-loamy soils. The primary irrigation field requires 1286m² to be laid on level contours. And a minimum reserve field of 30% is recommended.

Is Discharge Consent required?

Yes, due to proposed activities onsite the Wastewater volume exceeds the Northland Regional Council and Far Norths Districts Council PA allowance of 2000l.

Other requirements

Council will require a Producer Statement – Construction Review (PS4) to satisfy Council requirements therefore the system / disposal field will need to be inspection by the Wastewater Designer to ensure compliance with Wastewater Design

Recommendation:

A meeting on site before installation with the installer and owner to confirm exact positioning of the system and disposal field in accordance with the design

Waterflow NZ Ltd

PO Box 24, 1160 State Highway 12, Maungaturoto 0547

P. 0800 628 356 F. 09 431 8845 E. sales@waterflow.co.nz www.naturalflow.co.nz

2023

Waterflow NZ Ltd
Certified Designer

Taheke Marae
3182 State Highway 12
Taheke
Plan 441020

Reference Number: WF9063

Issued 10.05.23

[ONSITE WASTEWATER DESIGN REPORT]

Onsite Wastewater Design Report by Waterflow NZ Ltd – Copyright 2014

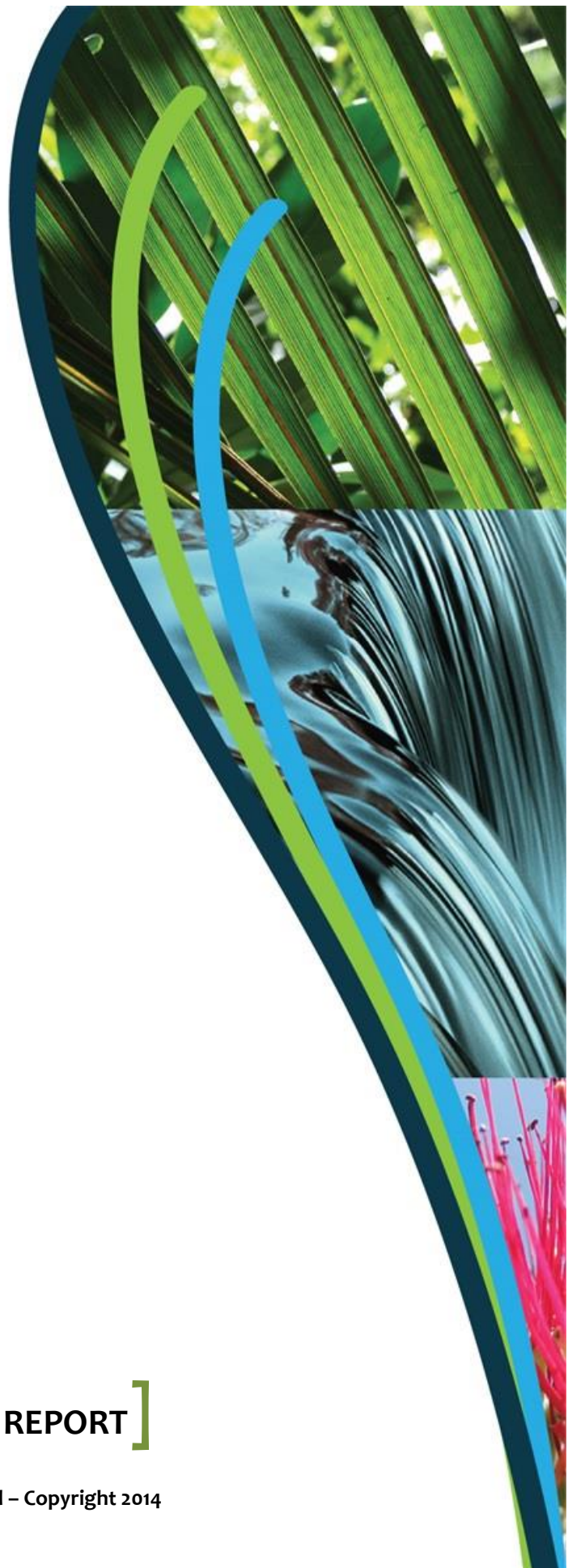


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PART B: SITE ASSESSMENT - SURFACE EVALUATION 5

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Attachments

- PS1
- Certificate of Title
- Land Application System Schematics
- Pump Specification
- Electrical Diagram
- Assessment of Environmental Effects
- System & Installation Specifications
- Home Owners Care Guide

PART A: CONTACT AND PROPERTY DETAILS

A 1. Consultant / Evaluator

Name:	Dean Hoyle
Company/Agency:	Waterflow New Zealand Ltd
Address:	1160 SH 12 Maungaturoto
Phone:	09 431 0042
Fax:	09 431 8845
Email Address:	dean@waterflow.co.nz

A 2: Applicant Details

Applicant Name:	Taheke Marae
Company Name:	
Property Owner:	Taheke Marae
Owner Address:	3182 State Highway 12 , Taheke
Phone:	
Mobile:	
Email Address:	

A 3: Site Information

Sited Visited by:	Caleb Pirini	Date:	Wednesday, 6 April 2022
Physical Address:	3182 State Highway 12 , Taheke		
Territorial Authority:	Far North District Council		
Regional Council:	Northland Regional Council		
Regional Rule	Resource Consent		
Legal Status of Activity:	Permitted:	<input checked="" type="checkbox"/> x	Controlled: <input type="checkbox"/> Discretionary: <input type="checkbox"/>
Total Property Area (m²):	5047m ²		
Map Grid Reference:			
Legal Description of Land (as on Certificate of Title):			
Lot No:	Taheke B Block Maori Land Plan 441020		
DP No:	0		
CT No:			

A 4: Are there any previous existing discharge consents relating to this proposal or other waste discharge/disposal on the site?

Yes:	<input type="checkbox"/>	No:	<input checked="" type="checkbox"/>
------	--------------------------	-----	-------------------------------------

If yes, give reference No's and description:

--

A 5: Dwelling(s) for which on-site wastewater service is to be provided

Status of dwelling(s) to be serviced:	New	<input checked="" type="checkbox"/>	Existing	<input type="checkbox"/>	Multiple	<input type="checkbox"/>
How many dwellings on the property?	Taheke Marae					
Capacity of dwellings: (or number of bedrooms)	Dwelling 1	Multiple groups using the Facilities - see Flow Calculation attached				
	Dwelling 2					
	Dwelling 3					
	Other:					
Notes:						

PART B: SITE ASSESSMENT - SURFACE EVALUATION

B 1: Site Characteristics

Performance of adjacent systems:	(Unknown)		
Estimated annual rainfall (mm):	1250 - 1500 (as per NIWA statistics)		
Seasonal variation (mm):	300-400mm		
Vegetation cover:	Native Scrub and Grasses		
Slope shape:	Linear Planar		
Slope angle:	5-12 °		
Surface water drainage characteristics:	Broad overland to boundry		
Flooding potential?	Yes:	No:	x
If Yes, specify relevant flood levels relative to disposal area:			
Site characteristics:	a communal rural property. Property is generally covered with pasture grass and trees. Property boundaries are on State Highway 12 to the North and residential site and farmland on all other boundaries.		

B 2: Slope Stability

Has a slope stability assessment been carried out on the site?

Yes:		No:	x
------	--	-----	---

If no, why not?

Low slope:	x	No signs of instability:	x	Other:
------------	---	--------------------------	---	--------

If yes, give brief details of report:

Details:	
Author:	
Company/Agency:	
Date of report:	

B 3: Site Geology

--

B 4: Slope Direction

What aspect does the proposed disposal system face?

North	x	West	
North-West		South-West	
North-East		South-East	
East		South	

B 5: Site Clearances if applicable (also on site plan)

	Treatment Separation Distance (m)	Disposal Field Separation Distance (m)
Boundaries:	>1.5	>1.5
Surface Water:	>15	>15
Ground Water:	>1.2	>1.2
Stands of Trees / Shrubs:	n/a	n/a
Wells/Water Bores:	>20	>20
Embankments / Retaining Walls:	>3	>3
Buildings:	>3	>3
Other:		

B 6: Please identify any site constraints applicable for this property, and indicate how the design process is to deal with these.

Constraints	Explain how constraints are being dealt with
1 Site constraints: (a) (b)	n/a

PART C: SITE ASSESSMENT - SOIL INVESTIGATION

C 1: Soil Profile Determination Method

Test pit:		Depth (mm):		No. of Test pits:	
Bore hole:	x	Depth (mm):	1200	No. of Bore holes	2
Other:					

C 2: Fill Material

Was fill material intercepted during the subsoil investigation?

Yes:	<input type="checkbox"/>	No:	<input checked="" type="checkbox"/>
------	--------------------------	-----	-------------------------------------

If yes, please specify the effect of the fill on wastewater disposal:

--

C 3: Permeability Testing

Has constant head Permeability Testing (Ksat) been carried out?

Yes:	<input type="checkbox"/>	No:	<input checked="" type="checkbox"/>
------	--------------------------	-----	-------------------------------------

If yes, please indicate the details (test procedure, number of tests):

--

Test report attached?

Yes:	<input type="checkbox"/>	No:	<input checked="" type="checkbox"/>
------	--------------------------	-----	-------------------------------------

C 4: SURFACE WATER CUT OFF DRAINS

Are surface water interception/diversion drains required?

Yes:	<input type="checkbox"/>	No:	<input checked="" type="checkbox"/>
------	--------------------------	-----	-------------------------------------

C 5: DEPTH OF SEASONAL WATER TABLE:

Winter (m):	>1.2
Summer (m):	>1.2

Was this:

Measured:	<input checked="" type="checkbox"/> no sign of ground water or mottling in bore holes
Estimated:	

C 6: SHORT CIRCUITS

Are there any potential short circuit paths?

Yes:	<input type="checkbox"/>	No:	<input checked="" type="checkbox"/>
------	--------------------------	-----	-------------------------------------

If yes, how have these been addressed?

--

C 7: SOIL CATEGORY

Is topsoil present?

Yes:	<input checked="" type="checkbox"/>	No:	<input type="checkbox"/>
------	-------------------------------------	-----	--------------------------

If yes, what is the topsoil depth & soil description?

250mm topsoil over silty clay-loam

Indicate the disposal field soil category (as per AC TP-58, Table 5.1)

Category	Description	Drainage	(x)
1	Gravel, coarse sand	Rapid draining	
2	Coarse to medium sand	Free draining	
3	Medium-fine & loamy sand	Good draining	
4	Sandy loam, loam & silt loam	Moderate draining	
5	Sandy clay-loam, clay loam & silty clay-loam	Moderate to slow draining	x
6	Sandy clay, non-swelling clay & silty clay	Slow draining	
7	Swelling clay, grey clay & hardpan	Poorly or non-draining	

Reason for placing in stated category:

Result of bore hole/test pit sample	<input checked="" type="checkbox"/>
Profile from excavation	<input type="checkbox"/>
Geotech report	<input type="checkbox"/>
Other:	<input type="checkbox"/>

C 8: SOIL STRUCTURE

Based on results of the in-situ soil profile investigation above (C7) please indicate the disposal (land application) field soil structure:

Massive	<input type="checkbox"/>
Single grained	<input type="checkbox"/>
Weak	<input type="checkbox"/>
Moderate	<input checked="" type="checkbox"/>
Strong	<input type="checkbox"/>

C 9: As necessary, provide qualifying notes on the relationship of Soil Category (C7) to Soil Structure (C8) and the effect this relationship will have on design loading rate selection:

--

PART D: DISCHARGE DETAILS - SEE HYDRAULIC LOADING TABLES

D 1: Water supply source for the property:

Rain water (roof collection)	x
Bore/well	
Public supply	

D 2: Are water reduction fixtures being used?

Yes:		No:	x
------	--	-----	---

If 'yes' Please state:

Standard Fixtures include dual flush 11/5.5 or 6.3 litre toilet cisterns, and includes standard automatic washing machine, but a low water use dishwasher, no garbage grinder.

D 3: Daily volume of wastewater to be discharged:

No. of bedrooms/people:	1: (As per Calculations attached) 2: 3:
Design occupancy (people): (as per AC TP-58, Table 6.1)	1: (As per Calculations attached) 2: 3:
	Black / Grey water
Per capita wastewater production (litres/person/day): (as per ARC TP-58, Table 6.2)	1: (As per Calculations attached) 2: 3:
Total daily wastewater production (litres per day):	12000 L/day (Buffered to 4500L/p/d)

D 4: Is daily wastewater discharge volume more than 2000 litres?

Yes:	x	No:	
------	---	-----	--

D 5: Gross lot area to discharge ratio:

Gross lot area:	5047 m ²
Total daily wastewater production (litres/day):	12000 L
Lot area to discharge ratio:	1.12

D 6: Net Lot Area

Area of lot available for installation of the disposal (land application) field and reserve area:

Net lot area (m ²):	4047 m ²
Reserve area (m ²):	30%

PART E: LAND DISPOSAL METHOD

E 1: Indicate the proposed loading method:

	Black / Grey Water
Gravity Dose:	
Dosing Siphon:	
Pump:	Davy B42A-B

E 2: If a pump is being used please provide following information:

Total Design Head (m):	32
Pump Chamber Volume (litres):	1600
Emergency Storage Volume (litres):	9000

Is a high water level alarm being installed in pump chambers?

Yes:	<input checked="" type="checkbox"/>	No:	<input type="checkbox"/>
------	-------------------------------------	-----	--------------------------

E 3: Identify the type(s) of Land Disposal method proposed for this site:

	Black / Grey Water
P.C.D.I. Dripper Irrigation:	PCDI surface laid and mulched
L.P.E.D. System:	
Evapo-Transpiration Beds:	
Other:	
(as per Schematics attached)	

E 4: Identify the Loading Rate proposed for option selected in E3:

as per ARC TP-58, Table 9.2 & Table 10.3	Black / Grey Water
Loading Rate (litres/m ² /day):	3.5
Disposal Area Basal (m ²):	
Areal (m ²):	1286

E 6: Details and dimensions of the disposal (land application) field:

Length (m):	42.9	No. Lines:	30	Hole Size:	N/A
Width (m):	30.0	Spacing (m):	1.0	Hole Spacing:	N/A
Notes:	1286sqm of Surface laid PCDI dripline pinned at 1m centers and covered with a minimum covering of 100mm mulch. See schematic drawing attached.				

PART F: PROPOSED WASTEWATER TREATMENT SYSTEM

A Econotreat EconoTreat VBB-C-3000 Triple System with a 225000l buffer tank and a Grease Trap, fed through surface laid PCDI dripline is suitable for this site. The EconoTreat VBB-C-3000 System has enough capacity to accommodate 9000ltr per day, so will be well within its capacity. The land application system is designed to discharge a maximum volume of 4500ltrs per day and if this is exceeded it could cause failure resulting in environmental and public harm.

PART G: OPERATION AND MAINTENANCE OF SYSTEM

The operation of this complete system will be explained verbally to the owner by the Installer or Agent on Completion of Installation; also provided with Waterflow's Home Owner's Manual.

Waterflow NZ Ltd encourages the Home Owner to monitor and care for your Econotreat system yourself, with our backing and support, and by doing so you will learn how your system works and operates and how to keep it in top working order.

It is also recommended that a Maintenance Program contract is in place at all times to ensure this system is maintained at top performance at all times.

All on site wastewater systems require regular maintenance; in this case once annually is suffice and may be specified within the consent process by the Building Department of Far North District Council. This Maintenance will be recorded on hard copy and supplied to both the Owner and Far North District Council Compliance Officer if requested.

NOTE TO OWNER: All written records pertaining to the wastewater system should be retained in a safe place. When a change of ownership occurs, a full and complete history is able to be passed to the new owners.

Animals are to be physically excluded from the installed effluent field to avoid damage, and to reduce the risk of soil compaction in the vicinity of the bed.

Planting within this area is encouraged to assist with evapotranspiration by plants.

PART H: SOIL LOG PROFILE



**250mm topsoil over silty clay-loam
Class 5, (as per AC TP-58, Table 5.1)**

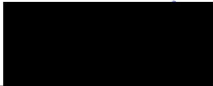
PART I: SITE IMAGES




Land Application System: 1286sqm of surface laid PCDI dripline, 30 x 42.9m pinned at 1m centers and covered with a minimum of 100mm landscape mulch. To be laid near to contour and protected from stock and vehicular traffic. See schematic drawing attached.

DECLARATION

I, hereby certify that, to the best of my knowledge and belief, the information given in this application is true and complete.

Prepared By:	
Name:	Alexandra Sabath - Wastewater Design Technician
Signature:	
Date:	10.05.23

Reviewed By:	
Name:	Dean Hoyle – PS Author ‘3037’ Auckland Council, NZQA Onsite Wastewater Training/Opus, BOINZ OWM, HBRC Approved Designer
Signature:	
Date:	10.05.23

NOTE: The Waterflow Systems are to be installed by a registered drainlayer to the designs supplied by Waterflow NZ Ltd. All work to comply with Regional Council Water and Soil Plans.

Comments/Summary:

The disposal field will need to be protected from traffic and animal grazing. Planting this area is recommended to increase Evapotranspiration.

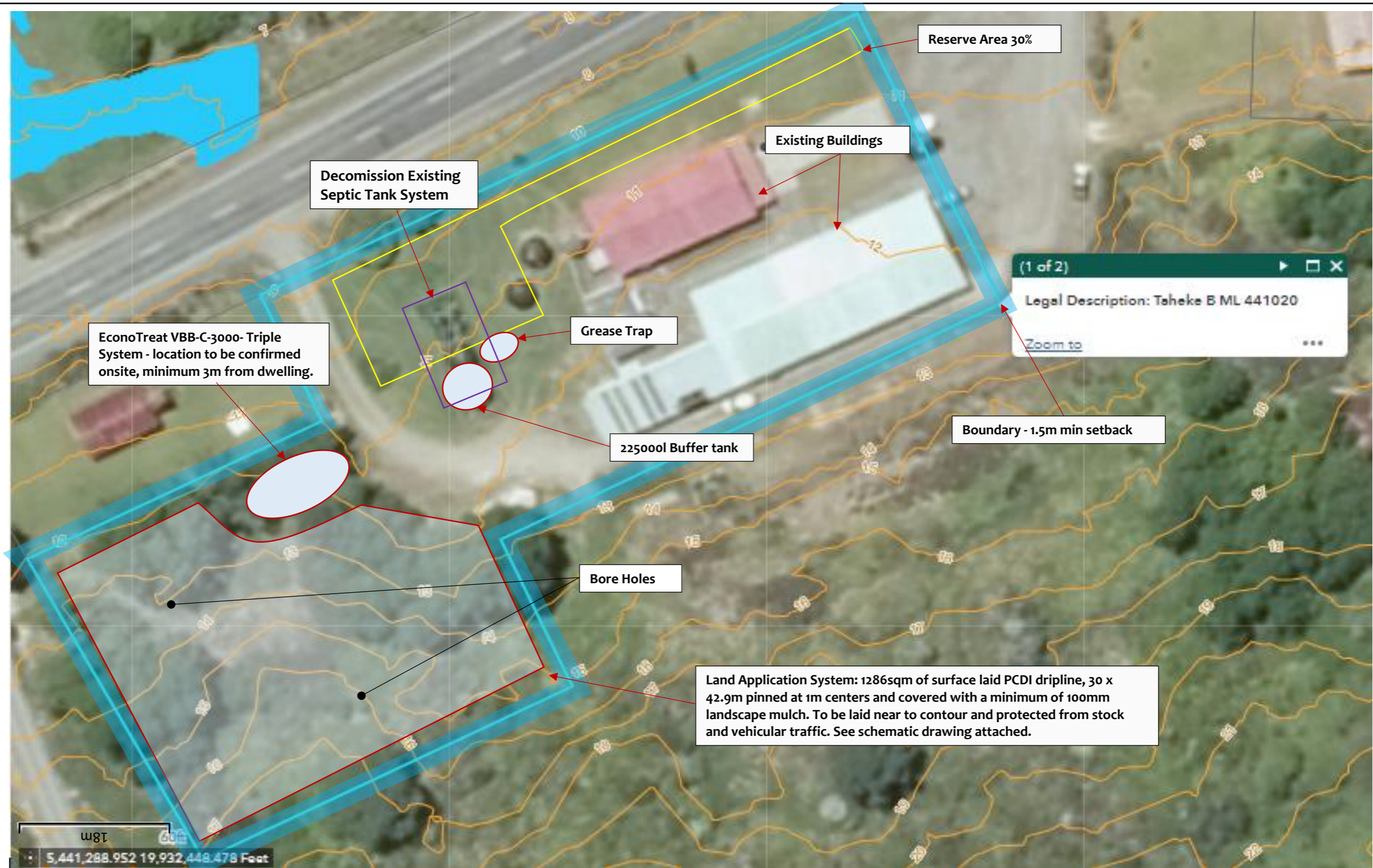
Suitable plants for the disposal field can be found on our website www.naturalflow.co.nz

Waterflow Treatment systems to be installed by accredited installer unless other arrangements have been made by Waterflow NZ Ltd

