From: Lynne Sun
To: info
Subject: External Sender: SUB Application | 318 Lamb Street, Cambridge
Date: Tuesday, 21 November 2023 3:55:04 pm
Attachments: image003.png

CYBER SECURITY WARNING: This email is from an external source - be careful of attachments and links. Please follow the Cybersecurity Policy and report suspicious emails to Servicedesk

Hi

Please find the link below for the subdivision consent application in regard to the abovenamed property.

SUB+LUC Application - 318 Lamb Street Cambridge.pdf

Regards,

Lynne Sun
Planner
BEP | NZPI

Blue Wallace Surveyors Ltd.
Mob: **021 656 908**
PO Box 38 | 25 Harwood St | Hamilton 3240
www.bluewallace.co.nz

FORM 9

Resource Consent Application Form

Section 88 of the Resource Management Act 1991 (RMA). This form provides us with your contact information and details about your proposal. Please print clearly and complete all sections.

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.

To: Name of Council that is the consent authority for this application: Waipa District Council

Type of resource consent being applied for:

☐ Land use ☐ Subdivision ☒ Combined land use and subdivision

Activity Status

☐ Controlled ☐ Restricted Discretionary ☐ Discretionary ☒ Non-complying ☐ I don't know

Fast Track Resource Consent

The Resource Management Act 1991 provides for land use activities that have a controlled activity status to be fast tracked through the resource consent process and processed within 10 working days of the application being lodged with Council. Your consent may be fast tracked if you tick 'yes' to the first two questions below.

1. Is this application for a controlled activity (land use consent only)? ☐ Yes ☒ No

2. Have you provided an electronic address for this service? ☐ Yes ☒ No

If you wish to opt out of the fast track process, tick here: ☒

Applicant Name

Please provide the full name of the persons, company, society or trust applying for this resource consent. If the applicant is a trust, please provide the full name/s of all trustees of that trust.

Name: Muscle Developments Limited

Applicant Contact Details

Postal Address:	c- agent		
Post code:		Email:	ryan@waipacivil.co.nz
Phone:		Mobile:	027 4433 065

Agent Contact Details

If you have an agent or other person acting on your behalf, please complete the details below.

Agent:	Blue Wallace Surveyors Ltd		
Contact:	Lynne Sun		
Postal Address:	PO Box 38 Hamilton		
Post code:	3240	Email:	lynne@bluewallace.co.nz
Phone:		Mobile:	021 656 908

Location of Proposal

Please complete with as much detail as you can, so the site for your proposal is clearly identifiable. Include details such as unit number, street number, street name and town.

Property address:

318 Lamb Street, Cambridge

Legal description:

Lot 2003 DP 535418 and Lot 2005 DP 535418 (R.T. 885366)

Owner/Occupier of Site

Landowner's full name, phone number and address:

OR

☒ Same as applicant details

Occupiers full name, phone number and address:

OR

☒ Same as applicant details

Description of Proposal

Please provide a brief description of the proposal and the reasons why resource consent is required ie which rules in the district plan are infringed. If the space provided is insufficient, please attach additional pages.

The application entails the creation of 20 residential lots at 318 Lamb Street, Cambridge via two stages. Additionally, it involves a boundary adjustment with the neighbouring property.

A land use consent is also sought for the proposed earthworks to enable road and building platform construction.

Other Consents

Please let us know of any other consents that you have applied for or know that you need to apply for related to this application. This includes any resource consents that may be required from a regional council under a regional plan.

☐ Other resource consents	Resource consent no. (if known)	
☐ Building consent	Building consent no. (if known)	
☐ Regional plan consent	Type of regional consent: *e.g. water discharge permit,* *water intake permit*	

National Environmental Standards (NES)*

Please let us know if you require consent under a National Environmental Standard. National Environmental Standards are regulatory documents that contain standards pertaining to certain matters eg management of contaminated land, telecommunications.

Is consent required under a NES? ☒ Yes ☐ No ☐ I don't know

Tick the following applicable NES:

- ☐ NES for Air Quality
- ☐ NES for Drinking Water
- ☐ NES for Telecommunication Services
- ☐ NES for Electricity Transmission Services
- ☒ NES for Assessing and Managing Contaminants in Soil to Protect Human Health
- ☐ NES for Plantation Forestry
- ☐ Other

* For further information about National Environmental Standards, their requirements and forms please refer to any other sheets provided with these application forms.

Assessment of Proposal

Please attach an assessment of your proposal's effects on the environment, an assessment against the relevant matters of Part 2 of the RMA and any relevant provisions of NES, regulations, national policy statement, regional policy statement, regional plan and district plan.

Please refer to attached application.

Pre-application Information

We recommend that you have a pre-application discussion about your proposal with a Council planner.

Have you had a pre-application meeting with a Council planner? ☒ Yes ☐ No

Have you had any other conversations with any other Council staff? ☐ Yes ☒ No

Date of meeting: 28/06/2023

Please provide the names of Council staff you have spoken with:

Quentin Budd (Consents Team Leader)
Layla Gruebner (Planner)
Eva Cucvarova (Senior Development Engineer)
Aidan Kirkby-McLeod (Reserves Planning Team Leader)

If notes of the meeting or other conversations were provided to you, please attach copies.

Have you attached any minutes/notes from the meeting? ☒ Yes ☐ No

Notification

The Resource Management Act 1991 allows applications to be notified for public submissions on request of the applicant.

Are you requesting that your application be publicly notified? ☐ Yes ☒ No

If you selected 'yes' to the above question, please attach a short summary outlining the details of your application.

Have you attached a summary? ☐ Yes ☐ No

Site Visit Requirements

☒ As landowner and with the consent of any occupiers or lessee, I am aware that Council staff or authorised consultants may visit the site which is the subject of this application, for the purposes of assessing this application, and agree to a site visit.

OR

☐ If the applicant is not the owner, I understand that Council staff or authorised consultants may visit the site, which is the subject of this application, for the purposes of assessing this application, and agree to a site visit.

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

Are there any dogs on the property?	☐ Yes	☒ No
Are there any hazards that may place a visitor at risk?	☒ Yes	☐ No

Provide details of any entry restrictions that Council staff should be aware of e.g. health and safety, organic farm etc.

Earth working equipment.

Contaminated land

Contact applicant for site visit.

Draft Conditions

When a consent is granted, Council can include conditions to manage any adverse effects.

Do you wish to see draft conditions prior to Council making a decision on the application?	☒ Yes	☐ No

☒ By ticking this box, I understand that the opportunity to review the draft conditions is an act of good faith by the Council intended to assist with identifying errors before consent is granted. I further understand that Council has the right to continue processing the application if too much time is taken in the review of draft conditions. By requesting draft conditions I agree to an extension of time under section 37 of the RMA.

Signature of the applicant(s)

Please read the information below before signing the application form.

Payment of fees and charges

You must pay the charges payable to Council for this application under the RMA. Please refer to Council's Fees and Charges on its website.

By submitting this application to Council, you agree to pay the charges set out in Council's Fees and Charges relevant to the application.

Privacy information

Council requires the information you have provided on this form to process your application under the RMA. Council will hold and store the information on a pubic register. The details may also be made available to the public on the Council's website. If you would like to request access to, or correction of any details, please contact the Council.

Information checklist

The information checklist provided with this form sets out the full set of information that Council requires for your application to be considered complete. Your application may be returned as incomplete if you do not provide adequate information. Your completed application should be submitted to Council with any supplementary forms and/or guidance as provided by Council.

Correspondence and Invoices

Please let us know where to send any correspondence and invoices. Where possible any correspondence will be sent by email.

All correspondence excluding invoices sent to: ☐ Applicant or ☒ Agent

All invoices sent to: ☒ Applicant or ☐ Agent

Confirmation by the applicant

☒ I/we confirm that I/we have read and understood the information and will comply with our obligations as set out above. *A signature is not required if you submit this form electronically.*

Applicant name:	Ryan George	Signature:		Date:	20/11/2023
Applicant name:		Signature:		Date:	
Applicant name:		Signature:		Date:	

Confirmation by the agent authorised to sign on behalf of the applicant

As authorised agent for the applicant, I confirm that I have read and understood the above information and confirm that I have fully informed the applicant of their obligations in connection with this application, including for fees and other charges, and that I have the applicant's authority to sign this application on their behalf. (*A signature is not required if you submit this form electronically.)*

Agent's full name:	Lynne Sun	Signature:		Date:	20/11/2023

Information Checklist for Resource Consent Application

All applications must include the following information:

☐ A description of the activity

☐ A description of the site where the activity will occur

☐ The full name and address of each owner or occupier of the site

☐ A description of any other activities that are part of the proposal to which this application relates

☐ A description of any other resource consent required for the proposal to which the application relates

☐ An assessment of the proposed activity's effects on the environment

☐ An assessment of the activity against Part 2 of the Resource Management Act 1991. This will need to address section 5 'Purpose', section 6 'Matters of national importance', section 7 'Other matters' and section 8 "Treaty of Waitangi'

☐ An assessment of the activity against any relevant objectives, policies or rules in the district plan

☐ An assessment of the activity against any relevant requirements, condition or permissions in any rules in a document listed in section 104(1)(b) of the RMA

☐ Record of title(s) for the subject site

This must be less than 3 months old. Please attach the title(s) and any consent notices, covenants, easements attached to the title(s)

☐ Site plan or scheme plan

Please provide at an appropriate scale (for example 1:100) showing the location of the building or activity in relation to all site boundaries. The site plan should include the following where relevant:

- North point
- Title or Reference No.
- Scale
- Date the plans were drawn
- Topographical information
- Natural features, including protected trees, indigenous vegetation, water courses
- Archaeological and/or cultural/heritage sites
- Record of Title boundaries/location of fence positions relative to boundaries
- Accessways and road frontages, including proposed crossing places/right of ways
- Onsite manoeuvring and existing and proposed car parking spaces
- Legal and physical roads
- Existing buildings
- Existing wells and/or effluent disposal systems
- Buildings on adjacent sites
- Layout and location of proposed buildings and activities in relation to legal site boundaries
- Earthworks design and contours/areas of excavation
- Landscaping
- Site coverage calculation
- Details of any signage (sign design, dimensions and location on buildings)
- Areas subject to hazards e.g. unstable slopes, areas of flooding, peat soils or fill
- Areas of potential or confirmed contamination

☐ Elevation plans

Please provide at an appropriate scale (for example 1:50, 1:100 or 1:200) and show all structures to be constructed or altered, showing the relationship and appearance of proposed buildings.

☐ Floor plans of proposed building or buildings to be used for the activity

Please clearly show the use of each area/buildings

☐ Engineering design plans for any water, wastewater and stormwater works

(Only concept engineering plans are required at this stage.)

☐ An assessment of the activity against any relevant provisions of a:

- National Environmental Standard
- National Policy Statement
- Regional Policy Statement
- Regional Plan

☐ A description of any part of the activity that is permitted under the district plan

☐ If a permitted activity is part of the proposal to which the application relates, a description of the permitted activity that demonstrates it complies with the relevant requirements and conditions for that permitted activity (so that resource consent not required for that activity).

☐ An assessment of effects (AEE) of the activity

An AEE is an essential part of your application. If an AEE is not provided Council is unlikely to accept your application. The AEE should discuss all the actual and potential effects of your proposed activity on the environment. Schedule 4 of the RMA outlines all of the matters that must be addressed in your AEE. The amount of detail provided must reflect the scale and significance of the effects that the activity may have on the environment. For example, if there are major effects arising from the proposal, a detailed analysis and discussion of these effects must be included in the AEE. It may require the provision of information from specific experts (eg a traffic engineer). If the effects of the proposal are minor, then a less detailed AEE can be submitted. (*The Council has information available to assist you to prepare the AEE – please contact us if you have any questions.)*

All applications for subdivision consent must also include the following information:

☐ The position of all new boundaries

☐ A north arrow and the scale (1:2000)

☐ All proposed and existing easements (including private easements)

☐ Any amalgamations

☐ Stages (if proposed)

☐ Dimensions and sizes of existing and proposed new lots

☐ Legal and physical roads, accessways and rights of way including grades (if applicable)

☐ All existing buildings and structures, their distance to existing and proposed boundaries and the position of any eaves in relation to rights of way/accessways

☐ The areas of all new allotments, unless the subdivision involves a cross lease, company lease, or unit plan

☐ The locations and areas of new reserves to be created, including any esplanade reserves and esplanade strips

☐ The locations and areas of any existing esplanade reserves, esplanade strips, and access strips

☐ The locations and areas of any part of the bed of a river or lake to be vested in a territorial authority under section 237A

☐ The locations and areas of any land within the coastal marine area (which is to become part of the common marine and coastal area under section 237A)

☐ The locations and areas of land to be set aside as new roads

Other useful information

The following examples of information are not compulsory, but they will be useful in helping Council make an informed decision about your application. Submitting this information *if it is relevant to your proposal* may save time and costs further down the track.

☐ Locality plan or aerial photo

Please provide at an appropriate scale (for example 1:500). Please indicate the location of the site in relation to roads and other landmarks. Show the street number of the subject site and those of adjoining sites.

☐ Volume of any earthworks

This must include area and volume of soil removed/imported and depth of cut/fill

☐ Details of Hazardous Activities and Industries (HAIL) List activity

If you are unsure whether your site is on the HAIL list please contact Council for assistance

☐ Any written approvals including details of those sought but not obtained

Please include any signed written approval forms and signed plans if acquired.

☐ Specialist reports to support your application

This may include traffic impact studies, landscape and planting plans, acoustic design certificates etc.

☐ Details and outcome of any consultation undertaken with adjacent land owners and occupiers, and relevant bodies. For example, the Regional Council, Heritage New Zealand Pouhere Taonga, Transpower, KiwiRail, NZTA, Department of Conservation etc.

☐ Details of any consultation undertaken with iwi

If you are unsure whether your proposal may affect matters of interest to iwi, or who the relevant iwi groups might be, please discuss this with Council prior to lodging your application

☐ Any other information arising from specific district plan provisions

Other information to include in an application for subdivision consent if it is relevant to your proposal

Proposal details

☐ Site coverage calculations

☐ Existing and proposed crossing places and sight distances and separation distances between crossing places

☐ Building platforms for all allotments including shape factors

☐ Onsite manoeuvring and existing and proposed vehicle parking spaces (where required)

Network utility operations

☐ Existing high voltage electricity lines and gas lines

☐ Location of existing and proposed service connections (including connections to reticulated services) and/or systems ie water, wastewater, stormwater and any easements

☐ Onsite effluent treatment and disposal areas and fields

Natural features

☐ Significant trees, bush stands, protected trees (including their extent of their dripline), covenanted areas or other features

☐ Water bodies

Heritage

☐ Archaeological and/or cultural heritage sites

Hazards

☐ Areas of likely or confirmed contamination

☐ Areas subject to land hazards e.g. unstoppable slopes, areas of flooding, peat soils, fill

- ☐ Details of proposed stormwater management appropriate to the scale and nature of the subdivision
- ☐ Pipework and onsite stormwater systems
- ☐ Open drains (including ownership)
- ☐ Effect of subdivision and end use on existing overland flow paths
- ☐ Contours showing existing and finished ground level (levels to the relevant datum) at 0.5m intervals within the subdivision, and at 2 metre intervals on adjoining properties (to enable effects on those properties to be assessed). A separate plan may be needed to show these details.
- ☐ Areas of proposed or existing fill or excavation
- ☐ Any proposed retaining walls or embankments (note if retaining wall over 1m is proposed, a typical cross section is required.)
- ☐ In urban areas, details of the percentage of proposed and existing impermeable and permeable areas
- ☐ Natural hazards, e.g. unstable slopes, areas of flooding, ponding, peat soils
- ☐ Elevations (to scale) of buildings which are affected by the location of new boundaries (e.g. where height in relation to boundary rules apply)

Blue Wallace Surveyors Ltd.

Resource Consent Application

Concurrent Subdivision and Boundary Adjustment

318 Lamb Street, Cambridge

ADDRESS FOR SERVICE
Blue Wallace Surveyors Ltd
PO Box 38, Waikato Mail Centre
Hamilton

21 November 2023

Contents

1.0 Form 9: Application for Consent – Subdivision & Boundary Adjustment

APPLICANT

Name	Muscle Developments Limited
Postal Address	107B Hautapu Road, Cambridge PO Box 11031, Hillcrest 3251
Email	ryan@waipacivil.co.nz (027 443 3065)

NAME AND ADDRESS FOR SERVICE

Name	Lynne Sun (Blue Wallace Surveyors Limited)
Postal Address	PO Box 38, WMC, Hamilton 3240
Phone	021 656 908
Email	lynne@bluewallace.co.nz

OWNER/S OF PROPERTY

Name	Te Mara Properties Limited

OCCUPIER - IF NOT OWNER

N/A

LOCATION OF SUBJECT SITE

318 Lamb Street, Cambridge

LEGAL DESCRIPTION & RECORD OF TITLE

RT: 1143238
Legal Description: Lot 2003 DP 535418, Lot 2005 DP 535418 and Lot 2 DP 593787

BRIEF DESCRIPTION OF PROPOSAL

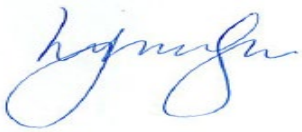
The application entails the creation of 20 residential lots at 318 Lamb Street, Cambridge via two stages. Additionally, it involves a boundary adjustment with the neighbouring property.

A land use consent is also sought for the proposed earthworks to enable road and building platform construction.

OTHER CONSENTS REQUIRED	APPLIED FOR?
Coastal Permit	No
Discharge permit	No
Water Permit	No
Other (NESCS)	YES (granted)

SIGNED

Name Lynne Sun **Date** 21 November 2023

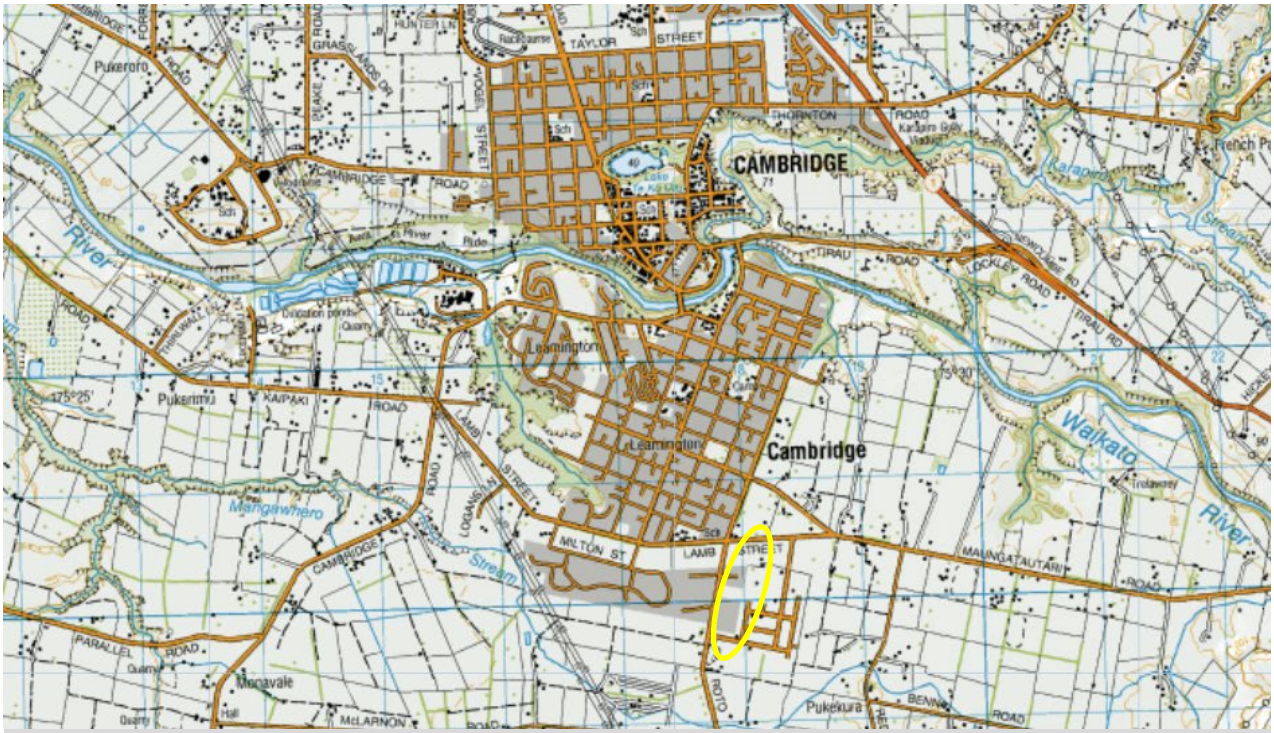


Signature

2.0 Application and Proposal

2.1 Introduction

Muscle Developments Limited ('the Applicant') is seeking approval to subdivide the property at 318 Lamb Street, Cambridge ('the Site') into 20 residential allotments.



NZ Topo Map Excerpt

The proposed subdivision will occur in two stages and is located within the Leamington Large Lot Residential Zone Structure Plan Area of the Operative Waipa District Plan ('WDP').

Stage 1 involves the creation of Lots 1, 14 and Lot 300, while Stage 2 will encompass the creation of Lots 2-13 and Lots 15-20. Lot 17 contains an existing dwelling.

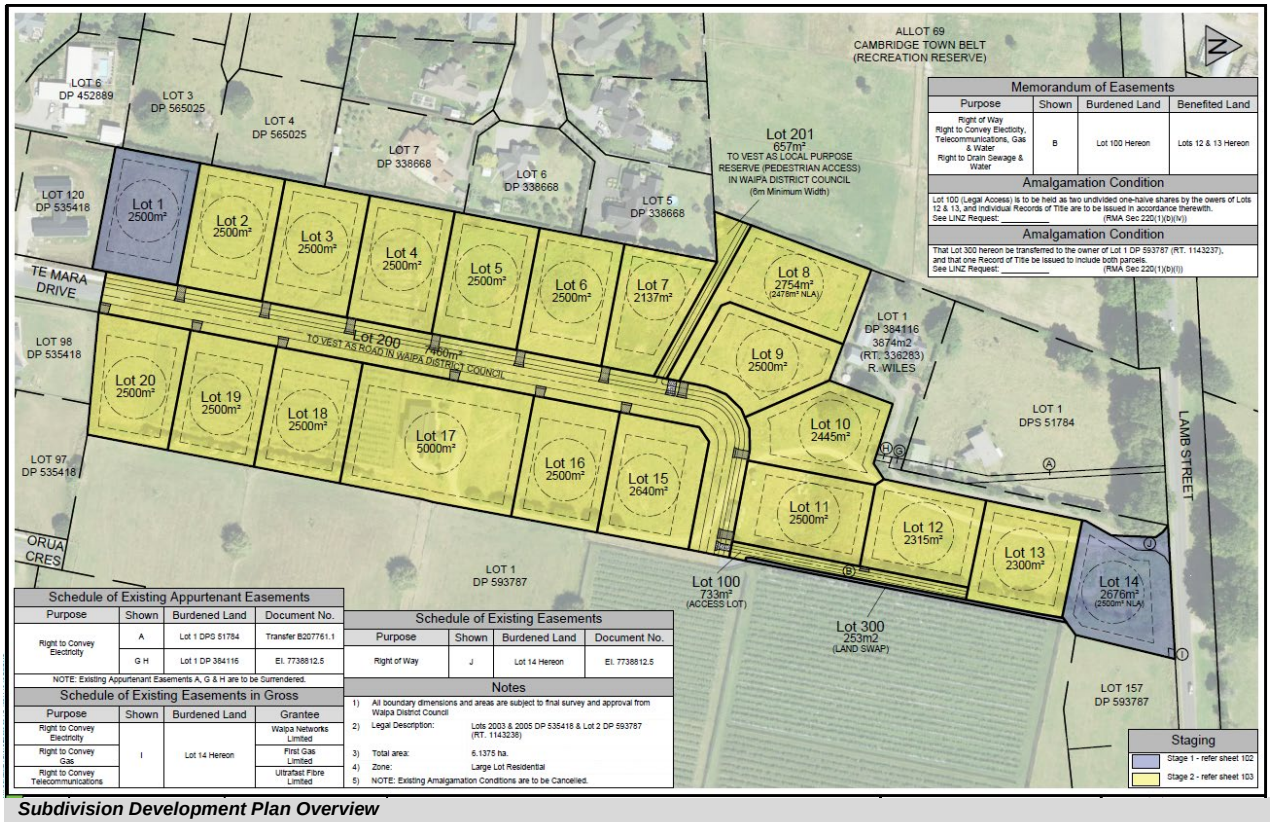
The proposed subdivision also includes the creation of a road reserve (Lot 200), a pedestrian reserve (Lot 201), an access lot (Lot 100).

A concurrent boundary adjustment (via amalgamation) is also being sought to facilitate the transfer of a sliver of land (Lot 300) to the neighbouring property located at 332 Lamb Street, Cambridge.

Please note, Lot 300 (253m^2) is not intended for residential use. It's being used as a small strip of land to be added to a blueberry farm. The purpose of this addition is simply to allow the owner to pass a mower through the area, making it easier to maintain the farm.

In addition to the subdivision, a Land Use Consent is required, and is concurrently sought, for the proposed earthworks to enable road and building platform construction.

A set of Subdivision Development Plans is provided in ***Appendix A*** and is visible in the image below.



Subdivision Development Plan Overview

Under the WDP subdivision and land use consent requirements triggered by the Applicant's proposal are summarized below:

- **Rule 3.4.2.9 –** The proposed earthworks will exceed 25m^3 and 250m^2.
- **Rule 15.4.2.1(k)** – Lots 7, 10, 12 and 13 are less than 2,500m^2.
- **Rule 15.4.2.3** – Lot 7 does not meet the required shape factor criteria.
- **Rule 15.4.2.6** – The proposal will create 3 rear lots.
- **Rule 15.4.2.69** – The roading design is in general accordance with the structure plan, with a few alterations made.

As a result of these non-compliances, the proposed subdivision and land use activities default collectively to that of a ***Non-Complying*** Activity under the ODP.

In consideration of the property's natural and physical values, the proposed subdivision has been subject to specific direction provided by both technical specialists, as well as discussions with relevant officers of the Waipa District Council.

Specialist reporting that has been used to guide this application consists of:

1) Three Water Assessment (Above Water)
2) Geotechnical Assessment (HD Geo)
3) DSI / SMP & RAP (HD Geo)
4) Integrated Transport Assessment (Gray Matter)
5) Assessment of Archaeological Values and Effects (W. Gumbley Limited)

Pre-application meeting notes PG/0070/23 dated 28 June 2023 is contained within ***Appendix B***.

Feedback of Iwi consultation is also provided in this report. A copy of the Memorandum of Understanding from Ngato Koroki Kahukura Trust and Ngati Hauaa Iw Trust is provided in ***Appendix E***. A Cultural Impact Assessment will be submitted to the Council during the s92 stage.

2.2 Site Description

2.2.1 Title Information

The property details subject to this application is shown in the Table below:

Subject Sites	**318 Lamb Street, Cambridge**	**332 Lamb Street, Cambridge**
Record of Title (RT)	1143238	1143237
Area	6.1375 hectares	8.3026 hectares
Legal Description	Lot 2003, 2005 Deposited Plan 535418 and Lot 2 Deposited Plan 593787	Lot 1 Deposited Plan 593787
Registered Owners	Te Mara Properties Limited	Simon Redding Makgill

Copies of RTs are provided in ***Appendix C***.

There are no interests or encumbrances registered on the titles that would otherwise restrict or limit the subdivision as sought.

In Section 2.3.4 of this planning report, the Applicant proposes to cancel a couple of easement instruments and a consent notice under Section 221 of RMA to rectify and remove certain encumbrances that are no longer pertinent.

2.2.2 Existing Environment

The Site is bounded by Lamb Street and currently contains a residential property, a shed, and a water tank positioned in the central east. To the east, is a blueberry orchard and pasture, while to the south and west, residential homes and additional pasture can be found.

The Site is generally flat and is located between 73m to 75m above local datum (see development plan set within ***Appendix A***).

An old, disused, rubbish pit is located in the central-west portion of the Site (see image below) and constitutes contaminated land under the National Policy Statement for Contaminated Land. Remediation works in relation to this piece of land are currently being undertaken to appropriately prepare the Site for residential land use.

Please note, a Land Use Consent (LU/0142/23) has been applied and granted to allow for the disturbance of contaminated soils and the change in land use on Site.

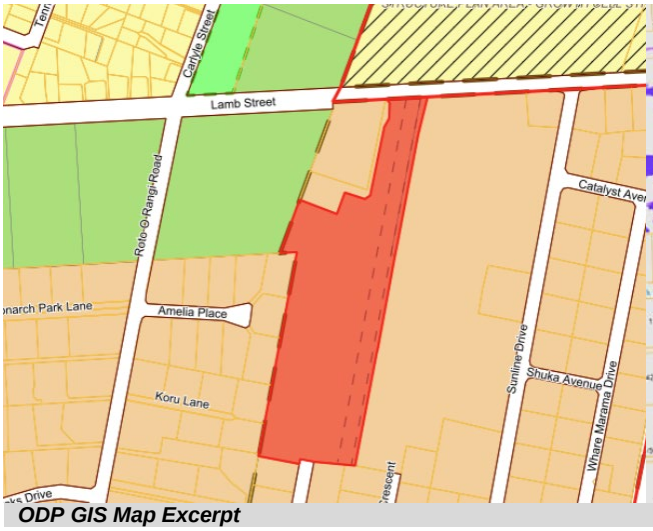
The Aerial Photo of the Site

2.2.3 Site Zoning and Planning Notations

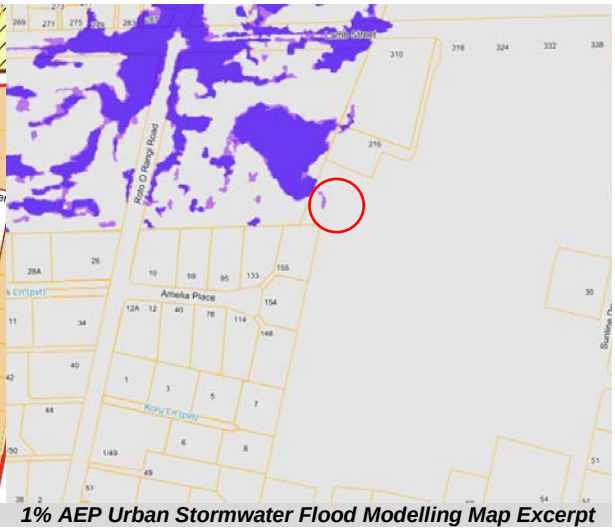
As evidenced from Council's GIS Mapping software, the Site is zoned 'Leamington Large Lot Residential Zone'.

The Site is to the north of Te Mara Drive and is identified in structure planning maps for the continued large lot development from the south and further to the east of the Site.

To the west of the Site is a section of reserve land identified as the Cambridge 'Town Belt'.



ODP GIS Map Excerpt



1% AEP Urban Stormwater Flood Modelling Map Excerpt

In terms of road linkage, there is an indicative road (marked with grey dashes) running along the eastern boundary of the Site. A revised road layout has been discussed with Council to satisfy the intent of the indicative road layout – but at a different location.

This new proposed road layout within the application will seamlessly integrate with the existing Te Mara Drive network to the south. Gray Matter Ltd was commissioned to conduct an Integrated Transport Assessment (ITA) to evaluate the transportation impacts associated with the proposed development (see ***Appendix F***).

Furthermore, the Site lies just beyond the Waipa District Council's 1% AEP Flood Modeling Map. Nonetheless, a minor depression (identified by the light purple blob) extends slightly within the Site boundary adjacent to the town belt, signifying negligible ponding potential during the 1% AEP

event. Further discussion regarding this flood matter can be found in Section 6.1 of this planning considerations report.

2.2.4 Infrastructure and Utilities

There is reticulated water supply in the surrounding area. There is an existing 100mm PVC main on the western side of Te Mara Road and a 50mm PE main on the eastern side. There is also an existing 180mm PE water main located on the northern side of Lamb Street.

Stormwater in the adjacent development developed areas is managed by a series of shallow grassed swales discharging to soakage trenches.

Tuatahi First Fibre and Waipa Networks have been consulted over the proposed development.

Power and telecommunication reticulations are able to be supplied to each lot (See ***Appendix D***).

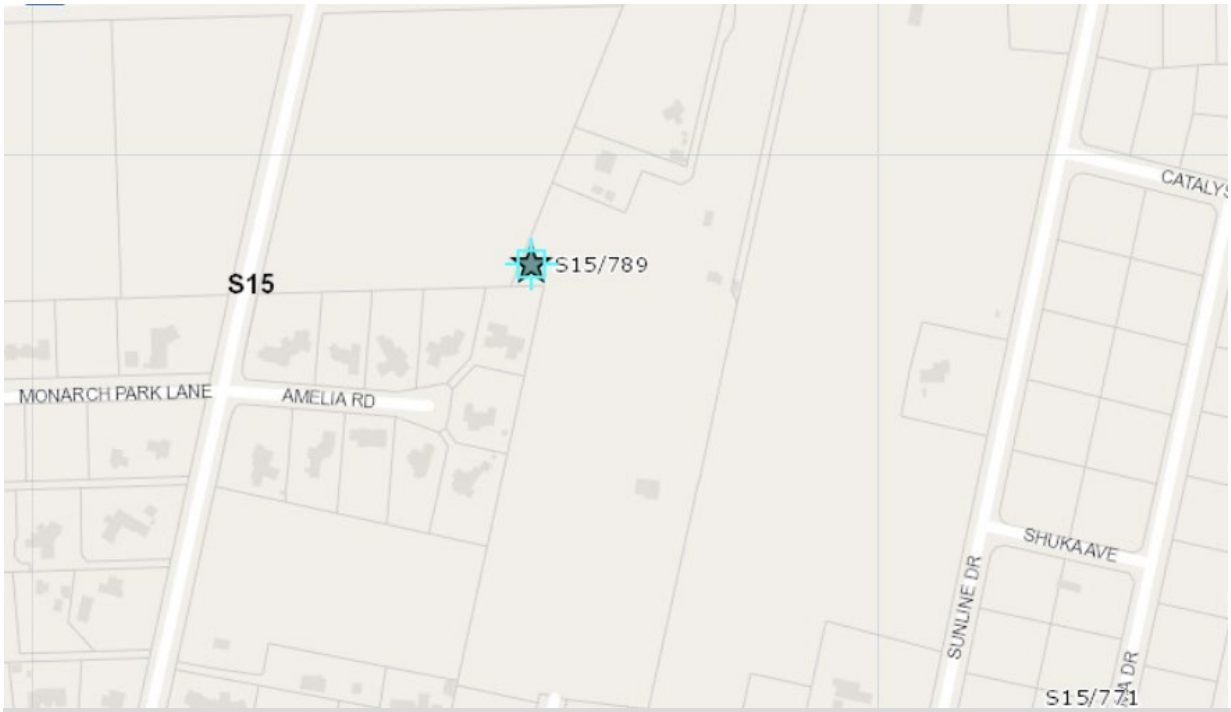
WDC Utilities Map Excerpt

2.2.5 Archaeological Investigation

As evidenced from the ArchSite Map, there is an archaeological site (S15/789) has been recorded within the Site.

Archaeological site S15/789 is recorded as being part of an extensive series of Māori horticultural sites along the Waikato River, characterised by borrow pits and Māori-made soils.

An Archaeological Assessment has been conducted, along with a detailed Archaeological Site Instruction and Research Strategy Report (see ***Appendix E***).



ArchSite Map Excerpt

2.3 Proposal

2.3.1 Proposal Overview

The Applicant owns a large block residentially zoned property and seeks:

1) *Subdivision resource consent to create 20 large-lot residential allotments.*
2) *The subdivision includes the creation of a road reserve (Lot 200) and a pedestrian reserve (Lot 201) to be vested with Waipa District Council.*
3) *Boundary adjustment (via amalgamation) to enable the transfer of a portion of land (Lot 300) to the neighbouring property at 332 Lamb Street.*
4) *Concurrent Land Use Consent for the proposed earthworks.*

The proposed subdivision will be conducted in two stages.

Stage 1 involves the creation of Lots 1, 14 and Lot 300, while Stage 2 will encompass the creation of Lots 2-13 and Lots 15-20.

The largest residential lot size is 5,000 m^2 (Lot 17); and the smallest residential lot size is 2,137 m^2 (Lot 7).

Lot 200 is proposed for roading, and Lot 201 is proposed a pedestrian access reserve. Both lots are scheduled for development during Stage 2 and will subsequently be vested with Council.

All residential allotments will be provided with three-waters solutions as indicated in the suite of development plans contained within ***Appendix A***.

In summary of the proposed subdivision – the design contains the following residential elements:

Lot No.	Area m^2	Comment
1	2,500	Residential lot
2	2,500	Residential lot
3	2,500	Residential lot
4	2,500	Residential lot
5	2,500	Residential lot
6	2,500	Residential lot
7	2,137	Residential lot (noncomplying)
8	2,754 (NLA 2,478)	Residential lot
9	2,500	Residential lot
10	2,458	Residential lot (noncomplying)
11	2,500	Residential lot
12	2,335	Residential lot (noncomplying)
13	2,302	Residential lot (noncomplying
14	2,678 (NLA 2,500)	Residential lot
15	2,640	Residential lot
16	2,500	Residential lot
17	5,000	Residential lot
18	2,500	Residential lot
19	2,500	Residential lot
20	2,500	Residential lot
100	733	Access lot
200	7,460	Road to vest
201	657	Local purpose reserve
300	253	Land swap

A concurrent boundary adjustment is being sought to facilitate the transfer a sliver of land (Lot 300) to the neighbouring property located at 332 Lamb Street, Cambridge.

Notably, Lot 300 (253m^2) is serving as a narrow strip of land to augment a blueberry farm. This addition facilitates convenient farm maintenance, enabling the owner to pass a mower through the area.

Proposed boundary adjustment area (mowed area)

2.3.2 Earthworks

The proposed development necessitates a certain level of soil disturbance, primarily for roading and site contouring for Lot 5.

Soil disturbance for the roading, including an access lot and a pedestrian crossing, are as follows:

- Cut volume 5,320 m^3
- Fill volume 110 m^3
- Net volume 5,430 m^3 (fill)

As for Lot 5, the soil disturbance is as follows:

- Cut volume 0 m^3
- Fill volume 930 m^3
- Net volume 930 m^3 (fill)

Please note that all the volumes mentioned above are not adjusted for compaction.

The topsoil will be evenly spread across the entire site.

Given that the proposed earthworks volume will exceed a total volume of 25m^3 or a total area of 250m^2 in a single activity or in cumulative activities in any one calendar year as per Rule 3.4.2.9, a land use consent for discretionary earthworks is being sought.

An Earthworks Construction Management Plan (ECMP) will be presented to Council for engineering approval at later stage detailing the earthworks timing, duration, hours/ days of operation, dust management, number of heavy traffic movements.

Confirmation of materials being used as fill will be confirmed before construction commences.

Earthworks Plan Excerpt

2.3.3 S221 Cancellation of Consent Notice

In accordance with Section 221 of the RMA, the Applicant seeks to cancel Consent Notice 11896794.1, pertaining to contaminated land associated with the parent title RT 937380.

Following the subdivision of this parent title, a portion of land (Lot 2 DP 593787) has been amalgamated with the application site, resulting in the transfer of this consent notice to 318 Lamb Street. The Applicant proposes the removal of this unnecessary encumbrance, a decision supported by discussions with Waipa District Council Officer Layla Gruebner (see email thread provided in ***Appendix B***).

Furthermore, Easement Instrument 7738812.5 and Transfer B207761.1, which pertain to the right to convey electricity to Lot 2003 DP 535418 (the Site) via mark J on DP 535418 (from Lamb

Street), are now deemed unnecessary due to the proposed development bringing electricity connection to the extension of Te Mara Drive. As such, the Applicant suggests the surrender of these documents in stage 2.

Copies of these instruments are provided in ***Appendix B***.

2.3.4 Access

Access to the proposed lots will be from a new road extension off Te Mara Drive (Lot 200), which will have a 20m width (7.5m formation width) and include footpaths, lighting, street trees, driveway locations and underground infrastructure, as illustrated in the combined subdivision and engineering plans set in ***Appendix A***.

As requested by Council, the street trees have been strategically placed along the central side of each lot, while the future crossing locations have been designed to predominantly align with the southern side. Vehicle crossing design detail can be found in the engineering sheet 23095-00-EN-352 in ***Appendix A***.

One lot (Lot 14) will have access from Lamb Street, while the remaining 19 lots will be accessible from the Te Mara Drive extension.

This extension will connect to the existing street network and Orua Crescent, creating a street layout consistent with Cambridge's typical grid design.

For Stage 1, a temporary gravel turning head is proposed to be situated at the eastern end of Lot 200 to facilitate vehicle manoeuvring.

The proposed road layout deviates from the one specified in District Plan Appendix S18 - Leamington Large Lot Residential Zone Structure Plan. This adjustment is intentional, aligning with the subject site's boundary to achieve greater consistency in lot shapes and sizes. To comprehensively evaluate the transportation impacts associated with this development, Gray Matter Ltd was engaged to conduct an Integrated Transport Assessment (ITA), documented in ***Appendix F***.

3.0 Technical Reports

3.1 3-Water Assessment

Above Water Consultant Limited has been engaged by the Applicant to undertake a Three Water Assessment for the Site (see ***Appendix G***).

The proposed three-water management system for the Site follows this approach:

- Soakage device sizing using the Auckland Council GD007 method, providing suitable mitigation for the proposed road and footpath within the development for a 1% AEP storm event (RCP8.5). Options include modular soakage tanks in the road reserve (2.4m wide, 96.5m long, 0.88m deep or equivalent), a soakage basin in Lot 5 (193.6m² area, 282.0m³ volume), or porous well liners in the road reserve berm (46 x 1.2m diameter well liners, 4.0m deep).
- Incorporating shallow grassed swales, similar to the adjacent development, for runoff pre-treatment before entering the soakage systems.
- Maintaining an overland flow path through the site post-development for upstream catchment runoff (east, south-east to north-west into the Cambridge green belt area). This

may be integrated into the proposed road corridor.

- Requiring on-site wastewater systems for each lot, with treatment levels based on lot size. Wastewater disposal areas will be confirmed at the building consent stage, contingent on geotechnical testing for each lot.
- Accessing water supply from the reticulated network, with each lot necessitating a 20mm MOPE connection to new mains in the road reserve, subject to Council confirmation of suitable flow and pressure.

3.2 Preliminary Geotechnical Assessment

HDGeo carried out a preliminary geotechnical assessment (***Appendix H***) of the overall project site area and concluded:

Groundwater	Groundwater was encountered at an approximate depth of 3.6 m bgl within HA05 during the time of the site investigation.
Earthquake	Based on qualitative assessment, we believe the liquefaction risk is 'low' to 'moderate'.
Volcanic, geothermal, or sedimentation activity	The site is not near any known sources of these risks. The site is not at risk of landslips.
Landslips	the site and surrounding land are near level flat with no significant changes in elevation. The site is not at risk of landslips.
Erosion	No indications of erosion were observed during the site investigation, and we consider the site to be at low risk of damage due to erosion.
Subsidence	Risk of the site to general subsidence is low.
Expansive soil	The ground conditions encountered below the property generally consisted of granular or low plasticity silt material. Therefore, we believe the site is classified as low risk for expansive soils.
Earthworks	• we expect minor localised excavation and replacement of approximately 0.2 m to 0.8 m of topsoil and loose silt. • The old dump site identified within lots 5 and 6 has been excavated as per guidance of the environmental report conducted on the site by HD Geo. • As per recommendations of the report the dump site is to be backfilled with engineered fill and suitably compacted. In general, we expect any externally sourced sand fill to be suitable for use as fill if placed in accordance with NZS4431:202212 and tested by a suitably qualified engineer.
Foundations	For light timber framed structures (NZS3604:2011 scope): • topsoil and any unsuitable material will need to be removed (approximately 0.2 m to 0.8 m bgl) across the site. • hardfill replacement (i.e., with pit sand, compacted to achieve 5 blows/100 mm on DCP). • reinforced stiffened, concrete raft foundations designed for the liquefaction risk.

3.3 Detailed Site Investigation (DSI) & Site Management Plan (SMP) & Remedial Action Plan (RAP)

As part of the contaminated land investigation (***Appendix I***), HDGeo identified a number of

Hazardous Activity and Industry List (HAIL) land uses have occurred within the property, theses being:

- *Former stockyards, which are commonly associated with livestock dipping and/or spray race operations (HAIL A8)*
- *Blueberry orchard, which has the potential to include the bulk storage and/or use of persistent pesticides (HAIL A10)*
- *A rubbish pit (HAIL G5)*
- *Multiple buildings which may have used lead-based paint and/or asbestos in their construction1. The degradation of either lead-based paint or asbestos construction material can result in contaminant concentrations in soil above human health guidelines (HAIL I)*

Considering the HAIL land use activities associated with the Site, a DSI has been conducted in accordance with the NESCS.

Due to the presence of lead and arsenic in the soil within the rubbish pit on the Site, soil remediation is necessary to render the site suitable for the proposed rural residential land use.

Please note, a Land Use Consent has been obtained to allow for the disturbance of contaminated soils and the change in land use on Site. This consent has been granted under the reference LU/0142/23.

The Applicant proposes to retain all contaminated soil on-site within a waste cell. Only the imported clay fill will require sampling to confirm the achievement of the remedial goals. It is understood that a suitably qualified and experienced practitioner (SQEP) will supervise the soil excavation process and promptly identify any unanticipated signs of contamination.

In the event that unexpected potential soil contamination is identified, an SQEP will be called to the Site to assess whether sampling and analysis are necessary before work can proceed. If sampling is deemed necessary, the SQEP will formulate an appropriate sampling plan detailing the nature and extent of the contamination, specifying the number of samples, and the contaminants to be analysed at the laboratory.

The findings will be documented in a Site Validation Report (SVR). The SVR will encompass a summary of the remedial works, any deviations from the RAP, and provide any requisite recommendations. This SVR will be submitted to WDC within 2 months of the completion of the soil disturbance work.

3.4 Archaeological Report

An Assessment of Archaeological Value and Effects was conducted by W. Gumbley Ltd in September 2018, covering both the Site (previously referred to as Stage 3A) and the neighbouring site (previously referred to as Stage 3B).

In addition, a more detailed addendum specifically focusing on 318 Lamb Street was carried out in November 2022. Both the initial assessment and the subsequent addendum can be found in ***Appendix E*** of this report.

Furthermore, an Archaeological Site Instruction and Research Strategy has been prepared and provided in ***Appendix E***.

Additionally, ***Appendix E*** also contains a copy of the Memorandum of Understanding obtained from Ngato Koroki Kahukura Trust and Ngati Hauaa Iw Trust. It is important to note that, due to

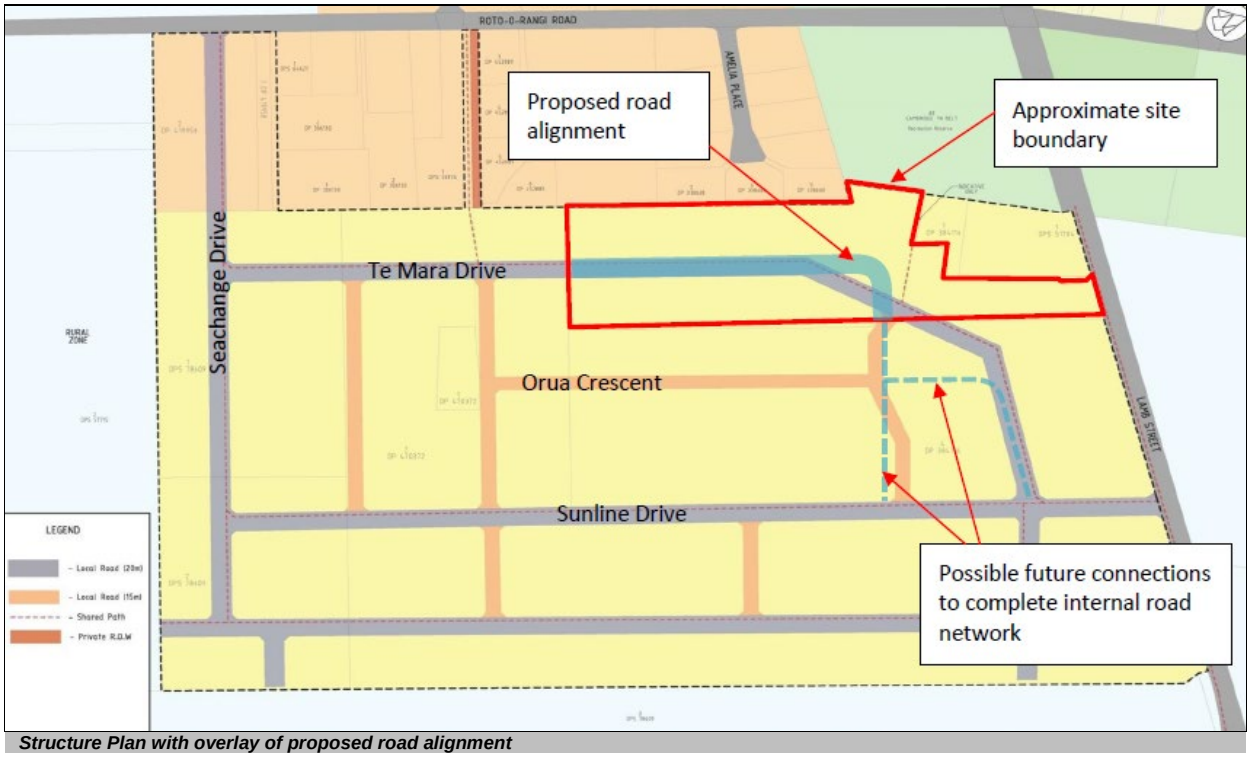
the significant workload of Nga Iwi Toopu o Waipa, a Cultural Impact Assessment will be presented to Council during the s92 stage.

3.5 Traffic Report

An Integrated Transport Assessment (ITA) conducted by Gray Matter has appraised the traffic implications of the proposition (refer to ***Appendix F***).

While the proposed road layout deviates from the one specified in District Plan Appendix S18 - Leamington Large Lot Residential Zone Structure Plan (see below), it aligns with the objectives of the structure plan and the existing road configuration in Pukekura Subdivision Area.

The layout accommodates local street norms with priority-controlled intersection arrangements, and anticipated Structure Plan deviations are considered to have negligible impacts.



Structure Plan with overlay of proposed road alignment

Furthermore, Gray Matters recommendations encompass the imposition of conditions addressing the following:

- Ensuring a minimum sight distance of 30m at the vehicle crossing for Lot 15.
- Widening the carriageway through the curve to accommodate the swept paths and clearances of an 8m medium rigid truck and 99 percentile cars, without overlap.
- Ensuring a clear line of sight along the full length of the proposed connection to the green belt and low or visually permeable fencing for properties adjoining the proposed reserve or walkway to allow for passive surveillance.

4.0 Resource Management Act

4.1 Part II Matters

The proposed subdivision adjacent to Te Mara Drive promotes sustainable management through the use of the piece of land for large lot residential purposes.

This development is envisaged as an integrated, carefully managed development where the component parts – extending well beyond the basic civil engineering dimensions that typically determine the character of most residential areas – have been very deliberately resolved. This approach promises a level of coherence, amenity, and response to the character of Leamington Large Lot Residential Zone Structure Plan Area.

The proposal safeguards life-supporting capacity of the natural resources air, and soil and water subject to conditions addressing stormwater and wastewater management, traffic generation and access.

Adverse effects of the proposed development have been considered in developing the proposal and have been mitigated through engineering and subdivision design. The development has been designed to take heed of the existing development pattern of the area and minimise the actual and potential adverse effects which result from development - such as limiting the effects from earthworks.

In acknowledgement of recent RMA amendments (i.e., Section 6(9h), the application's geotechnical assessment and stormwater management plan have both indicated that the Site development will not pose a natural hazard risk (flooding and from seismic activity) – and is inclusive of the potential effects of climate change.

In respect of Section 7 (Other Matters) of the Act, the maintenance and enhancement of amenity values (Section 7(c)), the maintenance and enhancement of the quality of the environment (Section 7(f)) and the efficient use and development of natural and physical resources (Section 7(b)), has also been considered.

As considered by the subdivision design, amenity values and environmental quality are closely interrelated. The extensive design and planning which underpins the proposed development will result in the level of amenity that is appropriate and will integrate with the surrounding area. The subdivision will result in enhanced landscape and natural land-form protection, as well as provide benefits to the wider Cambridge community.

In respect of the efficient use and development of natural and physical resources, the proposal is appropriate given that it has been comprehensively planned and designed to ensure that environmental effects can be avoided, remedied or mitigated.

In consideration of Section 8 (Treaty of Waitangi) matters, the Applicant has undertaken early consultation with local iwi representatives from Ngato Koroki Kahukura Trust and Ngati Hauaa Iw Trust. A subsequent CIA will be provided Nga Iwi Toopu o Waipa as well.

Overall, it is considered that the application is consistent with and achieves the purpose and principles of sustainable management set out in Part 2 of the Act.

4.2 104 Assessment Matters

This application should be considered as a ***Non-Complying*** Activity, as identified in the ODP.

Council's assessment of this application is subject to Sections 104 and 104B of the RMA, including the relevant activity status assessment criteria provided in the ODP.

> ***104 Consideration of applications***
> *(1) When considering an application for a resource consent and any submissions received, the consent authority must, subject to Part 2, have regard to–*
> *(a) any actual and potential effects on the environment of allowing the activity; and*
> *(b) any relevant provisions of—*

(i) a national environmental standard:
(ii) other regulations:
(iii) a national policy statement:
(iv) a New Zealand coastal policy statement:
(v) a regional policy statement or proposed regional policy statement:
(vi) a plan or proposed plan; and

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

(2) When forming an opinion for the purposes of subsection (1)(a), a consent authority may disregard an adverse effect of the activity on the environment if a national environmental standard or the plan permits an activity with that effect.

….

(3) A consent authority must not,—

(a) when considering an application, have regard to—

(i) trade competition or the effects of trade competition; or
(ii) any effect on a person who has given written approval to the application:

…

(4) A consent authority considering an application must ignore subsection (3)(a)(ii) if the person withdraws the approval in a written notice received by the consent authority before the date of the hearing, if there is one, or, if there is not, before the application is determined.

(5) A consent authority may grant a resource consent on the basis that the activity is a controlled activity, a restricted discretionary activity, a discretionary activity, or a non-complying activity, regardless of what type of activity the application was expressed to be for.

(6) A consent authority may decline an application for a resource consent on the grounds that it has inadequate information to determine the application.

(7) In making an assessment on the adequacy of the information, the consent authority must have regard to whether any request made of the applicant for further information or reports resulted in further information or any report being available

104B Determination of applications for discretionary or non-complying activities

After considering an application for a resource consent for a discretionary activity or non-complying activity, a consent authority—

(a) may grant or refuse the application; and

(b) if it grants the application, may impose conditions under section 108.

For the reasons provided in this application (in the preceding sections and below in the assessment of environmental effects section), the adverse effects of the activity on the environment will be less than minor; and the proposal will not be contrary to the Objectives and Policies of the ODP for the Large Lot Residential Zone.

5.0 Planning Assessment

5.1 WDP Activity Status

In summary of the WDP Assessment contained within ***Appendix J***, the flowing table identifies further infringements of the proposed development:

ODP Assessment	
Rules	**Activity Status**
3.4.2.9 - Earthworks Earthworks shall not exceed a total volume of 25m³ or a total area of 250m² in a single activity or in cumulative activities in any one calendar year, provided that this rule shall not apply to earthworks incidental to an approved resource consent or building consent.	**Discretionary** The earthworks required will exceed 25m^3 and 250m^2.
15.4.2.1 - Net lot area rules (k) Large Lot Residential Zone of Lamb Street, Leamington (Planning Map 27)… Minimum Net Lot Area = 2,500m²	**Non-Complying** Lots 7, 10, 12 and 13 are less than 2,500m^2.

Maximum Net Lot Area or Maximum Number of Lots = 5,000m²	
15.4.2.3 - Lot frontage, lot shape factor and vehicle crossings Lot shape factor: 30m diameter circle …	**Discretionary** With the exception of Lot 7, each site will also meet the shape factor requirement.
15.4.2.5 - Lot design Each new lot created shall be able to incorporate the lot shape factor in a position which does not encroach on any building setback or easement requirement.	**Discretionary** The shape factor circle will fit within all setbacks, but it's worth noting that Lot 7 has a smaller 28.43meter diameter circle.
15.4.2.6 Subdivision within the urban limits, and any Large Lot Residential Zone shall not create more than two rear lots, unless provided for by Rule 15.4.2.64.	**Discretionary** The proposal will create 3 rear lots.
15.4.2.69 All development and subdivision in areas subject to a Structure Plan, Development Plan or Concept Plan All development and subdivision within an area subject to an approved structure plan, development plan or concept plan shall be designed in general accordance with the requirements of that structure plan…	**Discretionary** The roading design is in general accordance with the structure plan, with a few alterations made.

5.2 WDP Objective and Policy Assessment

The zoning of the application site is Large Lot Residential. The following Objectives and Policies of the WDP are considered relevant to this application:

Section 3 - Large Lot Residential Zone

Objective -On-site amenity values and safety
3.3.5 To maintain and enhance amenity values in the Large Lot Residential Zone.
Policies - Safety and design
3.3.5.5 To maintain, and where possible enhance, the safety of Large Lot Residential Zones through site layouts and building designs that incorporate Crime Prevention Through Environmental Design principles.

Comment:

The intended use of the Site is primarily for large lot residential purposes, and as such, it is not expected to have any adverse effects on the surrounding lifestyle residential environment.

The majority of the proposed lots will retain to the scale and density anticipated in the Large Lot Residential Zone, with a net lot area of at least 2,500m^2. The smallest lot, Lot 7, is 2,137m^2 in size, which still provides ample space for future dwelling construction.

The proposed residential development is in harmony with the existing character of the Leamington Large Lot Structure Plan Area. It aligns with the principles of low-density residential development and complements the already established residential land use in the southern and western areas of the Site.

In summary, it is expected that the proposed development will fully align with the aforementioned objectives and policies.

Section 15 - Infrastructure, Hazards, Development and Subdivision

Objective - Integrated development: site design and layout
15.3.1 To achieve integrated development within the District, that contributes to creating sustainable communities and enhances key elements of character and amenity.
Policy Understanding the constraints and opportunities of a site by undertaking a site and surrounding area analysis
15.3.1.1 Development and subdivision should integrate with and acknowledge the constraints and opportunities of the site and surrounding area.
Policy Sustainable design and layout development principles
15.3.1.2 Development and subdivision within the urban limits and the Large Lot Residential Zones, should occur in accordance with the principles of sustainable design, and enable energy efficiency.
Policy Low impact design
*15.3.1.**3** The design and layout of development and subdivision, should recognise the landform and processes of the natural environment of the site and surrounding land, and avoid or minimise alterations to the landform and ecosystems.*
Policy All zones: ensuring boundary adjustments and boundary relocations do not compromise amenity
***15.3.1.4** Boundary adjustments and boundary relocations shall not create or increase any non compliance with rules for new lots in the zone within which the subdivision is taking place.*

Objective - Integrated development: natural hazards and site suitability
15.3.2 To ensure that sites proposed as part of a development or subdivision will be capable of accommodating activities anticipated within the applicable zone.
Policy Land to be suitable for use
15.3.2.1 Land to be developed or subdivided must be physically suitable to accommodate the permitted land use activities for that zone in accordance with the rules of this Plan.
Policy Consideration of natural hazards
15.3.2.2 Development and subdivision design should avoid natural hazards, or provide for the mitigation of the hazard within the development or subdivision design.
Policy Consideration of reverse sensitivity
15.3.2.4 Development and subdivision design should not result in reverse sensitivity effects on adjacent sites, adjacent activities, or the wider receiving environment.

Objective - Urban consolidation
15.3.4 To ensure urban consolidation will be achieved within the District, while also contributing to character and amenity outcomes.
Policy - Large Lot Residential Zone: intensification limitations
15.3.4.5 In order to achieve the character outcomes for the Large Lot Residential Zone, at the density levels prescribed in this Plan, development within the Large Lot Residential Zones, shall be considered as the final development form. Large lot residential development is not a precursor to further intensified urban format residential development.

Objective - Protection of cultural sites, and archaeological sites
15.3.9 To protect the District's cultural sites identified in this Plan and to manage the effects of development and subdivision on archaeological sites.
Policy - Avoid disturbance of cultural sites
15.3.9.1 To manage the actual and potential effects on cultural sites by assessing the layout and design of development and subdivision including buildings, earthworks, infrastructure and driveways within 20m of the boundary of an identified cultural site(s) to ensure that sites are not disturbed.
Policy - Management of effects on archaeological sites
15.3.9.2 To manage effects on the archaeological resource of the District at the time of development and subdivision.
Policy - Management of cultural sites and archaeological sites at the time of subdivision
15.3.9.3 To retain cultural sites and archaeological sites within one lot, where practicable or possible.

Objective - Structure planning
15.3.16 To achieve integrated development within structure plan areas.
Policy - Structure planning
15.3.16.1 To enable development and subdivision within approved structure plan areas where the development and subdivision is integrated with the development pattern and infrastructure requirements specified in an approved structure plan.

Comment:

As mentioned previously, the proposed residential development is sympathetic to the existing character of the Leamington Large Lot Structure Plan Area in that the proposal is for low density residential development.

It is considered that the proposed 20-lot residential subdivision will support the development of additional housing, which is proving to be in short supply in the region.

To the west of the Site lies the Cambridge 'Town Belt'. The proposed subdivision layout acknowledges this inherent connection by incorporating a pedestrian reserve. This thoughtful design aims to promote resident access to the open space, ultimately enhancing the physical and social well-being of the neighbourhood's inhabitants.

The Applicant has engaged the services of professional consultants to undertake stormwater and geotechnical investigations for the Site. A contaminated land assessment DSI has also been undertaken. As a result, a Land Use Consent has been obtained to allow for the disturbance of contaminated soils and the change in land use on Site. This consent has been granted under reference LU/0142/23.

It's important to note that the Site is located just beyond the boundaries of the Waipa District Council's 1% AEP Flood Modelling Map. While a minor depression slightly extends within the site boundary, the Applicant's engineer has designed the stormwater system to accommodate the 100-year ARI event, ensuring that future dwellings will not be adversely affected by downstream flooding.

Additionally, an archaeological site (S15/789) has been documented within the Site. This archaeological site pertains to a series of borrow pits and Māori-made soils. Early consultation

with local iwi has taken place concerning the proposed subdivision, resulting in their subsequent approval (refer to ***Appendix E***).

A comprehensive Archaeological Assessment, along with a detailed Archaeological Site Instruction and Research Strategy Report, has been undertaken to ensure that if any archaeological features are to be modified or destroyed, the appropriate authority must be sought from HNZPT prior to commencing any earthworks. This includes the mitigation of the archaeological resource through investigation and recording of archaeological remains before earthworks begin.

Considering the above, it is reasonable to conclude that the proposal is consistent with the stated objectives and policies.

Section 16 - Transportation

Objective - Ensuring sustainable, integrated, safe, efficient and affordable multi-modal land transport systems

16.3.1 All new development, subdivision and transport infrastructure shall be designed and developed to contribute to a sustainable, safe, integrated, efficient (including energy efficient network design) and affordable multi-modal land transport system.

Policy - Design elements

16.3.1.1 Development, subdivision and transport infrastructure shall be designed and located to:
(a) Minimise energy consumption in construction, maintenance and operation of the network; and
(b) Accommodate and encourage alternative modes of transport; and
(c) Give effect to the road hierarchy; and
(d) Contribute to:
i) Integrated transport and land use planning and a safe road system approach; and
(ii) Reducing deaths and serious injuries on roads; and
(iii) An effective and efficient road network; and
(iv) Efficient movement of freight.

Policy - Ensuring future connections

16.3.1.2 Development, subdivision and transport infrastructure shall be designed and located to:
(a) Link to existing transport networks, including roads, walking, cycling and passenger transport; and
(b) Accommodate future transport network connections and walking, cycling and passenger transport options to Deferred Zones and future growth areas.

Comment:

The proposed layout of the road (Lot 200) has been designed in a manner to comply with District Plan standards, as well as to enable a streetscape that contains functionality, streetscape amenity, as well as incorporating the Crime Prevention Through Environmental Design principles (i.e., street lighting for passive surveillance).

Gray Matter's traffic assessment indicates that Pukekura's streets will comfortably operate within a theoretical lane capacity of 1,000-1,400 veh/h. The additional traffic to the surrounding road network is expected to have negligible safety and efficiency effects. The proposed development is assessed to have less than minor impact on the existing transportation network.

In essence, the proposed subdivision aligns with the above transportation objectives and policies.

Section 19 - Hazardous Substances and Contaminated Land

Objective - Managing risks of contaminated land

19.3.3 To ensure that unacceptable risk to human health and the environment posed by remediation, development, use and redevelopment of contaminated land is prevented or mitigated.

Policy - Avoid or mitigate of adverse effects of contaminated land

19.3.3.1 By ensuring that all development, use, and redevelopment of land affected by soil contamination avoids, remedies or mitigates adverse effects and risk on human health.

Policy - Management measures for contaminated land

19.3.3.2 By ensuring that management measures for contaminated land, that provide for remediation, management, or disposal of contaminated soil, ensure that the level of contamination is appropriate for any proposed future use of the land.

Policy - Risk management for use of contaminated land

19.3.3.3 By ensuring that exposure from the on-going use of land affected by soil contaminants is managed in a way that prevents or mitigates any adverse effects on human health.

Comment:

As previously discussed in this application, the DSI had highlighted concerns regarding the 'rubbish pit' located within the Site, particularly concerning the elevated levels of contaminants such as lead and arsenic in relation to human health guidelines.

Nevertheless, the issue of contaminated land has been suitably addressed in the Site's DSI, RAP, and CSMP, all of which have been prepared by a SQEP.

An appropriate remediation methodology, oversight of remedial actions, a contaminated land management plan, and subsequent validation will all be carried out under the supervision of a recognized professional, in this case, HDGeo.

The comprehensive reporting and recommendations made in this process are deemed sufficient in recognizing the current site conditions and the necessary measures to address them.

It is further believed that with the implementation of the recommended conditions of consent, the surrounding area will be adequately safeguarded from any potential adverse effects for the foreseeable future.

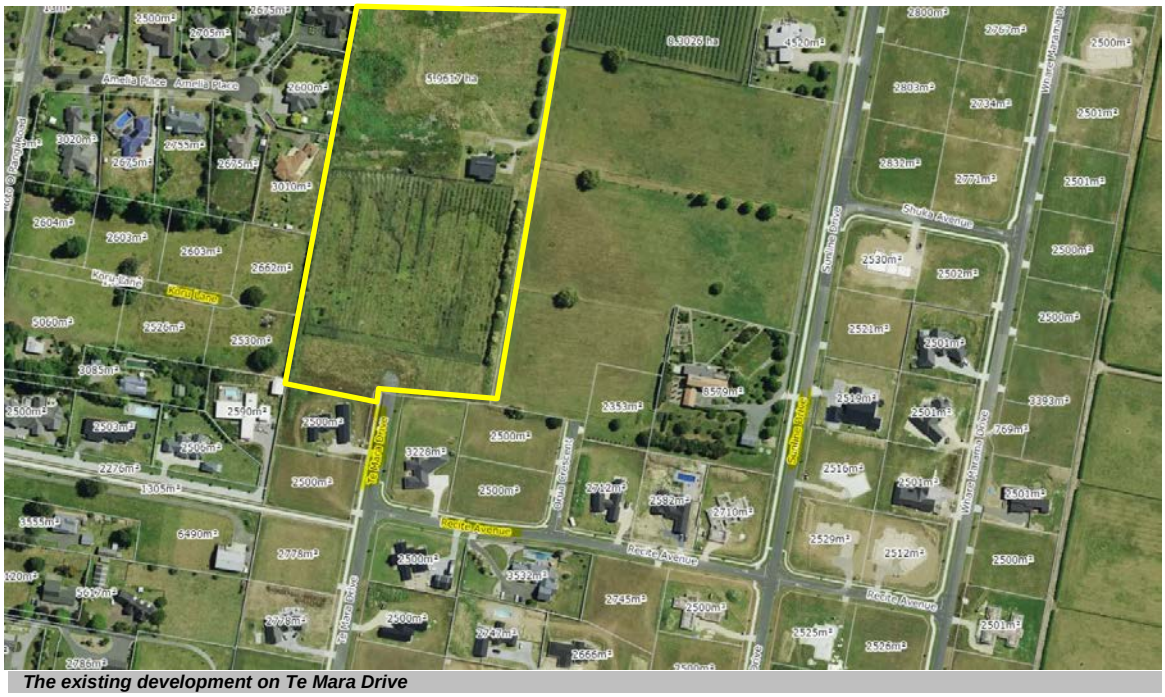
In summary, the proposed subdivision is in alignment with the objectives and policies outlined in the Waipa District Plan.

6.0 Assessment of Effects

6.1 Effects Identification

Visual Amenity and Reverse Sensitivity Effects

The application seeks to allow residential land uses to occur on a piece of land that is zoned for large lot residential purposes.



The existing development on Te Mara Drive

The proposed 20 residential lots for the most part meet the ODP requirement of a 2,500m^2 net lot area.

The largest lot is 5,000m^2 (Lot 17), and the smallest is 2,137m^2 (Lot 7).

While Lots 7, 10, 12, and 13 are smaller than 2,500m^2, Lots 12 and 13 are rear lots, so any potential effects (e.g., visual) are internal and can be effectively absorbed.

Lot 10 is 55m^2 short of 2,500m^2 due to the lot's shape, but this shortfall is not easily noticeable, and a compliant building platform can still be provided.

Lot 7 falls short of the 2,500m^2 requirement by 363m^2 to facilitate the creation of a straight, 6m-wide pedestrian reserve to the east, enhancing visibility and accessibility to the reserve with an unrestricted view. While the area shortfall is acknowledged, it's important to note that the adjacent pedestrian access will play a significant role in offsetting any potential perceived loss of open space and amenity.

It is believed that a dwelling can be easily constructed on these lots while have a negligible impact on the neighbours.

Moreover, various lot sizes are proposed to avoid repetition of standard house plans next to each other.

Additionally, similar-density subdivision developments exist in the surrounding area along Te Mara Drive, Recite Avenue, and Artistic Avenue. The proposed subdivision layout is also designed in a grid format, providing routes for walking and cycling.

Overall, the proposed development aligns with the Leamington Large Lot Residential Zone Structure Plan Environment, resulting in a residential density in line with existing developments. Therefore, the development can accommodate the proposed density and is a logical extension of these developments. The amenity and reverse sensitivity effects on adjoining persons and on the environment are considered less than minor.

Traffic Effects

The Transport Impact Assessment has been provided by Gray Matter Ltd. to ensure the alternative roading layout will still allow for a highly permeable, efficient, and seamless inter-linking with the adjoining subdivisions via Te Mara Drive.

Lot 14 will utilize the existing vehicle crossing on Lamb Street, with the remaining 19 lots accessing from the extension of Te Mara Drive. The existing vehicle crossing has unrestricted visibility to all directions.

The existing crossing on Lamb Street looking East

The existing crossing on Lamb Street looking West

As outlined in ***Appendix F***, the traffic generated by the proposed development is within the surrounding road network's capacity. Anticipating 156 veh/day and 17 veh/h, equivalent to one additional vehicle movement every 3.5 minutes, Lamb Street, Te Mara Drive and Roto O Rangi Road possess ample capacity to comfortably accommodate the estimated traffic.

The existing street view of Te Mara Drive

Parking is anticipated to be accommodated within each lot, facilitated by the large size of the lots. Any overflow parking can be conveniently accommodated on the street.

Detailed insights into the deviation of the roading layout from District Plan Appendix S18 - Leamington Large Lot Residential Zone Structure Plan can be found in Sections 2.3.4 and 3.5 of this planning report, preventing redundancy.

In summary, the analysis reasonably concludes that the proposed subdivision will not substantially compromise road safety and function.

Natural Hazards Effects

As previously mentioned, a rubbish pit is situated in the central-west section of the Site, containing elevated concentrations of arsenic and lead. Remediation works are presently underway on the Site, following the guidelines outlined in the SMP and RAP.

The Applicant proposes to confine all contaminated soil on-site within a designated waste cell. Validation of the achieved remedial goals necessitates sampling solely for the imported clay fill. The outcomes will be presented in a SVR, slated for submission to Waipa District Council within two months of completing the soil disturbance activities.

Notably, a Land Use Consent (LU/0142/23) has been duly sought and granted. This land use consent facilitates the disturbance of contaminated soil and allows for the change in land use on Site.

Earthworks around the rubbish pit area

Regarding flood considerations, the Site is situated slightly beyond the 1% Annual Exceedance Probability (AEP) Flood Modelling Map established by the Waipa District Council. Despite this, the stormwater advisor for the Applicant suggests that, both during and after the Site's development, overland flow from the upstream catchment should be permitted to traverse the Site towards the downstream green belt area.

To facilitate this, the design of the site contours have incorporated provisions for the designated overland flow path. This has been achieved through conveyance along the proposed road network within the Site and by establishing easements across private lots.

Effects on Archaeology

The Site features a recorded archaeological site (S15/789) along the Waikato River, characterized by borrow pits and Māori-made soils. The Applicant's archaeological advisor conducted an Archaeological Value and Effects Assessment, along with an Archaeological Site Instruction and Research Strategy.

Local iwi (Ngato Koroki Kahukura Trust and Ngati Hauaa Iw Trust) were consulted, resulting in a Memorandum of Understanding (see ***Appendix E***). A standard Waipa District Council accidental discovery protocol will be incorporated, aligned with the archaeological assessment. A Cultural Impact Assessment will be presented to the Council during the s92 stage.

7.0 Other Statutory Documents

7.1 NES: Assessing and Managing Contaminants in Soil to Protect Human Health

The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 came into effect on 1 January 2012. These Regulations ensure that land affected by contaminants in soil is appropriately assessed and made safe for human use.

Upon both desktop and physical (Site inspection) reviews of the property (inclusive of soil sampling), the DSI has confirmed that the HAIL activities of A8 (stockyards); A10 (bulk storage and/or use of pesticides); and HAIL I (lead-based paint or asbestos) have not left a contaminated land legacy on the Site that is a risk to human health. Laboratory evidence for such contaminates have been presented in the attached DSI.

Notwithstanding the above, the DSI did reveal that lead and arsenic were present in soil samples within the rubbish pit above the applied human health guidelines. Furthermore, it was recommended in the DSI that the soil within the rubbish pit was not suitable for offsite disposal as clean fill.

In consideration of the soil contaminates associated with the rubbish pit – the DSI has confirmed that it represents ‘a piece of land’ under the NESCS – and furthermore as the levels of contaminants exceed those presenting a risk to human health, that disturbance of the Soil would represent a Restricted Discretionary Activity pursuant to Regulation 10 of the NESCS.

As a consequence of the DSI, a Land Use consent (LU/0142/23) has been submitted and granted, and that such an application is to include a RAP and CSMP in accordance with the matters of discretion pursuant to Regulation 10 (3)(a-h) of the NESCS.

7.2 National Environmental Standards on Urban Development (NES-UD 2020) and Housing Supply Amendment Bill

The National Policy Statement on Urban Development 2020 came into effect on 20 August 2020 and supports greater housing density and requires councils to plan better for growth.

The NPS-UD intensification provisions seek to enable intensification through council plans in appropriate locations, such as:

- Places in or close to urban centres where people can access many jobs, services and amenities.
- Places that are well-served by public transport.
- Other areas with high demand for housing and business space

The purpose of this direction is to enable greater housing supply and new development capacity in locations that meet the diverse needs of communities.

The proposal promotes the efficient use of land by maximizing its ability to infill and is consistent with the NPS-UD 2020.

Furthermore, the Housing Supply Amendment Bill is designed to improve housing supply in New Zealand's five largest cities by speeding up implementation of the NPS-UD 2020 and enabling more medium density homes.

It is concluded that the proposed development results in a residential density in general accordance with the surrounding large lot residential zone environment; therefore, the development meets the relevant provisions as outlined in the NES-UD and the Bill above.

8.0 Section 95 Considerations

Consultation has been undertaken with local Iwi, network utility providers, and the Waipa District Council in regard to the proposed subdivision.

Such consultation has been undertaken to advise the organizations how the development will mitigate issues of reverse sensitivity, cultural value and stormwater management.

As the proposed development being in general accordance with the area's strategic growth planning, wider community consultation is not considered to be required.

It is expected that an accidental discovery protocol will be attached as a condition of consent by the Waipa District Council.

The assessment given within this report confirms that the actual and potential effects of the proposal will not be less than minor and given the nature of the non-compliances.

Consultation is ongoing with Iwi and there are very open channels of communication between the developer and nga iwi toopu waipa, there are no other potentially affected parties.

9.0 Conclusion

Muscle Developments Limited is seeking a subdivision consent to create 20 large residential lots in the Leamington Large Lot Residential Zone Structure Plan Area as a Non-Complying Activity.

In consideration of the property's natural and physical value, the proposed subdivision has been subject to specific direction provided by both technical specialists and Waipa District Council

officers.

This report investigates the actual and potential adverse effects of this proposal pursuant to the Fourth Schedule of the RMA and discusses the alignment with Waipa District Plan.

The conclusions reached are that the actual and potential adverse effects of the proposal will be less than minor, the proposal is consistent with achieving the relevant objectives and policies of the Waipa District Plan, NESCS, NES-UD and the Leamington Large Lot Residential Zone Structure Plan; the assessment confirms that no person will be adversely affected.

Overall, it is requested that Council process this application on a non-notified basis, under delegated authority and without the need for any affected party approvals.

10.0 Appendices

APPENDIX A

DEVELOPMENT PLANS SET

RESOURCE CONSENT PLANS

SUBDIVISION DEVELOPMENT

LOTS 2003 & 2005 DP 535418 & LOT 2 DP 593787

318 LAMB STREET, LEAMINGTON - CAMBRIDGE

PREPARED FOR: MUSCLE DEVELOPMENTS

BLUE WALLACE REF: 23095
DATE: 03 November 2023
S:\2023\23095\1. PLANNING\1. SCHEME PLANS\23095-00-PL-100-A 19-10-23.DWG

NOMINATED SUPERVISIOR	
NAME:	LOGAN ROSS - LICENSED CADASTRAL SURVEYOR
ADDRESS:	25 HARWOOD STREET, HAMILTON
E-MAIL:	logan@bluewallace.co.nz
PHONE:	Wk. (07) 839 7799 Mob. 021 361 576

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

RESOURCE CONSENT PLANS

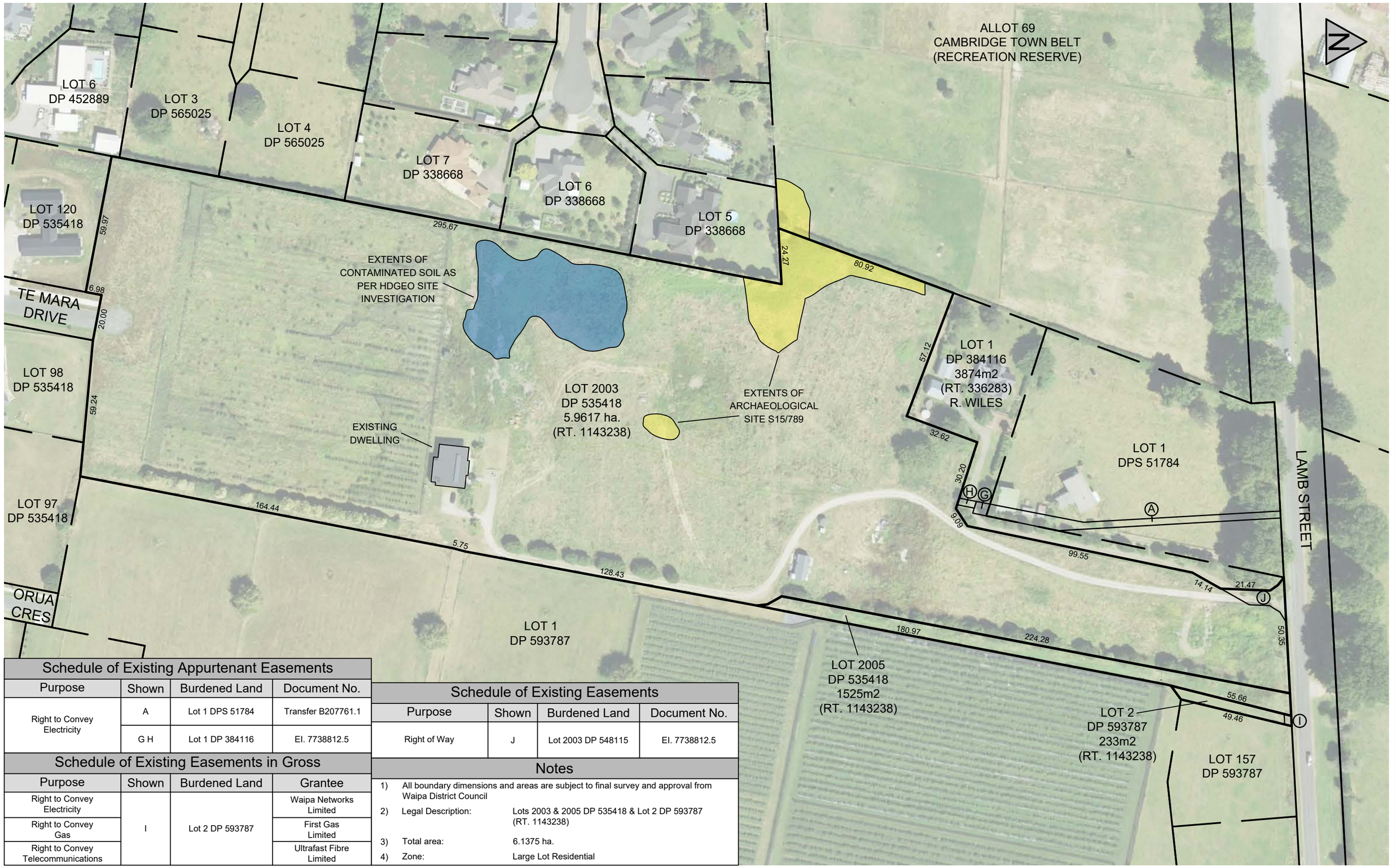
SUBDIVISION DEVELOPMENT

318 LAMB STREET, LEAMINGTON - CAMBRIDGE | MUSCLE DEVELOPMENTS

INDEX TO SHEETS

318 LAMB STREET - CAMBIDGE		3-Nov-23
23095-00-PL-100	Rev-B	EXISTING SITE PLAN
23095-00-PL-101	Rev-B	PROPOSED OVERALL SUBDIVISION PLAN
23095-00-PL-102	Rev-B	PROPOSED STAGE 1 SUBDIVISION PLAN
23095-00-PL-103	Rev-B	PROPOSED STAGE 2 SUBDIVISION PLAN
23095-00-EN-200	Rev-A	EXISTING CONTOURS PLAN
23095-00-EN-201	Rev-A	DESIGN SURFACE PLAN
23095-00-EN-202	Rev-A	CUT-FILL VOLUMES PLAN
23095-00-EN-300	Rev-A	ROADING LAYOUT PLAN
23095-00-EN-301	Rev-A	ROADING LONGSECTIONS - ROAD A
23095-00-EN-302	Rev-A	ROADING LONGSECTIONS - PED. ACCESS & LOT 100
23095-00-EN-350	Rev-A	ROADING - TYPICAL CROSS SECTIONS
23095-00-EN-351	Rev-A	VEHICLE CROSSINGS LAYOUT PLAN
23095-00-EN-352	Rev-A	ROADING VEHICLE CROSSING DETAIL
23095-00-EN-353	Rev-A	VEHICLE TRACKING PLAN
23095-00-EN-354	Rev-A	WAIPA NETWORKS RING MAIN UNIT & TRANSFORMER
23095-00-EN-400	Rev-A	STORMWATER RETICULATION PLAN
23095-00-EN-401	Rev-A	STORMWATER LONGSECTION
23095-00-EN-402	Rev-A	STORMWATER LONGSECTION
23095-00-EN-403	Rev-A	STORMWATER LONGSECTION
23095-00-EN-404	Rev-A	STORMWATER LONGSECTION
23095-00-EN-405	Rev-A	STORMWATER OVERLAND FLOW PATH
23095-00-EN-500	Rev-A	WASTEWATER RETICULATION PLAN
23095-00-EN-600	Rev-A	WATER RETICULATION PLAN
23095-00-EN-601	Rev-A	FIRE FIGHTING EXTENTS PLAN
23095-00-EN-700	Rev-A	COMBINED SERVICES PLAN

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455



Schedule of Existing Appurtenant Easements

Purpose	Shown	Burdened Land	Document No.
Right to Convey Electricity	A	Lot 1 DPS 51784	Transfer B207761.1
	G H	Lot 1 DP 384116	EI. 7738812.5

Schedule of Existing Easements in Gross

Purpose	Shown	Burdened Land	Grantee
Right to Convey Electricity	I	Lot 2 DP 593787	Waipa Networks Limited
Right to Convey Gas			First Gas Limited
Right to Convey Telecommunications			Ultrafast Fibre Limited

Schedule of Existing Easements

Purpose	Shown	Burdened Land	Document No.
Right of Way	J	Lot 2003 DP 548115	EI. 7738812.5

Notes

1) All boundary dimensions and areas are subject to final survey and approval from Waipa District Council
2) Legal Description: Lots 2003 & 2005 DP 535418 & Lot 2 DP 593787 (RT. 1143238)
3) Total area: 6.1375 ha.
4) Zone: Large Lot Residential

Size	A3	Scale	1:1500	Date	NOVEMBER 2023		
No.	Amendment	Init.	Date	Designed	WAB	07/23	
A	For Resource Consent	WAB	19/10/23	Drawn	WAB	03/11/23	
B	For Resource Consent - Rev #B	WAB	03/11/23	Checked	LAR	03/11/23	
C	----	----	----	Approved			

EXISTING SITE - PROPOSED SUBDIVISION OF LOTS 2003 & 2005 DP 535418 & LOT 2 DP 593787

318 LAMB STREET, LEAMINGTON - CAMBRIDGE

Prepared for: MUSCLE DEVELOPMENTS

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Vertical Datum 1953

Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-PL-100				B

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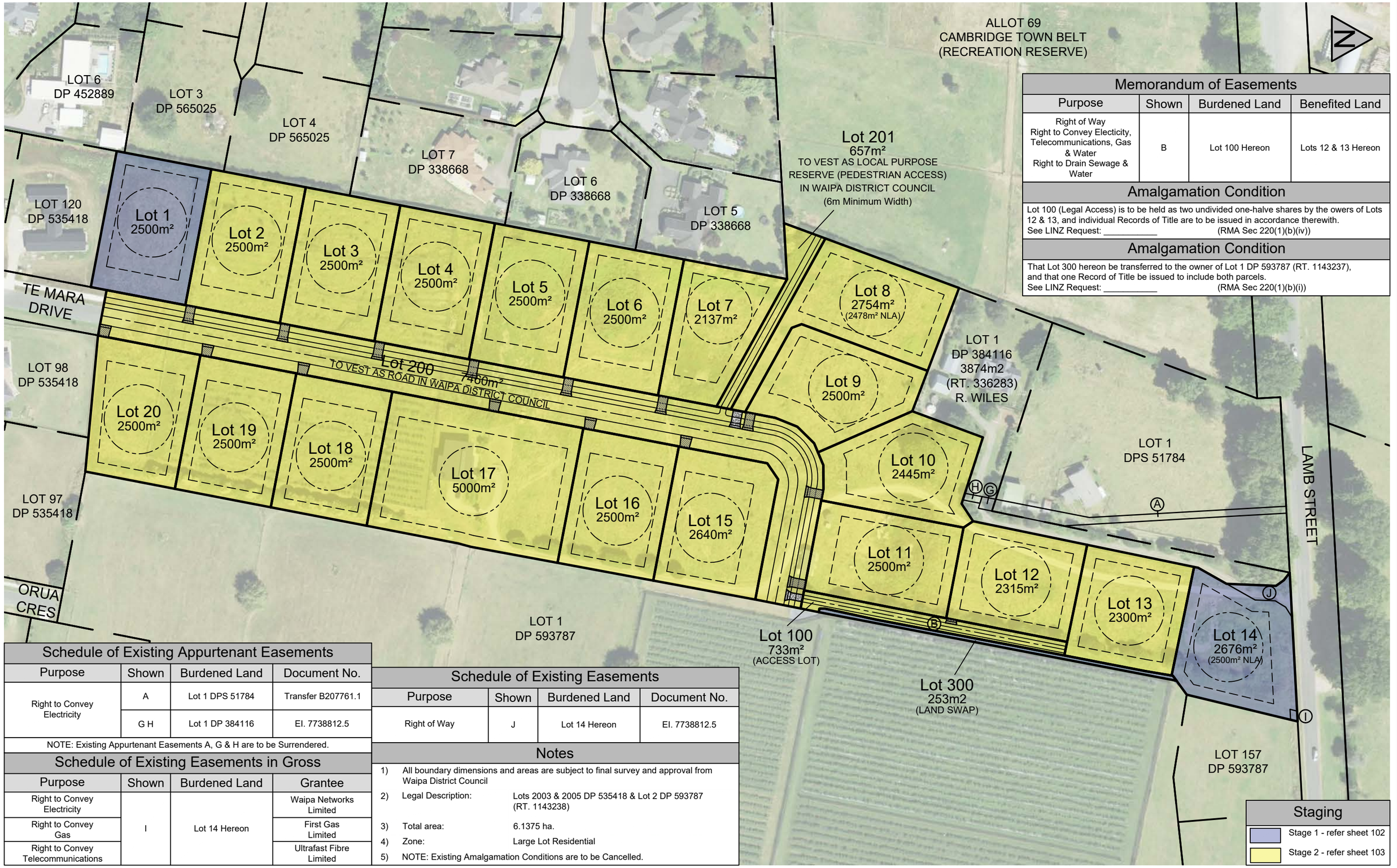

Memorandum of Easements

Purpose	Shown	Burdened Land	Benefited Land
Right of Way Right to Convey Electicity, Telecommunications, Gas & Water Right to Drain Sewage & Water	B	Lot 100 Hereon	Lots 12 & 13 Hereon

Amalgamation Condition

Lot 100 (Legal Access) is to be held as two undivided one-halve shares by the owers of Lots 12 & 13, and individual Records of Title are to be issued in accordance therewith.
See LINZ Request: _____ (RMA Sec 220(1)(b)(iv))

Amalgamation Condition

That Lot 300 hereon be transferred to the owner of Lot 1 DP 593787 (RT. 1143237), and that one Record of Title be issued to include both parcels.
See LINZ Request: _____ (RMA Sec 220(1)(b)(i))

Schedule of Existing Appurtenant Easements

Purpose	Shown	Burdened Land	Document No.
Right to Convey Electricity	A	Lot 1 DPS 51784	Transfer B207761.1
	G H	Lot 1 DP 384116	EI. 7738812.5

NOTE: Existing Appurtenant Easements A, G & H are to be Surrendered.

Schedule of Existing Easements in Gross

Purpose	Shown	Burdened Land	Grantee
Right to Convey Electricity	I	Lot 14 Hereon	Waipa Networks Limited
Right to Convey Gas			First Gas Limited
Right to Convey Telecommunications			Ultrafast Fibre Limited

Schedule of Existing Easements

Purpose	Shown	Burdened Land	Document No.
Right of Way	J	Lot 14 Hereon	EI. 7738812.5

Notes

1) All boundary dimensions and areas are subject to final survey and approval from Waipa District Council
2) Legal Description: Lots 2003 & 2005 DP 535418 & Lot 2 DP 593787 (RT. 1143238)
3) Total area: 6.1375 ha.
4) Zone: Large Lot Residential
5) NOTE: Existing Amalgamation Conditions are to be Cancelled.

Staging

- Stage 1 - refer sheet 102
- Stage 2 - refer sheet 103

Size	Scale	Date
A3	1:1500	NOVEMBER 2023

No.	Amendment	Init.	Date
A	For Resource Consent	WAB	19/10/23
B	For Resource Consent - Rev #B	WAB	03/11/23
C	----	----	----

Designed	WAB	07/23
Drawn	WAB	03/11/23
Checked	LAR	03/11/23
Approved		

PROPOSED OVERALL SUBDIVISION OF LOTS 2003 & 2005 DP 535418 & LOT 2 DP 593787

318 LAMB STREET, LEAMINGTON - CAMBRIDGE

Prepared for: MUSCLE DEVELOPMENTS

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Vertical Datum 1953

Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-PL-101				B

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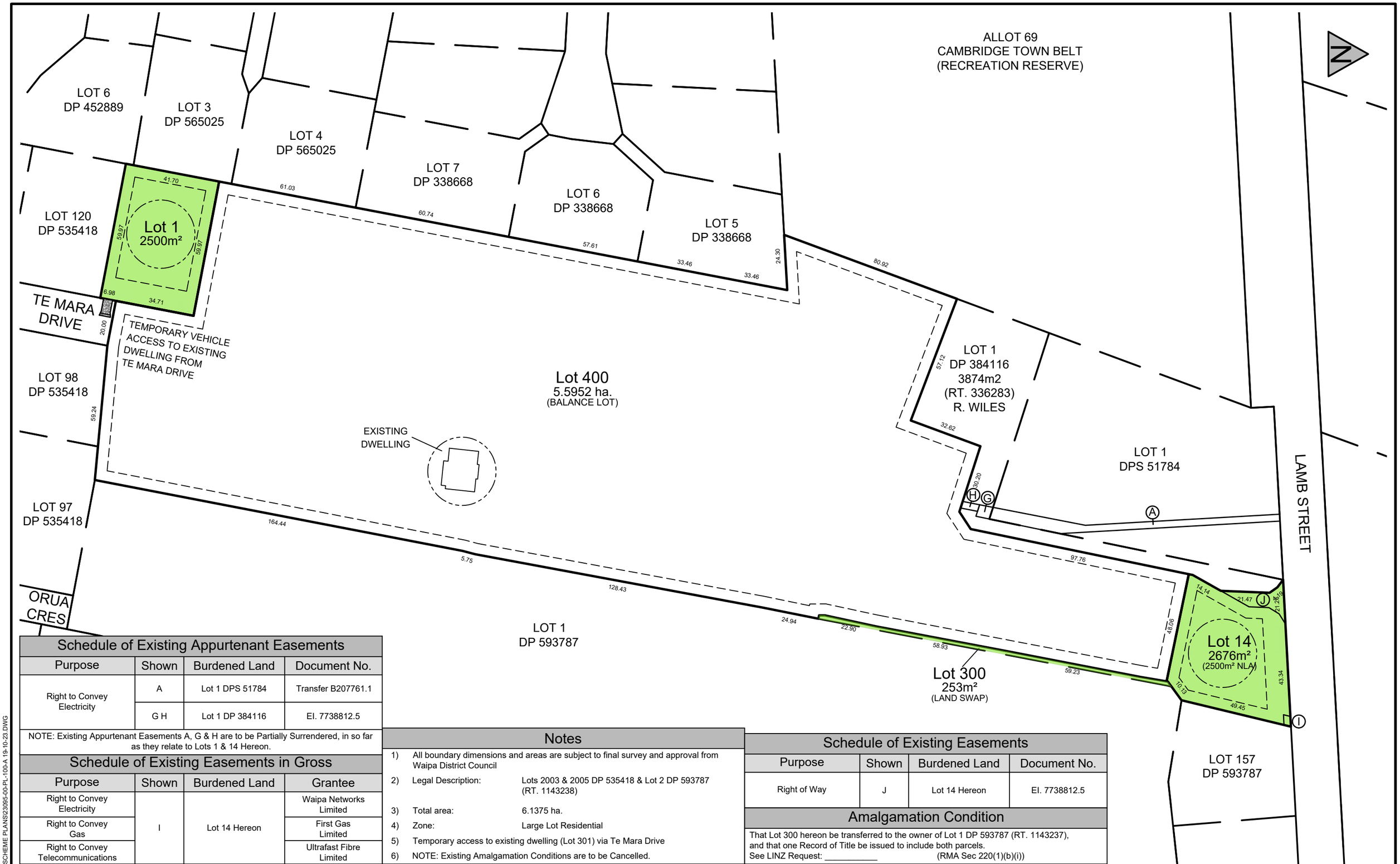

Schedule of Existing Appurtenant Easements

Purpose	Shown	Burdened Land	Document No.
Right to Convey Electricity	A	Lot 1 DPS 51784	Transfer B207761.1
	G H	Lot 1 DP 384116	EI. 7738812.5

NOTE: Existing Appurtenant Easements A, G & H are to be Partially Surrendered, in so far as they relate to Lots 1 & 14 Hereon.

Schedule of Existing Easements in Gross

Purpose	Shown	Burdened Land	Grantee
Right to Convey Electricity	I	Lot 14 Hereon	Waipa Networks Limited
Right to Convey Gas			First Gas Limited
Right to Convey Telecommunications			Ultrafast Fibre Limited

Notes

1) All boundary dimensions and areas are subject to final survey and approval from Waipa District Council
2) Legal Description: Lots 2003 & 2005 DP 535418 & Lot 2 DP 593787 (RT. 1143238)
3) Total area: 6.1375 ha.
4) Zone: Large Lot Residential
5) Temporary access to existing dwelling (Lot 301) via Te Mara Drive
6) NOTE: Existing Amalgamation Conditions are to be Cancelled.

Schedule of Existing Easements

Purpose	Shown	Burdened Land	Document No.
Right of Way	J	Lot 14 Hereon	EI. 7738812.5

Amalgamation Condition

That Lot 300 hereon be transferred to the owner of Lot 1 DP 593787 (RT. 1143237), and that one Record of Title be issued to include both parcels.
See LINZ Request: _____ (RMA Sec 220(1)(b)(i))

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Size A3 | Scale 1:1500 | Date NOVEMBER 2023

No.	Amendment	Init.	Date
A	For Resource Consent	WAB	19/10/23
B	For Resource Consent - Rev #B	WAB	03/11/23
C	----	----	----

Designed	WAB	07/23
Drawn	WAB	03/11/23
Checked	LAR	03/11/23
Approved		

STAGE 1 - PROPOSED SUBDIVISION OF LOTS 2003 & 2005 DP 535418 & LOT 2 DP 593787

318 LAMB STREET, LEAMINGTON - CAMBRIDGE

Prepared for: MUSCLE DEVELOPMENTS

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Vertical Datum 1953

Resource Consent Number: .....

BW Ref. 23095-00-PL-102 | Stg. | Purp. | Dwg. # | Revision: B

Schedule of Existing Appurtenant Easements

Purpose	Shown	Burdened Land	Document No.
Right to Convey Electricity	A	Lot 1 DPS 51784	Transfer B207761.1
	G H	Lot 1 DP 384116	EI. 7738812.5

NOTE: Existing Appurtenant Easements A, G & H are to be Surrendered.

Memorandum of Easements

Purpose	Shown	Burdened Land	Benefited Land
Right of Way Right to Convey Electicity, Telecommunications, Gas & Water Right to Drain Sewage & Water	B	Lot 100 Hereon	Lots 12 & 13 Hereon

Notes

1) All boundary dimensions and areas are subject to final survey and approval from Waipa District Council
2) Legal Description: Lot 400 DP ?????? (Stage 1 Balance) (RT. ???????)
3) Total area: 5.5952 ha.
4) Zone: Large Lot Residential

Amalgamation Condition

Lot 100 (Legal Access) is to be held as two undivided one-halve shares by the owers of Lots 12 & 13, and individual Records of Title are to be issued in accordance therewith.
See LINZ Request: _____ (RMA Sec 220(1)(b)(iv))

Size	A3	Scale	1:1500	Date	NOVEMBER 2023		
No.	Amendment	Init.	Date	Designed	WAB	07/23	
A	For Resource Consent	WAB	19/10/23	Drawn	WAB	03/11/23	
B	For Resource Consent - Rev #B	WAB	03/11/23	Checked	LAR	03/11/23	
C	----	----	----	Approved			

STAGE 2 - PROPOSED SUBDIVISION OF LOT 400 DP ?????? (Stage 1)

318 LAMB STREET, LEAMINGTON - CAMBRIDGE
Prepared for: MUSCLE DEVELOPMENTS

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Vertical Datum 1953
Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-PL-103				B

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LEGEND

Existing Ground - Major Contour, Interval 2.0m

Existing Ground - Minor Contour, Interval 0.5m

NOTE: Contours are derived from supplied Drone Survey, carried out by Waipa Civil - Date: September 2023

Size	Scale	Date
A3	1:1500	NOVEMBER 2023

No.	Amendment	Init.	Date
A	For Resource Consent	WAB	03/11/23
B			
C			

Designed	WAB	09/23
Drawn	WAB	03/11/23
Checked	LAR	
Approved		

EXISTING CONTOURS
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
Prepared for: MUSCLE DEVELOPMENTS

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Circuit: Mt Eden 2000
Height: -----

Resource Consent Number:
.....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-EN-200				A

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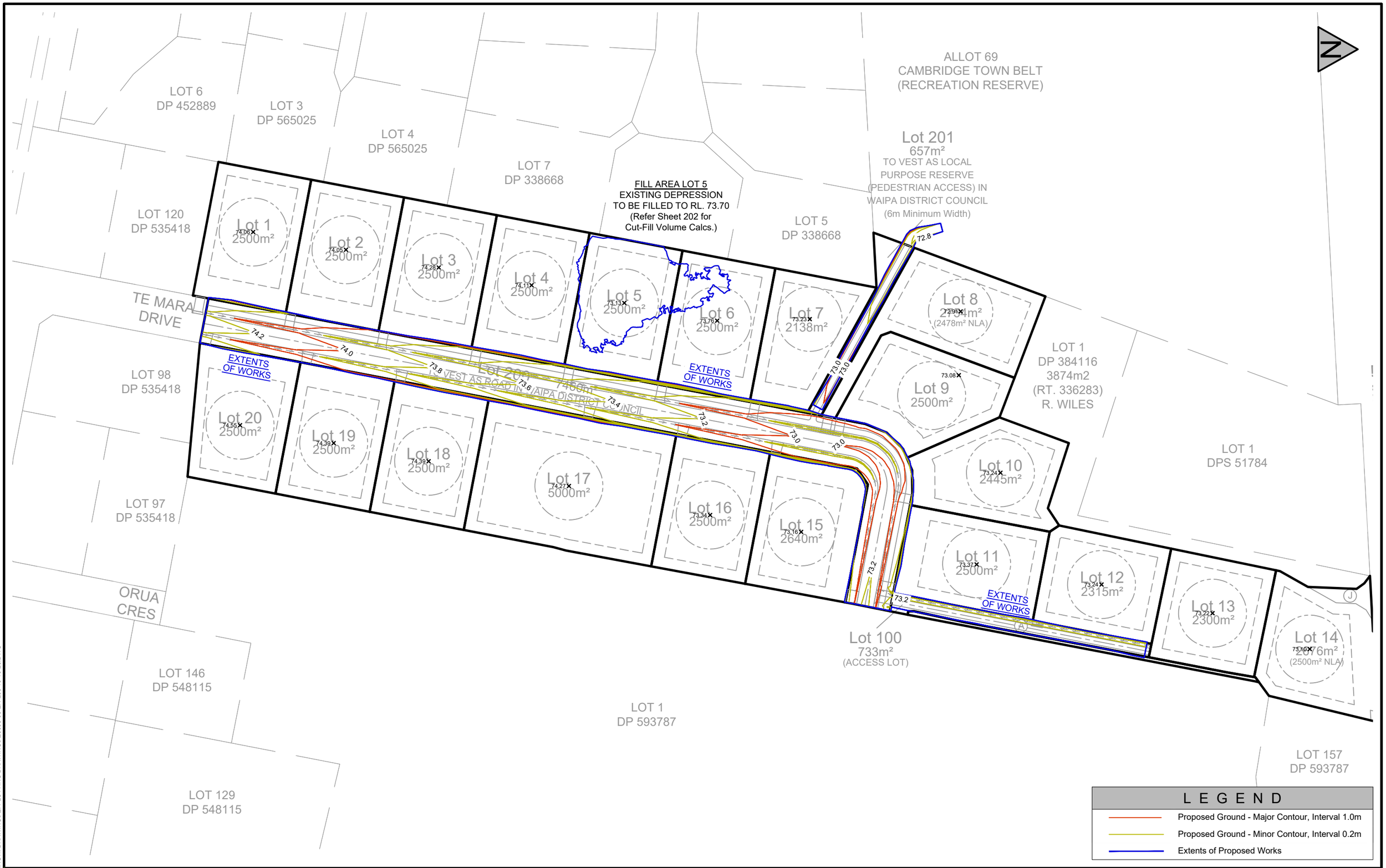

Size	A3	Scale	1:1500	Date	NOVEMBER 2023		
No.	Amendment	Init.	Date	Designed	WAB	09/23	
A	For Resource Consent	WAB	03/11/23	Drawn	WAB	03/11/23	
B				Checked	LAR		
C				Approved			

DESIGN SURFACE
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
Prepared for: MUSCLE DEVELOPMENTS

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: -----

Resource Consent Number:
.....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-EN-201				A

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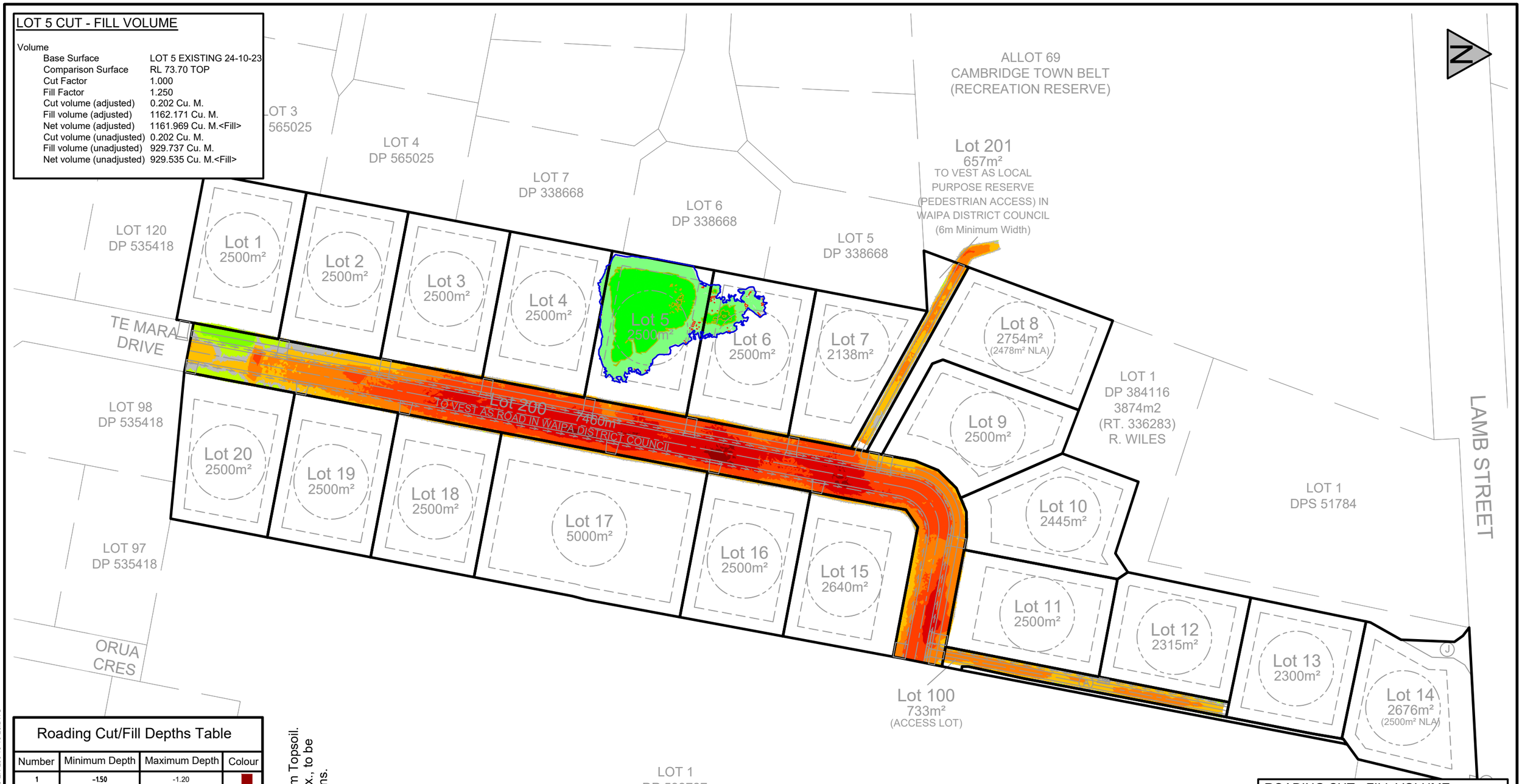
LOT 5 CUT - FILL VOLUME

Volume

Base Surface	LOT 5 EXISTING 24-10-23
Comparison Surface	RL 73.70 TOP
Cut Factor	1.000
Fill Factor	1.250
Cut volume (adjusted)	0.202 Cu. M.
Fill volume (adjusted)	1162.171 Cu. M.
Net volume (adjusted)	1161.969 Cu. M.<Fill>
Cut volume (unadjusted)	0.202 Cu. M.
Fill volume (unadjusted)	929.737 Cu. M.
Net volume (unadjusted)	929.535 Cu. M.<Fill>



Roading Cut/Fill Depths Table

Number	Minimum Depth	Maximum Depth	Colour
1	-1.50	-1.20	
2	-1.20	-0.90	
3	-0.90	-0.60	
4	-0.60	-0.30	
5	-0.30	-0.05	
6	-0.05	0.05	
7	0.05	0.30	
8	-0.30	0.60	
9	0.60	0.90	
10	0.90	1.20	
11	1.20	1.50	

NOTE:
Volume includes 300mm Topsoil.
Topsoil = 600m3 approx., to be respread across Sections.

ROADING CUT - FILL VOLUME

Volume

Base Surface	EG DRONE 09-10-23
Comparison Surface	ROAD A SUB
Cut Factor	1.000
Fill Factor	1.250
Cut volume (adjusted)	5274.468 Cu. M.
Fill volume (adjusted)	112.215 Cu. M.
Net volume (adjusted)	5162.254 Cu. M.<Cut>
Cut volume (unadjusted)	5274.468 Cu. M.
Fill volume (unadjusted)	89.772 Cu. M.
Net volume (unadjusted)	5184.697 Cu. M.<Cut>

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Size A3 | Scale 1:1500 | Date NOVEMBER 2023

No.	Amendment	Init.	Date
A	For Resource Consent	WAB	03/11/23
B			
C			

Designed	WAB	09/23
Drawn	WAB	03/11/23
Checked	LAR	
Approved		

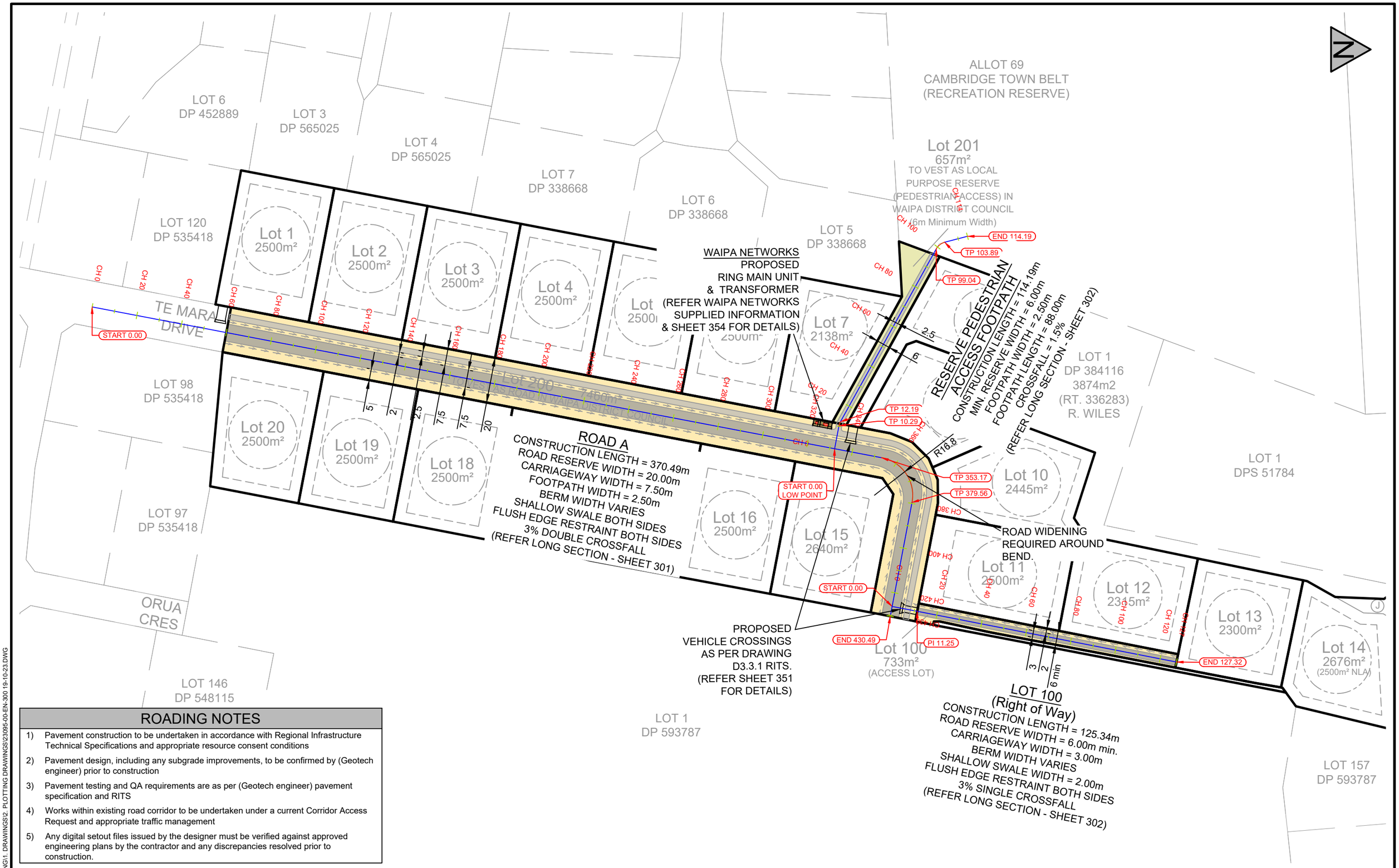
CUT - FILL VOLUME
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
Prepared for: MUSCLE DEVELOPMENTS

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: -----

Resource Consent Number:
.....

BW Ref. 23095-00-EN-202 | Stg. | Purp. | Dwg. # | Revision: A



ROADING NOTES

1) Pavement construction to be undertaken in accordance with Regional Infrastructure Technical Specifications and appropriate resource consent conditions
2) Pavement design, including any subgrade improvements, to be confirmed by (Geotech engineer) prior to construction
3) Pavement testing and QA requirements are as per (Geotech engineer) pavement specification and RITS
4) Works within existing road corridor to be undertaken under a current Corridor Access Request and appropriate traffic management
5) Any digital setout files issued by the designer must be verified against approved engineering plans by the contractor and any discrepancies resolved prior to construction.

Size	Scale	Date
A3	1:1500	NOVEMBER 2023

No.	Amendment	Init.	Date
A	For Resource Consent	WAB	03/11/23
B			
C			

Designed	WAB	09/23
Drawn	WAB	03/11/23
Checked	LAR	----
Approved		

ROADING LAYOUT PLAN
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
Prepared for: MUSCLE DEVELOPMENTS

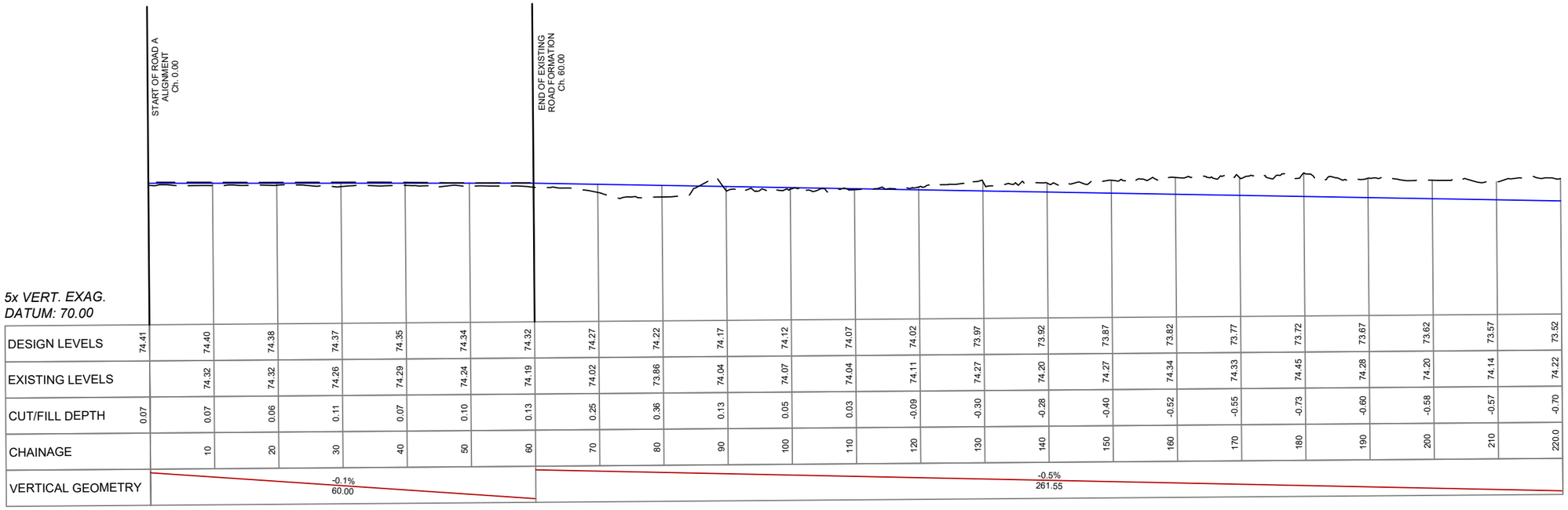
Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: -----
Resource Consent Number: .....

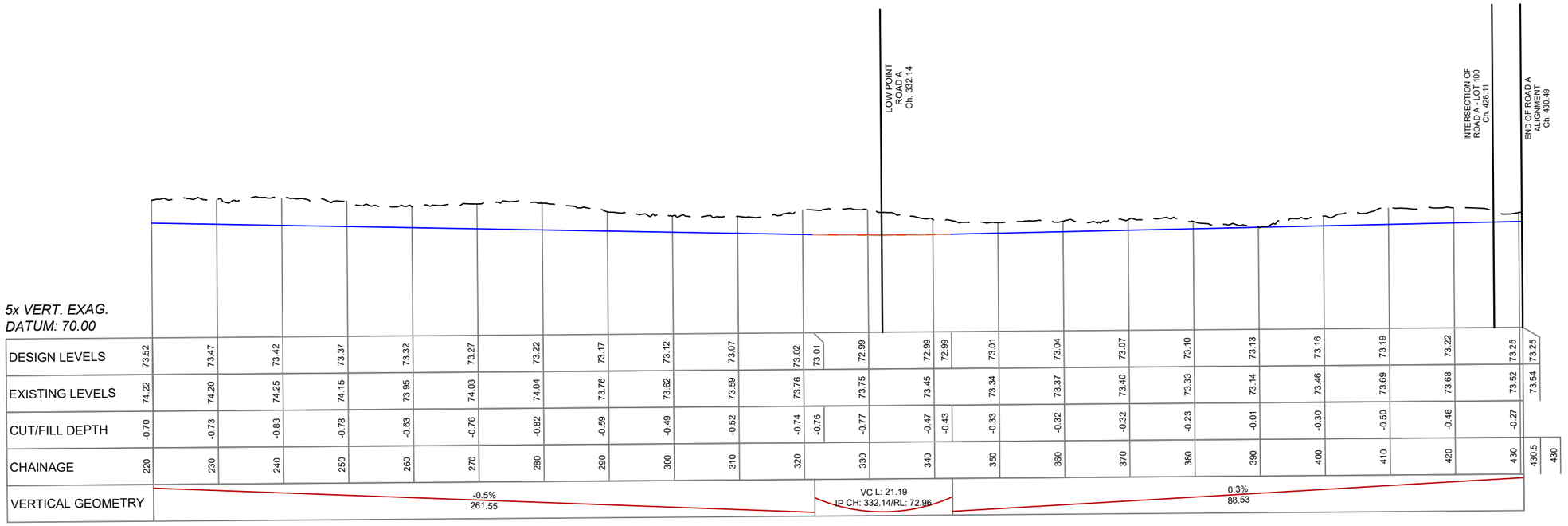
BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-EN-300				A

S:\2023\23095\2. ENGINEERING\1. DRAWINGS\2. PLOTTING DRAWINGS\23095-00-EN-300 19-10-23.DWG

Document Set ID: 11140901
Version: 1, Version Date: 21/11/2023



ROAD A LONG SECTION



ROAD A LONG SECTION

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Size	A3	Scale	1:750	Date	NOVEMBER 2023		
No.	Amendment	Init.	Date	Designed	WAB	09/23	
A	For Resource Consent	WAB	03/11/23	Drawn	WAB	03/11/23	
B				Checked	LAR	----	
C				Approved			

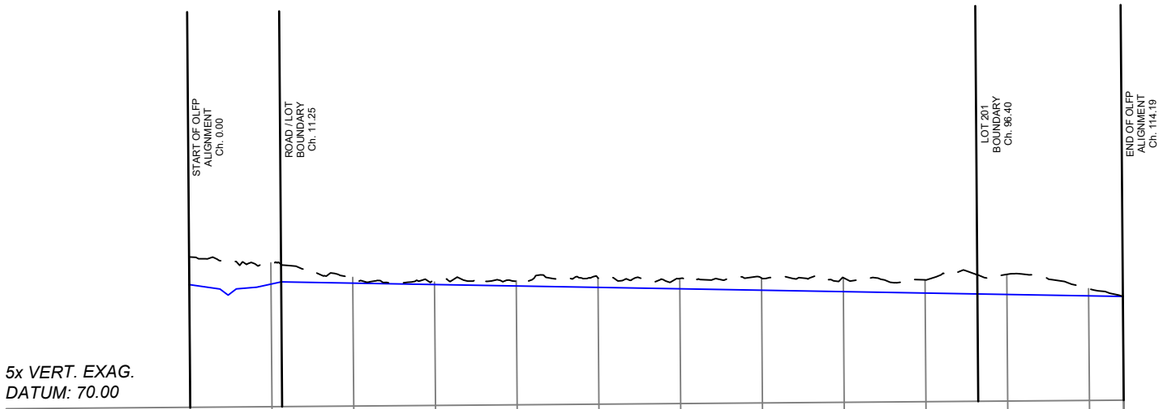
ROADING LONG SECTIONS
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
Prepared for: MUSCLE DEVELOPMENTS

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: -----
Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-EN-301				A

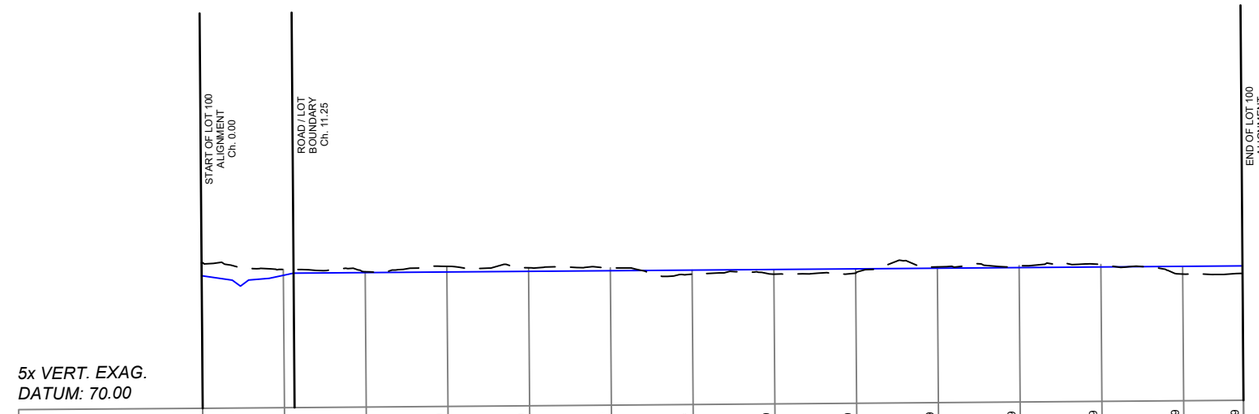
Document Set ID: 11140901
Version: 1, Version Date: 21/11/2023



5x VERT. EXAG.
DATUM: 70.00

DESIGN LEVELS	73.00	73.00	73.01	72.96	72.91	72.86	72.81	72.76	72.71	72.66	72.61	72.56	72.54
EXISTING LEVELS		73.52	73.15	73.02	73.04	73.09	73.06	73.05	73.05	72.98	73.10	72.73	72.54
CUT/FILL DEPTH	-0.68	-0.52	-0.14	-0.06	-0.13	-0.23	-0.25	-0.30	-0.34	-0.32	-0.49	-0.18	0.00
CHAINAGE		10	20	30	40	50	60	70	80	90	100	110	114.2
VERTICAL GEOMETRY		-3.75	-0.5%	2.5%	3.00	-0.5% 85.15						-0.5% 17.79	

RES PED ACCESS LONG SECTION



5x VERT. EXAG.
DATUM: 70.00

DESIGN LEVELS	73.24	73.24	73.29	73.29	73.29	73.29	73.29	73.29	73.29	73.29	73.29	73.29	73.29
EXISTING LEVELS		73.86	73.63	73.64	73.82	74.07	74.11	73.57	74.02	73.67	73.74	73.53	73.36	73.33
CUT/FILL DEPTH	-0.32	-0.14	-0.02	-0.14	-0.09	-0.07	0.10	0.12	0.11	-0.03	-0.05	-0.06	0.19	0.18
CHAINAGE		10	20	30	40	50	60	70	80	90	100	110	120	127.3
VERTICAL GEOMETRY		-3.75	-0.5%	2.5%	3.00	0.0% 116.35								

LOT 100 LONG SECTION

Size	A3	Scale	1:750	Date	NOVEMBER 2023		
No.	Amendment	Init.	Date	Designed	WAB	09/23	
A	For Resource Consent	WAB	03/11/23	Drawn	WAB	03/11/23	
B				Checked	LAR	----	
C				Approved			

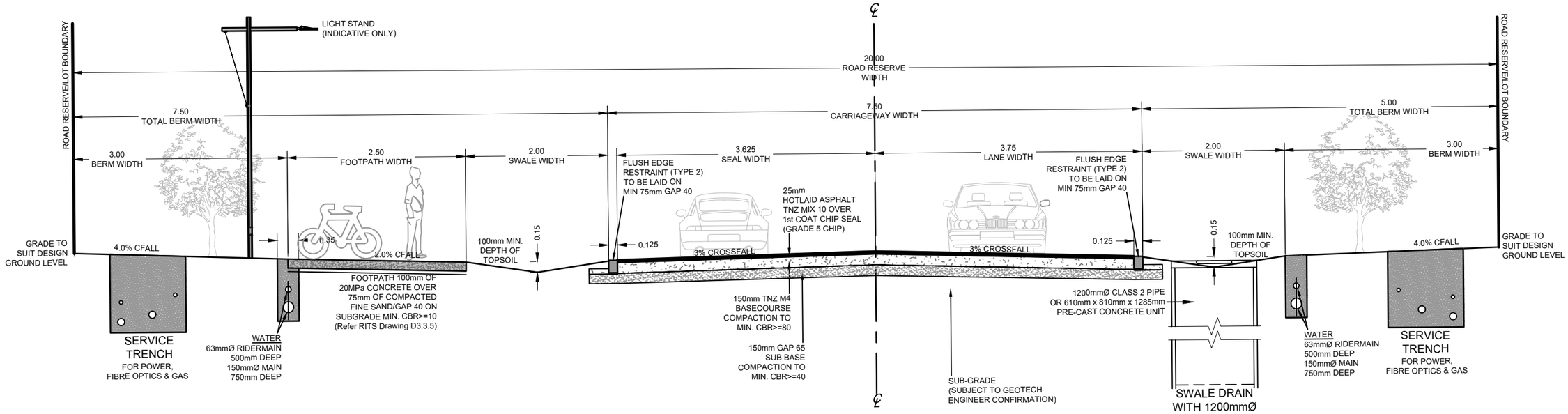
ROADING LONG SECTIONS
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
Prepared for: MUSCLE DEVELOPMENTS

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: -----
Resource Consent Number:
.....
BW Ref. 23095-00-EN-302 | Stg. | Purp. | Dwg. # | Revision: A

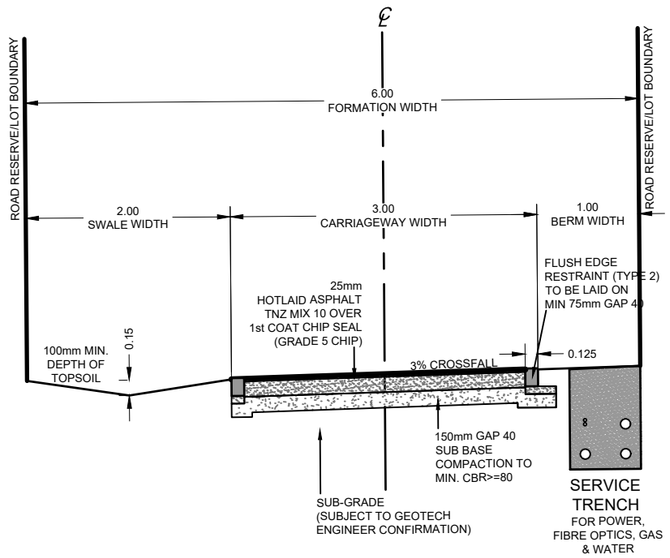
S:\2023\23095\2. ENGINEERING\1. DRAWINGS\2. PLOTTING DRAWINGS\23095-00-EN-300 19-10-23.DWG

Document Set ID: 11140901
Version: 1, Version Date: 21/11/2023

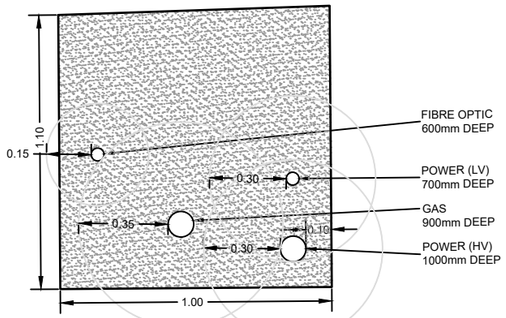


TYPICAL CROSS SECTION
20.00m WIDE LOCAL ROAD(vpd<500) - ROAD A
ROAD WITH SWALES BOTH SIDES - CHAINAGE: CH. 70.00m - END

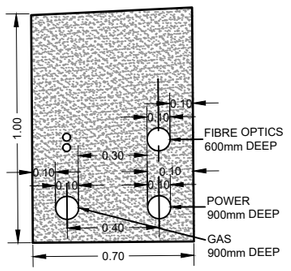
NOTE: PAVEMENT DESIGN TO BE CONFIRMED
PRIOR TO CONSTRUCTION.
(REFER GEO-TECH REPORT FOR CALCULATIONS)



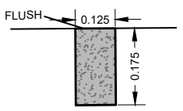
TYPICAL CROSS SECTION
6.00m WIDE RIGHT OF WAY - LOT 100
ROAD WITH SWALE ONE SIDE - CHAINAGE: CH. 10.00m - END



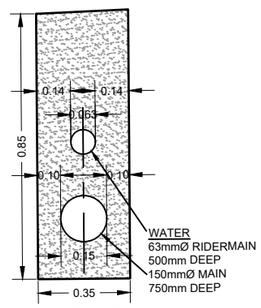
SERVICE TRENCH
ROAD A
FOR POWER,
FIBRE OPTICS & GAS



SERVICE TRENCH
LOT 100
FOR POWER,
FIBRE OPTICS & GAS



FLUSH EDGE
RESTRAINT
(TYPE 2)



SERVICE
TRENCH
FOR WATER

TYPICAL CROSS SECTIONS
KERB DETAIL DIAGRAMS
& UNDERGROUND SERVICES

Size	A3	Scale	Not to Scale	Date	NOVEMBER 2023		
No.	Amendment	Init.	Date	Designed	WAB	09/23	
A	For Resource Consent	WAB	03/11/23	Drawn	WAB	03/11/23	
B				Checked	LAR	----	
C				Approved			

ROADING - TYPICAL CROSS SECTIONS
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
Prepared for: MUSCLE DEVELOPMENTS

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: -----
Resource Consent Number:
.....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-EN-350				A

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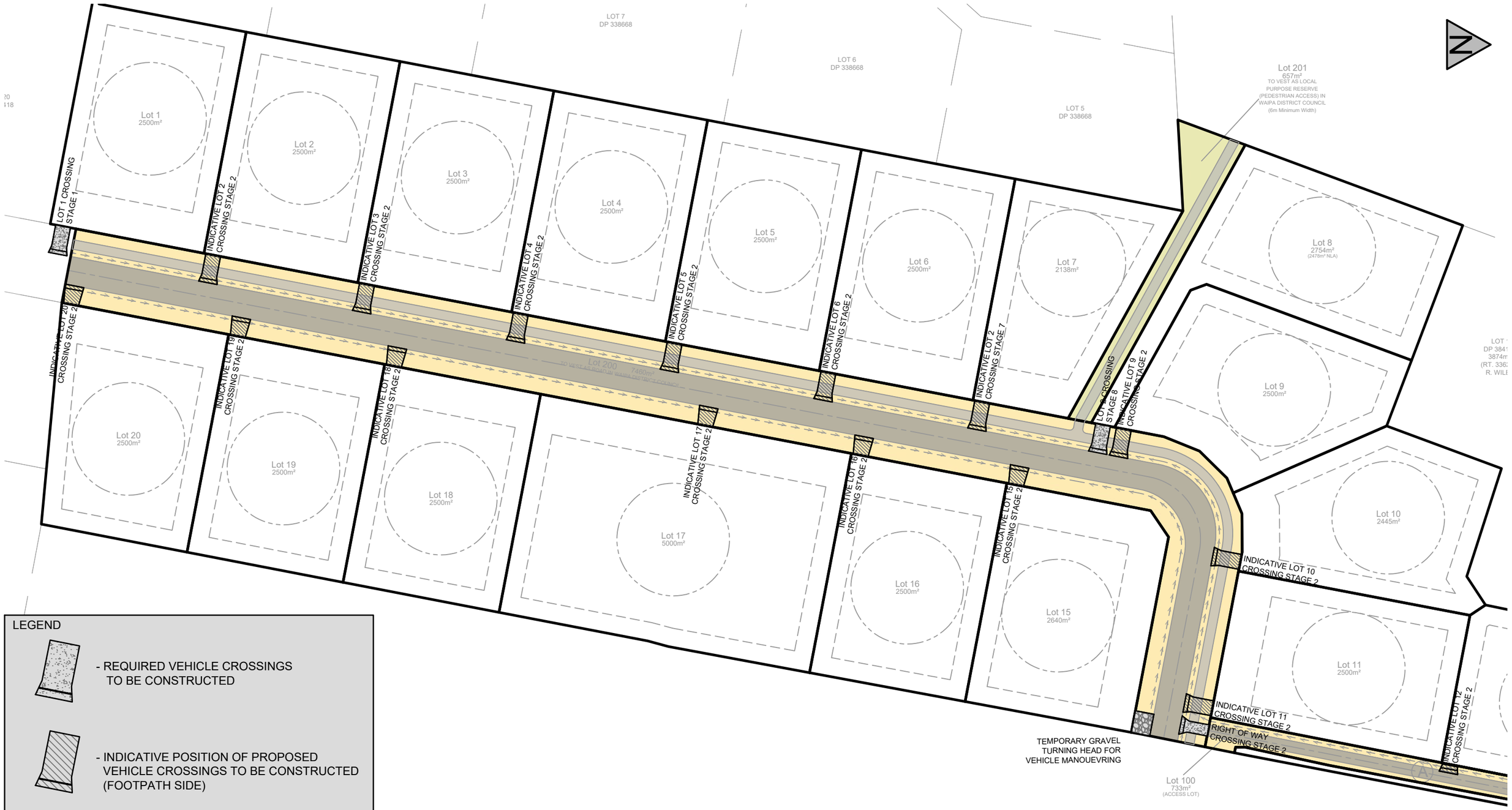


LEGEND

- REQUIRED VEHICLE CROSSINGS TO BE CONSTRUCTED

- INDICATIVE POSITION OF PROPOSED VEHICLE CROSSINGS TO BE CONSTRUCTED (FOOTPATH SIDE)

- INDICATIVE POSITION OF PROPOSED VEHICLE CROSSINGS TO BE CONSTRUCTED (NO FOOTPATH SIDE)

NOTE: VEHICLE CROSSINGS ARE BASED ON EXISTING CROSSINGS IN THE SURROUNDING AREA. (REFER SHEET 352 FOR VEHICLE CROSSING DETAIL)

S:\2023\23095\2. ENGINEERING\1. DRAWINGS\2. PLOTTING DRAWINGS\23095-00-EN-300 19-10-23.DWG

Size	Scale	Date
A3	1:1000	NOVEMBER 2023

No.	Amendment	Init.	Date
A	For Resource Consent	WAB	03/11/23
B			
C			

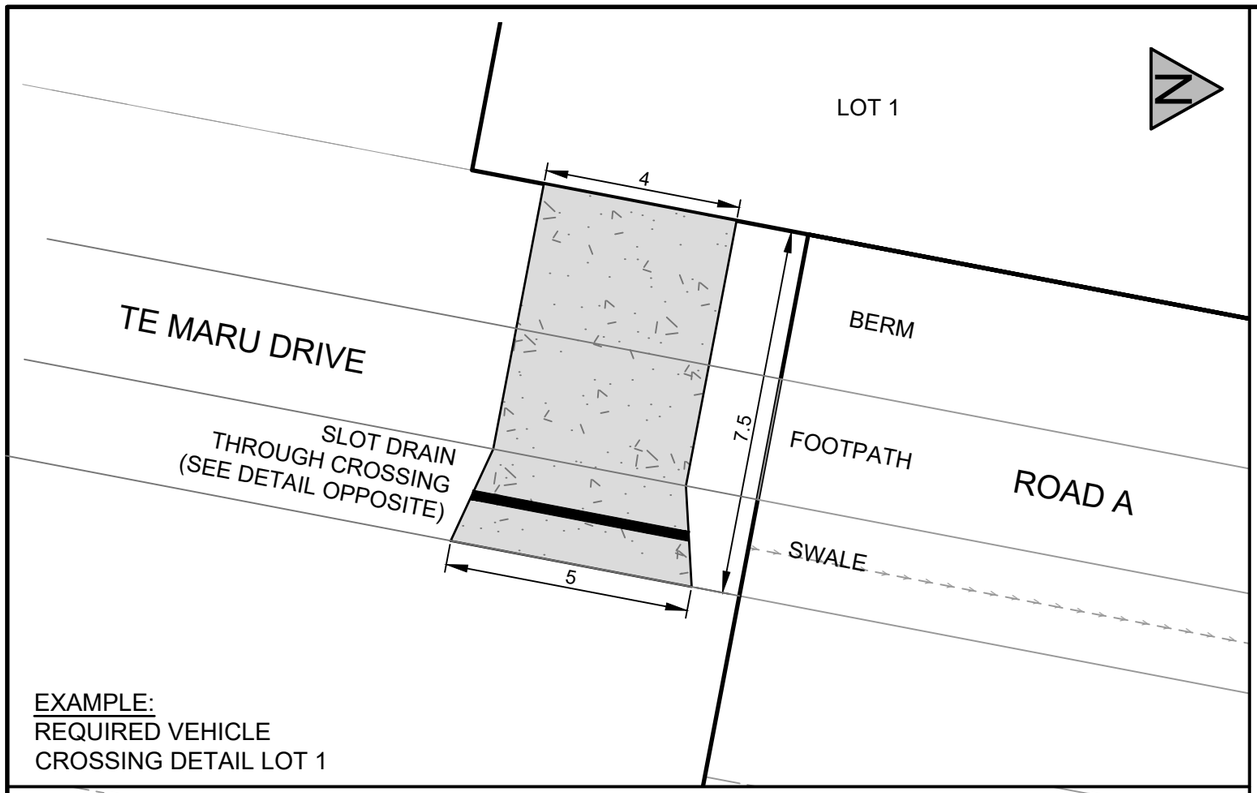
Designed	WAB	09/23
Drawn	WAB	03/11/23
Checked	LAR	----
Approved		

VEHICLE CROSSINGS LAYOUT PLAN
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
Prepared for: MUSCLE DEVELOPMENTS

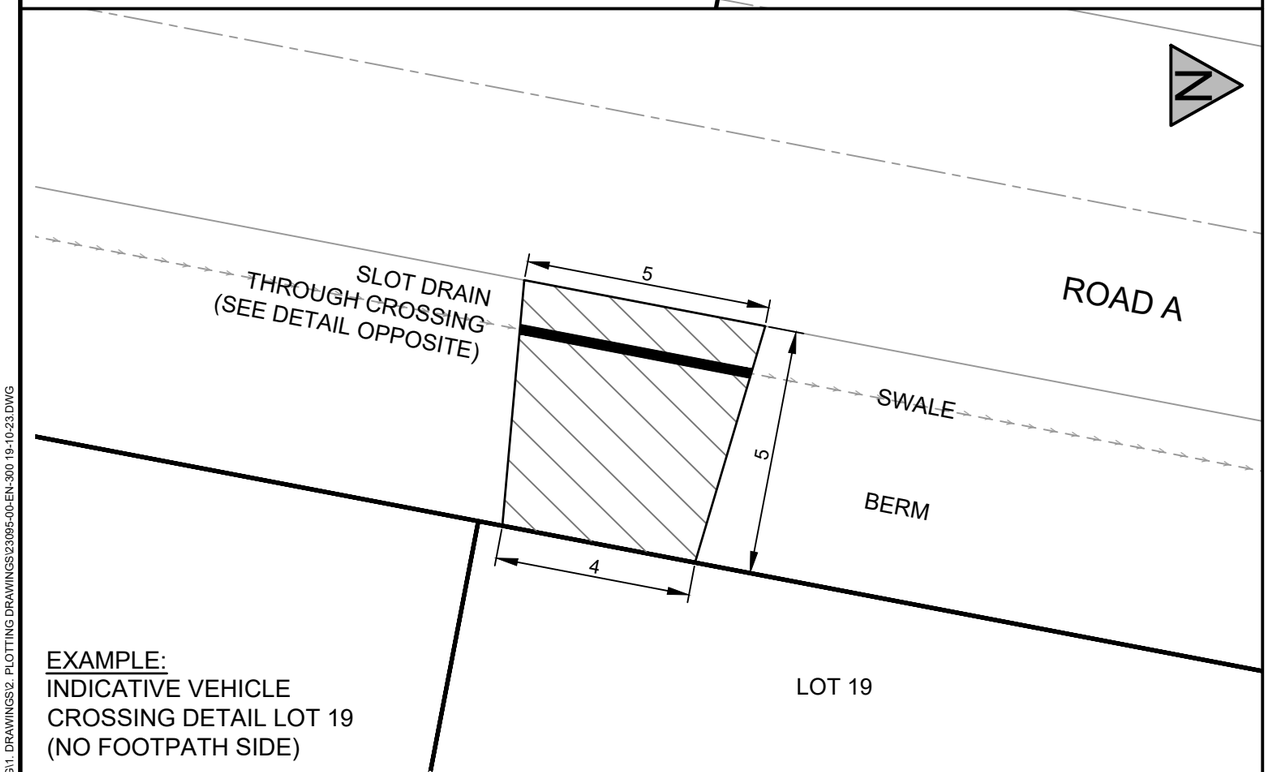
Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: -----
Resource Consent Number: .....

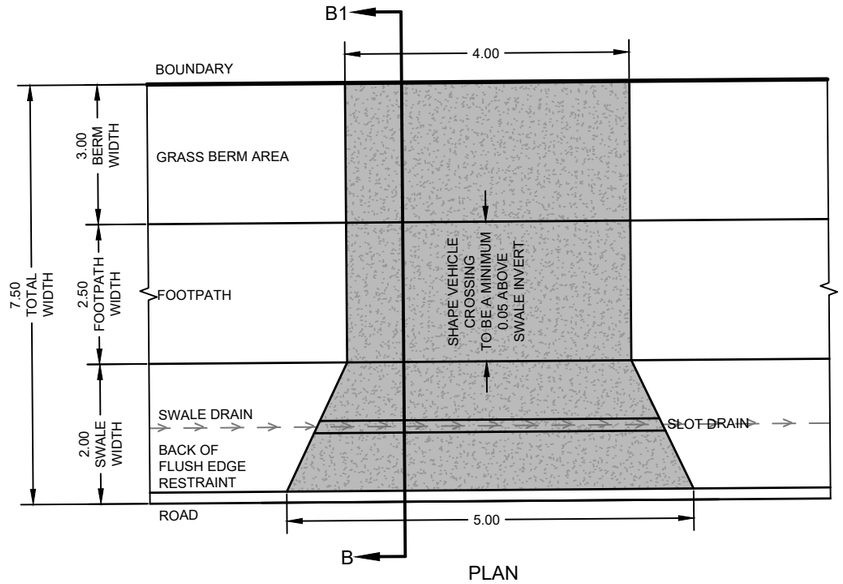
BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-EN-351				A



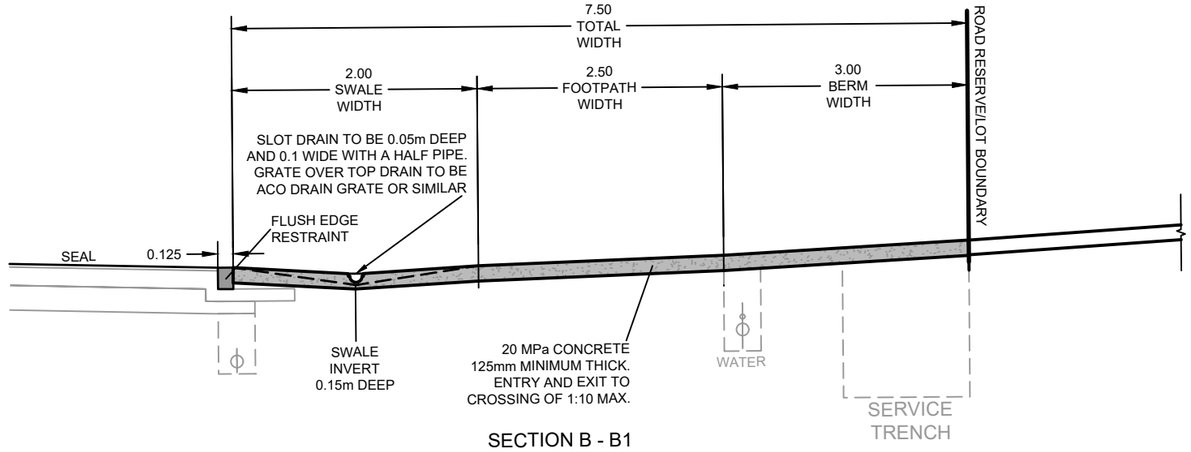
EXAMPLE:
REQUIRED VEHICLE
CROSSING DETAIL LOT 1



EXAMPLE:
INDICATIVE VEHICLE
CROSSING DETAIL LOT 19
(NO FOOTPATH SIDE)



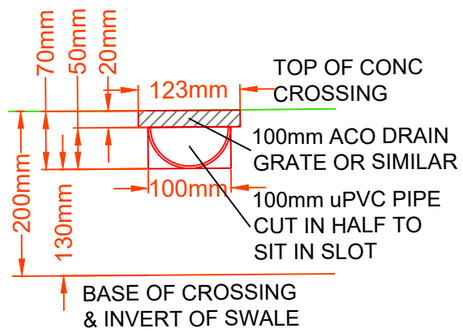
PLAN



SECTION B - B1

TYPICAL CROSS SECTION

VEHICLE CROSSING DETAIL
WITH SWALE SLOT DRAIN



SLOT DRAIN TYPICAL DETAIL

Size	A3	Scale	Not to Scale	Date	NOVEMBER 2023		
No.	Amendment	Init.	Date	Designed	WAB	09/23	
A	For Resource Consent	WAB	03/11/23	Drawn	WAB	03/11/23	
B				Checked	LAR	----	
C				Approved			

ROADING - VEHICLE CROSSING DETAIL
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
Prepared for: MUSCLE DEVELOPMENTS

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: -----
Resource Consent Number:
.....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-EN-352				A

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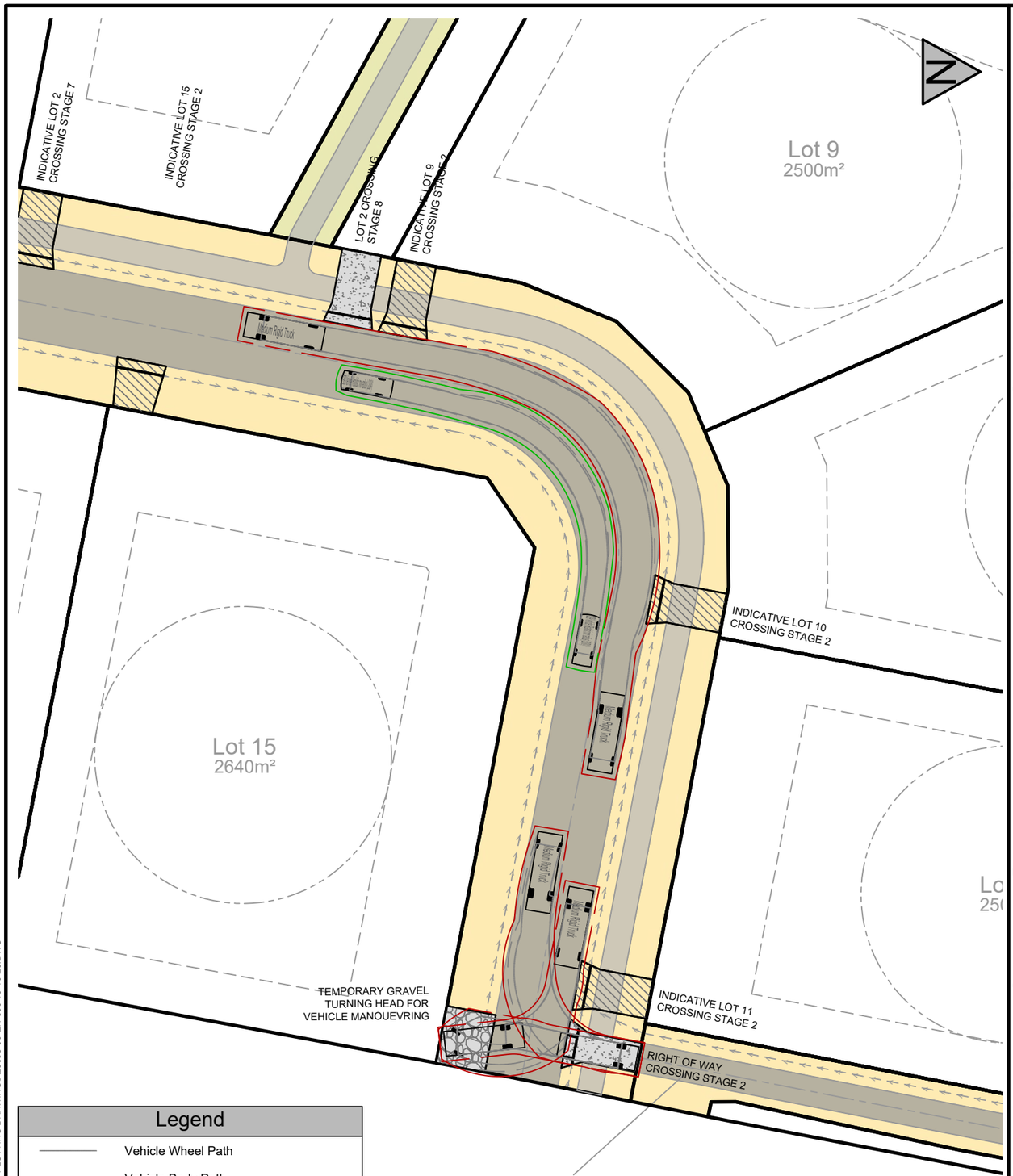
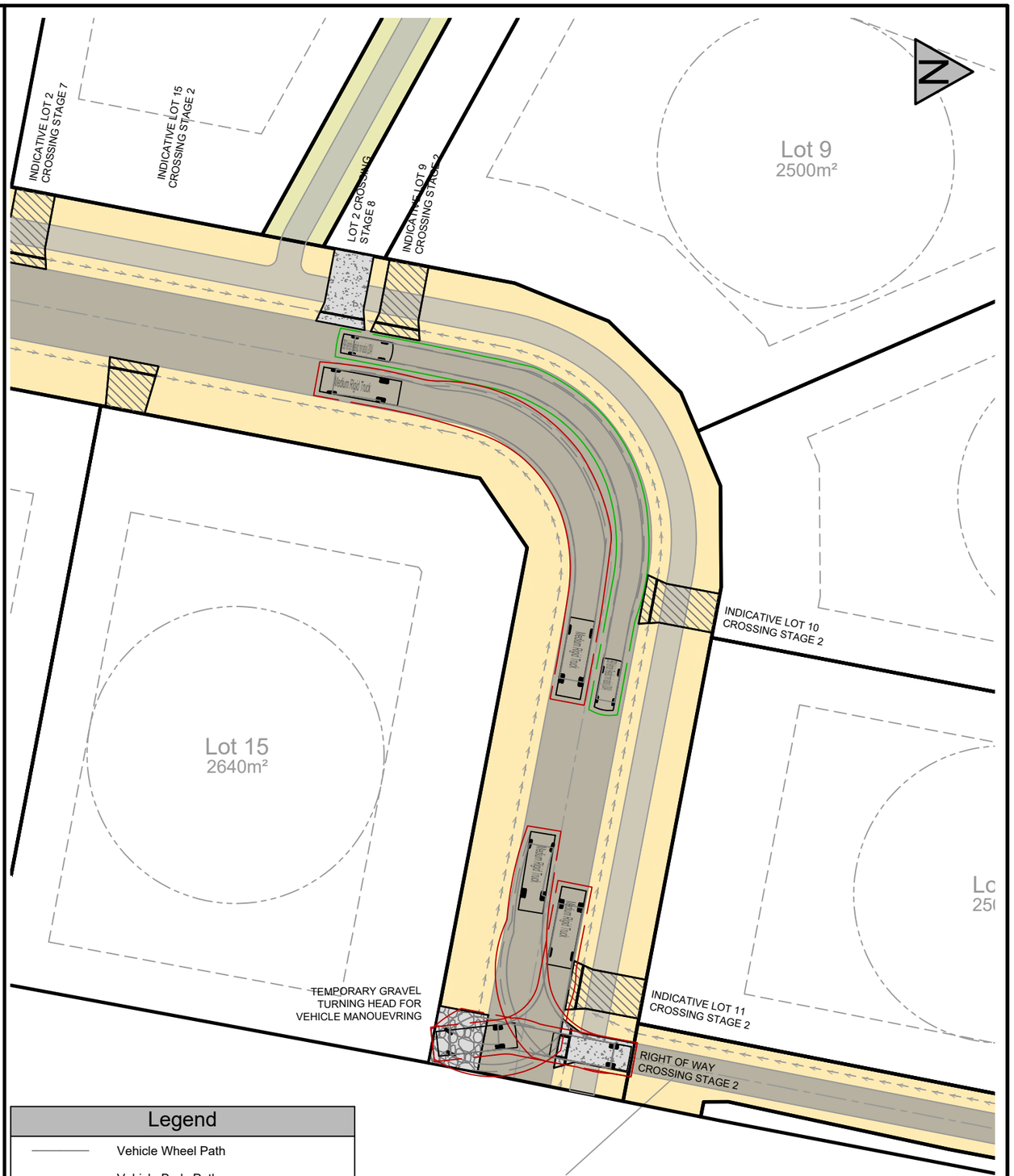


Legend

- Vehicle Wheel Path
- Vehicle Body Path
- 0.5m Body Path Offset - 8m Rigid Truck
- 0.5m Body Path Offset - B99 Vehicle



Legend

- Vehicle Wheel Path
- Vehicle Body Path
- 0.5m Body Path Offset - 8m Rigid Truck
- 0.5m Body Path Offset - B99 Vehicle

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Size	Scale	Date
A3	1:500	NOVEMBER 2023

No.	Amendment	Init.	Date
A	For Resource Consent	WAB	03/11/23
B			
C			

Designed	WAB	09/23
Drawn	WAB	03/11/23
Checked	LAR	----
Approved		

VEHICLE TRACKING PLAN
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
Prepared for: MUSCLE DEVELOPMENTS

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
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Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: -----
Resource Consent Number:
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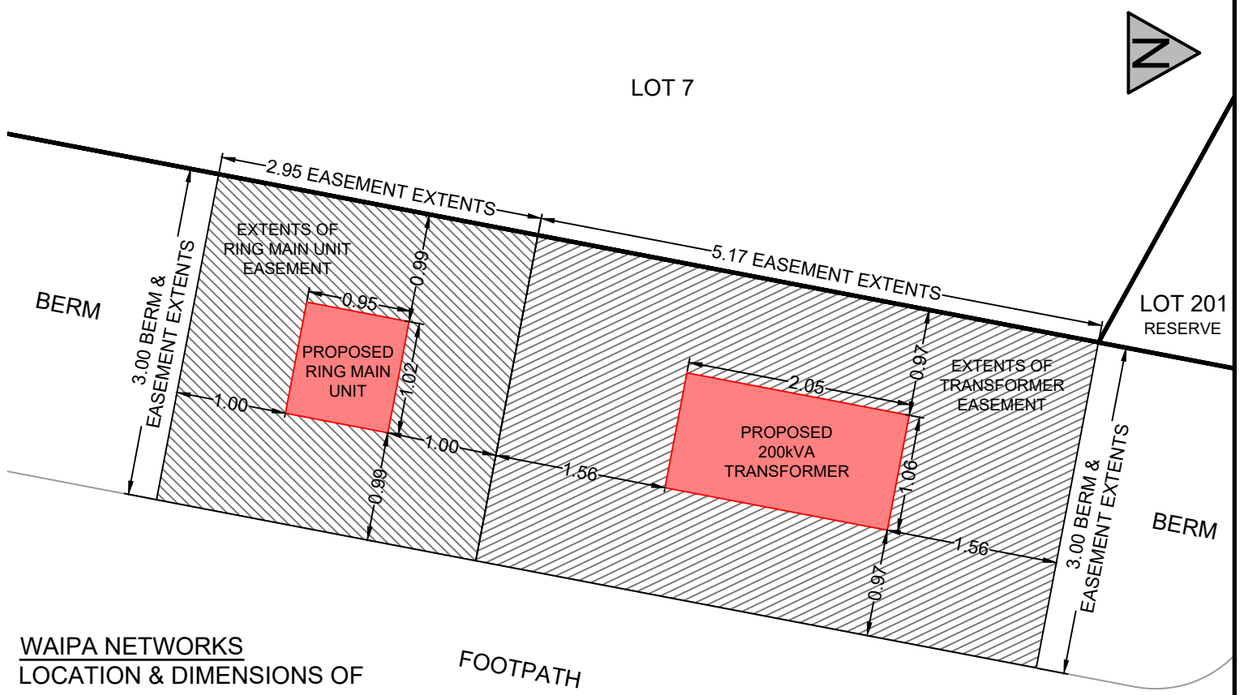
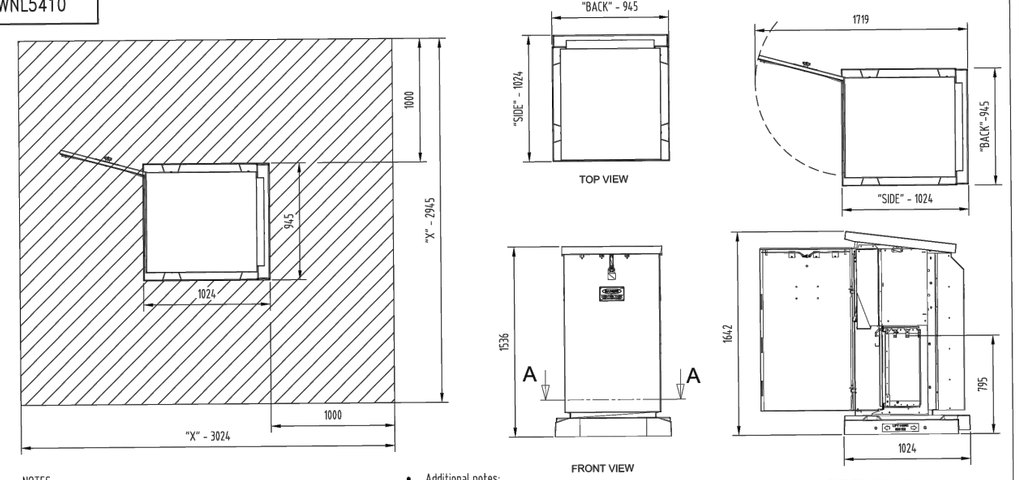
BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-EN-353				A



WAIPA NETWORKS
LOCATION & DIMENSIONS OF PROPOSED RING MAIN UNIT & TRANSFORMER

DRG. No. WNL5410



NOTES:
- Subdivision installation:
  a. Area "X" (3024 x 2945) is the standard easement requirement.
  b. Standard 1000mm clearance is required around the equipment for future access.
- Road reserve installation:
  a. Standard easement is not required but provide 1000mm clearance in both "side" of the equipment for future access.
  b. 300mm clearance between fence and "back" of the equipment.
- Additional notes:
  a. Refer to NZECP 34 Section 8.2.
  b. For two RMU's installation, minimum of 2m separation or clearance is required.
  c. For transformer and RMU installation, minimum of 2m separation or clearance is required.
  d. All dimensions in mm.