For more information do not hesitate to contact the team at Waterflow NZ Ltd on 0800 628 356



<p>SITE LOCATION PLAN:</p> <p>Taheke Marae 3182 State Highway 12 Taheke Taheke B Block Maori Land Plan 441020 0.5047HA</p>	<p>SCALE:</p> <p>1 : 132</p> <p>@ A3</p>
---	---



DATE DRAW: 10.05.23
 PREPARED BY: Alexandra Sabath
 REVISED: Dean Hoyle

SITE LAYOUT PLAN:

Taheke Marae
 3182 State Highway 12
 Taheke
 Taheke B Block Maori Land Plan 441020
 0.5047HA

SCALE:

1 : 42
@ A3

Taheke Marae

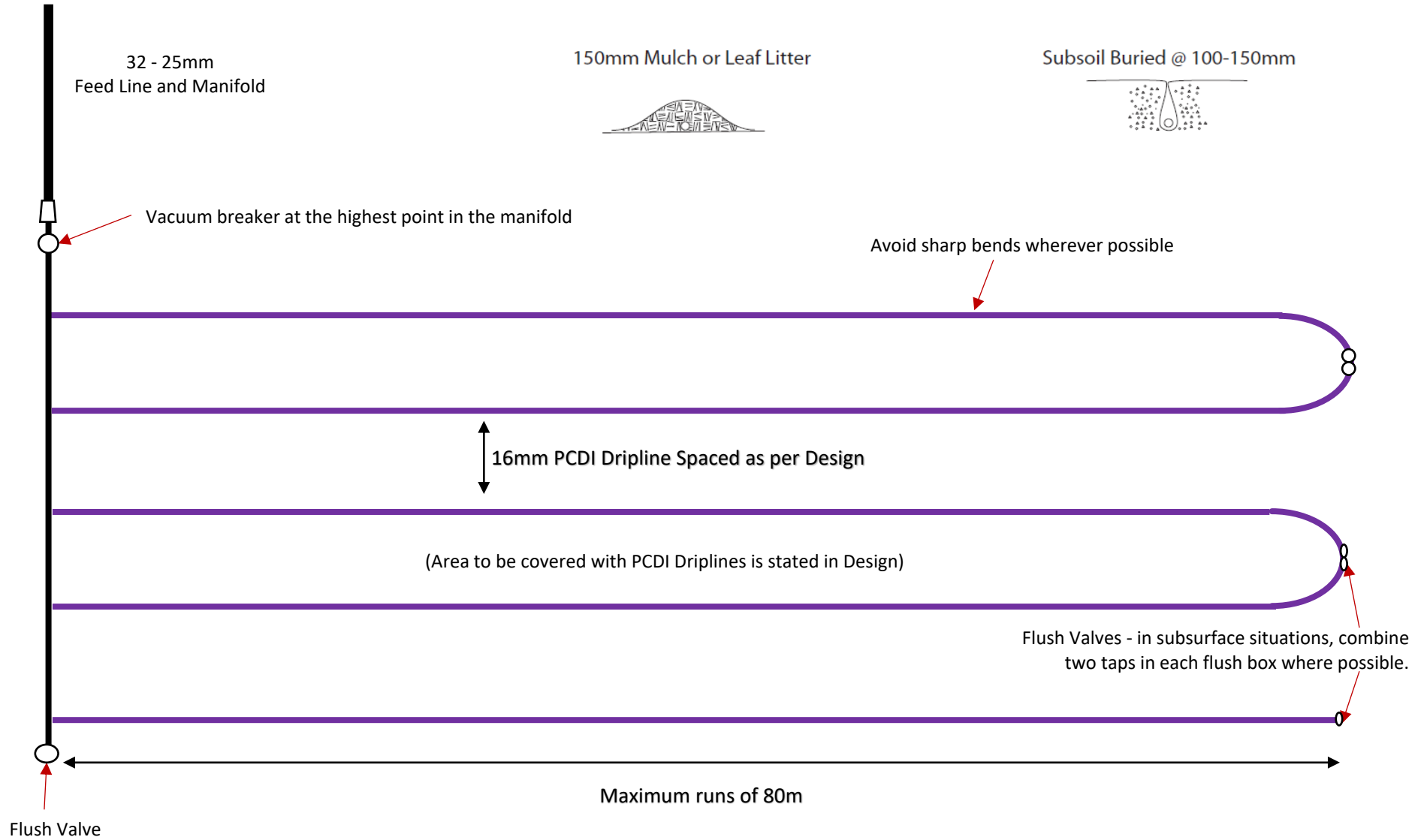
Proposal is to design a treatment system that will cater for a maximum loading scenerio over a fortnight/month period,

Discharge per Day	System Recommendation	Buffer Required	Soil Class	DLR PCDI	DLR Beds
4500	Triple VBB-3000	22500	5	3.5	12
				1286	375

Event	Numbers	Flow Rates	Daily Flow	Frequency per Month	Duration
Day Visitors Tangi	150	40	6000	2	3
Overnight Tangi	50	120	6000	2	3
			0	0	0
			0		
			0		
			0		

Taheke Marae Occupancy/Flow Calculations										
Day	Tangihanga Day	Tangihanga Night						Total Flow	Discharge L/p/day	Buffer L/p/day
Mon 1	0	0	0	0	0	0	0	0	4500	0
Tues 2	0	0	0	0	0	0	0	0	4500	0
Wed 3	0	0	0	0	0	0	0	0	4500	0
Thurs 4	0	0	0	0	0	0	0	0	4500	0
Fri 5	6000	6000	0	0	0	0	0	12000	4500	7500
Sat 6	6000	6000	0	0	0	0	0	12000	4500	15000
Sun 7	6000	6000	0	0	0	0	0	12000	4500	22500
Mon 8	0	0	0	0	0	0	0	0	4500	18000
Tues 9	0	0	0	0	0	0	0	0	4500	13500
Wed 10	0	0	0	0	0	0	0	0	4500	9000
Thurs 11	0	0	0	0	0	0	0	0	4500	4500
Fri 12	0	0	0	0	0	0	0	0	4500	0
Sat 13	0	0	0	0	0	0	0	0	4500	0
Sun 14	0	0	0	0	0	0	0	0	4500	0
Mon 15	0	0	0	0	0	0	0	0	4500	0
Tues 16	0	0	0	0	0	0	0	0	4500	0
Wed 17	0	0	0	0	0	0	0	0	4500	0
Thurs 18	0	0	0	0	0	0	0	0	4500	0
Fri 19	6000	6000	0	0	0	0	0	12000	4500	7500
Sat 20	6000	6000	0	0	0	0	0	12000	4500	15000
Sun 21	6000	6000	0	0	0	0	0	12000	4500	22500
Mon 22	0	0	0	0	0	0	0	0	4500	18000
Tues 23	0	0	0	0	0	0	0	0	4500	13500
Wed 24	0	0	0	0	0	0	0	0	4500	9000
Thurs 25	0	0	0	0	0	0	0	0	4500	4500
Fri 26	0	0	0	0	0	0	0	0	4500	0
Sat 27	0	0	0	0	0	0	0	0	4500	0
Sun 28	0	0	0	0	0	0	0	0	4500	0
Max Buffer Req										22500
22500 Litre Buffer Volume required										

PCDI SINGLE MANIFOLD LAYOUT





METZERPLAS

ADI

Cylindrical PC
(Pressure
Compensated)
dripper.

- Cylindrical PC dripper, with unique regulating labyrinth with self-flushing operation at the beginning and the end of each irrigation cycle.
- Triple inlet filter with filtering area 10 times larger than any other dripper.
- High clog resistance.
- Suitable for poor quality and effluent water.
- Large pressure compensation range up to 4.3 bars.
- Dripline diameter: 16, 18 and 20 mm.
- Dripper flow rate: 1.6, 2.2 and 3.5 l/h.
- *Rootguard*® configuration available for extra root protection in SDI (Subsurface Drip Irrigation).



ADI Dripline Technical Data:

Model	Inside Diameter (mm)	Wall Thickness (mm)	Min. Working Pressure (bars)	Max. Working Pressure (bars)	KD
ADI 16	13.8	0.9	0.8	3.5	1.12
		1.15	0.8	4.3	0.95
ADI 18	15.8	1.2	0.8	4.3	0.95
ADI 20	17.4	1.0	0.8	3.5	0.85
		1.25	0.8	4.3	0.6



METZERPLAS

ADI

Cylindrical PC (Pressure Compensated) dripper.

ADI 16 mm. Maximum lateral length (I.D. 13.8 mm, W.T 0.9 mm, Inlet pressure 2.5 bars):

Nom. Flow Rate (l/h)	Spacing Between Drippers (m)						
	0.20	0.30	0.40	0.50	0.60	0.75	1.00
1.6	86	122	156	188	218	260	324
2.2	72	103	131	157	182	216	269
3.5	51	73	94	113	131	156	195

ADI 18 mm. Maximum lateral length (I.D. 15.8 mm, W.T 1.2 mm, Inlet pressure 2.5 bars):

Nom. Flow Rate (l/h)	Spacing Between Drippers (m)						
	0.20	0.30	0.40	0.50	0.60	0.75	1.00
2.0	93	134	171	205	238	284	355
3.5	65	92	118	142	166	198	247

ADI 20 mm. Maximum Lateral length (I.D. 17.4 mm, W.T 1.0 mm, Inlet pressure 2.5 bars):

Nom. Flow Rate (l/h)	Spacing Between Drippers (m)						
	0.20	0.30	0.40	0.50	0.60	0.75	1.00
1.6	128	182	234	281	325	388	484
2.2	113	159	202	242	279	331	409
3.5	76	109	140	168	196	233	291

For additional tables and data please contact Metzerplas Technical Department or visit our website: www.metzerplas.com

Packaging Data

Model	Roll Length (m)	Quantity Per Container (Rolls)		
		20	40	40 h
ADI 16	400	150	300	350
ADI 18	300	150	300	333
ADI 20	300	133	266	300

Assessment of Environmental Effects

Taheke Marae of 3182 State Highway 12 , Taheke Taheke B Block Maori Land Plan 441020

1.1 Description of Proposal

The owners of this site propose the construction of a new Marae.

1.2 Site Description

This site, located at 3182 State Highway 12 , is a communal rural property. Property is generally covered with pasture grass and trees. Property boundaries are on State Highway 12 to the North and residential site and farmland on all other boundaries.

1.3 Wastewater Volume

In calculating the wastewater flows we have allowed for a maximum occupancy, based on the proposed Marae (as per AS/NZS 1547:2012 Table J1). Total wastewater production is based on an allowance of (various) litres per person per day (as per AS/NZS 1547:2012 Table H3, Note 2), which is conservative given that water supply is roof collected rain water and standard water fixtures will be used throughout the house.

1.4 Wastewater Volume

The EconoTreat VBB-C-3000- Triple system that is proposed will treat the wastewater to a high standard prior to dispersal using a PCDI drip line, into a purpose-designed disposal field, where the removal of nutrient will continue, both in the receiving soils and by plant uptake.

The system will be capable of producing reductions in Biochemical Oxygen Demand, Total Suspended Solids, Nitrogen, and Coliforms to a standard that meets the requirements (see details below). The system will cater for the wastewater requirements of the private dwellings (domestic wastewater) and will not service any commercial or trade waste sources. Risk Minor to Nil.

1.5 Proposed Treatment System

The objective of the treatment system is to reduce and remove much of the contaminants from the wastewater prior to discharge into the receiving soil. This will improve the long-term performance of the disposal field as well as reducing the risk to the receiving environment. The system will consist of:

Septic Tank Module

EconoTreat VBB-C-2200-Triple

Land Application System

1.6 Land Application System

The proposed irrigation system uses pressure-compensating dripper lines ensuring an even delivery of moisture over the entire irrigation field and a conservative DLR of 3.5mm. We propose the use of Metzerplas unibioline AD116/2.2 @ 0.6m/c with the Dripline laid out at 1m centres. This Dripline will then be covered by 100mm landscape mulch. Densely planting this area will greatly enhance evapo-transpiration and be very beneficial especially in the wetter months of the year. This irrigation can be installed in conjunction with existing or proposed landscaping.

1.7 Surface & Ground Water

It is proposed to treat the water to a high standard prior to discharge and the proposed irrigation system will introduce the water into the topsoil horizon using PCDI irrigation. A low application rate of treated effluent into the topsoil will significantly reduce the likelihood of, any breakout or runoff or any risk of surface water contamination. With the ground water levels being >1.2m this conservative DLR also means the risk of ground water contamination is virtually nil. A majority of the undeveloped areas of this site are suitable for a PCDI disposal field when the necessary setbacks are observed. Risk Minor to Nil.

1.8 Air Quality

The proposed EconoTreat VBB-C-3000- Triple system will produce no noticeable odour when functioning correctly. Any odour will be contained within the tanks. The PCDI irrigation system will load the soil at a rate that should not cause ponding, spraying or aerosol of the effluent that could potentially cause odours. Risk Minor to Nil.

1.9 Visual Impact

The tanks are installed wholly below ground level with only the lids being visible. The lids will protrude approximately 100mm to prevent egress of storm water into the system. The disposal field will be located in a purpose designed mulched and intensively planted disposal area. Warning signs may be installed to indicate the presence of the disposal area, although probably not necessary in a domestic situation, also the area may be fenced to restrict access.

1.10 Environmental Risks

Risks associated with this proposal are minor. The treatment system will be automated, and the Home Owner will be given a 'Home Owners Care Guide' which explains the necessary visual checks to ensure no issues arise with the system, specifically – solids build-up - high water level – discharge failure – filter blockage.

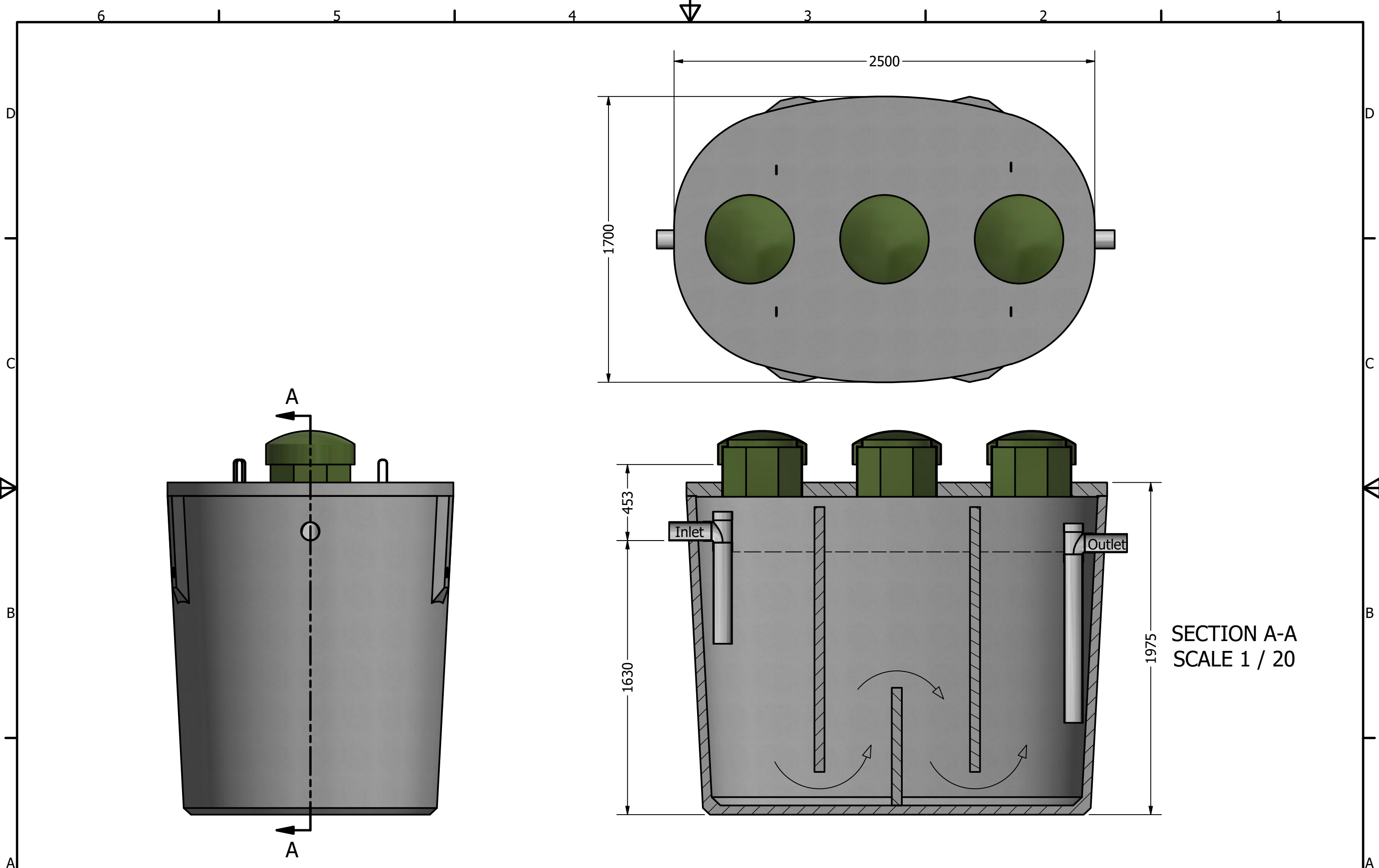
Peak flow into the system are not expected to be significant and the system includes a large emergency storage volume.

1.11 Maintenance Requirements

The maintenance requirement of this system is minimal, with the system fully automated. The system requires little input from the operator apart from the regular cleaning of the outlet filter between the treatment system and the Dripline field. All other maintenance interventions must be carried out by service persons familiar with the operation of the system and approved by the manufacturer. Maintenance may include checking of the dissolved oxygen levels, cleaning of effluent outlet filter, removal of excess sludge volume, checking of control panel function, etc....

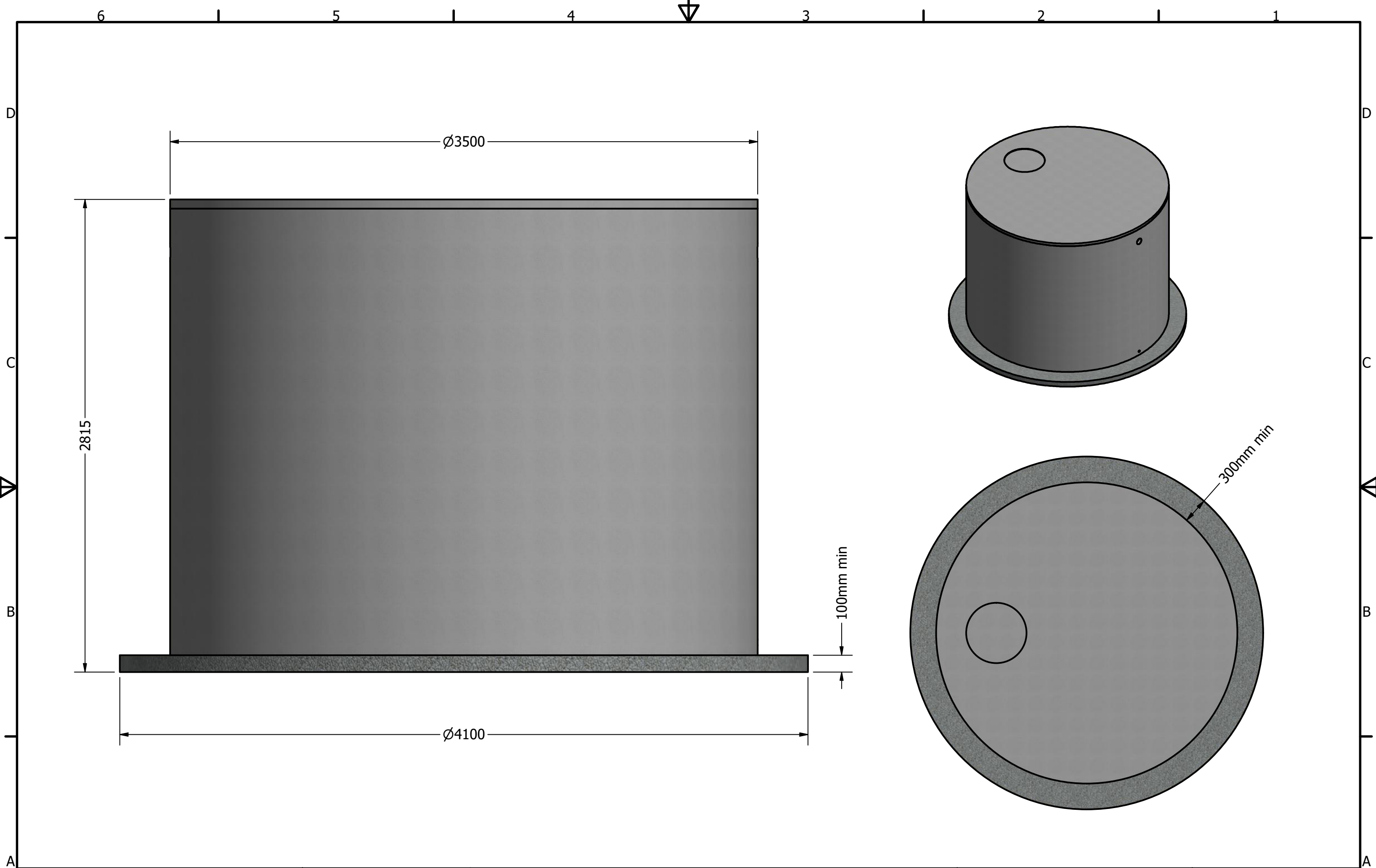
The disposal field is quite possibly the most important and sensitive part of the treatment system and requires a reasonable amount of maintenance to keep it functioning well. Any leaking or damaged Dripline must be fixed quickly using the appropriate materials, the planting must be maintained, weeds removed and grass kept cut. The Dripline should be kept covered with a suitable bark, mulch, or topsoil.