ISSUE	REFERENCE	CONSTRUCTION
A		

DRAWN: D. Andeza | DESIGNED: D. Andeza | REVIEWED: Construction/Planners | APPROVED: S. Poudel | PAGE NO. 1 OF 1

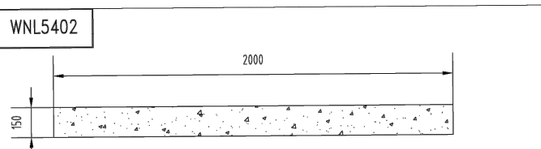
WAIPA NETWORKS

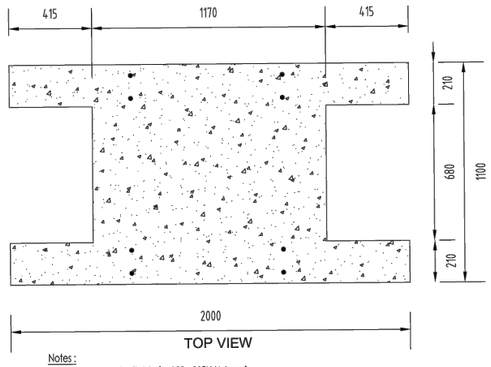
240 Harrison Ave, PO Box 505, TE AWAMUTU Ph. (07) 870 4014 Fax (07) 870 2401

TITLE: EASEMENT DRAWING – CFC/CCC RING MAIN UNIT – SAFELINK

SCALE: NTS | A3 | SHT. 1 of 1 | DRG. No. WNL5410 | Revision A

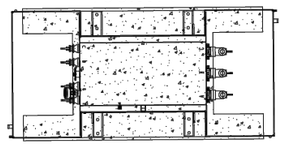
DRG. No. WNL5402



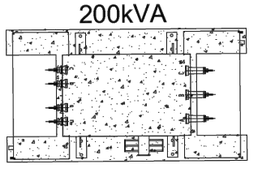


Notes :
- Concrete pad suitable for 100 - 300kVA transformer.
- Refer to padmount transformer standard easement and fire report requirements with dwg no WNL 5400.
- Measurement details may vary. Units in mm.
- The concrete pad drawings will be used for construction and planning reference.

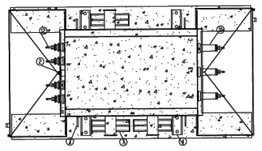
100kVA



200kVA



300kVA



ISSUE	REFERENCE	CONSTRUCTION
A		

DRAWN: D. ANDEZA | DESIGNED: D. ANDEZA | APPROVED: CONSTRUCTION/PLANNERS | APPROVED: S. POUDEL | PAGE NO. 1

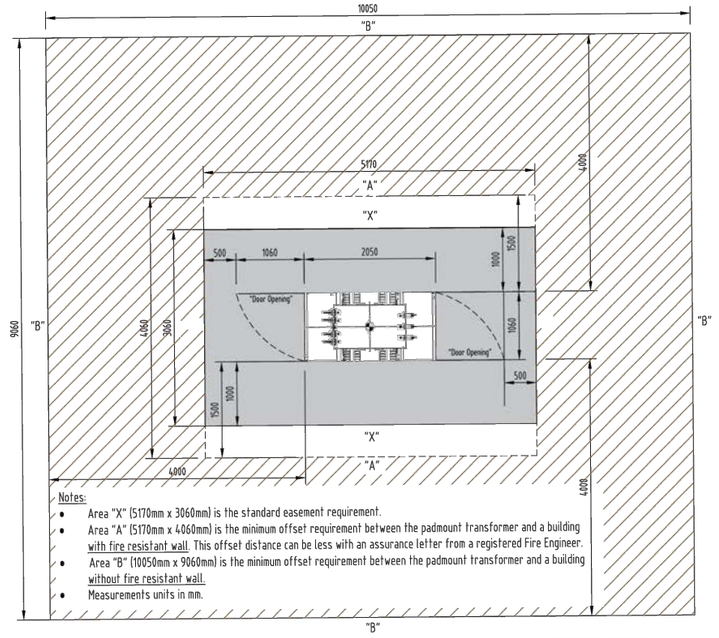
WAIPA NETWORKS

240 Harrison Ave, PO Box 505, TE AWAMUTU Ph. (07) 870 4014 Fax (07) 870 2401

TITLE: TRANSFORMER CONCRETE PAD 100kVA – 300kVA (MINIPAD)

SCALE: NTS | A3 | SHT. 1 of 1 | DRG. No. WNL5402 | Revision A

DRG. No. WNL5400



Notes:
- Area "X" (5170mm x 3060mm) is the standard easement requirement.
- Area "A" (5170mm x 4060mm) is the minimum offset requirement between the padmount transformer and a building with fire resistant wall. This offset distance can be less with an assurance letter from a registered Fire Engineer.
- Area "B" (10050mm x 9060mm) is the minimum offset requirement between the padmount transformer and a building without fire resistant wall.
- Measurements units in mm.

ISSUE	REFERENCE	CONSTRUCTION
A		

DRAWN: D. ANDEZA | DESIGNED: D. ANDEZA | APPROVED: CONSTRUCTION/PLANNERS | APPROVED: S. POUDEL | PAGE NO. 1

WAIPA NETWORKS

240 Harrison Ave, PO Box 505, TE AWAMUTU Ph. (07) 870 4014 Fax (07) 870 2401

TITLE: PADMOUNT TRANSFORMER STANDARD EASEMENT & FIRE REPORT REQUIREMENTS

SCALE: NTS | A3 | SHT. 1 of 1 | DRG. No. WNL5400 | Revision A

Size	A3	Scale	Not to Scale	Date	NOVEMBER 2023		
No.	Amendment	Init.	Date	Designed	WAB	09/23	
A	For Resource Consent	WAB	03/11/23	Drawn	WAB	03/11/23	
B				Checked	LAR	----	
C				Approved			

WAIPA NETWORKS RING MAIN UNIT & TRANFORMER PLAN
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
Prepared for: MUSCLE DEVELOPMENTS

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: -----
Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-EN-354				A

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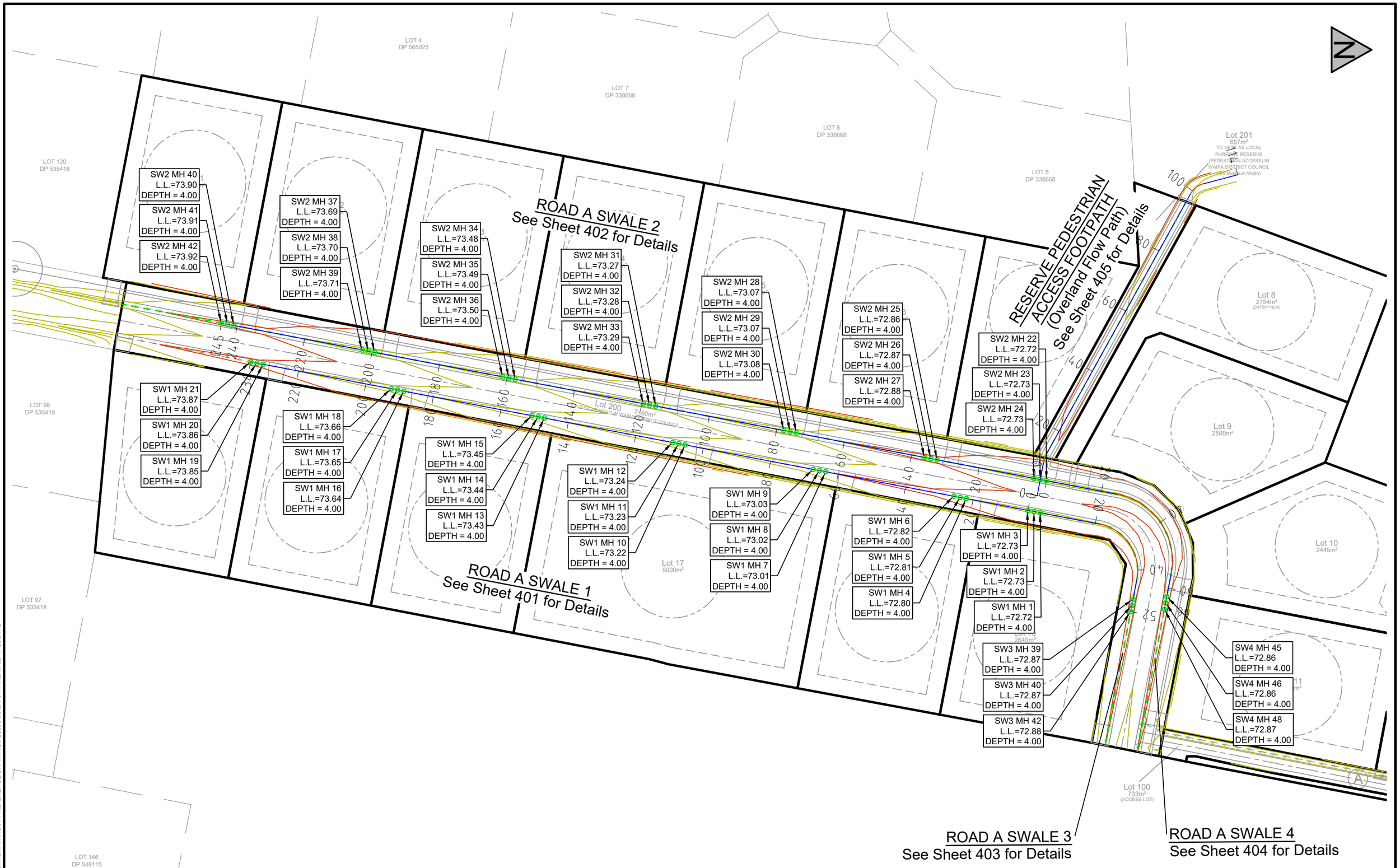

Size	Scale	Date
A3	1:1000	NOVEMBER 2023

No.	Amendment	Init.	Date
A	For Resource Consent	WAB	03/11/23
B			
C			

Designed	WAB	09/23
Drawn	WAB	03/11/23
Checked		
Approved		

STORMWATER RETICULATION
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
Prepared for: MUSCLE DEVELOPMENTS

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: -----

Resource Consent Number:
.....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-EN-400				A

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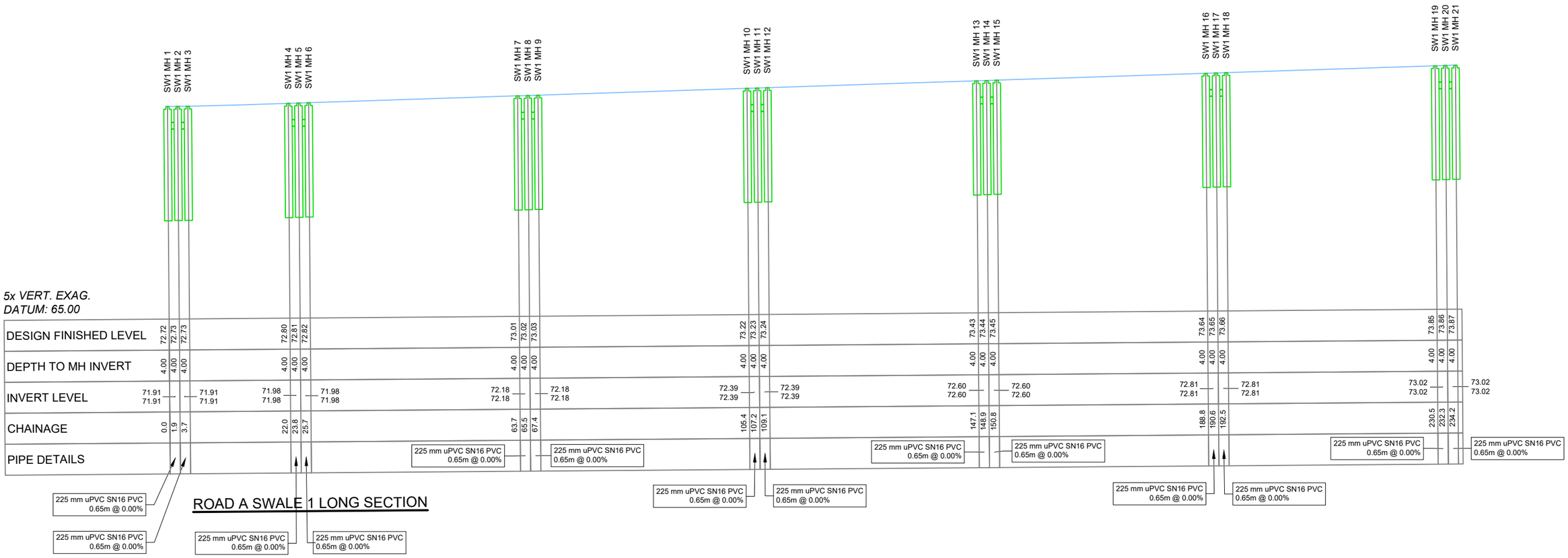

ROAD A SWALE 1 LONG SECTION

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Size	A3	Scale	1:750	Date	NOVEMBER 2023		
No.	Amendment	Init.	Date	Designed	WAB	09/23	
A	For Resource Consent	WAB	03/11/23	Drawn	WAB	03/11/23	
B				Checked			
C				Approved			

STORMWATER LONGSECTION
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
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Datum: Circuit: Mt Eden 2000
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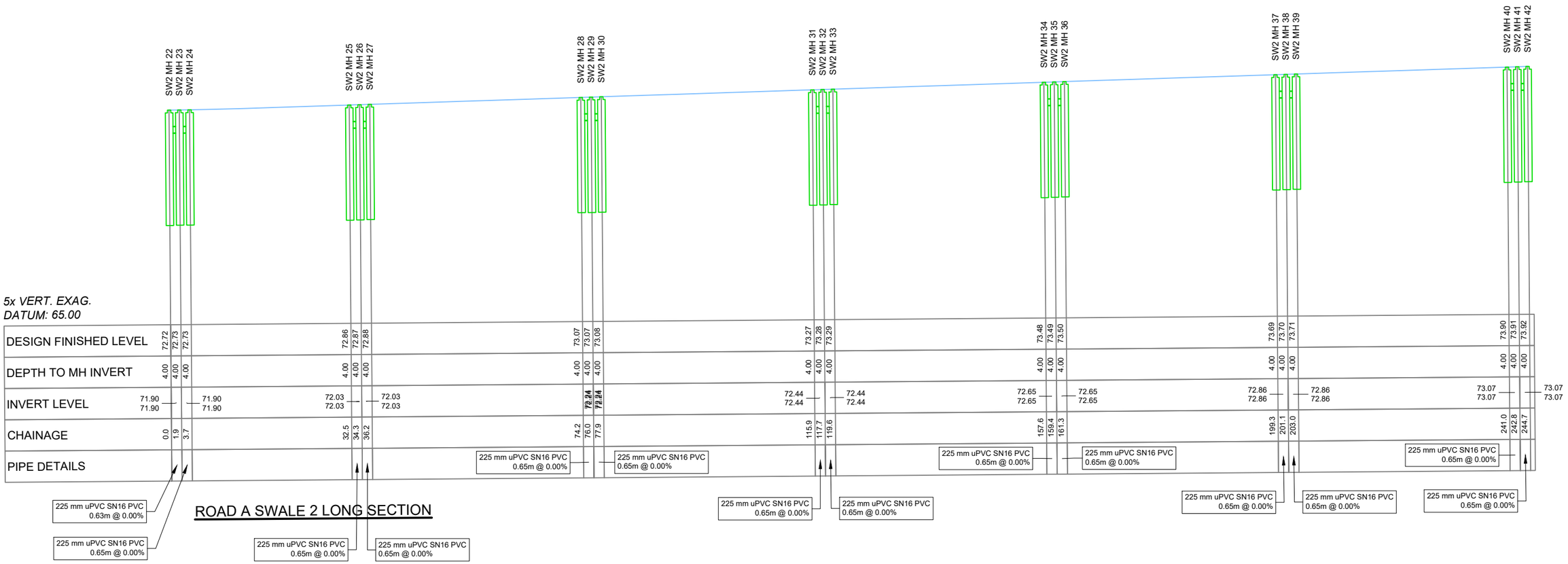
BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-EN-401				A



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STORMWATER LONGSECTION
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
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Datum: Circuit: Mt Eden 2000
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Resource Consent Number:
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BW Ref.	Stg.	Purp.	Dwg. #	Revision:
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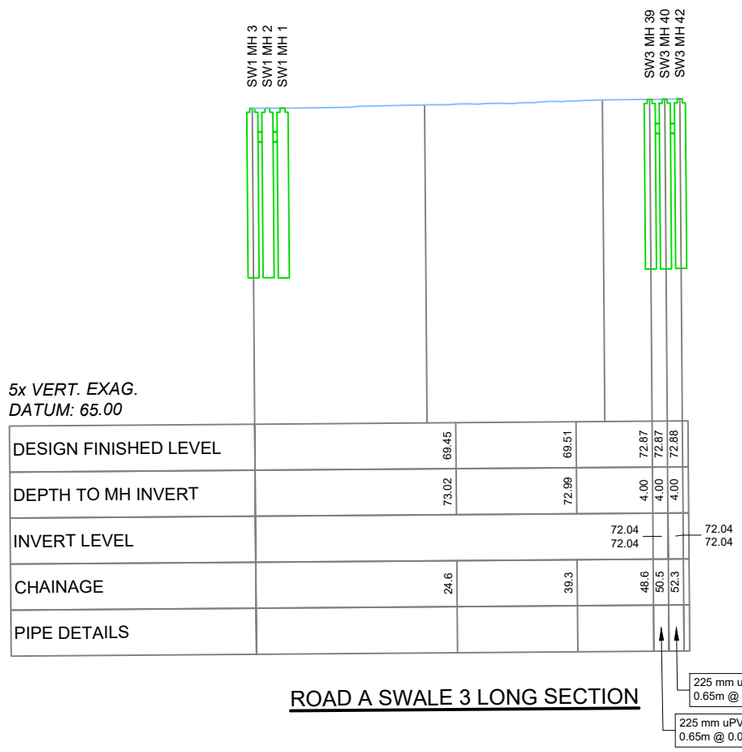
Version: 1, Version Date: 21/11/2023



ROAD A SWALE 3 LONG SECTION

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Size	A3	Scale	1:750	Date	NOVEMBER 2023		
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C					Approved		

STORMWATER LONGSECTION
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
Prepared for: MUSCLE DEVELOPMENTS

Blue Wallace Surveyors Ltd.
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Datum: Circuit: Mt Eden 2000
Height: -----

Resource Consent Number:
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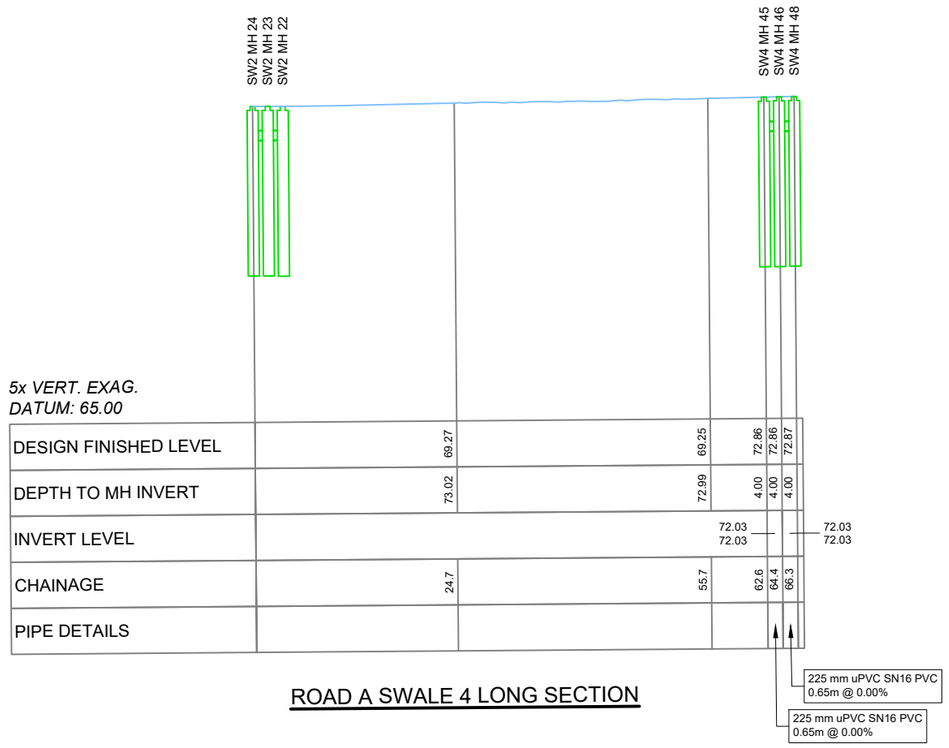
BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-EN-403				A



ROAD A SWALE 4 LONG SECTION

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Size	A3	Scale	1:750	Date	NOVEMBER 2023		
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STORMWATER LONGSECTION
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
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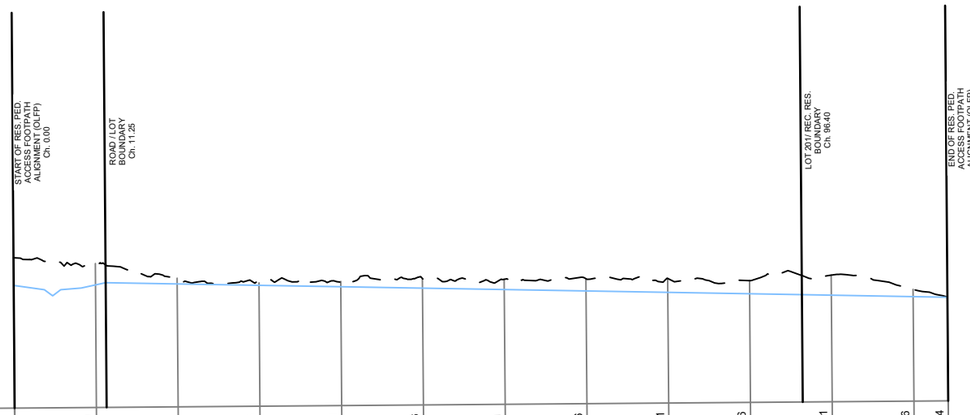

5x VERT. EXAG.
DATUM: 70.00

DESIGN LEVELS	73.00	73.00	73.01	72.96	72.91	72.86	72.81	72.76	72.71	72.66	72.61	72.56	72.54
EXISTING LEVELS		73.52	73.15	73.02	73.04	73.09	73.06	73.05	73.05	72.98	73.10	72.73	72.54
CUT/FILL DEPTH	-0.68	-0.52	-0.14	-0.06	-0.13	-0.23	-0.25	-0.30	-0.34	-0.32	-0.49	-0.18	0.00
CHAINAGE		10	20	30	40	50	60	70	80	90	100	110	114.2
VERTICAL GEOMETRY		-3.75% 1.70	-2.00% 2.00	-0.50% 2.00	2.50% 3.00	-0.5% 85.15					-0.5% 17.79		

RES PED ACCESS LONG SECTION

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STORMWATER OVERLAND FLOW PATH LONGSECTION
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
Prepared for: MUSCLE DEVELOPMENTS

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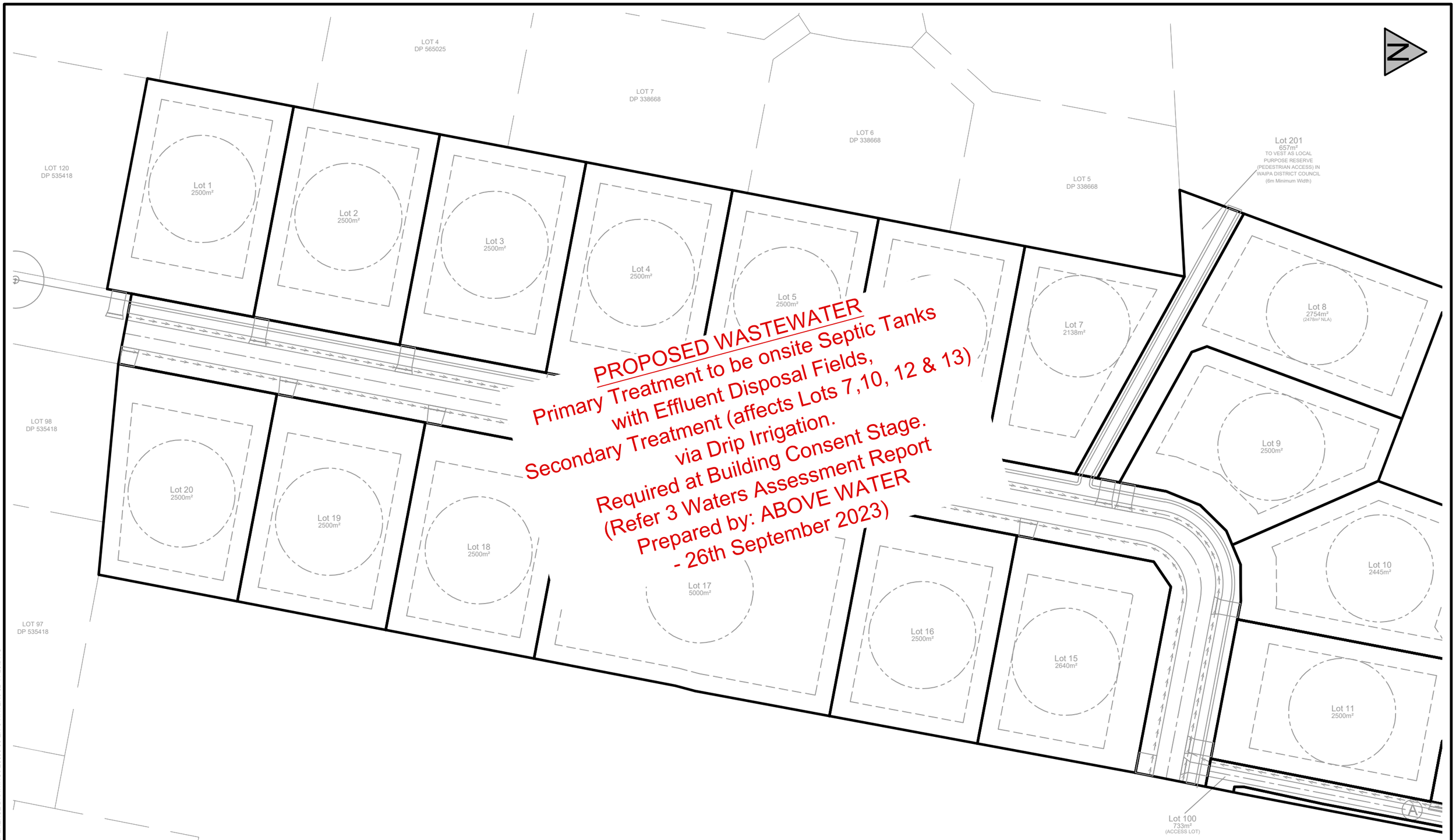

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Size	Scale	Date
A3	1:1000	NOVEMBER 2023

No.	Amendment	Init.	Date
A	For Resource Consent	WAB	03/11/23
B			
C			

Designed	WAB	09/23
Drawn	WAB	03/11/23
Checked		
Approved		

WASTEWATER RETICULATION
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
Prepared for: MUSCLE DEVELOPMENTS

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: -----
Resource Consent Number:
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BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-EN-500				A

LOT 6
DP 452889

LOT 3
DP 565025

LOT 4
DP 565025

LOT 7
DP 338668

LOT 6
DP 338668

LOT 5
DP 338668

ALLOT 69
CAMBRIDGE TOWN BELT
(RECREATION RESERVE)

Lot 201
657m²
TO VEST AS LOCAL PURPOSE RESERVE (PEDESTRIAN ACCESS) IN WAIPA DISTRICT COUNCIL
(6m Minimum Width)

LOT 120
DP 535418

Lot 1
2500m²

Lot 2
2500m²

Lot 3
2500m²

Lot 4
2500m²

Lot 5
2500m²

Lot 6
2500m²

Lot 7
2138m²

Lot 8
2754m²
(2478m² NLA)

EXISTING FIRE HYDRANT

EXISTING 100mmØ uPVC WDC WATER MAIN

EXISTING 50mmØ PE-MD WDC RIDER MAIN

TE MARA

WM1

WM2

WM3

PROPOSED EXTENSION OF 100mmØ uPVC WDC WATER MAIN LENGTH = 384.30m

WM4

PROPOSED FIRE HYDRANT

WM5

WM6

PROPOSED FIRE HYDRANT

WM7

WM8

DN 25mmØ CONNECTION FOR LOT 8

WM9

Lot 9
500m²

LOT 1
DP 384116
3874m2
(RT. 336283)
R. WILES

EXISTING 20mmØ LOT CONN. (Council Records) TO BE UTILISED BY LOT 20 HEREON (To be Comfirmed)

WM20
ALTERNATIVE PROPOSED 20mmØ LOT CONN. TO BE UTILISED BY LOT 20 HEREON (To be Comfirmed)

Lot 200
7460m²
TO VEST AS ROAD IN WAIPA DISTRICT COUNCIL

WM19

WM18

PROPOSED EXTENSION OF 63mmØ PE-MD WDC RIDER MAIN LENGTH = 280.61m

WM17B

WM17A

WM16

WM15

PROPOSED PEET VALVE

WM10

Lot 10
2445m²

LOT 1
DPS 51784

LAMB STREET

EXISTING SCOUR VALVE

Lot 19
2500m²

Lot 18
2500m²

Lot 17
5000m²

Lot 16
2500m²

Lot 15
2640m²

WM11

Lot 11
2500m²

Lot 12
2315m²

Lot 13
2300m²

Lot 14
2676m²
(2500m² NLA)

LOT 97
DP 535418

ORUA CRES

PROPOSED FIRE HYDRANT AT END OF 150mmØ WATER MAIN

Lot 100
733m²
(ACCESS LOT)

PROPOSED 2 WAY MANIFOLD BOX WITH CAST IRON COVER TO BE UTILISED BY LOTS 12 & 13. (INDIVIDUAL DN 25mmØ LOT CONNECTION)

EXISTING FIRE HYDRANT

WM14
PROPOSED 20mmØ LOT CONN. TO BE DUCTED UNDER LAMB STREET

EXISTING 180mmØ PE WDC WATER MAIN

LOT 1
DP 593787

DP 593787

Legend

- Existing Water Main
- Existing Fire Hydrant
- Proposed Lot Connection
- Proposed Sluice Valve
- Proposed Peet Valve
- Proposed Fire Hydrant
- Proposed Water Main
- Proposed Rider Main
- Proposed Lot Connection
- 135m Max. Hose Runs

WATER NOTES

1) Water supply construction to be undertaken in accordance with Regional Infrastructure Technical Specifications and appropriate resource consent conditions
2) Connections to existing (Waipa District Council) assets are only to be undertaken by (Waipa District Council), unless specific dispensation is provided.
3) Water supply testing and QA requirements (including disinfection and bacteriological testing) are as per RITS
4) For standard pipe size and materials refer RITS Table 6-2
5) Unless stated otherwise, lot connections to be DN20, located centrally on lot frontage
6) Ducts to be installed where lot connections are under formed pavements
7) Anchor and thrust block locations to be established by contractor on site in accordance with RITS
8) Meter boxes within formed entrances to be constructed with trafficable covers

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Size A3 | Scale 1:1500 | Date NOVEMBER 2023

No.	Amendment	Init.	Date
A	For Resource Consent	WAB	03/11/23
B			
C			

Designed	WAB	09/23
Drawn	WAB	03/11/23
Checked	LAR	
Approved		

WATER RETICULATION PLAN
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
Prepared for: MUSCLE DEVELOPMENTS

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
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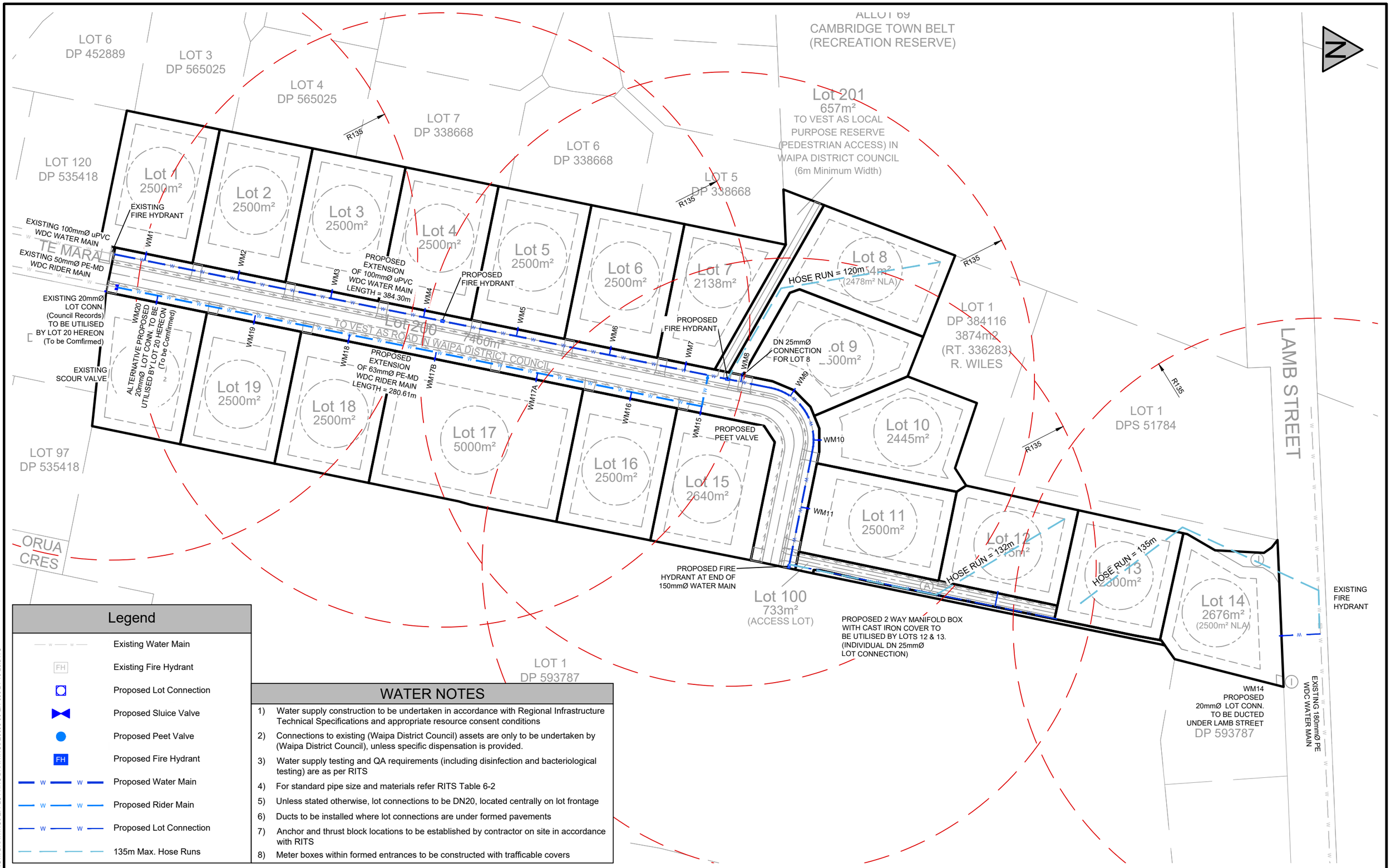
23095-00-EN-600				A



Legend

- Existing Water Main
- Existing Fire Hydrant
- Proposed Lot Connection
- Proposed Sluice Valve
- Proposed Peet Valve
- Proposed Fire Hydrant
- Proposed Water Main
- Proposed Rider Main
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FIRE FIGHTING EXTENTS PLAN
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
Prepared for: MUSCLE DEVELOPMENTS

Blue Wallace Surveyors Ltd.
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Datum: Circuit: Mt Eden 2000
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BW Ref.	Stg.	Purp.	Dwg. #	Revision:
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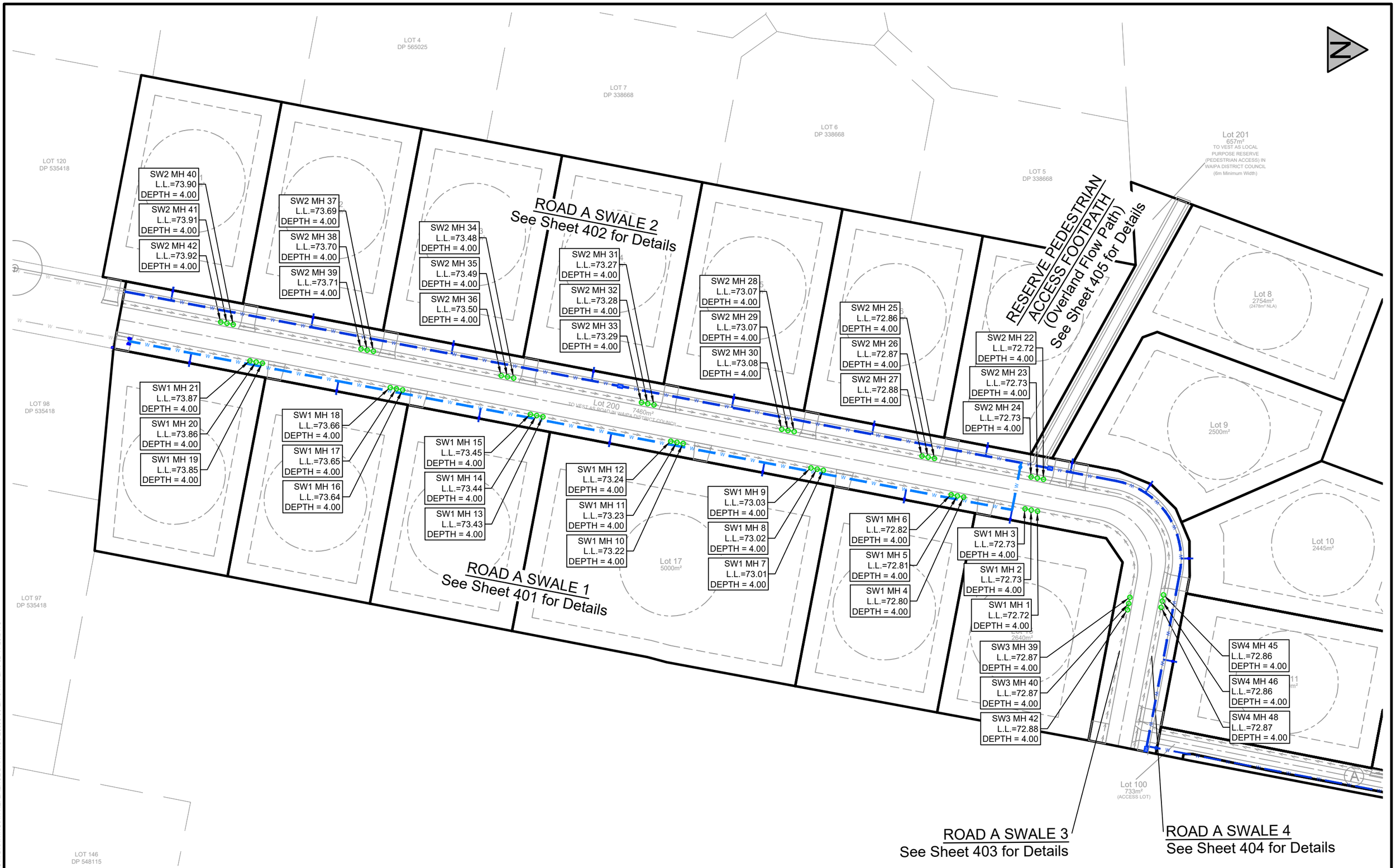

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COMBINED SERVICES PLAN
ENGINEERING WORKS
318 LAMB STREET, LEAMINGTON - CAMBRIDGE
Prepared for: MUSCLE DEVELOPMENTS

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Height: -----

Resource Consent Number:
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BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-EN-700				A

APPENDIX B

PRE-APPLICATION MEETING NOTES

Pre Application Meeting Notes

Application ref:	PG/0070/23
Applicant:	Ryan George
Agent:	Lynne Sun – Planner (Blue Wallace Surveyors) Logan Ross – Surveyor (Blue Wallace Surveyors) Tim Lester – Planner (Blue Wallace Surveyors)
Council Staff:	Quentin Budd (Consents Team Leader) Layla Gruebner (Planner) Eva Cucvarova (Senior Development Engineer) Aidan Kirkby-McLeod (Reserves Planning Team Leader)
Meeting time and date:	28 June 2023 at 10:00am
Site address:	318 Lamb Street Leamington Cambridge 3432
Legal Description:	LOT 2003 DP 535418 & LOT 2005 DP 535418 (RT 885366)
Zone:	Large Lot Residential
Policy Overlays:	Leamington Large Lot Residential Zone Structure Plan Area

Site Description

The site is located at 381 Lamb Stret contains two freehold records of title with a combined area of 6.11 ha. The site is a former blueberry farm. The property is zoned Large Lot Residential and is within the Leamington Large Lot Residential Zone Structure Plan Area.

Proposal

The applicant is proposing to undertake a 21 lot subdivision at 318 Lamb Street. Additional lots for roading, access, reserve and land swap area are also proposed.

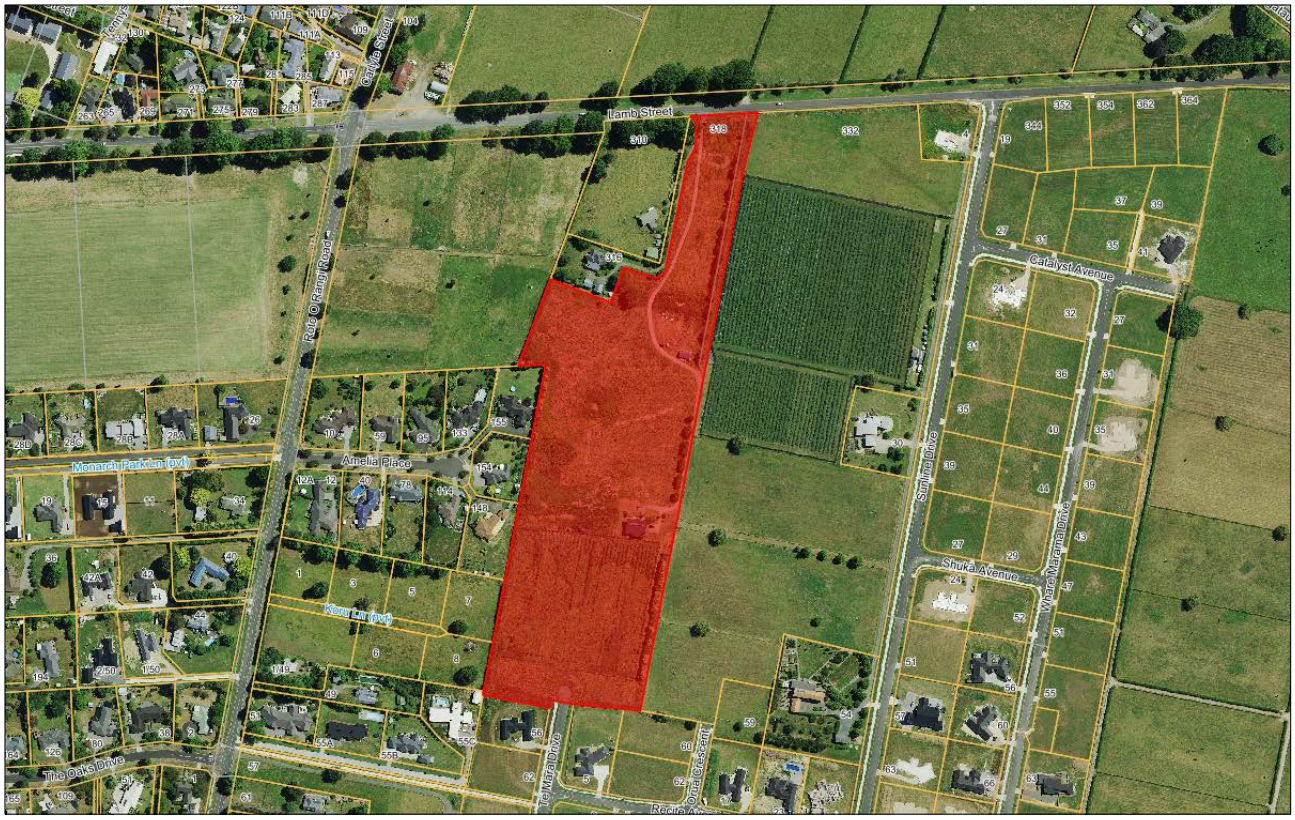


Figure 1: Aerial photograph of site.

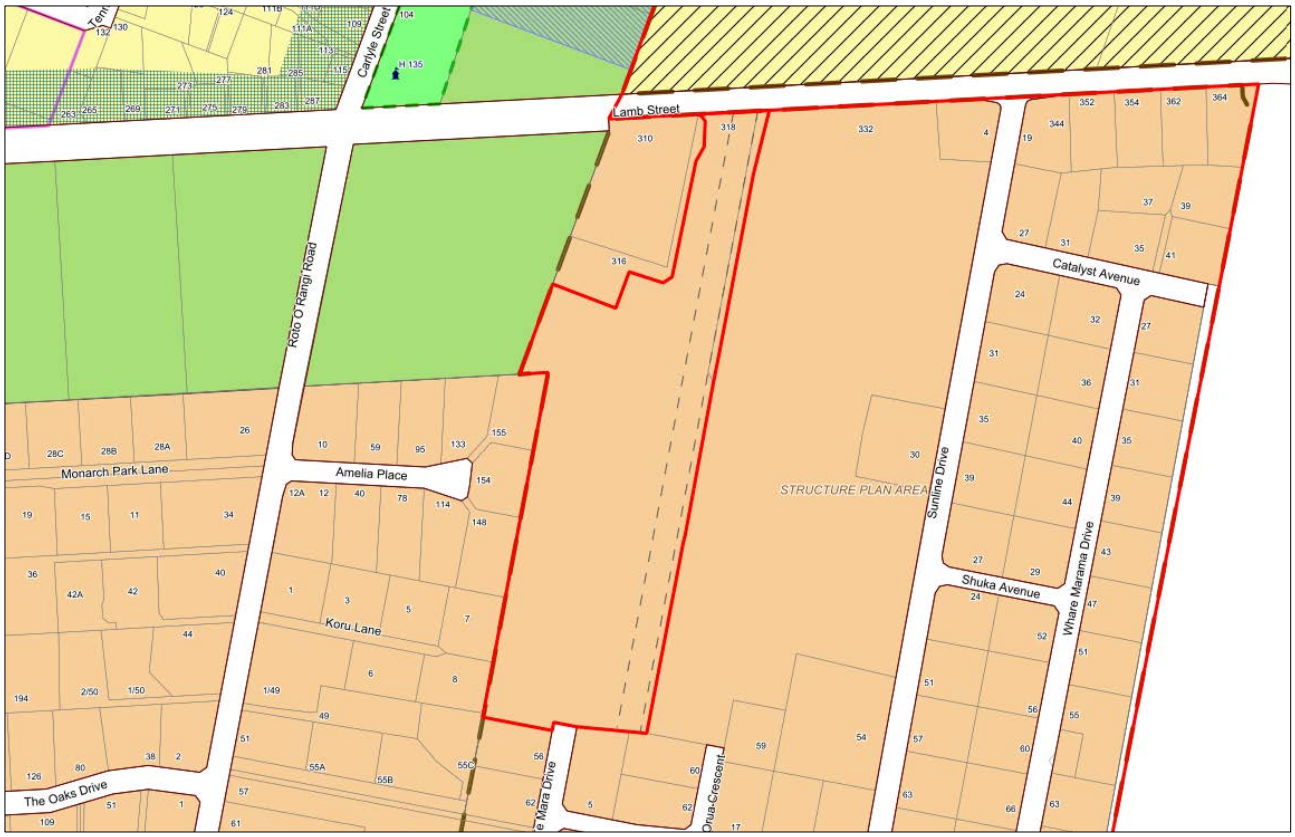


Figure 2: District Zone and Policy Overlays Map.

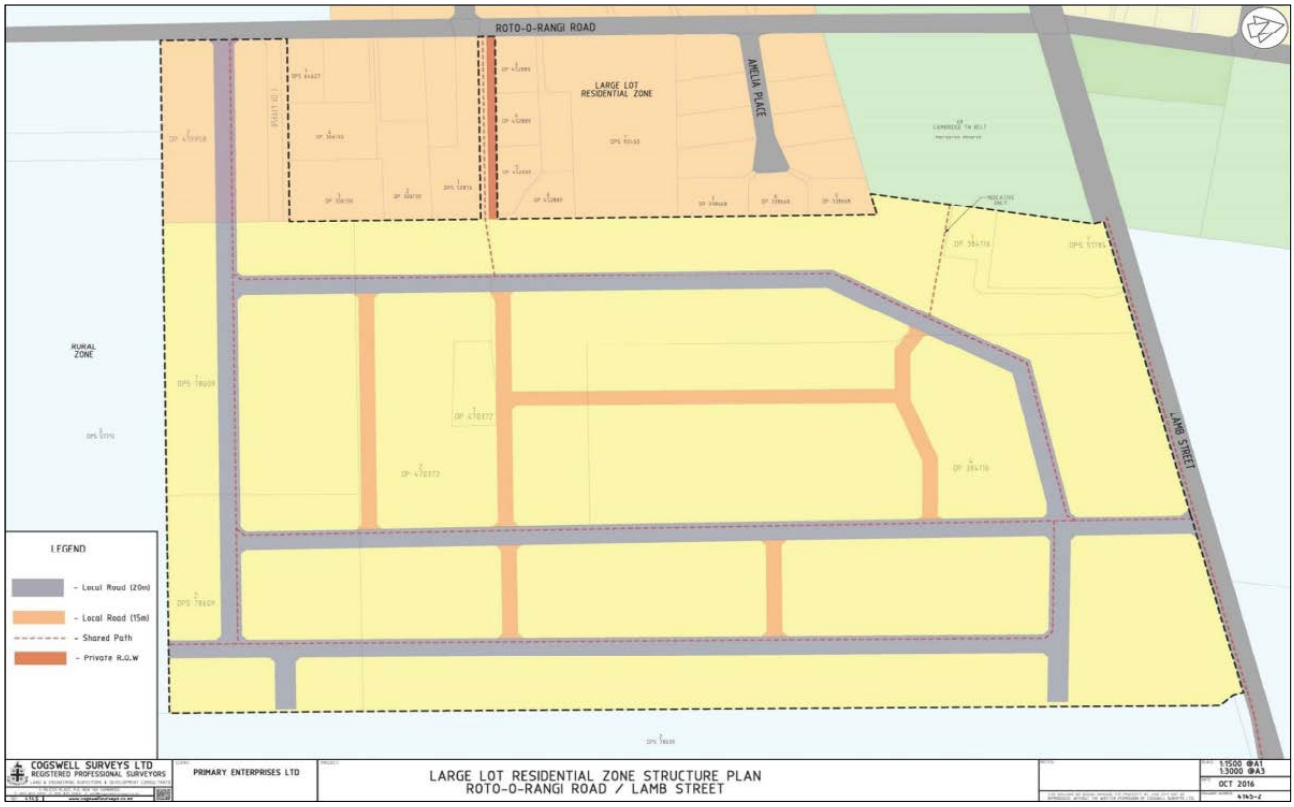


Figure 3: Structure Plan Map.

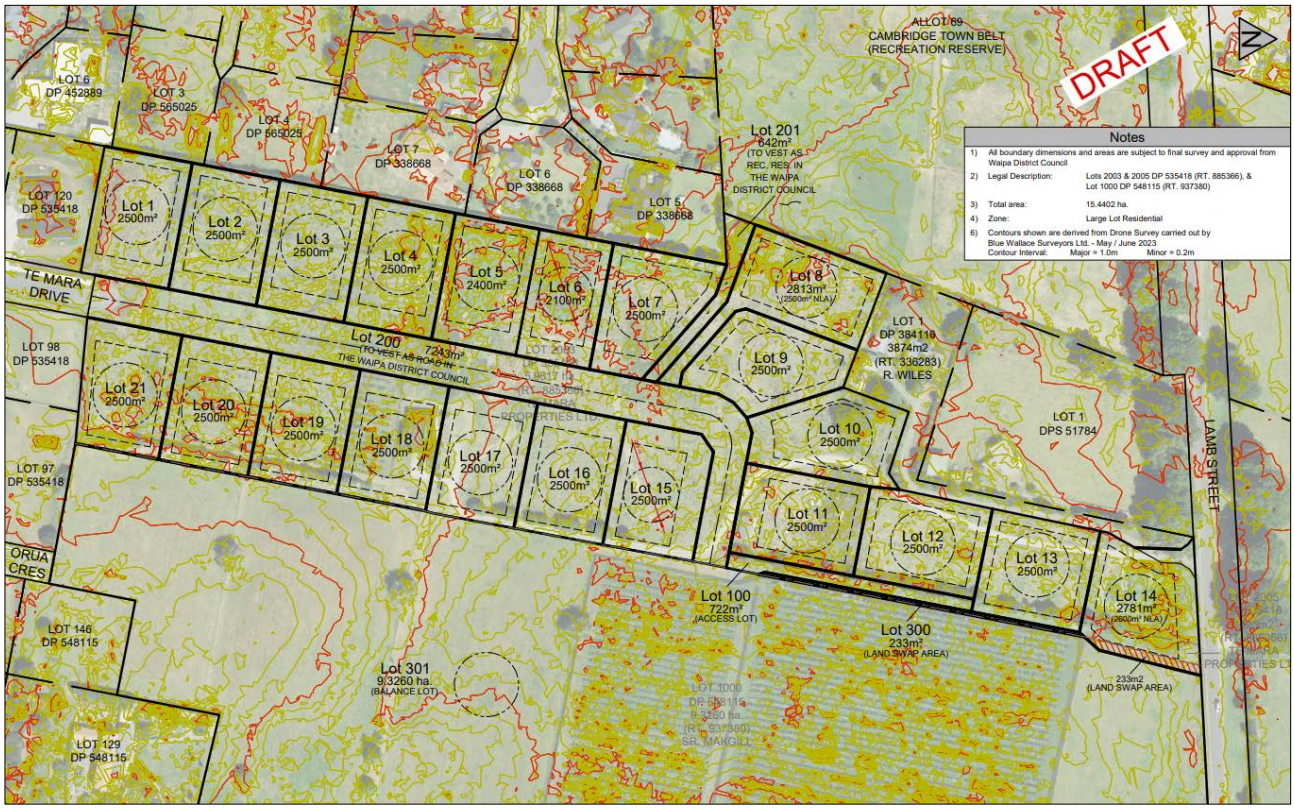


Figure 4: Proposed Scheme Plan.

Planning Comments

- Council supportive of an additional undersized lot in order to allow for complying road width and that the undersized lots comply with lot frontage requirements to ensure character as depth is not as easily seen therefore the preference is with the width.
- There is no need for a land use consent to be applied for with the subdivision consent as the undersized lots are not significantly undersized.
- Consent notices will be put on undersized lots for building platforms to ensure complying setbacks and show where can be built. Mr Budd is more comfortable having building within road setback on corner site as that is the 'side boundary'.
- Mr Budd recommends to provide as much information around contamination as possible (i.e. DSI, what management (RAP) will look like, management plan, etc.) then Council we can put conditions for it to be done in accordance with that. This way the applicant will only need to provide SVR afterwards rather than having to provide all other information at post decision stage.

Infrastructure Development Comments

- Roading is in accordance, but still not quite, with the structure plan – this will need to be discussed with Council's roading team to see what needs to happen here.
- Water supply is available from Te Mara Drive.
- Wastewater will be disposed of on site (consent notice to be included), and a secondary system will need to be used for lots under 2,500m^2, and a primary system for lots larger than 2,500m^2. The geotechnical report will address this.
- Stormwater management down Sunline Drive has had issues and systems were not enough so this will be scrutinised at application stage in terms of what is proposed and it will need to be sufficient for flows. Proprietary devices are required for the road so Council can maintain them, not rock soakage trenches. Overflows to reserve can be maintained and have to be at pre development rates.
- Vehicle crossings to accommodate swales – expand on design. Rear lots require a crossing and can propose a design and can be consent noticed/covenanted for future owners to construct based on this design.
- RITS requirements for planting and berm requirements and trees and driveway locations. Consider trees more centrally to northern side of the site to reduce likelihood of disrupting future crossing locations as people most likely will put the garage to the south.
- Suggested to send through amended designs before lodging to review again before lodging.
- Flooding on map is 0.1 so not worry about but most likely inaccurate. Keep at pre development levels.

Reserves Comments

- The walkway / shared path connection between the Cambridge Town Belt reserve land (west of the subject site) and the internal road network is anticipated by the Leamington Large Lot Residential Zone Structure Plan. The walkway would need to be vested to the Council as Local Purpose (Pedestrian Access) Reserve.The design of the walkway is considered to be problematic in terms of it being a relatively long accessway that bends and does not have clear visibility between the exit points. As a general Crime Prevention Through Environmental Design principle, users of

such an access should be able to see where they are exiting prior to entering the walkway. The bend in the walkway could give rise to potential entrapment spots or similar issues. While requiring the adjoining land owners to maintain low and/or visual permeable fencing may assist in alleviating such issues, it would be preferable to design out the issue in the first instance.

- The walkway should be designed to be 6m in width boundary to boundary, with a 3m wide concrete path. While it may be possible to narrow the overall width of the walkway, it would ideally be no less than 4m.
- Fences that adjoin boundaries with Council's reserves, including the walkway, need to be compliant with District Plan Performance Standard 2.4.2.21 which requires low and/or visually permeable fencing.

Post meeting comments

- After the meeting Lynne Sun (Blue Wallace) emailed Council asking about undertaking minor contouring works within the reserve in order to preserve the overland flow path. Mr Kirkby-McLeod has confirmed that Council would be willing to accept minor earthworks within the reserve as long as they are related to maintenance of existing overland flows only.

Communication

In order to establish clear lines of communication, any future correspondence should be directed to Quentin Budd (Consents Team Leader) at Quentin.budd@waipadc.govt.nz or Layla Gruebner (Planner) at Layla.gruebner@waipadc.govt.nz

Notes:

1. **Please note that all the information provided in this form is available to the public.**
2. **Pre-application meetings are intended to provide initial advice on specific issues identified for discussion by the applicant and any major issues. It cannot replace the in-depth investigation associated with the formal assessment of an application (and where relevant, consideration of public submissions). Advice provided by Council Staff is given in good faith and in no way binds a decision by the Council.**

APPENDIX C

RECORDS OF TITLE

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**1143237**
Land Registration District	**South Auckland**
Date Issued	25 August 2023

Prior References
937380

Estate	Fee Simple
Area	8.3026 hectares more or less
Legal Description	Lot 1 Deposited Plan 593787
Registered Owners	

Simon Redding Makgill

Interests

Subject to Section 8 Coal Mines Amendment Act 1950

7145921.1 Mortgage to Bank of New Zealand - 5.12.2006 at 9:00 am

Land Covenant in Easement Instrument 11094821.8 - 12.7.2018 at 1:24 pm

Land Covenant in Covenant Instrument 11552809.30 - 19.9.2019 at 2:41 pm

Fencing Agreement in Deed 11590062.1 - 25.10.2019 at 7:00 am

Land Covenant in Covenant Instrument 11733651.10 - 30.7.2020 at 9:08 am (limited as to duration)

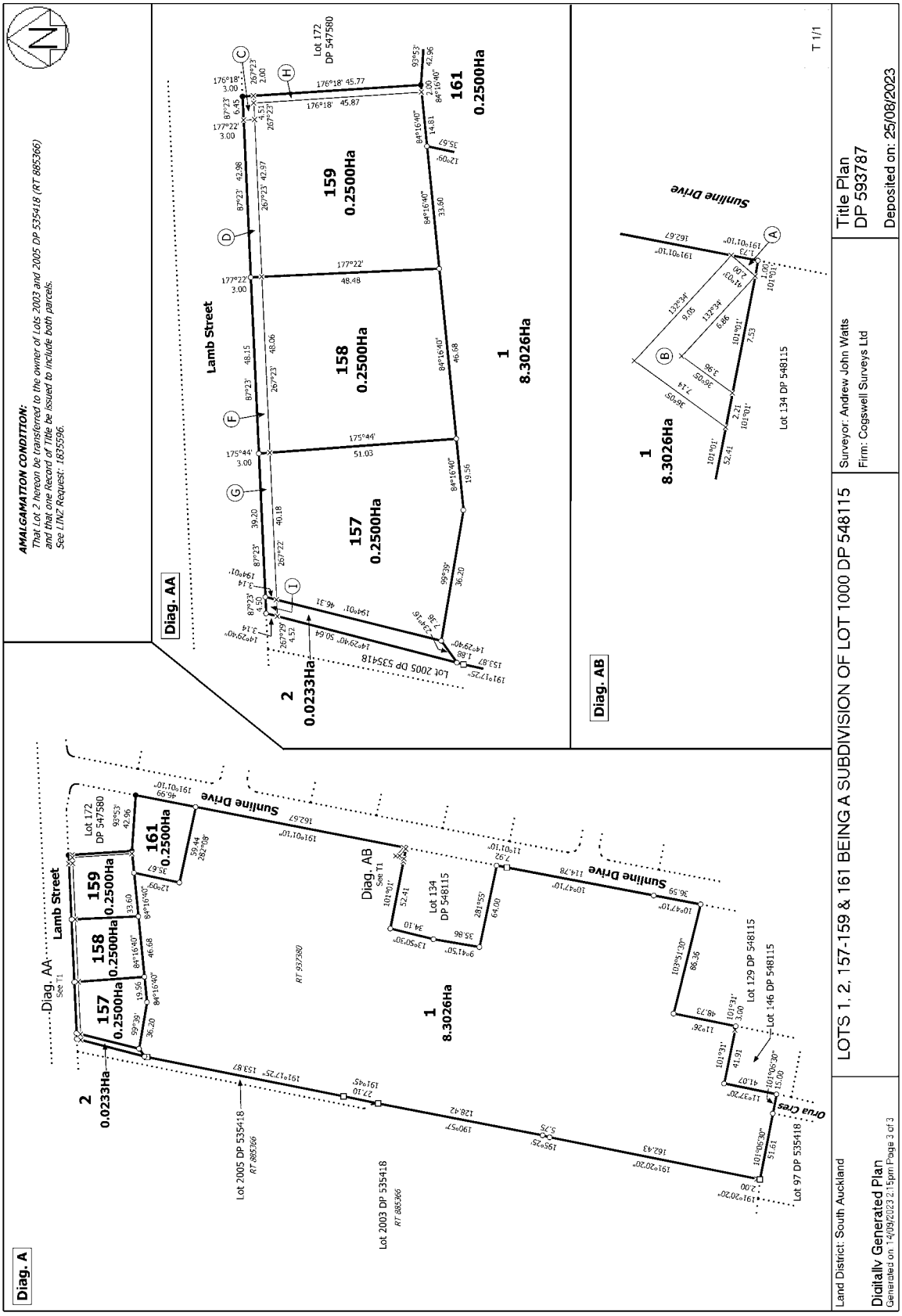
11830293.1 Fencing Agreement in Agreement Instrument - 13.8.2020 at 7:00 am

11896794.1 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 6.11.2020 at 12:24 pm

Subject to a right to convey electricity over parts marked A and B and a right to convey telecommunications over part marked A all on DP 593787 dated by Easement Instrument 11896794.3 - 6.11.2020 at 12:24 pm

The easements created by Easement Instrument 11896794.3 are subject to Section 243 (a) Resource Management Act 1991

Land Covenant in Covenant Instrument 12787914.7 - 25.8.2023 at 11:09 am



RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **1143238**

Land Registration District **South Auckland**

Date Issued 25 August 2023

Prior References

885366 937380

Estate Fee Simple

Area 6.1375 hectares more or less

Legal Description Lot 2003, 2005 Deposited Plan 535418 and
Lot 2 Deposited Plan 593787

Registered Owners

Te Mara Properties Limited

Interests

Subject to Section 8 Coal Mines Amendment Act 1950 (affects part formerly in CT SA44C/579 and Lot 2 DP 593787)

Appurtenant to Lot 2003 DP 535418 is a right to convey electricity created by Transfer B207761.1 - 8.6.1994 at 9.05 am

Subject to a right of way over part Lot 2003 DP 535418 marked J on DP 535418 created by Easement Instrument 7738812.5 - 5.3.2008 at 9:00 am

Appurtenant to part Lot 2003 DP 535418 formerly Lot 3 DP 384116 is a right to convey electricity created by Easement Instrument 7738812.5 - 5.3.2008 at 9:00 am

The easements created by Easement Instrument 7738812.5 are subject to Section 243 (a) Resource Management Act 1991 (See DP 384116)

Land Covenant in Easement Instrument 11094821.8 - 12.7.2018 at 1:24 pm (affects Lot 2005 DP 535418 and Lot 2 DP 593787)

11249689.3 Mortgage to Bank of New Zealand - 11.12.2018 at 9:29 am (affects Lot 2003 DP 535418)

Subject to Section 241(2) and Sections 242(1) and (2) Resource Management Act 1991 (affects DP 535418)

Land Covenant in Covenant Instrument 11552809.30 - 19.9.2019 at 2:41 pm(Affects Lot 2 DP 593787)

Fencing Agreement in Deed 11590062.1 - 25.10.2019 at 7:00 am(Affects Lot 2 DP 593787)

Subject to a right (in gross) to convey electricity over part Lot 2 DP 593787 marked I DP 593787 in favour of Waipa Networks Limited created by Easement Instrument 11733651.4 - 30.7.2020 at 9:08 am

The easements created by Easement Instrument 11733651.4 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right (in gross) to convey telecommunications over part Lot 2 DP 593787 marked I DP 593787 in favour of Ultrafast Fibre Limited created by Easement Instrument 11733651.5 - 30.7.2020 at 9:08 am

The easements created by Easement Instrument 11733651.5 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right (in gross) to convey gas over part Lot 2 DP 593787 marked I DP 593787 in favour of First Gas Limited created by Easement Instrument 11733651.6 - 30.7.2020 at 9:08 am

The easements created by Easement Instrument 11733651.6 are subject to Section 243 (a) Resource Management Act 1991

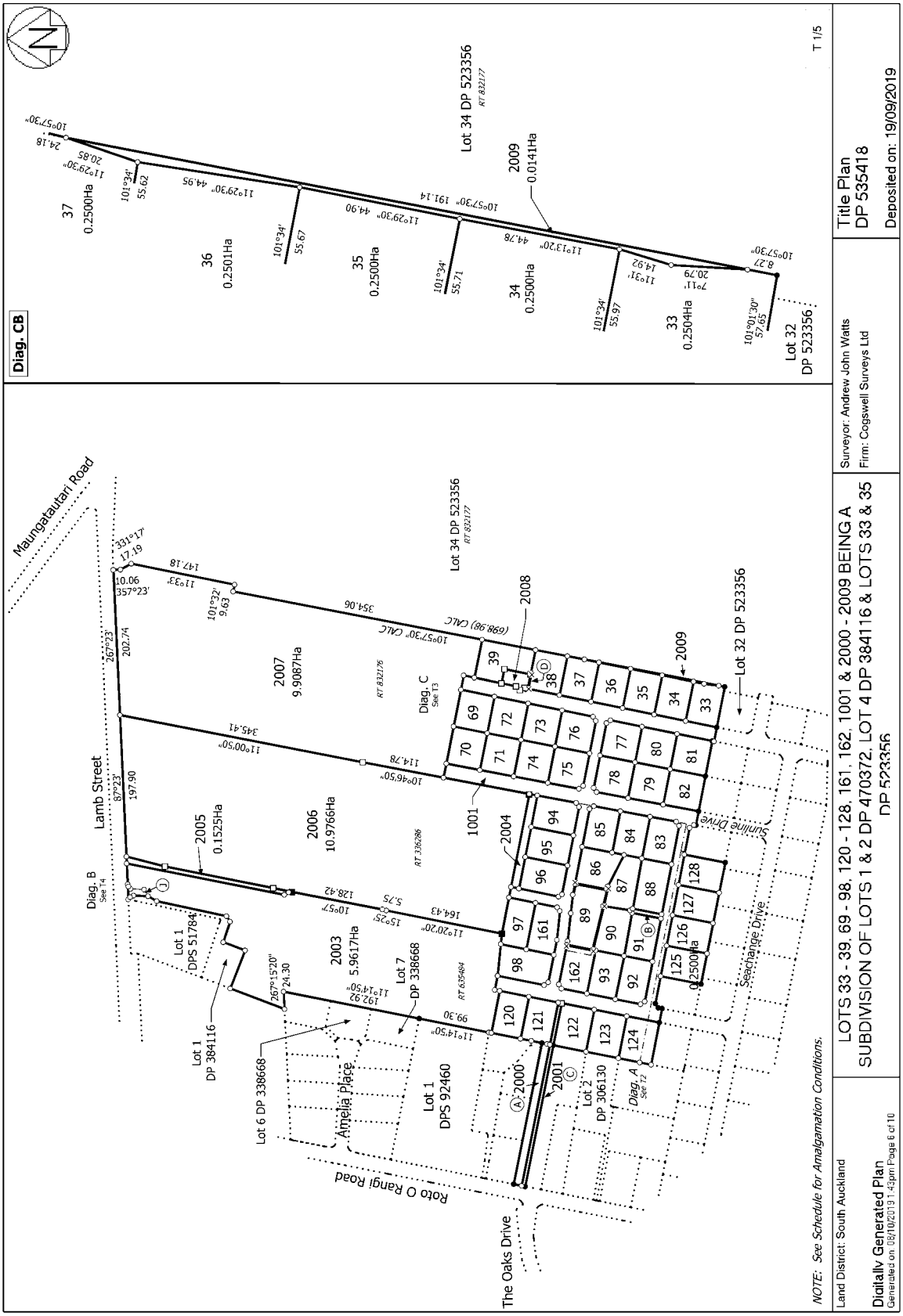
Land Covenant in Covenant Instrument 11733651.10 - 30.7.2020 at 9:08 am (limited as to duration) (Affects Lot 2 DP 593787)

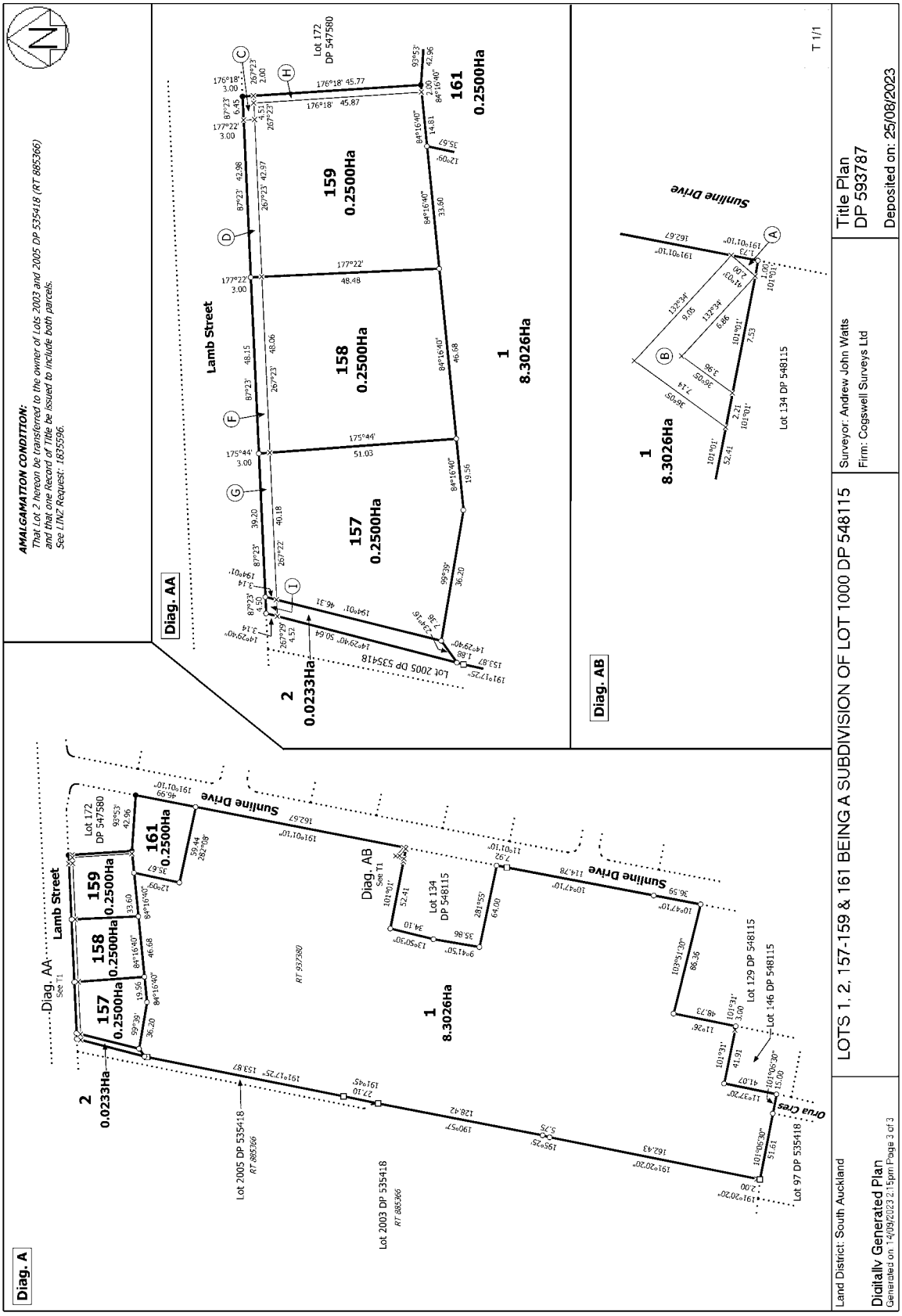
11830293.1 Fencing Agreement in Agreement Instrument - 13.8.2020 at 7:00 am(Affects Lot 2 DP 593787)

11896794.1 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 6.11.2020 at 12:24 pm (Affects Lot 2 DP 593787)

Fencing Covenant in Transfer 12787914.3 - 25.8.2023 at 11:09 am(Affects Lot 2 DP 593787)

Subject to Section 241(2) and Sections 242(1) and (2) Resource Management Act 1991 (affects DP 593787)





Approved by Registrar-General of Land under No. 2007/6225

Easement instrument to grant easement or *profit à prendre*, or create land covenant

Sections 90A and 90F, Land Transfer Act 1952

EI 7738812.5 Easement I
Cpy – 01/01, Pgs – 007, 06/03/08, 07:55
DocID: 511827664

Land registration district

SOUTH AUCKLAND

Grantor *Surname(s) mus.*

Matthew Philip HANNA, Philippa Jane WALLACE and Simon Redding MAKGILL (as to CT 336285) and Simon Redding MAKGILL (as to CT 336283)

Grantee *Surname(s) must be underlined or in CAPITALS.*

Matthew Philip HANNA, Philippa Jane WALLACE and Simon Redding MAKGILL (as to CT 336285) and Simon Redding MAKGILL (as to CTs 336283 and 336286)

Grant* of easement or *profit à prendre* or creation or covenant

The Grantor, being the registered proprietor of the servient tenement(s) set out in Schedule A, **grants to the Grantee** (and, if so stated, in gross) the easement(s) or *profit(s) à prendre* set out in Schedule A, **or creates** the covenant(s) **set out** in Schedule A, with the rights and powers or provisions set out in the Annexure Schedule(s).

Dated this 7th day of February 2008

Attestation

M P HANNA
P J WALLACE
S R MAKGILL

Signature [common seal] of Grantor

Signed in my presence by the Grantor

Signature of witness

Witness to complete in BLOCK letters (unless legibly printed)
Witness name Lesley Nielsen
Occupation Legal Executive
Address CAMBRIDGE

M P HANNA
P J WALLACE
S R MAKGILL

Signature [common seal] of Grantee

Signed in my presence by the Grantee

Signature of witness

Witness to complete in BLOCK letters (unless legibly printed)
Witness name Lesley Nielsen
Occupation Legal Executive
Address CAMBRIDGE

Certified correct for the purposes of the Land Transfer Act 1952.

[Solicitor for] the Grantee

*If the consent of any person is required for the grant, the specified consent form must be used.

REF: 7003 – AUCKLAND DISTRICT LAW SOCIETY

Approved by Registrar-General of Land under No. 2007/6225

Annexure Schedule 1

Registrar-General of Land Approval 07/6225 ADLS

Easement instrument Dated 7 February 2008 Page 1 of 4 pages

Schedule A *(Continue in additional Annexure Schedule if required.)*

Purpose (nature and extent) of easement, *profit*, or covenant	Shown (plan reference)	Servient tenement (Identifier/CT)	Dominant tenement (Identifier/CT *or* in gross)
Right of way	F DP 384116	Lot 3 DP 384116 Pt CT 336285	Lot 1 DP 384116 CT 336283
Right to convey water	J, K, L DP 384116	Lot 3 DP 384116 Pt CT 336285	Lot 4 DP 384116 CT 336286
Right to convey electricity	G, H DP 384116	Lot 1 DP 384116 CT 336283	Lot 3 DP 384116 Pt CT 336285 Lot 4 DP 384116 CT 336286
	E, I, J DP 384116	Lot 3 DP 384116 Pt CT 336285	Lot 4 DP 384116 CT 336286
	A DP 384116	Lot 6 DP 384116 Pt CT 336285	Lot 3 DPS 88655 CT 336285 * Lot 5 DP 384116 Pt CT 336285
	B, C DP 384116	Lot 3 DPS 88655 Pt CT 336285	Lot 5 DP 384116 Pt CT 336285 *
	D DP 384116	Lot 5 DP 384116 Pt CT 336285	Lot 4 DP 384116 CT 336286
			* LOT 4 DP 384116 CT 336286

Easements or *profits à prendre* rights and powers (including terms, covenants, and conditions)

Delete phrases in [ ] and insert memorandum number as required.
Continue in additional Annexure Schedule if required.

Unless otherwise provided below, the rights and powers implied in specific classes of easement are those prescribed by the Land Transfer Regulations 2002 and/or the Fifth Schedule of the Property Law Act 2007.

The implied rights and powers are **[varied]** ~~**[negatived]**~~ **[added to]** or ~~**[substituted]**~~ by:

[Memorandum number , registered under section 155A of the Land Transfer Act 1952].

[the provisions set out in Annexure Schedule 2].

Covenant provisions

Delete phrases in [ ] and insert memorandum number as required.
Continue in additional Annexure Schedule if required.

The provisions applying to the specified covenants are those set out in:

~~[Memorandum number , registered under section 155A of the Land Transfer Act 1952]~~

~~[Annexure Schedule 2].~~

All signing parties and either their witnesses or solicitors must sign or initial in this box

REF: 7003 – AUCKLAND DISTRICT LAW SOCIETY

Rights, powers, covenants and conditions continued:

1. Any maintenance, repair or replacement of any easement facility in respect of any easement set out herein that is necessary because of any act or omission by the Grantor or the Grantee (as defined in paragraph 1 of Schedule 4 to the Land Transfer Regulations 2002) must be carried out promptly by that Grantor or Grantee at the sole cost of that Grantor or Grantee or in such proportion as relates to the act or omission. Where the act or omission is the partial cause of the maintenance, repair or replacement, the costs payable by that owner responsible must be in proportion to that act or omission (with the balance payable in accordance with clause 11 of schedule 4 of the Land Transfer Regulations 2002).

2. Where there is conflict between the rights, powers, terms and covenants or restrictions herein, (the modifications) and the provision of Schedule 4 to the Land Transfer Regulations 2002 and/or the provisions of the Fifth Schedule of the Property Law Act 2007 then the modifications shall be prevail.

3. If, in respect of easements of right of way, there is a conflict between the provisions of Schedule 4 to the Land Transfer Regulations 2002 and/or the provisions of the Fifth Schedule of the Property Law Act 2007 then the latter shall prevail.

4. **Water Easement**

4.1 The Grantor and the Grantee have the benefit of a water supply created pursuant to this easement, for domestic, household and stock watering purposes only.

4.2 The Grantee shall pay the Grantor for the use of the water at the same rate as that charged by Waipa District Council for its customers in the Roto-o-rangi area, as determined by a water meter, which is to be read on a quarterly basis. This rate is to be reviewed annually and increased by the same percentage increase as the water supply scheme in the Roto-o-rangi area.

4.3 The Grantee shall pay the Grantor a fair proportion of the use of electricity used to operate the water pump. The Grantor is responsible for payment of the amount owed to the electricity supplier such payment to be made from the payments made to the Grantor by the Grantee.

4.4 The Grantor grants to the Grantee the right for the Grantee and the Grantee's tenants, agents, workmen, licensees and invitees (in common with the Grantor, the Grantor's tenants and any other persons lawfully entitled to do so):

(a) to take, convey and lead water at all times in any quantity in a free and unimpeded flow along the line of pipes described in clauses 4.4(b) or 4.4(c) (as the case may be);

(b) to use any line of pipes already laid in and under the soil of the easement area for the purpose described in clause 4.4(a);

(c) where no line of pipes already exists, to lay and maintain a line of pipes in and under the soil of the easement area for the purpose described in clause 4.4(a); and

(d) to enter on to the servient land (at any times, on any notice and by any route which is reasonable in the circumstances) with any tools, equipment, machinery and vehicles which are necessary and to remain there for any reasonable time for the purpose of laying, inspecting, cleaning, repairing, maintaining and renewing the pipes and to dig up the soil of the servient land to the extent necessary and reasonable, but in doing so the Grantee must:

(i) cause as little disturbance as reasonably possible to the surface of the servient land;

(ii) restore the surface of the servient land as nearly as possible to its original condition; and

(iii) restore any other consequential damage.

4.5 The Grantor shall be responsible, at the cost of both the Grantor and Grantee, for the installation, operation, upkeep, maintenance, repair and (as may be necessary) the replacement of the water tank, bore, pump and pipelines to ensure the maintenance at all times of an efficient and properly functioning system to provide the full, free and unimpeded flow of water.

5. General Covenants

5.1 The grant of the easement rights will be forever appurtenant to each and every part of the dominant land, but in respect of the water and power easements for areas H, I, J, K, L and E on DP 384116 these shall only be available while the dominant tenement is in no more than two certificates of title and used for rural purposes.

5.2 No power is implied for the Grantor to terminate the easement rights for breach of any provision in this transfer by the Grantee or for any other cause, it being the parties' intention that the easement rights will continue forever unless surrendered or unless the provisions of clause 5.1 apply in respect of the water and power easements for areas H, I, J, K, L and E on DP 384116.

5.3 The Grantor will not do anything which interferes with or restricts the rights of the Grantee or other authorised persons in relation to any of the easement rights.

5.4 The easement rights are those set out in Schedule 4 of the Land Transfer Regulations 2002.

6. Default

If either party fails ("defaulting party") to perform or join with the other party ("other party") in performing any obligation under this transfer, the following provisions will apply:

(a) the other party may serve a written notice on the defaulting party ("default notice") specifying the default and requiring the defaulting party to perform or to join in performing the obligation and stating that, after the expiry of one month from service of the default notice, the other party may perform the obligation;

(b) if after the expiry of one month from service of the default notice, the defaulting party has not performed or joined in performing the obligation, the other party may:
(i) perform the obligation; and
(ii) for that purpose enter on to the dominant land or the servient land;

(c) the defaulting party must pay to the other party the costs of:
(i) the default notice; and
(ii) the other party in performing the obligation of the defaulting party;
within one month of receiving written notice of the other party's costs; and

(d) the other party may recover any money payable under clause 6(c) from the defaulting party as a liquidated debt.

7. Disputes

If any dispute arises between the Grantor and Grantee concerning the rights created by this easement instrument, the parties must enter into negotiations in good faith to resolve their dispute. If the dispute is not resolved within one month of the date on which the parties begin their negotiations, the parties must submit to the arbitration of an independent arbitrator appointed jointly by the parties. If the parties cannot agree on an independent arbitrator within 14 days, the parties will submit to the arbitration of an independent arbitrator appointed by the President for the time being of the District Law Society in which the servient land is situated. That arbitration will be determined in accordance with the Arbitration Act 1996 and its amendments or any enactment passed in substitution. The parties' execution of this easement instrument will be deemed a ~~submission to~~ arbitration agreement.

If this Annexure Schedule is used as an expansion of an instrument, all signing parties and either their witnesses or solicitors must sign or initial in this box.

Approved by Registrar-General of Land under No. 2003/6150

Annexure Schedule - Consent Form

Land Transfer Act 1952 section 238(2)

Registrar-General of Land Approval 03/6150EF A.D.L.S.

Insert type of instrument
"Caveat", "Mortgage" etc

Easement Instrument

Page 1 of 1 pages

Consentor *Surname must be underlined or in CAPITALS*	**Capacity and Interest of Consentor** *(eg. Caveator under Caveat no./Mortgagee under Mortgage no.)*
Bank of New Zealand	**Mortgagee under Mortgage no 5377739.3**

Consent

Delete Land Transfer Act 1952, if inapplicable, and insert name and date of application Act.
Delete words in [ ] if inconsistent with the consent.
State full details of the matter for which consent is required.

Pursuant to [section 238(2) of the Land Transfer Act 1952]

~~[section of the Act]~~

[Without prejudice to the rights and powers existing under the interest of the Consentor]

the **Consentor hereby consents** to:

the registration of the within easement instrument creating a right of way and a right to convey water over Lot 3 DP 384116 and a right to convey electricity as set out on DP 384116

Dated this 8th day of February 2008

Attestation

SIGNED for and on behalf of BANK OF NEW ZEALAND By its Attorney:	**Signed in my presence by the Consentor**
	Signature of Witness
	Witness to complete in BLOCK letters (unless legibly printed)
	Witness name ANDREA LINCOLN
	Occupation BANK OFFICER
	Address AUCKLAND
Signature of Consentor	

An Annexure Schedule in this form may be attached to the relevant instrument, where consent is required to enable registration under the Land Transfer Act 1952, or other enactments, under which no form is prescribed.

REF: 7029 – AUCKLAND DISTRICT LAW SOCIETY

Bank of New Zealand

CERTIFICATE OF NON-REVOCATION OF POWER OF ATTORNEY

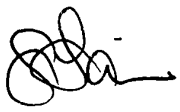
I, **,Quality Assurance Officer of** Auckland, New Zealand, Bank Officer, certify:

1. That by deed dated 12 July 2005, Bank of New Zealand, of Level 14, BNZ Tower, 125 Queen Street, Auckland, New Zealand, appointed me its attorney.

2. A copy of the deed is deposited in the North Auckland registration district of Land Information New Zealand as dealing No. 6508607.1

3. That I have not received notice of any event revoking the power of attorney.

SIGNED at Auckland 08 February 2008



View Instrument Details

Instrument No	11896794.1
Status	Registered
Date & Time Lodged	06 November 2020 12:24
Lodged By	Nielsen, Lesley
Instrument Type	Consent Notice under s221(4)(a) Resource Management Act 1991

Affected Records of Title	Land District
935157	South Auckland

Annexure Schedule Contains 2 Pages.

Signature

Signed by Monique Leigh Medley-Rush as Territorial Authority Representative on 06/11/2020 12:01 PM

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

CONSENT NOTICE

IN THE MATTER	of the Land Transfer Act 2017
AND	
IN THE MATTER	of Section 221 of the Resource Management Act 1991
AND	
IN THE MATTER	of the Land in Record of Title 935157 (South Auckland Registry) and Plan No DP 548115

WHEREAS:

1. The **WAIPA DISTRICT COUNCIL** has pursuant to Sections 34A(1), 104, 104B, 104D and 108 of the Resource Management Act 1991 granted to **SIMON REDDING MAKGILL** subdivision consent for the subdivision of Lot 303 DP 547580.

2. The subdivision to which consent has been given is shown on Plan No. DP 548115.

3. It was a condition of the said consent that pursuant to Section 108(2) of the Resource Management Act 1991 that:

   (a) The current and future owners of Lot 1000 DP 935157 (for which new record of title 937380 has been allocated) are advised that the lot contains an identified HAIL site and may be considered a 'piece of land' under the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 ('NESCS') and that future proposals on the lot (for example, change of use or soil disturbance activities) may require further assessment against the NESCS.

   (b) For subsequent development of Lots 146 and 1000 DP 935157 (for which new records of title 937379 and 937380 have been allocated), a suitably qualified and experienced Engineer will be required to inspect the site and submit to Council for approval, at the time of building consent, design details on the foundations of the buildings.

   Reasons: *The above condition is required for Lot 146 DP 935157 (for which new record of title 937379 has been allocated) as the site is subject to subsidence and soft soils as identified in the site suitability report provided by Mark T Mitchell, dated 19/09/2019 (Council Reference number: 10103349, Appendix D, Pages 60 - 73). Appropriate management methodologies are highlighted within Sections 2.0 – Foundation Recommendations – Concrete Floor and 3.0 – Concrete Floor Foundation Preparation). This condition is required for Lot 1000 DP 935157 (for which new record of title 937380 has been allocated) as the site contains soils of unknown quality.*

   (c) For subsequent development of Lot 146 DP 935157 (for which new record of title 937379 has been allocated) a suitably qualified and experienced Engineer will be required to inspect the site and submit to Council for approval, at the time of building consent, design details on the proposed on-site waste water disposal system.

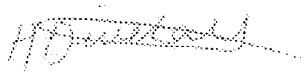
Reason: *The above condition is required to ensure that all wastewater generated from development on Lot 146 DP 935157 (for which new record of title 937379 has been allocated) is wholly disposed of within the new boundaries for this lot. The design shall reflect the results outlined in the site suitability report provided by Mark T Mitchell, dated 19/09/2019 (Council Reference number: 10103349, Appendix D, Pages 60 to 73 - Section 4: Onsite wastewater (Effluent) Drainage – Preliminary assessment').*

4. The said conditions are to be complied with pursuant to the provisions of Section 221 of the Resource Management Act 1991 on a continuing basis.

NOW PURSUANT TO Section 221 of the Resource Management Act 1991 the **WAIPA DISTRICT COUNCIL HEREBY CONSENTS** to the deposit of the Survey Plan of Subdivision under the Land Transfer Act 2017.

DATED at Cambridge this 4th day of May 2020

SIGNED by Waipa District Council



.....
Authorised Officer

Hannah Patricia Divehall
.....
Name of Authorised Officer

Approved by the District Land Registrar, South Auckland. *H. 310733*

New Zealand

B207761.1 TE

MEMORANDUM OF TRANSFER

WHEREAS WILLIAM RALPH RIPPEY of Cambridge, Manager is registered as the proprietor of an estate in fee simple (HEREINAFTER CALLED THE DOMINANT OWNER)

NEW ZEALAND STAMP DUTY ACT
05/05/94 0000s001 D/P $.00

subject however, to such encumbrances, liens and interests as are notified by memoranda underwritten or enclosed hereon, in all that piece of land situate in the South Auckland Registry containing 24.9440 hectares

be the same a little more or less being Lot 1 on Deposited Plan 64174 being all that land comprised in Certificate of Title Volume 51D Folio 209 SUBJECT TO:- ~~NIL~~ SECTION 8 COAL MINES AMENDMENT ACT 1950 B/113488.2 (hereinafter called "the dominant tenement")

AND WHEREAS PETER MURISON BOYCE of Cambridge, Farmer and NANCY MAY BOYCE his wife are registered as the proprietors of an estate in fee simple in that piece of land situated in the South Auckland Registry containing 9110m² more or less being situate in Block IX Cambridge Survey District being Lot 1 on Deposited Plan S.51784 being all that land comprised in Certificate of Title Volume 44C Folio 578 (hereinafter called "the servient tenement") SUBJECT TO: SECTION 8 COAL MINES AMENDMENT ACT 1950

NOW THEREFORE IN CONSIDERATION of the sum of ONE DOLLAR ($1.00) paid to the servient owner by the said dominant owner (the receipt of which sum is hereby acknowledged) the servient owner DOTH HEREBY TRANSFER and grant to the dominant owner and other authorised persons (in common with the dominant owner and all others having like rights) to supply lead and convey electricity without interruption or impediment (except during periods of renewal or repair over the area marked "A" on DPS 64174 ~~the servient land shown in Deposited Plan S.51784~~) to the dominant land by means of the existing transmission lines to the dominant land

~~IN CONSIDERATION of the sum of~~

~~(which sum includes $ for chattels)~~

~~paid to~~

~~(the receipt of which sum is hereby acknowledged) DO HEREBY TRANSFER to the said~~

~~all estate and interest in the said piece~~

~~of land above described~~

IN WITNESS WHEREOF these presents have been executed this 23rd

day of MARCH One thousand nine hundred and ninety three.

SIGNED by the abovenamed WILLIAM RALPH RIPPEY as dominant tenement
in the presence of

Witness: .....

Occupation: Solicitor

Address: Cambridge

SIGNED by the abovenamed PETER MURISON BOYCE and NANCY MAY BOYCE)
as servient tenement)
in the presence of)

P Boyce
N Boyce

Witness: .....

Occupation: Solicitor

Address: Cambridge

No.

TRANSFER

Correct for the purposes of the Land Transfer Act

.....
Solicitor for Transferee

.....W R RIPPEY..... Transferor

P M & N M BOYCE ..... Transferee

I HEREBY CERTIFY THAT THIS TRANSACTION DOES NOT CONTRAVENE THE PROVISIONS OF PART IIA OF THE LAND SETTLEMENT PROMOTION AND LAND ACQUISITION ACT 1952.

.....
Solicitor for the Purchaser
or Leesee

Particulars entered in the Register as shown in the Schedule of Land herein on the date and at the time stamped below.

.....
Assistant Land Registrar
of the District o

PARTICULARS ENTERED IN REGISTER
LAND REGISTRY SOUTH AUCKLAND
ASST. LAND REGISTRAR

9.05 08 JUN 94 B 207761.1

510/28
4A/C/158

F/
18/5/120

COONEY VOSPER
SOLICITORS
CAMBRIDGE

HAMILTON DISTRICT LAW SOCIETY

RICE PRINTERS LIMITED

APPENDIX D

CONNECTION CONFIRMATION LETTERS

Tuatahi First Fibre

PO Box 27050
Garnett Avenue 3257
0800 Fibre LTD
tuatahifibre.co.nz

TFF ID: CA-057-01

20 October 2023

CONDITIONAL ACCEPTANCE BY TUATAHI FIRST FIBRE LIMITED AS TELECOMMUNICATIONS OPERATOR

Development: 318 Lamb Street, Leamington
Legal Name: LOTS 2003 & 2005 DP 535418 & LOT 2 DP 593787

1. Tuatahi First Fibre Limited (TFF) confirms that a TFF telecommunications connection will be made available for each site in the development, **providing the developer was to sign an TFF Installation Agreement.** Upon approval of this agreement, TFF will undertake to become the telecommunications operator of the telecommunications reticulation in the proposed public roads for 318 Lamb Street, Leamington (the "**Subdivision**"), to provide network connections to all lots (circa 20 lots), in the Subdivision (the "**Reticulation**").

2. The Reticulation will be installed in accordance with:

   (a) the requirements and standards set by the Waipa District Council and advised to TFF via the Council's website; and

   (b) the requirements of the Telecommunications Act 2001 and all other applicable laws, regulations and codes (as amended).

3. The Reticulation will be installed by our preferred provider to TFF's satisfaction.

4. TFF will be the owner, operator and maintainer of the Reticulation.

5. One or more retail service providers will be available to supply telecommunications services over the completed Reticulation when service is available, provided that TFF shall not be responsible if the retail service provider's offer to supply such telecommunications services or the number of such providers varies from time to time.

SIGNED for and on behalf of **TUATAHI FIRST FIBRE LIMITED** by:

Signature: *D J Rugaas*

Name: Daniel Rugaas

24 October 2023

Muscle Developments
PO Box 11031
HILLCREST 3251

Project name: Muscle Developments
Your ref: N/A
Project Description: 20 Lot Subdivision
Designer: Joanne Newcombe

318 Lamb Street Cambridge
Our Ref: EQ230008

To accommodate your request, Waipā Networks will be required to carry out the work detailed below.

Scope of Work:

- Install new ABB Safelink CFC Ring Main Unit RMU1 at location as per the design plan.
  - Install 70mm Cu earthing.
  - Terminate 3c185mm HV cable into RMU1.
  - Terminate 3c95mm HV cable into RMU1.
- Install new Etel 200kVA ground mount transformer TX1 adjacent to ring main RMU1.
  - Install 70mm Cu earthing.
  - Install LV frame.
  - Terminate 3c95mm HV cable into transformer TX1.
  - Terminate 3 sets of 4c185mm LV cable into transformer TX1.
- Install 8 new EP9 fuse pillars – SP01~SP04, SP06~SP09 at locations as per the design plan.
- Install new EP6 short fuse pillar – SP05 on the common boundaries of Lots 10 & 11.
- In open trenches supplied, install new 4c185mm AL XLPE LV cable.
  - TX1 to SP01 via SP03 & SP02.
  - TX1 to SP06 via SP04 & SP05.
  - TX1 to SP08 via SP07.
- In open trench supplied, install new 3c185mm AL XLPE HV cable.
  - Joint Site A to RMU1.
- In open trench supplied, install new 3c95mm AL XLPE HV cable.
  - RMU1 to TX1.
- Joint new 3c185mm AL XLPE HV cable onto existing HV cable at Joint Site A.
- Install new HV spare duct from Ring Main Unit, along roadway, to eastern boundary of subdivision.
- Install new LV spare duct form pillar SP05, along roadway, to eastern boundary of subdivision.
- As Built all network installations.

These connections will be suitable for a standard lifestyle dwelling with a three-phase rating of 63 amps:

Conditions and Exclusions:

The subdivision cannot be connected to the network until installation of a new voltage regulator on the Roto-o-Rangi feeder has been completed.
This work is in progress with an installation date yet to be confirmed.

Cost Breakdown	
Materials and Subcontractors	$ 150,920.03
Labour, Design and Project Management	$ 39,633.67
Mileage and Plant	$ 3,950.40
Net Amount	$ 194,504.10
GST	$ 29,175.62
Total	$ 223,679.72
Less Design Fee	$ (1,000.00)
Total	**$ 222,679.72**

Network Connection Fee

This quote is for the capital work required for Waipā Networks to establish a network connection supply point. It does not include any fees associated with the application and connection of the supply. When you are ready to have the supply connected, you must complete an application form for the new connection on our website. A new connection fee will then be invoiced separately and is payable prior to your application being approved.
The new connection fee is calculated as follows:

- Standard connections less than 70kva $2,372 excluding GST
- Non standard connections over 70kva $34 per kva excluding GST

For more information, please see our website **waipanetworks.co.nz/get-connected** or contact our customer services team on **talk2us@waipānetworks.co.nz**.

Transformer and Ringmain Unit lead time – 26 weeks

The lead time for the transformer and/or ringmain unit is indicative based on the current information provided to Waipā Networks by the manufacturer. Waipā Networks cannot commit to a confirmed date of delivery to our site until written confirmation is received from the manufacturer closer to the estimated delivery time given previously.
If the above lead times pose significant delays to the customer's anticipated livening time frame, it may be possible to organise temporary low voltage generation at their cost.
Please contact us if you wish to discuss this option in further detail.

For subdivisions
This quote letter does not confirm that satisfactory arrangements have been made to satisfy the consent process. A separate 224 clearance letter will be issued on request when all conditions have been met and arrangements are finalised.

Please review our current terms and conditions attached with this quote letter and complete the acceptance form and return it to projects@waipanetworks.co.nz. On receipt of this form and payment in full, and subject to the arrival of long lead items, this work will be entered into our schedule. Due to prior commitments, there is a minimum lead time of 12 – 14 weeks currently for new work to be undertaken which does not include the lead time for equipment if stated above.

This quote remains valid for 30 days after which time Waipā Networks reserves the right to re-issue it based on current rates to recover any additional costs. In this instance, the quote fee remains valid for 6 months after which time it may be forfeited.

Acceptance of quote and T&Cs

Subdivision or project: 318 Lamb Street Cambridge

Our Ref No: EQ230008

Quote Amount: $ 222,679.72

I/We: _____

hereby authorise Waipā Networks Limited to carry out the work as quoted above and confirm that I/we accept the terms and conditions attached.

Worksite address: _____

Postal Address (if different) _____

_____

Email Address: _____

Contact Phone Number: _____

Name of Person/Company responsible for the account (if different from the above):

_____

Name of Person/Company to appear on Tax invoice (if different from the above):

_____

Signed: _____ Date: _____

Capital Contribution payment (incl GST): $_____

Payment by internet banking:

WBC Te Awamutu: 03-0442-0252213-00

(Please use your quote number and name to identify your payment)

CC EQ230008 MuscleDevelopments_LambSt_JN

Waipā Networks is a member of the Utilities Disputes complaints scheme.
If you ever have a complaint we can't resolve, you can contact Utilities Disputes, a free and independent service for resolving complaints. Visit www.utilitiesdisputes.co.nz for further information.

WAIPĀ NETWORKS LIMITED
TERMS AND CONDITIONS FOR CAPITAL CONTRIBUTION
February 2022

1. APPLICATION

1.1 These terms and conditions ("Terms") applies to any capital contribution works provided by Waipā Networks Limited to enable network connection or upgrade to the Customer.
1.2 If there is any conflict these Terms takes priority over any other terms of trade and applies to all goods and services supplied by Waipā Networks Limited.
1.3 Waipā Networks Limited may vary these Terms (but not retrospectively) for all or any future supplies by notice to the Customer.
1.4 Where Waipā Networks Limited fails to enforce any right power or remedy under or in connection with these Terms it will not be deemed to have waived that right, power or remedy.
1.5 Acceptance of these Terms by the Customer is deemed to be acceptance of the Waipā Networks Capital Contribution Policy as published on its' website.

2. SCOPE OF WORK

2.1 The estimate/quotation is confined to the work, materials and service specified in the estimate/quotation (the "work").
2.2 If any additional work is required or there are changes to the work, that additional work or those changes may increase or decrease the capital contribution charged by Waipā Networks Limited.

3. THE ESTIMATE/QUOTATION

3.1 If an estimate is given by Waipā Networks Limited that estimate is an indication of the cost of work and the final cost of work may vary from that estimate. The Customer will be liable for the actual cost of the work.
3.2 If a quotation is given that quotation is for a fixed capital contribution which will not be altered during its currency unless:
a. the Customer requests changes to the work.
b. material costs alter significantly.
c. there are changes in the taxation system.
d. there are delays in the work being undertaken which are not directly attributable to Waipā Networks Ltd.

4. ACCEPTANCE

4.1 If the Customer wishes the work to proceed the estimate/quotation must be signed by the Customer and returned to Waipā Networks Limited.
4.2 Acceptance of the estimate/quotation also includes acceptance of these Terms.
4.3 Once the quotation is accepted, the quotation will be valid for a period of 12 months ("Validity Period") and the Customer is required to book the work within the Validity Period. In the event the work is not booked within the Validity Period by the Customer, Waipā Networks Ltd at its absolute discretion will either refund any amounts paid by the Customer and provide a new quotation for the work or cancel the work.

5. CONSENTS

5.1 Waipā Networks Limited will obtain all necessary consents to enable the work to proceed, unless otherwise stated by the estimate/quotation.

6. PAYMENT

6.1 All amounts are exclusive of GST unless otherwise specified. Unless other arrangements have been agreed to in writing, the capital contribution as specified on the estimate/quotation must be paid in full before work commences.
Date issued: Feb 2022 Review date: Feb 2024 Page 2 of 3 Doc ID: N/A
Author: Network Asset Manager Version No. 2.0 Document name: Capital Contributions T&Cs
6.2 Waipā Networks Limited is not obliged to carry out the work if payment as required by this clause or as otherwise stated is not made on the due date.
6.3 Where an additional amount is payable as a result of 3.2, the amount shall be paid in full by the 20th of the following month. Penalty interest at a rate of 5% per annum above the rate charged to Waipā Networks Limited for overdraft facilities by its bank from time-to-time will be charged by Waipā Networks Limited on any overdue accounts from due date until actual payment.
6.4 All costs incurred by Waipā Networks Limited in the recovery of overdue accounts (including costs on a solicitor/client basis) will be paid by the Customer.
6.5 Waipā Networks Limited may refuse to supply the Customer or parties related to the Customer with further goods or services if the Customer owes money to Waipā Networks Limited.

7. INFORMATION TO BE SUPPLIED BY THE CUSTOMER

7.1 Prior to the commencement of work the Customer must supply Waipā Networks Limited with details of:
a. Any hazards or potential risks to the safety of those working on the site if the site is on the Customer's land.
b. The location of all existing services; and
c. Copies of all necessary consents if obtained by the Customer.

8. ENTRY

8.1 The Customer irrevocably authorises Waipā Networks Limited to enter the Customer's land and buildings for the purpose of completing the work if required.

9. LIABILITY

9.1 All work completed by Waipā Networks Limited is subject to the following:
a. Waipā Networks Limited is not liable for oral representations made about the work.
b. Unless expressly stated in the quote/estimate, Waipā Networks Limited is not obliged to complete the capital works within any particular time frame and any estimate or other indication of the proposed time frame in the quote/estimate is an estimate only. Waipā Networks Limited shall not be liable for any loss, cost, expense or other liability incurred by the Customer as a result of any delays in completion of the Capital Works.
c. Waipā Networks Limited has no liability for economic loss and/or consequential loss suffered by the Customer in relation to the work.

10. TITLE

10.1 The legal and beneficial ownership in all the capital contribution works supplied by Waipā Networks Ltd remains with Waipā Networks Limited.

11. FORCE MAJEURE

11.1 Waipā Networks Limited is not liable for any failure or delay in performing the works if it is due to a force majeure event.
11.2 A "force majeure event" includes delay or damage caused directly or indirectly by weather conditions, labour disputes, strike, lockout, accident, fire, epidemic or pandemic, act of God or any other event beyond the control of Waipā Networks Limited.

12. ADDITIONAL POWERS

12.1 Waipā Networks Limited shall be entitled to:
a. Decline to commence the work until all conditions to be fulfilled by the Customer prior to the commencement of work have been completed.
b. Suspend performance of the work if the Customer fails to promptly perform any of the Customer's obligations under these Terms.

13. DISPUTES

Waipā Networks Limited undertakes to resolve any dispute or complaint in relation to these Terms using our free Complaints Resolution Process. Complaints or Disputes should be raised initially with the Waipā Networks Limited's Project Manager, or should the Customer prefer, with the Waipā Networks Limited's Stakeholder Services Manager.
Utilities Disputes Ltd
Utilities Disputes Ltd is a free and independent complaints resolution service available to electricity customers and landowner/land occupiers.
Waipā Networks Limited is a member of this scheme, and should the Customer not be satisfied with the outcome of our internal Complaints Resolution Process they are able to make use of this service. Information about the Utilities Disputes Ltd can be found at their website www.utilitiesdisputes.co.nz.

APPENDIX E

ARCHAEOLOGICAL ASSESSMENT AND RESEARCH STRATEGY REPORT

W GUMBLEY LTD.
ARCHAEOLOGISTS

Warren Gumbley
Principal/Director

PO Box 7108, Hamilton East, Hamilton 3247
cell 027 471 2165 **landline** 07 856 9071
email warren@archaeologist.co.nz

Addendum to: Pukekura Stages 3a and 3b – Assessment of archaeological values and effects (Gumbley & Laumea 2018).

Te Mara Properties – Assessment of area for proposed stormwater management and Pukekura Stage 3A development.

Matthew Gainsford **November 2022**

1 Introduction

Cogswell Surveyors Ltd engaged W. Gumbley Ltd to undertake a site visit/survey of an area adjacent to the Pukekura subdivision, Stage 3A. The subject area is located within the green belt and is owned by Waipa District Council. The client proposes to add a stormwater runoff management area in the southeastern corner of the green belt for the Pukekura development. Within the subject area there was evidence for Māori horticulture in the southeastern corner of the greenbelt and the adjacent development area recorded as archaeological site S15/789. The development area adjacent the greenbelt (Stage 3A) was also surveyed to determine the spread of archaeology; identified adjacent the greenbelt with another small area to the south.

Figure 1. General location of subject area within the green belt adjacent the development and Lamb Street (Source: LINZ).

2 *Site surveys*

Initial site visit and survey of area for stormwater management

An auger and test pit survey was undertaken within the subject area; the area identified by the client for the management of stormwater runoff (red polygon in Figure 2).

Figure 2. Image showing the results of the auger and test pit survey in the greenbelt. Green dots=no horticultural soil, Red dots= horticultural soil. The black square is the test pit location. The yellow polygon is an approximate area for the horticultural soils.

Within an area in the southeast corner of the greenbelt; adjacent the development (to the east) and existing houses (to the south) a small area of horticultural soil and charcoal deposits was identified (Figures 2–3). A single test pit was also excavated within the identified area to further visualise the soil stratigraphy (Figure 4).

Figure 3. Auger sample showing the charcoal rich soil at one of the locations. The layer is filled with sand and gravel as well as charcoal. Scale division is 20 centimetres.

Figure 4. View of test pit ion the middle of the area of identified horticultural soil.

The test pit also showed the presence of a charcoal rich layer and a modified layer containing sand and gravel.

Follow up survey of the development area – July 1, 2022.

Due to this presence of Māori horticultural soil, it was decided that the area adjacent the greenbelt, within the proposed Pukekura development area Stage 3A, should also be subject to an auger survey to determine whether horticultural soils continued into the development area or were just restricted to the greenbelt (Figure 5).

Figure 5. Results from both visits combined. Note that the area of horticultural soils extends east into Stage 3A and along the north-south fence line.

It was determined that the area of horticultural soil identified within the greenbelt extends into Stage 3A of the Pukekura development area. It is restricted to a small swath along the fence line bulging outward around the area for the proposed walkway.

Second follow up survey of the development area – July 27, 2022.

Due to the identified presence of horticultural soil within the subject area it was requested by Cogswell Surveyors that W. Gumbley extend the auger survey southwards from the identified soil to determine if further archaeology was likely within the rest of Stage 3A.

Only two of the samples from the auger survey returned a positive result for horticultural soils (archaeology). The identified area lies to the southeast of the previously identified horticultural soils, within the corridor for the proposed road (Figure 6). In the below image the locations for the initial (2018) auger survey are included for reference (orange points).

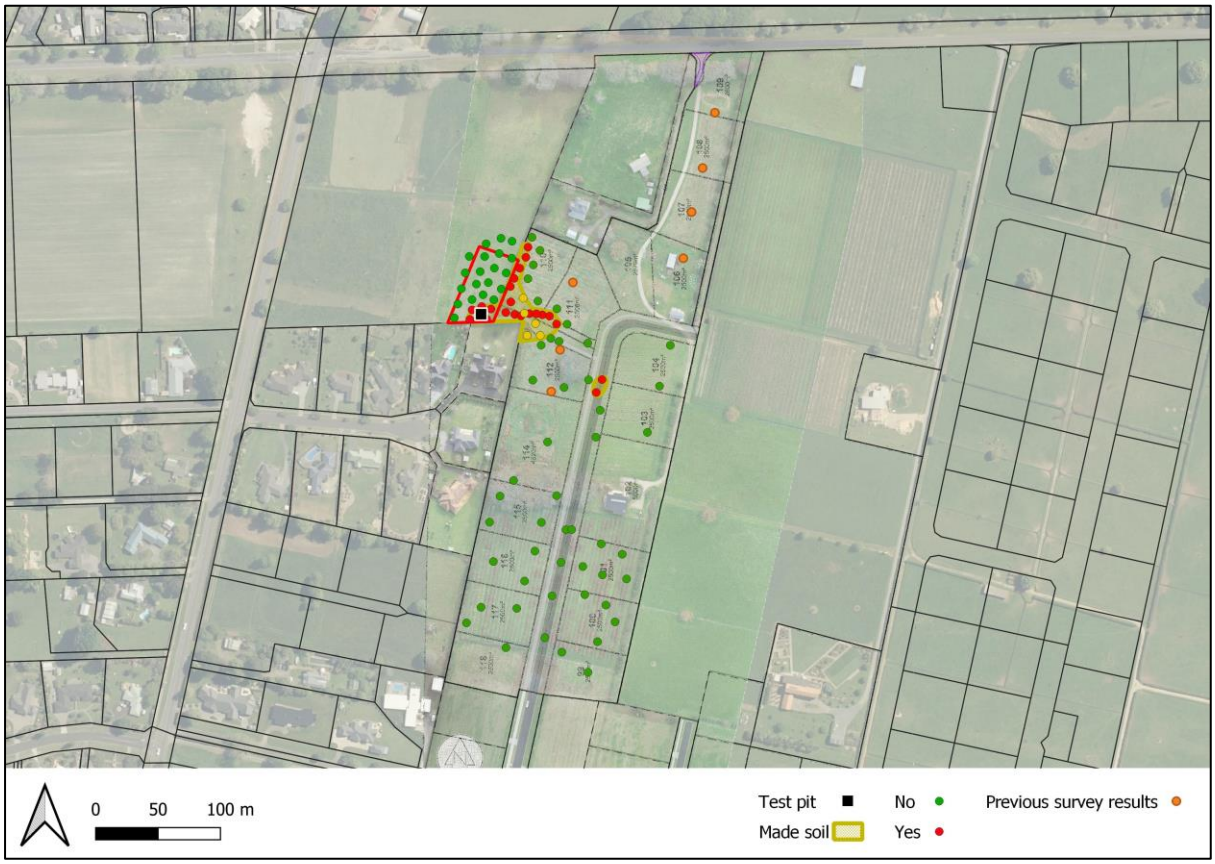


Figure 6. Additional auger samples were taken south of the identified horticultural soils within Stage 3A. Sample locations from the initial (2018) survey have also been included.

Figure 7. Close up image that identifies all the areas of identified horticultural soil from the auger survey of the remaining subject area.

3 Description of S15/789

Archaeological deposits in the form of Māori-made soils (Tamahere loam) have been confirmed within the assessed subject area; in the Cambridge greenbelt and within Pukekura development Stage 3A. Based on the results of the site visit, this assessment and previous investigation in the immediate area there is a high likelihood for archaeological features and/or deposits to be present.

4 Assessment of archaeological values

Archaeological site S15/789 is part of an extensive series Māori horticultural sites along the Waikato River, characterised by borrow pits and Māori-made soils formed from the alluvium quarried from these pits. Archaeological sites of this type along the river are functionally parts of the same wider agricultural landscape.

Prior experience suggests that there is also a high potential for subsurface archaeological remains to be present within or adjacent to pre-European Māori horticultural sites, and while these mostly relate to the horticultural process, deposits reflecting domestic occupation (i.e. kāinga) associated with the horticultural areas may also be found, however, these elements are difficult to anticipate. Archaeological values are assessed against the criteria for Heritage New Zealand and the Waikato Regional Policy Statement.

4.1 Heritage New Zealand criteria

Table 1. Assessment of S15/789 against the HNZ criteria.

Value	**Assessment: S15/789**
Condition	Made soil within the subject area appear from a site visit to be preserved. The archaeological deposits appear to be in moderate-good condition. Some cultivation may have affected the deposits/site.
Rarity/uniqueness	This site forms part of a larger complex of sites concentrated along the banks of the Waikato River and some of its tributaries between Arapuni in the south and Mercer in the north. However, there is a gradual attrition of this resource because of on-going development on the Waikato River banks with approximately 65 percent of the sites destroyed or significantly affected since the 1940s (Gumbley & Hutchinson 2013). Domestic elements have been found to be associated with other horticultural sites in the Waikato complex (e.g. S14/386, S14/249, S15/424, S15/771, S15/775 & S15/776).
Information potential	Is likely to provide information about pre-European Māori horticultural practice in the Middle Waikato Basin. This information is likely to include the age of the activities, the nature of the horticultural process (agronomy), but may also include evidence of domestic and other satellite activities.
Amenity value	Horticultural gardens were a major part of the economy for Waikato Māori, and their formation was part of a complex and time-consuming process. The borrow pits that form part of the garden areas are conspicuous in the heritage landscape. Selected preservation and interpretation potentially have high amenity or education value, in terms of recognising and understanding this former way of life.
Cultural associations	This is a matter for Tangata Whenua.

4.2 Waikato Regional Policy Statement

Table 2. Assessment of S15/789 against the Waikato Regional Policy Statement.

Archaeological Qualities	**S15/789**
Information	Will contain archaeological evidence associated with the Waikato Horticultural Complex. These sites have potential to add to the developing understanding of this complex archaeological landscape and this type of site in particular. The condition of the site is assessed as moderate–good.
Research	Has the potential to address archaeological research questions around the adaptation of tropical Polynesian horticulture, including around forest clearance and garden preparation, and to provide radiocarbon dates, and palaeo-environmental information.
Recognition or protection	HNZPT archaeological provisions.
Architectural Qualities	
Style or type	N/A
Design	N/A
Construction	N/A
Designer or Builder	N/A
Cultural Qualities	
Sentiment	This is a matter for Tangata Whenua.
Identity	This is a matter for Tangata Whenua.
Amenity or Education	Horticultural gardens were a major part of the economy for Waikato Māori, and their formation was part of a complex and time-consuming process. The borrow pits that form part of the garden areas are conspicuous in the heritage landscape. Selected preservation and interpretation potentially have high amenity or education value, in terms of recognising and understanding this former way of life.

Historic Qualities	
Associative Values	The site is part of a wider complex of horticultural sites associated with the Māori settlement of the inland Waikato, particularly the Cambridge area.
Potential Scientific Research	see Archaeological Qualities.
Technical Qualities	
Technical Achievement	Māori horticulture sites represent an important form adaptation of a horticulture system developed in the tropics to the temperate climate of New Zealand. Sites of the Waikato Horticultural Complex reflect an intensive form of swidden agriculture.

5 Assessment of effects on archaeological values

S15/789 will be modified/destroyed by any future development within the green belt or in Stage 3A. Archaeology directly within proposed development footprints will be destroyed.

6 Conclusions and recommendations

There is identified archaeology (horticultural soil) in the proposed area for stormwater management and there is identified archaeology on the other side of the fence within the proposed Pukekura development Stage 3A, identified by the yellow hashed polygons. Made soil has been recorded as archaeological site S15/789.

If any archaeology is to be modified/destroyed then an Authority must be sought from HNZPT prior to any earthworks commencing and that the mitigation of the archaeological resource be through the archaeological investigation and recording of archaeological remains prior to earthworks.

ARCHSITE archaeological site recording scheme

Site Record Form

NZAA SITE NUMBER: S15/789

SITE TYPE: Maori horticulture

SITE NAME(s):

DATE RECORDED:

SITE COORDINATES (NZTM) Easting: 1818027 **Northing:** 5800302 **Source:** Handheld GPS

IMPERIAL SITE NUMBER: **METRIC SITE NUMBER:** S15/789

Finding aids to the location of the site

Located at the corner of the Cambridge greenbelt and in the adjacent property to the east.

Brief description

Recorded features

Soil - made

Other sites associated with this site

SITE RECORD HISTORY	NZAA SITE NUMBER: S15/789

Site description

Updated 15/11/2022 (Field visit), submitted by warrengumbley , visited 29/06/2022 by Gainsford, Matthew
Grid reference (E1818027 / N5800302)

Made soil identified across an area in the corner of the Cambridge greenbelt. Made soil in several instance (eg along the fence) was very thick and distinct.

Condition of the site

Updated 15/11/2022 (Field visit), submitted by warrengumbley , visited 29/06/2022 by Gainsford, Matthew

There is made soil present but this and potential features are subsurface.

Statement of condition

Current land use:

Threats:

SITE RECORD INVENTORY	NZAA SITE NUMBER: S15/789

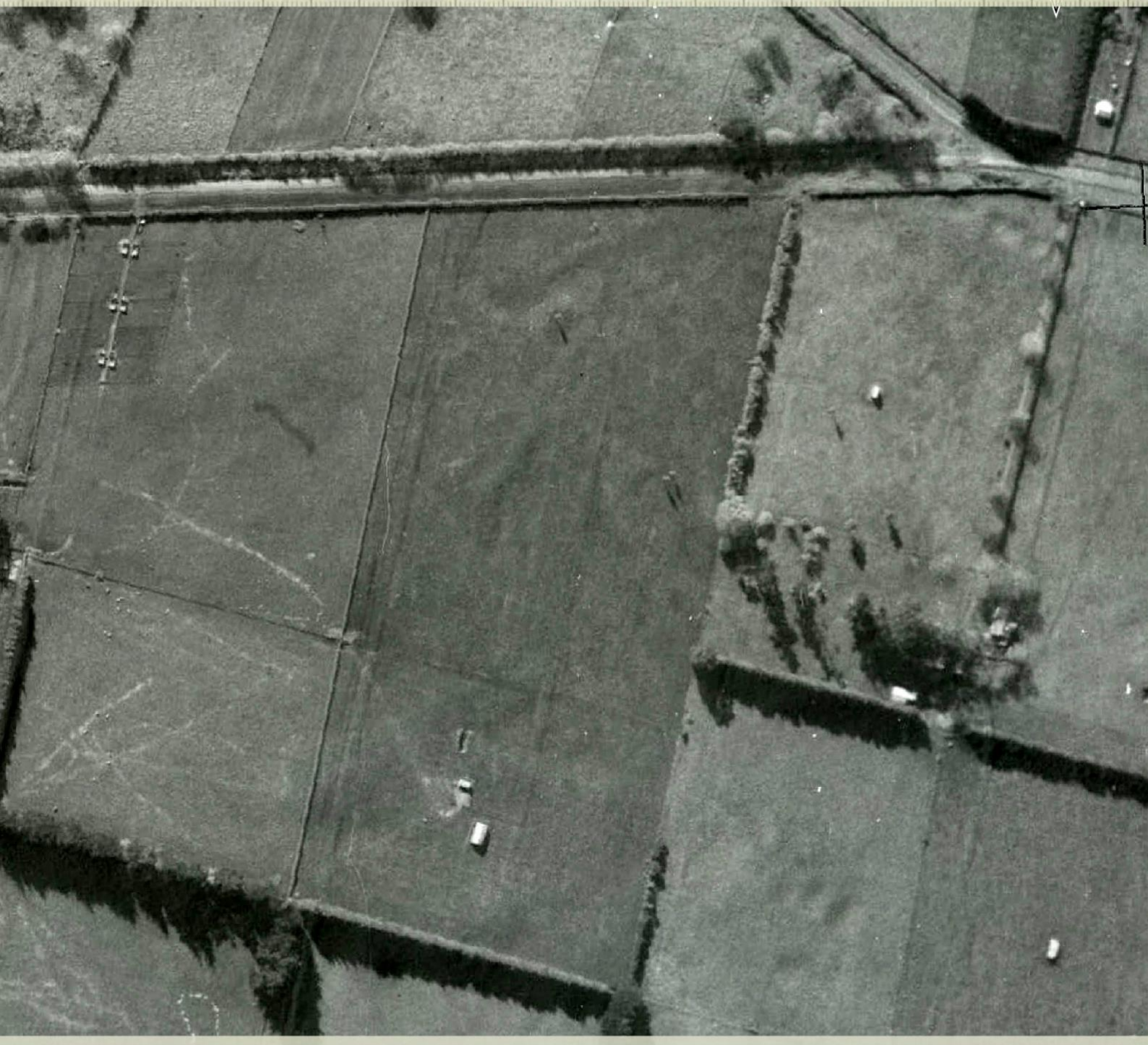
Supporting documentation held in ArchSite

Approximate areas of made soil identified during site visit

W GUMBLEY LTD.
ARCHAEOLOGISTS

Warren Gumbley
Principal/Director

PO Box 7108, Hamilton East, Hamilton 3247
cell 027 471 2165 **landline** 07 856 9071
email warren@archaeologist.co.nz



Pukekura Stages 3a and 3b - Assessment of Archaeological Values and Effects

Warren Gumbley and Mana Laumea

September 2018

Contents

1. Introduction

The following report has been prepared for Primary Enterprises Ltd. in relation to the residential subdivision of farmland and a stud farm located just beyond the southern end of the Leamington green belt in Cambridge, New Zealand. The proposed subdivision is known as the Pukekura project. The development area shown in Figure 1 currently includes the entirety of Lot 33 DP 523356 and Lot 2 DP 470372. It will eventually expand into Lot 4 DP 384116 during a later stage of development. Archaeological investigations detailed in this report refer specifically to the yellow outlined portions shown in Figure 1.

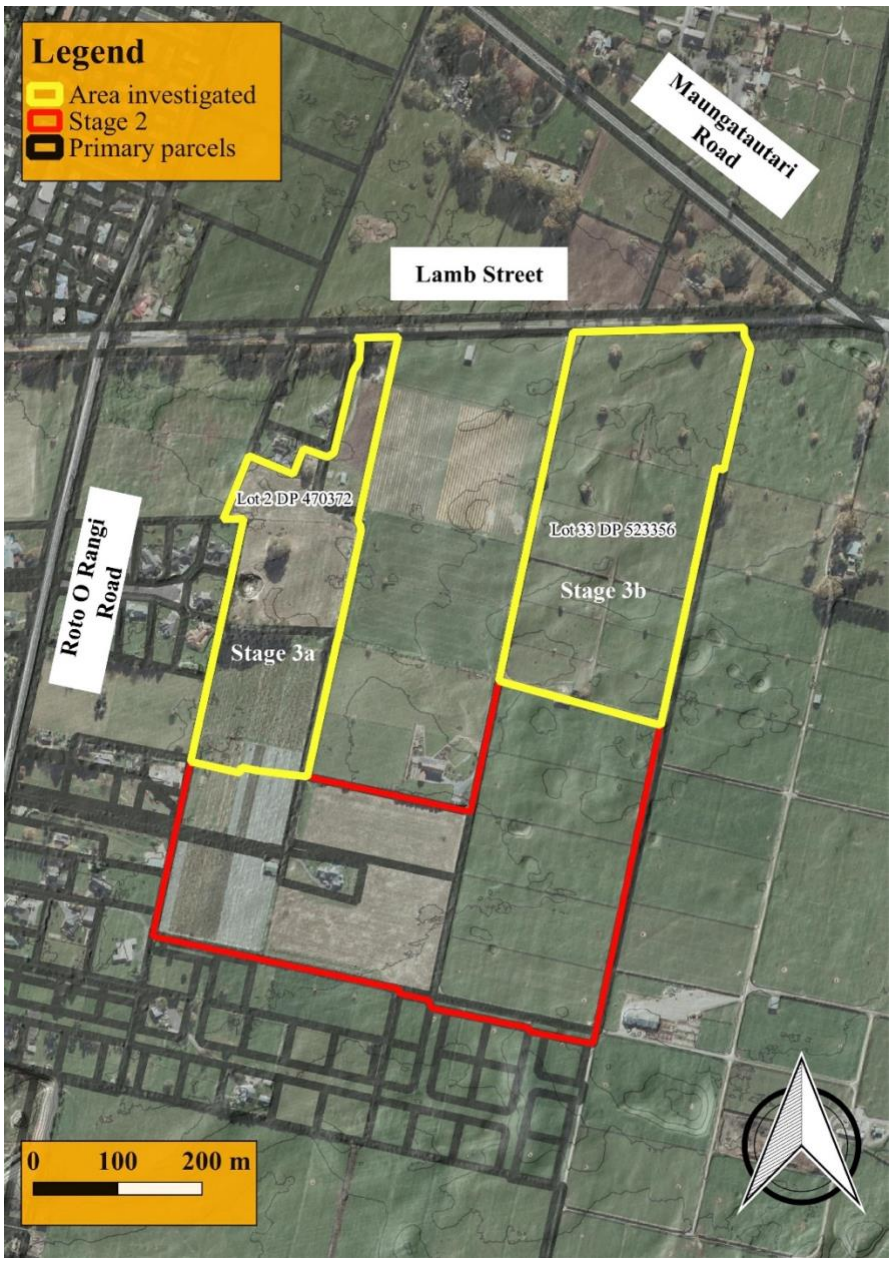


Figure 1: Overview of the area investigated (yellow polygon) to assess the nature and condition of archaeology in the northern portions of the Pukekura project area.

The Pukekura subdivision has been subject to an archaeological survey covering approximately 15.17 ha of land at the northern margins of the current project area (Figure 1). The land investigated during this survey pertains to Stages 3a and 3b of the Pukekura subdivision and follows from another archaeological survey covering 15.29 ha of Stage 2 of the same subdivision project. The Stage 3a and 3b survey resulted in a total of 0.41 ha of Māori-made horticultural soils in four tracts in parts of the surveyed land. In this report, the composition and values of these are described with actual and potential effects identified.

1.1 Heritage New Zealand Pouhere Taonga Act 2014

Heritage New Zealand Pouhere Taonga Act 2014 requires that an archaeological authority be granted by Heritage NZ before for an archaeological site may be modified or destroyed. An archaeological site is defined as –

a. any place in New Zealand including any building or structure (or part of a building or structure) that:

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

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

b. Includes a site for which a declaration is made under Section 43(1) of the Act (such declarations are rare and usually pertain to important post-1900 remains with archaeological values).

An application for an archaeological Authority from Heritage New Zealand will be made for all archaeological sites located within the entirety of the Pukekura project area.

1.2 Recorded archaeological sites

Two archaeological sites have been recorded within Stages 3a and 3b of the Pukekura project area as a result of the assessment investigation. These sites are S15/775 and S15/776. All of the sites identified are related to pre-European Māori horticultural activity. Site boundaries are defined by the observation of large ground surface depressions (borrow pits) and the identification of sandy and/or gravelly soil matrices in auger samples. It is postulated that Māori extracted and added pumiceous alluvium substrate to the local topsoil for the improvement of local gardening conditions: the quarries being the source for this alluvium.

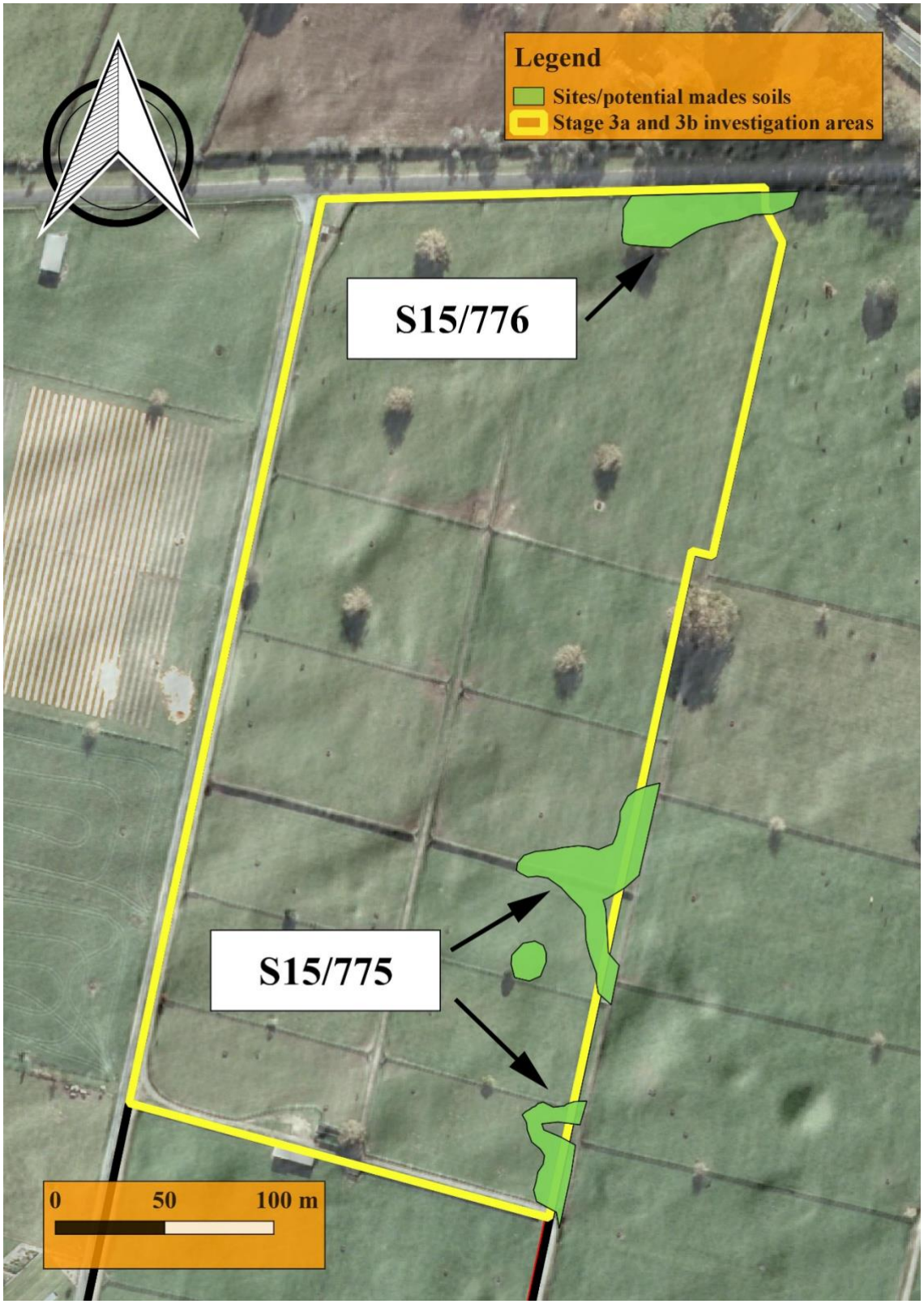


Figure 2: Distribution of potential made soils identified during coring survey of areas outlined in Stages 3a and 3b of the Pukekura subdivision, Leamington. Arrows denote tracts recorded as archaeological sites from the auger survey, while unlabeled polygons indicate areas with materials that are potentially of archaeological origin.

2. Setting

2.1 Physiography

The investigation area sits entirely on the Hinuera Formation, which effectively forms a plain that is gently sloping from Cambridge to Taupiri. This formation represents the remains of a protected alluvial process that succeeded the eruption of Taupo 26,0000 years ago that lasted for approximately 10,000 years. During that time the sediments steadily filled the hill and valley systems of the Waikato to the extent that the Waikato River became, effectively, a braided river system criss-crossing the developing surface of the formation.

The development area is characterised by a gently undulating ground surface with slight changes in elevation resulting in localised subsoil variants. The subsoils identified in the investigation are mainly a part of the Horotiu series, which are typically found on the highest margins of the Hinuera Formation. The predominant Horotiu subsoil type is characterised by a yellowish-brown sandy silt (Horotiu loam) which is found across elevated portions of the ground surface. Most archaeological phenomena identified within the development area correlate to the distribution of this subsoil variant. In addition to this, some of the subsoils in the investigation area were comprised of the Bruntwood Series. The Bruntowood soils are classed as Typic Impeded Allophanic Soils using the NZSC (Hewitt 1998) and are imperfectly drained. Consequently, areas characterised by the Bruntwood soil type did not typically contain evidence of archaeological materials.

It is also worth noting that the investigation area is located roughly 1.5 km northeast from an artificially drained/infilled swamp named Moana Tua Tua. The swamp covered an area of 20,226 acres and, although few artefacts relating to Māori occupation have been found, it is most probably an important component of the surrounding archaeological landscape.

2.2 Vegetation

Like most of the Waikato Basin the project area has been largely transformed for pastoral farming. The dominant vegetation type is grassland with hedges demarcating several paddocks, particularly around the peripheral margins of the project area. No annotations concerning vegetation cover are present in the examined historical records.

3. Land-use and historical records

It is historically known that the planned area for subdivision has been used for farming purposes. At least 20 paddocks are present on the property, which are currently used to keep livestock and horses. Recent satellite imagery indicates that the property has been used for farming and grazing purposes for at least the last 10 years and historic aerial imagery indicates that the project area has been used as pasture land since 1943 and probably earlier; visible paddocks along with two potential sty structures can be seen in photo SN266/836/61 (Figure 3).

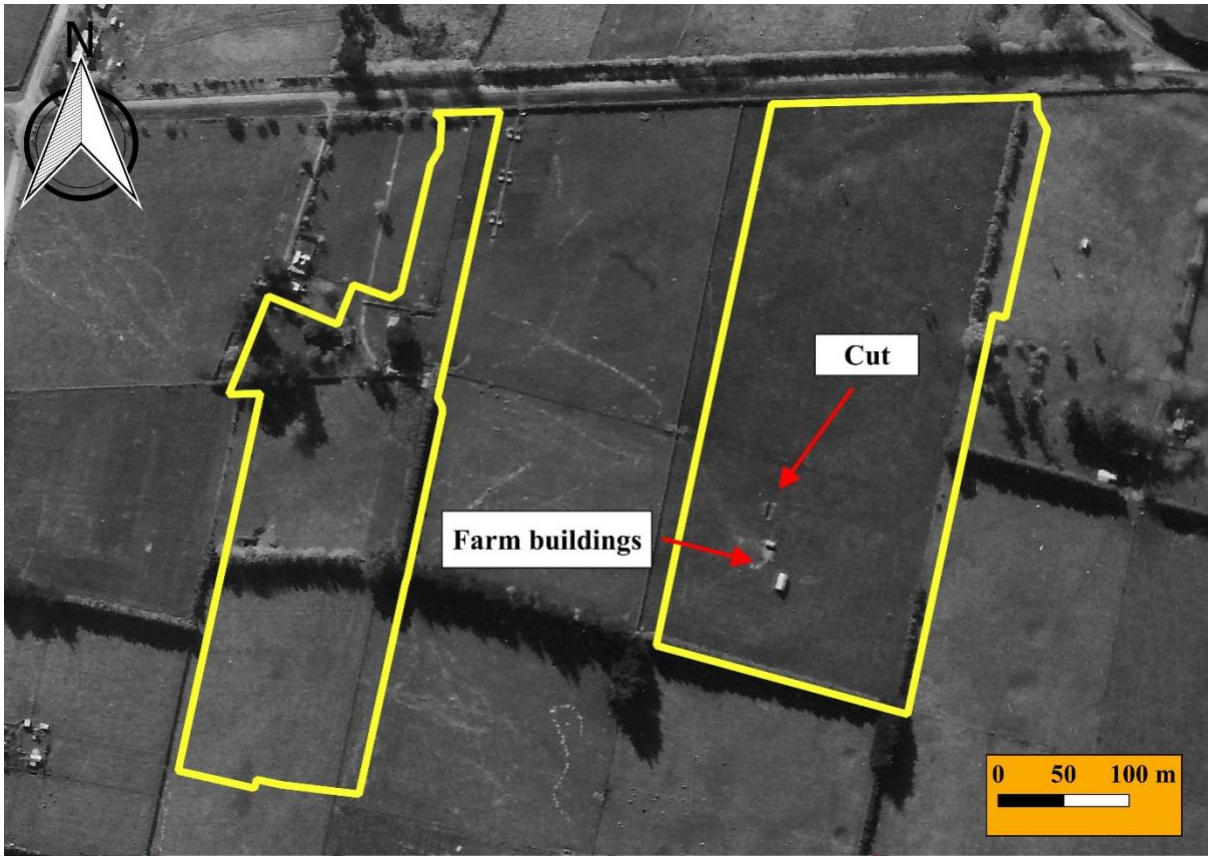


Figure 3: 1940s aerial photograph SN266/836/61 showing an open cut and possible pig sties inside the investigation area. Possible borrow pits are also visible in the lower right-hand corner of the image.

A 20 m wide large open cut is present inside the investigation area. It is still visible years later in aerial photography from the 1950s. It is not known whether this cut was made into a pre-existing ground surface depression (i.e. a borrow pit) or whether this is simply modern feature in this part of the investigation area. It is clear by the presence of a similar cut 280 m to the south that this is not an isolated event.

The potential pigsties are small structures measuring roughly 8 m^2 and 10 x 8 m in size respectively. No additional structures are visible in this part of the investigation in the 1940s imagery.

3.1 Historic maps

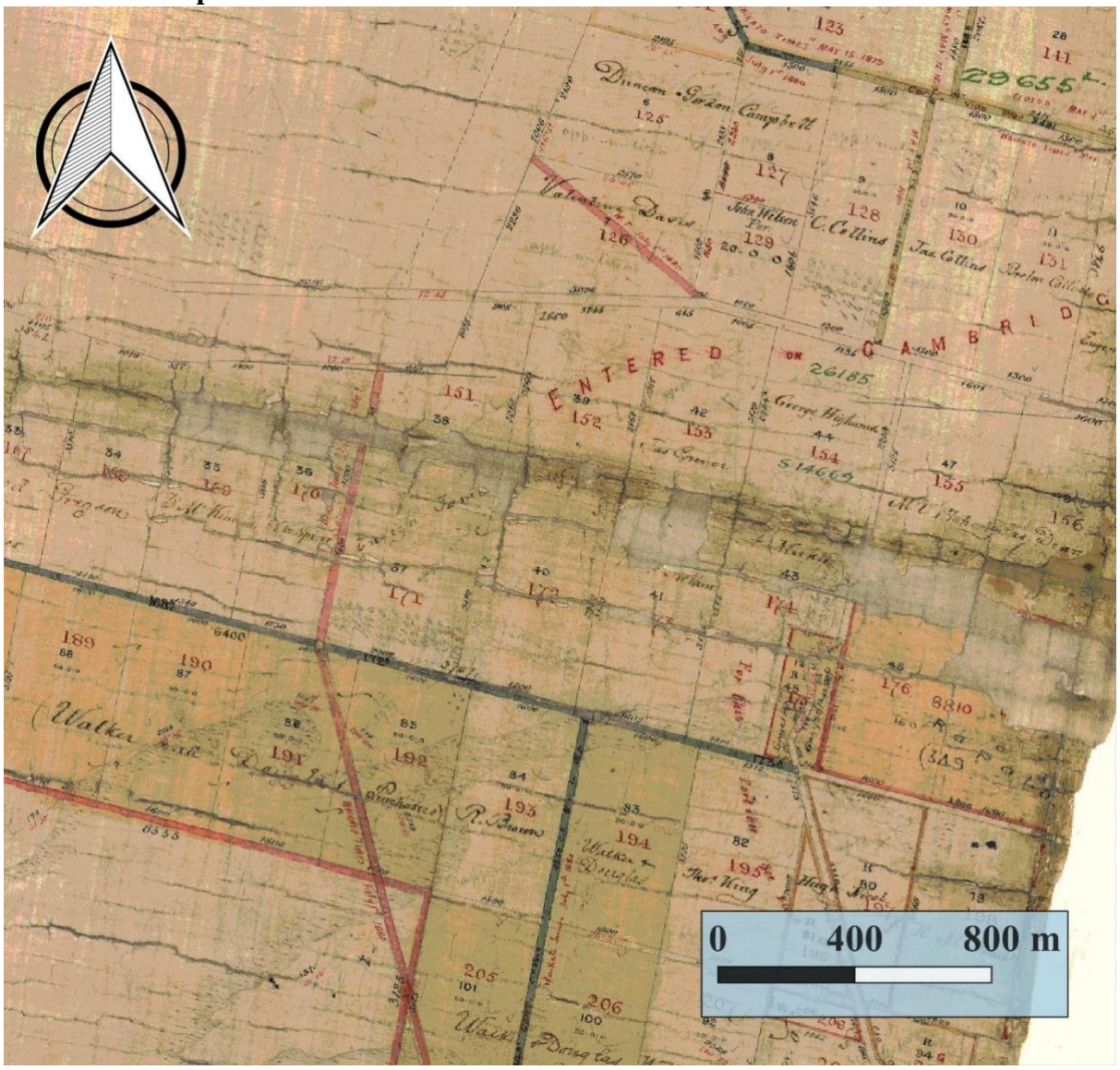


Figure 4: 1800s Historic map SO 335/1. The investigation area spans Lots 151-152 and Lots 171-172 shown in the map. Also visible is the north-eastern edge of the Moana Tua Tua swamp.

Two historic maps from the mid- to late-1800s were consulted during a review of historic materials relating to the investigation area. The first of these is SO 335/1 which is undated, but likely comes from the mid-1860s. This plan shows Lots 151-152 and Lots 171-172 in the location of the current project area. No visible landmarks or structures are depicted inside the lots and map annotations, presumably noting the title holders, are difficult to distinguish. Notably, the map does show the north-eastern extent of the Moan Tua Tua swamp with a property area of 20,226 acres. The swamp likely would have been an important physiographic feature in pre-European times.

Map SO 2489 was also examined and dates to 1880. This map shows the eastern margins of the investigation area separated into two parcels (151 and 171), both of which are listed as belonging to Mr. Reynolds. The western margins of the investigation area Lot (172) does not have an associated title holder.

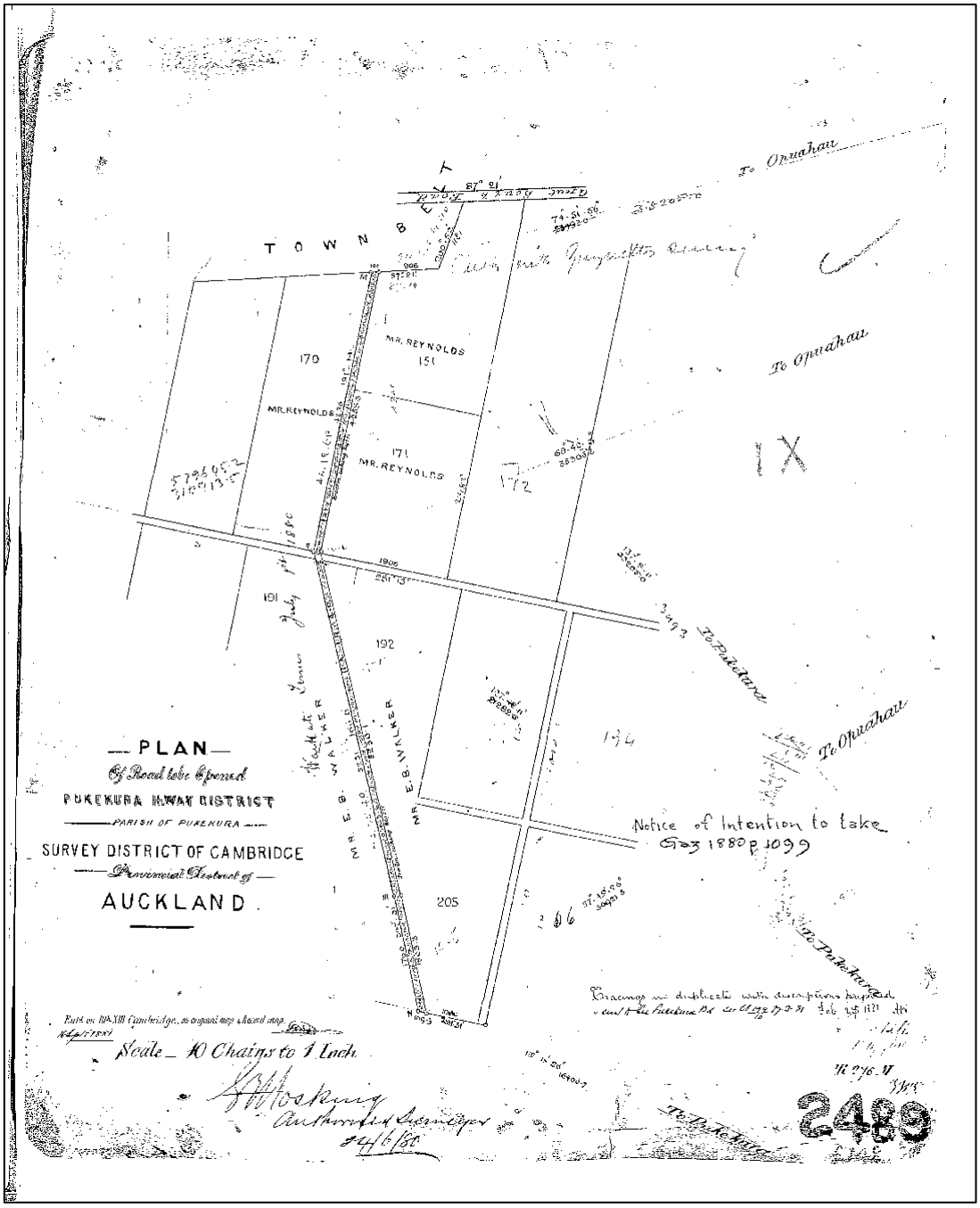


Figure 5: SO 2489 showing Lots 151, 171 and 172.

4. Archaeological background review

4.1 General review of the archaeology and history of the Waikato

The archaeology of Māori settlement of the inland Waikato Basins is not well understood, although archaeological research over the last 15-20 years, almost all of it driven by the need to mitigate development, is beginning to permit some coherent understanding of the archaeological landscape and more specifically the place of Māori agriculture within it. One of the outcomes of this archaeological research is an increasingly clear chronology based on radiocarbon dating. The earliest robust radiocarbon dates associated with settlement in the

inland Waikato[1] comes from archaeological sites at Leamington[2], which date to the 15th century AD (Gumbley & Laumea 2017). Radiocarbon dates from further investigations of horticultural sites suggest that after this point settlement became more general along the Waikato River relatively quickly (Hoffmann 2011, 2012, 2013, Gumbley and Higham 2000, Gumbley et al. 2004, Gumbley and Hoffmann 2013, Gumbley and Hutchinson 2014, Campbell and Harris 2011, Campbell and Hudson 2012). This chronology is generally consistent with the traditional history of the iwi descended from the Tainui Waka (Kelly 1949, Jones & Biggs 1995).

Cassells (1972a, 1972b, 1972c) attempted to synthesise the archaeological information available for the inland Waikato in the early 1970s. Cassells' model employed a locational analysis approach based on an examination of the distribution of archaeological sites in the inland Waikato in conjunction with the ecological settings of the sites. The model is, therefore, strongly environmentally focussed and ultimately proposes six " 'types' of site-location" (1972a, 227), which are essentially sub-sets of the local environment where sites of varying natures can be congregated.

Not surprisingly, given that Cassells developed his hypotheses in the early 1970s, there was little data available. This largely constituted a couple of published archaeological investigations (Bellwood 1971 & 1978; Peters 1971; Shawcross 1968) at Lake Mangakawhare and Lake Ngaroto and the unpublished fieldwork season Cassells undertook in the wider Waikato area. Substantially more data has been accumulated and much of the data, particularly that relating to environment, has superseded that available to Cassells.

[1] A site containing the remains of moa in known on the outskirts of Tokoroa but this is one of only two known moa-hunting sites in the North Island and has not been radiocarbon dated.
[2] S15/639, S15/641 and S15/757.

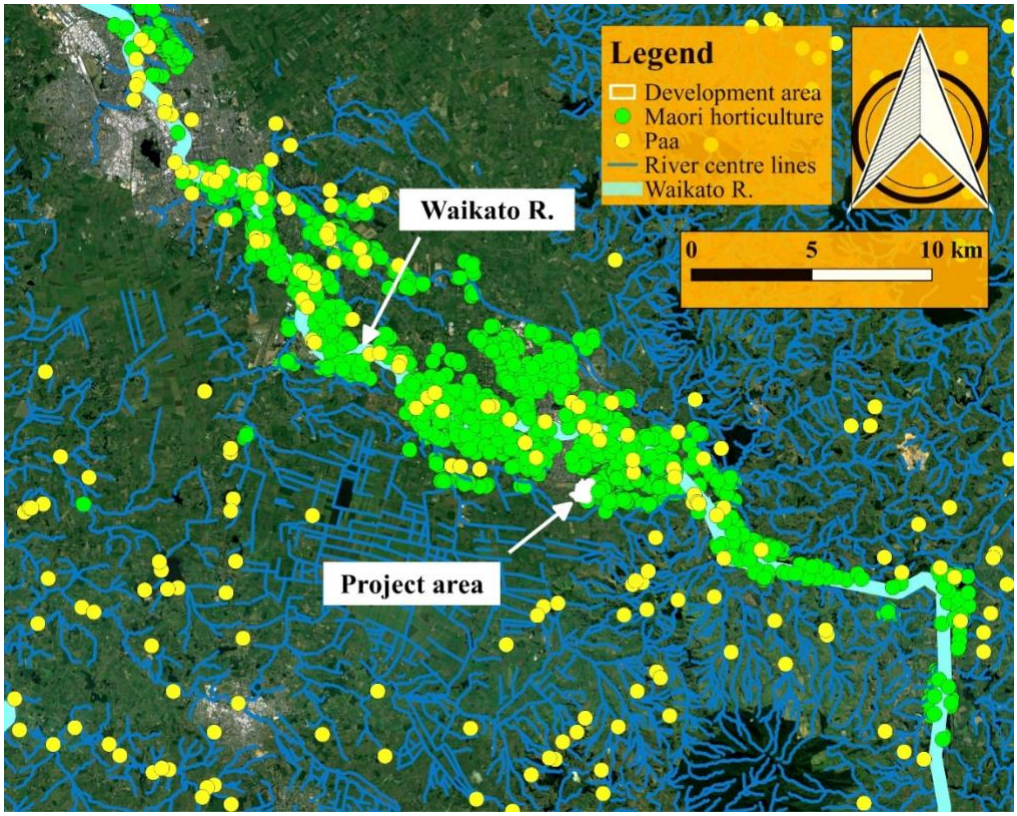


Figure 6: Distribution of paa sites and pre-European horticultural sites in the central Waikato as of March 2016. Note the strong correlation between water-courses – in particular the Waikato River – and the spatial distribution of shown sites.

Cassells argued that lakes, and to some degree swamps, provided a form of optimal location for Māori occupation because of the range of resources available within what can be termed 'the catchment' exploited by the local inhabitants. Consequently, he argued, these locations were probably among the earliest settled. Cassells also noted that the highest density of occupation sites, in all cases paa, was associated with the soils modified for the gardening of kumara. This is the soil today classified as Tamahere loam, which was formed on soil originating on the Hinuera Formation and the more recent Taupo Pumice Alluvium. Essentially, Cassells considered the paa/made-soils complex to be the second most favoured site-location category. Both of these conclusions remain valid to some degree, although not necessarily for the reasons Cassells believed. As a generalisation, his observation that archaeological sites, particularly paa, congregate strongly around waterways and where Māori-made agricultural soils are found, remains valid, and in this sense it has provided a workable, if rather simple, predictive model. However, there is no reason to believe, as Cassells proposed, that lakes were the early focus of settlement. The weight of current evidence explicitly points to the Waikato River as the primary focus of Māori activity. This should be no surprise, it is one of New Zealand's major water-courses and is flanked by some of the islands' best soils, and it would have contained an array of fish, crustacean and shellfish resources. Given these available resources and its unparalleled value as a communications artery it is likely that it formed the earliest focus for permanent settlement rather than the more remote lakes.

In summary it is clear that Cassells understood the explicit relationship between paa and the horticultural landscape focused on the Waikato River and was correct to emphasise it.

It should be noted that the identification of pre-European archaeological sites in the inland Waikato provides a set of problems not found on, or close to the coast where most archaeological sites are found. Archaeological sites are often identified from their remaining surface-visible features. These may be terraces, pits, ditches and, often, shell middens. On the coast many archaeological sites are identified solely from the presence of shell midden, which can be seen on the surface or as a result of sub-surface testing with probes. Shell midden is virtually invisible in the inland Waikato reflecting the distance from the coastal harbours and estuaries and the typically poor preservation of the shell of freshwater mussels (Hyridella sp.). Where shell midden is present it is in very small quantities and is often quite localised. Its detection is mostly a matter of luck. This means that small occupation sites, in particular those that did not include substantial earthworks (such as paa) that are routinely identified in coastal areas only because of the presence of shell midden, are likely to be missed inland. In this sense the archaeological record in the inland Waikato probably suffers from a bias.

It is important to note that almost all of the recorded archaeological sites in the Lower and Middle Waikato Basins have been recorded on an ad hoc basis rather than as a result of systematic archaeological surveys. Where archaeological surveys have occurred almost all of them have been restricted to relatively small areas focussed on the assessment of the effects of specific activities such as a subdivision or public works project. Therefore, as noted above, the record is partial and with a tendency to be biased toward the recording of archaeological sites that are visible on the ground surface.