Warning signs such as ponding, odours, and signs of excessive growth act as an indicator to possible problems. A disk filter is fitted to help prevent blockage of the drippers and to protect the Dripline. This filter will require cleaning during servicing of the system. The owners will be verbally informed at the commissioning of this system of all maintenance requirements and strongly advised to have a service contract in place prior to final sign off of the system installation.



SECTION A-A
SCALE 1 / 20

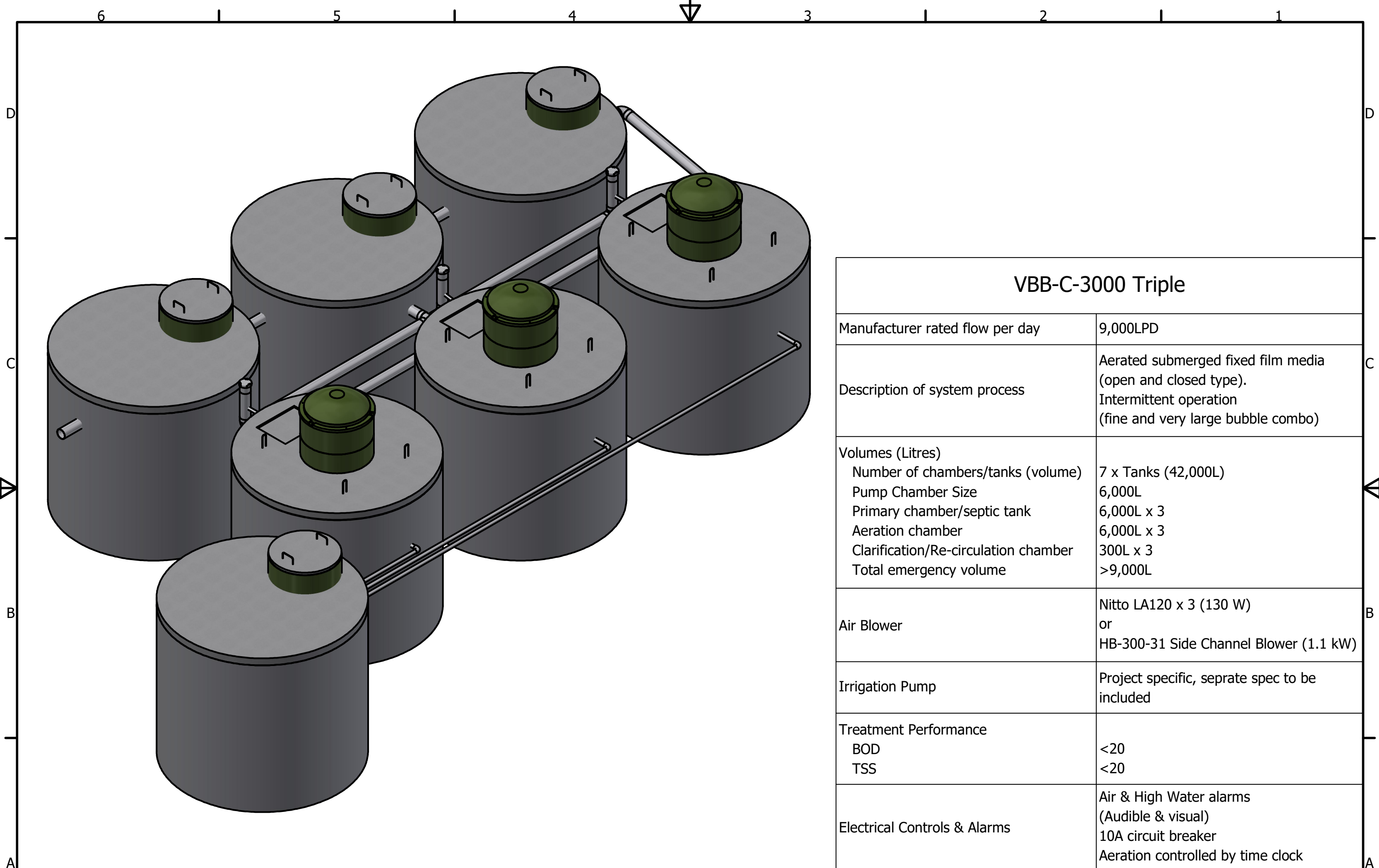
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1160 SH12
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22,500L Buffer Tank with uplift restraint

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VBB-C-3000 Triple	
Manufacturer rated flow per day	9,000LPD
Description of system process	Aerated submerged fixed film media (open and closed type). Intermittent operation (fine and very large bubble combo)
Volumes (Litres)	
Number of chambers/tanks (volume)	7 x Tanks (42,000L)
Pump Chamber Size	6,000L
Primary chamber/septic tank	6,000L x 3
Aeration chamber	6,000L x 3
Clarification/Re-circulation chamber	300L x 3
Total emergency volume	>9,000L
Air Blower	Nitto LA120 x 3 (130 W) or HB-300-31 Side Channel Blower (1.1 kW)
Irrigation Pump	Project specific, seprate spec to be included
Treatment Performance	
BOD	<20
TSS	<20
Electrical Controls & Alarms	Air & High Water alarms (Audible & visual) 10A circuit breaker Aeration controlled by time clock

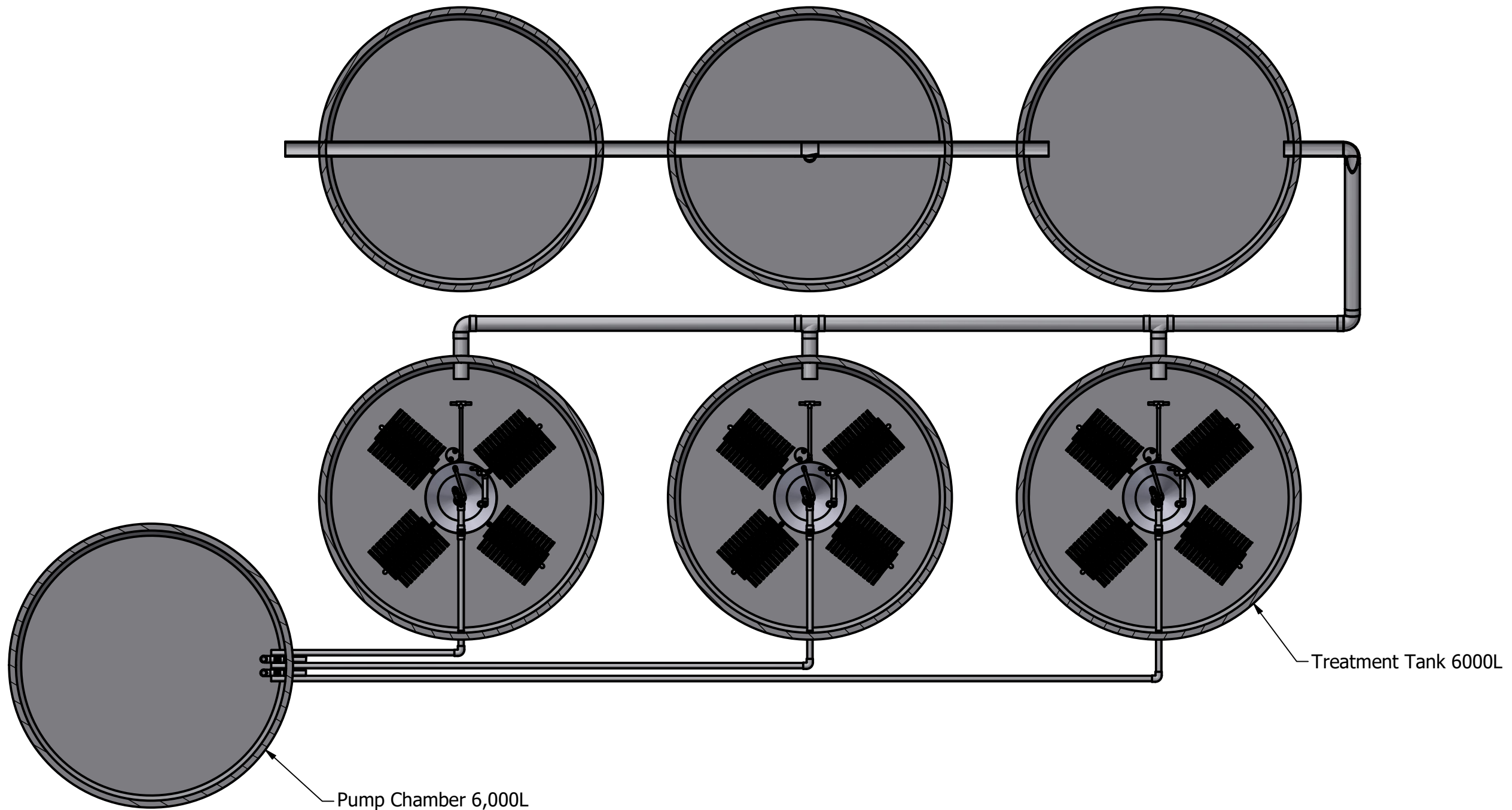


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Econotreat VBB-C-3000 Triple System - 6000L Septics

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SECTION A-A
SCALE 1 / 35



Pump Chamber 6,000L

Treatment Tank 6000L



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Econotreat VBB-C-3000 Triple System - 6000L Septics

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Sheet 2 of 3

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SCALE: 1 / 35

REF:

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DATE: 17/04/2019

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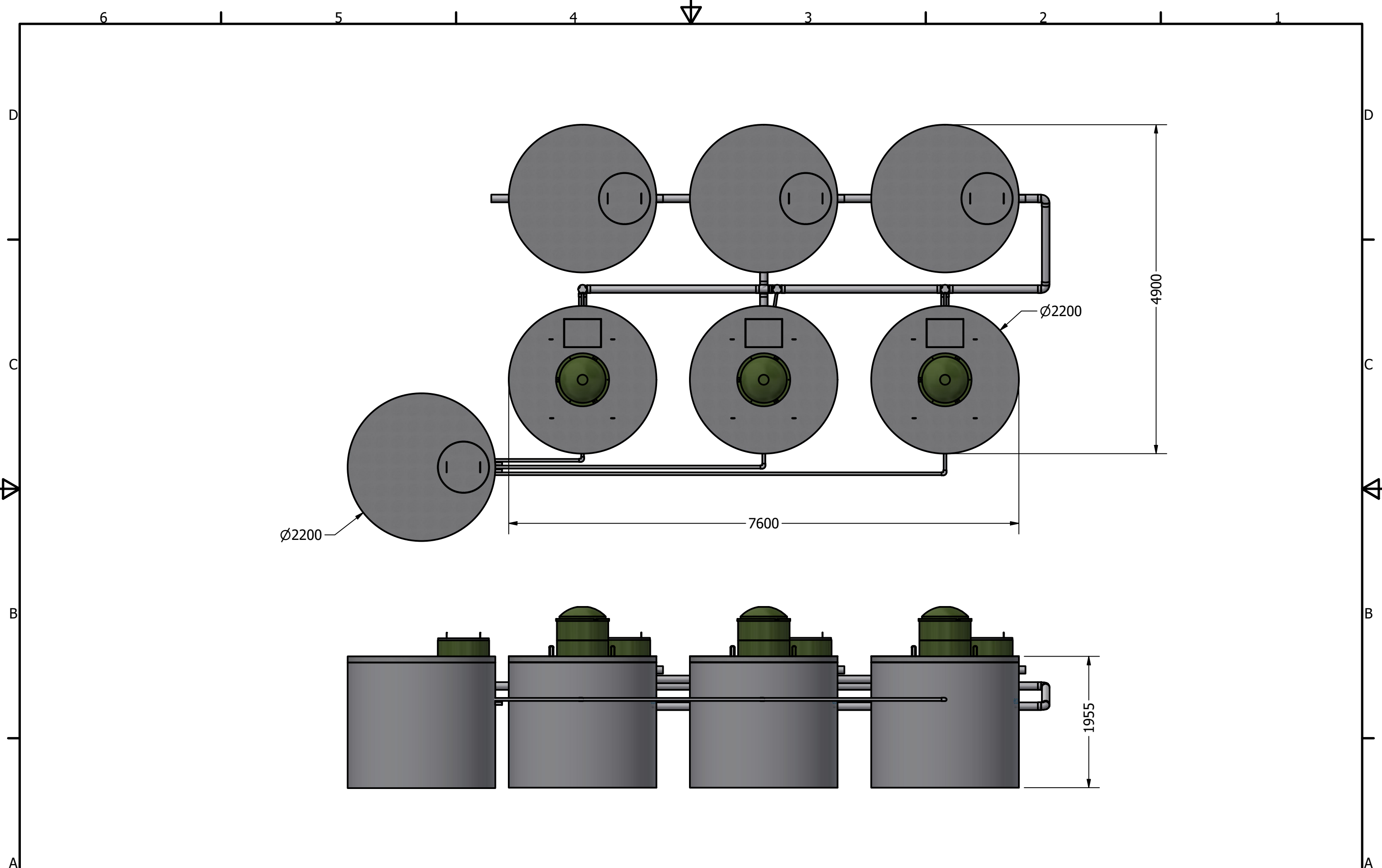
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Econotreat VBB-C-3000 Triple System - 6000L Septics

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DRAWN: Gerald	DATE: 17/04/2019		
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econo-treat

Econotreat VBB-C-3000 Treatment System

System Specifications & Installation Instructions



ECONOTREAT VBB-C-3000

System Specification & Installation Instructions

New Zealand's Leaders in Advanced Secondary Treatment Systems

Compliance Requirements

All Econotreat Treatment Systems meet the requirements of the NZ Building Code G13-VM4.

Section 9 of AS/NZS 1546.1:2008 state that tanks constructed to these Standards will meet the requirements of the Code for Clauses B1 and B2, structure and durability.

Compliance with Section 9 of AS/NZS 1546.1:2008 and also Clauses G13.3.4 relating to on-site treatment and disposal systems and G14.3.1 and 14.3.2 relating to the control of foul water as an industrial waste.

The Treatment Process

Primary Chamber / Tank

Influent enters the chamber via the source whereby scum and solids capable of settling are separated from the raw influent. Primary treated effluent flows through a transfer port to the aeration tank. This primary tank will also act as a storage chamber for sludge returned from the Clarification Chamber.

Aeration Chamber

Water enters from the Primary Chamber. Air is introduced into this chamber via an air blower to create an environment for aerobic bacteria and other helpful organisms to consume the organic matter present. The aeration tank is designed in a manner to help prevent short circuiting of the wastewater to ensure extended aeration. Media is present in the tank to support the growth of bacteria.

Clarification Chamber

The Clarification chamber is essentially a quiescent zone where suspended particles/solids are settled out of the water. These particles are returned to the Primary chambers via a sludge return which aids in further biological reduction, denitrification and providing a constant food supply rich in microbes supporting the system through periods of limited flows.

Performance	
BOD (g/m ³)	<10
TSS (g/m ³)	<10
Total Nitrogen TN (g/m ³)	<15
Ammonia Nitrogen NH ₄ -N (g/m ³)	<5
Total Phosphorous (g/m ³)	<5

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ECONOTREAT VBB-C-3000

System Specification & Installation Instructions

New Zealand's Leaders in Advanced Secondary Treatment Systems

Tank Specifications

Tanks are made of 50mpa Fiber Reinforced Concrete, which is suitable material for wastewater treatment containment meeting all the requirements of Section 4.3.3 of AS/NZS 1547:2012. These tanks have an expected lifespan of 50 years.

Dual Chamber Septic Tank

6000L Nominal Capacity
2200mm Diameter
1960mm High
~4,100kg

Aeration Tank

6000L Nominal Capacity
2200mm Diameter
1960mm High
~3,640kg

Installation Location and Certification

These tanks are not designed for vehicle loads and shall be located no closer than 2m to a driveway, road frontage or a building. If for any reason the tank is located where vehicle traffic may drive over the tank or approach closer than 2m, or where it may be trampled on by farm stock then the tank should be protected by a concrete slab designed to support these loads. Surface water must also be diverted from flowing into the installation.

Installation must be in accord with G13 of Building Code. Final producer statement certificate to be issued and held by the regulatory authority.

High Water Table Installations

All tanks have been engineered and designed for maximum strength, in accordance with the AS/NZS 1546.1:2008 and G13 Clauses B1 and B2 for structure and durability, to withstand any hydraulic pressures, both lateral and uplift, created by high water table conditions.

In high water table installations, it is important to fill the tanks with water. This removes the hydraulic uplift and simplifies the installation. In extremely high-water tables, a concrete foot can be added to the tank during manufacture. Waterflow must be made aware of this early on in view of supplying a tank that is fit for purpose.

Plumbing Pipes and Fittings

All internal plumbing is done with PVC pipes with appropriate connections according to AS/NZS 1260 and AS/NZS 4130.

Backfill and Bedding

Place and bed to NZBC G13/AS2, using compacted granular metal, in layers not exceeding 100mm.

If in doubt contact the experts on 0800 SEWAGE or sales@waterflow.co.nz

ECONOTREAT VBB-C-3000

System Specification & Installation Instructions

New Zealand's Leaders in Advanced Secondary Treatment Systems

Electrical

Where a pump is required on a flat site electrical connection must be installed according to AS/NZS 3000 and the control and alarm system must be in a weatherproof housing located in a readily visible position.


Warranty

WATERFLOW NZ LTD warrants that the Econotreat System will be free from defects in material and workmanship for the following periods of time from the date of installation as set out in the following conditions:

1. Concrete Tank 15yrs
2. Roto-Molded Tanks 15yrs
3. Nitto Blower 2yrs
4. Irrigation Pumps 2yrs
5. Warranty of Operation covers the performance of the Econotreat System as connected to the effluent inflow for which they are designed, and has been installed to the criteria as set out in the relative installation instructions and procedures, and has an assigned Service/Maintenance contract in place with Waterflow NZ Ltd or it's appointed agent/s.

Warranty excludes defects due to:

- A) Failure to use the system in accordance with owner's manual.
- B) A force majeure event outside the reasonable control of WATERFLOW NZ LTD such as (but not limited to) earthquake, fire, flood, soil subsidence, ground water table variations or plumbing fault.
- C) Modifications to surrounding landscape contour after installation
- D) The actions of a third party
- E) The system required to bear loads (either hydraulic or biological) greater than that for which it was designed
- F) Any modifications or repairs undertaken without the consent of WATERFLOW NZ LTD
- G) Failure, where applicable, to fence and plant disposal field.



1st June 2014
Dean Hoyle
Managing Director

ECONOTREAT VBB-C-3000

System Specification & Installation Instructions

Econotreat VBB-C-3000 Installation Instructions

The Econotreat system is to be installed or signed off by a registered Drain layer to the design specified by Waterflow NZ Ltd.

The following installation instructions and procedures followed correctly will ensure System performance is not compromised in any way.

1. Excavate two 2.5m x 2.5m level platforms at an appropriate depth to ensure adequate fall for inlet pipe from the source. This has to be installed on virgin ground. The two platforms are ideally on the same level and next to each other, either side-by-side or end-on-end.
2. Lay 100mm of bedding metal on platform and place the Septic and Aeration tanks next to each other. As close as practically possible to minimize the connection distance between the tanks.
3. Connect the two tanks with 100mm PVC. If the tanks are side-by-side the connection will need supporting. This is done by tying it back to the wire on the lids with a length of rope supplied. The rope can be found in the top of the treatment tank.



Sludge return 25mm



Supported with rope

4. Next connect the sludge return. This is a 25mm PVC pipe that come out of the central riser on the treatment tank. This must be plumbed back to the second 100mm PVC at the start of the septic tank. It is important that this pipe is falling slightly or at minimum flat.
5. Trench from Dose Chamber outlet to disposal field and lay the 25mm alkathene feed line.
6. Take a minimum of 3 photos at this point to showing connections and back fill, to ensure correct installation for sign off.
7. Back fill around tanks. Using spoil from the excavation is fine, be aware that this will settle over time though.