4.2 Local archaeological landscape (Cambridge/Leamington)

The archaeological landscape of Cambridge and Leamington is largely characterised by pre-European gardening sites, paa sites and sites relating to post-European farming, military activity and domestic occupation. Although the pre- and post-European records manifest differently in the material record, it is the combination of these two that has resulted in the current form of the archaeological landscape of the area. Understanding the nature of each record at a local scale is important for assessing potential archaeology within the Pukekura development.

4.2.1 Immediate area

The central and peripheral margins of Cambridge comprise an archaeologically rich landscape. Recent development, largely linked to plan changes by the Waipa District Council, have resulted in an increasing body of knowledge regarding the archaeological record in and around the Cambridge area. The Leamington district is one of the localities which has seen extensive subdivision in recent years. Consequently, our understanding of the chronology, distribution and condition of archaeology in this part of Cambridge is improving (e.g. Gumbley and Laumea 2017). At least 59 archaeological sites are currently recorded within a 3 km radius of the Pukekura development area. Some general patterns are evident in the distribution of recorded sites in this area: (1) known paa are distributed exclusively in concert with the footprint of the Waikato River and its tributaries; (2) pre-European horticultural sites occur no further than 3 km from the river and mostly within 1 km, (3); these horticultural sites are predominantly situated beyond the footprint of urban housing development and are generally located on current farmland.

This distribution is probably not a coincidence and instead reflects the fact that sites closer to the town centre relating to Māori occupation have been subject to extensive damage as Cambridge has developed. In other words, it is unlikely that this distribution is a reflection of empirical patterning in the archaeological record.

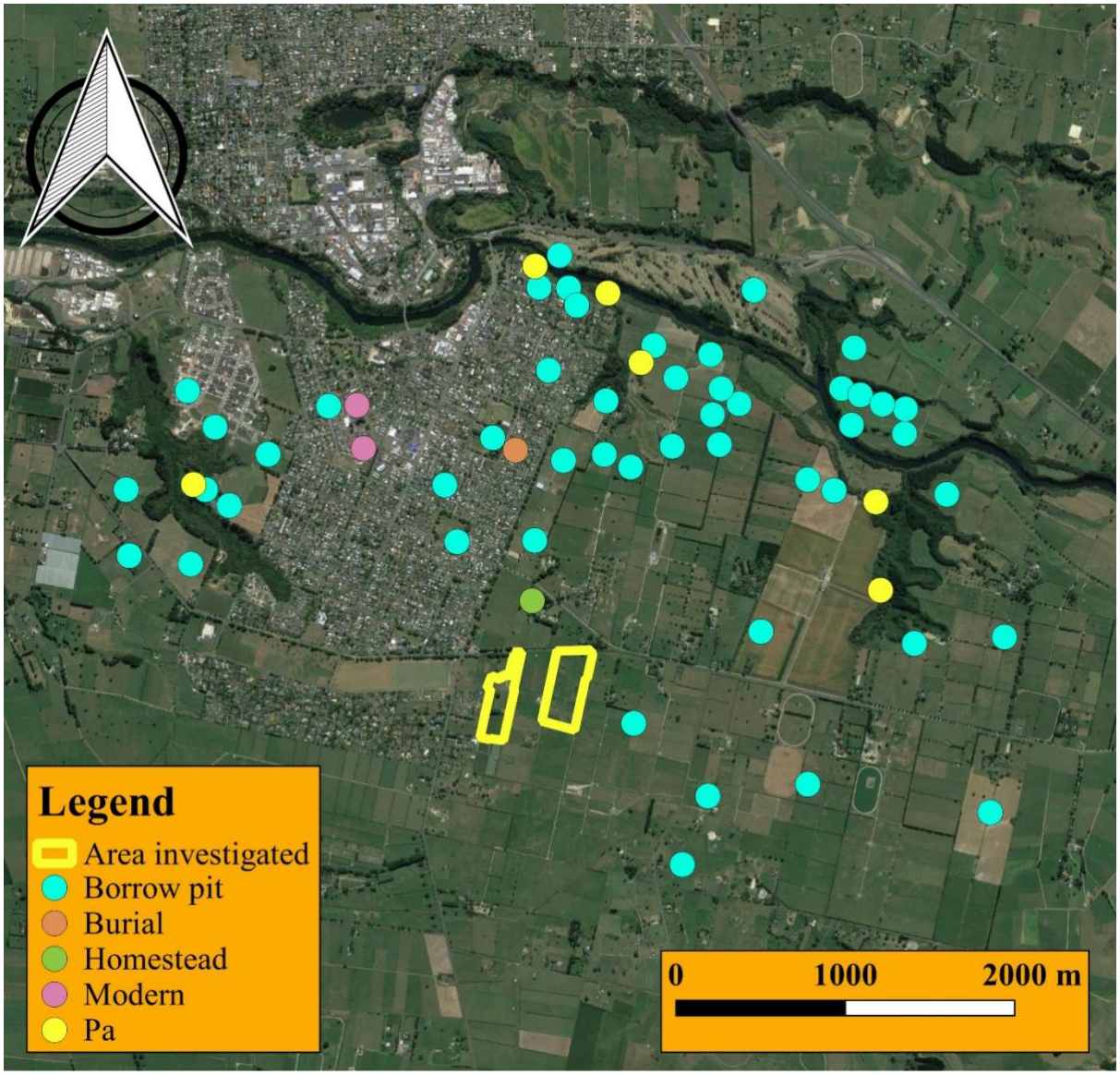


Figure 7: Distribution of site types within a 3 km radius of the project area. Investigation areas demarcated by yellow polygons.

The frequency of site types within the radius also gives an indication of the archaeological landscape. Fourty-nine of the 59 sites are related to Māori horticulture (i.e. made soils and borrow pits), 6 are paa sites, 1 site relates to a pre-European burial, 1 is a homestead and 2 are post-1900 rubbish dumps. As noted earlier, the Māori gardening sites cluster along the Waikato River in predominantly undeveloped areas, while paa follow the waterways. Two of these paa are situated adjacent to the southern edge of the Waikato River (sites S15/94 and S15/96), while the remaining 4 paa sites occur along southern tributaries of the Waikato River. Many of the sites pertinent to the archaeology within the project area are north and east of the development site and, as such, are considered below to provide context for the assessment of the Pukekura subdivision area.

4.2.2 Māori horticultural sites

Māori gardening sites are the most common site type within 3 km of the development area, and generally extend southwards from the edge of the Waikato River towards the development area. The gardening sites have mostly been recorded through the consultation of historic aerial imagery and LiDAR visualisations, with at 47 recorded via such methods. Consequently, the remotely recorded sites mostly consist of groups of borrow pits. Although discrete spatial patterning has previously been shown to occur within the feature type (Gumbley and Hutchinson 2013), the sites recorded here are presumably arbitrary groupings based on the spatial proximity of observed borrow pits. It should also be noted that an unknown number of horticultural sites will have been destroyed by the expansion and development of Leamington suburb without being recorded in any manner. This, no doubt, is also the case for Cambridge township across the river.

Because many of these sites have been recorded remotely, it is important to note that the visible surface features are usually part of larger archaeological gardening systems (e.g. Gumbley 2009; S14/424 – report in prep.). In this sense, these features are best considered a proxy for the empirical distribution of the archaeological record. For example, gardening soils, growing features, associated occupation areas and ancillary archaeology (e.g. crop storage pits) may be also present within the same system, yet lie outside of presently recorded site boundaries. Altogether, the Māori horticulture sites form a broader archaeological landscape that generally follows the Waikato River, extending northwards and southwards across suitable tracts of land. In a regional context, this patterning is most pronounced in the Waipa. This would tend to suggest that Leamington, Cambridge and the immediate surroundings are important for understanding patterning in the chronology and distribution of Māori horticultural sites across the broader Waikato.

4.2.3 Paa

Paa are an important component of the archaeological landscape surrounding the development area. The nearest paa site (S15/24) is located 1.7 km north of the development area, while the remaining 5 paa are situated 2.3 km to 2.7 km from the development site. It is also worth noting that several paa are located just beyond 3 km from the development area (i.e. sites S15/23, T15/1, T15/19, T15/94 and T15/95). These sites likely form part of the same archaeological landscape.

As noted earlier, the location of these fortified sites largely corresponds to the distribution of waterways in the area. The paa are generally located on headlands or above waterway escarpments and include features such as ditch and bank systems, terraces, borrow pits and made soils, for example

Table 1: Recorded paa sites located within 3 km of the Pukekura development area.

Site	Type	Condition	Description
S15/356	Paa	Poor	Paa on north-pointing headland, recorded in 1973. The site consisted of approx. 70 m of headland cut off by a 60 m long transverse ditch. Site contained two transverse terraces measuring roughly 20 x 6 m, and the terraces each contained three side-by-side pits. Numerous indent in paa interior suggests further storage pits, particularly along the western margins of the complex.
S15/24	Paa	Moderate to good	Triangular paa on promontory formed by stream gully and the edge of the upper river terrace. The southeast side marked by single ditch with remains of bank on inside of feature. A row of Pseudocacia robinia have been planted on each side of the ditch.

S15/96	Paa	Good	Paa with transverse ditch, platform and associated pits (approx. n=8). Located on headland at intersection of Waikato R. and southern tributary.
S15/94	Paa	Destroyed	Quadrilateral paa recorded using remote sensing techniques.
T15/92	Paa	poor	Small paa with transverse and lateral ditches. The site was identified using 1940's photography. It is likely that most of the site is destroyed, although portions of it may remain intact under shrub.
T15/93	Paa	Poor	Small paa on edge of a gully with tranverse and lateral ditches and approx. 7-8 internal pits. The site has probably mostly been destroyed. The ditches may remain intact at the site.

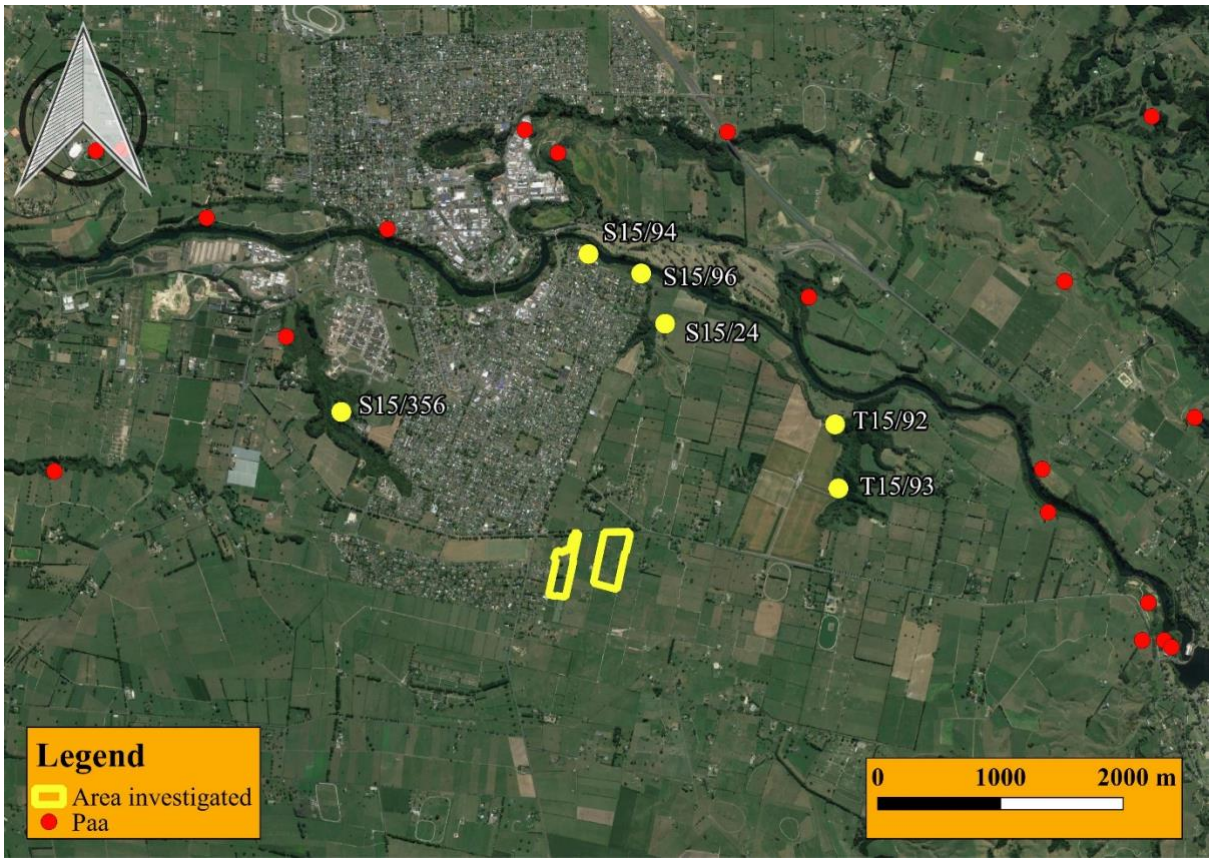


Figure 8: Paa sites shown in Table 1 (yellow points) that are located within 3 km of the development area. Additional paa located beyond 3 km from development site also shown (red points).

4.2.4 Burial (S15/310)

An upright crouching burial was uncovered during earthworks for the construction of a house in 1986. The finding was recorded by N. C. Laurie of the Waikato museum on December 5, 1986. No additional information is provided regarding the presence of potential archaeological features or any materials associated with the human remains. The associated Site Record Form notes that the remains were transferred for inspection by the pathology department at the Waikato Hospital.

4.2.5 Trecarne House (S15/471)

Trecarne House is a historic homestead located roughly 300 m north from the northern boundary of the Pukekura project area. The house was constructed in 1887. Recent

investigations have been conducted at the property as a result of monitoring works (Simmons 2011). Historic artefacts (e.g. bottles, ceramics) and refuse pits are noted to be present at the site. The condition of the grounds and the structure is excellent and it is probable that further intact historic, and possibly pre-European, features remain inside the property.

4.2.6 Post-1900's features
Sites S15/382 and S15/383 were initially recorded as pre-European made soils, but are now known to be deposits containing post-European rubbish (e.g. building debris).

4.3 Archaeology of the Waikato Horticultural Complex

4.3.1 National context relating to pre-European Māori garden sites
Historical and archaeological sources tell us that Māori were cultivating a suite of tropical or semi-tropical domesticated plants when Europeans arrived in New Zealand. Most prominent among these was the kumara (*Ipomoea batatas*) but other prominent species were taro (*Colocasia esculenta*) and bottle gourd (*Lagenaria siceraria*). Tropical yam/uwhi[3] (*Dioscorea sp.*) was also grown although not commonly by Cook's arrival. Others included tropical ti (*Cordyline fruticosa*) and paper mulberry (*Broussonetia papyrifera*). Understanding how the transition from the tropics to a temperate environment was made has been one of the themes of archaeological research in New Zealand (Barber 2004). Despite this, it remains relatively poorly understood.

In most parts of New Zealand, the gardens themselves are difficult to identify other than as areas where soil horizons have been mixed, often between 300 and 500 mm deep, and with distinct enrichment from charcoal (Barber 2004: 189). Sometimes ancillary structures such as stone rows indicate horticulture sites. In places the gardens are more readily identified because of the modifications made to the soil by Māori through the addition of sand and/or gravel.

Such soils modified for gardening Polynesian cultigens have been identified in a number of places in New Zealand and Barber 2004 provides a thoughtful summary of the evidence. In most cases the reports have described isolated instances of this practice. However, areas are known where this practice has occurred on a more extensive scale, to a degree where they are regionally significant. These are:

- the Kaikoura Coastal plain near the Clarence River mouth (McFadgen 1980; Trotter & McCulloch 1999),
- the Waimea and Motueka River plains in Tasman Bay (Barber 2004, 2010; Challis 1976, 1978; Rigg & Bruce 1923)
- in places in both south and north of Taranaki, particularly the Waitara River valley (Smart 1962; Buist 1964; Walton 1984; Walton and Cassels 1991; Cassels and Walton 1992),
- on the Waikato Coast between Aotea and Ruapuke (Walton 1983 and 1984)

However, the largest concentration of Māori-made soils is found in the inland Waikato, where the area of these soils probably equals or exceeds that of the other areas combined[4].

[3] This should not be confused with the small red tuber commonly referred to a yam in New Zealand, which is a member of the *Oxalis* family.
[4] This is based on data supplied in McFadgen's 1980 article.

The current estimate made by Gumbley is that there is, or was, approximately 4000 hectares of Māori-made soils in the Waikato River valley.

Figure 9: Part of 1943 aerial photograph 834/57 which shows the borrow pits at one pre-European Māori garden site (S14/27). Earthworks for the pa S14/26 are visible adjacent to the gully edge.

3.3.2 Pre-European Māori garden sites on the Waikato plains

In the Waikato pre-European Māori garden sites are identified by two defining features; the presence of borrow pits (Figures 11, 20 & 21)), and soils heavily modified by the addition of sand and gravel; as well as charcoal. The borrow pits are near circular depressions usually between 1 and 4 metres deep (archaeological investigations indicate they were typically 3-5 m deep originally) and often 100-300 m^2. It is these two features that make these garden sites so visible compared to pre-European Māori gardens in most of the rest of New Zealand. Here, the archaeological evidence is principally found in both the middle and the lower Waikato basins (Selby and Lowe 1992).

In the middle Waikato Basin, pre-European Māori garden complexes are concentrated along the Waikato River from Arapuni to Taupiri, in areas on the Horotiu Plain and along the margins of the Waipa River and its tributaries. In the lower Waikato Basin, the resource is more poorly understood but it is known to exist on raised levees along the banks of the Waikato River in the area of Huntly-Rangiriri and possibly in some places lower down the river (Grange et al. 1939; Taylor 1958; Clarke 1977; Law 1968). The total original area of these sites is unknown but Taylor (1958) proposed an estimate of 5000 acres (2000 ha) based on the soil survey data available in 1958. Our analysis of the

available soil survey data[5] using GIS, indicates that an estimated area of 4000 hectares is probably more accurate. The locations of the gardens are strictly associated with particular series of alluvial soils.

Figure 10: Borrow pit (one of 34) at site S14/27 located at Tamahere. (photo: D Lowe)

In the middle Waikato Basin these 'made' or 'modified' soils are classified in the Tamahere series, with the two named soil types being 'Tamahere gravelly sand (on Horotiu soils) (Mh)' or 'Tamahere gravelly sand (on Waikato soils) (Mw)' (Bruce 1979; McLeod 1984). In the New Zealand Soil Classification (NZSC) (Hewitt 1998) the modified garden soils in the Waikato belong to the Artifact Fill Anthropic Soils class.

As well as modifying the well-drained Waikato series soils and Horotiu loams, the less well-drained Bruntwood silt loams were also modified. Less commonly the poorly-drained Te Kowhai silt loams are found to have been modified for gardening.

The Horotiu and Bruntwood loams (as well as the Te Kowhai soil) have formed on 18,000 — 20,000-year-old volcanogenic alluvium called the Hinuera Formation. The deposits of this formation have been overlain by a cover (500-700 mm) of thin multiple tephra-fall deposits since the Hinuera alluvium finished accumulating.

[5] It must be noted that the soil survey data is incomplete and does not include areas where borrow pits have been identified south of Cambridge and along the banks of the Waikato River above Cambridge.

The Waikato series soils have formed on 1800-year old coarse pumiceous alluvium (Taupo Pumice Alluvium) which formed low terraces near the Waikato River (Grange et al. 1939; Taylor 1958; Lowe 1988; Singleton 1988; McCraw 2002).

Specifically, it was the sand and gravel alluvium substrate from the Hinuera and Waikato formations that was quarried from the borrow pits and used to modify the upper soil horizons (Figure 22).

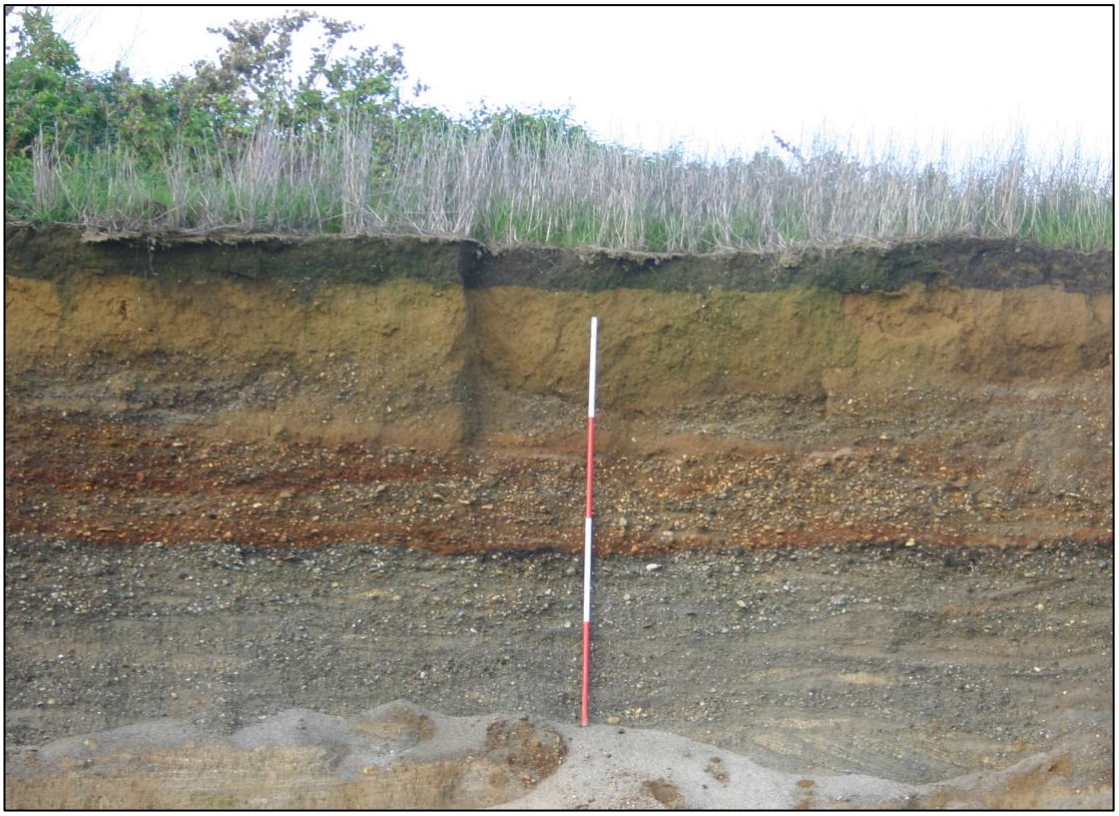


Figure 11: A photograph showing the upper horizons of Horotiu sandy loam. The upper 700-800 mm of yellowish-brown material is the accumulated volcanic tephra that overlies the Hinuera Formation alluvium. It is this alluvium that was quarried and added to the gardens. (Scale is 2 m.) (photo: W. Gumbley)

Although active research is now being carried out it remains difficult to be confident of how the material quarried from borrow pits was applied to or mixed with the parent soils to form the modified soils (Tamahere loam). Until 1999 it had been assumed that this quarried material was either; (1) added to the surface of the parent soil as mulch or puke (mounds), or (2) was well mixed into upper part of the soil (i.e. topsoil and upper subsoil parts of the profile).

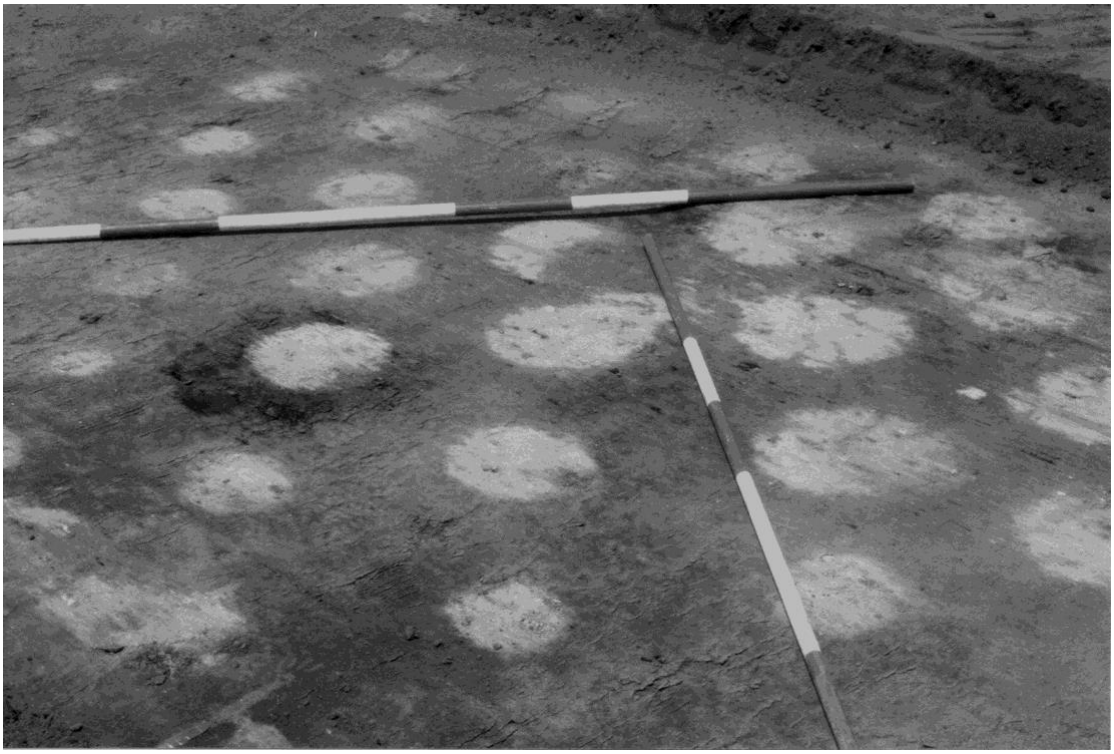


Figure 12: Photograph from S14/201 (Chartwell, Hamilton) showing the sand-filled bases of puke dug into the subsoil. (Scale intervals: 0.5 and 0.25 m.) (photo: Gumbley).

Figure 13: Photograph from S14/195 (Horotiu) showing bowl-shaped depressions of puke bases with the sand and gravel removed (Scales are 1 m.) (photo: Gumbley).

Archaeological investigations at an area of Tamahere soils and borrow pits (S14/201) at Chartwell in Hamilton (Gumbley and Higham 2000; Gumbley et al. 2004) revealed two adjacent areas where circular sand-filled bowls were identified at the topsoil-subsoil interface (Figure 23). Both sets of bowls, although slightly differently oriented, had similar internal organisation of the depressions where they were arranged in quincunx fashion (a form of off-set rows where four bowls are arranged around a central bowl). This conformed closely to historical references, which describe orderly gardens where kumara were grown in puke organised in this fashion (Best 1925; Colenso 1880).

Since 1999 these sand-filled bowls, in similar arrangements, have also been found at Riverton Estate subdivision, on the northern edge of Hamilton on the east side of the Waikato River, when part of a large body of garden soils (S14/165) was investigated (Simmons 2008). The same type of feature has been found at several other sites: S14/158 and S14/198 at Taupiri (Campbell & Harris 2011; Gumbley in prep) S14/468 at Ngaruawahia (Gumbley in prep), at S14/164 (Simmons 2013) and S14/194 (Gumbley & Hoffmann 2013) at Horotiu and at S14/248 (Keith in prep) at Tamahere. Outside the Waikato similar features have been identified at Whangaruru Bay in Northland (J Carpenter, pers comm.); at Mahia Peninsula and in Golden Bay.

In a handful of sites containing a distinct pattern in the upper soil horizon have been identified (S14/194, S14/324, S15/424, S15/421[6]), which appears to reflect the absence or near absence of modern cultivation. The A horizon is strongly enriched by sand and/or gravel and 25-40 cm thick. It is found with three units; the uppermost is the turf layer which is dark greyish-brown and includes organic material and, in terms of its particle size range, is well-sorted with a preponderance of material in the grades from medium sand size and finer. The middle unit is dark greyish-brown or black and includes organic matter. Texturally the middle unit is not sorted with a range of particle sizes up to coarse gravel represented. The lower unit contains the same range of particle sizes but has a paler matrix, yellowish-brown, reflective of the underlying B horizon. This unit contains relatively low quantities of charcoal. The contact between the A and B horizons is irregular with an almost wavy appearance in places. The upper element (top ~ 20 cm) of the B horizon is usually distinctly darker than the underlying material, with obvious enrichment with charcoal. It is possible that this is a buried remnant topsoil. While it is tempting to suggest that sandy and gravelly A horizon represents the remains of sand and gravel mulch, experimental gardening carried out by Gumbley indicates an alternative explanation; that this layer represents the demolished and decayed remains of sand and gravel growing mounds that have weathered to appear like a continuous layer. Importantly, when the A horizon material is removed by hand and the interface between the A and B horizons is examined with care it is clear that the irregularity visible in profile reflects the dimpled or undulating surface of the B horizon. This dimpling appears to be an artefact of the working of the soil with tools and from the castes of roots (of kumara).

[6] Refer Gumbley and Hoffmann 2013 regarding S14/194 but otherwise reports are in preparation.

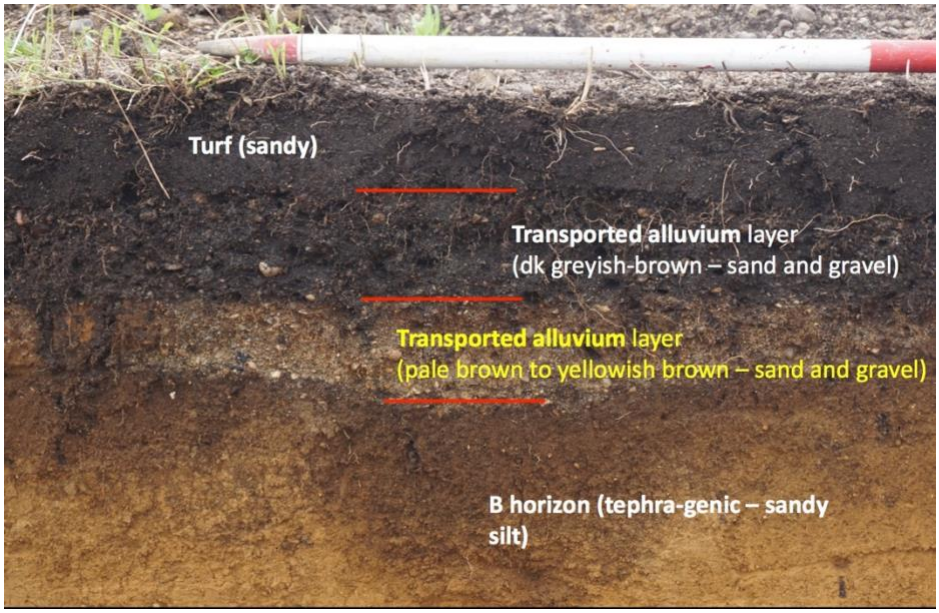


Figure 14: An example of an unmodified Māori-made soil horizon.

Figure 15: Example of the dimpled interface found at S15/374 at Ngaruawahia, garden site located on Waikato series soil.

As well as the identification of 'puke', other archaeological features have been found in association with gardens. These include drains where the gardens have encroached onto poorly drained soils, postholes for structures and the remains of fireplaces and umu.

We now also have direct evidence of what was grown in the gardens from the analysis of microfossils[7] found in the fill of sand-filled bowls and oval depressions at several sites. These analyses have found abundant kumara starch grains and also taro remains (Campbell & Harris, 2011; Gumbley & Hoffmann 2013; Hoffmann, 2011 & 2013). At site S14/222 a single yam starch grain was identified (Hoffmann 2011). Yam/uwhi, a tropical cultigen, has very rarely been identified in New Zealand but this find shows that this plant was also grown in the Waikato despite its sensitivity to a temperate climate.

Microfossil analysis also provides important data enabling reconstruction of the environment at the time the gardens were created and the impacts the gardening process had on the environment. Recent results are beginning to create a picture of the environmental changes resulting from the slash-and-burn process used to form gardens by Māori.

While we now have a better understanding of the anatomy of these sites this is based on the excavation of a handful of sites in any detail. Because of this there remains the potential that the understanding of that anatomy is incomplete. We do not understand how the features found so far actually function; i.e. what their purpose was. A significant handicap lies in the lack of archaeological remains that tell us about what was present above the ground surface since this aspect of the gardens has disappeared. For example, from the presence of the sand-filled bowls and depressions we can safely infer that the material quarried from borrow pits was deposited in the depressions after the soil had been removed. However, it is unclear whether the sand and gravel were used to form the mound part of the puke. Volumetric analysis of the modified soils for S14/201 suggests this was unlikely (Gumbley et al. 2004) but without similar research from other sites this evidence is weak. In an attempt to address this experimental gardening is being undertaken by Gumbley.

In much the same way that we are unsure about how the sand and gravel were used, we remain unsure about what function the process had. Several writers have suggested that the addition of alluvial material improved the friability and heat retention of the soil, reduced the likelihood of frost damage, improved fertility, provided a disease-free growing medium, and created a sharp interface between the added materials and buried horizons to encourage larger tuber formation (Best 1925; Challis 1976; Singleton 1988). Together, it is assumed, these modifications made soils more suitable for growing the subtropical kumara in New Zealand's temperate environment (Taylor 1958).

One effect we do know occurred was that soil drainage was changed by the addition of sand and gravel. The Tamahere series soils are described as "well to somewhat excessively drained" (McLeod 1984: 24), often increasing drainage in already well-drained soils (i.e. Horotiu loam and Waikato loam). Best (1925) and others remark on the desirability of free drainage for Māori when growing kumara. However, free drainage seems to have been desirable with such soil preferred, not only in the Waikato but more

[7] Microfossils are the microscopic remains of plants. Pollen, phytoliths and remains of vegetation such as starch grains and xylem cells are what is analysed.

generally where kumara were grown in New Zealand (Best 1925). The addition of ash from burning the existing vegetation growing on the garden site probably improved nutrient levels (Grange et al. 1939; Taylor 1958), particularly potassium and nitrogen, which, together with phosphorus, are important nutrients for kumara growth (Singleton 1988).

These gardens were a major part of the economy for Waikato Māori. Their construction was part of a complex and time-consuming process. First, the area where the garden was to be established had to be cleared from forest, which would have begun well in advance of the planting season. Then the garden had to be prepared. This stage in the process would have begun with the making of tools and baskets for digging and carrying the sand and gravel. The sand and gravel had to be quarried from the borrow pits but only after the yellowish-brown loam overburden had been removed. Then the material had to be carried to the plots and the plots laid out and puke formed. Following this planting could occur followed several months after by the harvest and construction of the kumara stores.

Even to form one garden was an energy intensive activity but when we also consider there were probably over 3000 ha of these gardens in the inland Waikato we can gain some understanding of the importance of these sites for tangata whenua.

5. Archaeological Survey: Methodology and Results

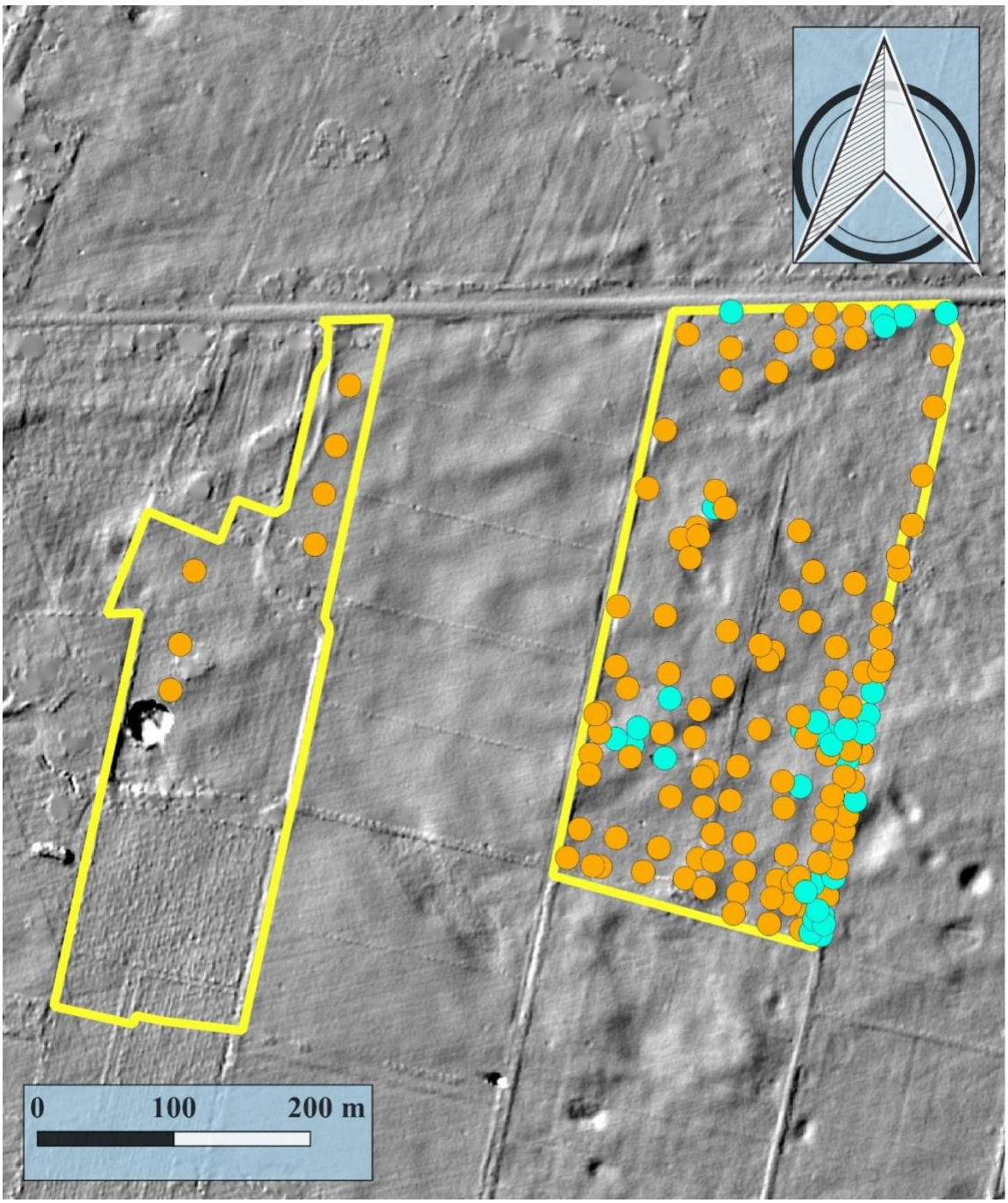


Figure 16: Plan of the 155 GPS points generated during pedestrian survey of the Pukekura development area. The GPS points were coded based on the examination of soil matrices, with orange point indicating a negative result and turquoise points indicating potential made soils.

An archaeological survey of the Pukekura Stage 3a and 3b development areas was carried out on September 5, 2018. Investigations involved two components: 1) systematic pedestrian auger survey of areas of archaeological potential, and; 2) the excavation of test pits excavated based on identified made soil distributions. Primarily, the auger survey was designed to improve the accuracy of recorded soil distributions and inform on the condition of Māori horticultural soils across the development area. Excavation of the test pits was undertaken to

more clearly establish the condition and morphology of subsurface soils while also assessing the degree and extent of potential modification from previous farming activities (e.g. ploughing).

5.1 Pedestrian auger survey

A pedestrian auger survey was carried out using a 25 mm screw-type auger to record the spatial distribution of Māori-made soils. The survey took place over a period of one day, by manually traversing and coring land within individual farm paddocks. Survey transects were run according to the shape of individual paddocks; generally, this involved orienting transects parallel to the longest fence line of the paddock to maximise the space incorporated by each transect.

Auger samples were examined at intervals varying between 30-60 m. Variation in the sampling distance related primarily to the homogeneity and consistency of nearby samples. For example, if anthropic sand and gravel had previously been identified as consistently occurring in the area, intervals were increased until the sand and gravel layer began to dissipate. Around the edge of archaeological sand and gravel deposits, sample spacing was decreased to improve the accuracy of the aggregate edge. If soil stratigraphy changed abruptly between two auger samples, additional samples were then taken between those points to evaluate that change. When possible, all cores were driven to below the natural A-B-horizon interface (i.e. generally < 0.5 m) to ensure that no additional archaeological soils were present underneath the sand and gravel and to observe the nature of the associated subsoil. Previously unrecorded possible borrow pits were also recorded with GPS points during the pedestrian survey.

Four sets of data were recorded for the soil surveying exercise: GPS number, presence/absence of horticultural soils, B-horizon type and notes. The GPS number and presence/absence data sets were mandatory entries, while B-horizon and notes were recorded only as necessary (e.g. when clear changes in the B-horizon were observed or when an unusual soil matrix was encountered).

After completion, a dataset containing a total of 155 GPS points was generated. The points were then loaded onto QGIS and coded based on the presence/absence of Māori horticultural soils. Following this, point distributions were examined visually to distinguish individual groups of horticultural soil. These point aggregates were then delimited with polygons to provide an approximate boundary and assessment of the soil extent relating to each tract of Māori-made soil.

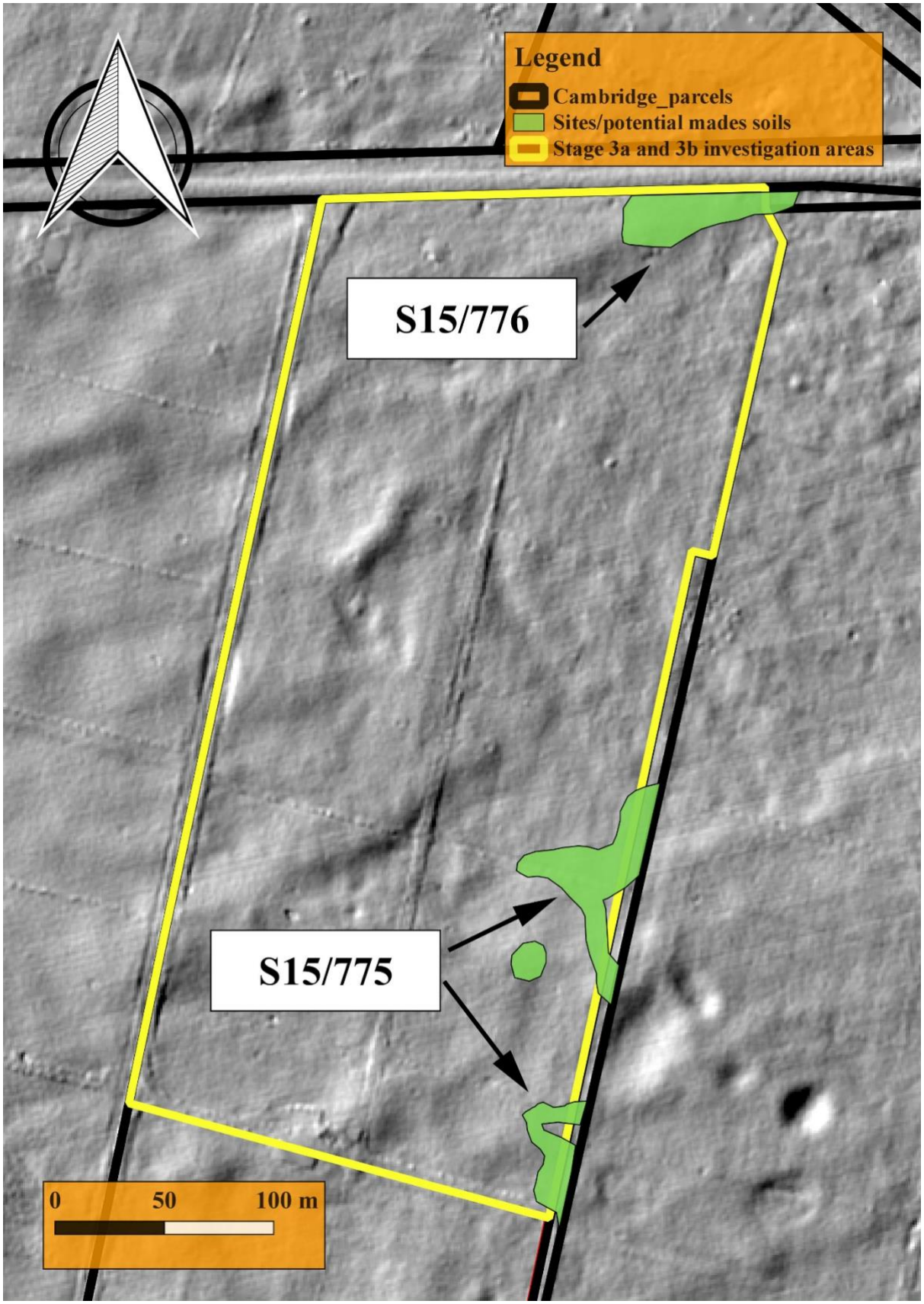


Figure 17: Polygons depicting the approximate boundaries of made soil and borrow pit aggregates (visible as depressions immediately east of the Stage 3b) identified during the survey. The polygons were drawn using the negative/positive GPS point data.

A total of 2 discrete Māori horticultural soil areas were identified from the data[8], incorporating approximately 0.41 ha of the 15.17 ha currently outlined for development in Stages 3a and 3b. The made soil tracts occur in relative proximity and are somewhat constrained in terms of spatial extent. The sites are spread across 12 variably sized paddocks towards the northern end of Lot 33 DP 523356, starting adjacent to the southern edge of Lamb Street and terminating 475 m south of Lamb Street. Together, the recorded sites span a distance no further than 100 m west to east[9]. The tracts are comparatively small when positioned against S15/683, for example. The reason for this is twofold: (1) made horticultural soils are invisible to most remote sensing techniques currently in use, meaning that the spatial extent of a site is usually refined and decreases after such surveys, and; (2) Māori horticultural sites are known to be less frequent farther from the Waikato River and these sites fall at the southern extent of the current distribution.

Table 2: The area and perimeter distance of the Māori horticultural sites identified within the investigated section of the Pukekura development area and shown in Figure 17.

Site	Area (m^2)	Perimeter (m)
S15/775	2876.44	696.88
S15/776	1275.25	523.53

It is important to articulate that the generated data is indicative only, and that it may not reflect the full distribution of the empirical record at these sites (i.e. they probably extend to the east in the vicinity of the visible borrow pits). Beyond test-pitting (see following section), subsurface trenching and areal archaeological investigation offer the best means of examining the material records of these sites.

5.2 Test pits

A total of 2 spade-dug test pits were excavated as part of the pedestrian auger survey. The test pits were excavated following the completion of the auger survey and were used to more clearly establish the nature and condition of soil stratigraphy in particular areas. More specifically, the test pits targeted locations with thick deposits of potential made soils, locations with anomalous soil results (i.e. unusual subsoil matrix and colour) and locations containing potential feature fill. Consequently, 2 test pits were excavated in S15/775. Two discrete tracts of made soils were present in S15/775, and single test pits were placed in each tract to examine the condition and depth of archaeological materials. Results from the test pits are described separately below.

[8] The areas are S15/775-S15/776, which are comprised of 4 tracts of potential made soils.
[9] This refers only to the investigated parts of these sites. Site S15/775 extends further eastwards based on the presence of a large borrow pits observed to the east of the race (see Figure 17).

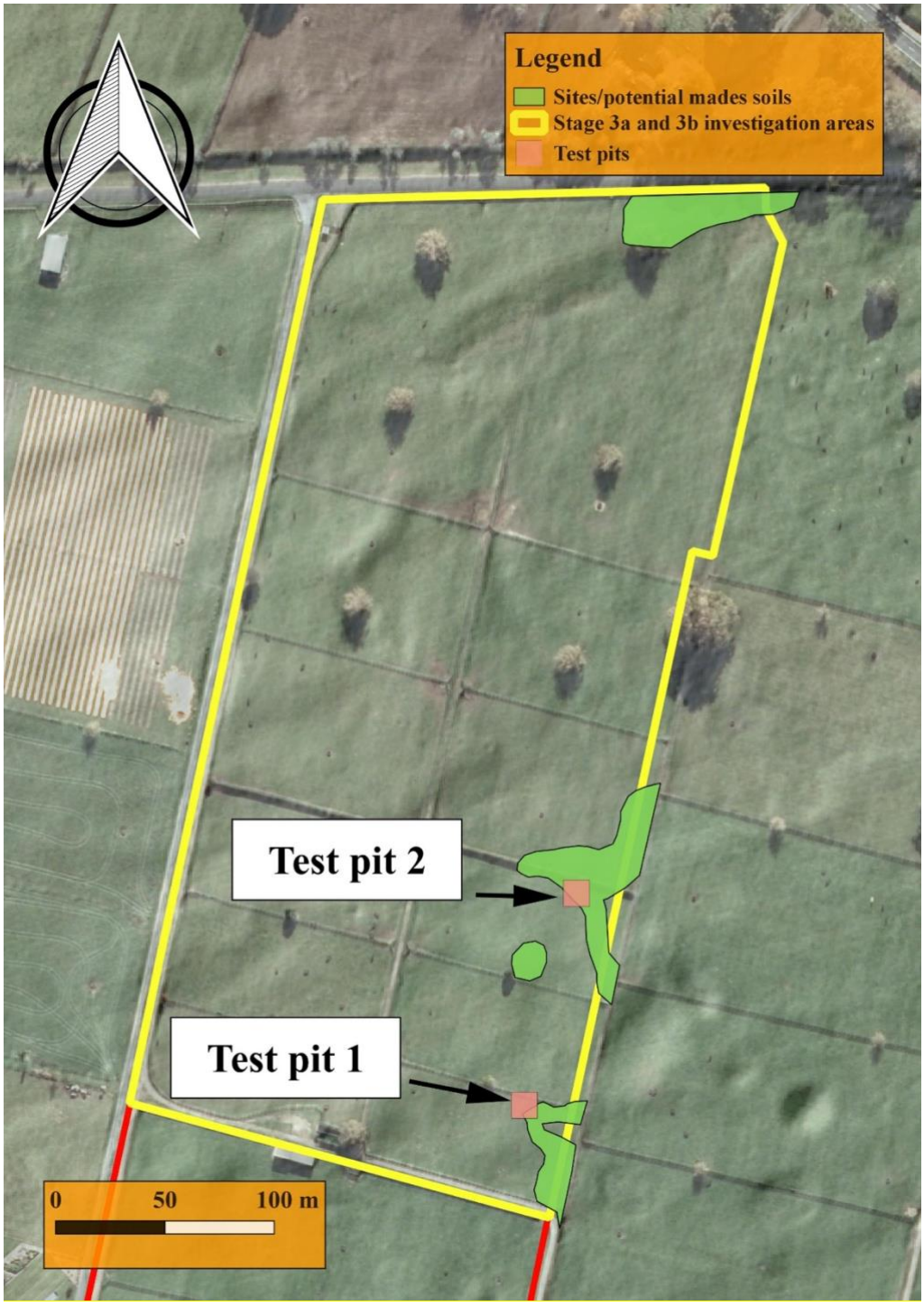


Figure 18: Location of excavated test pits in relation to sites defined inside the project area.

Test pit 1

Test pit 1 was excavated on the western end of the southern-most paddock. The test pit contained 25 cm overlying a charcoal-stained (10YR 2/1) sandy silt loam. The sandy silt loam extended to a depth of 40 cm. Notable disturbance was visible at the topsoil interface, which showed an irregular surface due to probable ploughing. The B-horizon interface, however, showed no evidence of disturbance in Test pit 1 was comprised of with a yellowish-

brown (10YR 4/4) sandy silt matrix. The observed characteristics of the B-horizon are consistent with Horotiu loam soils. The test pit was excavated to a depth of 54 cm, with soil disturbance present to a depth of 38 cm (i.e. just above the B-horizon). No made soils were observed in Test pit 1.

Test pit 2
Test pit 2 was excavated 100 m north of Test pit 1 and approximately 67 m northwest of a cluster of borrow pits adjacent to the eastern boundary of the Stage 3b investigation area. The soil profile of Test pit 2 contained 10 cm of topsoil, 11 cm of made soils and a 25 cm thick silt loam which sat on top of a yellowish-brown B-horizon at 46 cm of depth. The made soils contained two discrete elements resulting from probable ploughing in the upper margins of the soil profile. Specifically, the upper 5 cm of the made soil layer was characterised by a black (10YR 2/1) sand and gravel matrix, while the lowest 6 cm of the layer exhibited a paler grey to white colour with no evidence of disturbance. This indicates the lower part of the made-soil in this area and hence the underlying deposits have not been disturbed by modern activities (e.g. ploughing). The underlying silt loam fill exhibited a homogenous soil morphology with medium compaction and was yellowish-brown in colour (10YR 5/6). The morphology and depth of this layer indicates that it is potentially part of an archaeological feature or deposit (e.g. storage pit).

5.2.1 Discussion
One of the excavated test pits contained made soils relating to pre-European horticulture at sites S15/775. Test pits 1 and 2 both show that modern landscape modification has occurred in the investigation area, although the depth of this modification varies in both test pits[10]. At least one feature was identified through the excavation of Test pit 2. The feature contains one layer of stratigraphy and is overlaid by two elements of made soils. In addition to this, the disturbed black layer in Test pit 1 suggests that further archaeological deposits and/or features are present inside the investigation area. Further investigation of this area will be important for identifying features possibly related to occupation or other activities at S15/775.

6. Assessment of Archaeological and Other Values
Because the investigation area was thoroughly investigated and identified sites are reasonably small in spatial terms, we have a good understanding of the archaeology present inside this portion of the development area. Although we know that these sites are part of a broader system of pre-European gardening, and that these likely extend into other parts of the development, this assessment considers only the areas investigated during the outlined survey. Given the sites relative remoteness from the Waikato River and identified paa, there remains the potential for proximate domestic activity areas (i.e. kaainga) associated with the local gardens.

The following assessment addresses the archaeological values of sites: Their values are assessed against the Heritage New Zealand Pouhere Taonga criteria.

[10] The disturbance noted in Test pit 1 was considerably deeper than in Test pit 2.

Table 3: Table of the Heritage New Zealand Pouhere Taonga criteria for assessing archaeological and other values.

Value	Assessment
Condition	The condition of the sites is generally good to moderate, with some variability depending on the distribution of historic/modern landscape modification. Test pits show that portions of S15/775 have been affected by such processes, and the archaeology within these sites is not necessarily pristine. However, auger samples generally indicate that these effects are localised and as such they do not significantly affect the condition of the sites.
Rarity/uniqueness	The sites are not considered especially rare or unique in a local context. Several large pre-European gardening sites are recorded in proximity to the two identified in this report and such sites are known to occur this far from the river. However, it should be noted that these garden sites are close to the southern edge of the limits of Maaori-made soil complex in the Leamington area and so relatively remote from the Waikato River.
Contextual value	The sites do offer important contextual value, particularly in terms of refining chronologies for the settlement of Cambridge and the broader Waikato Basin. Specifically, early dates have been recovered from the Leamington area in previous investigation (Gumbley and Laumea 2017) closer to the Waikato River. Patterning in the chronological record is beginning to suggest that earlier sites are generally located closer to the river. Dates from this part of Leamington hold value in testing this hypothesis, especially when compared to the earlier dates in the area, because sites S15/775-S15/776 are located at the distant margins of this distribution.
Information potential	The sites hold moderate information potential. Valuable information can be gathered from associated made soils, particularly for dating and understanding the morphology and make-up of horticultural materials in this part of Leamington. Additionally, the presence of a feature ancillary to horticulture in Test pit 2 may provide inside into occupation or other activities. Information garnered from investigations at these sites also fits into a regional picture of gardening practices, and helps to further evaluate landscape-scale patterning associated with such sites in the Waikato.
Amenity value	There is no amenity value set aside for sites S15/775 and S15/776.
Cultural associations	Cultural associations are a matter for Tangata Whenua.

7. Archaeological Assessment of Effects

The development of the Pukekura project area will be extensive and relatively intensive with respect to the archaeological landscape within the project area. Therefore, the archaeological deposits represented by the identified archaeological sites S15/775 and S15/776 will be destroyed.

Because of the unique and non-renewable attributes of archaeological sites mitigation for the adverse effects will form the primary remedy.

This will take the following forms:

1. Identification of all archaeological deposits. This process has been initiated through the archaeological survey described in this report. However, the sub-surface nature of archaeological sites means that there is potential for further archaeological deposits to be identified during the development phase.
2. The principal form of mitigation will be thorough substantive archaeological investigation to record the archaeological deposits impacted. The nature and form of these will be determined by Heritage New Zealand through the statutory process prescribed by the Heritage New Zealand/Pouhere Taonga Act. (Note: An archaeological authority will be applied for from Heritage NZ.)

8. Recommendations

It is recommended:

1. That an application is made to HNZPT for a general archaeological authority under Section 44 of the *Heritage New Zealand Pouhere Taonga Act 2014* for all earthworks associated with the construction of the Tauranga Northern Link. The authority must be granted before the commencement of any earthworks.

2. That archaeological investigations are conducted to investigate and record the surface and subsurface archaeological evidence and information. An Archaeological Site Management Plan (ASMP) and a Research Strategy and Methodology will be drafted to manage this process.

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10. Appendices

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

ARCHSITE archaeological site recording scheme

Site Record Form

NZAA SITE NUMBER: S15/775

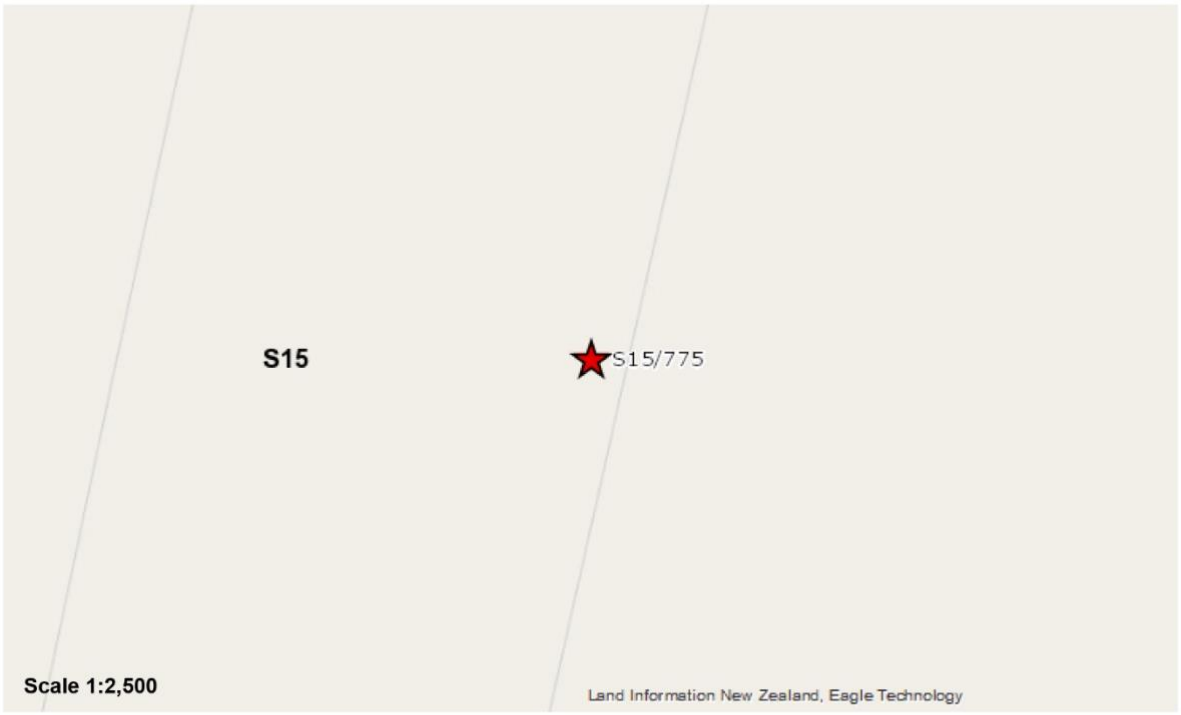
SITE TYPE: Maori horticulture

SITE NAME(s):

DATE RECORDED:

SITE COORDINATES (NZTM) Easting: 1818556 **Northing:** 5800193 **Source:** Handheld GPS

IMPERIAL SITE NUMBER: **METRIC SITE NUMBER:** S15/775



Finding aids to the location of the site

Located towards the eastern margins of 344 Lamb st (Lot 33 DP 523356), straddling fence line with adjacent Lot to east. Tracts located 320 m and 420 m south of the northern lot boundary respectively.

Brief description

Recorded features

Soil - made

Other sites associated with this site

Printed by: warrengumbley 17/09/2018

1 of 3

SITE RECORD HISTORY	NZAA SITE NUMBER: S15/775

Site description

Updated 10/09/2018 (Field visit), submitted by warrengumbley , visited 05/09/2018 by Laumea, Mana
Grid reference (E1818556 / N5800193)

Site is comprised of two made soil tracts which were identified during a pedestrian soil survey on 05/09/2018. The northern tract measures roughly 1867 m square and the southern 867 m square in size. Both tracts probably relate to a series of borrow pits located immediately to the east in the neighbouring land parcel. It is worth mentioning that, generally, the distribution of made soils and borrow pits in this area correlate to the presence/absence of the upper Hinuera alluvial terrace. This site follows this pattern.

Updated 10/09/2018 (Field visit), submitted by warrengumbley , visited 05/09/2018 by Laumea, Mana
Grid reference (E1818556 / N5800193)

Site is comprised of two made soil tracts which were identified during a pedestrian soil survey on 05/09/2018. The northern tract measures roughly 1867 m square and the southern 867 m square in size. Both tracts probably relate to a series of borrow pits located immediately to the east in the neighbouring land parcel; this is why they have been recorded as the same site. It is worth mentioning that, generally, the distribution of made soils and borrow pits in this area correlate to the presence/absence of the upper Hinuera alluvial terraces. This site follows this pattern.

Condition of the site

Updated 10/09/2018 (Field visit), submitted by warrengumbley , visited 05/09/2018 by Laumea, Mana

Moderate condition. There is evidence of possible disturbance from ploughing in the upper 25 cm of the soil profile in the southern tract. However, charcoal or bracken-stained deposit(s) are present in this area. The no evidence of disturbance was noted in soil from these deposits and it is possible they derive from intact archaeological features.
the northern tract is in good condition. No evidence of disturbance was observed in this tract.

Statement of condition

Current land use:

Threats:

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

ARCHSITE archaeological site recording scheme

Site Record Form

NZAA SITE NUMBER: S15/776

SITE TYPE: Maori horticulture

SITE NAME(s):

DATE RECORDED:

SITE COORDINATES (NZTM) Easting: 1818602 **Northing:** 5800502 **Source:** Handheld GPS

IMPERIAL SITE NUMBER: **METRIC SITE NUMBER:** S15/776

Finding aids to the location of the site

Site is located at the north-eastern corner of Lot 33 DP 523356, adjacent to the southern edge of Lamb Street.

Brief description

Recorded features

Soil - made

Other sites associated with this site

S15/775

Printed by: warrengumbley 17/09/2018

1 of 3

SITE RECORD HISTORY	NZAA SITE NUMBER: S15/776

Site description

Updated 10/09/2018 (Field visit), submitted by warrengumbley , visited 29/08/2018 by Laumea, Mana
Grid reference (E1818602 / N5800502)

A made soil tract measuring roughly 1275 m square in size, containing mixed sand and gravel materials relating to Maori horticulture. A series of large borrow pits are located approx. 80 m to the east, however it is currently not clear whether the made soils identified in this site are spatially contiguous to the borrow pits. The footprint of the made soil tract follows the upper Hinuera terrace in this part of the property and dissipates towards the west.

Condition of the site

Updated 10/09/2018 (Field visit), submitted by warrengumbley , visited 29/08/2018 by Laumea, Mana

No evidence for major landscape modification or intensive horticultural/farming practices identified in historic resources (e.g. historic survey plans, aerial imagery). Limited subsurface investigation has been completed in the made soil tract, so it is not yet clear whether the soil profile has been affected by ploughing or other land-use practices. If land-use history is consistent with other parts of the allotment, the made soils may be in good condition (i.e. the soils could be undisturbed, or preserved at lower stratigraphic levels.

Statement of condition

Current land use:

Threats:

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

SITE RECORD INVENTORY	NZAA SITE NUMBER: S15/776

Supporting documentation held in ArchSite

W GUMBLEY LTD.
ARCHAEOLOGISTS

Warren Gumbley
Principal/Director

PO Box 7108, Hamilton East, Hamilton 3247
cell 027 471 2165 **landline** 07 856 9071
email warren@archaeologist.co.nz

Pukekura Stage 3A and stormwater management area

Archaeological site instruction and research strategy: S15/789

Matthew Gainsford

November 2022

1 Purpose

1.1 The purpose of this document is an instruction to accommodate the modification of archaeological deposits (S15/789) within Te Mara Properties (TMP) Pukekura subdivision (Stage 3A) and the adjacent greenbelt, Lamb Street, Cambridge.

1.2 This plan includes the procedure for archaeological investigation of the entire area affected by the proposed development.

1.3 The anticipated audience of this plan is:

- Te Mara Properties
- Cogswell Surveyors
- Construction planners
- Construction contractors
- Construction workers/on-site crews
- Archaeological personnel
- HNZPT

1.4 This plan has been written to accompany an archaeological authority application to HNZPT to modify and/or destroy an archaeological site.

Figure 1. The subject area (Plan A), Pukekura subdivision Stage 3A, Lamb Street, Cambridge (Source: Cogswell Surveyors).

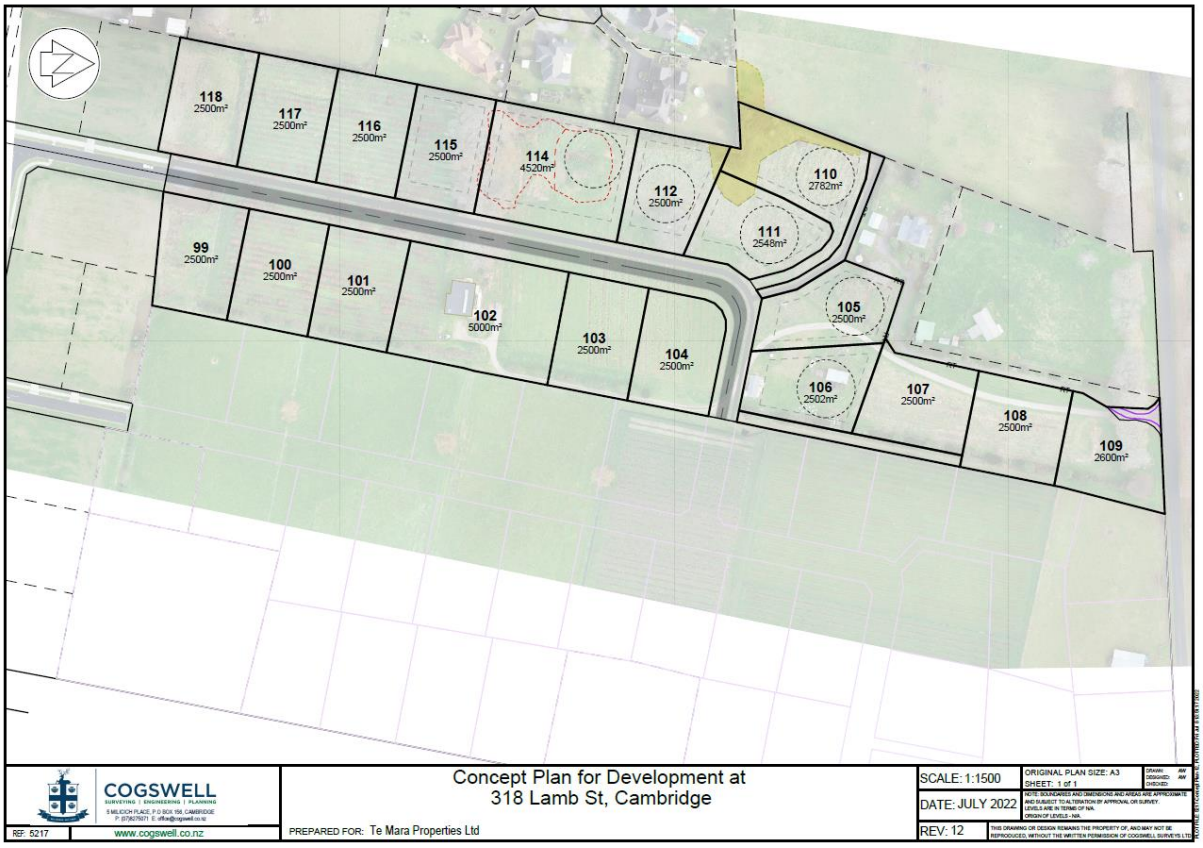


Figure 2. The subject area (Plan B), Pukekura subdivision Stage 3A, Lamb Street, Cambridge. This is the fall back plan for the proposed subdivision (Source: Cogswell Surveyors).

2 On-site archaeological briefing

Prior to the commencement of any earthworks defined in communications with/or in plans supplied by TMP, individuals, contractors or other persons responsible for undertaking on-site work shall be briefed by the archaeologist on potential archaeology at the site and on the protocols described in this instruction.

3 Archaeological investigation

The project archaeologist, their designated representative and their team shall, before any earthworks take place, investigate the site using archaeological best practice. All archaeological investigation shall be completed prior to any works taking place. Areas of archaeological significance within or adjacent earthworks may be encountered. Areas of archaeological significance adjacent earthworks could be discovered due to machinery movement or unforeseen eventualities that require an extension of earthworks. These may also be investigated. This will be determined at the discretion of the S45 archaeologist. Sufficient time must therefore be allowed for by the client so the archaeologist may conduct any investigation, recording and sampling of archaeological remains, features or deposits to their satisfaction before construction can progress.

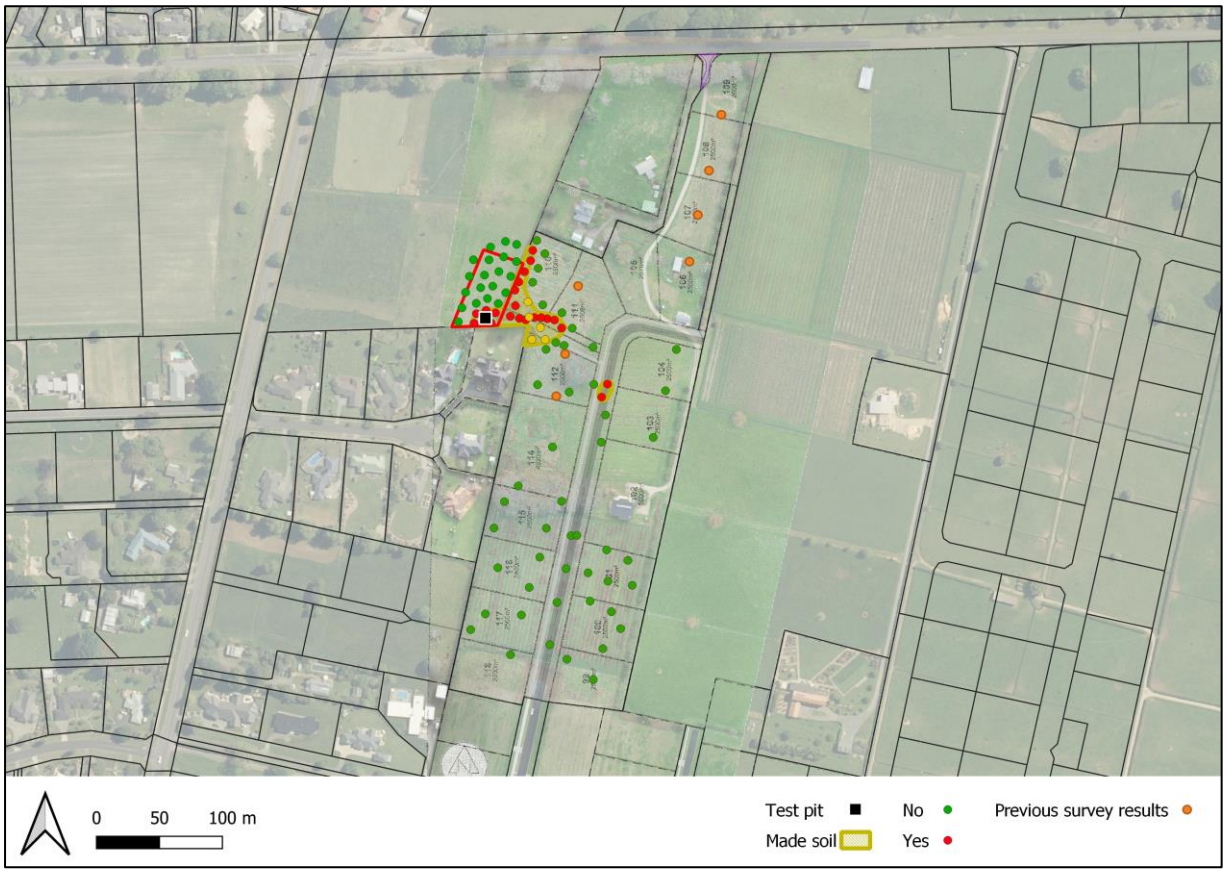


Figure 3. Pukekura subdivision stage 3A with the results of auger surveys. The yellow polygons identify site S15/789.

Figure 4. Site S15/789 within Stage 3A and the greenbelt (yellow polygons).

4 Archaeological recording and sampling

4.1 Investigation and recording

Where appropriate archaeological features will be examined by hand and recorded in sufficient detail to form a meaningful and lasting record to the satisfaction of the archaeologist. Recording shall incorporate, but be not limited to, photography, site descriptions, profile drawings and similar which are deemed best archaeological practice. Enough time shall be allowed for by the client so that the archaeologist can record any identified archaeology to their satisfaction.

4.2 Sampling

The sampling strategy will be that determined by the archaeologist during monitoring and investigation of archaeological remains, features or deposits. Sampling may include, but be not limited to, sampling of soils, midden, historic artefacts or other substrates or materials that are deemed by the archaeologist to have information potential.

5 Reporting of archaeological investigations

A report on the results of the archaeological investigation will incorporate results from fieldwork and any post-excavation analyses required. A preliminary report will be prepared and sent to HNZPT for approval followed by a final report.

6 Research and mitigation strategy

6.1 General methodology

Trenching/removal of soil across the site will be carried out with a hydraulic excavator. This will be conducted firstly as a series of trenches to identify feature spread. Areas of feature density will be expanded to investigate and record the site and features. Recording/excavation of archaeological features or deposits will be undertaken by hand (or partially by machine if necessary) using accepted archaeological practice (for example, field descriptions, scale drawings, photography and sampling). Spatial data will be recorded using an RTK GPS and/or total station.

Archaeological features and deposits will be examined to determine their relationship to the sites chronology and to help determine the sites function and form. The area in the immediate vicinity of identified features may be examined for the presence of domestic features that may indicate the degree of permanence or occupation of the site. This would include the presence or absence of dwelling structures.

Samples for radiocarbon dating will be collected as bulk samples. These will be analysed to determine the local paleoenvironment and to gain appropriate samples for dating analyses. Further material samples may be collected for specific dating or specialist analysis. The sampling strategy will be that determined by the archaeologist. Samples will be removed to W. Gumbley Ltd for sorting, wet sieving/drying and processing. Charcoal will also be extracted to facilitate species determination and reconstruction of the palaeo-environment of the site, as well as suitable samples for radiocarbon dating. The number of radiocarbon samples sent for analysis will be determined during investigation and post-processing of samples. Some samples may also be sent for specialist analysis.

7 Samples and analyses

7.1 Radiocarbon sample collection and selection

Pre-processed charcoal samples will be sent to Rod Wallace for speciation. Suitable samples for radiocarbon dating will be identified through this process.

Radiocarbon samples will be submitted for radiocarbon dating. Selection of dating samples will be based upon the analysis of charcoal samples or suitable shell examples.

Samples for radiocarbon dating will be recovered from secure contexts. Issues of in-built age, ‘outlying’ dates and large probability ranges are an issue in New Zealand archaeology. In order to address these problems, the following strategy will be applied:

- Shell from midden can be used for dating as a possible comparison against dates derived from charcoal.
- Identification of charcoal to short-lived species or young growth on longer-lived species will be selected.
- Priority will be given to dating samples from species that live to less than 50 years and/or seeds (whether from long or short-lived species).
- The dating of samples of mixed species will be avoided to minimise the effect of inbuilt age.
- Where possible, multiple samples from single contexts will be submitted for dating in order to address the issues of out-lying dates and to allow the reduction in probability ranges through Bayesian analysis.

7.2 Midden analysis

If midden is identified, shell material will be taken to W. Gumbley Ltd for initial assessment, washing drying and sorting. A selection of the samples will be analysed to determine shell species present, their relative frequency and size ranges (MNI and shell size).

7.3 Faunal analysis

All faunal material will be taken to W. Gumbley Ltd for initial assessment, washing, drying and sorting. Remains (fish, bird and other) may be submitted to specialists for identification.

7.4 Artefact analysis

Artefacts will be taken to W. Gumbley Ltd. All artefacts will be identified, photographed, described, measured and weighed. Sourcing analyses will be carried out where appropriate for lithic artefacts. Artefacts will be registered through the Ministry for Culture and Heritage.

8 Reporting

Reports on archaeological investigation will be completed as required; in accordance with any archaeological authority granted by HNZPT.

9 Responsibilities

The authority holder and contactors involved in the project have the following responsibilities regarding archaeological requirements:

- Meet/consult with the project archaeologist early in the development of the work programme to ensure appropriate allowance is made for archaeological monitoring and investigation to be carried out;
- To make available whatever machinery is needed by the archaeologist;
- Areas to be investigated by the archaeologist may only be investigated under the supervision of a qualified archaeologist;
- The contractor and/or authority holder will give reasonable notice of when earthworks are to take place so that investigation may be completed prior; and
- If any material or features that are suspected to be archaeological (as per the site briefing by the archaeologist) are encountered when the archaeologist is not present, the contractor will stop work and contact the project archaeologist immediately.

10 Protocols and procedures

Since it is not always possible to anticipate the presence of archaeological deposits, especially single artefacts (taonga) or burials (koiwi tangata), it is important that construction crews are briefed on archaeological and cultural issues and that they are aware of the protocols surrounding their discovery (refer page 6).

11 Contact for the Project Archaeologist

Warren Gumbley (W Gumbley Ltd) 027 471 2165

Matthew Gainsford (W Gumbley Ltd): 0210594957

Protocols Relating to Koiwi Tangata (Human Remains)

If bone material is identified that could potentially be human, the following protocol will

be adopted:

1. Earthworks/harvesting works should cease in the immediate vicinity while an Archaeologist establishes whether the bone is human.
2. If it is not clear whether the bone is human, work shall cease in the immediate vicinity until the University's reference collection and/or a specialist can be consulted and a definite identification made.
3. If bone is confirmed as human (koiwi tangata), the Archaeologist will immediately contact Iwi representatives (if not present), Heritage NZ and the NZ Police.
4. The site will be secured in a way that protects the koiwi as far as possible from further damage.
5. Consultation will be undertaken with all Iwi representatives as outlined in the authority, the Heritage NZ Regional Archaeologist and the authority holder to determine and advise the most appropriate course of action. No further action will be taken until responses have been received from all parties, and the koiwi will not be removed until advised by Heritage NZ.
6. The Iwi representatives will advise on appropriate tikanga and be given the opportunity to conduct any cultural ceremonies that are appropriate.
7. If the Iwi representatives are in agreement and so request, the bones may be further analysed by a skilled bio-anthropological specialist prior to reburial, in line with the *Heritage NZ Guidelines Koiwi Tangata Human Remains* (2014).
8. Activity in that place can recommence as soon the bones have been reinterred or removed and authorisation has been obtained from Heritage NZ.