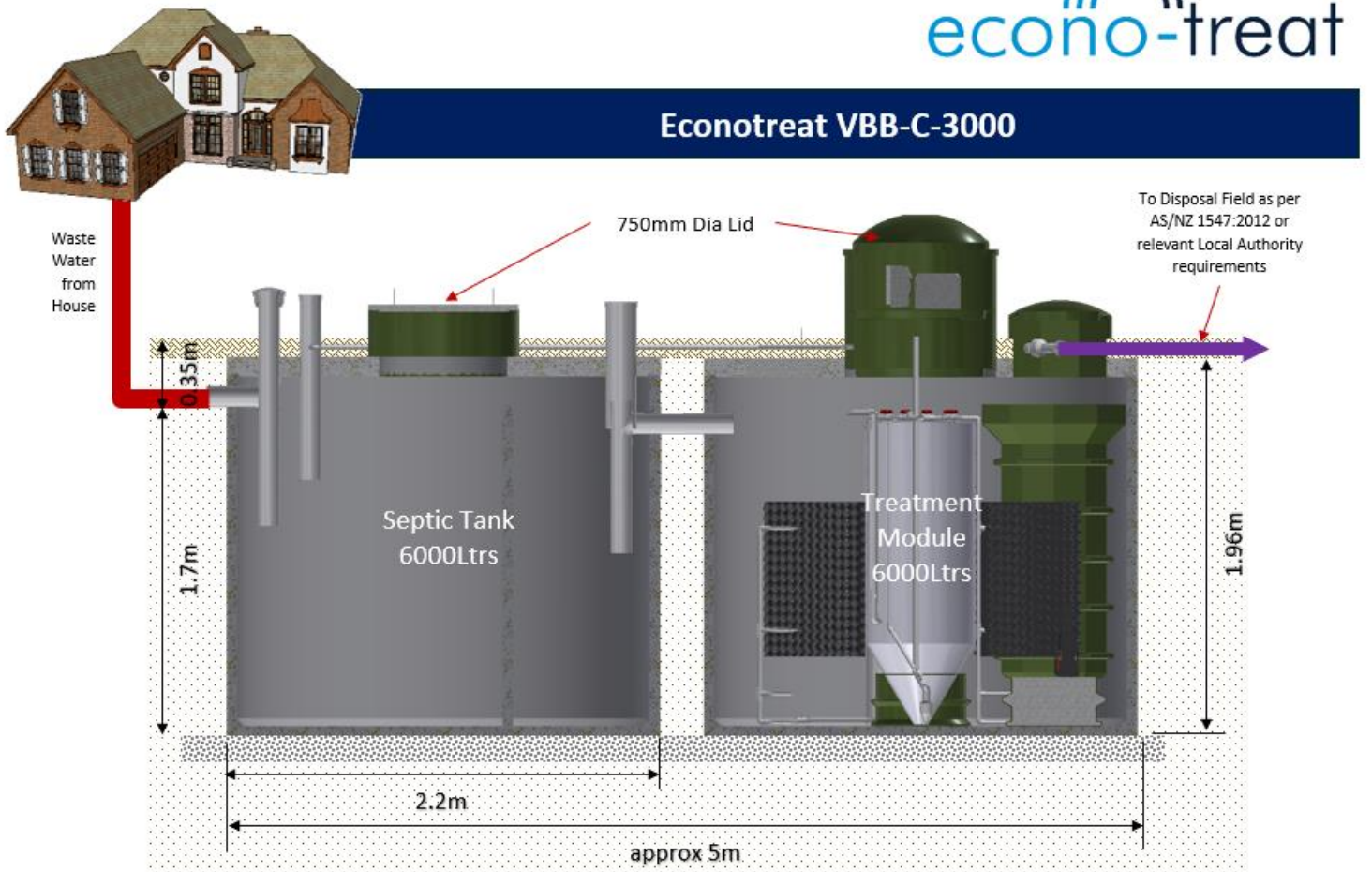
Caution: System must be protected from excessive super imposed loads both lateral and top loads. E.g. loads from vehicular traffic. There needs to be at least 2m of clearance maintained around system.

If in doubt contact the experts on 0800 SEWAGE or sales@waterflow.co.nz

ECONOTREAT VBB-C-3000

System Specification & Installation Instructions

Econotreat VBB-C-3000 Schematic Drawings



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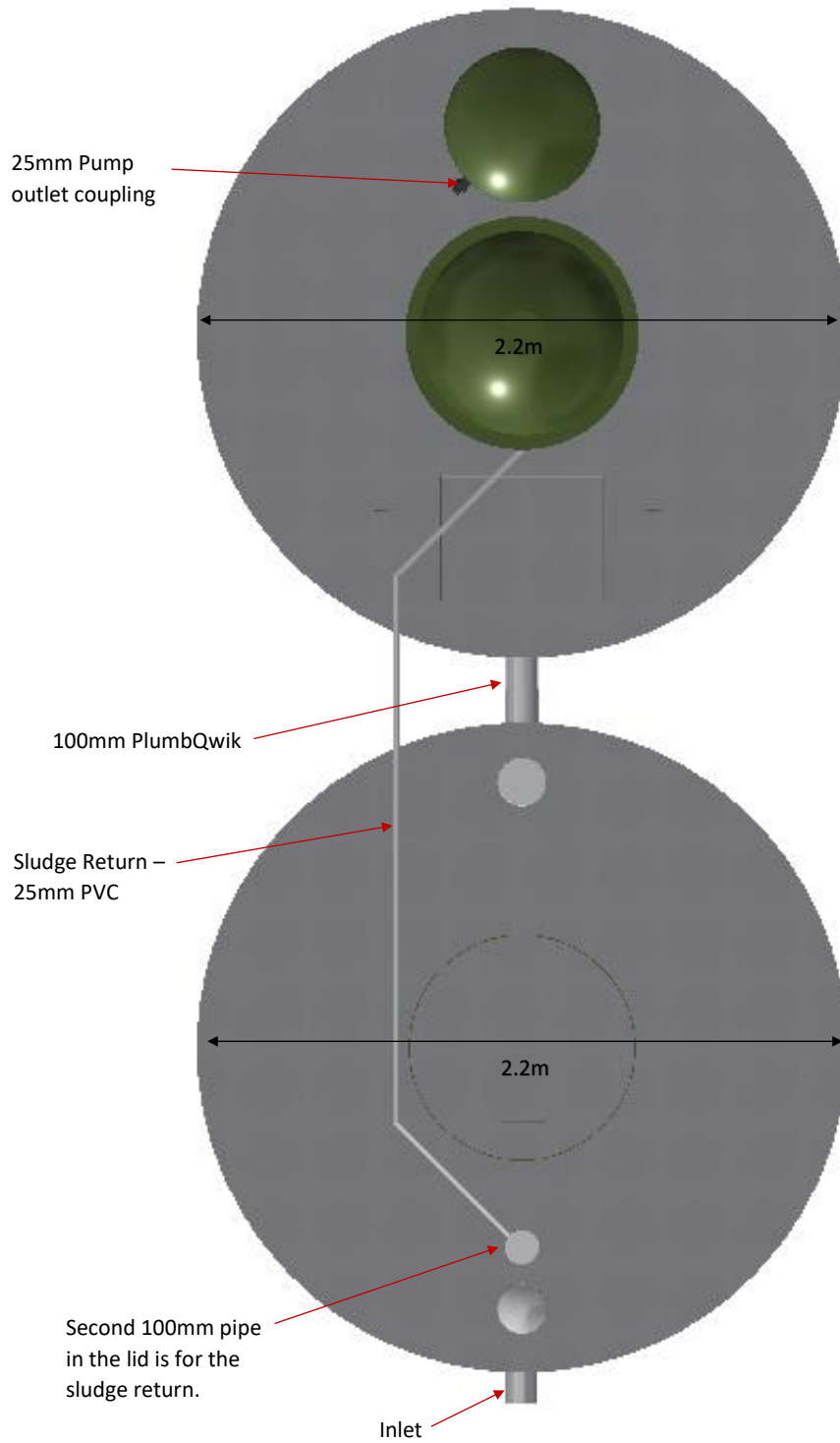
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ECONOTREAT VBB-C-3000

System Specification & Installation Instructions

Econotreat VBB-C-3000 Schematic Drawings

End on End Installation





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Or for more information www.waterflow.co.nz



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econo-treat
Advanced Secondary Treatment

Econotreat Aerated Wastewater Systems

Home Owners Guide



ECONOTREAT AERATED WASTEWATERSYSTEMS

Home Owners Care Guide

Trusted Wastewater Management Solutions

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ECONOTREAT AERATED WASTEWATERSYSTEMS

Home Owners Care Guide

Trusted Wastewater Management Solutions

To the Home Owner

Thank you for choosing an Econotreat System to treat and care for your on-site sewage and wastewater.

Your Econotreat System is fully automatic in operation and requires little owner intervention to ensure years of service. It is useful that the owner/operator of the system understand some of the broad concepts of the system operation. This manual has been written to provide this simple explanation and to serve as a future reference so that you can ensure that the system is operating effectively at all times.

We would encourage you to monitor and care for your Econotreat system with our backing and support and by doing so you will learn how your system works and operates and how to keep it in top working order. Waterflow promises consistent results year after year.

Kind regards,
The Waterflow Team

Warranty

WATERFLOW NZ LTD warrants that the Econotreat System will be free from defects in material and workmanship for the following periods of time from the date of installation as set out in the following conditions:

1. Concrete Tank 15yrs
2. Roto-Molded Tanks 15yrs
3. Nitto Blower 2yrs
4. Irrigation Pumps 2yrs
5. Warranty of Operation covers the performance of the NaturalFlow System as connected to the effluent inflow for which they are designed, and has been installed to the criteria as set out in the relative installation instructions and procedures, and has an assigned Service/Maintenance contract in place with Waterflow NZ Ltd or it's appointed agent/s.

Warranty excludes defects due to:

- A) Failure to use the system in accordance with owner's manual.
- B) A force majeure event outside the reasonable control of WATERFLOW NZ LTD such as (but not limited to) earthquake, fire, flood, soil subsidence, ground water table variations or plumbing fault.
- C) Modifications to surrounding landscape contour after installation
- D) The actions of a third party
- E) The system required to bear loads (either hydraulic or biological) greater than that for which it was designed
- F) Any modifications or repairs undertaken without the consent of WATERFLOW NZ LTD
- G) Failure, where applicable, to fence and plant disposal field.

ECONOTREAT AERATED WASTEWATERSYSTEMS

Home Owners Care Guide

Trusted Wastewater Management Solutions

How it Works

Primary Chamber / Tank

Influent enters the chamber via the source whereby scum and solids capable of settling are separated from the raw influent. Primary treated effluent flows through a transfer port to the aeration tank. This tank will also act as a storage chamber for sludge returned via the Clarification Chamber.

Aeration Chamber

Water enters via the Primary Chamber. Air is introduced into this chamber via an air blower to create an environment for aerobic bacteria and other helpful organisms to consume the organic matter present. The aeration tank is designed in a manner to help prevent short circuiting of the wastewater to ensure extended aeration. Media is also present in the tank to support the growth of bacteria.

Clarification Chamber

The Clarification chamber is essentially a quiescent zone where suspended particles/solids are settled out of the water. These particles are returned to the Primary chambers via a sludge return which aids in further biological reduction, denitrification and providing a constant food supply rich in microbes supporting the system through periods of limited flows.



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ECONOTREAT AERATED WASTEWATERSYSTEMS

Home Owners Care Guide

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Servicing

Your Econotreat System requires annual service and maintenance inspections (this can vary depending on local council regulations). This will need to be done by our trained technicians. We will phone to arrange a suitable time to attend to your servicing needs.

A record sheet (in triplicate) will be completed by our technician at the time of service. One copy is for you the customer and available upon payment, another is sent off to Council and the third copy will be retained for our records.

Please call our office on the number listed at the back of this manual for the cost of servicing after the initial 12-month period.

1. A general inspection of tank area, irrigation and drainage.
2. Inspection of electrical equipment including timer, Low powered Blower, irrigation pump, warning lights and connections.
3. Inspection of Pump-out Chamber and septic tank, checking air lines, adjusting air supply (if necessary), operating de-sludging unit, resetting air control, operating submersible switch, checking bio-mass growth, checking sludge level.
4. Inspection of irrigation including lines, jets and outlets. Between 4 - 9 years the tank will need to be de-sludged (pumped out) as with any septic tank. We will notify you of this requirement, as the service technicians will be monitoring sludge depth annually.

Holiday Precautions

There are no precautions to take. Your Econotreat can be left to function automatically for 6 to 12 months. However, if you are likely to be away from home for more than six months you may like to contact our office, so we can make a routine check.

Responsibility

As the owner of the system, you are responsible for the correct operation and maintenance and to conform to Council's requirements.

Slowly remove irrigation cap (unscrew anti- clockwise). It is important to unscrew slowly to allow any built-up pressure to be relieved. Watch out for the O-ring inside the cap, be careful not to drop this in the tank.

ECONOTREAT AERATED WASTEWATERSYSTEMS

Home Owners Care Guide

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Problem Solving

To ensure the most effective operation of your Econotreat System you should familiarize yourself with the contents of this manual. The Econotreat has been designed to include additional safety margins and minor mishaps and normal household usage will not usually affect the operation of the system.

However, if the alarm sounds or strong odors persist Please call your service agent.

Area of Concern	Potential Cause	Remedial Action
Alarm sounds	Irrigation pump not working	Check water levels
	Air supply not working	Listen for the air compressor
	No power at the tank	Check power supply source
Water around tank	Irrigation pump not working	Check water levels
	Irrigation lines blocked or kinked	Check irrigation lines and clear sprinklers
Excessive foaming	Too much laundry detergent	Use recommended quantities
	Too many washes	Spread wash loads over different days
Persistent odors	Too much water usage	Add biologic starter pack
	Excessive chemicals in use	Install water saving devices
		System will recover
Irrigation system not working	Pump failure	Check water level
	Irrigation lines blocked	Clear irrigation lines
Water ponding on irrigation field	Irrigation line blocked	Installation should comply with original approval
	Excessive water use	Install water saving devices
	Broken irrigation pipe	Repair irrigation pipe

Do not flush baby wipes down toilets

ECONOTREAT AERATED WASTEWATERSYSTEMS

Home Owners Care Guide

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Caring for Your Wastewater System

Components of Your Complete Wastewater Septic System

A typical wastewater septic system has two main components: a Wastewater Treatment System and a Land Application System (or disposal field). This is simply treatment then discharge.

Efficient Water Use – ‘it does make a difference’

Average indoor water use in the typical single-family home is approximately 180ltrs per person per day. The more water a household conserves, the less water enters the septic system. Efficient water use can improve the operation of the wastewater system and reduce any risk of disposal field overload.

High-efficiency toilets

Toilet use accounts for 25 to 30 percent of household water use.

Do you know how many liters of water your toilet uses to flush? Most older homes have toilets with 11+ liter reservoirs, while newer high-efficiency dual flush toilets use 6.3/5.5ltrs or down to 4.5/3ltrs of water per flush. N.B. Did you know leaky toilets can waste as much as 700ltrs each day.

Consider reducing the volume of water in the toilet tank with a volume displacer (fancy name for a brick, stone etc!) if you don't have a high-efficiency model or replacing your existing toilets with high efficiency models.

Check to make sure your toilet's reservoir isn't leaking into the bowl. Add five drops of liquid food coloring to the reservoir before bed. If the dye is in the bowl the next morning, the reservoir is leaking, and repairs are needed.

Water fixtures

A small drip from a faucet may add many liters of unnecessary water to your system every day. To see how much a leak adds to your water usage, place a cup under the drip for 10 minutes. Multiply the amount of water in the cup by 144 (the number of minutes in 24 hours, divided by 10). This is the total amount of clean water travelling to your septic system each day from that little leak.

Faucet aerators and high efficiency showerheads

Faucet aerators help reduce water use and the volume of water entering your septic system. High-efficiency showerheads also reduce water use.

Washing machines

By selecting the proper load size, you'll reduce wastewater. Washing small loads of laundry on the large-load cycle wastes precious water and energy. If you can't select load size, run only full loads of laundry. N.B. A new Energy Star washing machine uses 35 percent less energy and 50 percent less water than a standard model.

If in doubt contact the experts on 0800 SEWAGE or sales@waterflow.co.nz

ECONOTREAT AERATED WASTEWATERSYSTEMS

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Watch your drains!

What goes down the drain can have a major impact on how well your wastewater system works.

What shouldn't you flush down your toilet?

Dental floss, feminine hygiene products, diapers, cotton swabs, cigarette butts, cat litter, and other kitchen and bathroom items that can clog and potentially damage septic system components if they become trapped. Flushing household chemicals, gasoline, oil, pesticides, antifreeze, and paint can also stress or destroy the biological treatment taking place in the system or might contaminate surface or ground waters.

Care for your Land Application System

Your land application system is an important part of your wastewater system. Here are a few things you should do to maintain it:

- Flush driplines regularly – every 3 months recommended
- Plant only recommended wetland plants over and near your wastewater system. Roots from nearby trees or shrubs might clog and damage the drain field
- Don't drive or park vehicles on any part of your wastewater system. Doing so can compact the soil in your drain field or damage the pipes, tank, or other septic system components
- Do not build any structures over it or seal it with concrete, asphalt etc.
- Keep roof drains, basement sump pump drains, and other rainwater or surface water drainage systems away from the drain field. Flooding the drain field with excessive water slows down or stops treatment processes and can cause plumbing fixtures to back up
- Trees with very aggressive roots, such as willows, should be kept well away from the disposal system, see page 11 for list of recommended planting
- A soggy drain field won't absorb and neutralize liquid waste. Plan landscaping, roof gutters and foundation drains so that excess water is diverted away from the Land Application System

Household Cleaning Chemicals

Effects on Wastewater and Disposal System Receiving Environments

Use of many cleaning chemicals in facilities served by on-site disposal systems, can result in high concentrations of the constituents in those cleaning agents being discharged into the receiving soils. These chemicals and constituents can have a massive impact on the quality and condition of the receiving soils over time.

Many of the chemicals can disrupt soil structure and decrease hydraulic conductivity while others can act as bactericides, destroying the essential micro-organisms required to achieve the high level of biodegradation in the treatment and disposal systems.

The following matters need to be considered when using cleaning agents in a domestic situation:

- Laundry powders are often extremely high in sodium which will destroy the salt balance in the soils. Check the labels for low sodium and phosphorous contents.
- Wastewater flow from dishwashing machines can have an impact on wastewater treatment systems, in terms of the strong cleaning chemicals used, so check labels for low sodium products
- Highly corrosive cleaners (such as toilet and drain cleaners) that have precautionary labels warning users to minimize direct contact, are an indication that they can adversely affect the wastewater treatment system. Up to 1 cup of bactericides such as bleach can be sufficient to impact on all the microorganisms/bugs in a septic system.

Recommended Cleaning Brands:



earthwise
caring for your world

Cleaning Substitutes

Substitutes for Household Cleaning Chemicals (Ref TP58)

Use of the following readily biodegradable substitutes for common potentially harmful household cleaning chemicals will reduce the stress on any wastewater system, significantly enhance the performance of the whole system and increase the life of the land application system, while reducing the potential effects of the receiving soils.

General Cleaners

Use soft soap cleaners and bio-degradable cleaners and those low in chlorine levels.

Ammonia-Based Cleaners

Instead sprinkle baking soda on a damp sponge.

Disinfectants

In preference use Borax (sold in most Bin Inn stores): ½ cup in 4-litres of water.

Drain De-Cloggers

Avoid using de-clogging chemicals. Instead use a plunger or metal snake or remove and clean trap.

Scouring Cleaners and Powders

Instead sprinkle baking soda on a damp sponge or add 4-Tbs baking soda to 1-Litre warm water. It's cheaper and won't scratch.

Toilet Cleaners

Sprinkle on baking soda, then scrub with toilet brush.

Laundry Detergent

Choose one with a zero-phosphate content and low in alkaline salts (in particular, a low sodium level) and no chlorine.

Oven Cleaners

Sprinkle salt on drips, then scrub. Use baking soda and scouring pads on older spills.

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In a Nutshell

Because your system is fully automatic there is no need for the owner to be concerned. However, there are some simple precautions to observe:

DO

- Avoid using strong acids, alkalis, oils and chemicals in your toilet, bathroom, laundry and kitchen (too much can kill off the working “bugs”).
- Limit the use of water in the dwelling.
- Try to spread wash loads over different days.
- Try to avoid using the washing machine and shower at the same time.
- Front loader washing machines reduce water usage.
- If your system requires power supply make sure this remains on continuously, unless system is being serviced.
- Check faucets and toilets for leaks; make repairs if necessary.
- Use low flush toilets where possible.
- Use a ‘displacer’ to reduce the amount of water needed to flush older toilets.
- Use aerators on faucets and flow reducer nozzles on showers to help lower water consumption.
- Reduce water levels for small loads of laundry.
- Wait until the dishwasher is full to run it.
- Densely plant your field to maximize transpiration.
- Perform regular monthly visual checks of your system and field.
- Grass should be mowed or trimmed regularly to optimize growth and prevent the grass from becoming rank.
- Use signs, fences and/or plantings to prevent any vehicle or stock access.
- Keep records of all maintenance undertaken on the wastewater systems.
- Monitor and care for your Wastewater System as per instructions in the home owner’s manual.