Protocols Relating to Taonga (Maori Artefacts)

Maori artefacts such as carvings, stone adzes, and greenstone objects are considered to be taonga (treasures). These are taonga tuturu within the meaning of the Protected Objects Act 1975. Taonga may be found in isolated contexts, but are generally found within archaeological sites. If taonga are found the following protocols will be adopted:

1. The area containing the taonga will be secured in a way that protects the taonga as far as possible from further damage, consistent with conditions of the Authority.
2. The Archaeologist will then inform Heritage NZ and the Iwi representatives so that the appropriate actions (from cultural and archaeological perspectives) can be determined.
3. These actions will be carried out within an agreed stand down period and work may resume at the end of this period or when otherwise advised by Heritage New Zealand.
4. The Archaeologist will notify the Ministry for Culture and Heritage of the find within 28 days as required under the Protected Objects Act 1975. This can be done through the Auckland War Memorial Museum.
5. The Ministry for Culture and Heritage, in consultation with the tangata whenua, will decide on custodianship of the taonga (which may be a museum or the iwi whose claim to the artefact has been confirmed by the Maori Land Court). If the taonga requires conservation treatment (stabilisation), this can be carried out by the Department of Anthropology, University of Auckland (09-373-7999) and would be paid for by the Ministry. It would then be returned to the custodian or museum.

MEMORANDUM OF UNDERSTANDING

Te Mara Properties Limited

Ngāti Koroki Kahukura Trust

Ngāti Hauāā Iwi Trust

Ngāti Hauā
Iwi Trust

Contents

Dated 2022

Parties

TE MARA PROPERTIES LIMITED (TMPL)

NGĀTI KOROKI KAHUKURA through the Ngāti Koroki Kahukura Trust ('NKKT')

NGĀTI HAUĀ through the Ngāti Hauā Iwi Trust ('NHIT')

1 Background

1.1 TMPL is a private limited liability Company that owns the site at 318 Lamb Street, Cambridge.

1.2 TMPL proposes to develop the site into a residential subdivision which is scheduled to commence construction in 2023, subject to the approval of appropriate resource consents. Herein referred to as the 'Project'.

1.3 Ngāti Koroki Kahukura and Ngāti Hauā are mana whenua of the area on which the TMPL subdivision will be located.

1.4 Ngāti Koroki Kahukura is represented by the Ngāti Koroki Kahukura Trust (NKKT) and Ngāti Hauā are represented by the Ngāti Hauā Iwi Trust (NHIT).

2 Purpose of this document

2.1 The parties have decided to formalise their discussions by way of this Memorandum of Understanding (MOU) to recognise and enhance the positive and effective relationship which has been achieved between the parties through an open and frank dialogue.

2.2 The intent of this MOU is to record the agreements to date between TMPL and NKKT and NHIT in relation to the Project and to assist TMPL to proceed with the successful completion of the Project's design and construction.

2.3 This MOU also outlines the protocols for collaborative actions and works agreed between the parties.

3 Relationship with other agreements

3.1 The purpose of this MOU between TMPL and NKKT and NHIT is to deal with specific issues with the Project.

4 General

4.1 This MOU is intended to remain operational until the completion of the Project scheduled to occur in 2023 and 2024.

4.2 This MOU and any appendices to it can be amended at any time with the agreement of all parties.

4.3 This MOU is not intended to be, and is not, legally binding on the parties.

4.4 The parties acknowledge that TMPL has statutory responsibilities, and duties under the Resource Management Act 1991 (RMA). While the parties have committed to work together constructively and in good faith in relation to this agreement, it is recognised and agreed that this agreement will in no way affect TMPL's ability to perform those statutory responsibilities, and duties.

The parties acknowledge that, ultimately, the conditions on the Project will be determined by the appropriate consent authorities under the relevant statutory processes.

5 Principles of this MOU

5.1 The principles that underpin this MOU are:

5.1.1 NKKT and NHIT will have active input into decision making concerning cultural matters involving the specific issues discussed in section 7 and 8 of this MOU.

5.1.2 TMPL will assist where possible, practicable, reasonable and affordable with respect to Project related matters with the capacity and capability building for NKKT and NHIT.

5.1.3 The parties are committed to establish and maintain a sustainable and culturally safe engagement process.

5.1.4 To ensure an on-going and meaningful relationship and co-operation the parties agree to do the following:

a. Meet on a regular basis with NKKT and NHIT representatives to ensure all relevant people are informed of issues and that relevant information is shared.
b. Whenever possible, the parties will give each other prior notice of the agenda for each meeting to ensure early engagement between the parties is achieved.
c. Consider, investigate, and resolve issues as they arise in a manner that maintains the integrity, professionalism, and statutory accountabilities of the other party.
d. Act in good faith in meeting their responsibilities under this agreement and in resolving differences of opinion.

6 Legislative context

6.1 As well as the RMA considerations and other statutory obligations the Project must also give consideration to the following Legislation;

a. Waikato Tainui Raupatu Claims Settlement Act 1995
b. Waikato Tainui Raupatu Claims River Settlement Act 2010
c. Ngāti Koroki Kahukura Claims Settlement Act (2014)
d. Ngāti Hauā Claims Settlement Act (2014)
e. Heritage New Zealand Pouhere Taonga Act (2014)

6.2 The Waikato Tainui Environment Plan (2013) has been notified with Local Body and

Regional Councils. This Project is therefore required to consider the plan.

6.3 Ngāti Hauā Iwi Trust Environmental Plan "Te Rautaki Tamata Ao Turoa o Hauā' (2019) has been notified. This project is therefore required to consider the plan.

7 Project background

7.1 The Project is for the construction a residential subdivision and the associated roads, services and earthworks. The subdivision will create 19 residential lots, a road to vest in Council, and one Local Purpose Reserve (walkway) to vest in Council and a right of way.

7.2 There are two possible arrangements for the lot layout. The number of lots and location of the road to vest does not change, however the walkway and some of the lot locations do vary. Either layout may be approved, consented and developed.

7.3 Following any statutory or other resource management processes, further design modifications may be required to meet consent conditions and funding constraints, as well as detailed design to enable the construction of the subdivision.

8 TMPL engagement with NKKT and NHIT

8.1 The parties have been in consultation via email since November 2022.

8.2 Since then, the parties have actively engaged in the writing of this MOU.

8.3 In particular, TMPL have consulted NKKT and NHIT about:

a. The effects of the Project on the horticultural soils within RT 885366 (project site), which will result in them being modified and destroyed;
b. The effects of the project on the horticultural soils within the town belt reserve in Council ownership, by completing earthworks to complete an overland flow path.

8.4 The parties agree that:

a. TMPL will engage with NKKT and NHIT about the measures to avoid, remedy or mitigate the adverse effects, from the construction and operation of the Project, on the environment and about any other measures to be included in the Project to enhance the environment.

b. TMPL will advise NKKT and NHIT of opportunities to tender for part(s) of the construction of the Project.

c. TMPL does not have any roads that will require name (road extensions only.

d. That the Ngāti Hauā Mahi Trust and/or the Sanctuary Mountain Maungatautari eco-nursery' have the opportunity to tender for, and price any planting requirements for the subdivision.

Best Practice Guidelines

e. The best available practices will apply to all construction and earthwork activities.

9 Archaeological and Heritage Sites

9.1 An application for 'Authority to modify or destroy an archaeological site' is required to be applied for to Heritage New Zealand. W Gumbley Limited Archaeologists (Warren Gumbley) is responsible for managing this project.

9.2 TMPL will provide/undertake engagement with NKKT and NHIT about the appropriate technique and location to mark and record significant identified features, if found. This may include a commemorative plaque and/or signage or other similar technique. If a commemorative plaque or feature is proposed, NKKT and NHIT will provide TMPL with the information that is to be included.

9.3 In the event of any discovery of additional archaeological sites, köiwi or taonga during construction of the Project, the procedures set out in the "Discovery Protocols of Heritage New Zealand" will be followed.

9.4 Opportunities and resourcing will be provided by TMPL to NKKT and NHIT kaitiaki, (cultural monitors) to oversee soil stripping excavations specifically with regard to the archaeological investigations, and expert cultural advice will be provided as required. See section 12 for costs.

9.5 TMPL recognises that Waikato-Tainui are duty registered as Temporary Custodians of Taonga tûturu found within the Waikato rohe and/or deemed to be of Waikato origin. Therefore, any discovered taonga will immediately be provided to NKKT and NHIT on behalf of Waikato-Tainui, until ownership is determined.

9.6 TMPL will ensure appropriate transport of taonga is provided to the designated storage location to ensure the protection of the taonga. (Ongoing storage requirements is covered as a requirement by the Ministry of Culture and Heritage).

10 Landscaping

10.1 TMPL will make extensive use of indigenous plants in landscaping the Project where possible.

10.2 Plants used in the landscaping will be eco-sourced.

11 Stormwater

11.1 During construction, TMPL will manage, treat and dispose of stormwater from the construction site using clean and dirty water diversion channels, silt fences and sediment retention ponds, in accordance with an Erosion and Sediment Plan approved by Waipa District Council and/or the Waikato Regional Council.

11.2 The parties acknowledge that ultimately the consent conditions on the project will be determined by the appropriate consent authorities under the relevant statutory processes.

12 Administration Costs

12.1 Hourly rates will cover the attendance at management hui, cultural monitor hours and koha for kaumatua service – eg karakia and whakawaatea.

12.2 Hourly rate (including 10% administration costs) is $100 per hour per monitor.

12.3 NKKT and NHIT will invoice the developer by the 20th of the month for payment by the 20th of the month following.

12.4 Timesheets for management attendance, cultural monitors and kaumatua will be provided by NKKT and NHIT and signed off by the appropriate member of TMPL.

13 Conflicts and dispute resolution

13.1 Where a conflict arises between the parties that is unable to be resolved at the operational level, then:

a. The conflict shall be elevated to any senior management as agreed between the parties; and if senior management are unable to resolve the conflict within a reasonable period, as agreed by the parties, then the parties may appoint a mutually agreed mediator with the intention to resolve disagreement.

Execution
Signed for and on behalf of
Te Mara Properties Limited

Simon Makgill
TMPL **Date:**

Signed for and on behalf of
NGĀTI KOROKI KAHUKURA TRUST

05/12/2022

Karaitiana Tamatea
Co-Chair Ngāti Koroki Kahukura Trust **Date:**

Signed for and on behalf of
NGĀTI HAUĀ IWI TRUST

Lisa Gardiner
General Manager Ngāti Hauā Iwi Trust **Date:** 5/12/22

DRAFT
Not consented

COGSWELL
SURVEYING | ENGINEERING | PLANNING
5 MILLTON PLACE, P O BOX 158 CAMBRIDGE
P: (07) 827 5071 E: office@cogswell.co.nz
www.cogswell.co.nz

REF: 5217

Concept Plan for Development at 318 Lamb St, Cambridge

PREPARED FOR: Te Mara Properties Ltd

SCALE: 1:1500
ORIGINAL PLAN SIZE: A3
SHEET: 1 of 1
DRAWN:
DESIGNED:
CHECKED:
DATE: MAY 2022
NOTE: BOUNDARIES AND DIMENSIONS AND AREAS ARE APPROXIMATE AND SUBJECT TO ALTERATION BY APPROVAL OR SURVEY
LEVELS ARE IN TERMS OF N/A
ORIGIN OF LEVELS - N/A
REV: 10

DRAFT
Not consented

COGSWELL
SURVEYING | ENGINEERING | PLANNING
1 MUOCH PLACE, P.O BOX 158, CAMBRIDGE
P: (07)8277071 E: office@cogswell.co.nz
www.cogswell.co.nz

RFF: 5217

Concept Plan for Development at 318 Lamb St, Cambridge

PREPARED FOR: Te Mara Properties Ltd

SCALE: 1:1500	ORIGINAL PLAN SIZE: A3 SHEET: 1 of 1	DRAWN DESIGNED CHECKED
DATE: JULY 2022	NOTE: BOUNDARIES AND DIMENSIONS AND AREAS ARE APPROXIMATE AND SUBJECT TO ALTERATION BY APPROVAL OR SURVEY. LEVELS ARE IN TERMS OF N/A. ORIGIN OF LEVELS - N/A	
REV: 12	THIS DRAWING OR DESIGN REMAINS THE PROPERTY OF, AND MAY NOT BE	

APPENDIX F

ITA

Integrated Transport Assessment

318 Lamb Street, Leamington, Cambridge

Blue Wallace 114_09

Gray Matter

APPROVAL

Prepared by	Reviewed by
	
Matthew Chamberlin	Melanie Parsons
Date: 7/11/23	Date: 9/11/23

VERSION CONTROL

Version	Date	Author	Reviewed by	Summary of Revision
1	10/11/23	Matthew Chamberlin	Melanie Parsons	Final

TABLE OF CONTENTS

1. INTRODUCTION

1.1. Background

Blue Wallace on behalf of Muscle Developments Ltd has engaged Gray Matter Ltd to provide an Integrated Transport Assessment (ITA) to support the land use consent for a large-lot residential subdivision. The development is at 318 Lamb Street, Leamington in the Pukekura subdivision. The site locality is shown in the figure below.

Figure 1: Area overview (Pukekura subdivision outlined in yellow and proposed development in red)

1.2. Purpose and Basis of Report

The purpose of this report is to assess the transportation effects of the proposal to support the consent application. We have assessed the proposal based on the criteria described in Section 21.2.16.2 of the Waipā District Plan for a Simple Integrated Transportation Assessment.

This report is based on the following information:

- Blue Wallace Engineering Plans, dated 20 October 2023 (BW Ref. 23095-00-EN-300-302&350-352)
- Blue Wallace Lot Plans, dated 19 October 2023 (BW Ref. 23095-00-PL-100-103)
- Pre-Application meeting notes, dated 28 June 2023 (Application ref: PG/0070/23)

2. EXISTING SITE AND TRANSPORT ENVIRONMENT

2.1. Site and Surrounding Land Use

The existing site is zoned large lot residential and is located within the Leamington Large Lot Residential Structure Plan Area (Growth Cell C6) on the southeastern boundary of Cambridge. The site was previously a Blueberry Farm. Most of the lots on the existing streets within the Pukekura subdivision have already been developed.

2.2. Surrounding Transport Environment

Lamb Street is classified as a Minor Arterial Route in the District Plan road hierarchy, with a One Network Framework (ONF) classification of Rural Connector. Lamb Street carries approximately 910 veh/day (Mobile Road, 30/06/2021) and has a posted speed limit of 80km/h. Sunline Drive has a Give Way control where it intersects with Lamb Street.

Roto O Rangi Road is classified as a Collector Road and has an ONF classification of Local Street. Roto O Rangi Road carries approximately 2,200 veh/day (Mobile Road, 23/06/2023) and has a posted speed limit of 60kmh which becomes 100kmh south of the intersection with Seachange Drive. Seachange Drive has a Stop control where it intersects with Roto O Rangi Road.

The existing streets in the Pukekura development have an ONF classification of Local Streets and a posted speed limit of 50kmh. Mobile Road shows the estimated traffic volume within the Pukekura development was 50 - 100 veh/day as of 15 June 2020. It is likely that the traffic volume has grown in the past three years as more properties establish in the area. We expect the existing traffic volume on the streets within Pukekura to be in the order of 100-450 veh/day.[1].

Pukekura subdivision includes 2.5m wide paths for shared walking and cycling use which connect to an existing path on Roro-O-Rangi Road. There are no paths on Lamb Street at Sunline Drive. Lamb Street has off-road shared trails west of the intersection with Roto O Rangi Road. The Te Awa River Ride is located on Mangatautari Road, 350m east of Sunline Drive.

2.3. Crash History 2019-2023

The Waka Kotahi Crash Analysis System (CAS) shows two reported crashes have occurred in the most recent 5-year period. Both crashes were single vehicle run-off-road crashes on the grass berm on the north side of Lamb Street near the intersection with Sunline Cresent. One crash resulted in minor injury to the vehicle occupant. There does not appear to be an existing crash issue on the surrounding road network.

3. THE PROPOSAL

3.1. Description

The proposal is to develop 20 lots with a new road extension off Te Mara Drive. One lot (Lot 14) will have access onto Lamb Street and the balance (19 lots) will be accessed from the Te Mara Drive extension. The development is proposed to be split into two stages with Lot 1 and Lot 14 being constructed in Stage 1 and the rest being constructed in Stage 2, as shown in the figure below.

[1] Based on *Research Report 453 Trips and parking related to land use* (RR453) (Waka Kotahi, November 2011) using the 85th percentile trip rate for outer suburban residential dwellings of 8.2 veh/day (0.9 veh/h) and an estimate of 100 developed dwellings, generating 820 veh/day (90 veh/h) and assuming trips equally distributed to the Lamb Street and Roto O Rangi Road intersections.

We understand that the extension of Te Mara Drive will be a temporary cul de sac. When the adjacent lot to the east is developed, we understand the Te Mara Drive extension will connect to the existing street network and Orua Crescent. This will provide a street layout consistent with the typical grid layout throughout Cambridge.

Figure 2: Layout and staging of proposed development

3.2. Trip Generation

Waka Kotahi's *Research Report 453 Trips and parking related to land use* (RR453) show an 85th percentile trip generation rate of 8.2 veh/day and 0.9 veh/h for outer suburban dwellings. Nineteen of the proposed lots will have access to Te Mara Drive and are expected to generate 156 veh/day and 17 veh/h in a peak hour. The estimated peak hour trips equate to one additional vehicle every 3.5 minutes.

Trips are expected to primarily be towards Cambridge, either by a left turn from Sunline Drive onto Lamb Street or a right turn from Seachange Drive onto Roto O Rangi Road (and the opposite for the return trip). If all traffic generated by the development were to use just one of the intersections this would equate to an increase in traffic volume of approximately 17% on Lamb Street to approx. 1,060 veh/day or 7% on Roto O Rangi Road to approx. 2,340 veh/day.

In a peak hour, the total number of vehicle movements in/out of Pukekura is expected to be about 110 veh/h which equates to one vehicle movement every 33 seconds.

We expect the streets within Pukekura will be well within theoretical lane capacity of 1,000-1,400 veh/h when fully developed and that the addition of trips to the surrounding road network will have negligible safety and efficiency effects.

3.3. Road Layout

The proposed road layout differs from the layout depicted in District Plan Appendix S18 - Leamington Large Lot Residential Zone Structure Plan, shown in the figure below. The proposed road alignment follows the boundary of the subject site, enabling more consistent lot shapes and sizes to be developed. The Structure Plan is unusual in that it shows a layout of streets that differs from the grid or modified grid layout that is typical throughout Cambridge.

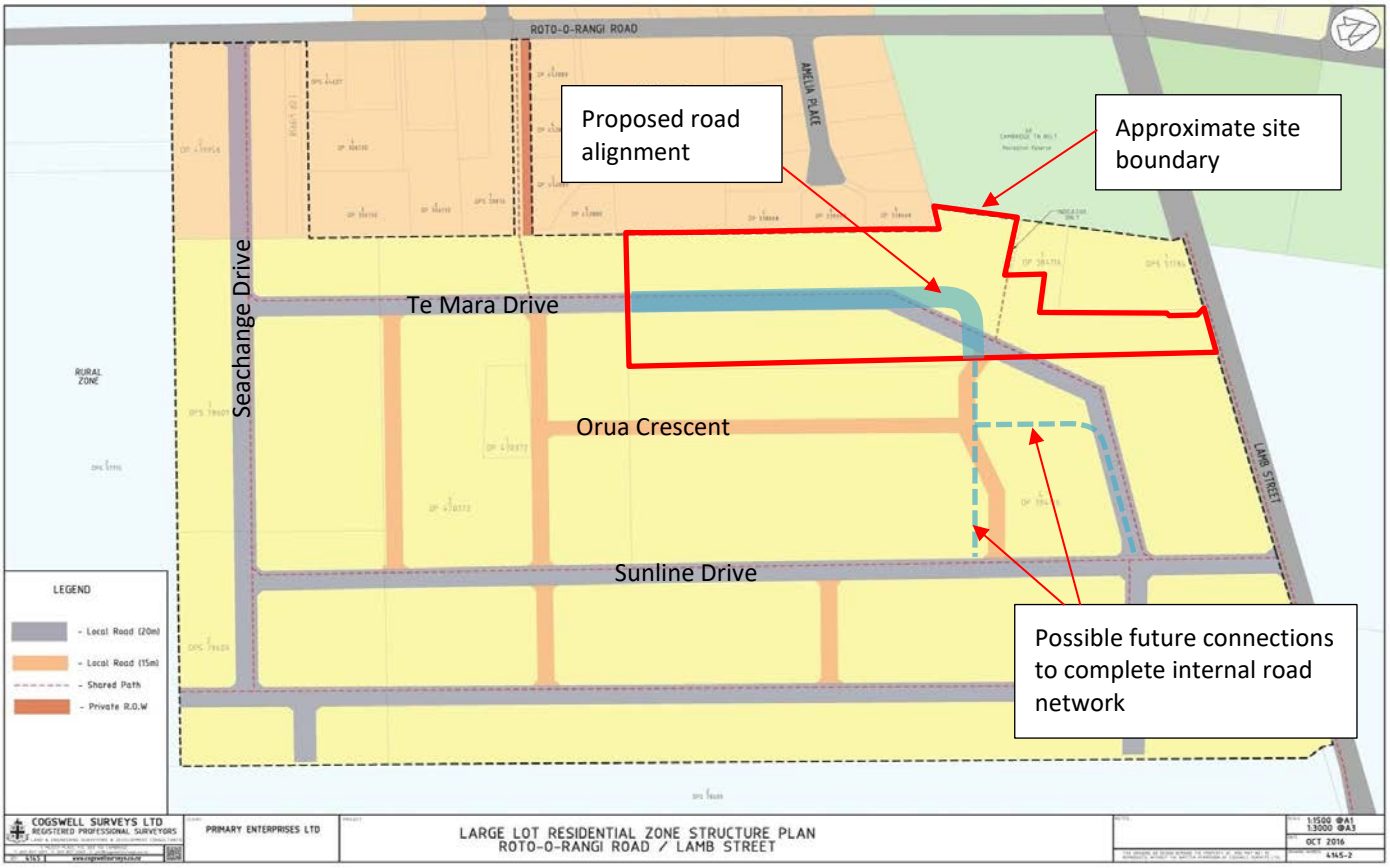


Figure 3: Structure Plan with overlay of proposed road alignment

The proposed road alignment does not preclude completion of the internal road network when the lot to the east is developed. Possible future road connections and intersections to complete the internal road network are shown in Figure 3.

We consider the proposed road layout is consistent with the intent of the structure plan, the existing road layout within Pukekura, and allows for priority-controlled intersection arrangements that are typical for local streets. We consider the effects of the departure from the Structure Plan are likely to be less than minor.

3.4. Road Cross-sections

The proposed road and right of way cross-sections comply with Appendix T4 - Criteria for Public and Private Roads, except the road carriageway is edged with a flush concrete kerb instead of a 0.75m unsealed shoulder. The proposed road cross-section is consistent with the existing streets in Pukekura subdivision and consists of:

- 20m road reserve width
- 7.0m carriageway width
- 2.0m wide grass swale each side
- 2.5m wide footpath on one side (suitable for low-volume shared use)
- 3.0m wide berms with street trees.

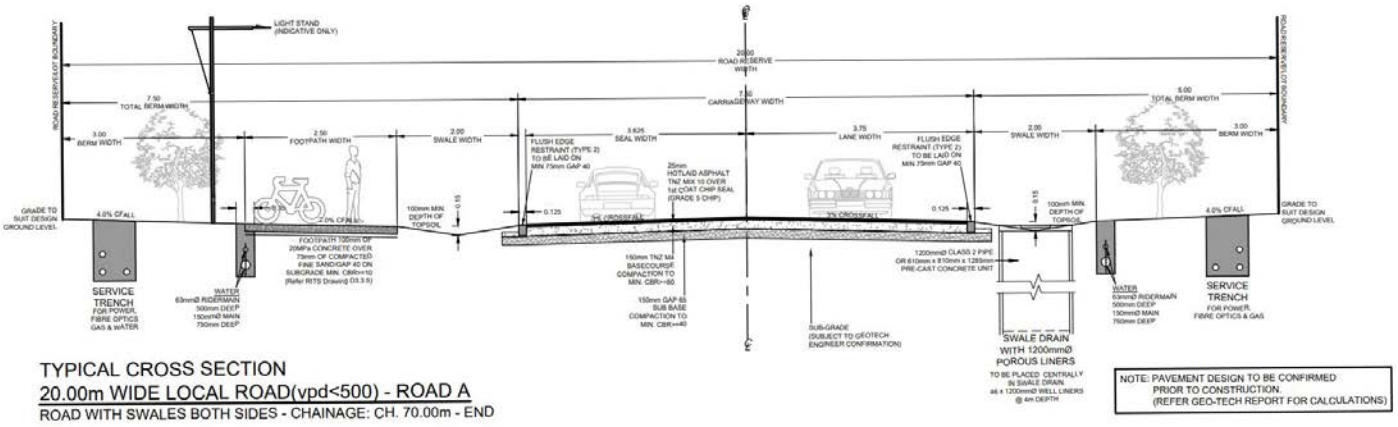


Figure 4: Proposed road cross-section

Lot 12 and Lot 13 will be accessed by a right of way. The proposed cross-section for the right of way is shown below.

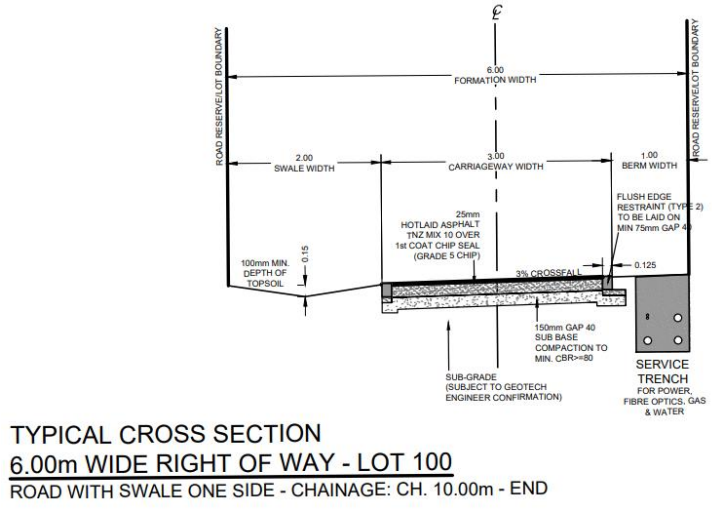


Figure 5: Proposed Right of Way cross section

3.5. Vehicle Tracking

Vehicle tracking has been provided for the proposed development for the curve and the temporary turning head at the end of the road, these can be seen in the Figure below. A medium rigid (8m) truck can use the turning head and vehicle crossing for Lots 12 and 13 without tracking into the berm.

The vehicle tracking shows a potential issue between opposing vehicles at the curve. There is insufficient clearance for an 8m truck and 99 percentile car to safely pass. We recommend the carriageway is widened at the curve to accommodate both vehicles and provide the required clearances as per *RTS18 New Zealand on-road tracking curves for heavy vehicles (Waka Kotahi, 2007)*.

Austroads Guide to Road Design Part 3: Geometric Design (section 7.9) recommends pavement widening on horizontal curves is based off vehicle tracking templates for small radius curves. The proposed curve radius is 15m.

We recommend widening the curve to accommodate the vehicle swept paths and clearances shown below, without overlap.

Figure 6: Vehicle tracking for a medium rigid truck (8m) and 99 percentile car

3.6. Vehicle Crossings

3.6.1. Location of Vehicle Crossings

The proposed layout plan (Figure 2) shows the location of vehicle crossings. The vehicle crossings for Lot 1, 8 and the right of way for Lot 12 and 13 are confirmed and will be formed during construction of Stage 1. Lot 14 will use the existing vehicle crossing on Lamb Street. All other vehicle crossing locations are indicative only and will be confirmed during development of the lots.

The location and spacing of vehicle crossings are expected to comply with Rule 16.4.2.5 of the District Plan which requires 30m separation from an intersection and 20m between adjacent vehicle crossings. Any departures from the vehicle crossing location and spacing requirements are not expected to result in adverse safety effects, provided sight distance requirements are met or the effects of a shortfall in sight distance are considered less than minor.

3.6.2. Sight Distance

The *Regional Infrastructure Technical Specifications* (RITS) refers to Waka Kotahi's Road Traffic Standards 6 (RTS6) *Guidelines for sight distance at driveways* for sight distance at vehicle crossings. At low volume driveways on local roads with a 50km/h posted speed limit (assumed 60km/h 85th percentile operating speed), RTS6 requires a sight distance of 55m.

Given the nature of the development we expect the operating speed to be less than 60km/h. However, at least 55m of sight distance will be met on the straight sections of road, as shown in the figure below.

Figure 7: View of an existing street in the subdivision showing sight distance

Sight distance at the vehicle crossings near the curve are shown in the figure below.

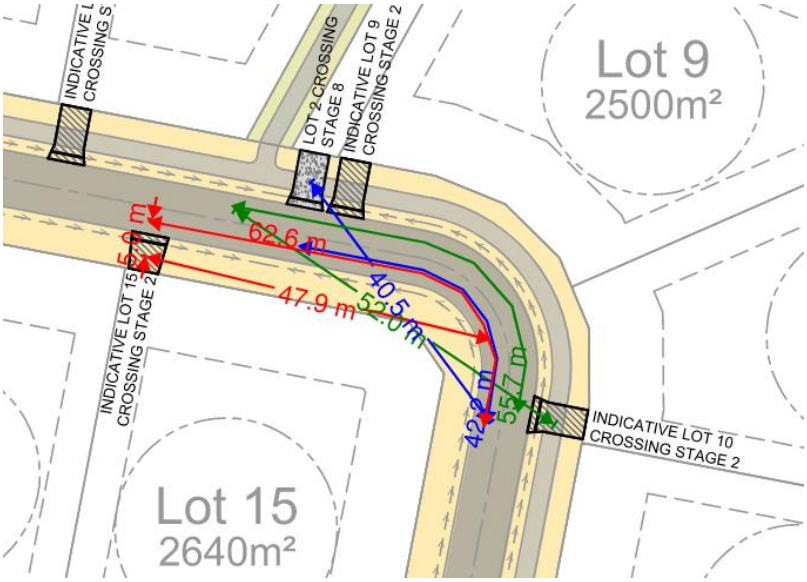


Figure 8: Sight distance at vehicle crossings near the curve

We expect the operating speed at the curve to be lower than 60km/h. For an operating speed of 50km/h RTS6 requires a sight distance of 40m, and 30m for 40km/h. Sight distance at the vehicle crossing for Lot 8 is 40.5m, which complies for a 50km/h vehicle operating speed. Sight distance at the indicative vehicle crossing location for Lot 15 is 62m, however if the vehicle crossing was located closer to the curve, sight distance would be reduced.

We recommend confirmation of the final location of the vehicle crossing for Lot 15 ensures a minimum of 30m sight distance is achieved.

The existing vehicle crossing on Lamb Street (to be used by Lot 14) has sight distance greater than the 210m required in RTS6 for a 90km/h operating speed (80km/h posted speed limit) on an arterial road.

3.6.3. Vehicle Crossing Design

Each lot will have a vehicle crossing which is 4m wide at the property boundary and splays to 5m at the edge of the carriage way. The vehicle crossings include a slot drain to allow pass-through drainage from the grass swales. The design of the vehicle crossings and drainage is consistent with the existing vehicle crossings throughout Pukekura subdivision, an example can be seen in the figure below.

Figure 9: Vehicle crossing slot drain

3.7. Parking

Parking is expected to be accommodated within each lot due to the large lot sizes. Any overflow parking can be accommodated within the street. The proposed road cross-sections are the same as the existing streets within Pukekura and a few cars were observed parked with one wheel in the swale/berm.

3.8. Active Modes

The proposal includes a 2.5m wide shared path on the west side of the street and a shared path connection to the Cambridge green belt alongside the vehicle access for Lot 8. Cycling is expected to be on-road or on the shared path. The paths within Pukekura link to the existing footpath on Roto O Rangi Road where cycling is expected to be on-road. There are no existing walking or cycling facilities on Lamb Street.

District Plan Rule 3.4.2.5 requires low or visually permeable fencing for properties adjoining a Council reserve or public walkway to satisfy the principles of *Crime Prevention Through Environmental Design*[2] (CPTED) by allowing for passive surveillance. We agree that the proposed connection to the green belt should be designed to allow for passive surveillance from adjoining properties and provide a clear line of sight along the full length of the walkway.

[2] National Guidelines for Crime Prevention through Environmental Design in New Zealand, Part 1: Seven Qualities of Safer Places, ministry of Justice (November 2005)

The green belt adjacent to the proposal appears to be fenced and used for animal grazing. The proposed connection to the green belt will provide a link for recreational walking but is unlikely to be used as a walking or cycling commute route unless an all-weather path is provided.

4. TRANSPORTATION EFFECTS AND RECOMMENDED MITIGATION

The transportation effects are summarised in the table below.

Effect	Description of effect	Recommended mitigation
Traffic Safety	The proposal includes low-volume streets connecting to existing priority-controlled intersections. The proposed curve is too narrow to allow a truck and 99 percentile passenger car to pass safely. The final location of the vehicle crossing for Lot 15 could result in a shortfall in sight distance.	= Widen the carriageway through the curve to accommodate the swept paths and clearances of a medium rigid truck and 99 percentile car, without overlap. = Minimum of 30m sight distance at the vehicle crossing for Lot 15.
Efficiency	The proposal is expected to generate 156 veh/day and 17 veh/h which equates to one additional vehicle movement every 3.5 minutes. Lamb Street and Roto O Rangi Road both have sufficient capacity to accommodate the estimated traffic.	No further mitigation required.
Parking	The large lot sizes should accommodate all parking. Any overflow parking can be accommodated on-street. Minimal on-street parking was observed during the site visit.	No further mitigation required.
Pedestrian and Cyclists	There is a 2.5m wide shared path through the development and the proposal has a path that connects into the Cambridge green belt.	= A clear line of sight along the full length of the proposed connection to the green belt and low or visually permeable fencing for properties adjoining the proposed reserve or walkway to allow for passive surveillance.

Table 1 **Transportation Effects Summary**

The proposed road layout differs from the layout depicted in District Plan Appendix S18 - Leamington Large Lot Residential Zone Structure Plan. We consider the proposed road layout is consistent with the intent of the structure plan, the existing road layout within Pukekura, and allows for priority-controlled intersection arrangements that are typical for local streets. We consider the effects of the departure from the Structure Plan are likely to be less than minor.

5. DISTRICT PLAN ASSESSMENT

Our assessment of the proposal against the transportation provisions of the District Plan is provided in Appendix A. The proposal is expected to comply with all District Plan transportation provisions.

6. RECOMMENDED CONDITIONS

We recommend conditions addressing the following:

- Minimum of 30m sight distance at the vehicle crossing for Lot 15.
- Widen the carriageway through the curve to accommodate the swept paths and clearances of an 8m medium rigid truck and 99 percentile car, without overlap.
- A clear line of sight along the full length of the proposed connection to the green belt and low or visually permeable fencing for properties adjoining the proposed reserve or walkway to allow for passive surveillance.

7. CONCLUSION

The proposal includes the extension of Te Mara Drive, a shared path connection into the green belt and the subdivision of the property into 20 large residential lots. The proposed road cross-section matches the existing streets in Pukekura. We estimate the proposal could generate approximately 156 veh/day and 17 veh/h during a peak hour which equates to one additional vehicle movement every 3.5 minutes.

We consider the safety and efficiency effects related to the proposal are likely to be less than minor.

With the recommended mitigation and consent conditions there does not appear to be any reason related transport why the proposal cannot proceed.

APPENDICES

District Wide Objectives	Policies	Comments
16.3.2 Integrating land use and transport: ensuring a pattern of land uses and a land transport system which is safe, effective and compatible	Land use and transport systems successfully interface with each other through attention to design, safety and amenity Policies a) Integrating land use and transport b) Enhancing pedestrian safety c) Safe roads d) Managing effects on character and amenity	a) Expected to comply b) Expected to comply c) Expected to comply d) Expected to comply
16.3.3 Maintaining transport network efficiency	To maintain the ability of the transport network to distribute people and goods safely, efficiently and effectively Policies a) Effects of development or subdivision on the transport network b) Location of network utilities	a) Expected to comply b) Expected to comply
16.3.4 Provision of vehicle entrances, parking, loading and manoeuvring areas	The provision of adequate and well-located vehicle entrances and parking, loading and manoeuvring areas that contribute to both the efficient functioning of the site and the adjacent transport network Policies a) Location of vehicle entrances b) Ensuring adequate parking, loading and manoeuvring areas on site c) On-site vehicle manoeuvring in the residential zone d) Encouraging the adaptive re-use of heritage items	a) Expected to comply b) N/A c) Expected to comply d) N/A
16.3.5 Minimising adverse effects of the transport network	The transport network can have effects on the adjacent environment that must be mitigated through design Policies a) Natural environment b) Noise and vibration	a) Expected to comply b) Expected to comply

21.1.1.6 Traffic Assessment Criteria	Comments
(a) The impacts on the safe, efficient and effective provision of the transportation system including, but not limited to: (i) Impacts on the road network and the effective operation of the road hierarchy; and (ii) Infrastructure provision, including works needed to maintain the safety, efficiency and effectiveness of the transportation system such as any upgrades necessary to pedestrian and cycle facilities, intersections, pavements and structures on the system affected by the proposed activity; and (iii) Timing and staging of development; and (iv) Connectivity between adjacent areas of development.	(i) Complies. (ii) Complies (iii) Complies – within growth cell C6 (iv) Complies

21.1.1.6 Traffic Assessment Criteria	Comments
(b) Whether sufficient provision has been made for alternative modes of transportation where this is available and practicable, including but not limited to: (i) Public transport; and (ii) Cycle and pedestrian movement; and (iii) The establishment of cycleways, walkways and public transport stops; and (iv) The establishment of cycle stands; and (v) Connectivity to alternative transport modes such as rail and air transport.	(i) No public transport in the area (ii) shared path on one side of the street (iii) Complies (iv) N/A (v) N/A
(c) The extent to which the location of the activity on the site has given regard to: (i) The need for acceleration and deceleration lanes; and (ii) The type, frequency and timing of traffic; and (iii) The safety of road users, cyclists and pedestrians; and (iv) The ability for access to roads other than arterial roads or State Highways; and (v) The need for forming or upgrading roads and pavements potentially affected by the activity; and (vi) The need for additional maintenance, inspection or traffic monitoring; and (vii) The need for traffic control, including signs, signals and traffic islands; and (viii) The ability for parking and manoeuvring to be carried out on site.	(i) N/A (ii) Estimated increase in traffic can be accommodated on the surrounding transport network. (iii) Shared path facilities, or on-road cycling on low volume streets. (iv) N/A (v) N/A (vi) N/A (vii) N/A (viii) Expected to comply
(d) The extent to which the location of the site access way has given regard to: (i) Safety for vehicles, and pedestrians with particular regard to the effect on the safety and functioning of the road and/or level crossing. (ii) The practicality and adequacy of the proposed access having regard to the location, nature and operation of the proposed activity and/or development.	(i) Expected to comply with minimum sight distance requirements. (ii) Complies - within Growth Cell C6
(e) The extent to which the location of the land use activity on the site has given regard to: (i) Visibility and sight distances particularly the extent to which vehicles entering or exiting the level crossing are able to see trains. (ii) The extent to which failure to provide adequate level crossing sightlines will give rise to level crossing safety risks.	(i) N/A no level crossings (ii) N/A

Rule	Comment
Rule - Road hierarchy	
16.4.2.1 All structure plans, plan changes, developments, and subdivisions must be consistent with the road hierarchy, as contained in Appendix T5. 16.4.2.2 To maintain the effectiveness of the road hierarchy, a road network must be designed so that a road connects to a road at the same level in the hierarchy, or directly above or below its place in the hierarchy. 16.4.2.3 To maintain the effectiveness of the road hierarchy, when a site has two road frontages, vehicle access and egress must be from the lesser road type	Complies - No change to the road hierarchy. Complies – local road is being extended. Complies – all lots only front one road
Rule - Vehicular access to sites in all zones	
16.4.2.4 Every site shall be provided with vehicle access to a formed road that is constructed to a permanent standard. The vehicle access shall be designed to accommodate the demands of all traffic from the activity on that site, taking into account the form and function of the road.	Complies

Rule	Comment
Rule - Vehicle entrance separation from intersections and other vehicle entrances	
16.4.2.5 The minimum distance of a vehicle entrance (accessway) from an intersection or other entrance shall be as follows: For 50km/h posted speed limit - - A minimum of 30m from intersections - A minimum of 20m between accessways	Complies
Rule - Vehicle entrance separation from railway level crossings	
16.4.2.6 New vehicle access ways shall be located a minimum of 30m from a railway level crossing.	N/A
Rule - Minimum sight distance requirements for a railway level crossing	
16.4.2.7 Any buildings, structure or land use shall be located to comply with the minimum rail level crossing sightline requirements within Appendix T2.	N/A
Rule - Vehicle access to compact housing development	
16.4.2.8 Compact housing development must only have one access point to a strategic road.	N/A
Rules - Vehicle access to sites in the Commercial Zone	
16.4.2.9 No new vehicle access is permitted across any 'pedestrian frontage' as identified on the Planning Maps.	N/A
16.4.2.10 No direct vehicle access onto the State Highway is permitted from properties fronting State Highway 3.	N/A
16.4.2.11 Where a site has frontage to a road and a service lane, all vehicle access shall be from the service lane.	N/A
Rule - Vehicle access to sites in the Industrial Zone	
16.4.2.12 Where a site has a frontage greater than 50m to a road which is not a State Highway or a major arterial road, two vehicle crossings will be allowed from that road, subject to the requirements of Rule 16.4.2.5.	N/A
Rule - Parking, loading and manoeuvring area. (residential exemption)	
16.4.2.13 All activities that involve the erection, construction or substantial reconstruction, alteration or addition to a building on any site, or changes the use of any land or building, shall provide parking and loading/unloading for vehicles on the site as set out in Appendix T1	Complies – Temporary turning head at the end of the street

Rule	Comment
16.4.2.15 On front sites or corner sites in the Residential Zone, on-site vehicle manoeuvring areas may be exempt from Rule 16.4.2.14.e. and shall not be required where: a) The site contains a single, principal dwelling; and b) The garage doors, or vehicle entrance to the carport faces the road where the vehicle will access (refer to diagram following Rule 16.4.2.16); and c) The distance between the garage door, or vehicle entrance to the carport and the road boundary on the site is no more than 12m (refer to diagram following Rule 16.4.2.16); and d) The driveway does not encroach on any minimum outdoor living area as required under Rule 2.4.2.18 or road boundary setback other than at the vehicle entrance. Provided that: i. The site is not accessed from a road with a posted speed limit exceeding 50kmh; and ii. In rules b. and c. where there is no garage or carport the shortest dimension of the car parking space must face the road and must be no more than 12m from the road boundary.	N/A
16.4.2.16 On sites in the Residential Zone with access to a right of way, manoeuvring may occur in the right of way and sites may be exempt from Rule 16.4.2.14.e. where: a. The site contains a single, principal dwelling; and b. The garage doors, or vehicle entrance to the carport face the right of way where the vehicle will access; and c. The distance between the garage door, or vehicle entrance to the carport and the site boundary with the right of way is no more than 12m; and d. The driveway does not encroach on any minimum outdoor living area as required under Rule 2.4.2.18; and e. Rights over the right of way shall be apportioned so as to provide legal access to all sites for the purposes of vehicle manoeuvring; and f. The right of way shall be of sufficient dimension to provide for a vehicle manoeuvring area of a standard adequate to accommodate a 99.8 percentile car, in order to ensure that all vehicles have the ability to access the adjoining road in a forward direction after no more than a three point turning manoeuvre on the site.	N/A
Rule - Car park landscaping and lighting	

Rule	Comment
16.4.2.23 Other than in the St Peters School Zone, all car parks must: (a) Provide at least one tree planted for every 5 car parking spaces at a grade of no less than PB95. For the avoidance of doubt, PB95 is equivalent to a tree that is at least 1.5m tall at the time of planting; and (b) Ensure lighting is designed to avoid shading areas or isolating areas of public use. Provided that in the Commercial Zone, car parks with more than 25 car parking spaces shall be a restricted discretionary activity.	N/A
Rule - Provision of bicycle parking facilities	
16.4.2.24 In areas other than the Rural Zone and Pedestrian Frontages, activities employing more than ten people must provide bicycle parking facilities at a rate of one bicycle park for every ten people employed.	N/A

APPENDIX G

THREE-WATER ASSESSMENT

ABOVE WATER

3 Waters Assessment

318 Lamb Street, Cambridge

26th September 2023

ADDRESS: 318 Lamb Street, Cambridge
JOB NUMBER: 23-157
PROJECT TYPE: Residential Subdivision
REPORT PREPARED FOR: Muscle Developments
PRINCIPAL ENGINEER: Josy Cooper

Rev	Date	Details	Prepared by	Reviewed by
0	26/09/23	Issued to Muscle Developments.	Jess Renshaw NZDE (Civil), MEngNZ	Josy Cooper BE, CMEngNZ, CPEng (259163)
A				
B				

Table of Contents

1. General

1.1 Project Scope

The following document discusses the 3 waters requirements for the development of 318 Lamb Street, Leamington, Cambridge.

This assessment is a resource consent level review of the site and outlines options for stormwater and wastewater disposal and water supply for future development. It is based on the attached scheme plan (Blue Wallace – reference 23095).

1.2 Site Description

The site is located in the Waipa District Council C6 structure plan area and is currently used for rural-residential purposes, with one existing house currently located on the property. The adjacent land to the south and west is already developed for residential purposes. The site is generally flat, with some fall noted as per the attached topographic survey (supplied by others) from east to west.

1.3 Design Codes and Guidelines

This 3 waters assessment complies with the New Zealand Building Code and the following current standards:

- RITS;
- AS/NZS1547;
- NZS4404.

2.0 Stormwater Management

2.1 Existing Stormwater

The site is generally flat with overland flow across the site from the upstream catchment as indicated in Figure 1. A depression in the existing farm to the east of the site is shown on the attached topographic survey (and in Figure 1). The catchment area upstream of the site as shown in Figure 1 is approximately 22.0Ha – this incorporates the adjacent farm and existing C6 developed areas located east of the site.

Stormwater in the adjacent developed C6 areas is managed by a series of shallow grassed swales discharging to soakage trenches – Figure 2 shows the existing stormwater network in these areas.

During and post development of 318 Lamb Street, overland flow from the upstream catchment must be allowed to pass through the site towards the downstream area in the Green Belt. Development of the design site contours must ensure that this overland flow path is provided for – this can be by way of conveyance through the site via the proposed road network and/or via easements across private lots.

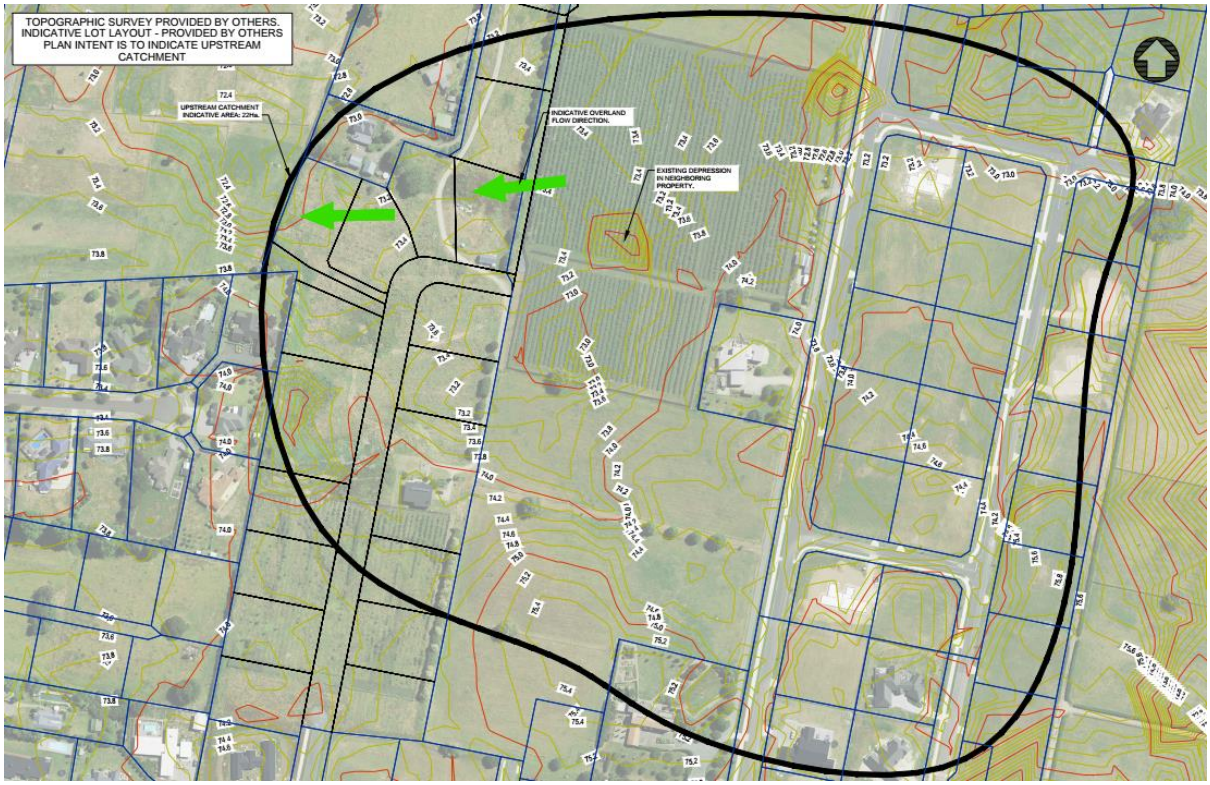


Figure 1: Upstream Catchment (indicative – based on supplied topographic survey)

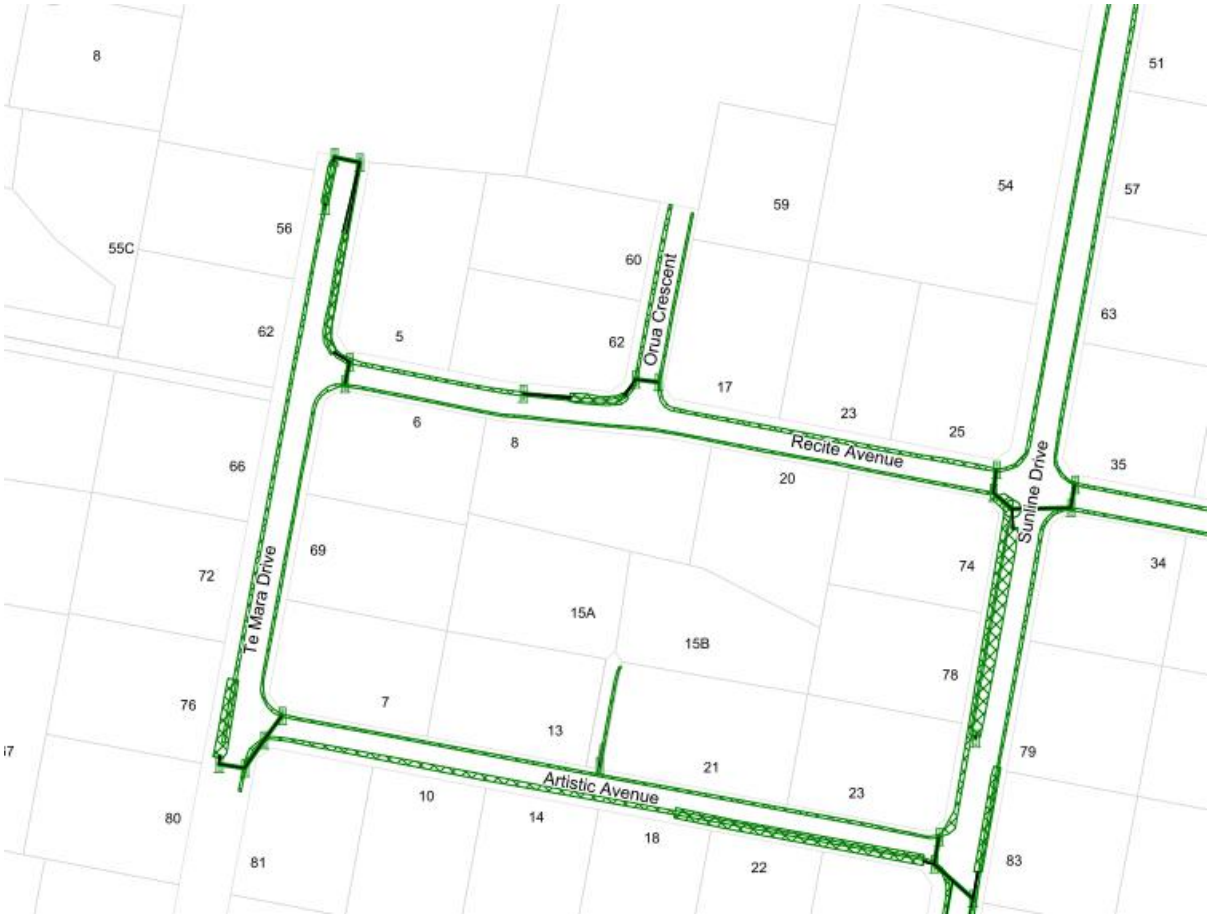


Figure 2: Existing stormwater reticulation in adjacent C6 developments

2.2 Percolation Testing

A site visit and percolation testing were completed on the 25/05/23 by Above Water Engineering Ltd (refer to Figure 3 for the location of these tests).

Recent communications from Waipa District Council have indicated that Council may no longer be accepting the NZ Building Code, Clause E1/VM1 method as suitable for stormwater design for developments of this size and scale. Therefore, this report provides interpretation of the percolation test results using both the Building Code method as well as the GD 2021/007 method (Auckland Council) to allow for a comparison of results.

It is considered likely that Waipa District Council will enforce using a method such as GD 2021/007 in this instance, but this can be confirmed with Council.

Figure 3: Percolation test locations

Both methods have included suitable reduction factors applied to accommodate loss of performance over time. Soils encountered generally include sandy silts overlying sands and gravel, with the exception of HA03 – where a 300mm layer of white clay was encountered at 1.4m below ground level. The percolation rates at the location of HA01 and HA02 indicate that soils in this area are very well draining, with HA03 indicating moderately well-draining soils in the northern part of the site.

Please note that groundwater levels do fluctuate affecting soil percolation rates, and differing groundwater levels and soakage rates may be encountered following periods of prolonged heavy rainfall or drought or as a result of adjacent development. Above Water has taken all care to estimate soakage rates in accordance with the relevant codes, however no liability is accepted for extreme weather or changes in ground water table in the vicinity of the site.

It is recommended that further percolation testing is carried out at detailed design stage at the location of proposed stormwater mitigation devices.

2.3 Stormwater Mitigation Design Parameters

Due to the identified downstream flooding at the site (refer Section 3) design of stormwater mitigation from the site must accommodate the 100yr ARI event (as per Table 4-3 of the RITS).

Each Lot within the development will need to mitigate its own stormwater (up to a 100yr ARI event) within the Lot boundaries – this includes any ROWs servicing the Lots. The design of each of these systems will be at the building consent stage and have not been included further in this assessment.

The following recommendations relate to management of the stormwater runoff from the proposed road and footpath within the development. The following has been assumed - 380m of public road length comprised of 7.5m wide impervious road area and a 1.5m wide impervious footpath on one side of the road.

2.4 Stormwater Design Factors – E1 Method

Soakage design factors in accordance with the NZ Building Code – Surface Water E1 for the development of the proposed road and footpath have been summarised in the following table (Figure 4).

The percolation rates include a reduction factor of 0.50 applied to accommodate loss of performance over time (as per RITS).

Design Storm	60 minutes
Storm Event	100yr ARI (1% AEP)
Rainfall Depth (HIRDS V4, RCP8.5)	73.9mm
Coefficient of Runoff	0.85
Total Impervious Areas	3,500m²
Design Soakage Rate	1,100mm/hr (HA01), 1,650mm/hr (HA02), 540mm/hr (HA03)
Groundwater Depth	Not encountered to 2m bgl

Figure 4: Soakage design parameters – E1

2.5 Stormwater Design Factors – GD007 Method

Soakage design factors in accordance with GD007 (Auckland Council) for the development of the proposed road and footpath have been summarised in the following table (Figure 5).

Factors of safety applied to the percolation rates include consequence level 1 (Table 5, GD007) and quality level 2 (Table 6, GD007).

Design Storm	24 hours
Storm Event	100yr ARI (1% AEP)
Rainfall Depth (HIRDS V4 RCP8.5)	184.0mm
Coefficient of Runoff	0.85
Total Impervious Areas	3,500m²
Design Soakage Rate	2.29 L/min/m² (HA01), 3.57 L/min/m² (HA02), 0.78 L/min/m² (HA03)
Groundwater Depth	Not encountered to 2m bgl

Figure 5: Soakage design parameters – GD007

2.6 Stormwater Mitigation Device and Overflow Details – E1 Sizing

Run-off from the new road and footpath proposed at this site can be directed to soakage devices. The design of the size and details of the soakage device area are indicated in the attached calculations (E1).

The following options can be considered using the NZ Building Code E1 method:

- Option A: Modular soakage tank/s located within the road reserve berm (rainsmart or equivalent product) - 2.0m wide, 59.50 m long (equivalent area of 119.0m²) and 0.88m deep.
- Option B: A soakage basin – 85.0m² in area and 1.5m deep. Design of a soakage basin will require appropriate batters in addition to this minimum base area, access for maintenance around the perimeter, and appropriate drainage array at the base. Geotechnical input will be required (by others) to confirm any risks of a basin with respect to liquefaction and other geotechnical factors. An indicative footprint for the basin (assuming 1:3 batters and a 2m wide access track) would be in the order of 530m².
- Option C: Porous well liners located in the road reserve berm – the attached calculations indicated in the order of 40 x 1.2m diameter well liners at 4.0m deep would be required.

The position of any soakage device can be confirmed on site with the minimum setback distances required (in addition to those specified by the Geotechnical Engineer):

- 1.5m from adjacent boundaries; and
- 3.0m from building foundations;
- 2.0m from public sewer lines or 1.0m from private sewer lines.

2.7 Stormwater Mitigation Device and Overflow Details – GD007 Sizing

Run-off from the new road and footpath proposed at this site can be directed to a soakage device. The design of the size and details of the soakage device area are indicated in the attached calculations (GD007).

The following options can be considered using the GD007 (Auckland Council) method:

- Option A: Modular soakage tank/s located within the road reserve berm (rainsmart or equivalent product) - 2.4m wide, 96.5m long (equivalent area of 318.6m²) and 0.88m deep.
- Option B: A soakage basin – 193.6m² in area and 282.0m³ of volume (i.e., 1.5m deep). Design of a soakage basin will require appropriate batters in addition to this minimum base area, access for maintenance around the perimeter, and appropriate drainage array at the base. Geotechnical input will be required (by others) to confirm any risks of a basin with respect to liquefaction and other geotechnical factors. An indicative footprint for the basin (assuming 1:3 batters and a 2m wide access track) would be in the order of 730m².
- Option C: Porous well liners located in the road reserve berm – the attached calculations indicated in the order of 46 x 1.2m diameter well liners at 4.0m deep would be required.

The position of any soakage device can be confirmed on site with the minimum setback distances required (in addition to those specified by the Geotechnical Engineer):

- 1.5m from adjacent boundaries; and
- 3.0m from building foundations;
- 2.0m from public sewer lines or 1.0m from private sewer lines.

2.8 Stormwater Construction, Operation and Maintenance

It is recommended that additional percolation testing is carried out at the location of the proposed stormwater mitigation devices when these have been confirmed as part of the design of the development. The Engineer is required to view soakage systems during construction to confirm suitability. The drain layer must provide as-builts and a PS3 prior to the issue of the PS4.

Ongoing maintenance is required to ensure the continuous performance of the soakage devices. Suggested maintenance can include some or all the following as required (as per On-site Stormwater Management Guidelines, NZWERF, 2004):

- Regular clearance of debris, litter from entry and contributing areas;
- Flushing to remove accumulated sediment and slime.

3.0 Flood Hazard

The site is located in the Waipa District Council C6 structure plan area and is currently used for rural-residential purposes, with one existing house currently located on the property. The adjacent land to the south and west is already developed for residential purposes. The site is generally flat, with some fall noted as per the attached topographic survey (supplied by others) from east to west.

The site is just outside the Waipa District Council flood modelling extents, Figure 6 shows an existing area of flood ponding to the north-west of the site in the Cambridge green belt. A small depression extends just inside the site boundary adjacent to the green belt indicating ponding in the 1% AEP event as shown in Figure 6.

During and post development of 318 Lamb Street, overland flow from the upstream catchment must be allowed to pass through the site towards the downstream area in the Green Belt. Development of the design site contours must ensure that this overland flow path is provided for – this can be by way of conveyance through the site via the proposed road network and/or via easements across private lots.

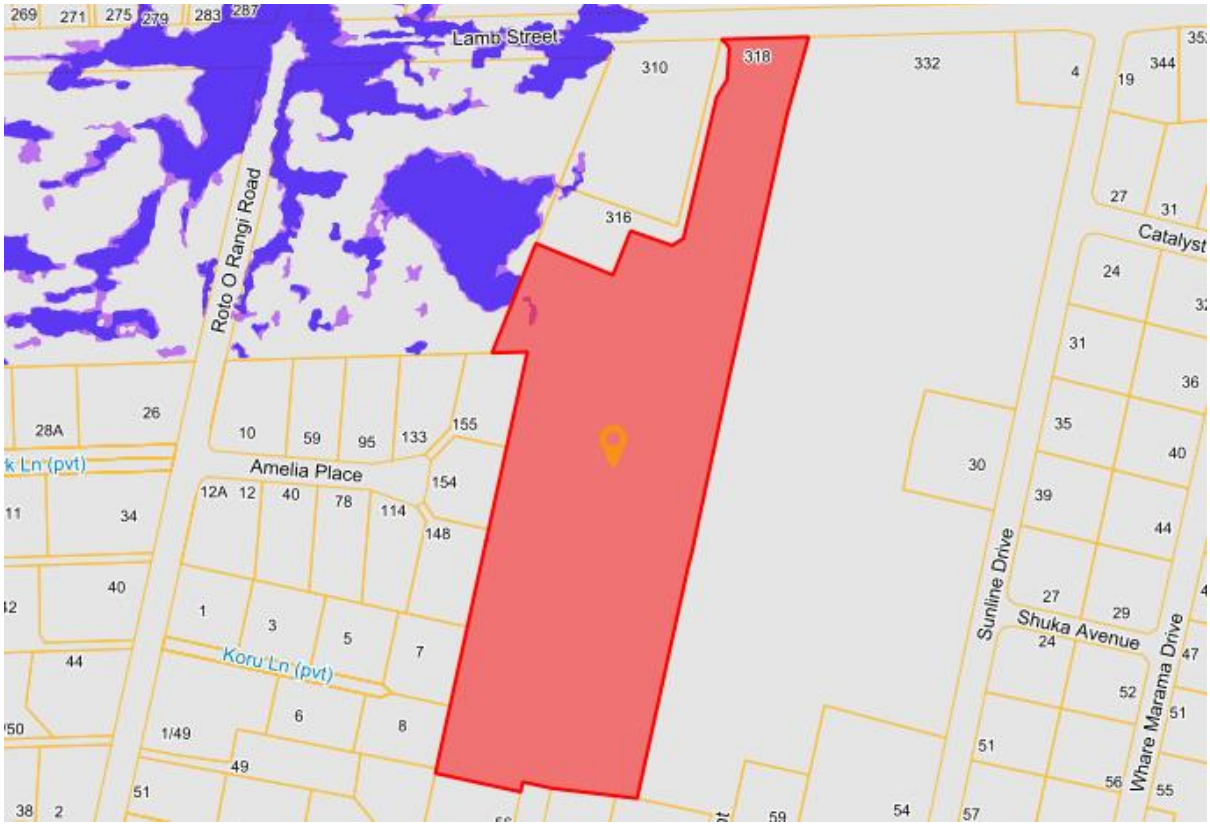


Figure 6: Waipa District Council 1% AEP Urban Stormwater Flood Modelling

4.0 Wastewater Management

4.1 Site and Soil Evaluation

Preliminary hand auger testing was undertaken at three locations across this site by Above Water Engineering (refer Section 2), soils encountered included Sandy Silts overlying sands and gravel. In HA03 300mm of white clay was encountered at 1.4m bgl (refer to figure 4 above for approximate test locations). These soils are generally consistent with Category 2-3 soils in accordance with TP58/AS/NZS1547 however, this will need to be confirmed at building consent stage at each site with specific testing.

Groundwater was not encountered during testing however, as mentioned above groundwater levels do fluctuate affecting soil percolation rates, and differing groundwater levels and soakage rates may be encountered following periods of prolonged heavy rainfall or drought or as a result of adjacent development.

4.2 Required System and Estimated Capacity

To be considered a Permitted Activity under WRC rules, septic tanks/primary treatment on-site wastewater systems must have an effective disposal area for any treatment and disposal system no less than 2,500m² (rules 3.5.7.4, 3.5.7.5). Some lots within the development will be less than 2,500m² - Lots 7, 10, 12 and 13.

These lots will require an improved/secondary treatment system to comply with the WRC permitted activity rule 3.5.7.5.

The design of a wastewater disposal system for each lot will be undertaken at the building consent stage and will depend upon the proposed occupancy of any new dwelling.

Assumed design factors can include the following:

- Assumed 4-bedroom dwelling, occupancy of 6 people.
- Assumed reticulated water supply with standard water reduction fittings gives a typical daily design flow of 165 L/person/day.
- Assumed design flow rate is therefore 870 L/day.

4.3 Land Disposal Options

The following disposal system is suitable for Category 2-3 soils:

- Lots 1, 2, 3, 4, 5, 6, 8, 9, 11, 14, 15, 16, 17, 18, 19, 20: Primary treatment (septic tank) discharging to conventional disposal beds (Figure L5, AS/NZS1547).
- Lots 7, 10, 12 and 13: Secondary treatment (refer to suppliers) discharging via drip irrigation (Figure M1, AS/NZS1547).

Figure 7 outlines recommended design loading rates (based on AS/NZS 1547:2012):

Disposal System Option	Minimum Required Level of Treatment	Recommended Loading Rate
Conventional beds	Primary	15 - 20mm/day (basal loading)
Conventional beds	Secondary	30 - 50mm/day (areal loading)
Drip irrigation	Secondary	3.5 - 4mm/day (areal loading)

Figure 7: Applicable Design Loading Rates

4.4 Required Disposal Area

The required disposal area for each lot will vary based on the dwelling occupancy, level of treatment for each lot, and associated daily loading rate and soil conditions.

The requirements for each lot will be completed at building consent stage.

4.5 Reserve Area

AS/NZS 1547:2012 specifies that a reserve area is always required to be available for use in the event of system failure or underestimation of daily wastewater production. A reserve area of 100% will therefore be provided for in the detailed design.

4.6 Separation Distances

Figure 8 outlines the required separation distances for Category 2-3 soils based on Table R1 in AS/NZS 1547.

Buildings/Houses	3.0m
Property Boundaries	1.5m
Surface Water	15.0m
Water Supply Bore	30.0m
Groundwater	0.6m
Floodplain	1 in 20yr
Embankments/retaining walls	3m from the drainage material/cut batter interface or 45-degree angle from toe of wall excavation (whichever is the greatest)

Figure 8: Separation Distances – On-site Wastewater

5.0 Water

5.1 Water Supply

There is reticulated water supply in the surrounding area. There is an existing 100mm PVC main on the western side of Te Mara Road and a 50mm PE main on the eastern side. There is also an existing 180mm PE water main located on the northern side of Lamb Street – refer Figure 9.

Based on the RITS requirements for water supply (see drawing D6.1) the new road (Lot 200) will require a main on one side of the road and a rider main on the other. The details of this can be confirmed at engineering design stage.

Each lot will require a 20mm MDPE connection to the new reticulated water supply. Council is to confirm available flow and pressure.

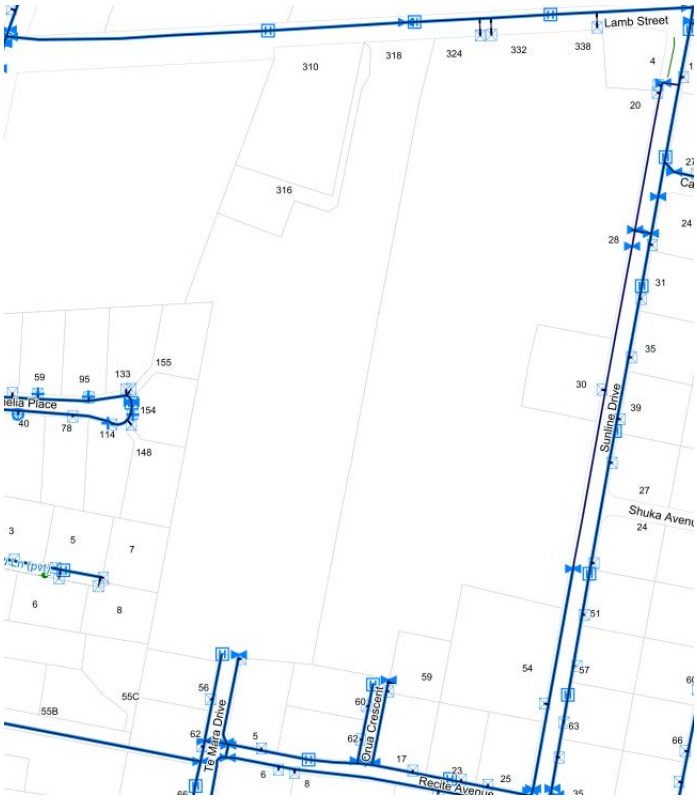


Figure 9: Existing Water Reticulation

5.2 Fire-fighting Water Supply

There is an existing hydrant at the capped end of the 100mm PVC main on Te Mara Drive (at the entrance to this site). New hydrants will be installed as per the RITS requirements and spaced at intervals not exceeding 135m (for residential areas) and there will need to be a hydrant no more than 65m from the end of the cul-de-sac or roads end.

6.0 Recommendations

As described in the preceding report, the following is noted with respect to future development of 318 Lamb Street, Leamington, Cambridge:

- Soakage devices for stormwater mitigation for the proposed new road and footpath through the site are suitable based on the percolation testing carried out and summarised within this report.
- Council will likely require soakage devices to be sized using a method other than the Surface Water E1 method (although calculations using this method have been provided in this report for completeness).
- Indicative sizing of soakage devices using the Auckland Council GD007 method indicates that one of the following options provides suitable mitigation for the proposed road and footpath within the development at 318 Lamb Street for a 1% AEP storm event (RCP8.5):
    - Modular soakage tank/s located within the road reserve (2.4m wide, 96.5m long and 0.88m deep or equivalent).
    - A soakage basin located within Lot 5 (193.6m² in area with 282.0m³ of volume).
    - Porous well liners located in the road reserve berm (46 x 1.2m diameter well liners at 4.0m deep).
- The soakage device should be combined with shallow grassed swales (as per the adjacent development) which will provide some pre-treatment of runoff prior to discharge to the soakage systems.
- An overland flow path through the site should be maintained post-development to enable runoff from the upstream catchment (to the east, south-east) to pass through the site downstream (to the north-west into the Cambridge green belt area). This may be able to be designed to be accommodated via the proposed road corridor through the subdivision as part of the design of the site contours.
- On-site wastewater systems will be required for each lot. The level of treatment required prior to disposal will depend on the size of the lot (refer to section 3.2).
- Wastewater disposal areas to be confirmed at building consent stage, specific geotechnical testing will need to be completed for each lot prior to detailed wastewater design.
- Water supply will be available from the reticulated network. Each lot will require a 20mm MDPE connection to new mains to be located in the road reserve. Council is to confirm that suitable flow and pressure is available.

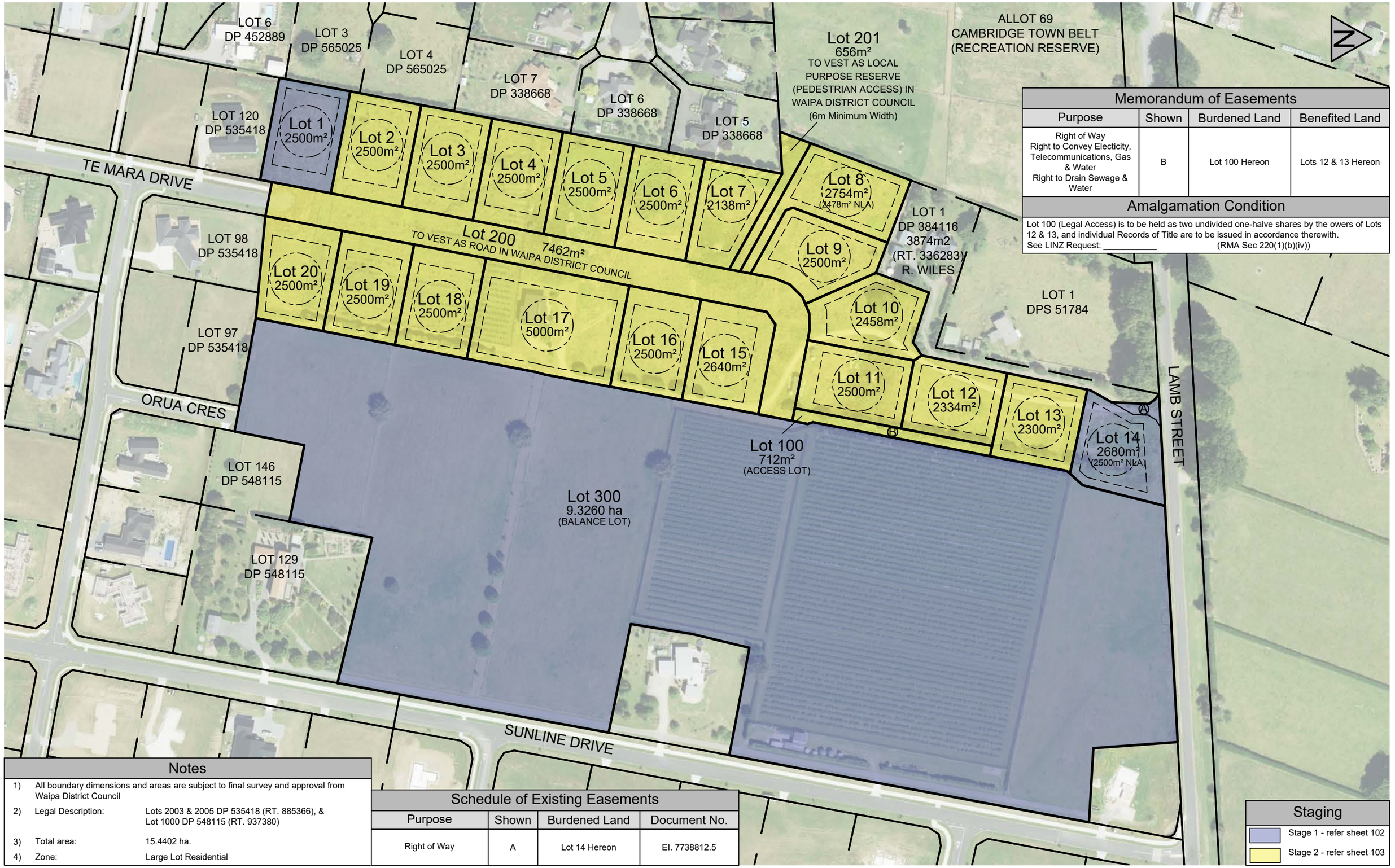
7.0 Appendices

7.1 Blue Wallace Scheme Plan

7.2 E1 Percolation Rates and Calculations

7.3 GD007 Percolation Rates and Calculations

7.4 Topography and Upstream Catchment Plan



Memorandum of Easements

Purpose	Shown	Burdened Land	Benefited Land
Right of Way Right to Convey Electicity, Telecommunications, Gas & Water Right to Drain Sewage & Water	B	Lot 100 Hereon	Lots 12 & 13 Hereon

Amalgamation Condition

Lot 100 (Legal Access) is to be held as two undivided one-halve shares by the owers of Lots 12 & 13, and individual Records of Title are to be issued in accordance therewith.
See LINZ Request: _____ (RMA Sec 220(1)(b)(iv))

Notes

1) All boundary dimensions and areas are subject to final survey and approval from Waipa District Council
2) Legal Description: Lots 2003 & 2005 DP 535418 (RT. 885366), & Lot 1000 DP 548115 (RT. 937380)
3) Total area: 15.4402 ha.
4) Zone: Large Lot Residential

Schedule of Existing Easements

Purpose	Shown	Burdened Land	Document No.
Right of Way	A	Lot 14 Hereon	EI. 7738812.5

Staging

- Stage 1 - refer sheet 102
- Stage 2 - refer sheet 103

Size	Scale	Date
A3	1:2000	SEPTEMBER 2023

No.	Amendment	Init.	Date
D	For Information	WAB	05/09/23
C	For Information	WAB	05/07/23
B	For Information	WAB	16/06/23

Designed	WAB	05/07/23
Drawn	WAB	05/09/23
Checked	LAR	05/09/23
Approved		

PROPOSED OVERALL SUBDIVISION OF LOTS 2003 & 2005 DP 535418 & LOT 1000 DP 548115

318 LAMB STREET, LEMINGTON - CAMBRIDGE

Prepared for: RYJO Holdings Ltd.