DON'T

- Switch off power unless servicing
- Use chlorine-based disinfectant & cleaning products in the toilets or kitchen sink (Cleaners high in chlorine, phosphorous or ammonia must not be used)
- Over use heavy cleaners that kill beneficial bacteria in the septic system
- Pour any toxic/strong chemicals (paint, oil, grease, paint thinners or pesticides) down any drains
- Flush down your toilet – Dental floss, feminine hygiene products, diapers, cotton swabs, cigarette butts, cat litter, and other kitchen and bathroom items
- Discard any drugs down the sink or toilet
- Alter or add any part of your system without Waterflow NZ LTD’s approval
- Never turn the system off, even when away on holidays.

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Plants Suitable for Onsite Wastewater Disposal Systems

Plantings that will soon have your field looking magnificent!

Below are some of the most common of native and other plant species that are tolerant or fond of moist conditions, such as those associated with wastewater disposal fields.



Cordyline australis



Apodasia similis



Alocasia nigrescens



Carex secta

- Alocasia nigrescens (Black Taro)
- Apodasmia similis (Oioi)
- Arthropodium Matapouri Bay
(Rengarenga Lily)
- Carex dispacea
- Carex dissita
- Carex maorica
- Carex secta
- Carex tenuiculmis
- Carex virgata
- Cordyline australis (Cabbage Tree)
- Cordyline Midnight Star
- Leptospermum Burgundy Queen
(Flowering Ti Tree)
- Lomandra Tanika
- Phomium Surfer

See our website: www.waterflow.co.nz



"Making it Easy"

Call us today to discuss your needs

0800 SEWAGE

Or for more information www.waterflow.co.nz



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E. kerry@waterflow.co.nz

www.waterflow.co.nz

Date: 4/7/2022
Client: Taheke Marae
Address: [REDACTED]
Phone: [REDACTED]

Quote: 0009063R2
JN#: WF9063
Attn: Paul White
Email: paul.birch6097@gmail.com

Thank you for giving us the opportunity to supply this proposal for your wastewater management system.
Waterflow NZ LTD strives to reduce your environmental impact and maximise your return on investment.

Name and Site Address	Marae State Highway 12
Legal Description	Lot ##, DP #####
Waste Water System	Econotreat EconoTreat VBB-C-3000 - Pumped discharge
Number Bedrooms	Taheke Marae
Water Supply (Tank/Reticulated)	Rain water (roof collection)
Total Design Flow (ltrs)	5142.857
Disposal Field Type	PCDI surface laid
Disposal Field Size (m²)	1714 - Split into 2 using an indexing valve.

This proposal covers the following:

- To supply onsite wastewater system design (TP58) for council consent
- Supply and installation of the wastewater system and disposal field
 - Backfill may sink over time and require topping up (topping up not allowed for in this proposal)
- Decommission & suck out existing system
- Lay & connect 50mtrs of wastewater drains - subject to final site measure
- Extra Provision Costs as set out below
- Supply and installation of 5200L grease trap

Wastewater System Investment

EconoTreat VBB-C-3000 Wastewater system:	\$ 88,317.04
Buffer Tank:	\$ 12,901.92
PCDI Disposal field kit:	\$ 12,708.77
10% Trade Discount:	\$ -11,392.77
Installation & materials:	\$ 36,550.00
Subtotal:	\$ <u>140,584.96</u>
Total Including GST	\$ 161,672.70

Grease Trap Investment

Wastewater system & disposal field kit:	\$ 8,156.52
10% Trade discount:	\$ -815.65
Installation & materials:	\$ 1,541.30
Subtotal:	\$ <u>8,882.17</u>
Total Including GST	\$ 10,214.50

Drainage Connections

Wastewater drainage:	\$ 4,000.00
Subtotal:	\$ <u>4,000.00</u>

Waterflow NZ LTD

PO Box 24, 1160 State Highway 12, Maungaturoto 0547

P. 0800 628 356 F. 09 431 8845 E. sales@waterflow.co.nz www.naturalflow.co.nz

Initial: _____

Total Including GST \$ **4,600.00**

Provisional Cost

Suck out & decommission existing septic system:	\$ 9,100.00
Clear Vegetation:	\$ 8,750.00
Supply and mulch field:	\$ 16,520.00
Supply and plant field:	\$ 31,260.00
Fencing of the disposal field:	\$ 6,587.00
Subtotal:	\$ <u>72,217.00</u>
Total Including GST	\$ 83,049.55

Total Investment Including GST \$ **259,536.76**

This proposal does not include any of the following:

- Plumbing or sub-floor drains
- Electrical connections to system
- Removal of any excess spoil off site
- Consent Application or Council Consent fees

Terms and Conditions:

This proposal is subject to final wastewater design approval by the applicable regulatory authority.

On acceptance of this quote a \$1500 excl GST deposit is required to complete all documentation for consent.

This is non-refundable if the project does not proceed.

Further payment terms are 50% upfront to prepare stock 30% prior to delivery and remainder at installation completion. If completion of project is delayed by circumstance's/events beyond our control further progress payments at our discretion may be required. Full payment is required before the issue of final documentation.

This quotation is based on site conditions, site plans provided, site access for machinery and underground conditions at the time of site assessment, any deviation from this may incur extra cost.

All underground services are to be clearly located by owner before excavation starts and any services damaged that are not located will not be the responsibility of the installer.

Boundaries must be clearly identifiable, and the location of buildings accurately marked out.

This quotation is valid for 60 days from the above date. Prices are valid for 6 months from the time of signing or accepting this proposal.

If you have any questions regarding this proposal or wish to discuss any aspects of it please feel free to contact us at any time.

We thank you once again for the opportunity to present this proposal, would value your favourable consideration and look forward to working through this with you.

Kind Regards





Caleb Pirini
Sales Representative

I, _____ hereby accept this proposal (#0009063R2) including the terms and conditions as above and Waterflow NZ Ltd Standard terms of trade (a copy of Waterflow NZ Ltd terms of trade will be supplied upon request).

Signature: _____

Date: _____



Initial: _____

Application for Resource Consent - Taheke Marae

Steven Sanson <steve@sansons.co.nz>
To: environmentalplanning@nzta.govt.nz

Sat, Oct 28, 2023 at 4:27 PM

Hello,

Please find in the link below an application for resource consent for Taheke Marae that is to be submitted to the Far North District Council and Northland Regional Council

<https://boiplanning.sharepoint.com/:f:/s/BOIPlanning/EidAJMCeYfZGiG4u8ZtXIBEBIJ-jl8Sxz8zE372w3TaHlg?email=environmentalplanning%40nzta.govt.nz&e=9PKhBs>

The proposal includes additional buildings for the Marae which are within the 10m setback of the Rural Production Zone. The breach is on the roadside boundary (SH12). Therefore, we are seeking NZTA feedback / approval on the proposal.

Appreciate your comments noting these will be formally lodged with each respective agency in due course.

Nga Mihi,

--
Steven Sanson (BPlan Hons)
M: 021-160-6035 | steve@sansons.co.nz
Managing Director | Consultant Planner
www.sansons.co.nz





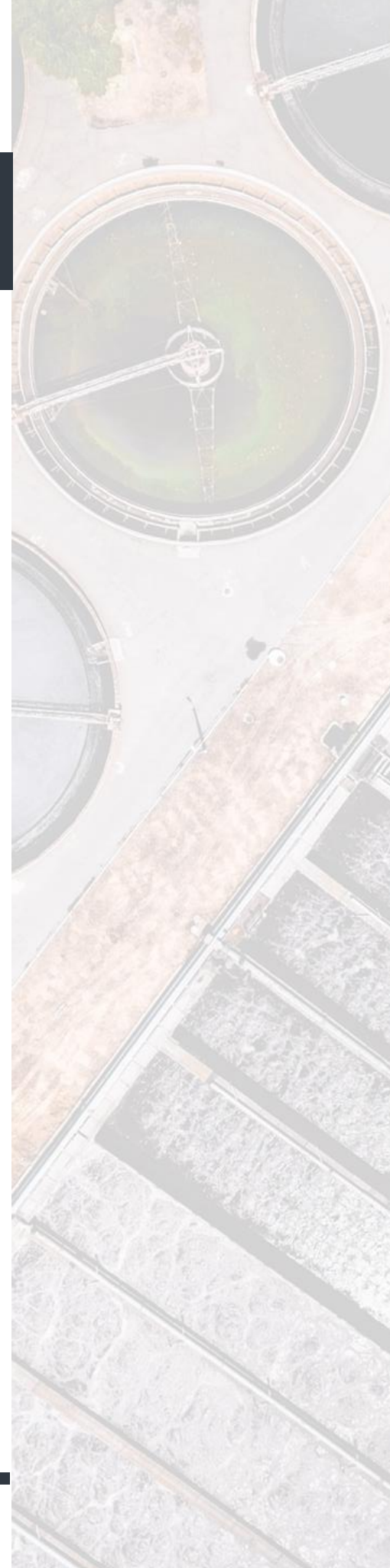
geologix
consulting engineers

STORMWATER MANAGEMENT REPORT

TAHEKE MARAE,
3184 STATE HIGHWAY 12,
TAHEKE

WATERFLOW LTD

**C0299-3W-01
JULY 2023
REVISION 1**





DOCUMENT MANAGEMENT

Document Title Stormwater Management Report

Site Reference Taheke Marae, 3184 State Highway 12, Taheke

Client Waterflow Ltd

Geologix Reference C0299-3W-01

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Revision 01

Prepared Sander Derks
Graduate Civil Engineer, Dip Eng

Approved Edward Collings
Managing Director, CEnvP, CPEng, MPhys (Hons)



Signer ID: BVJRNOBNO9...

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REVISION HISTORY

Date	Issue	Prepared	Approved
June 2023	First Issue	SD	EC



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1 INTRODUCTION

This Stormwater Management Report has been prepared by Geologix Consulting Engineers Ltd (Geologix) for Waterflow NZ Ltd as our Client in accordance with our standard short form agreement and general terms and conditions of engagement.

Our scope of works has been undertaken to assist with Resource and Building Consent application in relation to the proposed additions and amendments of an existing Marae development at 3184 State Highway 12, Taheke, the 'site'. This assessment provides means of managing stormwater runoff from proposed impervious surfaces with a less than minor effect on the environment as a result of the proposed activities outlined in Section 1.1.

1.1 Proposal

A proposed development plan was presented to Geologix at the time of writing, prepared by Arcline Architecture¹ and is reproduced within Appendix A as Drawing No. 400. It is understood the Client proposes to upgrade the existing buildings on the site with some minor additions, a new covered deck and entrance canopies and a future ablutions block under a stage 2 development. Amendments to the referenced plan may require an update to the recommendations of this report.

2 SITE DESCRIPTION AND DESKTOP ASSESSMENT

The site is legally described as Taheke B Block ML 441020 and occupies approximately 5,047m² to the south of State Highway 12 designated as Rural Production land according to the Far North District Plan zone maps, see Figure 1.

The site is roughly rectangular in shape with the State Highway 12 reserve delineating the northern boundary and with bush and scrub beyond the southern boundary. The adjacent properties present as similar sized parcels developed with a rural residential purpose. Topographically the site is gently sloping down from south to north.

2.1 Flood Hazard Assessment

Stormwater at the site is anticipated to move as sheet flow across the property to the north, intercepted by State Highway 12 and a roadside swale, ultimately moving downslope and into an adjacent river meandering around the site with the tidal CMA to the northwest. One minor overland flow path has been identified within the site boundaries, channelling surface water towards the road from the upper slopes to the south.

Road runoff stormwater will be intercepted by well-defined roadside swales. Available GIS data from the NRC² and FNDC³ systems indicate flood hazard either adjacent to but not

¹ Arcline Architecture, Sheet Ref. A-101, not dated.

² <https://localmaps.nrc.govt.nz/LocalMapsGallery/>

³ <https://www.fndc.govt.nz/Our-Services/Online-maps/Far-North-Maps>



within the site boundaries as a result of river and coastal flood inundation processes. A summary of flood potential and the downstream environment is presented as Table 1.

Table 1: Summary of Flood Hazard Potential

Event	Location	Prediction at Site	Downstream Prediction
River Flood, 10 % AEP		Overtops channel banks to pastureland surrounding the channel up to 7m contour. Site elevation 8 m at lowest point.	Generally confined to river channel, overtopping banks to the south.
River Flood, 2 % AEP*			
River Flood, 1 % AEP*	Northern boundary		Contained flooding over pasture to north and south of channels, contained within valley bottom, up to approximately the 7 m contour. SH12 acts as a minor barrier to flows to the north of the site. Flooding potential on adjacent properties downstream to the west.
Coastal Flood, current		No hazard mapped.	Nearest hazard reaches up drainage channels to c. 200 m downstream of site.
Coastal Flood, 2 % AEP		Generally contained in channel.	Some general sheet flow across low lying pastureland overtopping drainage channels.
Coastal Flood, 1 % AEP & Rapid Sea Level Rise		No hazard mapped.	Some general sheet flow across low lying pastureland overtopping drainage channels.

* Minor increase in flood area over less minor event(s).

2.2 Design Storm Event

This assessment has been modelled to provide stormwater attenuation and management as follows:

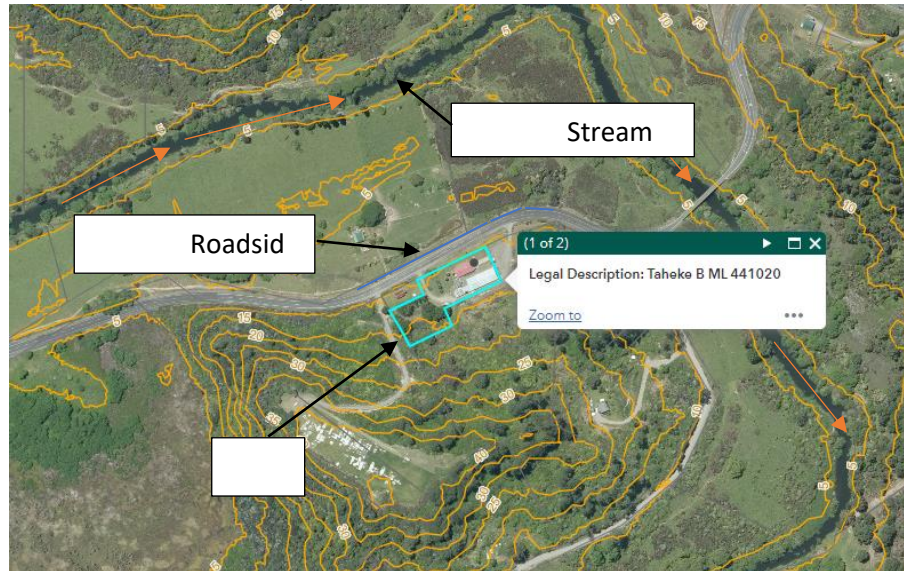
Due to widespread flooding downstream and with downstream properties within this zone, stormwater attenuation and management will be designed to accommodate the 1 % AEP storm event peak flows with provision for climate change.

Attenuation modelling under the above scenarios avoids exacerbating downstream flooding and correctly sized discharge and management devices reduce scour and erosion at discharge locations which may otherwise result in concentrated discharge.

2.3 Existing Stormwater Management

Existing impervious surfaces and associated stormwater devices are recorded within the site boundaries. Stormwater from existing building roof areas is directed to five, 25,000 litre water tanks. Metal internal driveway stormwater runoff is diverted to surrounding areas. A recently new vehicle crossing at the northeastern site entrance has enhanced stormwater management with riprap on both sides. Roadside stormwater management includes a well-defined grassed swale drain and driveway culverts at the northern boundary, see Figure 1.

Figure 1: Site Location and Stormwater System



3 PROPOSED DEVELOPMENT

Proposed development plans presented to Geologix at the time of writing, indicate the proposed development of the site entailing extensions of the two current existing buildings and a future plan to remove and replace the ablution block on Taheke Marae. Based on the information presented to us some key design assumptions have been made below. Should the proposed development or the built environment differ from these assumptions, amendments to this report and design may be required.

3.1 Design Assumptions

- The existing consented development comprises of two large buildings, a separate toilet building, a metal driveway around the perimeter and some pathways between buildings.
- Proposed deck is indicated to be entirely under a veranda and canopy. As such the area is classed as impermeable.
- Stage 2 proposed future ablution block is incorporated in this stormwater management design concept. Taking in account the old existing building will be replaced by the new building design. The proposed roof area comprises 90 m².
- Extension of the Wharehui building, 31 m².
- New decking with canopy around the Wharekai building, 102 m².
- Three additional 25,000 l water tanks to total of five potable water supply tanks on site.

3.2 Impermeable Surfaces

A summary of existing and proposed impermeable surfaces is presented as Table 2.



Table 2: Summary of Impermeable Surfaces

Surface	Type	Area	Difference
Existing Condition			
Wharehui Building	Impermeable	156 m ²	
Wharekai Building	Impermeable	407 m ²	
Concrete Paving	Impermeable	98 m ²	
Ablution Block	Impermeable	48 m ²	
Metal Driveway	Impermeable	533 m ²	
Grass/ lawn	Permeable	3805 m ²	
	Total	5047 m²	
Total Impermeable		1242m² / 24.6 %	
Proposed Condition			
Wharehui Building	Impermeable	187 m ²	+31 m ²
Wharekai Building	Impermeable	407 m ²	+0 m ²
Concrete Paving	Impermeable	98 m ²	+0m ²
Ablution Block (Stage 2)	Impermeable	90 m ²	+42 m ²
Metal Driveway	Impermeable	533 m ²	+0 m ²
New Canopy	Impermeable	36 m ²	+36 m ²
New Deck & Veranda	Impermeable	102 m ²	+102 m ²
Grass/ lawn	Permeable	3594 m ²	- 211 m ²
	Total	5047 m²	
Total Impermeable		1453 m² / 28.8 %	

FNDC District Plan Rule 8.6.5.1.3⁴ defines the Permitted Activity stormwater criteria as 15 % of the gross site area. The existing, consented development is calculated to cover 24.6 % of the gross site area with additions covered by this Consent of 211 m². Following the proposed development, impermeable areas will increase to 28.8 % of the gross site area, or a Discretionary Activity considering the site is designated as a Maori freehold title.

Mitigation of any environmental effect can be achieved through Low Impact Design principles. This will involve attenuation of additional impermeable surfaces. It is proposed to attenuate impermeable surface peak runoff to the Permitted Activity definition of 15 % of the gross site

⁴ District Plan Rule 8.6.5.1.3. The maximum proportion of the gross site area covered by buildings and other impermeable surfaces shall be 15%.



area, or 757 m² of impermeable surfaces. This will in-turn provide additional benefit to the downstream environment above the existing consented development condition.

Geologix were not presented with any existing Consents and associated conditions to consider any further requirements of the site.

4 STORMWATER MANAGEMENT

4.1 Guideline Documents

This stormwater management design has been prepared in general accordance with the following stormwater legislation and good practice guidelines.

- New Zealand Building Code, Clause E1: Surface Water.
- Auckland Regional Council, TP10.
- Auckland Council, GD01.
- Auckland Regional Council, TP108.
- FNDC Operative District Plan.
- NRC Proposed Regional Plan for Northland.

4.2 Stormwater Management Design Concept

This stormwater management design meets the requirements of the local and regional consent authorities by providing stormwater management up to and including the design storm event as below.

- The two main buildings and new toilet block, 684 m², the proposed covered decking and canopies, 138 m² will be routed to the stormwater tanks. These areas provide sufficient impermeable area to attenuated to the Permitted Activity condition within five 25,000litre roof water tanks, recently constructed and sited to the north west corner of the site. The tanks will also serve as potable water supply.
- Driveway area, 533 m². The existing driveway area does not require to be offset by roof attenuation. The parking area will shed as sheet flow to adjacent areas as the current condition.
- Discharge. To limit scour and erosion at the roof water tank outlet a specifically sized dispersion device has been designed in this report and will be situated downslope from the tanks towards the northern boundary of the site.



4.3 Device Standards

4.3.1 *Fittings*

No drainage fittings including chambers, manholes, frames, grates etc. are anticipated. If any fittings are proposed at ground level, these shall meet the requirements of AS3996 Class C (Heavy Duty) or EN1433 Class C for use in metallated or parking areas.

4.3.2 *Driveway Area*

Any additional future driveways shall be constructed with a minimum 2 % crossfall to surrounding areas to provide adequate drainage and to reduce flooding potential.

4.3.3 *Stormwater Pipes*

All proposed piping shall be minimum 80 mm uPVC with sealed joints. This design included a minimum 100 mm diameter sealed DN100 piping for tank inlets and outlets. The installation of stormwater pipes shall be per manufacturers guidelines to meet the requirements of NZBC Clause E1 Acceptable Solutions.

4.3.4 *Stormwater Tank*

At the time of writing, Geologix were informed that the proposal includes two existing, and a further three 25,000 litre Promax plastic above ground tank. The tanks shall be installed with the inlet pipe below roof gutter fittings upon a min. 100 mm thick bed of compacted sand or GAP hard fill. If topsoil depths are greater than 100 mm, all unsuitable materials shall be removed and classed as the base thickness. The compacted base shall extend a minimum of 250 mm outside the tank perimeter. The proposed tank specification and general installation instructions are presented as Appendix C of this report. The potable water outlet shall be installed a minimum of 150 mm above the base of the tank to provide a 'dead' storage volume to allow for sedimentation to occur in the tank.

4.3.5 *Dispersion Pipe/ Trench*

Roof water tank overflows shall be directed to a dispersion device contained within the site boundaries to avoid concentrated discharge and associated erosion. A typical dispersion pipe and trench detail is presented as Drawing No. 402 within Appendix A. The final device type shall be chosen by the Client as part of the application. An above ground dispersion pipe shall comprise a 100 mm diameter, DN100 PVC or PE pipe, drilled with 10 mm diameter holes at 200 mm c/c spacing. The pipe shall be laid flat on the surface, parallel to the ground contour to ensure uniform discharge. The pipe should be pegged to hold in place.

Alternatively, a below ground dispersion trench may be adopted. The trench shall be a minimum of 300 mm wide and 450 mm deep. The trench shall be lined with a woven geotextile fabric with general opening size of 0.06 to no more than 0.2 mm to minimise sedimentation in the trench. The DN100 stormwater pipe, drilled as above shall be laid upon a minimum 50 mm bed of cohesionless drainage metal such as scoria or approved similar in

the base of the trench. The same drainage medium shall also be used to backfill the trench. A 100 mm thick low permeability clay cap or topsoil horizon will seal the trench at ground level.

4.4 Stormwater Attenuation

Relevant design rainfall intensity and depths have been ascertained for the site location from the NIWA HIRDS meteorological model⁶. NIWA provides guidelines for modelling the effects of potential climate change effects of rainfall intensity increase by applying a potential change factor to historical data. This report has adopted potential change factors to account for a 2.1 °c climate change increase scenario. NIWA HIRDS and climate change data is presented in full within Appendix B.

This stormwater attenuation design has accounted for peak flow attenuation up to and including the 1 % AEP rainstorm event due to potential flooding at the site boundary and upon adjacent downstream properties. Attenuation design has been calculated adopting the Rational Method to attenuate to Permitted Activity conditions detailed in Table 2. Full calculations are presented as Appendix B, summarised as Table 3 and a schematic typical attenuation tank detail is presented within Appendix A as Drawing No. 401. The proposed attenuation design confirms there will be no increase in peak flows discharging to land up to and including the design (1 % AEP) storm event.

Table 3: Summary of Stormwater Attenuation

Condition	1 % AEP Peak Flow	Total Storage Volume Required	Design
Pre-development	33.22 l/s		
Post-development	63.76 l/s*	18,325 litres	5x 25,000 litre retention/ detention tank with 29 mm orifice installed 0.38 m below outflow and water supply outlet installed 150 mm above base of tank for sedimentation.

4.5 Discharge

The direct discharge of water tank overflow in a concentrated manner can cause scour and erosion in addition to excessive saturation of shallow soils. It is recommended that overflow from rainwater detention tanks are conveyed in sealed DN100 type pipes to a dispersion pipe which maybe either pegged to the surface above ground or installed into a shallow below ground trench, see Section 4.3.5. Feeding pipes can be either buried or pinned to the surface as desired. Based on the proposed development. A dispersion pipe or trench design summary is presented as Table 4. Calculations to derive this are presented within Appendix B based on the NIWA HIRDS Depth-Duration data. A typical detail of the concept dispersion options are presented within Appendix A as Drawing No. 402.

⁶ NIWA High Intensity Rainfall Data System, <https://hirds.niwa.co.nz>.



Table 4: Summary of Concept Dispersion Devices

Concept Impervious Area to Tank	Design Velocity	Dispersion Pipe/ Trench Min. Length	Min. No. of Drilled Holes
696 m ²	2.73 m/s	11 m	56

4.6 Stormwater Quality

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

- Sediments and minor contaminants washed from impervious surfaces, in particular from roof areas to the water tank.
- Leaf matter, grass and other organic debris.

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

- Leaf guards on roof guttering and first flush devices on roof guttering and downpipes.
- Rainwater tank for potable use onsite only to be filled by roof runoff.
- Room for sedimentation within the base of the roof runoff water tank as dead storage volume.
- Stormwater runoff from impervious surfaces not discharged directly to existing watercourses or overland flow paths.

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.

4.7 Assessment Criteria

4.7.1 District Plan

The proposed activity has been assessed as a **Discretionary Activity**.

4.7.2 Regional Plan

The proposed activity is determined to meet the requirements of a **Permitted Activity** according to the provisions of Proposed Regional Plan Rule C.6.4.2.

5 LIMITATIONS

This report has been prepared for Waterflow NZ Ltd 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



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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.



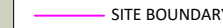



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APPENDIX A

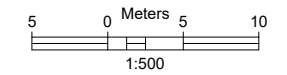
Drawings

GENERAL NOTES

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

-  SITE BOUNDARY
-  OVERLAND FLOWPATH
-  CONCEPT 25,000 LITRE WATER TANK ATTENUATING TO DISPERSION DEVICE
-  EXISTING ROADSIDE SWALE

EXISTING IMPERMEABLE AREA	
CONCRETE PAVING	98m ²
WHAREHUI BUILDING	156m ²
WHAREKAI BUILDING	407m ²
METAL DRIVEWAY	533m ²
TOTAL	1194m²
PROPOSED IMPERMEABLE AREA	
WHAREHUI BUILDING EXTENSION	31m ²
FUTURE ABLUTION BLOCK	90m ²
TIMBER DECKING VERANDA	93m ²
VERANDA CANOPY	44m ²
TOTAL	258m²
TOTAL SITE AREA	5047m²



A	CONSENT	07/06/2023
Revision	Issue	Date



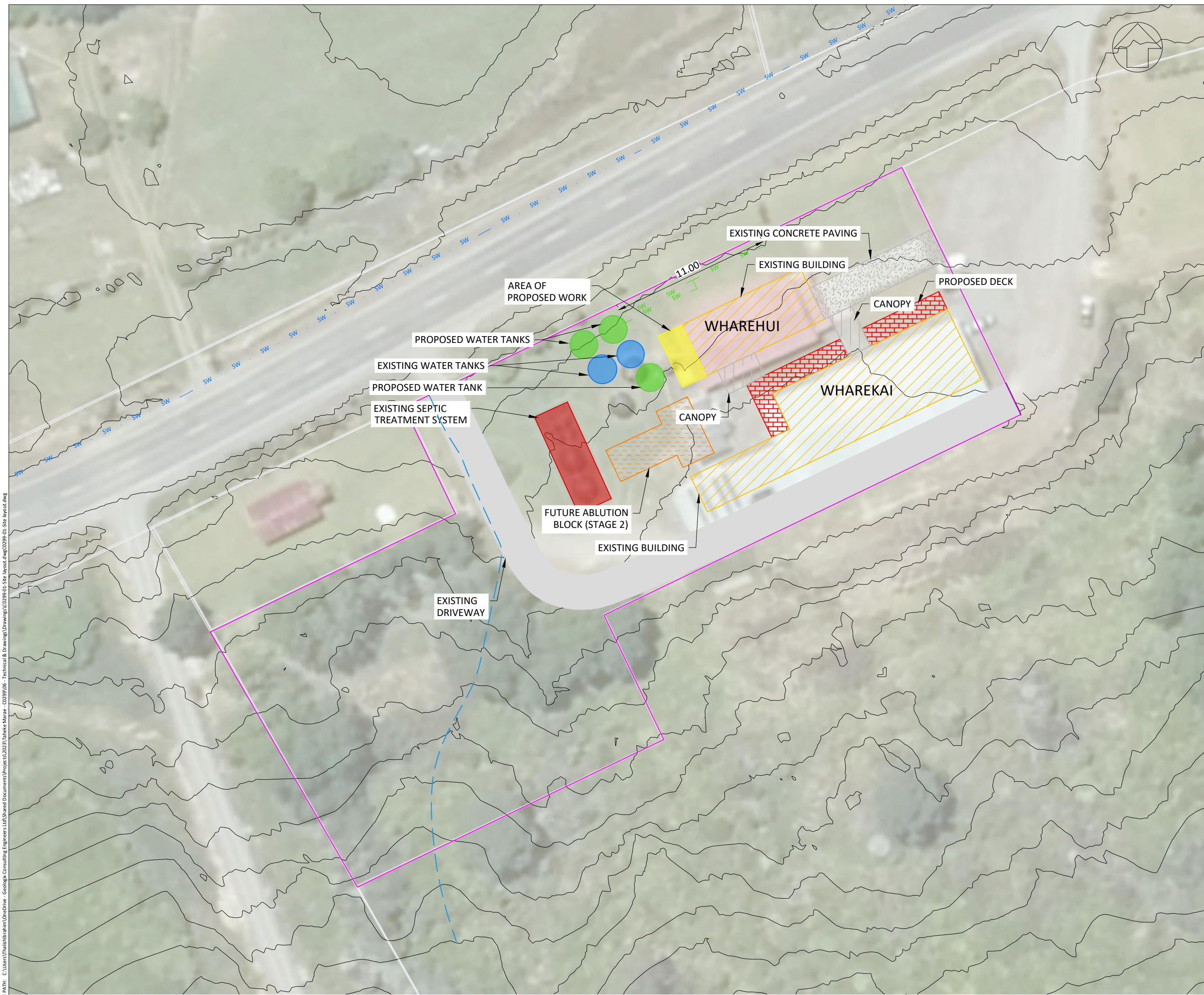
Project Name and Address
3182 STATE HIGHWAY 12
TAHEKE
TAHEKE B BLOCK ML441020

Project **C0299** | Drawn By **TI**

Client
WATERFLOW NZ LTD

Sheet Title
STORMWATER LAYOUT PLAN

Sheet
400

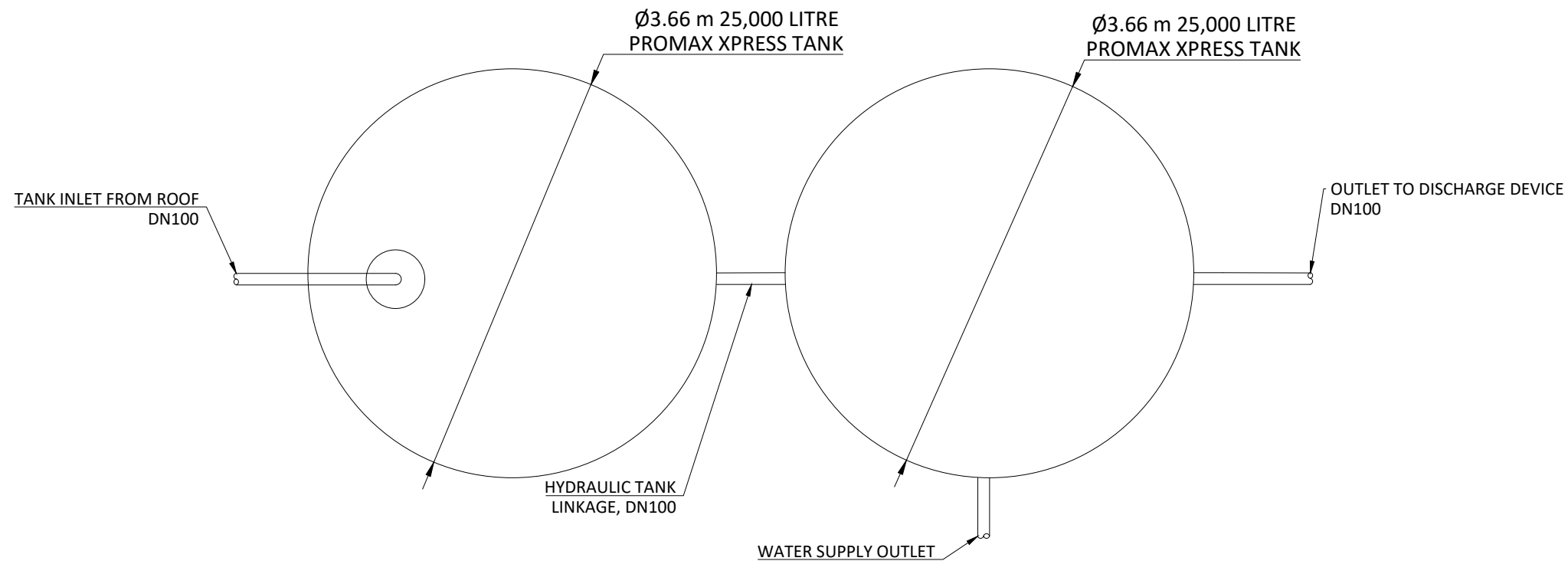


FILE PATH: C:\Users\Thalishrahim\OneDrive - Geologix Consulting Engineers Ltd\Shared Documents\Projects\2023\Taheke Marae - C0299\06 - Technical & Drawings\Drawings\CD299-01-Site layout.dwg

PLOTED: 08/06/2023

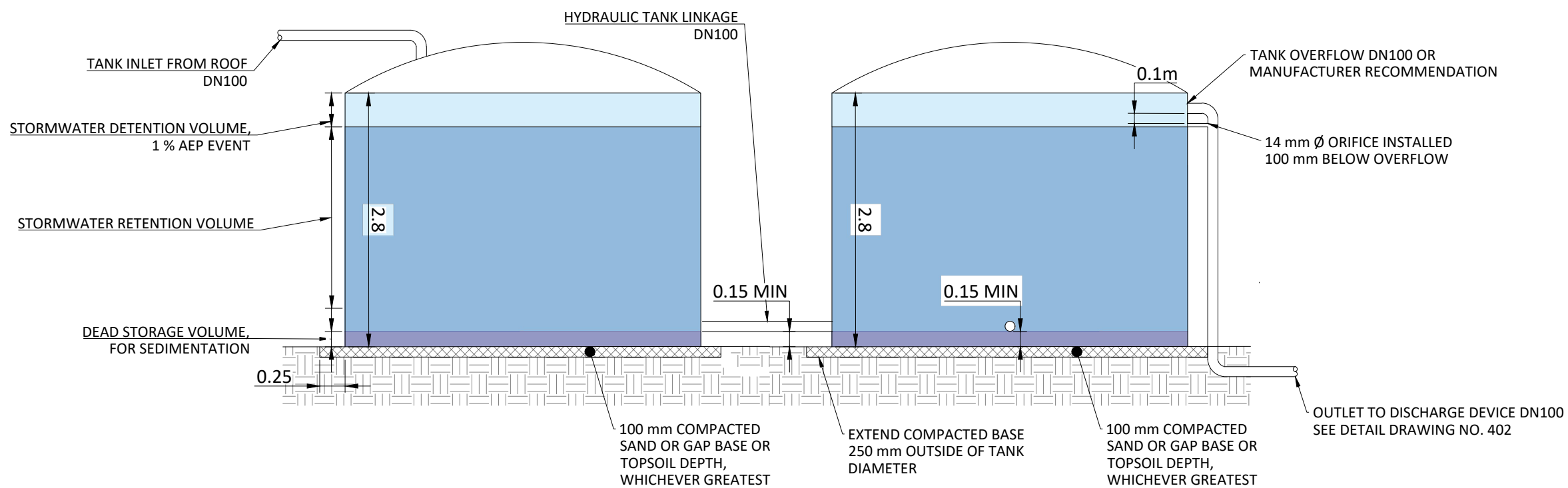
PROPOSED TANK PLAN VIEW

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.

0	CONSENT	16/05/2023
Revision	Issue	Date



AUCKLAND | NORTHLAND

Project Name and Address
**3182 STATE HIGHWAY 12
 TAHEKE
 TAHEKE B BLOCK ML441020**

Project C0299	Drawn By SD
-------------------------	-----------------------

Client
WATERFLOW NZ LTD

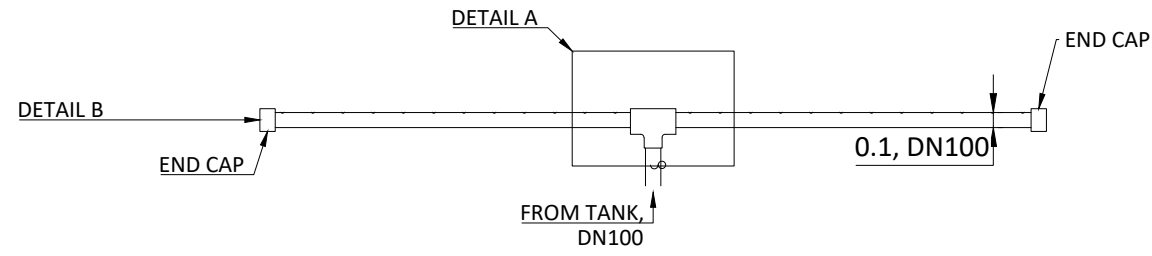
Sheet Title
TYPICAL TANK DETAIL

Sheet

401

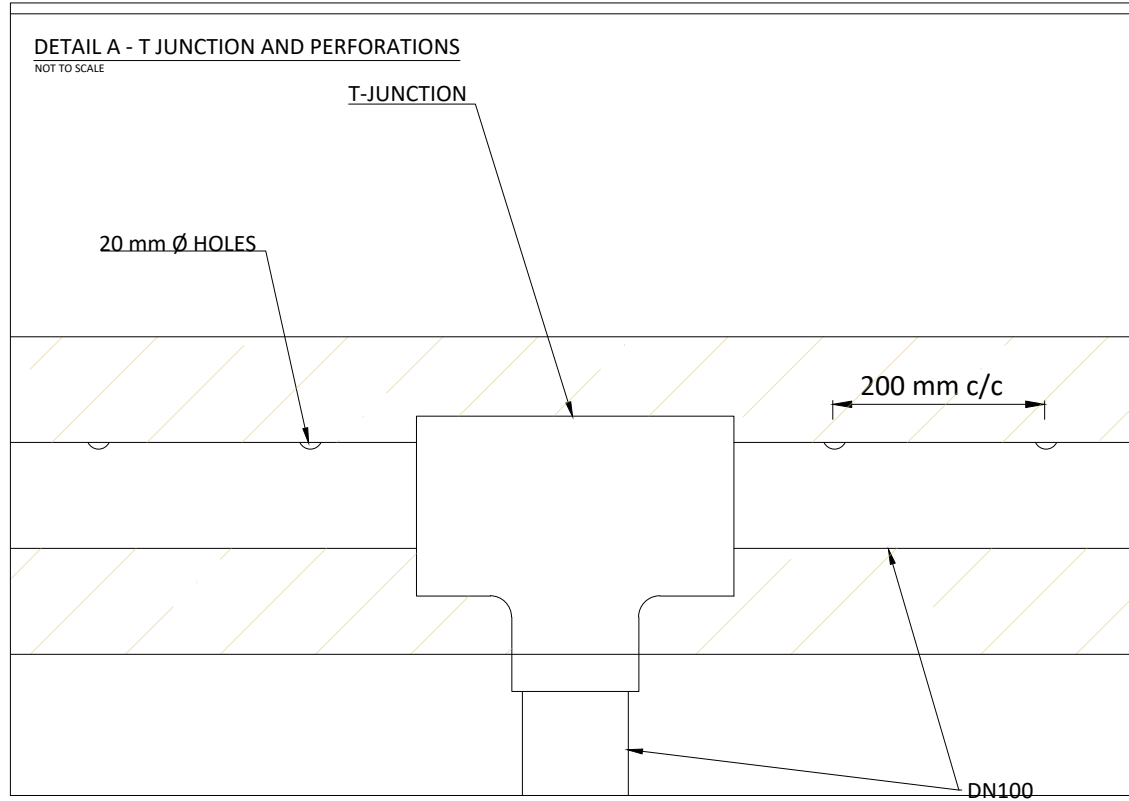
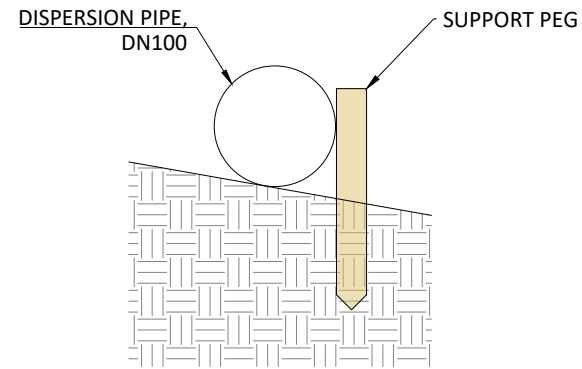
OPTION 1: DISPERSION VIA ABOVE GROUND PIPE