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Vertical Datum 1953

Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-PL-101				D

S:\2023\23095\1. PLANNING\1. SCHEME PLANS\23095-00-PL-100-D 31-07-23.DWG

Stormwater Soakage Test Results - Using E1/VM1 - Clause 9.0.2

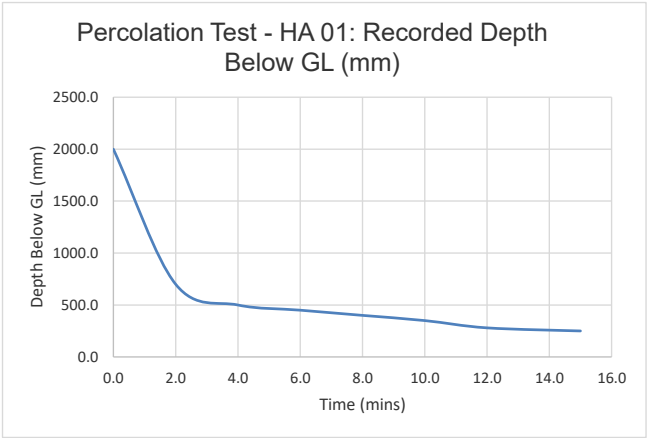
PROJECT:	**318 Lamb Street, Cambridge - HA01** ***(sandy silt overlying sands and gravels)***

Soak Test 1 - Dia 100mm:

Design Soakage Rate (Sr) **Sr =** 1100.0 mm/hr

BH Depth, D = *2000* mm
Start WL = *0* mm

Time Min	Recorded Depth Below GL (mm)	Drop in WL (mm)	Soakage Rate (mm/hr)	Recorded Depth Below GL (mm)
0.0	0.0	0.00		2000.0
2	1300	1300.00	39000.0	700.0
4	1500	200.00	6000.0	500.0
6	1550	50.00	1500.0	450.0
8	1600	50.00	1500.0	400.0
10	1650	50.00	1500.0	350.0
12	1720	70.00	2100.0	280.0
15	1750	30.00	600.0	250.0
	**hole collapse at 1750mm*			
			Ave Soak Rate:	
			2200.0	



Stormwater Soakage Test Results - Using E1/VM1 - Clause 9.0.2

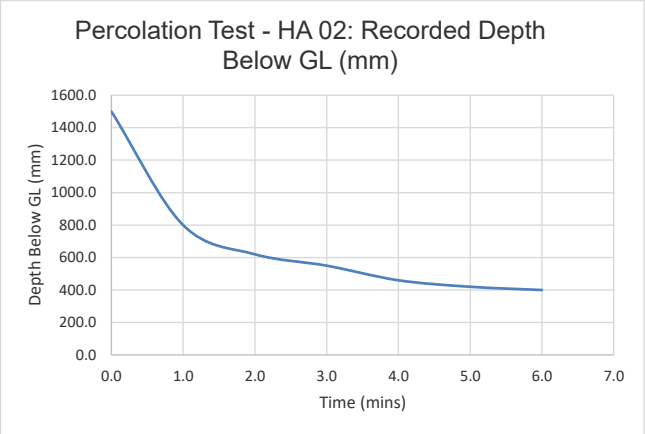
PROJECT:	**318 Lamb Street, Cambridge - HA02** ***(sands and gravels)***

Soak Test 2 - Dia 100mm:

Design Soakage Rate (Sr) **Sr =** 1650.0 mm/hr

BH Depth, D = *1500* mm
Start WL = *0* mm

Time Min	Recorded Depth Below GL (mm)	Drop in WL (mm)	Soakage Rate (mm/hr)	Recorded Depth Below GL (mm)
0.0	0.0	0.00		1500.0
1	700	700.00	42000.0	800.0
2	880	180.00	10800.0	620.0
3	950	70.00	4200.0	550.0
4	1040	90.00	5400.0	460.0
5	1080	40.00	2400.0	420.0
6	1100	20.00	1200.0	400.0
	**hole collapse at 1100mm*			
			Ave Soak Rate:	
			3300.0	



Stormwater Soakage Test Results - Using E1/VM1 - Clause 9.0.2

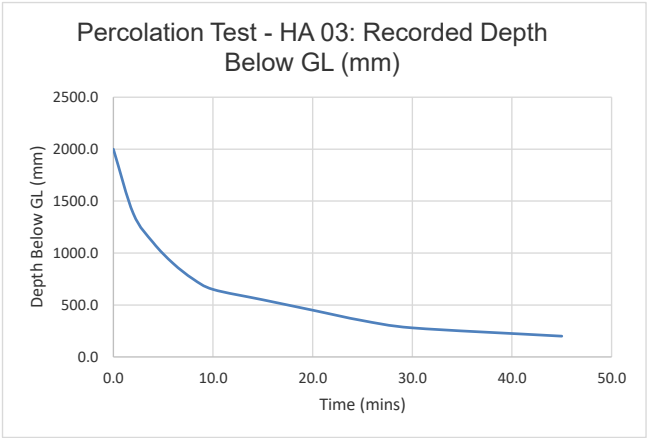
PROJECT:	**318 Lamb Street, Cambridge - HA03** ***(sands, 300mm layer of white clay @ 1400mm bgl, underlying sand)***

Soak Test 3 - Dia 100mm:

Design Soakage Rate (Sr) **Sr =** 540.0 mm/hr

BH Depth, D = *2000* mm
Start WL = *0* mm

Time Min	Recorded Depth Below GL (mm)	Drop in WL (mm)	Soakage Rate (mm/hr)	Recorded Depth Below GL (mm)
0.0	0.0	0.00		2000.0
2	620	620.00	18600.0	1380.0
4	900	280.00	8400.0	1100.0
6	1100	200.00	6000.0	900.0
8	1250	150.00	4500.0	750.0
10	1350	100.00	3000.0	650.0
15	1450	100.00	1200.0	550.0
20	1550	100.00	1200.0	450.0
25	1650	100.00	1200.0	350.0
30	1720	70.00	840.0	280.0
45	1800	80.00	320.0	200.0
	**hole collapse at 1800mm*			
			Ave Soak Rate:	
			1080.0	



On-site Stormwater Disposal to Soakage Calculation to Surface Water E1, NZBC, Clauses 9.0.5, 9.0.6

PROJECT:	**318 Lamb Street, Cambridge - Future Council Road**

Design Event : 10% AEP, 10yr Storm

Design Soakage Rate (includes soakage reduction factor of 0.5)

1100 mm/hr ***HA01**

Total Impervious Area

3500 m²

Runoff Coefficient, C

0.85

Design Soakage Rate (Sr)	**Sr =**	1100 mm/hr
	Design Soakage depth =	*0.88* m
Run-off Discharged Rc		
C =	**Runoff Coef**	0.85

Soakage Trench:		**Soak Hole - 900mm dia:**	
Runoff to Storage = V_{Stor}		**Runoff to Storage = V_{Stor}**	
Width	*2.0* m		
Area	2.0 m²	**Area**	0.6 m²
MODULAR	*0.95*	**SOAK HOLE (LINER)**	*1.0*
V_{stor} =	1.7 m³	**V_{stor} =**	0.6 m³

Runoff to Soakage = V_{soak} for 1hr storm event		**Runoff to Soakage = V_{soak} for 1hr storm event**	
Asp =	2.0 m²	**Asp =**	0.6 m²
Sr =	1100.0 mm/hr	**Sr =**	1100.0 mm/hr
Sd 1hr =	1.0	**Sd 1hr =**	1.0
V_{soak} =	2.2 m³	**V_{soak} =**	0.7 m³

HIRDS V4 (RCP8.5)

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h
1.58	0.633	11.3	15.9	19.2	26.0	33.9	48.3	58.3	69.1	79.7	85.7
2	0.500	12.6	17.7	21.3	28.8	37.6	53.4	64.5	76.0	87.7	94.4
5	0.200	17.0	23.7	28.5	38.4	50.0	70.8	85.2	99.9	115	124
10	0.100	20.4	28.4	34.1	45.8	59.5	84.0	101	118	135	146
20	0.050	24.0	33.4	40.1	53.7	69.5	98.0	117	136	157	168
30	0.033	26.3	36.5	43.7	58.5	75.7	106	127	148	169	181
40	0.025	27.9	38.7	46.4	62.0	80.1	113	134	156	179	191
50	0.020	29.2	40.5	48.5	64.8	83.8	118	140	163	186	199
60	0.017	30.3	42.0	50.3	67.1	86.7	122	145	168	192	206
80	0.013	32.1	44.5	53.2	71.0	91.5	128	152	177	202	216
100	0.010	33.5	46.3	55.4	73.9	95.2	133	159	184	209	224

ABOVE WATER

DESIGN CALCULATIONS TO DETERMINE CRIRTICAL STORM EVENT FOR CATCHMENT:

Storm Duration (Min)	Storm Duration (hrs)	Rainfall Depth (mm)	Intensity (mm/hr)	V soak - Trench (m^3)	V soak - Pit (m^3)	V soak + V stor - Trench (m^3)	V soak + V stor - Pit (m^3)	Des Soak Trench Length (m)	Des Soak Hole No. of
10	0.17	33.5	201.0	0.37	0.12	2.04	0.68	48.886	147.403
15	0.25	39.9	159.6	0.55	0.17	2.22	0.73	53.421	161.630
20	0.33	46.3	138.9	0.73	0.23	2.41	0.79	57.265	173.765
30	0.50	55.4	110.8	1.10	0.35	2.77	0.91	59.457	181.262
60	1.00	73.9	73.9	2.20	0.70	3.87	1.26	56.780	174.627
90	1.50	84.55	56.4	3.30	1.05	4.97	1.61	50.591	156.360
120	2.00	95.2	47.6	4.40	1.40	6.07	1.96	46.644	144.617
240	4.00	114.1	28.5	8.80	2.80	10.47	3.36	32.415	101.108
360	6.00	133	22.2	13.20	4.20	14.87	4.76	26.605	83.192
540	9.00	146	16.2	19.80	6.29	21.47	6.85	20.229	63.367
720	12.00	159	13.3	26.40	8.39	28.07	8.95	16.850	52.836
1080	18.00	171.5	9.5	39.60	12.59	41.27	13.15	12.362	38.801
1440	24.00	184	7.7	52.80	16.79	54.47	17.35	10.049	31.558
2880	48.00	209	4.4	105.60	33.57	107.27	34.13	5.796	18.217
4320	72.00	224	3.1	158.40	50.36	160.07	50.92	4.163	13.087

DESIGN RESULTS:

TRITON UNITS		
Soakage Length =	59.46	m
Soakage Width =	2.00	m
Soakage Height =	0.88	m
Soakage Volume =	104.6	m^3
Critical Storm =	60.0	min
Modular Unit Volume =	0.126	m^3
No. Units Required =	**832**	**Units**

Cirtex Modular Units (or equivalent product)

ABOVE WATER

On-site Stormwater Disposal to Soakage Calculation to Surface Water E1, NZBC, Clauses 9.0.5, 9.0.6

PROJECT:	**318 Lamb Street, Cambridge - Future Council Road - Soakage Basin**

Design Event : 1% AEP, 100yr Storm

Design Soakage Rate (includes soakage reduction factor of 0.5)

1100 mm/hr ****HA01***

Total Impervious Area

3500 m²

Runoff Coefficient, C

0.85

Design Soakage Rate (Sr)	**Sr =**	1100 mm/hr
	Design Soakage depth =	*1.5* m
Run-off Discharged Rc		
C =	**Runoff Coef**	0.85

Soakage Trench:		**Soak Hole - 900mm dia:**	
Runoff to Storage = V_{Stor}		**Runoff to Storage = V_{Stor}**	
Width	*2.0* m		
Area	2.0 m²	**Area**	0.6 m²
BASIN	*1.00*	**SOAK HOLE (LINER)**	*1.0*
V_{stor} =	3.0 m³	**V_{stor} =**	1.0 m³

Runoff to Soakage = V_{soak} for 1hr storm event		**Runoff to Soakage = V_{soak} for 1hr storm event**	
Asp =	2.0 m²	**Asp =**	0.6 m²
Sr =	1100.0 mm/hr	**Sr =**	1100.0 mm/hr
Sd 1hr =	1.0	**Sd 1hr =**	1.0
V_{soak} =	2.2 m³	**V_{soak} =**	0.7 m³

HIRDS V4 (RCP8.5)

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h
1.58	0.633	11.3	15.9	19.2	26.0	33.9	48.3	58.3	69.1	79.7	85.7
2	0.500	12.6	17.7	21.3	28.8	37.6	53.4	64.5	76.0	87.7	94.4
5	0.200	17.0	23.7	28.5	38.4	50.0	70.8	85.2	99.9	115	124
10	0.100	20.4	28.4	34.1	45.8	59.5	84.0	101	118	135	146
20	0.050	24.0	33.4	40.1	53.7	69.5	98.0	117	136	157	168
30	0.033	26.3	36.5	43.7	58.5	75.7	106	127	148	169	181
40	0.025	27.9	38.7	46.4	62.0	80.1	113	134	156	179	191
50	0.020	29.2	40.5	48.5	64.8	83.8	118	140	163	186	199
60	0.017	30.3	42.0	50.3	67.1	86.7	122	145	168	192	206
80	0.013	32.1	44.5	53.2	71.0	91.5	128	152	177	202	216
100	0.010	33.5	46.3	55.4	73.9	95.2	133	159	184	209	224

ABOVE WATER

DESIGN CALCULATIONS TO DETERMINE CRIRTICAL STORM EVENT FOR CATCHMENT:

Storm Duration (Min)	Storm Duration (hrs)	Rainfall Depth (mm)	Intensity (mm/hr)	V soak - Trench (m^3)	V soak - Pit (m^3)	V soak + V stor - Trench (m^3)	V soak + V stor - Pit (m^3)	Des Soak Trench Length (m)	Des Soak Hole No. of
10	0.17	33.5	201.0	0.37	0.12	3.37	1.07	29.603	93.112
15	0.25	39.9	159.6	0.55	0.17	3.55	1.13	33.437	105.174
20	0.33	46.3	138.9	0.73	0.23	3.73	1.19	36.895	116.050
30	0.50	55.4	110.8	1.10	0.35	4.10	1.30	40.199	126.441
60	1.00	73.9	73.9	2.20	0.70	5.20	1.65	42.279	132.985
90	1.50	84.55	56.4	3.30	1.05	6.30	2.00	39.926	125.584
120	2.00	95.2	47.6	4.40	1.40	7.40	2.35	38.273	120.384
240	4.00	114.1	28.5	8.80	2.80	11.80	3.75	28.767	90.483
360	6.00	133	22.2	13.20	4.20	16.20	5.15	24.424	76.824
540	9.00	146	16.2	19.80	6.29	22.80	7.25	19.050	59.921
720	12.00	159	13.3	26.40	8.39	29.40	9.35	16.089	50.607
1080	18.00	171.5	9.5	39.60	12.59	42.60	13.54	11.977	37.672
1440	24.00	184	7.7	52.80	16.79	55.80	17.74	9.810	30.856
2880	48.00	209	4.4	105.60	33.57	108.60	34.53	5.725	18.009
4320	72.00	224	3.1	158.40	50.36	161.40	51.31	4.129	12.987

DESIGN RESULTS:

SOAKAGE BASIN		
Soakage Length =	42.28	m
Soakage Width =	2.00	m
Soakage Height =	1.50	m
Soakage Volume =	126.8	m^3
Soakage Area =	84.6	m^2
Critical Storm =	60.0	min

ABOVE WATER

On-site Stormwater Disposal to Soakage Calculation to Surface Water E1, NZBC, Clauses 9.0.5, 9.0.6

PROJECT:	**318 Lamb Street, Cambridge - Future Council Road - Porous well liners**

Design Event : 1% AEP, 100yr Storm

Design Soakage Rate (includes soakage reduction factor of 0.5)

1100 mm/hr ****HA01***

Total Impervious Area

3500 m²

Runoff Coefficient, C

0.85

Design Soakage Rate (Sr)	**Sr =**	1100 mm/hr
	Design Soakage depth =	*4* m
Run-off Discharged Rc		
C =	**Runoff Coef**	0.85

Soakage Trench:			**Soak Hole - 1200mm dia:**	
Runoff to Storage = V_{Stor}			**Runoff to Storage = V_{Stor}**	
Width	*2.0* m			
Area	2.0 m²		**Area**	1.1 m²
BASIN	*1.00*		**SOAK HOLE (LINER)**	*1.0*
V_{stor} =	8.0 m³		**V_{stor} =**	4.5 m³

Runoff to Soakage = V_{soak} for 1hr storm event		**Runoff to Soakage = V_{soak} for 1hr storm event**	
Asp =	2.0 m²	**Asp =**	1.1 m²
Sr =	1100.0 mm/hr	**Sr =**	1100.0 mm/hr
Sd 1hr =	1.0	**Sd 1hr =**	1.0
V_{soak} =	2.2 m³	**V_{soak} =**	1.2 m³

HIRDS V4 (RCP8.5)

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

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h
1.58	0.633	11.3	15.9	19.2	26.0	33.9	48.3	58.3	69.1	79.7	85.7
2	0.500	12.6	17.7	21.3	28.8	37.6	53.4	64.5	76.0	87.7	94.4
5	0.200	17.0	23.7	28.5	38.4	50.0	70.8	85.2	99.9	115	124
10	0.100	20.4	28.4	34.1	45.8	59.5	84.0	101	118	135	146
20	0.050	24.0	33.4	40.1	53.7	69.5	98.0	117	136	157	168
30	0.033	26.3	36.5	43.7	58.5	75.7	106	127	148	169	181
40	0.025	27.9	38.7	46.4	62.0	80.1	113	134	156	179	191
50	0.020	29.2	40.5	48.5	64.8	83.8	118	140	163	186	199
60	0.017	30.3	42.0	50.3	67.1	86.7	122	145	168	192	206
80	0.013	32.1	44.5	53.2	71.0	91.5	128	152	177	202	216
100	0.010	33.5	46.3	55.4	73.9	95.2	133	159	184	209	224

ABOVE WATER

DESIGN CALCULATIONS TO DETERMINE CRIRTICAL STORM EVENT FOR CATCHMENT:

Storm Duration (Min)	Storm Duration (hrs)	Rainfall Depth (mm)	Intensity (mm/hr)	V soak - Trench (m^3)	V soak - Pit (m^3)	V soak + V stor - Trench (m^3)	V soak + V stor - Pit (m^3)	Des Soak Trench Length (m)	Des Soak Hole No. of
10	0.17	33.5	201.0	0.37	0.21	8.37	4.73	11.912	21.075
15	0.25	39.9	159.6	0.55	0.31	8.55	4.83	13.883	24.564
20	0.33	46.3	138.9	0.73	0.41	8.73	4.94	15.772	27.905
30	0.50	55.4	110.8	1.10	0.62	9.10	5.14	18.112	32.044
60	1.00	73.9	73.9	2.20	1.24	10.20	5.77	21.554	38.135
90	1.50	84.55	56.4	3.30	1.87	11.30	6.39	22.260	39.384
120	2.00	95.2	47.6	4.40	2.49	12.40	7.01	22.840	40.411
240	4.00	114.1	28.5	8.80	4.97	16.80	9.50	20.205	35.749
360	6.00	133	22.2	13.20	7.46	21.20	11.98	18.664	33.022
540	9.00	146	16.2	19.80	11.19	27.80	15.71	15.624	27.643
720	12.00	159	13.3	26.40	14.92	34.40	19.44	13.751	24.329
1080	18.00	171.5	9.5	39.60	22.38	47.60	26.90	10.719	18.965
1440	24.00	184	7.7	52.80	29.84	60.80	34.36	9.003	15.929
2880	48.00	209	4.4	105.60	59.69	113.60	64.21	5.473	9.684
4320	72.00	224	3.1	158.40	89.53	166.40	94.05	4.005	7.086

DESIGN RESULTS:

POROUS WELL LINERS	
Depth =	4.00 m
Liner Diameter =	1.20 m
No. Well Liners =	40
Critical Storm =	120.0 min

ABOVE WATER

Stormwater Soakage Test Results - Using Auckland Council GD007 (Falling Head Appendix B1.1)

PROJECT:	**318 Lamb Street, Cambridge - HA01** ***(sandy silt overlying sands and gravels)***

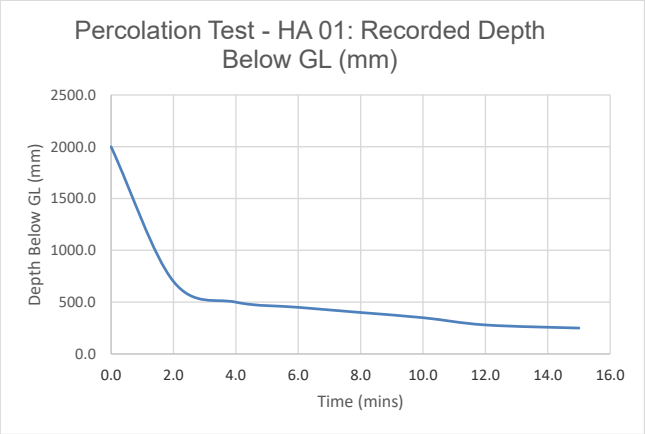
Soak Test 1 - Dia 100mm:

Design Soakage Rate (Sr) **Sr =** 2.29 L/min/m²

BH Depth, D = *2000* mm
Start WL = *0* mm

Time	Recorded Depth	Drop in WL	Soakage Rate	Recorded Depth	Interval gradient
Min	Below GL (mm)	(mm)	(mm/hr)	Below GL (mm)	(m/min)
0.0	0.0	0.00		2000.0	0
2	1300	1300.00	39000.0	700.0	0.650
4	1500	200.00	6000.0	500.0	0.050
6	1550	50.00	1500.0	450.0	0.008
8	1600	50.00	1500.0	400.0	0.006
10	1650	50.00	1500.0	350.0	0.005
12	1720	70.00	2100.0	280.0	0.006
15	1750	30.00	600.0	250.0	0.002
	*hole collapse at 1750mm				

d	0.065	*distance between midpoint of the last two readings and the base of the borehole*
P	3.2051	*L/min/m²*
FoS (c)	1	*Consequence level 1 (Table 5)*
FoS (u)	1.4	*Quality level 2 (Table 6)*
FoS (total)	1.4	
P (factored)	2.29	*L/min/m²*



Stormwater Soakage Test Results - Using Auckland Council GD007 (Falling Head Appendix B1.1)

PROJECT:	**318 Lamb Street, Cambridge - HA02** ***(sands and gravels)***

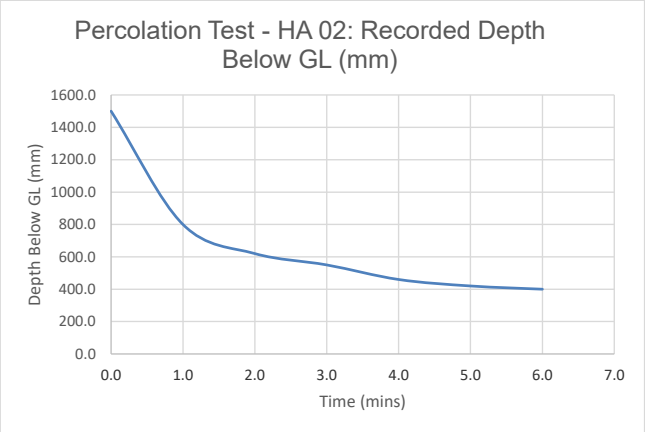
Soak Test 2 - Dia 100mm:

Design Soakage Rate (Sr) **Sr =** 3.57 L/min/m²

BH Depth, D = *1500* mm
Start WL = *0* mm

Time Min	Recorded Depth Below GL (mm)	Drop in WL (mm)	Soakage Rate (mm/hr)	Recorded Depth Below GL (mm)	Interval gradient (m/min)
0.0	0.0	0.00		1500.0	0
1	700	700.00	42000.0	800.0	0.700
2	880	180.00	10800.0	620.0	0.090
3	950	70.00	4200.0	550.0	0.023
4	1040	90.00	5400.0	460.0	0.023
5	1080	40.00	2400.0	420.0	0.008
6	1100	20.00	1200.0	400.0	0.003
	*hole collapse at 1100mm				

d	0.04	*distance between midpoint of the last two readings and the base of the borehole*
P	5.0000	*L/min/m²*
FoS (c)	1	*Consequence level 1 (Table 5)*
FoS (u)	1.4	*Quality level 2 (Table 6)*
FoS (total)	1.4	
P (factored)	3.57	*L/min/m²*



Stormwater Soakage Test Results - Using Auckland Council GD007 (Falling Head Appendix B1.1)

PROJECT:	**318 Lamb Street, Cambridge - HA03** ***(sands, 300mm layer of white clay @ 1400mm bgl, underlying sand)***

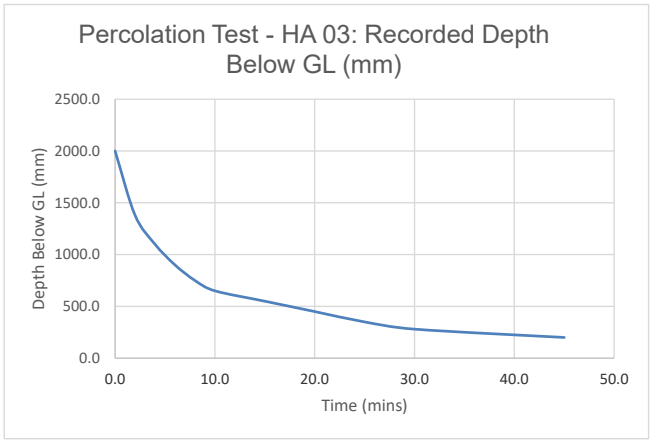
Soak Test 3 - Dia 100mm:

Design Soakage Rate (Sr) **Sr =** 0.78 L/min/m²

BH Depth, D = *2000* mm
Start WL = *0* mm

Time	Recorded Depth	Drop in WL	Soakage Rate	Recorded Depth	Interval gradient
Min	Below GL (mm)	(mm)	(mm/hr)	Below GL (mm)	(m/min)
0.0	0.0	0.00		2000.0	0
2	620	620.00	18600.0	1380.0	0.310
4	900	280.00	8400.0	1100.0	0.070
6	1100	200.00	6000.0	900.0	0.033
8	1250	150.00	4500.0	750.0	0.019
10	1350	100.00	3000.0	650.0	0.010
15	1450	100.00	1200.0	550.0	0.007
20	1550	100.00	1200.0	450.0	0.005
25	1650	100.00	1200.0	350.0	0.004
30	1720	70.00	840.0	280.0	0.002
45	1800	80.00	320.0	200.0	0.002
	**hole collapse at 1800mm*				

d	0.115	*distance between midpoint of the last two readings and the base of the borehole*
P	1.0870	*L/min/m²*
FoS (c)	1	*Consequence level 1 (Table 5)*
FoS (u)	1.4	*Quality level 2 (Table 6)*
FoS (total)	1.4	
P (factored)	0.78	*L/min/m²*



TP108 Worksheet

Project: 318 Lamb Street, Cambridge

Project No.: New Council Road Only

Task: Run-off Calculations

Calculated: Josy Cooper **Signature:**  **Date:** 30/05/2023

A) Runoff Parameters and Time of Concentration

1. Catchment Details POST-DEVELOPMENT

Total Area (ha)	0.3500
Pervious Area (ha)	0.0000
Impervious Area (ha)	0.3500
Channel^{n} factor **C**	0.60
Catchment length **L** (km)	0.19
Catchment slope **Sc**	0.010

Assumptions (if any):
Sands and gravels
380m road length - 7.5m road width plus 1 x 1.5m wide footpath on one side of the road.

2. Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil Name and Classific.	Area identifier, cover description (cover type, treatment and hydrological condition)	Curve number CN*	Area	Product CN x Area
B	New Council Road	98	0.35	34.3
	* from Appendix B	**Total**	**0.3500**	**34.3**

CN (weighted) = $\frac{\text{total CN x A}}{\text{total area}} = \frac{34.3}{0.3500} =$ **98.0**

Ia (weighted) = $\frac{\text{5 x pervious area}}{\text{total area}} = \frac{0.0}{0.3500} =$ **0.0**

3. Time of Concentration

Runoff Factor = $\frac{CN}{200 - CN} =$ 0.961

tc = 0.14C x L0.66 x [CN/(200-CN)]-.55 x Sc-0.30 = **0.170** hrs Note: tc = 10 min = 0.17hrs

SCS Lag for HEC-HMS "tp" = 2/3 x tc = 0.113 hrs

B) Graphical Peak Flow Rate

1. Catchment Area (km^2) = 0.0035

2. Calc storage, S = 25.4 x [(1000/CN - 10)] = 5.184

	Storm #1	Storm #2		
3. Annual Recurrence Interval (ARI)	**10yr, 24hr**	**100yr, 24hr**		
4. 24 hour rainfall depth, P_{24} (mm)	115.7	184.00		*RCP8.5*
5. Compute c* = $\frac{P_{24} - 2Ia}{P_{24} - 2Ia + 2S}$ (mm)	0.918	0.947		
6. Specific flow rate q* (from Fig. 5.1 below)	0.165	0.167		
7. Peak flow rate, $q_p = q^*AP_{24}$ (m^3/sec)	0.0668	0.1075		
8. Runoff depth, Q_{24} = $\frac{(P_{24} - Ia)^2}{(P_{24} - Ia) + S}$ (mm)	110.7	179.0		
9. Runoff Volume, $V_{24} = 1000 \times Q_{24}A$ (m^3)	387.59	626.35		

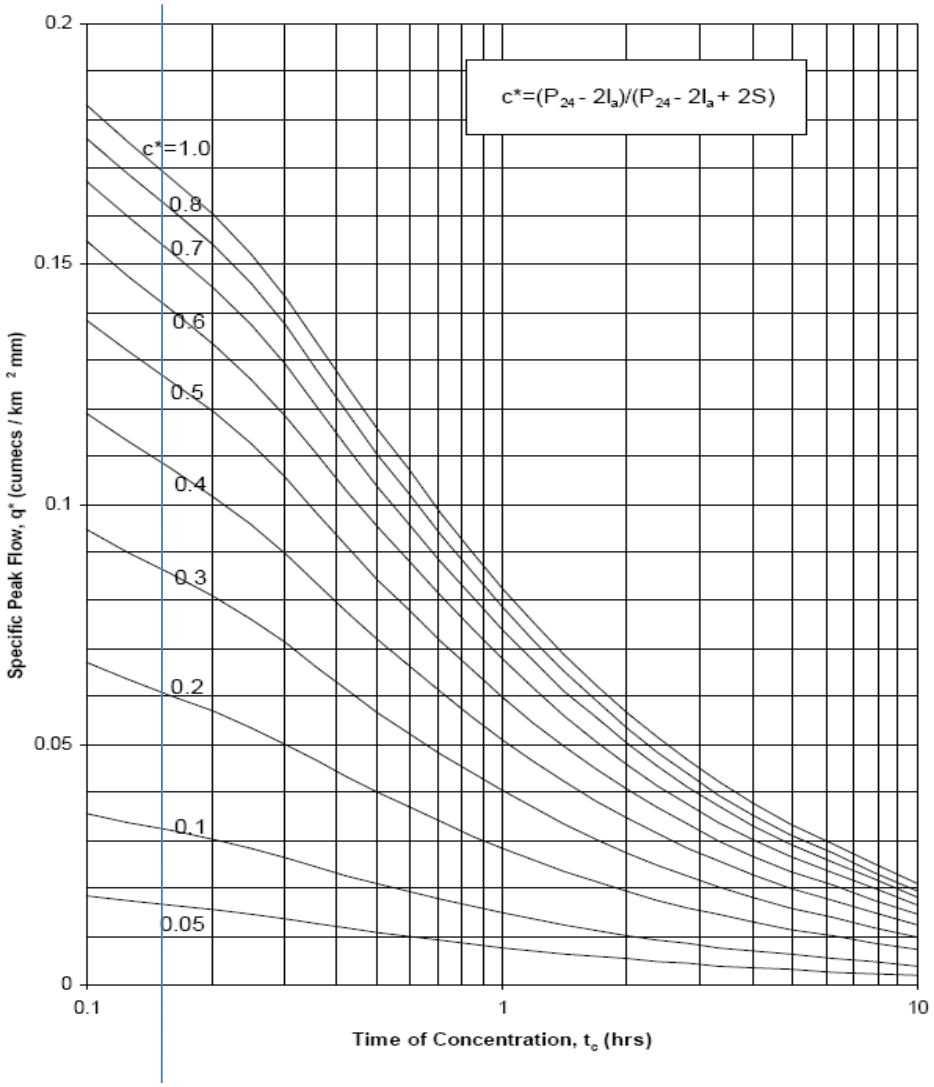
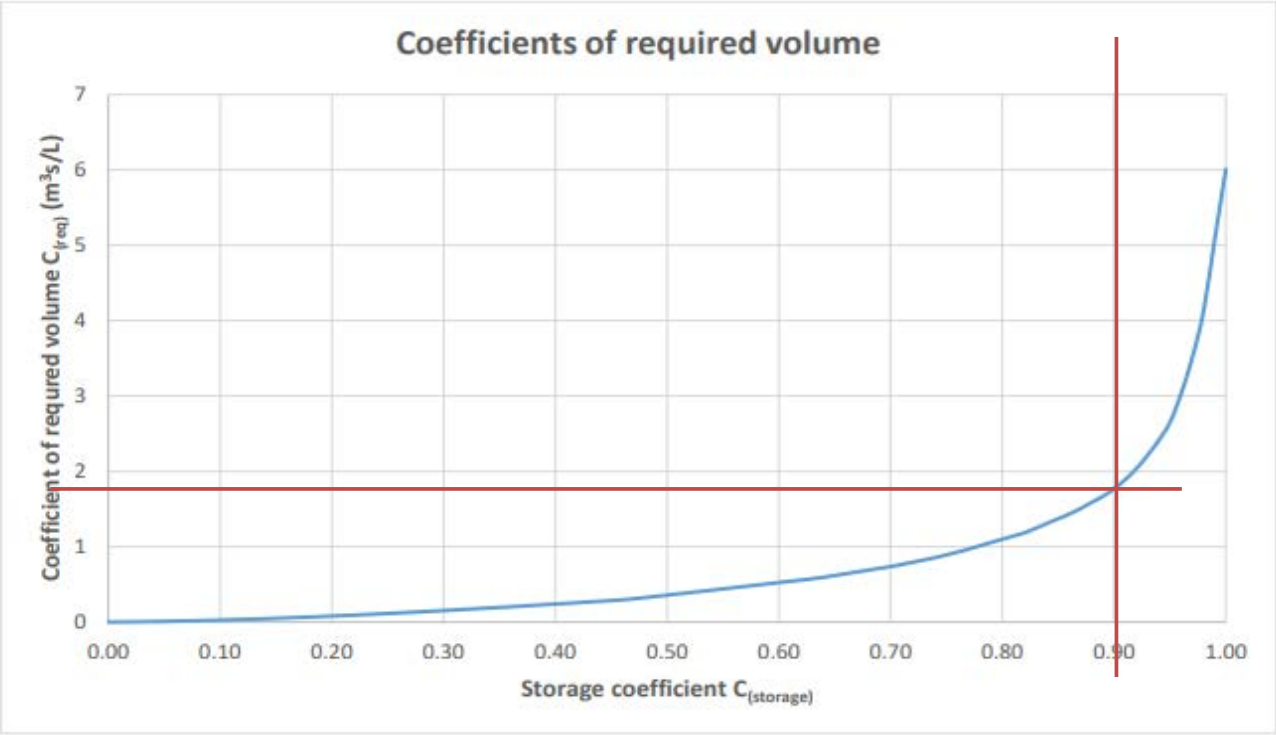


Figure 5.1 - Specific Peak Flow Rate

Figure 5.1, from TP108

GD007 Calculations - Device Sizing (C 2.6)

P	2.29	L/min/m² (HA01)	
Q (s)	0.1075	m³/sec	
Q (s)	107.55	L/sec	
Initial C	0.9		
C (req)	1.8		
V (req)	193.59	m³	storage volume
A (req)	281.79	m²	soakage area
Soakpit	0.88	m deep	
	2.4	m wide	
	96.5	m long	
Void ratio	0.95	assuming soakage tanks (rainsmart or eqiv)	
V (soakpit)	193.62	m³	*ok*
A (soakpit)	318.63	m²	*ok*
T (drain)	5.000	hours	*ok*
Rainsmart	1539	Units	

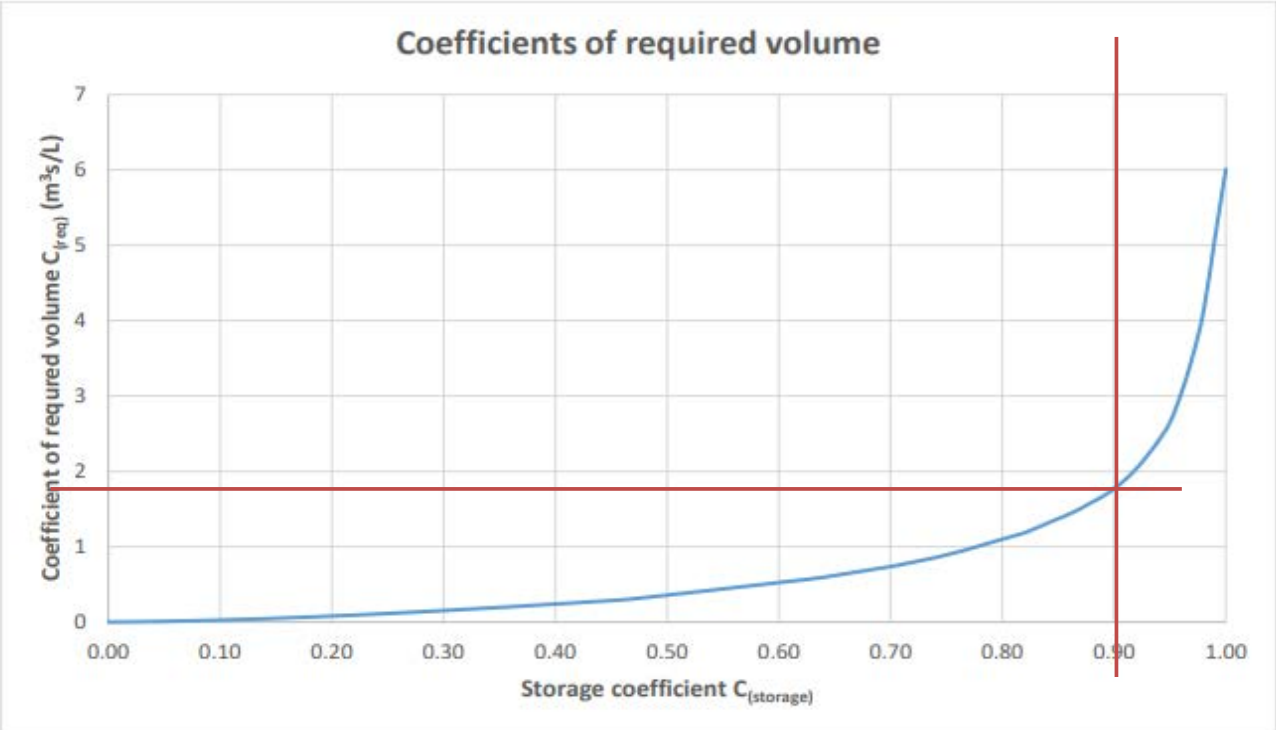


Each iteration should be completed according to the following guidelines:

- To reduce required soakage area, increase $C_{(storage)}$
- To reduce required storage volume, decrease $C_{(storage)}$.

GD007 Calculations - Device Sizing (C 2.6)

P	2.29	L/min/m² (HA01)	
Q (s)	0.1075	m³/sec	
Q (s)	107.55	L/sec	
Initial C	0.9		
C (req)	1.8		
V (req)	193.59	m³	storage volume
A (req)	281.79	m²	soakage area
Well liners	4	m deep	
	1.2	m diameter	
	46.0	No. liners	
Void ratio	0.95	assuming soakage tanks (rainsmart or eqiv)	
V (soakpit)	197.69	m³	*ok*
A (soakpit)	693.66	m²	*ok*
T (drain)	5.000	hours	*ok*
No well liners	46		



Each iteration should be completed according to the following guidelines:

- To reduce required soakage area, increase $C_{(storage)}$
- To reduce required storage volume, decrease $C_{(storage)}$.

TOPOGRAPHIC SURVEY PROVIDED BY OTHERS.
INDICATIVE LOT LAYOUT - PROVIDED BY OTHERS
PLAN INTENT IS TO INDICATE UPSTREAM CATCHMENT

UPSTREAM CATCHMENT
INDICATIVE AREA: 22Ha.

INDICATIVE OVERLAND FLOW DIRECTION.

EXISTING DEPRESSION IN NEIGHBORING PROPERTY.

REV	DATE	AMENDMENT	BY	APPD
A	06/06/23	STORMWATER ASSESSMENT	CTC	JCC

DESIGNED	JCC	June-23
DESIGN CHECK	JC	June-23
DRAWN	CTC	June-23
REVIEWED	JCC	June-23
APPROVED		

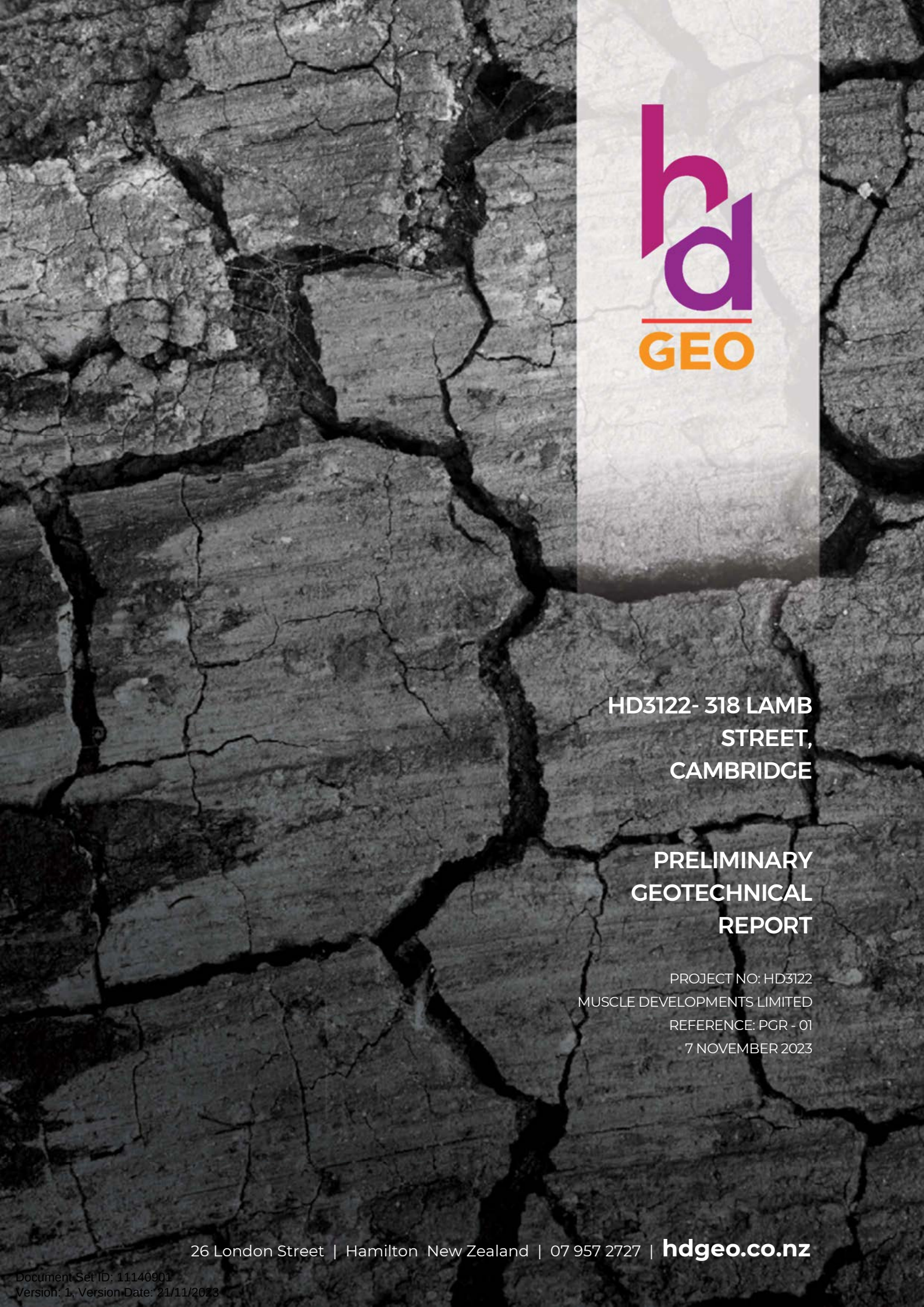
ABOVE WATER

318 LAMB STREET, LEAMINGTON, CAMBRIDGE
STORMWATER ASSESSMENT
TOPOGRAPHIC SURVEY & UPSTREAM CATCHMENT

CAD FILE: 23-157	DATE: 06-June-23
ORIGINAL SCALE A1: 1:2000@A3	SHEET NUMBER C-001
CLIENT RYJO	ISSUE 1 / REVISON A
PROJECT NUMBER 23-157	

APPENDIX H

GEOTECHNICAL REPORT



HD3122- 318 LAMB STREET, CAMBRIDGE

PRELIMINARY GEOTECHNICAL REPORT

PROJECT NO: HD3122
MUSCLE DEVELOPMENTS LIMITED
REFERENCE: PGR - 01
7 NOVEMBER 2023

26 London Street | Hamilton New Zealand | 07 957 2727 | **hdgeo.co.nz**

Executive summary

Introduction

Muscle Developments Limited (the client) proposes to subdivide their property at 318 Lamb street, Cambridge (the site) to create 20 new lots. The new residential development is planned in two stages (Stages 1 and 2).

This report presents the results of our investigation and assessment for Stage 1 and Stage 2 of the proposed development. A site plan showing the proposed development is included in Appendix A. This report is intended to be submitted to the Waipa District Council in support of an application for subdivision consent.

Our scope included

- a desktop study of the site to review existing information, including historical aerial images, geology maps, contour maps, and the NZ Geotechnical Database (NZGD)
- a site investigation to characterise site conditions, which included:
    - 11 hand augers between 3 and 5 m with strength testing up to 3 m below ground level (bgl)
    - 10 dynamic cone penetrometer (DCPs) tests were completed up to 1.5 m bgl along the proposed right of way (ROW)
- a natural hazards assessment, including a qualitative liquefaction assessment
- a high level settlement summary
- a high level earthworks discussion
- a indicative pavement subgrade conditions
- a preliminary recommendations for foundations

Our key findings

- ground conditions were consistent with the mapped geology (Hinuera Formation)
- Hinuera Formation consisting of interbedded loose to dense fine to coarse sand with some pumiceous gravels and firm to very stiff moderately sensitive to sensitive sandy silts up to 3 m bgl
- groundwater was encountered at an approximate depth of 3.6 m bgl within the proposed Stage 1 and Stage 2 development
- based on the qualitative liquefaction assessment, we expect that liquefaction damage is likely to be 'minor to moderate' under ULS conditions
- foundations will need to be designed for loose soils and the anticipated liquefaction risk

Further work

Further work includes:

- excavation of the old dump site and replacement with engineered fill
- further testing (ie CPT testing) and assessment to quantify the liquefaction and settlement risk
- construction observation and testing during earthworks to support certification of ground conditions below foundations
- additional testing to suitably inform pavement design of the ROW
- further testing and assessment for proposed structures are required to support building consent

Contents

PREPARED BY: **Dave Freeman**

ENGINEERING GEOLOGIST

Dave@hdgeo.co.nz

Tel 027 355 98 26

REVIEWED BY: **Daniel Whately**

SENIOR GEOTECHNICAL ENGINEER

Daniel@hdgeo.co.nz

Tel 027 242 1178

APPROVED BY: **Kent Morgan, CPEng**

SENIOR GEOTECHNICAL ENGINEER

kent@hdgeo.co.nz

Introduction

Muscle Developments Limited proposes to subdivide the property at 318 Lamb street, Cambridge to create 20 new lots. The new residential development is planned in two stages (Stages 1 and 2).

This report presents the results of our investigation and assessment for Stage 1 and Stage 2 of the proposed development. A site plan showing the proposed development is included in Appendix A. This report is intended to be submitted to the Waipa District Council in support of an application for subdivision consent.

Scope

The scope of our assessment included:

- a desktop study of the site to review existing information, including historical aerial images, geology maps, contour maps, and the NZ Geotechnical Database (NZGD)
- a site investigation to characterise site conditions, which included:
    - 11 hand augers between 3 and 5 m with strength testing up to 3 m below ground level (bgl)
    - 10 dynamic cone penetrometer (DCPs) tests were completed up to 1.5 m bgl along the proposed right of way
- a natural hazards assessment, including a qualitative liquefaction assessment
- a high level settlement summary
- a high level earthworks discussion
- a indicative pavement subgrade conditions
- a preliminary recommendations for foundations

Site description

The site is located at 318 Lamb Street, Cambridge. It is bounded by Lamb Street and a residential house to the north, a blueberry orchard and pasture to the east, and residential houses and pasture to the south and west.

Most of the site is vacant pasture. The site contains:

- a residential house, located in the central-east portion of the site
- a shed and water tank, located in the central-east portion of the site
- an access track, running through the east portion of the site from Lamb Street to the residential house
- a dump site, located in the central-west portion of the site
- a small blueberry orchard, located in the south-east portion of the site (balance area)

Most of the site is relatively flat and is located between 73 m to 75 m above local datum.

Proposed development

The client proposes to develop the site in two stages[1] and to create 20 new residential lots and a balance land area. This report focuses on the proposed 20 lot subdivision.

[1] Proposed overall subdivision of Lots 2003 & 2005 DP 535418 & Lot 1000 DP 548151, Blue Wallace Surveyors Ltd, Drawing Ref 23095-00-PL-101, Rev D, dated September 2023

Stage 1 includes Lots 1 and Lot 14. Stage 2 includes Lots 2 to 13 and Lots 15, 16 and Lots 18 to 20. Lot 17 has an existing dwelling. The proposed lots sizes are between approximately 2100m^2 and 2700m^2. The balance lot is 9.32 Ha.

A proposed ROW extends north from Te Mara Drive for approximately 300 m before bending east and terminating against the balance Lot area. The proposed development plan is included in Appendix A.

Desk study

Geology

The geological map of the area[2] indicates that the property is in an area mapped as (Late Pleistocene) river deposits (Hinuera Formation). This geology is described as cross-bedded pumice sand, silt, and gravel with interbedded peat.

Site and hand auger observations are consistent with geological maps and predicted ground conditions. Hand augers encountered Hinuera formation silts and sands to a depth of 4.6 m below ground level (bgl).

Aerial Photography

We have sourced historic[3] and recent[4] aerial photos to identify past land uses and any geomorphic changes at the site or surrounding area. Clear images were available from 1943. Changes in the geomorphology of the site or surrounding area over the period reviewed include:

- since 1943 the site has been used as farmland with multiple structures visible off an access road extending south from Lamb street. A dump site is visible in the western project area
- since 1953 residential property has been built north west of the site
- since 1966 the footprint of the dump site has increased
- since 1995 a new access track has been established to the dump site and the dump site foot print has increased
- since 2006 crops have been established in the southern area of site
- since 2015 the dump site has been partially infilled. The house on proposed Lot 17 has been built
- since 2022 the dump site has been infilled. A shed located along the northern access track has been removed

Historic and recent aerial photographs are included in Appendix B.

NZGD

We accessed the New Zealand Geotechnical Database (NZGD)[5] to determine whether ground investigations have been conducted at or near the site. Hand auger investigation data is available within 250 m of the site. All data indicates silty sand and sandy silt of the Hinuera formation up to 3 m bgl. Holes generally encountered loose to very stiff silt and loose to medium dense fine to coarse sand up to 3.0 m bgl. Groundwater was not encountered within the hand augers in the upper 3 m bgl.

[2] 1:250,000 Geological Map of New Zealand (QMAP). New Zealand Geology Web Map. GNS, 2013. https://data.gni.cri.nz/geology.

[3] Sourced from http://retrolens.nz and licensed by LINZ CC-BY.

[4] Google Earth Pro.

[5] NZGD data sourced from https://www.nzgd.org.nz/ARCGISMapViewer/mapviewer.aspx, date accessed 10/10/23

Previous reports

Previous investigations and related reports at the site include:

A geotechnical report provided by Geocon Geotechnical limited[6]. The report outlines:

- the soils identified are loose to dense silts and sands of the Hinuera formation
- bore hole 24 drilled through proposed lot 3 identified an area of approximately 1.4 bgl uncontrolled fill. Further exploratory holes drilled around borehole 24 identify the uncontrolled fill is no larger than 2 m in diameter (marked on site plan)
- targeted testing of the old dump site

A geotechnical report provided by Mark T Mitchell limited [7]. The report outlines:

- the site does not meet criteria of 'good ground' according to NZS 3604:2011
- foundation requirements for lots within the proposed old dump site to be piled
- foundations requirements for lots with concrete foundations to have the upper 0.8 m of loose soil removed and replaced with compacted fill

An environmental report provided HD Geo[8]. The report outlines:

- the site contains areas of contaminated land
- the report outlines a management plan for working onsite
- the dump site is to be excavated to a depth of 5.5 m
- the dump site is to be suitably backfilled and tested confirming it is suitable for rural and residential land use

We have reviewed the investigation results, findings, and recommendations of the above reports in the preparation of this report.

Site investigation

Our site investigation included eleven hand auger boreholes (denoted HA01 to HA11) with in-situ strength testing (shear vane and DCP) undertaken to a depth of between 3.0 m bgl. 10 additional DCP's were taken along the proposed ROW to a depth of 1.5 m bgl.

In-situ shear vane testing was generally performed at intervals of 0.3 m in cohesive material and undertaken in accordance with the New Zealand Geotechnical Society (NZGS) Guidelines for Hand Held Shear Vane Test (NZGS 2001).

Ground conditions exposed within the hand auger and machine auger boreholes were logged in accordance with the Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (NZGS 2005). Boreholes were backfilled with recovered material.

A site plan showing the location of each test and the finalised hand auger borehole logs are provided in Appendix C.

[6] Geocon Geotechnical ltd: *Supplementary site investigation for proposed subdivision – Part stage 3a n318 (lots 114 to 117) lamb street, Cambridge*, Reference G – 16550.1, Date 11 March 2021

[7] Mark T Mitchell: *Supplementary site investigation for foundation recommendations proposed subdivision – stage 3a n318 (lots 114 to 117) lamb street, Cambridge*, Reference W – 16550.7, Date 12 April, 2021

[8] HD Geo: *Site management plan and remedial action plan, 318 Lamb Street, Cambridge*, Reference: HD2964 – SMP/RAP Date; 07 August 2023

Ground conditions

The investigation encountered ground conditions which were consistent with Hinuera Formation. Ground conditions have been separated as HA01 to HA03 and HA05 to HA11 to accurately describe the sites ground conditions.

Ground conditions are summarised in Tables 1 and 2 below:

Table 1: Summary of ground conditions in southern portion of site

Geology	Average depth (m bgl)	Soil description	Strength (DCP blows per 100 mm)	Test #
Topsoil	0.1 to 0.2	Organic silt	N/A	HA01 to HA03
Hinuera Formation	0.2 to 0.9	Loose to medium dense sandy silt	2 to 3 blows	
	0.9 to 1.5	Dense gravelly sand	7 to 9 blows	
	1.6 to 3.0	Medium dense to dense sand	3 to 13 blows	

Table 2: Summary of ground conditions in central/northern portion of site

Geology	Average depth (m bgl)	Soil description	Strength (DCP blows per 100mm)	Test #
Topsoil	0.1 to 0.2	Organic silt	N/A	HA05 to HA11
Hinuera Formation	0.2 to 0.8	Very loose to loose sandy silt	1 to 2 blows	
	0.8 to 2.0	Interbedded loose to medium dense sand and silt	1 to 5 blows	
	2.0 to 3.0	Loose to dense sand	2 to 10 blows	
	3.0 to 3.6	Dense gravel	5 to 6 blows	HA05
	3.6 to 4.6	Interbedded silt and sand	No strength testing – targeting GW	

The site is largely consistent in terms of its shallow ground conditions with Hinuera silt and sand being the dominant soils below topsoil. The southern extent of the site ranging from HA01 to HA03 has an area of dense gravelly sand above the interbedded silt and sand. This layer of dense gravel was not identified beyond HA03.

Groundwater

Groundwater was encountered at an approximate depth of 3.6 m bgl within HA05 during the time of the site investigation. The site investigation was completed during October 2023 in Spring weather conditions. Groundwater are likely to fluctuate seasonally.

Geotechnical assessment

This assessment is a collection of general information and advice for the site. The site is suitable for the proposed subdivision, subject to the geotechnical recommendations in this report.

Natural hazards

- **Earthquake:** Design peak ground acceleration for the 1 in 500-year annual return interval earthquake is calculated to be 0.28g[9] . The site subsoil class is D 'Deep or soft soils'. Based on qualitative assessment (see 'liquefaction' section below), we believe the liquefaction risk is 'low' to 'moderate'.
- **Volcanic, geothermal, or sedimentation activity:** The site is not near any known sources of these risks.
- **Landslips:** the site and surrounding land is near level flat with no significant changes in elevation. The site is not at risk of landslips.
- **Erosion:** No indications of erosion were observed during the site investigation, and we consider the site to be at low risk of damage due to erosion.
- **Subsidence** Risk of the site to general subsidence is low.
- **Expansive soil:** The ground conditions encountered below the property generally consisted of granular or low plasticity silt material. Therefore, we believe the site is classified as low risk for expansive soils.

Table 3 below provides a summary of our risk assessment for the site.

Table 3: Natural hazards risk matrix

RISK ASSESSMENT MATRIX		LIKELIHOOD				
		Very unlikely	Unlikely	Possible	Likely	Very likely
POTENTIAL CONSEQUENCES	Severe					
	Moderate	- Volcanic				
	Minor			- Liquefaction - Ground subsidence (static)		
	Negligible	- Geothermal or sedimentation activity - Landslips or slope instability - Expansive soils - Lateral spreading				

[9] Ministry of Business Innovation and Employment (MBIE) / New Zealand Geotechnical Society (NZGS). Earthquake Geotechnical Engineering Practice (November 2021). Module 1. Overview of the guidelines.

Liquefaction

We have undertaken a qualitative liquefaction assessment for the site using the latest guidelines. This assessment qualifies as a Level B (calibrated desk study) in accordance with the 2017 planning guidelines[10]. Class D soils have been assumed for this assessment.

As the site is in the same geomorphic region and as Hamilton City, we have assessed the likely potential liquefaction hazard at the site using the information presented in the Hamilton City Liquefaction Hazard Desktop Study[11]. The site is mapped as being in the geomorphic zone 'Alluvial Plains'. Our site investigation supports this geology and geomorphology.

As discussed above, the groundwater at the site is expected to be at approximately 3.6 m during the winter/spring months and lower over summer. Using a conservative groundwater of 3 m, the desk study shows the degree of liquefaction induced ground damage is likely to be 'minor to moderate' under ULS conditions, and negligible under SLS conditions.

The median Liquefaction Severity Number (LSN) is 'minor to moderate', with an LSN range of 13 to 18 under ULS condition. The spectrum of outcomes ranges from negligible to severe. It is recommended that Cone penetrometer testing (CPT) be carried out to quantify the risk of liquefaction at this site.

See Appendix D for selected HCC liquefaction outputs.

Lateral spreading

Lateral spreading is a phenomenon where the soil has above a liquefied layer of silt or sand moves laterally towards a free face, such as a stream bank or drainage ditch. Due to the flat and even terrain at the site and within the surrounding area, lateral spreading risk is expected to be negligible.

Static settlement

North of HA03 (Lots 5 to 15) loose soils of the Hinuera formation were identified that may be susceptible to static settlement from future earthworks or proposed buildings. Weak layers of silt and sand (typically in the approximate upper 2 m bgl) were identified using DCP testing. This risk should be taken into account when designing foundations.

It is recommended that CPTs are carried onsite to quantify the risk of static settlement.

Earthworks

No cut and fill plans were available at the time of this assessment. However, based on our site investigation, we expect minor localised excavation and replacement of approximately 0.2 m to 0.8 m of topsoil and loose silt.

Any earthworks, including excavation, preparation of subgrade and backfill should be performed in accordance with the geotechnical recommendations presented within this report and applicable portions of the New Zealand Standard 4431:2022 entitled, "Engineering fill construction for light weight structures", and New Zealand Standard 4404:2010 entitled, "Land Development and Subdivision Infrastructure" prepared by Standards New Zealand. All earthworks should be performed under the observations and testing of a suitably experienced and qualified Geo-Professional familiar.

[10] Earthquake Commission (EQC) / Ministry for the Environment and Ministry of Business, Innovation and Employment. 'Planning and engineering guidance for potentially liquefaction prone land' Rev 01. Dated September 2017.
[11] 'Liquefaction Desktop Study' prepared by Tonkin and Taylor for Hamilton City Council, Ref No. 1007144 v1.1, dated February 2019

The old dump site identified within lots 5 and 6 has been excavated as per guidance of the environmental report conducted on the site by HD Geo. As per recommendations of the report the dump site is to be backfilled with engineered fill and suitably compacted. In general, we expect any externally sourced sand fill to be suitable for use as fill if placed in accordance with NZS4431:2022[12] and tested by a suitably qualified engineer.

Indicative Pavement Subgrade Conditions

Based on the anticipated ground conditions from testing and the concept plans, subgrades for access ways are likely to be founded upon sand. Based on our testing results, the estimated subgrade CBR of the material is provided below assuming a depth of pavement below 400 mm. DCP's were completed to a depth of 1.5 m bgl.

DCP01 to 10:

- CBR between 1.9 % and 8.0 % (average of 4.0 %)

Standard pavements with subgrade improvement such as undercutting and replacement of loose/soft soils with suitable engineered fill are likely to be appropriate.

Once the plans of the subdivision are complete, testing should be undertaken to confirm the design subgrade CBR and any isolated loose areas.

A site plan of the DCP locations can be found in Appendix C.

Foundations

The strength requirement of 'good ground' according to NZS 3604:2011 were typically not met below the topsoil in the discrete locations of the investigation due to soft / loose soils in the approximate upper 2 m and due to the site's assessed liquefaction risk. Specific foundation design will be required for the proposed buildings in the Stage 1 and Stage 2 development.

Our preliminary recommendations are:

For light timber framed structures (NZS3604:2011 scope):

- topsoil and any unsuitable material will need to be removed (approximately 0.2 m to 0.8 m bgl) across the site
- hardfill replacement (i.e. with pit sand, compacted to achieve 5 blows/100 mm on DCP)
- reinforced stiffened, concrete raft foundations designed for the liquefaction risk

Further work

Further work includes:

- excavation of the old dump site and replacement with engineered fill
- further testing and assessment using CPTs to quantify liquefaction and settlement risk
- construction observation and testing during earthworks to support certification of ground conditions below foundations
- further testing to suitably inform the pavement design of the ROW
- further testing and assessment for proposed structures are required to support building consent

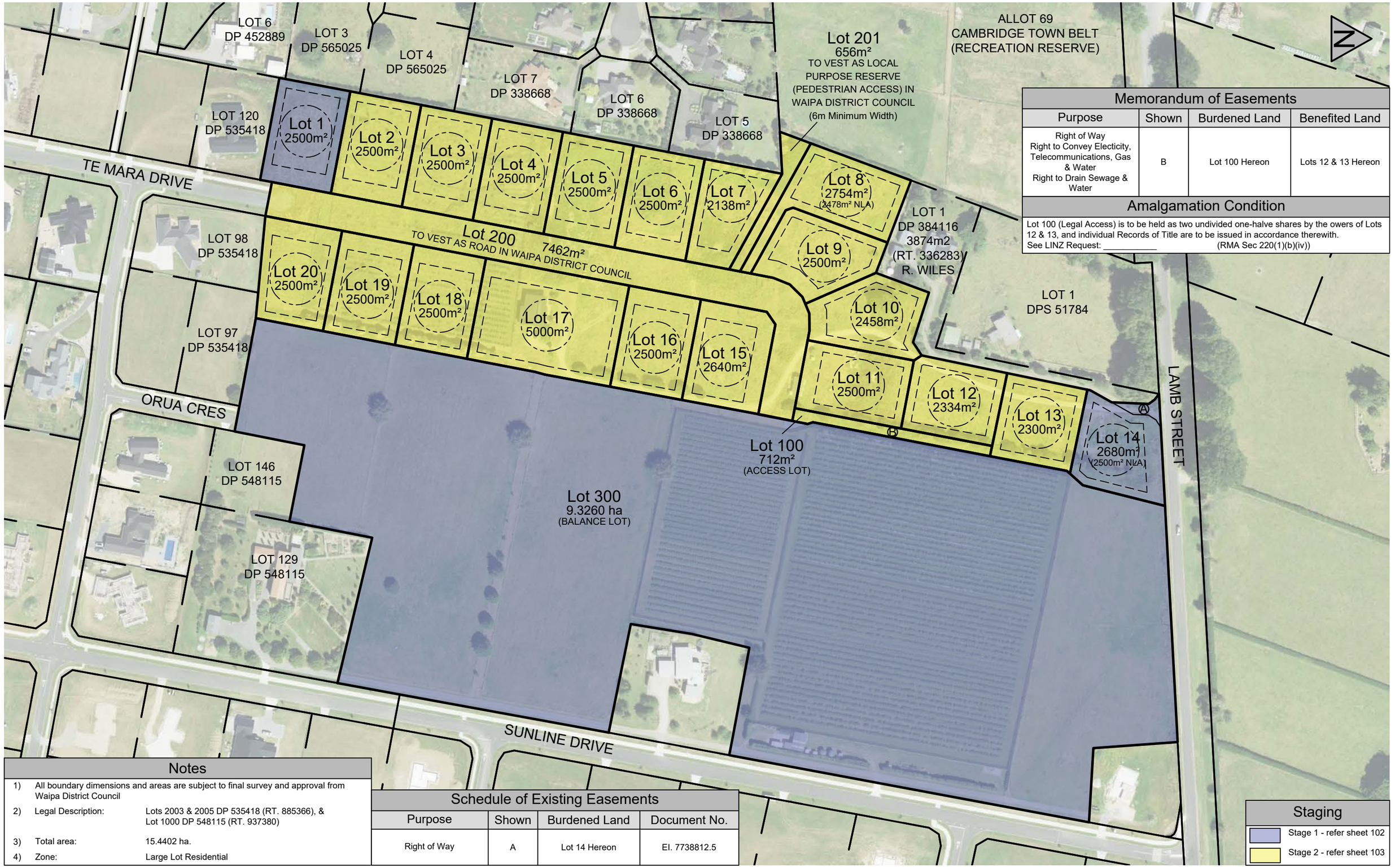
[12] NZS 4431:2022: Engineered fill construction for lightweight structures

Limitation

This report has been prepared for our client, Muscle Development Limited, their professional advisers, and the relevant local authority for the purposes detailed above and may not be relied on by any other party for any other purposes. This report contains a preliminary assessment to support an application for subdivision consent based on a site walkover and testing in discrete locations. Further testing and assessment are required during the development of the site. Inferences about the conditions at the site have been made based on the testing undertaken and our understanding of the geological environment in which the site lies.

We recommend that HD Geo is engaged to undertake further testing and assessment for building consent, and to observe works during the site preparation.

APPENDIX A – SITE DEVELOPMENT PLANS



Memorandum of Easements

Purpose	Shown	Burdened Land	Benefited Land
Right of Way Right to Convey Electicity, Telecommunications, Gas & Water Right to Drain Sewage & Water	B	Lot 100 Hereon	Lots 12 & 13 Hereon

Amalgamation Condition

Lot 100 (Legal Access) is to be held as two undivided one-halve shares by the owers of Lots 12 & 13, and individual Records of Title are to be issued in accordance therewith.
See LINZ Request: _____ (RMA Sec 220(1)(b)(iv))

Notes

1) All boundary dimensions and areas are subject to final survey and approval from Waipa District Council
2) Legal Description: Lots 2003 & 2005 DP 535418 (RT. 885366), & Lot 1000 DP 548115 (RT. 937380)
3) Total area: 15.4402 ha.
4) Zone: Large Lot Residential

Schedule of Existing Easements

Purpose	Shown	Burdened Land	Document No.
Right of Way	A	Lot 14 Hereon	EI. 7738812.5

Staging

- Stage 1 - refer sheet 102
- Stage 2 - refer sheet 103

Size	Scale	Date
A3	1:2000	SEPTEMBER 2023

No.	Amendment	Init.	Date
D	For Information	WAB	05/09/23
C	For Information	WAB	05/07/23
B	For Information	WAB	16/06/23

Designed	WAB	05/07/23
Drawn	WAB	05/09/23
Checked	LAR	05/09/23
Approved		

PROPOSED OVERALL SUBDIVISION OF LOTS 2003 & 2005 DP 535418 & LOT 1000 DP 548115

318 LAMB STREET, LEMINGTON - CAMBRIDGE

Prepared for: RYJO Holdings Ltd.

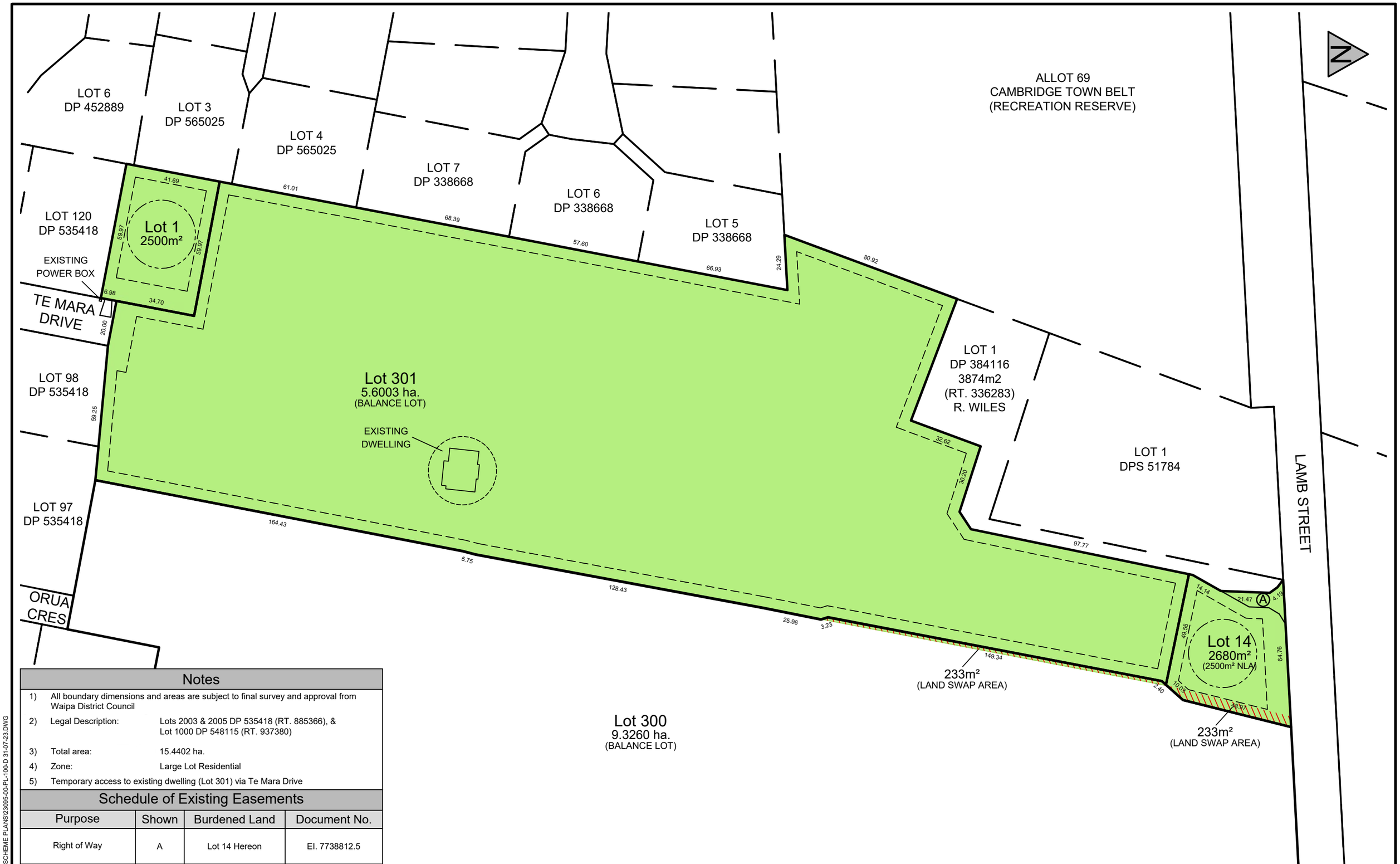
Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Vertical Datum 1953

Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-PL-101				D

S:\2023\23095\1. PLANNING\1. SCHEME PLANS\23095-00-PL-100-D 31-07-23.DWG



Notes

1) All boundary dimensions and areas are subject to final survey and approval from Waipa District Council
2) Legal Description: Lots 2003 & 2005 DP 535418 (RT. 885366), & Lot 1000 DP 548115 (RT. 937380)
3) Total area: 15.4402 ha.
4) Zone: Large Lot Residential
5) Temporary access to existing dwelling (Lot 301) via Te Mara Drive

Schedule of Existing Easements

Purpose	Shown	Burdened Land	Document No.
Right of Way	A	Lot 14 Hereon	EI. 7738812.5

Size	A3	Scale	1:1500	Date	SEPTEMBER 2023		
No.	Amendment	Init.	Date	Designed	WAB	05/07/23	
1	For Information	WAB	05/09/23	Drawn	WAB	05/09/23	
2	For Information	WAB	05/07/23	Checked	LAR	05/09/23	
3	For Information	WAB	16/06/23	Approved			

STAGE 1 - PROPOSED SUBDIVISION OF LOTS 2003 & 2005 DP 535418 & LOT 1000 DP 548115

318 LAMB STREET, LEMINGTON - CAMBRIDGE

Prepared for: RYJO Holdings Ltd.

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Vertical Datum 1953

Resource Consent Number: .....

BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-PL-102				D

S:\2023\23095\1. PLANNING\1. SCHEME PLANS\23095-00-PL-100-D 31-07-23.DWG

Notes

1) All boundary dimensions and areas are subject to final survey and approval from Waipa District Council
2) Legal Description: Lots 2003 & 2005 DP 535418 (RT. 885366), & Lot 1000 DP 548115 (RT. 937380)
3) Total area: 15.4402 ha.
4) Zone: Large Lot Residential

Amalgamation Condition

Lot 100 (Legal Access) is to be held as two undivided one-halve shares by the owers of Lots 12 & 13, and individual Records of Title are to be issued in accordance therewith.
See LINZ Request: _____ (RMA Sec 220(1)(b)(iv))

Memorandum of Easements

Purpose	Shown	Burdened Land	Benefited Land
Right of Way Right to Convey Electicity, Telecommunications, Gas & Water Right to Drain Sewage & Water	B	Lot 100 Hereon	Lots 12 & 13 Hereon

Size	Scale	Date
A3	1:1500	SEPTEMBER 2023

No.	Amendment	Init.	Date
1	For Information	WAB	05/09/23
2	For Information	WAB	05/07/23
3	For Information	WAB	16/06/23

Designed	WAB	05/07/23
Drawn	WAB	05/09/23
Checked	LAR	05/09/23
Approved		

STAGE 2 - PROPOSED SUBDIVISION OF LOTS 2003 & 2005 DP 535418 & LOT 1000 DP 548115

318 LAMB STREET, LEMINGTON - CAMBRIDGE

Prepared for: RYJO Holdings Ltd.

Blue Wallace Surveyors Ltd.
25 Harwood Street, P O Box 38,
Hamilton Central, HAMILTON.
Phone (07) 839 7799, Fax (07) 839 4455

Datum: Circuit: Mt Eden 2000
Height: Moturiki Vertical Datum 1953

Resource Consent Number: .....