NOT TO SCALE



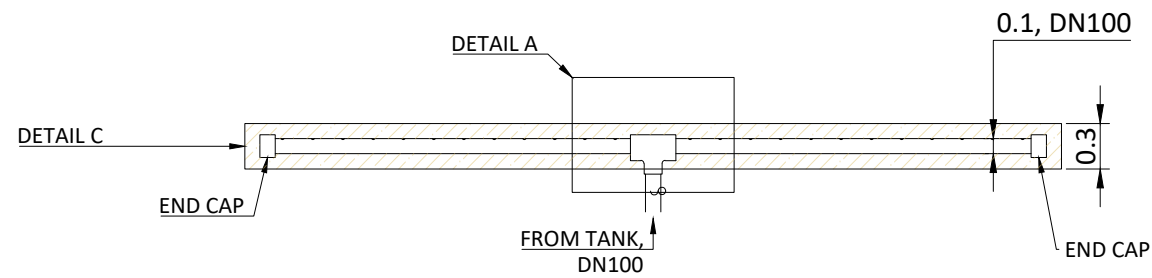
DETAIL B - SIDE VIEW

NOT TO SCALE



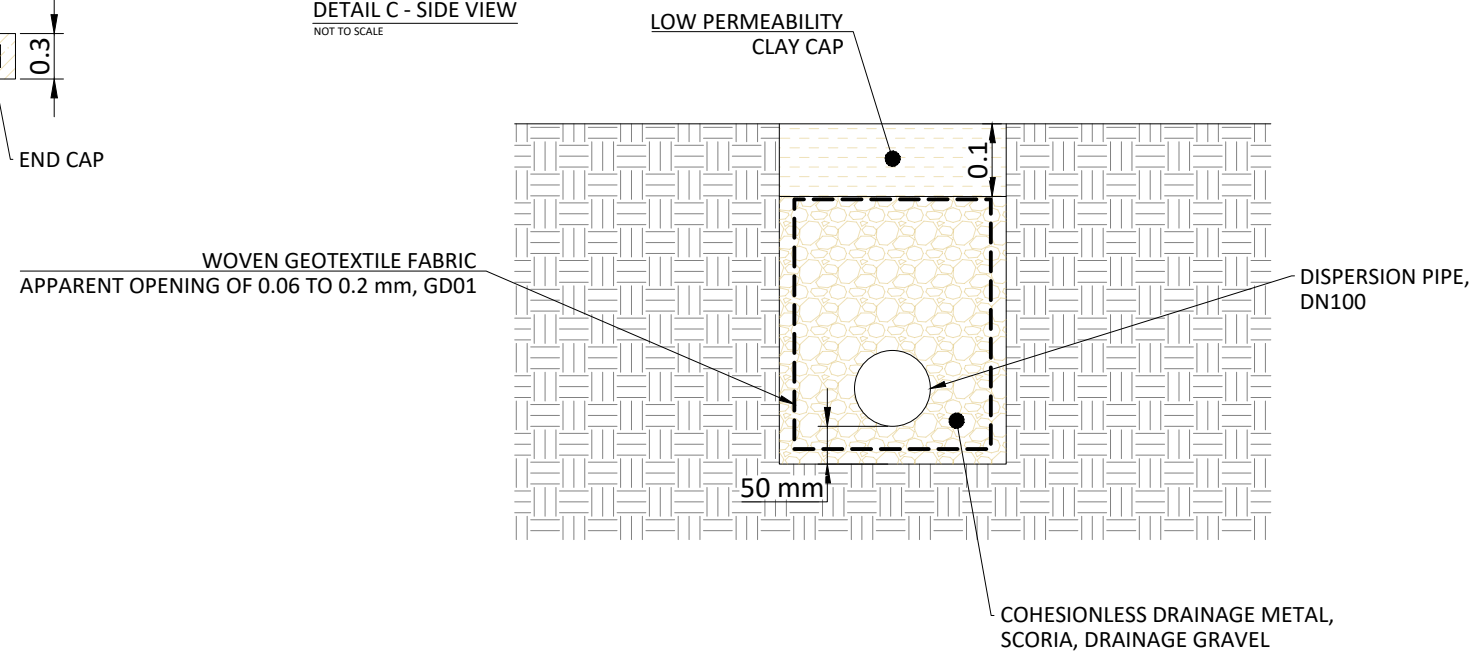
OPTION 2: DISPERSION VIA BELOW GROUND TRENCH

NOT TO SCALE



DETAIL C - SIDE VIEW

NOT TO SCALE



GENERAL NOTES

1. ALL WORK TO BE UNDERTAKEN IN ACCORDANCE WITH NEW ZEALAND BUILDING CODE E1 ACCEPTABLE SOLUTIONS, RELEVANT STANDARDS AND GUIDELINES INCLUDING AUCKLAND COUNCIL GD01, WHERE APPLICABLE.
2. DO NOT SCALE FROM THIS DRAWING.
3. CONTRACTOR IS TO ORGANISE ALL SET OUT, INSPECTIONS AND MONITORING AS REQUIRED TO MEET CONSENT CONDITIONS.

0	CONSENT	16/05/2023
Revision	Issue	Date



AUCKLAND | NORTHLAND

Project Name and Address
**3182 STATE HIGHWAY 12
 TAHEKE
 TAHEKE B BLOCK ML441020**

Project
C0299

Drawn By
SD

Client
WATERFLOW NZ LTD

Sheet Title
TYPICAL DISPERSION PIPE DETAIL

Sheet


402



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APPENDIX B

Calculations

Project Ref:	C0299	STORMWATER ATTENUATION TANK DESIGN	
Project Address:	3184 State Highway 12, Taheke		
Prepared By:	SD		
Date:	4 July 2023 REV 1		

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

RUNOFF COEFFICIENTS DETERMINED FROM WDC ENGINEERING STANDARDS 2022 TABLE 4-4 FOR TYPE C SOILS.

PREDEVELOPMENT SCENARIO				POST DEVELOPMENT SCENARIO			
ITEM	AREA, A, m ²	COEFFICIENT, C	DESCRIPTION	ITEM	AREA, A, m ²	COEFFICIENT, C	DESCRIPTION
PR IMPERVIOUS	757	0.96	PA THRESHOLD	IMPERVIOUS	1453	0.96	PR DEVELOPMENT
0	0	0		0 IMPERVIOUS	0	0	
0	0	0		0 IMPERVIOUS	0	0	
TOTAL	757	TYPE D	PR = PROPOSED	TOTAL	1453	TYPE D	

PRE DEVELOPMENT RUNOFF

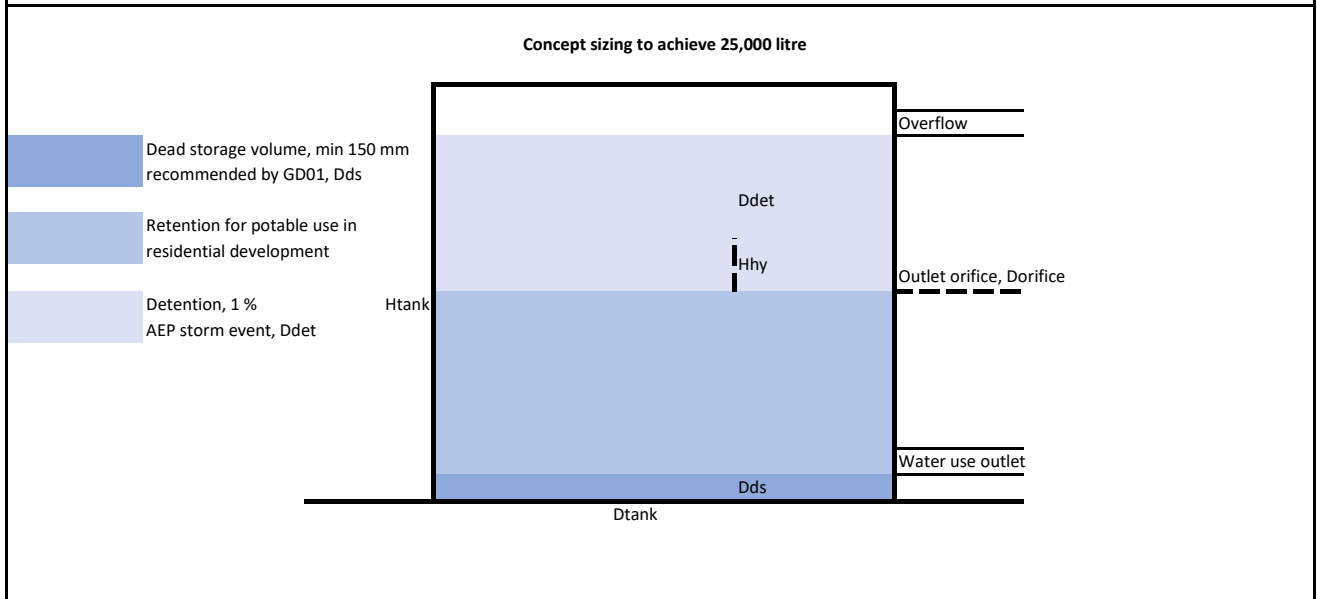
1 % AEP RAINFALL INTENSITY, 10 MIN, I, mm/hr	128.0	mm/hr	* CLIMATE CHANGE FACTOR CALCULATED IN ACCORDANCE WITH NIWA
CLIMATE CHANGE FACTOR, 2.1 DEG, 10 MIN*	28.56	%	HIRDS RECOMMENDATIONS. HISTORIC RAINFALL INTENSITY, 10 MINUTES
1 % AEP RAINFALL INTENSITY, 10 MIN WITH CC	164.6	mm/hr	IS MULTIPLIED BY POTENTIAL CLIMATE CHANGE FACTORS. NIWA
1 % AEP PRE DEVELOPMENT PEAK FLOW	33.22	l/s	RECOMMENDS THAT FOR 10 MINUTE TO 1 HOUR ADOPT THE 1 HR FACTOR.

INCREASED POST DEVELOPMENT RUNOFF, 1 % AEP WITH CLIMATE CHANGE PROJECTION OF 2.1 DEGREES

TIME, min	INTENSITY, mm/hr	CC FACTOR	CC INTENSITY, mm/hr	RUNOFF, Q, l/s	ALLOW. RUNOFF, l/s	Difference, l/s	Required Storage, litres
10	128.00	1.2856	164.56	63.76	33.22	30.54	18325
20	90.20	1.2856	115.96	44.93	33.22	11.71	14055
30	73.50	1.2856	94.49	36.61	33.22	3.39	6109
60	51.50	1.2856	66.21	25.65	33.22	No Att. Req.	0
120	35.70	1.2751	45.52	17.64	33.22	No Att. Req.	0
360	19.30	1.2415	23.96	9.28	33.22	No Att. Req.	0
720	12.80	1.2121	15.51	6.01	33.22	No Att. Req.	0
1440	8.18	1.1806	9.66	3.74	33.22	No Att. Req.	0
2880	5.07	1.1575	5.87	2.27	33.22	No Att. Req.	0
4320	3.77	1.1449	4.32	1.67	33.22	No Att. Req.	0


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

ATTENUATION TANK DESIGN OUTPUT



SPECIFICATION

TOTAL STORAGE REQUIRED	18.325 m ³	NOTES:
TANK HEIGHT, Htank	2.6 m	Concept sizing to achieve 25,000 litre
TANK DIAMETER, Dtank	3.5 m	No. of Tanks 5
TANK AREA, Atank	48.11 m ²	Area of four tanks hydraulically linked
TANK MAX STORAGE VOLUME, Vtank	125075 litres	
REQUIRED STORAGE HEIGHT, Ddet	0.38 m	Below overflow
DEAD STORAGE VOLUME, Dds	0.15 m	GD01 recommended minimum
TOTAL WATER DEPTH REQUIRED	0.53 m	
AVERAGE DISCHARGE RATE, Qavg	0.00021 m ³ /s	
AVERAGE HYDRAULIC HEAD, Hhy	0.19 m	
AREA OF ORIFICE, Aorifice	6.61E-04 m ²	
ORIFICE DIAMETER, Dorifice	29 mm	Note minimum 10 mm diameter
VELOCITY AT ORIFICE	2.73 m/s	

Project Ref:	C0299	STORMWATER DISPERSION PIPE/ TRENCH	
Project Address:	3184 State Highway 12, Taheke		
Prepared By:	SD	CONCEPT RENEWATION DEVELOPMENT PLAN	
Date:	4 July 2023		

TP108 Worksheet 1 - Runoff curve number & Initial Abstraction

Soil name & Cover description	Curve Number, CN	Area	Product of CN * Area	TOTAL SITE AREA, m2
TYPE D PR DEVELOPMENT		98 1453	142394	5047
TYPE D	0	89 0	0	
TYPE D	0	0 0	0	
TYPE D PA THRESHOLD		73 3594	262362	
Total		5047	404756	

TP108, FIGURE 5.1

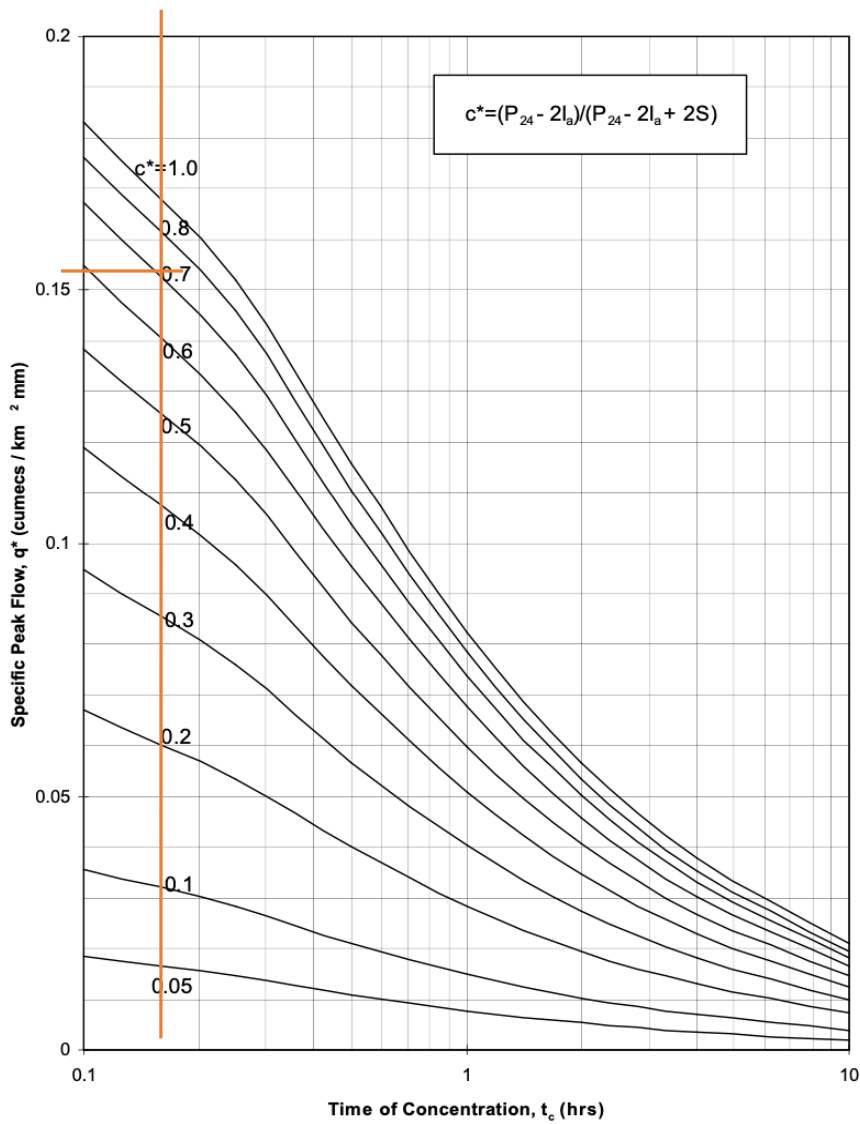



Figure 5.1 - Specific Peak Flow Rate

Project Ref:	C0299	STORMWATER DISPERSION PIPE/ TRENCH	
Project Address:	3184 State Highway 12, Taheke		
Prepared By:	SD		
Date:	4 July 2023		
		CONCEPT RENOVATION DEVELOPMENT PLAN	

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

DESIGN STORM EVENT **1%** AEP EVENT

ESTIMATE DESIGN RAINFALL DEPTH, P24

RAINFALL DEPTH	24 HR DURATION	1%	196 mm
CLIMATE CHANGE FACTOR	2.1 DEGREE INCREASE, 24 HR	1%	8.6 %
RAINFALL DEPTH WITH CC, P24			212.9 mm

ESTIMATE DETENTION VOLUME, TP108 GRAPHICAL METHOD


PEAK FLOW RATE, $q_p = q^* \times A \times P_{24}$

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

CURVE NUMBER, CN (WEIGHTED)	84	See summary table, based on smallest lot size
INITIAL ABSTRACTION, I_a	0.00 mm	As TP108, adopt 0 mm impervious, 5 mm pervious
MITIGATION AREA, A_m	1453 m²	Accounts for roof and NOT driveway as an offset
SOIL STORAGE, S	48.4	
RUNOFF INDEX, C^*	0.69 mm	
TIME OF CONCENTRATION, t_c	0.167 hrs	
SPECIFIC PEAK FLOWRATE, q^*	0.155	TP108, Figure 5.1, see next page.
PEAK FLOWRATE, q_p	47.94 l/s	
RUNOFF DEPTH, Q_{24}	173.4 mm	
RUNOFF VOLUME, V_{24}	252001 litres	

CONSTRUCTION OF DISPERSION ABOVE GROUND PIPE OR PIPE WITHIN TRENCH

DIA. OF ORIFICE, D	20 mm
AREA OF ORIFICE, A	314.16 mm ²
DESIGN VELOCITY, D_v	2.73 m/s
NUMBER OF ORIFICES	56 No.
ORIFICE INTERVALS, C/C	200 mm
DISPERSION PIPE LENGTH	11 m

Project Ref:	C0299	STORMWATER ATTENUATION TANK DESIGN		
Project Address:	3184 State Highway 12, Taheke			
Prepared By:	SD			CONCEPT RENERVATION DEVELOPMENT PLAN
Date:	4 July 2023			REV 1

CLIMATE CHANGE PROJECTIONS

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

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

HIRDS V4 Intensity-Duration-Frequency Results
 Sitename: 3182 State Highway 12
 Coordinate system: WG584
 Longitude: 173.6458
 Latitude: -35.4622
 DDF Model

Taheke

Parameters: c d e f g h i
 Values: 0.00265007 0.4684841 -0.01039233 -0.00260328 0.7521983 -0.01130125 3.02008201
 Example: Duration (hrs) ARI (yrs) x Rainfall Rate (mm/hr) 8.183455354

Rainfall Intensities (mm/hr) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	52.1	36.4	29.5	20.5	14.1	7.53	4.93	3.13	1.93	1.42	1.14	0.952
2	0.5	57	39.8	32.3	22.4	15.4	8.27	5.41	3.44	2.12	1.57	1.25	1.05
5	0.2	73.7	51.6	41.9	29.2	20.1	10.8	7.08	4.52	2.78	2.06	1.65	1.38
10	0.1	85.9	60.3	48.9	34.1	23.6	12.7	8.33	5.32	3.28	2.43	1.95	1.63
20	0.05	98.4	69.1	56.2	39.2	27.1	14.6	9.62	6.15	3.8	2.82	2.26	1.89
30	0.033	106	74.8	60.5	42.3	29.3	15.8	10.48	6.88	4.31	3.05	2.42	2.05
40	0.025	111	78.1	63.6	44.5	30.8	16.6	11	7.01	4.34	3.22	2.58	2.17
50	0.02	115	81.1	66	46.2	32	17.3	11.4	7.3	4.52	3.35	2.69	2.25
60	0.017	119	83.5	67.9	47.6	33	17.8	11.8	7.53	4.66	3.46	2.78	2.33
80	0.013	124	87.3	71.1	49.8	34.5	18.7	12.3	7.9	4.89	3.63	2.92	2.45
100	0.01	128	90.2	73.5	51.5	35.7	19.3	12.8	8.2	5.07	3.79	3.02	2.54
250	0.004	145	102	83.3	58.4	40.6	22.1	14.6	9.36	5.81	4.32	3.47	2.91

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	6.7	4.3	3	2.2	1.5	0.93	0.65	0.56	0.35	0.26	0.21	0.17
2	0.5	7.3	4.6	3.3	2.4	1.7	1	0.71	0.62	0.39	0.29	0.23	0.19
5	0.2	10	6.6	4.8	3.3	2.3	1.4	0.98	0.84	0.52	0.39	0.31	0.26
10	0.1	13	8.6	6.3	4.2	2.9	1.7	1.2	1	0.62	0.47	0.38	0.31
20	0.05	16	11	8.3	5.4	3.8	2.2	1.5	1.2	0.74	0.55	0.44	0.37
30	0.033	18	13	9.7	6.3	4.4	2.5	1.7	1.3	0.81	0.61	0.49	0.4
40	0.025	20	15	11	7	4.9	2.8	1.9	1.4	0.87	0.65	0.52	0.43
50	0.02	22	16	12	7.6	5.3	3	2.1	1.5	0.92	0.69	0.55	0.45
60	0.017	23	17	13	8.2	5.7	3.2	2.2	1.6	0.96	0.72	0.57	0.47
80	0.013	26	19	14	9.1	6.3	3.5	2.5	1.7	1	0.77	0.61	0.5
100	0.01	27	21	15	9.9	6.9	3.8	2.7	1.8	1.1	0.81	0.64	0.53
250	0.004	37	29	21	14	9.6	5.3	3.7	2.2	1.3	1	0.79	0.65

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	55.8	38.9	31.6	21.9	15	7.95	5.16	3.26	1.99	1.47	1.17	0.977
2	0.5	61.1	42.7	34.6	24.1	16.5	8.74	5.68	3.59	2.19	1.62	1.29	1.08
5	0.2	79.2	55.5	45	31.4	21.6	11.5	7.47	4.72	2.89	2.14	1.71	1.43
10	0.1	92.6	64.9	52.7	36.8	25.3	13.5	8.8	5.58	3.42	2.53	2.02	1.69
20	0.05	106	74.5	60.6	42.3	29.2	15.6	10.2	6.45	3.96	2.93	2.34	1.96
30	0.033	114	80.3	65.3	45.6	31.5	16.8	11	6.98	4.29	3.17	2.54	2.12
40	0.025	120	84.3	68.6	48	33.1	17.7	11.6	7.36	4.53	3.35	2.68	2.24
50	0.02	124	87.5	71.2	49.8	34.4	18.4	12.1	7.66	4.71	3.49	2.79	2.33
60	0.017	128	90.1	73.4	51.3	35.5	19	12.4	7.91	4.87	3.6	2.88	2.41
80	0.013	134	94.3	76.8	53.8	37.2	19.9	13	8.29	5.11	3.78	3.03	2.53
100	0.01	138	97.5	79.4	55.6	38.5	20.7	13.5	8.6	5.3	3.92	3.14	2.63
250	0.004	156	110	89.9	63.1	43.7	23.5	15.4	9.84	6.07	4.5	3.6	3.02

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	55.8	38.9	31.6	21.9	15	7.95	5.16	3.26	1.99	1.47	1.17	0.977
2	0.5	61.1	42.7	34.6	24.1	16.5	8.74	5.68	3.59	2.19	1.62	1.29	1.08
5	0.2	79.2	55.5	45	31.4	21.6	11.5	7.47	4.72	2.89	2.14	1.71	1.43
10	0.1	92.6	64.9	52.7	36.8	25.3	13.5	8.8	5.58	3.42	2.53	2.02	1.69
20	0.05	106	74.5	60.6	42.3	29.2	15.6	10.2	6.45	3.96	2.93	2.34	1.96
30	0.033	114	80.3	65.3	45.6	31.5	16.8	11	6.98	4.29	3.17	2.54	2.12
40	0.025	120	84.3	68.6	48	33.1	17.7	11.6	7.36	4.53	3.35	2.68	2.24
50	0.02	124	87.5	71.2	49.8	34.4	18.4	12.1	7.66	4.71	3.49	2.79	2.33
60	0.017	128	90.1	73.4	51.3	35.5	19	12.4	7.91	4.87	3.6	2.88	2.41
80	0.013	134	94.3	76.8	53.8	37.2	19.9	13	8.29	5.11	3.78	3.03	2.53
100	0.01	138	97.5	79.4	55.6	38.5	20.7	13.5	8.6	5.3	3.92	3.14	2.63
250	0.004	156	110	89.9	63.1	43.7	23.5	15.4	9.84	6.07	4.5	3.6	3.02

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	56.7	39.6	32.1	22.3	15.3	8.05	5.22	3.29	2.01	1.48	1.18	0.984
2	0.5	62.2	43.4	35.2	24.5	16.8	8.86	5.75	3.63	2.21	1.63	1.3	1.09
5	0.2	80.7	56.5	45.8	31.9	21.9	11.6	7.57	4.78	2.92	2.16	1.72	1.44
10	0.1	94.3	66.3	53.7	37.4	25.8	13.7	8.92	5.64	3.45	2.55	2.04	1.7
20	0.05	108	75.9	61.7	43.1	29.7	15.8	10.3	6.53	4	2.96	2.36	1.98
30	0.033	116	81.8	66.5	46.5	32	17.1	11.2	7.06	4.34	3.2	2.56	2.14
40	0.025	122	85.9	69.9	48.9	33.7	18	11.8	7.45	4.57	3.38	2.7	2.26
50	0.02	127	89.2	72.6	50.8	35.1	18.7	12.2	7.75	4.76	3.52	2.82	2.36
60	0.017	131	91.8	74.7	52.3	36.1	19.3	12.6	8	4.92	3.64	2.91	2.43
80	0.013	137	96.1	78.2	54.8	37.8	20.3	13.2	8.39	5.16	3.82	3.05	2.56
100	0.01	141	99.3	80.9	56.7	39.2	21	13.7	8.7	5.35	3.96	3.17	2.65
250	0.004	159	112	91.6	64.3	44.5	23.9	15.7	9.96	6.14	4.54	3.64	3.04

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	59.6	41.6	33.7	23.4	16	8.39	5.4	3.4	2.06	1.51	1.2	1
2	0.5	65.4	45.7	37.1	25.8	17.6	9.25	5.97	3.74	2.27	1.67	1.33	1.11
5	0.2	85.1	59.6	48.4	33.7	23.1	12.2	7.87	4.94	3.01	2.22	1.76	1.47
10	0.1	99.6	69.8	56.7	39.5	27.2	14.3	9.29	5.84	3.56	2.62	2.09	1.75
20	0.05	114	80.2	65.2	45.5	31.6	16.6	10.8	6.76	4.13	3.04	2.43	2.03
30	0.033	123	86.4	70.3	49.1	33.8	17.9	11.6	7.32	4.48	3.3	2.63	2.2
40	0.025	129	90.8	73.9	51.7	35.6	18.9	12.3	7.73	4.72	3.48	2.78	2.32
50	0.02	134	94.3	76.7	53.7	37	19.7	12.8	8.04	4.92	3.63	2.9	2.42
60	0.017	138	97.1	79.7	55.3	38.1	20.3	13.2	8.3	5.08	3.75	2.99	2.5
80	0.013	144	102	82.8	58	40	21.3	13.8	8.71	5.34	3.94	3.14	2.63
100	0.01	149	105	85.6	59.9	41.4	22	14.3	9.04	5.53	4.08	3.26	2.72
250	0.004	169	119	97	68	47	25.1	16.4	10.3	6.34	4.68	3.74	3.13

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	56.3	39.3	31.9	22.1	15.2	8.01	5.19	3.28	2	1.47	1.17	0.981
2	0.5	61.7	43.1	35									

HIRDS V4 Depth-Duration-Frequency Results
 Sitename: 3182 State Highway 12
 Coordinate system: WG584
 Longitude: 173.6458
 Latitude: -35.4622
 DDF Model

Taheke

Parameters: c d e f g h i j
 Values: 0.00265007 0.4684841 -0.01039233 -0.00260328 0.2521983 -0.01130125 3.02008201
 Example: Duration (hrs) ARI (yrs) Y Rainfall Depth (mm)
 24 100 3.17805383 4.600149227 196.4029285

Rainfall depths (mm) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	8.69	12.1	14.7	20.5	28.2	45.2	59.1	75.2	92.4	102	109	114
2	0.5	9.5	13.3	16.1	22.4	30.9	49.6	64.9	82.6	102	113	120	126
5	0.2	12.3	17.2	20.9	29.2	40.2	64.8	85	108	134	148	158	166
10	0.1	14.3	20.1	24.5	34.1	47.2	76.1	100	128	158	175	187	196
20	0.05	16.4	23	28.1	39.2	54.3	87.8	115	148	183	203	217	227
30	0.033	16.6	24.8	30.5	41.5	58.5	94.8	125	160	197	220	236	245
40	0.025	18.5	26	31.8	44.5	61.6	99.8	131	168	208	232	248	260
50	0.02	19.2	27	33	46.2	64	104	137	175	217	241	258	271
60	0.017	19.8	27.8	34	47.6	65.9	107	141	181	224	249	267	279
80	0.013	20.7	29.1	35.5	49.8	69	112	148	190	235	262	280	293
100	0.01	20.1	30.1	36.7	51.5	71.4	116	153	198	243	271	290	304
250	0.004	24.1	34.1	41.6	58.4	81.2	132	175	225	279	311	333	350

Depth standard error (mm) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	1.1	1.5	1.5	2.3	3.1	5.6	7.9	13	17	19	20	21
2	0.5	1.2	1.6	1.7	2.6	3.4	6.2	8.7	15	19	21	23	24
5	0.2	1.7	2.2	2.5	3.6	4.7	8.3	12	20	25	28	30	32
10	0.1	2.2	2.8	3.3	4.5	6	10	14	24	30	34	36	38
20	0.05	2.8	3.7	4.3	5.7	7.7	13	18	29	36	40	43	45
30	0.033	3.2	4.3	5.1	6.6	8.9	15	20	32	39	44	47	49
40	0.025	3.6	4.8	5.7	7.3	9.9	16	22	34	42	47	51	53
50	0.02	3.8	5.2	6.2	7.9	11	18	24	36	44	49	53	55
60	0.017	4.1	5.5	6.7	8.4	12	19	25	37	46	51	56	58
80	0.013	4.5	6.1	7.4	9.3	13	21	28	40	49	55	60	62
100	0.01	4.9	6.7	8.1	10	14	23	30	42	52	58	63	65
250	0.004	6.7	9.2	11	14	19	31	41	52	64	71	78	80

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.3	13	15.8	21.9	30	47.7	61.9	78.3	95.6	106	112	117
2	0.5	10.2	14.2	17.3	24.1	33	52.5	68.2	86.1	105	116	124	129
5	0.2	13.2	18.5	22.5	31.4	43.1	68.8	89.6	113	139	154	164	171
10	0.1	15.4	21.6	26.4	36.8	50.7	81	106	134	164	182	194	203
20	0.05	17.7	24.8	30.3	42.3	58.4	93.5	122	155	190	211	225	235
30	0.033	19	26.8	32.6	45.6	63	101	132	167	206	228	244	255
40	0.025	20	28.1	34.3	48	66.3	106	139	177	217	241	257	269
50	0.02	20.7	29.2	35.6	49.8	68.9	111	145	184	226	251	268	280
60	0.017	21.4	30	36.7	51.3	71	114	149	190	234	259	277	289
80	0.013	22.3	31.4	38.4	53.8	74.3	120	157	199	245	272	290	304
100	0.01	23.1	32.5	39.7	55.6	76.9	124	162	206	254	282	301	315
250	0.004	26.1	36.8	45	63.1	87.5	141	185	236	291	324	346	362

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.3	13	15.8	21.9	30	47.7	61.9	78.3	95.6	106	112	117
2	0.5	10.2	14.2	17.3	24.1	33	52.5	68.2	86.1	105	116	124	129
5	0.2	13.2	18.5	22.5	31.4	43.1	68.8	89.6	113	139	154	164	171
10	0.1	15.4	21.6	26.4	36.8	50.7	81	106	134	164	182	194	203
20	0.05	17.7	24.8	30.3	42.3	58.4	93.5	122	155	190	211	225	235
30	0.033	19	26.8	32.6	45.6	63	101	132	167	206	228	244	255
40	0.025	20	28.1	34.3	48	66.3	106	139	177	217	241	257	269
50	0.02	20.7	29.2	35.6	49.8	68.9	111	145	184	226	251	268	280
60	0.017	21.4	30	36.7	51.3	71	114	149	190	234	259	277	289
80	0.013	22.3	31.4	38.4	53.8	74.3	120	157	199	245	272	290	304
100	0.01	23.1	32.5	39.7	55.6	76.9	124	162	206	254	282	301	315
250	0.004	26.1	36.8	45	63.1	87.5	141	185	236	291	324	346	362

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.45	13.2	16	22.3	30.5	48.3	62.6	79.1	96.4	106	112	118
2	0.5	10.4	14.5	17.6	24.5	33.6	53.2	69	87	106	117	125	130
5	0.2	13.4	18.8	22.9	31.9	43.9	69.8	90.8	115	140	155	165	172
10	0.1	15.7	21.8	26.8	37.4	51.5	82	107	135	166	184	196	204
20	0.05	18	25.3	30.8	43.1	59.4	95	124	157	192	213	227	237
30	0.033	19.4	27.3	33.2	46.5	64.1	103	134	169	208	231	246	257
40	0.025	20.4	28.6	34.9	48.9	67.4	108	141	179	220	243	260	271
50	0.02	21.1	29.7	36.3	50.8	70.1	112	147	186	229	253	270	283
60	0.017	21.8	30.5	37.4	52.3	72.2	116	151	192	236	262	279	292
80	0.013	22.8	32	39.1	54.8	75.7	122	159	201	248	275	293	307
100	0.01	23.5	33.1	40.4	56.7	78.3	126	165	209	257	285	304	318
250	0.004	26.6	37.5	45.8	64.3	89.1	144	188	239	294	327	349	365

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.94	13.9	16.9	23.4	32	50.3	64.8	81.5	98.9	109	115	120
2	0.5	10.9	15.2	18.5	25.8	35.3	55.5	71.6	89.8	109	120	128	133
5	0.2	14.2	19.9	24.3	33.7	46.2	73	94.5	119	144	160	169	177
10	0.1	16.6	23.3	28.3	39.5	54.3	86.1	112	140	171	189	201	209
20	0.05	19	26.7	32.6	45.5	63.5	99.6	129	162	198	219	233	243
30	0.033	20.5	28.8	35.1	49.1	67.6	108	140	176	215	238	253	264
40	0.025	21.5	30.3	36.9	51.7	71.2	113	147	185	227	251	267	279
50	0.02	22.4	31.4	38.4	53.7	74	118	153	193	236	261	278	290
60	0.017	23	32.4	39.5	55.3	76.3	122	158	199	244	270	287	300
80	0.013	24.1	33.9	41.4	57.8	79.9	128	166	209	256	283	302	315
100	0.01	24.9	35	42.8	59.9	82.7	132	172	217	266	294	313	327
250	0.004	28.1	39.7	48.5	68	94.1	151	196	248	304	337	359	375

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.39	13.1	15.9	22.1	30.3	48.1	62.3	78.9	96.1	106	113	118
2	0.5	10.3	14.4	17.5	24.3	33.4	52.9	68.7	86.7	106	117	124	130
5	0.2	13.3	18.7	22.8	31.7	43.6	69.4	90.3	114	140	155	165	172
10	0.1	15.6	21.9	26.6	37.2	51.2	81.7	106	135	165	183	195	204
20	0.05	17.9	25.1	30.6	42.8	59	94.4	123	156	191	212	226	236
30	0.033	19.2	27.1	33	46.1	63.6	102	133	169	207	230	246	256
40	0.025	20.2	28.4	34.7	48.5	67	107	140	178	219	243	259	270
50	0.02	21	29.5	36	50.4	69.6	112	146	185	228	252	269	282
60	0.017	21.6	30.4	37.1	51.9	71.7	115	151	191	235	261	278	291
80	0.013	22.6	31.8	38.8	54.4	75.2	121	158	200	247	274	292	306
100	0.01	23.3	32.9	40.1	56.2	77.8	125	164	208	256	283	302	317
250	0.004	26.4	37.2	45.5	63.8	88.4	143	187	238	293	326	348	364

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	10.4											



geologix
consulting engineers

APPENDIX C

Product Specifications

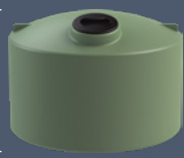




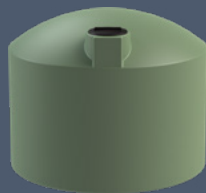
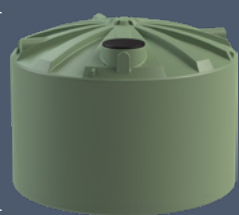
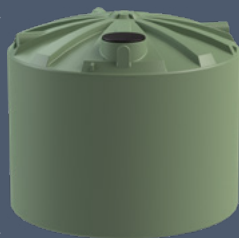
Tank Specifications

Promax Enduro Water Tanks

<p>120L Header Tank PMXST00120</p>  <p>510mm 660mm DIA</p>	<p>450L PMXST00450</p>  <p>820mm 880mm DIA</p>	<p>1000L PMXST01000</p>  <p>1,420mm 1,030mm DIA</p>	<p>2000L PMXST02000</p>  <p>1,720mm 1,300mm DIA</p>	<p>3000L PMXST03000</p>  <p>1,760mm 1,600mm DIA</p>
<p>4000L PMXST04000</p>  <p>2,200mm 1,600mm DIA</p>	<p>5000L PMXST05000</p>  <p>2,650mm 1,600mm DIA</p>	<p>5000L - Low Profile PMXST05000LP</p>  <p>1,850mm 2,200mm DIA</p>		
<p>10000L PMXBT10000</p>  <p>2,900mm 2,200mm DIA</p>	<p>25000L PMXBT25000</p>  <p>2,800mm 3,660mm DIA</p>	<p>30000L PMXBT30000</p>  <p>3,100mm 3,660mm DIA</p>		



Promax XPRESS Water Tanks

<p>2500L XPST02500</p>  <p>1,240mm 1,850mm DIA</p>	<p>3500L XPST03500</p>  <p>1,640mm 1,850mm DIA</p>	<p>5000L XPST05000</p>  <p>2,240mm 1,850mm DIA</p>	<p>3000L - Slimline PMXSL03000SL</p>  <p>2,120mm 570mm 3,000mm</p>	<p>5000L - Slimline PMXSL05000SL</p>  <p>2,120mm 910mm 3,000mm</p>
<p>10000L XPBT10000</p>  <p>3,100mm 2,200mm DIA</p>	<p>15000L XPBT15000</p>  <p>2,450mm 3,000mm DIA</p>	<p>25000L XPBT25000</p>  <p>2,800mm 3,660mm DIA</p>	<p>30000L XPBT30000</p>  <p>3,100mm 3,660mm DIA</p>	

Tank Specifications

Promax Enduro Water Tanks

Code	Description	D (mm)	H (mm)	Outlet (mm)	Manhole (mm)
PMXST00120	120L Header Tank	660mm	510mm	20mm	450mm
PMXST00450	450L Water Tank	880mm	820mm	20mm	450mm
PMXST01000	1000L Water Tank	1030mm	1420mm	20mm	450mm
PMXST02000	2000L Water Tank	1300mm	1735mm	25mm	450mm
PMXST03000	3000L Water Tank	1600mm	1760mm	25mm	450mm
PMXST04000	4000L Water Tank	1600mm	2200mm	32mm	450mm
PMXST05000	5000L Water Tank	1600mm	2650mm	32mm	450mm
PMXST05000LP	5000L Water Tank - Low Profile	2200mm	1850mm	50mm	450mm
PMXBT10000	10000L Water Tank - North Island Only	2200mm	2900mm	50mm	450mm
PMXBT25000	25000L Water Tank	3660mm	2800mm	2 x 50mm	600mm
PMXBT30000	30000L Water Tank	3660mm	3100mm	2 x 50mm	600mm

XPRESS Water Tanks

Code	Description	D (mm)	H (mm)	Outlet (mm)	Manhole (mm)
XPST02500	2500L Water Tank	1850mm	1240mm	25mm	450mm
XPST03500	3500L Water Tank	1850mm	1640mm	25mm	450mm
XPST05000	5000L Water Tank	1850mm	2240mm	32mm	450mm
XPBT10000	10000L Water Tank - South Island Only	2200mm	3100mm	50mm	450mm
XPBT15000	15000L Water Tank	3000mm	2650mm	50mm	600mm
XPBT25000	25000L Water Tank	3660mm	2800mm	50mm	600mm
XPBT30000	30000L Water Tank	3660mm	3100mm	50mm	600mm

XPRESS Stackable Water Tanks

Code	Description	D (mm)	H (mm)	Outlet (mm)	Manhole (mm)
XPST00600	600L Stackable Water Tank	1000mm	700mm	20mm	-
XPST05760ST	5760L Stackable Water Tank	2300mm	2040mm	25mm	450mm

Slimline Tanks

Code	Description	D (mm)	H (mm)	Outlet (mm)	Manhole (mm)
PMXSL02000SL	2000L Slimline Tank	2250mm x 570mm	2150mm	25mm	300mm
PMXSL03000SL	3000L Slimline Tank	3000mm x 570mm	2150mm	25mm	300mm
PMXSL05000SL	5000L Slimline Tank	3000mm x 910mm	2150mm	32mm	300mm

Technical Drawings available on request.

* Please note ALL XPRESS tanks have smooth walls.

+ Material complies with the following standards:

AS/NZS 4020: 2002 Potable (Drinking) Water Standard

AS/NZS 2070: Part 1 and Part 8 Australian Standards for Food Contact

AS/NZS 4766 (INT): 2002 Polyethylene Storage Tanks for Water and Chemicals

Promax Water Tank Colours



XPRESS Water Tank Colours



Please Note: Tank Colours are displayed as close as printing methods will allow.

Please Note: All XPRESS tanks have smooth walls.

Please Note: Available in Mist Green Only.



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APPENDIX D

Assessment Criteria