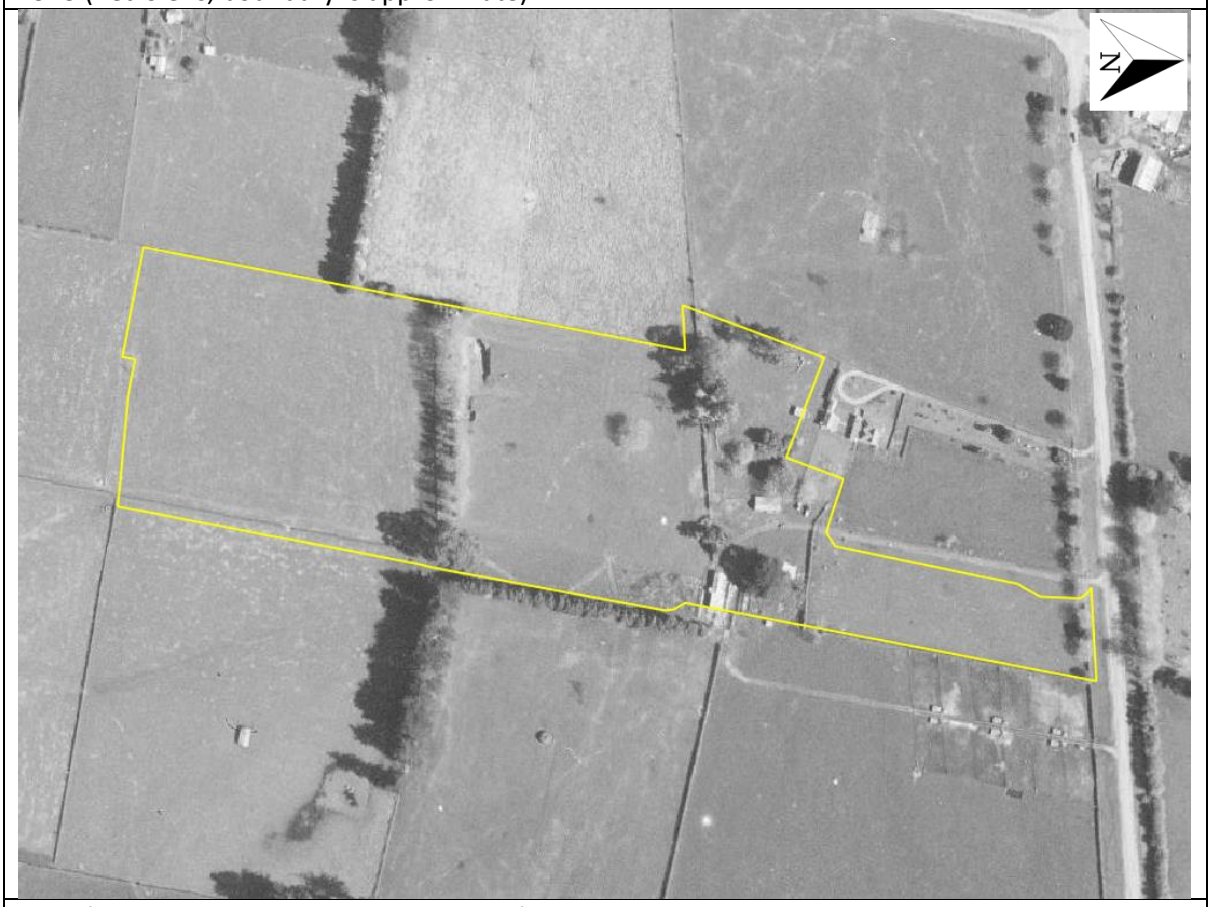
BW Ref.	Stg.	Purp.	Dwg. #	Revision:
23095-00-PL-103				D

S:\2023\23095\1. PLANNING\1. SCHEME PLANS\23095-00-PL-100-D 31-07-23.DWG

APPENDIX B – HISTORICAL AERIAL PHOTOGRAPHY

HD2964 – 318 Lamb Street historical aerials – Accessed 03.07.23

1943 (Retrolens, boundary is approximate)



1953 (Retrolens, boundary is approximate)

HD2964 – 318 Lamb Street historical aerials – Accessed 03.07.23

1966 (Retrolens, boundary is approximate)

1979 (Retrolens, boundary is approximate)

HD2964 – 318 Lamb Street historical aerials – Accessed 03.07.23

1995 (Retrolens, boundary is approximate)

2006 (Google Earth Pro, boundary is approximate)

HD2964 – 318 Lamb Street historical aerials – Accessed 03.07.23

2015 (Google Earth Pro, boundary is approximate)

2022 (Google Earth Pro, boundary is approximate)

APPENDIX C – INVESTIGATION RECORDS

hd GEO

TITLE
HD3122 - 318 Lamb street, Cambridge
Site plan

CLIENT
Waipa Civil

Scale: 1:2000 0 25 50 75 100 m

GENERAL NOTES AND DISCLAIMER
1. Coordinates are in NZTM
2. Imagery and cadastral information sourced from LINZ. Crown copyright reserved
3. Areas and dimensions are approximate only, any use or reliance on this plan is at the users risk

DRAWN	DF	20/10/2023
CHECKED	DW	27/10/23
LOCATION	WAIKATO	
JOB NUMBER	HD3122	

DEV	BY	CHKD	DATE

DRAWING No HD3122-101 | SHEET 1 | REVISION 1

INVESTIGATION LOG

Job No.:	HD3122
Client:	Muscle Developments Ltd
No.:	HA01
Project:	HD3122 318 Lamb Street, Cambridge
Location:	318 Lamb Street
Date:	12.10.23
Co-ordinates:	1818013mE, 5800007mN
Logged By:	SW/TD
Elevation:	Ground
Checked By:	DF

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)
Top soil	TOPSOIL; dark brown; moist.	0.2
Hinuera Formation	SILT, with some sand, with minor gravel; brown. Moist; sand, coarse; gravel, fine, angular.	0.4
	0.6 m: turns orange brown	0.6
		0.8
	Gravelly SAND; light brown. Dense; moist; sand, fine to coarse; gravel, fine, subround.	1.0
		1.2
		1.4
	SAND; greyish brown. Dense; moist; sand, fine to coarse.	1.6
	EOH: 2.00 m	1.8
		2.0
		2.2
		2.4
		2.6
		2.8
		3.0

Legend: TS (Topsoil)

Scala Penetrometer (Blows / 100 mm)

Depth (m)	Blows / 100 mm
0.0–0.2	3, 3
0.2–0.4	3, 3, 3
0.4–0.6	3, 3, 2
0.6–0.8	3, 2, 3
0.8–1.0	9, 10
1.0–1.2	12, 10
1.2–1.4	8, 7
1.4–1.6	11, 9
1.6–1.8	13, 12
1.8–2.0	9, 9
2.0–2.2	5, 3
2.2–2.4	2, 6
2.4–2.6	7, 6
2.6–2.8	13, 13
2.8–3.0	7

Vane Shear Strength (kPa) Vane: 3719

Depth (m)	Peak
0.2–0.4	220+
0.6–0.8	220+

Water: Groundwater Not Encountered

Photo

Remarks

End of HA at 1.6m. Target depth not achieved due to being to hard with collapse.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- [x] Hand Auger
- [ ] Investigation Pit
- [ ] Machine Borehole

Document Set ID: 11140901
Version: 1, Version Date: 21/11/2023

INVESTIGATION LOG

Job No.:	HD3122
No.:	HA02
Client:	Muscle Developments Ltd
Project:	HD3122 318 Lamb Street, Cambridge
Location:	318 Lamb Street
Co-ordinates:	1818102mE, 5800069mN
Elevation:	Ground
Date:	12.10.23
Logged By:	SW/TD
Checked By:	DF

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)
Topso il	TOPSOIL; dark brown; moist.	0.2
Hinuera Formation	SILT, with some sand, with trace clay; orange brown. Very stiff; moist; low plasticity, sensitive; sand, fine.	0.6
	Gravelly SAND; brown. Medium dense to dense; moist; well graded; sand, fine to coarse; gravel, fine, subround to rounded.	1.6
	SAND, with minor gravel; grey. Medium dense to dense; moist; well graded; sand, fine to coarse; gravel, fine, rounded to subround.	2.6
	EOH: 2.60 m	

Legend

Scala Penetrometer (Blows / 100 mm)

Depth (m)	Blows / 100 mm
0.0–0.2	1, 2
0.2–0.4	1, 2, 2
0.4–0.6	3, 6
0.6–0.8	7, 7
0.8–1.0	5, 5
1.0–1.2	7, 8, 8
1.2–1.4	10, 9
1.4–1.6	7, 4
1.6–1.8	5, 7
1.8–2.0	14, 13
2.0–2.2	13, 14
2.2–2.4	6, 6
2.4–2.6	10, 8
2.6–2.8	8, 9

Vane Shear Strength (kPa) — Vane: 3719

Depth (m)	Peak	Remoulded
0.2–0.4	129	19

Water: Groundwater Not Encountered

Photo

Remarks

End of HA at 2.6. Target depth not achieved due to being too hard with collapse.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

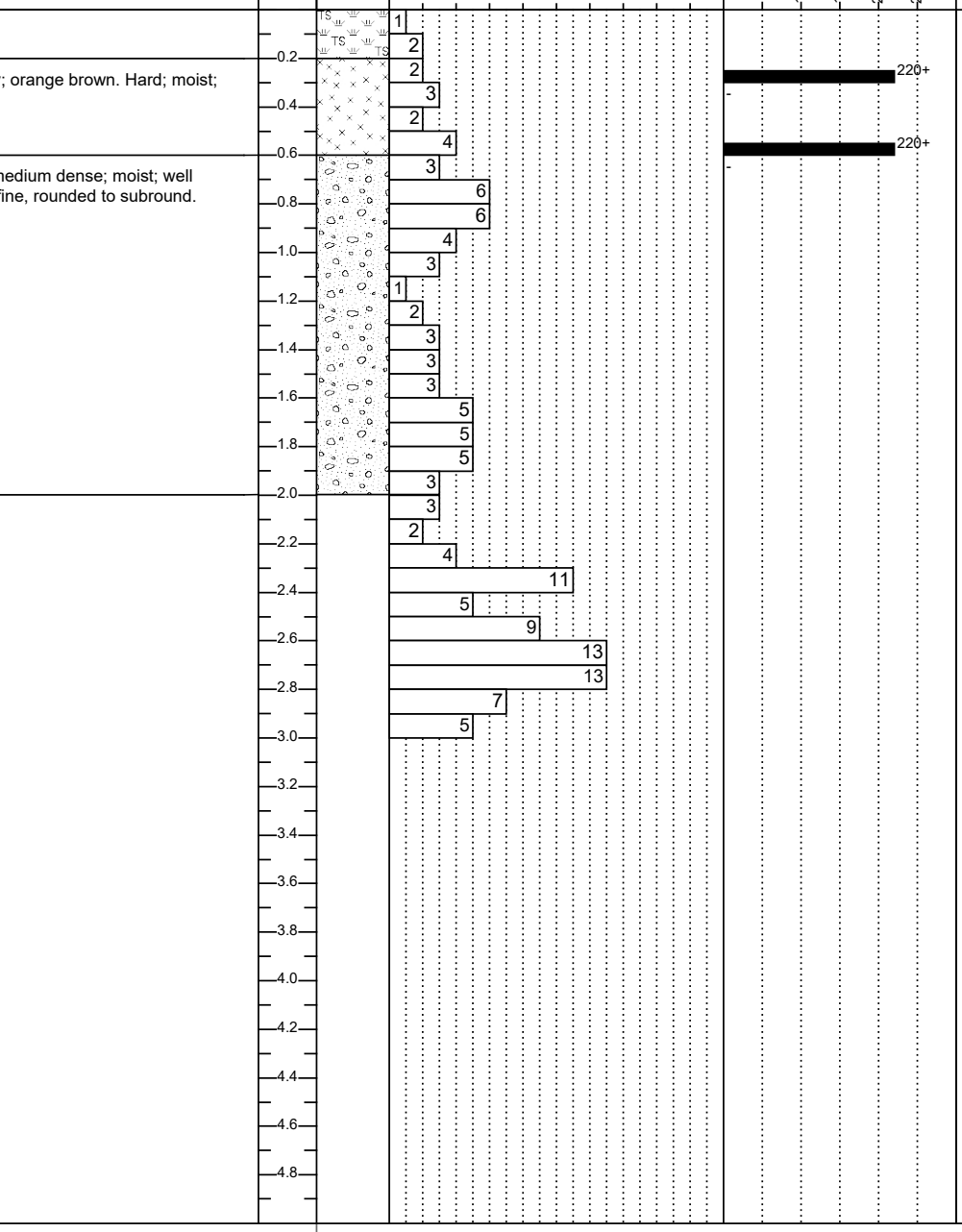
Investigation Type
- [x] Hand Auger
- [ ] Investigation Pit
- [ ] Machine Borehole

Document Set ID: 11140901
Version: 1, Version Date: 21/11/2023

INVESTIGATION LOG

Job No.:	HD3122
No.:	HA03
Client:	Muscle Developments Ltd
Project:	HD3122 318 Lamb Street, Cambridge
Location:	318 Lamb Street
Co-ordinates:	1818028mE, 5800116mN
Elevation:	Ground
Date:	12.10.23
Logged By:	SW/TD
Checked By:	DF

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)
Topso	TOPSOIL; dark brown; moist.	0.0
Hinuera Formation	SILT, with some sand, with trace clay; orange brown. Hard; moist; sand, medium.	0.4
	Gravelly SAND; grey. Very loose to medium dense; moist; well graded; sand, fine to coarse; gravel, fine, rounded to subround.	0.6
	EOH: 2.00 m	2.0



Photo

Remarks

End of HA at 2.0m. Target depth not achieved due to being too hard with collapse.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

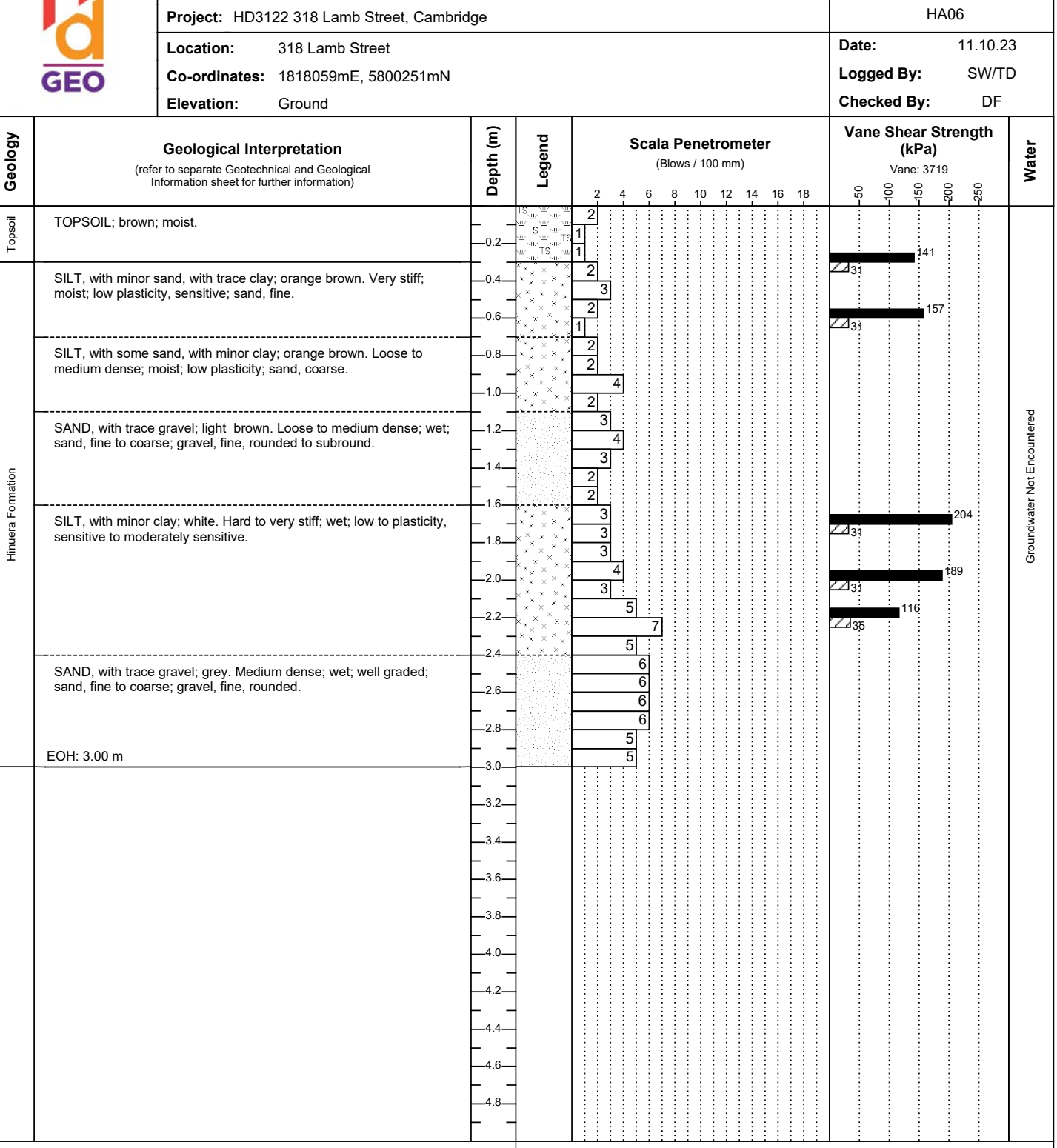
Investigation Type
- ☑ Hand Auger
- ☐ Investigation Pit
- ☐ Machine Borehole

Document Set ID: 11140901
Version: 1, Version Date: 21/11/2023

INVESTIGATION LOG

Job No.:	HD3122
Client:	Muscle Developments Ltd
No.:	HA06
Project:	HD3122 318 Lamb Street, Cambridge
Location:	318 Lamb Street
Date:	11.10.23
Co-ordinates:	1818059mE, 5800251mN
Logged By:	SW/TD
Elevation:	Ground
Checked By:	DF

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)
Topsoil	TOPSOIL; brown; moist.	0.2
Hinuera Formation	SILT, with minor sand, with trace clay; orange brown. Very stiff; moist; low plasticity, sensitive; sand, fine.	0.4
		0.6
	SILT, with some sand, with minor clay; orange brown. Loose to medium dense; moist; low plasticity; sand, coarse.	0.8
		1.0
	SAND, with trace gravel; light brown. Loose to medium dense; wet; sand, fine to coarse; gravel, fine, rounded to subround.	1.2
		1.4
		1.6
	SILT, with minor clay; white. Hard to very stiff; wet; low to plasticity, sensitive to moderately sensitive.	1.8
		2.0
		2.2
		2.4
	SAND, with trace gravel; grey. Medium dense; wet; well graded; sand, fine to coarse; gravel, fine, rounded.	2.6
		2.8
	EOH: 3.00 m	3.0
		3.2
		3.4
		3.6
		3.8
		4.0
		4.2
		4.4
		4.6
		4.8



Photo

Remarks

End of HA at 3.0m. Target depth achieved.

Shear Vanes
- Peak
- Remoulded

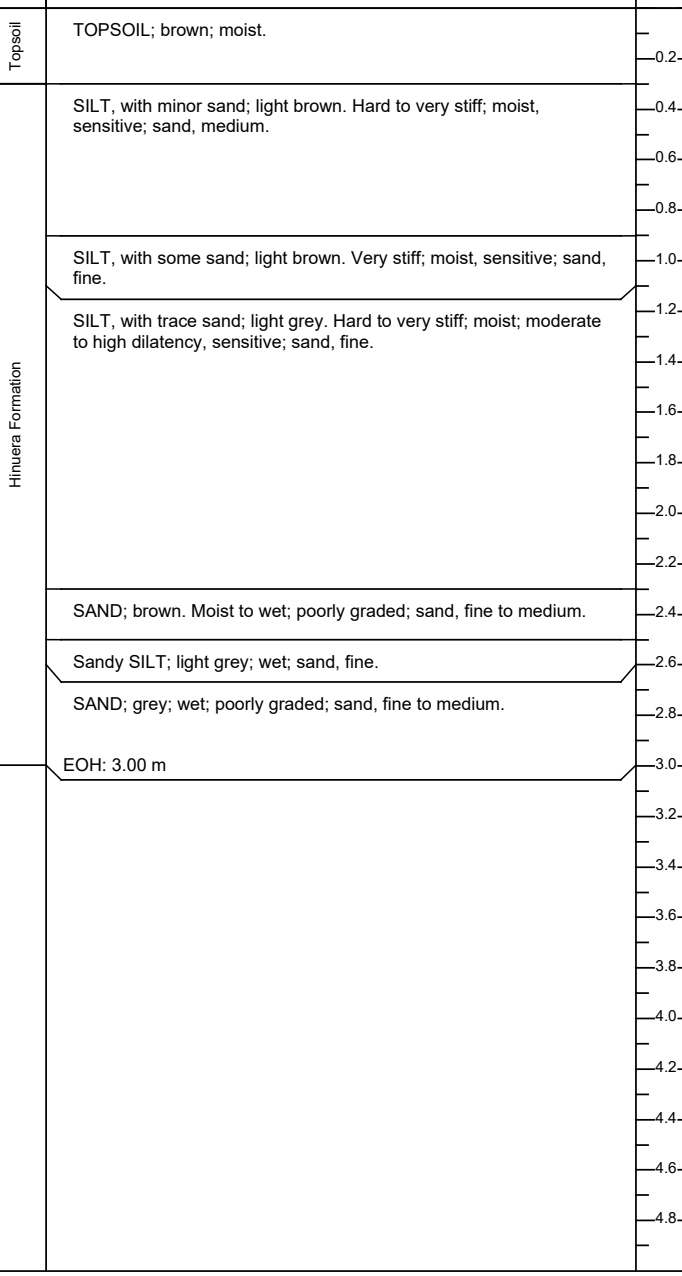
Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- [x] Hand Auger
- [ ] Investigation Pit
- [ ] Machine Borehole

INVESTIGATION LOG

Job No.:	HD3122
No.:	HA04
Client:	Muscle Developments Ltd
Project:	HD3122 318 Lamb Street, Cambridge
Location:	318 Lamb Street
Co-ordinates:	1818211mE, 5800134mN
Elevation:	Ground
Date:	11.10.23
Logged By:	SW/TD
Checked By:	DF

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)
Topsoil	TOPSOIL; brown; moist.	0.2
Hinuera Formation	SILT, with minor sand; light brown. Hard to very stiff; moist, sensitive; sand, medium.	0.4, 0.6, 0.8
	SILT, with some sand; light brown. Very stiff; moist, sensitive; sand, fine.	1.0
	SILT, with trace sand; light grey. Hard to very stiff; moist; moderate to high dilatency, sensitive; sand, fine.	1.2, 1.4, 1.6, 1.8, 2.0, 2.2
	SAND; brown. Moist to wet; poorly graded; sand, fine to medium.	2.4
	Sandy SILT; light grey; wet; sand, fine.	2.6
	SAND; grey; wet; poorly graded; sand, fine to medium.	2.8, 3.0
	EOH: 3.00 m	3.2, 3.4, 3.6, 3.8, 4.0, 4.2, 4.4, 4.6, 4.8



Photo

Remarks

End of HA at 3.0m. Target depth achieved.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

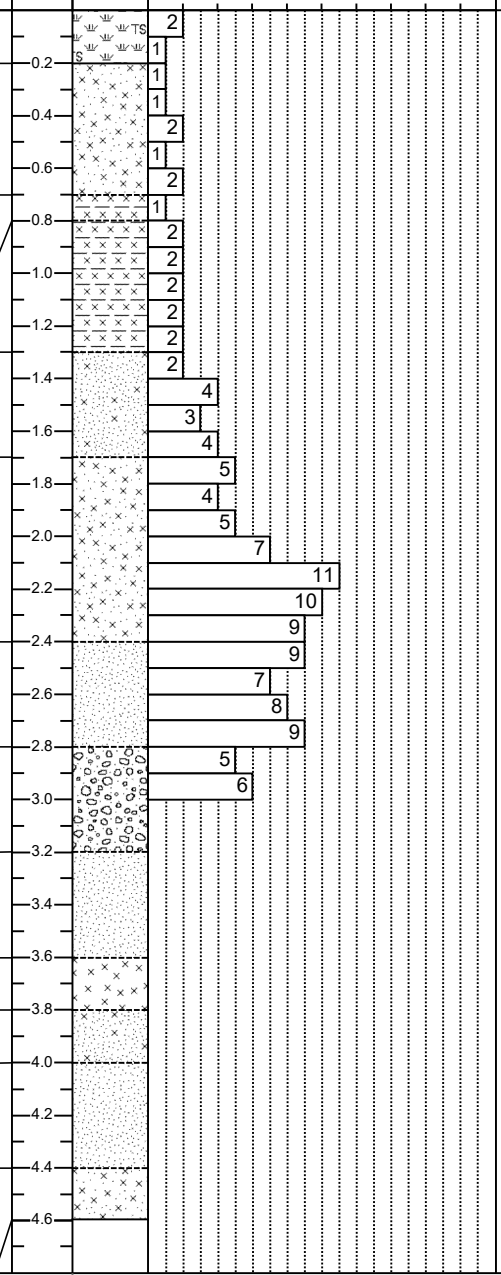
Investigation Type
- [x] Hand Auger
- [ ] Investigation Pit
- [ ] Machine Borehole

INVESTIGATION LOG

Client:	Muscle Developments Ltd
Project:	HD3122 318 Lamb Street, Cambridge
Location:	318 Lamb Street
Co-ordinates:	1818129mE, 5800186mN
Elevation:	Ground

Job No.: HD3122
No.: HA05
Date: 11.10.23
Logged By: SW
Checked By: DF

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)
Topsoil	TOPSOIL; dark brown. Moist.	0.2
Hinuera Formation	Sandy SILT; light brown. Very loose to loose; moist; sand, medium.	0.4
		0.6
	SILT, with minor sand, with trace clay. Very loose; wet; sand, medium.	0.8
	SILT, with some clay. Wet; high plasticity.	1.0
		1.2
	SAND, with minor silt; grey. Loose to medium dense; wet; sand, fine.	1.4
		1.6
	SILT, with trace sand; light grey. Medium dense to dense; wet; sand, fine.	1.8
		2.0
		2.2
	SAND; grey. Medium dense; wet; sand, fine to coarse.	2.4
		2.6
	GRAVEL, with some sand; grey. Wet; gravel, fine to medium, rounded; sand, coarse.	2.8
		3.0
	SAND; grey. Wet; sand, fine to medium.	3.2
		3.4
	SILT; light grey. Wet; high dilatency.	3.6
	SAND, with some silt; light grey. Saturated; sand, fine to coarse.	3.8
	SAND; light grey. Saturated; sand, medium.	4.0
		4.2
	SILT, with minor sand; light grey. Saturated; high dilatency; sand, fine to medium.	4.4
	EOH: 4.60 m	4.6



Photo

Remarks

End of HA at 4.6m. Could not advance due to hole collapse.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- [x] Hand Auger
- [ ] Investigation Pit
- [ ] Machine Borehole

Document Set ID: 11140901
Version: 1, Version Date: 21/11/2023

INVESTIGATION LOG

Job No.:	HD3122
Client:	Muscle Developments Ltd
No.:	HA07
Project:	HD3122 318 Lamb Street, Cambridge
Location:	318 Lamb Street
Date:	11.10.23
Co-ordinates:	1818065mE, 5800308mN
Logged By:	SW/TD
Elevation:	Ground
Checked By:	DF

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)
Topsoil	TOPSOIL; dark brown; moist.	0.0
Hinuera Formation	SILT, with minor sand; brown. Loose to medium dense; moist; sand, fine.	0.6
	SAND, with trace silt; orange brown. Very loose to loose; moist; uniformly graded; sand, medium.	0.8
	Silty SAND, with trace clay; light brown. Loose; moist; low plasticity; uniformly graded; sand, medium.	1.2
	SAND; light grey. Loose to medium dense; moist; well graded; sand, fine to coarse.	1.6
	SILT, with some sand, with trace clay; white. Medium dense to dense; moist; low plasticity; sand, fine.	1.8
	SAND, with trace gravel; grey. Medium dense; moist; well graded; sand, fine to coarse; gravel, fine, rounded to subround.	2.8
	EOH: 3.00 m	3.0

Photo

Remarks

End of HA at 3.0m. Target depth achieved.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- [x] Hand Auger
- [ ] Investigation Pit
- [ ] Machine Borehole

INVESTIGATION LOG

Client:	Muscle Developments Ltd	**Job No.:**	HD3122
Project:	HD3122 318 Lamb Street, Cambridge	**No.:**	HA08
Location:	318 Lamb Street	**Date:**	11.10.23
Co-ordinates:	1818147mE, 5800283mN	**Logged By:**	SW/TD
Elevation:	Ground	**Checked By:**	DF

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)
Topsoil	TOPSOIL; brown; moist.	0.2
Hinuera Formation	Sandy SILT; brown. Medium dense; moist; sand, medium.	0.4
	SILT, with some sand; orange brown. Loose; moist; sand, fine.	0.8
	SAND; light brown. Very loose to medium dense; moist to wet; sand, fine to coarse.	1.8
	SILT, with minor clay; white. Very stiff; moist; low to moderate plasticity, sensitive.	2.0
	SAND; light grey. Dense to medium dense; moist; sand, fine to coarse.	2.8
	SAND; light grey. Dense; moist; sand, fine to medium.	3.0
	EOH: 3.00 m	

Legend

Scala Penetrometer (Blows / 100 mm)

Vane Shear Strength (kPa) — Vane: 3719

Water: Groundwater Not Encountered

Photo

Remarks

End of HA at 3.0m. Target depth achieved.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- [x] Hand Auger
- [ ] Investigation Pit
- [ ] Machine Borehole

INVESTIGATION LOG

Job No.:	HD3122
Client:	Muscle Developments Ltd
No.:	HA09
Project:	HD3122 318 Lamb Street, Cambridge
Location:	318 Lamb Street
Date:	11.10.23
Co-ordinates:	1818151mE, 5800352mN
Logged By:	SW/TD
Elevation:	Ground
Checked By:	DF

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane: 3719	Water
Top soil	TOPSOIL; brown; moist.	0.0	TS	2		
Hinuera Formation	SILT, with minor sand; brown. Very stiff; moist, sensitive; sand, fine.	0.2		4, 4	126, 28	Groundwater Not Encountered
	SILT, with trace clay and sand; orangeish brown. Very stiff; moist; low plasticity, sensitive; sand, fine.	0.4		2, 2		
		0.6		1, 2	126, 22	
		0.8		1		
	SAND; orangeish brown. Loose to medium dense; moist; sand, fine to coarse.	1.0		2, 3, 3		
		1.2		3, 3		
		1.4		2, 2		
		1.6		2, 3	163, 47	
	SILT, with minor clay; white. Very stiff; moist; low to moderate plasticity, moderately sensitive.	1.8		4, 4		
	SAND, with minor gravel; light brown. Dense; moist; well graded; sand, fine to coarse; gravel, fine, rounded.	2.0		10, 8		
		2.2		7, 9		
		2.4		7, 9		
	SAND, with some gravel; grey. Dense to medium dense; moist; well graded; sand, fine to coarse; gravel, fine, rounded.	2.6		7, 5		
	EOH: 2.70 m	2.8		7, 6		
		3.0		7		

Scala Penetrometer scale: 2 4 6 8 10 12 14 16 18

Vane Shear Strength scale: 50 100 150 200 250

Photo

Remarks

End of HA at 2.7m. Target depth not achieved due to hard material and collapse.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- [x] Hand Auger
- [ ] Investigation Pit
- [ ] Machine Borehole

Document Set ID: 11140901
Version: 1, Version Date: 21/11/2023

INVESTIGATION LOG

Job No.:	HD3122
No.:	HA10
Client:	Muscle Developments Ltd
Project:	HD3122 318 Lamb Street, Cambridge
Location:	318 Lamb Street
Co-ordinates:	1818180mE, 5800444mN
Elevation:	Ground
Date:	11.10.23
Logged By:	SW/TD
Checked By:	DF

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)
Top soil	TOPSOIL; dark brown; moist.	0.2
Hinuera Formation	SILT, with minor sand; brown. Loose; moist; sand, fine.	0.4
	SILT, with some sand; orange brown. Loose; moist; sand, fine.	0.6
	SAND; brown. Very loose to loose; moist; well graded; sand, fine to coarse.	0.8
		1.0
	Clayey SILT; light grey. Very stiff; moist; high plasticity, sensitive.	1.2
	SAND; orangeish brown. Medium dense; moist; sand, fine to medium; Fe+ staining.	1.4
	1.6 m: turns grey	1.6
		1.8
		2.0
		2.2
		2.4
	SAND, with minor silt; light grey. Medium dense; moist; poorly graded; sand, fine to medium.	2.6
	SAND, with trace gravel; grey. Medium dense to dense; moist; sand, fine to coarse; gravel, fine, subround, pumice.	2.8
	EOH: 3.00 m	3.0

Legend: TS (Topsoil)

Scala Penetrometer (Blows / 100 mm)

Depth (m)	Blows / 100 mm
0.0–0.2	1, 2, 2
0.2–0.4	2, 2, 2
0.4–0.6	2, 2, 3
0.6–0.8	2, 4, 4
0.8–1.0	1, 2, 2
1.2–1.4	4, 4, 4
1.4–1.6	4, 4, 5
1.6–1.8	4, 4, 4
1.8–2.0	4, 4, 4
2.0–2.2	4, 4, 3
2.2–2.4	3, 2, 3
2.4–2.6	3, 4, 7
2.6–2.8	13

Vane Shear Strength (kPa)

Vane: 3719

Depth (m)	Peak	Remoulded
1.2–1.4	100	18

Water: Groundwater Not Encountered

Photo

Remarks

End of HA at 3.0m. Target depth achieved.

Shear Vanes
- Peak
- Remoulded

Water
- Standing Water Level
- Out flow
- In flow

Investigation Type
- [x] Hand Auger
- [ ] Investigation Pit
- [ ] Machine Borehole

INVESTIGATION LOG

Job No.:	HD3122
Client:	Muscle Developments Ltd
No.:	HA11
Project:	HD3122 318 Lamb Street, Cambridge
Location:	318 Lamb Street
Date:	11.10.23
Co-ordinates:	1818167mE, 5800404mN
Logged By:	SW
Elevation:	Ground
Checked By:	DF

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)
Topsoil	TOPSOIL; brown; moist.	0.2
Hinuera Formation	SILT, with minor clay, with trace sand; orange brown. Very stiff; moist; low plasticity, sensitive; sand, medium.	0.8
	SAND, with some silt, with trace clay; orange brown. Medium dense; moist; low plasticity; sand, coarse.	1.0
	SAND, with trace silt; orange brown; moist; well graded; sand, fine to coarse.	1.4
	SILT, with trace clay; white. Very stiff; moist; low to moderate plasticity, low to moderate dilatency, sensitive.	1.6
	SAND, with trace gravel; grey. Medium dense to dense; wet; sand, fine to coarse; gravel, fine, subround to rounded.	2.2
	SAND, with minor gravel; grey. Medium dense to dense; wet; well graded; sand, fine to coarse; gravel, fine, rounded to subround.	2.8
	EOH: 3.00 m	3.0

Legend

Scala Penetrometer (Blows / 100 mm)

Depth (m)	Blows / 100 mm
0.0–0.2	1, 2, 2
0.2–0.4	1, 2
0.4–0.6	1, 2
0.6–0.8	3, 4
0.8–1.0	4, 3
1.0–1.2	2, 1
1.2–1.4	5, 3
1.4–1.6	4, 4
1.6–1.8	3, 3
1.8–2.0	5, 5
2.0–2.2	5, 9
2.2–2.4	4, 7
2.4–2.6	5, 5
2.6–2.8	7, 8
2.8–3.0	7

Vane Shear Strength (kPa) Vane: 3719

Depth (m)	Peak	Remoulded
0.2–0.4	141	31
0.4–0.6	148	28
1.2–1.4	195	31

Water

Groundwater Not Encountered

Photo

Remarks

End of HA at 3.0m. Target depth.

Shear Vanes

- Peak
- Remoulded

Water

- Standing Water Level
- Out flow
- In flow

Investigation Type

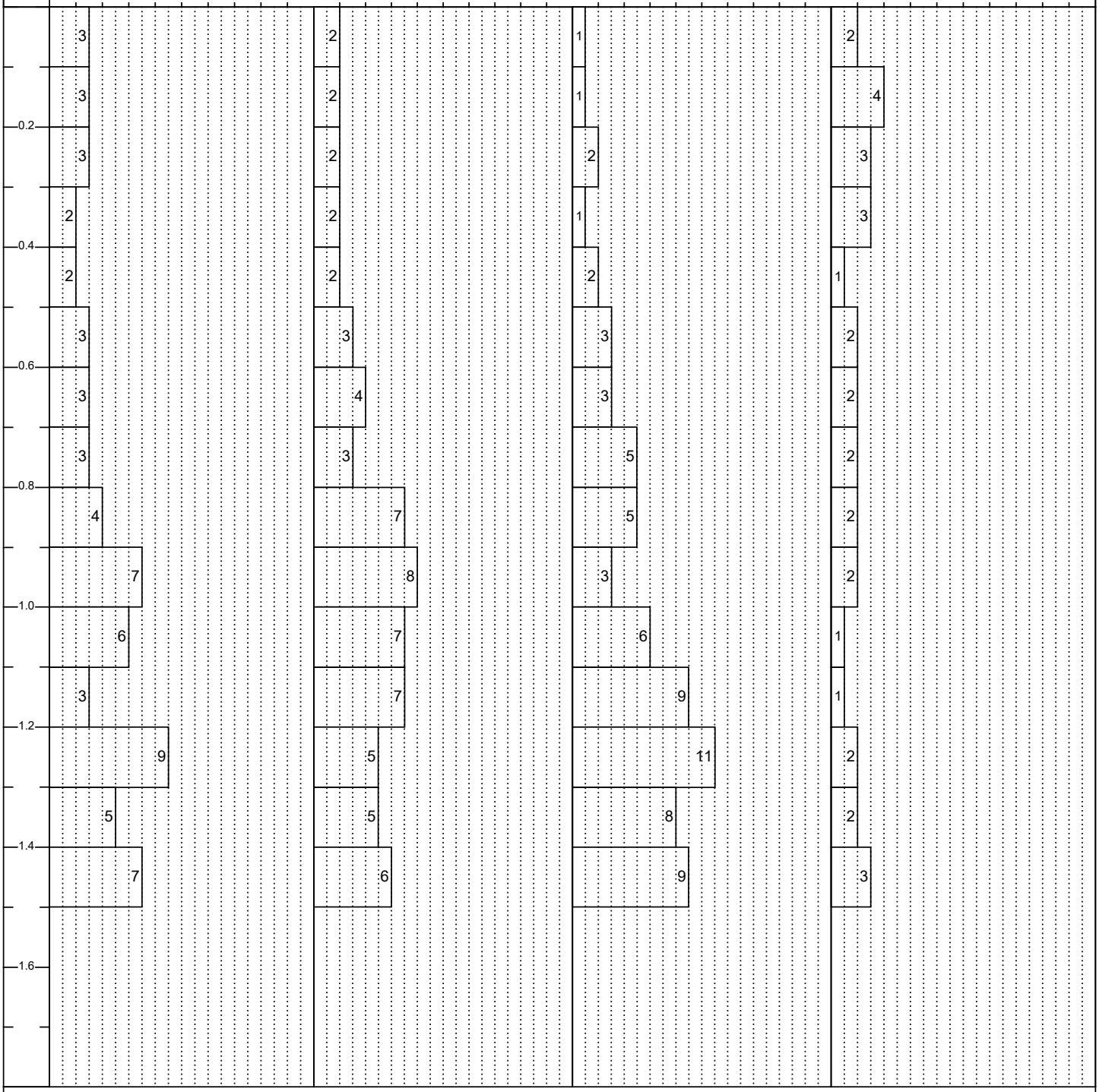
- [x] Hand Auger
- [ ] Investigation Pit
- [ ] Machine Borehole

DYNAMIC CONE PENETROMETER (DCP) LOG

Job No.:	HD3122		
Client:	Muscle Developments Ltd	**No.:**	DCP_01
Project:	HD3122 318 Lamb Street, Cambridge		
Location:	Cambridge	**Date:**	11.10.23
Co-ordinates:	1818049mE, 5800020mN	**Logged By:**	TD
Elevation:	Ground	**Checked By:**	DF

Scala Penetrometer

(Blows / 100 mm)



Remarks

Investigation Type

- ☐ Hand Auger
- ☐ Investigation Pit
- ☑ Machine Borehole

Document Set ID: 11140901
Version: 1, Version Date: 21/11/2023

DYNAMIC CONE PENETROMETER (DCP) LOG

Job No.:	HD3122		
Client:	Muscle Developments Ltd	**No.:**	DCP_05
Project:	HD3122 318 Lamb Street, Cambridge		
Location:	Cambridge	**Date:**	11.10.23
Co-ordinates:	1818079mE, 5800154mN	**Logged By:**	TD
Elevation:	Ground	**Checked By:**	DF

Scala Penetrometer

(Blows / 100 mm)

Depth (m)

318 Lamb Street DCP_05	318 Lamb Street DCP_06	318 Lamb Street DCP_07	318 Lamb Street DCP_08
2	2	4	1
3	2	2	1
3	3	2	2
3	3	2	2
2	2	2	3
3	2	1	2
3	3	1	2
3	2	2	2
3	2	1	3
3	1	2	3
4	1	2	2
5	2	2	3
7	2	4	6
8	4	3	5
8	2	3	7

Remarks

Investigation Type

- ☐ Hand Auger
- ☐ Investigation Pit
- ☑ Machine Borehole

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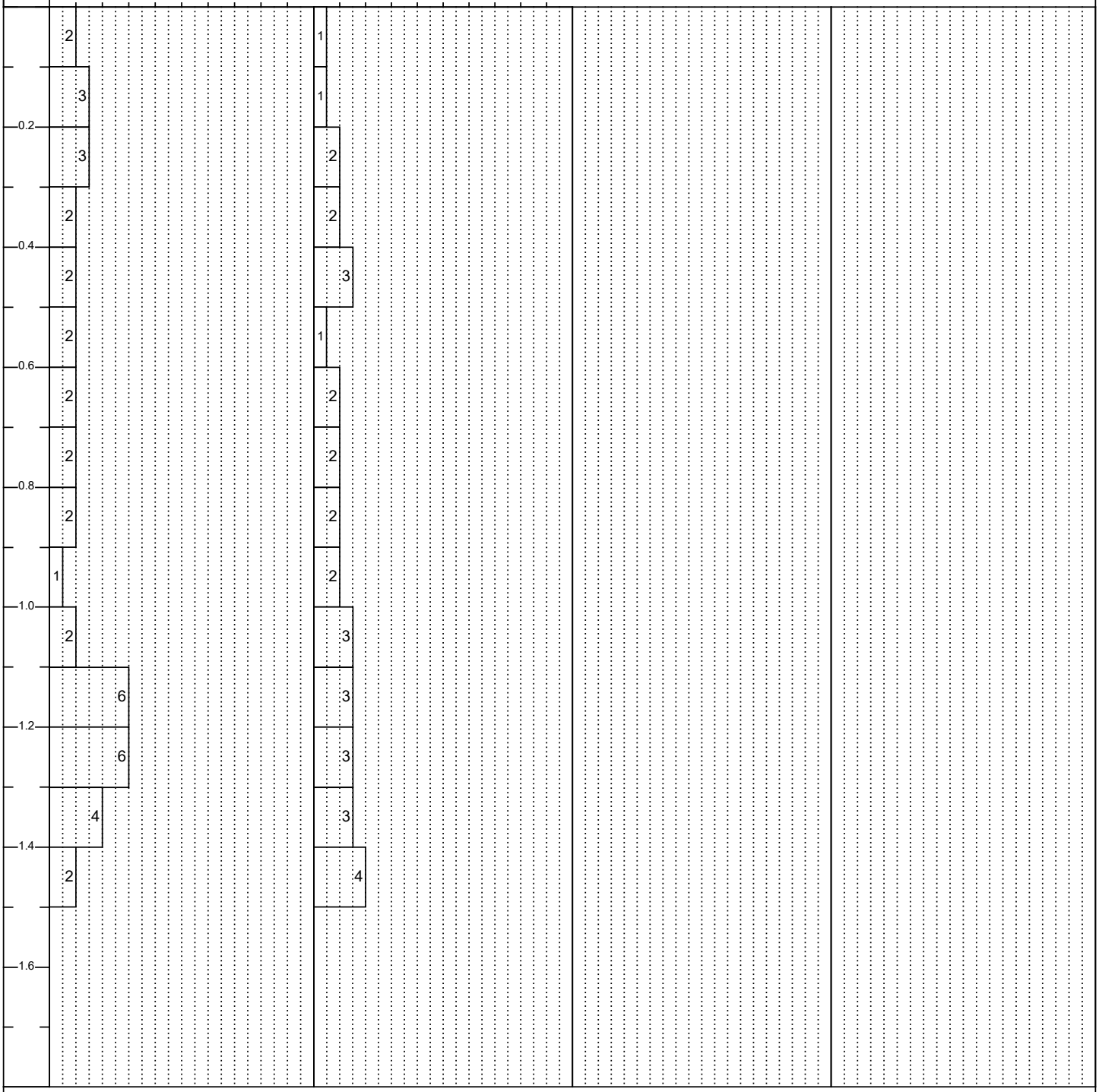
Version: 1, Version Date: 21/11/2023

DYNAMIC CONE PENETROMETER (DCP) LOG

Job No.:	HD3122		
Client:	Muscle Developments Ltd	**No.:**	DCP_09
Project:	HD3122 318 Lamb Street, Cambridge		
Location:	Cambridge	**Date:**	11.10.23
Co-ordinates:	1818136mE, 5800271mN	**Logged By:**	TD
Elevation:	Ground	**Checked By:**	DF

Scala Penetrometer

(Blows / 100 mm)



Remarks

Investigation Type

- ☐ Hand Auger
- ☐ Investigation Pit
- ☑ Machine Borehole

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Document Set ID: 11140901
Version: 1, Version Date: 21/11/2023

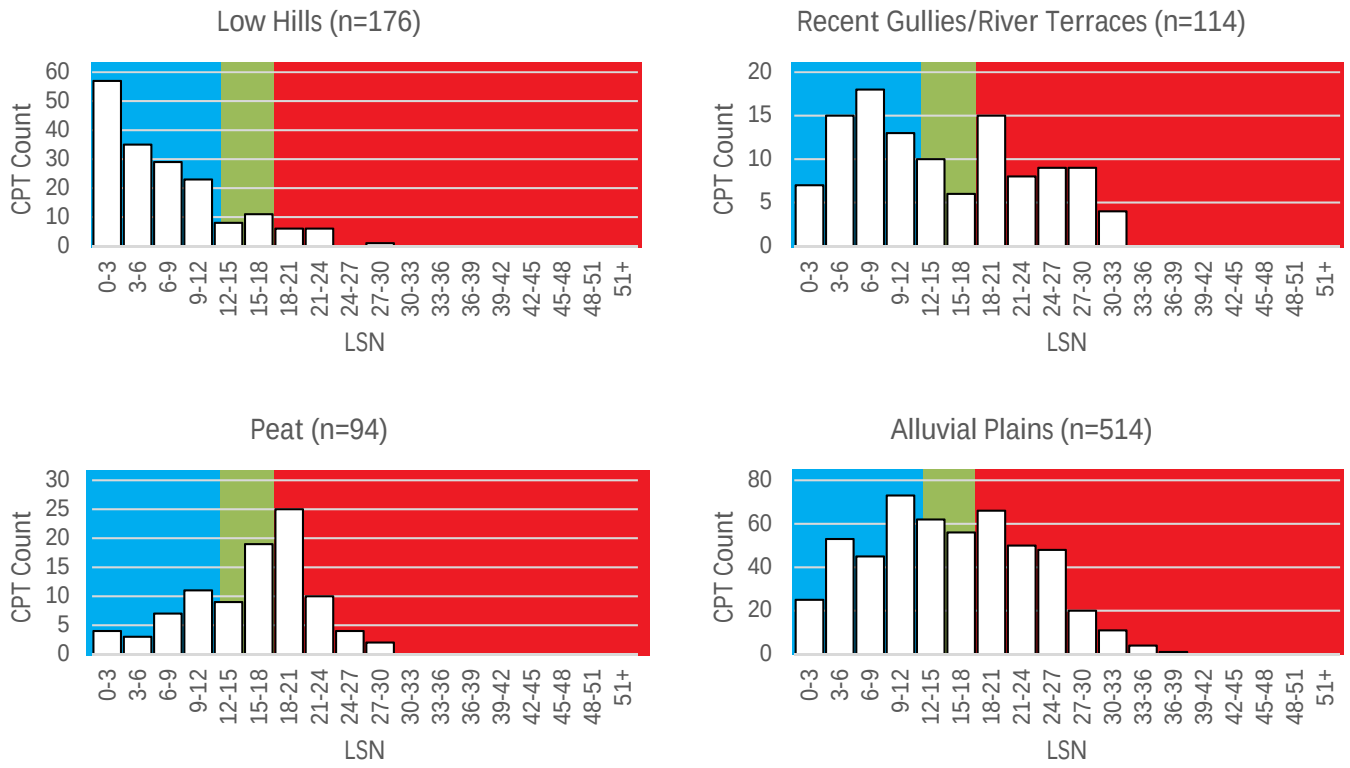
APPENDIX D – HCC LIQUEFACTION OUTPUTS

Figure C2.12

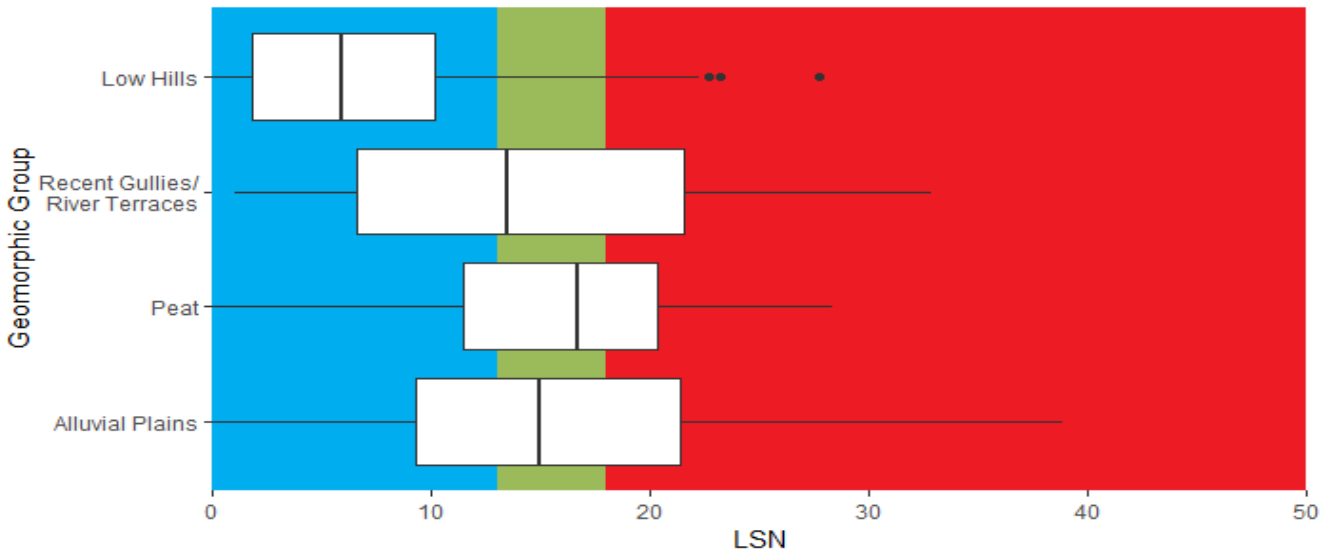
CPT based liquefaction analysis

Scenario: 1000 yr ARI (Mw=5.9,PGA = 0.28m) 3m GWD

Histograms of LSN values by geomorphic group



Box and whisker plot of LSN values by geomorphic group



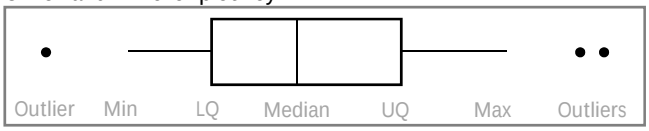
Legend

Degree of liquefaction induced ground damage	Characteristic LSN values (P_L=15%)
None to Minor	0-13
Minor to Moderate	13-18
Moderate to Severe	>18

These values are intended only for use in area-wide hazard assessment using the MBIE (2017) performance criteria. Different values may be more appropriate for other purposes (such as site-specific design).

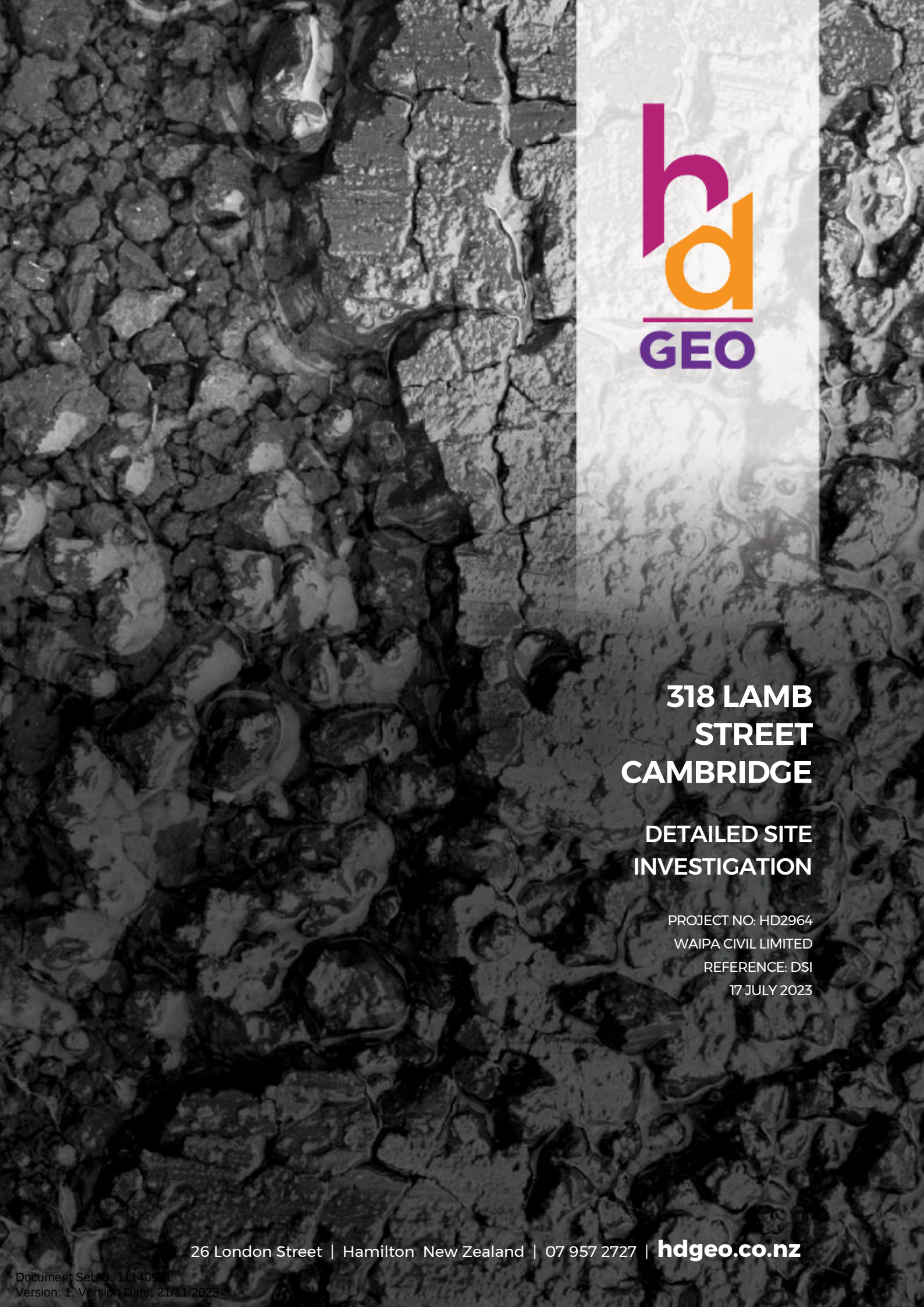
Notes

1. Refer to Table 2.2 and Appendix A of the MBIE liquefaction guidance document for further information about land damage categories.
2. Liquefaction analyses are undertaken assuming a probability of liquefaction (P_L) of 15%. (Refer to section 4.2 for further detail)
3. Box and Whisker plot key:



APPENDIX I

DSI, SMP & RAP



318 LAMB STREET CAMBRIDGE

DETAILED SITE INVESTIGATION

PROJECT NO: HD2964
WAIPA CIVIL LIMITED
REFERENCE: DSI
17 JULY 2023

26 London Street | Hamilton New Zealand | 07 957 2727 | hdgeo.co.nz

Executive summary

Waipa Civil Limited (the client) wish to subdivide 318 Lamb Street, Cambridge (the site) into a total of 19 lots and change the land use from production land to rural residential. We have included a site plan in Appendix A.

The site has been subject to 4 confirmed and potential hazardous activities and industries list (HAIL) activities. The HAIL activities on the site are:

- former stockyards, which are commonly associated with livestock dipping and/or spray race operations (HAIL A8)
- a blueberry orchard, which has the potential to include the bulk storage and/or use of persistent pesticides (HAIL A10)
- a rubbish pit (HAIL G5)
- multiple buildings which may have used lead-based paint and/or asbestos in their construction[1]. The degradation of either lead-based paint or asbestos construction material can result in contaminant concentrations in soil above human health guidelines (HAIL I)

The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) requires consideration where subdivision, change in land use, and/or soil disturbance are proposed at confirmed or potential HAIL sites.

As the site has been subject to confirmed and potential HAIL activities, the NESCS requires a detailed site investigation (DSI) for the proposed subdivision, change in land use, and soil disturbance. The client has engaged us (HD Geo) to complete this DSI.

Based on our desktop study, site investigation, and interpretation of laboratory results, our conclusions are that:

- the rubbish pit (HAIL G) is a 'piece of land' under the NESCS
- the site is not subject to HAIL A8 associated with the stockyards on site
- the site is not subject to HAIL A10 associated with the blueberry orchard on site
- the site is not subject to HAIL I associated with the:
  - use of ACM building material
  - application of lead-based paint
- soils within the identified 'piece of land' present a risk to human health for the proposed development
- soils within the identified 'piece of land' and around 3 of 7 removed buildings (see Appendix A) are not suitable for disposal off-site as cleanfill
- the proposed subdivision, change of land use, and soil disturbance for the 'piece of land' is a restricted discretionary activity under the NESCS
- a site management plan (SMP) and remedial action plan (RAP) are required to ensure that the identified 'piece of land' can be safely managed and remediated

We recommend that:

- this DSI report is submitted to WDC to support an application for restricted discretionary consent under the NESCS for the proposed subdivision
- as a condition of consent, Council requires that a SQEP:

[1] Pre-1960s buildings for lead-based paint, pre-2000s buildings for asbestos-containing material

    - develops a SMP to guide the safe management of soil during earthworks required for the subdivision
    - develops and submits a RAP to WDC for approval. The RAP will guide soil remediation works and set remedial goals/targets for the identified 'piece of land'
    - develops and submits a site validation report (SVR) to WDC for approval. The SVR will document compliance with the SMP and assess whether the remedial goals/targets outlined in the RAP have been met including a statement regarding the suitability of the site for rural residential land use
- any soil proposed for off-site disposal has a copy of the relevant laboratory reports (Appendix F) provided to the chosen disposal facility to confirm that they can accept the soil

List of acronyms

Acronym	Definition
ACM	asbestos-containing material
bgl	below ground level
CLMG	contaminated land management guideline
COPC	contaminants of potential concern
CSM	conceptual site model
DSI	detailed site investigation
HAIL	hazardous activities and industries list
HD Geo	HD Geo Limited
IANZ	International Accreditation New Zealand
km	kilometre
m	metre
MfE	Ministry for the Environment
mg/kg	milligrams per kilogram
mm	millimetres
NEPM	National Environmental Protection Measures
NESCS	National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health
OCPs	organochlorine pesticides
OSMP	ongoing site management plan
PAH	polycyclic aromatic hydrocarbons
RAP	remedial action plan
RPD	relative percent difference
SMP	site management plan
SQEP	Suitable Qualified and Experienced Practitioner
TPH	total petroleum hydrocarbons
WDC	Waipā District Council
WRC	Waikato Regional Council

Contents

PREPARED BY: **Matt Moore, CEnvP**

Environmental Consultant
Matt@hdgeo.co.nz
Tel 027 701 9529

REVIEWED BY: **Paul Gibbins, CEnvP**

Senior Environmental Consultant
Paul@hdgeo.co.nz
Tel 022 155 8308

APPROVED BY: **Daniel Whately**

Technical Director
Senior Geotechnical Engineer
Daniel@hdgeo.co.nz

Introduction

Waipa Civil Limited (the client) wish to subdivide 318 Lamb Street, Cambridge (the site) into a total of 19 lots and change the land use from production land to rural residential. We have included a site plan in Appendix A.

The site has been subject to 4 confirmed and potential hazardous activities and industries list (HAIL) activities. The HAIL activities on the site are:

- former stockyards, which are commonly associated with livestock dipping and/or spray race operations (HAIL A8)
- a blueberry orchard, which has the potential to include the bulk storage and/or use of persistent pesticides (HAIL A10)
- a rubbish pit (HAIL G5)
- multiple buildings which may have used lead-based paint and/or asbestos in their construction[2]. The degradation of either lead-based paint or asbestos construction material can result in contaminant concentrations in soil above human health guidelines (HAIL I)

The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) requires consideration where subdivision, change in land use, and/or soil disturbance are proposed at confirmed or potential HAIL sites.

As the site has been subject to confirmed and potential HAIL activities, the NESCS requires a detailed site investigation (DSI) for the proposed subdivision, change in land use, and soil disturbance. The client has engaged us (HD Geo) to complete this DSI.

Purpose, objectives, and scope

The purpose of this DSI is to evaluate whether the site is suitable for the proposed development in accordance with the NESCS regulations. In doing so, this DSI will support the client's resource consent application.

The specific objectives of this DSI are to determine if:

- the potential and/or verified HAIL activities have impacted the on-site soil
- any soil impacted by HAIL activities exceeds the applied human health guidelines
- any risk to human health exists should the proposed subdivision and/or change in land use be undertaken
- any material proposed for off-site disposal can be disposed as cleanfill
- there is a requirement for any further investigation and/or reporting under the NESCS

This DSI consists of the following elements:

- a desktop study, including review of historic and recent aerial photos, geology and hydrogeology, applicable council records, and any other relevant environmental studies
- a site inspection to identify features of interest and potential contamination sources
- collection and analysis of soil samples
- preparation of a report consistent with Ministry for the Environment's Contaminated Land Management Guidelines No. 1[3]

[2] Pre-1960s buildings for lead-based paint, pre-2000s buildings for asbestos-containing material

[3] Ministry for the Environment. 2021. *Contaminated land management guidelines No 1: Reporting on contaminated sites in New Zealand (Revised 2021)*. Wellington: Ministry for the Environment

Site details

Site details are included in Table 1 and site photos are provided in Appendix B.

Table 1: Site details[4]

Item	Description
Site address	318 Lamb Street, Cambridge
Current legal descriptions	LOT 2003 DP 535418 LOT 2005 DP 535418
Zoning	Large lot residential
Approximate site area	61,142 m^2
Current site use	Vacant pasture, rural residential
Proposed site use	Rural residential
District Council	Waipā District Council
Regional Council	Waikato Regional Council
Approximate elevation	73 m to 75 m above local datum

Site description

The site is located at 318 Lamb Street, Cambridge. It is bounded by Lamb Street and a residential house to the north, a blueberry orchard and pasture to the east, and residential houses and pasture to the south and west.

Most of the site is vacant pasture. The site contains:

- a residential house, located in the central-east portion of the site
- a shed and water tank, located in the central-east portion of the site
- an access track, running through the east portion of the site from Lamb Street to the residential house
- a rubbish pit, located in the central-west portion of the site
- a small blueberry orchard, located in the south-east portion of the site

Most of the site is relatively flat and is located between 73 m to 75 m above local datum. We have included a plan showing the site in Appendix A[5] and site photos in Appendix B.

Proposed development

The client proposes to subdivide the site into a total of 19 lots (Lots 99 to 112, Lots 114 to 118). The proposed development involves:

- removing the existing shed and remaining blueberry orchard/orchard infrastructure
- retaining the existing house with proposed Lot 102
- the construction of an extension to Te Mara Drive, located at the central-south site boundary, to give internal access to the proposed lots

We have included a plan showing the proposed development in Appendix A.

[4] Waipa District Council, Intra Maps, accessed 07/07/23. https://waipadc.spatial.t1cloud.com/spatial/IntraMaps/?configId=6aa41407-1db8-44e1-8487-0b9a08965283&project=affd0934-6c16-44e6-90d4-b245ea9bdd6c

[5] The aerial image in Appendix A shows the footprint of the blueberry orchard and a shed at sample location ES08. Both have been removed from site

Desktop study

We completed a desktop study prior to the site visit to identify areas of interest. This included a review of historical[6] and recent[7] aerial images, geological maps, and the evaluation of existing records.

Historical aerial photos

Our aerial photo review evaluated previous land uses and areas of interest. Aerial photos are provided in Appendix C and described in Table 2.

Table 2: Historical aerial photos

Year	Description
1943	Most of the site is vacant pasture used for livestock grazing. There is an access track located in the north portion of the site, which gives access to 3 buildings and a stockyard. There is a large excavation pit located in the central-west portion of the site. The site is bounded by Lamb Street and a residential house to the north, stock pens to the north-east, and vacant pasture in all other cardinal directions.
1953 to 1957	A building has been constructed along the north-west site boundary.
1966 to 1981	A building has been constructed within the north portion of the site. The excavation pit has been extended.
1995	An access track has been developed from the existing sheds to the excavation pit.
2006 to 2022	By 2006, all but 2 of the sheds have been removed from site. A blueberry orchard has been developed in the south portion of the site. Fill material appears to have been placed within the excavation pit. Between 2010 and 2016, the site is converted into a blueberry orchard in stages. In 2014, a house was constructed in the central-east portion of the site. Between 2019 and 2021, a shed was removed from the north side of the site. Between 2019 to present-day, the blueberry orchard has been removed in stages with only a small block remaining directly south of the existing house. Fill material has been placed in the excavation pit between 2006 and 2019.

Geology and hydrogeology

The geologic map of the area[8] shows that the site is underlain by the Hinuera Formation, which consists of 'cross-bedded pumice sand, silt and gravel with interbedded peat'.

There is 1 mapped body of water within 1 km of the site, which is the Mangawhero Stream, located approximately 875 m to the south-east. The Waikato River is located approximately 2.02 km to the north. Based on the topography of the site and surrounding area, it is likely that groundwater flows either south towards the Mangawhero Stream or north towards the Waikato River.

According to Wells Aotearoa New Zealand[9], there are 3 mapped bores within 1 km of the site. Bore depths ranged from 11.5 m to 45 m deep. The depth to water ranged from 6.4 m to 14 m deep.

[6] Sourced from http://retrolens.nz and licensed by LINZ CC-BY. Accessed 03/07/23
[7] Google Earth Pro
[8] 1:250,000 Geological Map of New Zealand (QMAP). *New Zealand Geology Web Map*. GNS, 2013. http://data.gns.cri.nz/geology/. Accessed 07/07/23
[9] Wells Aotearoa New Zealand, Maps, https://wellsnz.teurukahika.nz/wells/map. Accessed 07/07/23

Council records

We reviewed the Waipā District Council (WDC) Intra Maps[10] and requested records from Waikato Regional Council (WRC). We have included the Council records provided in Appendix D.

WDC list the site in their Intra Maps as being subject to potential HAIL activities. Upon contact, WDC confirmed that they list the site in their online database as a potential HAIL due to the presence of market gardens/orchards.

We did not receive records from WRC before the publication of this report. Should the records show any additional information regarding potentially contaminating activities on site, this report will be updated accordingly.

We did not order property records from either Council as their responses, and the available historical aerial photos, were sufficient to understand the site history and the sites potentially contaminating activities.

Site uses and potentially contaminating activities

Our desktop inspection confirmed that the site is mostly vacant pasture, with a small blueberry orchard, house, shed, and rubbish pit located across the site. From our review of aerial images, we identified buildings constructed pre-2000s and a stock race.

The blueberry orchard was developed between 1995 and 2006, which is outside of the time period where OCPs were used in New Zealand[11]. Therefore, we do not consider OCPs associated with the blueberry orchard a contaminants of potential concern (COPC).

The site was historically used for grazing livestock and therefore may have elevated cadmium concentrations associated with the application of superphosphate fertiliser. The NESCS Methodology[12] document recommends that the cadmium SCS is adjusted based on the natural soil pH as cadmium mobility decreases with increasing soil pH. Landcare Research map the expected soil pH to range from 5.8 to 6.4[13]. Using the minimum expected soil pH, the recommended NESCS guideline for cadmium in a rural residential land use is 1.4 mg/kg for a background soil pH between 5.5 and 5.9. From our experience in the area, we consider it highly unlikely that cadmium concentrations in soil will exceed applied human health guidelines. Therefore, we have ruled out the application of superphosphate fertiliser as a COPC.

The COPC for this site include:

- arsenic and organochlorine pesticides (OCPs) associated with the historic stockyards
- heavy metals associated with the blueberry orchard
- heavy metals, polycyclic aromatic hydrocarbons (PAH), and asbestos associated with the rubbish pit
- lead associated with the application of lead-based paints to structures constructed pre-1960s
- asbestos associated with the use of asbestos-containing material (ACM) in buildings constructed pre-2000s

[10] Waipa District Council, Intra Maps, Environment, accessed 03/07/23. https://enterprise.mapimage.net/intramaps22A/?configId=6aa41407-1db8-44e1-8487-0b9a08965283&project=affd0934-6c16-44e6-90d4-b245ea9bdd6c&module=5b9891cd-d0f6-4158-a55d-e07e41576a9b

[11] Guidance for assessment of sites in accordance with category A10 of the Hazardous and Activities Industries List (HAIL)

[12] Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment

[13] Land Resource Information System, LRIS portal, FSL pH. https://lris.scinfo.org.nz/layer/48102-fsl-ph/. Accessed 11/07/23

Site inspection

We completed a site inspection to evaluate existing site conditions and to identify features that have the potential to contaminate the soil on site. We have included site photos from our walkover in Appendix B.

We confirmed that most of the site is vacant pasture, with a rubbish pit located near the central-west site boundary. Most of the blueberry orchard has been removed from the site, with a small portion remaining directly south of the existing house. Some of the framing structure of the orchard remains on the south portion of the site. There are 2 buildings located on site, which includes:

- a building constructed pre-2000s and was used to house the pesticides used across the blueberry orchard
- a recently constructed house, located near the centre of the site

During our site walkover, we observed:

- the rubbish pit containing organic silt, sand, gravel, and intermixed inorganic building debris
- most of the fertiliser storage building is surrounded by concrete hardstand
- no remnants of the former stockyards or demolished buildings

Apart from those noted above, we:

- observed no visual or olfactory signs of contamination during our site walkover
- found no evidence of underground storage tanks or hazardous substance releases at the time of our inspection
- did not observe signs of chemically stressed vegetation

Conceptual site model

The conceptual site model (CSM) helps identify how potential soil contamination could affect human health should the site be subject to future subdivision or the change in land use. Our CSM follows the source - pathway - receptor model and is summarised in Table 3.

Table 3: Conceptual site model

Potential HAIL activity	Source	COPC	Pathways	Routes of entry	Potential receptors
A8 – Livestock dip or spray race operations	Use of pesticide and spray applications at stock yards	Arsenic, OCPs	Plant uptake, surface water run-off, soil disturbance, dust generation	Dermal adsorption (contact), inhalation of dust, ingestion of dust and/or soil, ingestion of contaminated plants	Current site users, future construction workers, future occupants
A10 - Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds	Application of persistent pesticides	Heavy metals	Plant uptake, surface water run-off, soil disturbance, dust generation	Dermal adsorption (contact), inhalation of dust, ingestion of dust and/or soil, ingestion of contaminated plants	Current site users, future construction workers, future occupants
G5 - Waste disposal to land (excluding where biosolids have been used as soil conditioners)	Uncontrolled fill placed in borrow pit	Heavy metals, PAH	Surface water run-off, physical disturbance of material, dust generation	Dermal adsorption (contact), inhalation of dust, ingestion of dust and/or soil	Current site users, future construction workers, future occupants

Potential HAIL activity	Source	COPC	Pathways	Routes of entry	Potential receptors
G5 - Waste disposal to land (excluding where biosolids have been used as soil conditioners)	Uncontrolled fill placed in borrow pit	Asbestos	Surface water run-off, soil disturbance, dust/fibre generation	Inhalation of fibres	Current site users, future construction workers, future occupants
I - Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment	Lead-based paint	Lead	Surface water run-off, soil disturbance, dust generation	Dermal adsorption (contact), inhalation of dust, ingestion of dust and/or soil	Current site users, future construction workers, future occupants
	Asbestos containing building material	Asbestos	Surface water run-off, soil disturbance, dust/fibre generation	Inhalation of fibres	Current site users, future construction workers, future occupants

Site investigation and sampling

Sampling rationale

We considered the following when developing our sampling and analysis plan:

- the Contaminated Land Management Guidelines (CLMG) No. 5[14]
- the potential linkages identified in our CSM
- our knowledge of transport and behaviour of the identified COPC

We used targeted sampling strategies to investigate the potential for spray race operations (HAIL A8) on site, associated with the stockyards. As pesticides associated with spray race operations are applied directly to livestock, residual pesticide contamination is likely to be highest in the topsoil. We collected a near-surface (50 mm to 100 mm below ground level [bgl]) soil sample from the former footprint for sampling and analysis. We also collected shallow subsurface samples so that, should the laboratory detect surficial soil contamination, we could evaluate whether deeper soil contamination is present.

We used a systematic sampling strategy to investigate HAIL A10 associated with the former blueberry orchard. As heavy metals are relatively immobile in soil, and pesticides are applied from the top-down, residential contamination from these COPC are likely highest in the near-surface soils. Therefore, we targeted the near-surface soils within the footprint of the current and removed blueberry orchard for sampling and analysis.

We used a systematic sampling strategy to investigate HAIL G5 associated with the on-site rubbish pit. The material within the rubbish pit is heterogenous, with potential contamination present throughout the full depth of the pit. Therefore, we planned collection of samples across the rubbish pit up to 5 m depth to ensure our data was representative of the entire rubbish pit.

We also use a targeted sampling strategy to investigate the soils potentially impacted by lead and asbestos. The main transport mechanism for lead and asbestos to enter soil from building materials is from weathering and degradation (paint flakes and damage to ACM) over time. Consequently, asbestos and lead contamination associated with the existing and former buildings is likely to be limited to the curtilage of the buildings. Asbestos is also immobile in soil and lead is relatively immobile, with concentrations likely highest in the near-surface soils. Therefore, we targeted the near-surface soils within the curtilage of current and removed buildings for sampling and analysis.

[14] Ministry for the Environment. 2021. Contaminated land management guidelines No. 5: Site investigation and analysis of soils (Revised 2021). Wellington: Ministry for the Environment

Site sampling

The site investigation included the collection of:

- samples collected from 4 locations up to 2.9 m[15] bgl across the rubbish pit (ES01, ES02, ES21, ES22)
- near-surface and shallow subsurface (250 mm to 300 mm bgl) samples collected from the footprint of the former stockyard (ES03)
- near-surface samples collected from the approximate curtilage of existing and former buildings (ES04 to ES10)
- near-surface and shallow subsurface samples collected from the footprint of the current and former blueberry orchard (ES11 to ES20)
- duplicate samples collected from ES12 and ES20 for quality control

We had:

- select samples run from the rubbish pit (ES01, ES02, ES21, and ES22) analysed for heavy metals, PAH, and asbestos
- the near-surface sample from the former stockyard (ES03) analysed for arsenic and OCPs
- the near-surface samples from the approximate curtilage of existing and former buildings (ES04 to ES08 and ES10) analysed for lead and asbestos
- the near-surface sample from the approximate curtilage of a former building (ES09) analysed for asbestos
- the near-surface samples from the footprint of the existing and removed blueberry orchard (ES11 to ES20) analysed for heavy metals
- the duplicate samples collected from locations ES12 and ES20 analysed for heavy metals

We used decontaminated sampling equipment and gloved hands to collect and place soil samples in suitable containers. We changed gloves between each sample collected. Samples were collected in accordance with CLMG No 5. We transported samples to Hill Labs under chain-of-custody protocols. Hill Labs is IANZ accredited for the analyses requested.

During our site investigation, we encountered:

- topsoil underlain by silt and sand across most of the site
- organic silt with intermixed sand, gravel, and inorganic building debris (concrete, metal, ceramics, tiling) within the rubbish pit

We have included photos of the encountered ground conditions in Appendix B.

A suitably qualified and experienced practitioner (SQEP) with contaminated land experience oversaw the investigation and collected the samples.

Laboratory results, evaluation, and application

Laboratory results and results evaluation

We have provided a summary table of laboratory results in Appendix E and full laboratory reports in Appendix F. For risk evaluation, we used the:

[15] Due to the building debris mixed in with soil within the rubbish pit, our deepest hand auger refused at a depth of 2.9 m bgl

- NESCS rural residential soil contaminant standards (SCS) for heavy metals and benzo(a)pyrene[16]
- National Environment Protection Measures (NEPM) residential guidelines for nickel and zinc[17]
- MfE petroleum hydrocarbon Tier 1 residential guidelines for naphthalene and pyrene[18]
- New Zealand guidelines for assessing and managing asbestos in soil for a residential land use[19]
- New Zealand background concentrations to determine NESCS consenting requirements[20]
- Waikato regional cleanfill criteria for suitability for off-site disposal as cleanfill[21]

The analysis found that:

- lead and arsenic are present in soil within the rubbish pit above the applied human health guidelines
- low concentrations of PAHs were detected in soil within the rubbish pit below the applied human health guidelines
- no asbestos was detected in soil within the rubbish pit
- arsenic is present in soil within the stockyards below background concentrations
- no OCPs were detected in soil within the stockyards
- lead is present in soil around the former buildings below the applied human health guidelines
- no asbestos was detected in soil around the former and current buildings
- heavy metals in soil are present within the footprint of the orchard below the applied human health guidelines and generally below background concentrations

The soil within the rubbish pit and around the curtilage of 3 of 7 removed buildings are not suitable for off-site disposal as cleanfill. If soil is proposed for off-site disposal, it must go to a facility consented to accept soil with contaminants at the encountered concentrations. We have included a plan showing areas with soil above Waikato cleanfill criteria in Appendix A.

To evaluate the replication of laboratory results in samples, we calculated the relative percent differences (RPDs) for the heavy metal results from the duplicate samples, ES12 and ES20. RPD is considered to be acceptable when it is below 30% to 50%[22]. The RPDs were all <30% and so we consider the laboratory results to be representative (see Appendix E).

Application of guidelines

Our assessment for whether the site has been subject to HAIL activities is summarised in Table 4.

Table 4: Assessment of potential HAIL activities

Potential HAIL activity	Source	Assessment	HAIL applies?
HAIL A8	Use of pesticide and spray applications at stock yards	• Arsenic is present in soil below the applied human health guidelines and below background concentrations • No OCPs were detected in the tested soil	No
HAIL A10	Application of persistent pesticides	• Heavy metals are present in soil below the applied human health guidelines and generally below background concentrations	No

[16] Ministry for the Environment. 2012. Users' Guide: National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.
[17] National Environmental Protection Measure. *Schedule B1 – Guideline on investigation levels for soil and groundwater*. Revised 2013
[18] Ministry for the Environment. *Guidelines for assessing and managing petroleum hydrocarbon contaminated sites in New Zealand (revised 2011)*. Module 4: Tier 1 soil acceptance criteria. Dated August 1999
[19] Building Research Association of New Zealand. *New Zealand guidelines for assessing and managing asbestos in soil*. November 2017
[20] Waikato Regional Council. *Natural background concentrations in the Waikato region*. https://www.waikatoregion.govt.nz/services/regional-services/waste-hazardous-substances-and-contaminated-sites/contaminated-sites/natural-background-concentrations/. Accessed 07/07/23
[21] Waikato Regional Council. *Standard operating policies for defining cleanfill acceptance criteria*. Revised 15/09/2018
[22] Ministry for the Environment Contaminated land management guidelines No. 5: Site investigation and analysis of soils (Revised 2011).

Potential HAIL activity	Source	Assessment	HAIL applies?
HAIL G5	Rubbish pit	• Lead and arsenic are present in soil above the applied human health guidelines in 2 of 4 sample locations • All other heavy metals are present in soil below the applied human health guidelines • No asbestos was detected in the tested soil	Yes – rubbish pit is a 'piece of land'
HAIL I	Lead-based paint	• Lead is present in soil below the applied human health guidelines	No
	Asbestos containing building material	• No asbestos was detected in the tested soil	No

For the identified 'piece of land', a restricted discretionary consent under the NESCS is required as soil contaminants are present above the applied human health guidelines. The NESCS does not apply to the remainder of the site as no HAIL activities have been identified. We have included a plan showing the identified 'piece of land' in Appendix A.

Conclusions and recommendations

Our conclusions are that:

- the rubbish pit (HAIL G) is a 'piece of land' under the NESCS
- the site is not subject to HAIL A8 associated with the stockyards on site
- the site is not subject to HAIL A10 associated with the blueberry orchard on site
- the site is not subject to HAIL I associated with the:
  - use of ACM building material
  - application of lead-based paint
- soils within the identified 'piece of land' present a risk to human health for the proposed development
- soils within the identified 'piece of land' and around 3 of 7 removed buildings (see Appendix A) are not suitable for disposal off-site as cleanfill
- the proposed subdivision, change of land use, and soil disturbance for the 'piece of land' is a restricted discretionary activity under the NESCS
- a site management plan (SMP) and remedial action plan (RAP) are required to ensure that the identified 'piece of land' can be safely managed and remediated

We recommend that:

- this DSI report is submitted to WDC to support an application for restricted discretionary consent under the NESCS for the proposed subdivision
- as a condition of consent, Council requires that a SQEP:
  - develops a SMP to guide the safe management of soil during earthworks required for the subdivision
  - develops and submits a RAP to WDC for approval. The RAP will guide soil remediation works and set remedial goals/targets for the identified 'piece of land'
  - develops and submits a site validation report (SVR) to WDC for approval. The SVR will document compliance with the SMP and assess whether the remedial goals/targets outlined in the RAP have been met including a statement regarding the suitability of the site for rural residential land use
- any soil proposed for off-site disposal has a copy of the relevant laboratory reports (Appendix F) provided to the chosen disposal facility to confirm that they can accept the soil

Limitations

This document does not include any assessment or consideration of potential health and safety issues under the Health and Safety Work Act 2015. HD Geo has relied upon information provided by the Client and other third parties to prepare this document, some of which has not been fully verified by HD Geo. This document may be transmitted, reproduced, or disseminated only in its entirety. This report has been prepared for our client, their professional advisers, and the relevant territorial and regional authorities for the purposes detailed above and may not be relied on by any other party for any other purposes.

From a technical perspective, the subsurface environment at the site may present substantial uncertainty. It is a heterogeneous, complex environment, in which small subsurface features or changes in geologic conditions can have substantial impacts on water, vapour, or chemical movement. HD Geo's professional opinions are based on its professional judgement, experience, and training. It is possible that testing and analysis might produce different results and/or different opinions. Should additional information become available, this report should be updated accordingly.

Certification

This report presents information from an environmental site investigation conducted by and under the oversight of a SQEP with contaminated land expertise, as required by the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health and who is a Certified Environmental Practitioner. Detailed qualifications are available upon request.

Paul Gibbins

Certified Environmental Practitioner, CEnvP #1410

APPENDIX A – SITE PLANS

COGSWELL
SURVEYING | ENGINEERING | PLANNING
5 MILICICH PLACE, P.O BOX 156, CAMBRIDGE
P: (07)8275071 E: office@cogswell.co.nz

Concept Plan for Development at 318 Lamb St, Cambridge

PREPARED FOR: Te Mara Properties Ltd

SCALE: 1:1500
ORIGINAL PLAN SIZE: A3
SHEET: 1 of 1
DRAWN: AW
DESIGNED: AW
CHECKED:
DATE: DEC 2022
NOTE: BOUNDARIES AND DIMENSIONS AND AREAS ARE APPROXIMATE AND SUBJECT TO ALTERATION BY APPROVAL OR SURVEY. LEVELS ARE IN TERMS OF N/A. ORIGIN OF LEVELS - N/A.
REV: 13

TITLE

318 Lamb Street, Cambridge
Sample locations

CLIENT

Waipa Civil Limited

0 20 40 60 80 100 m

Scale: 1:2750

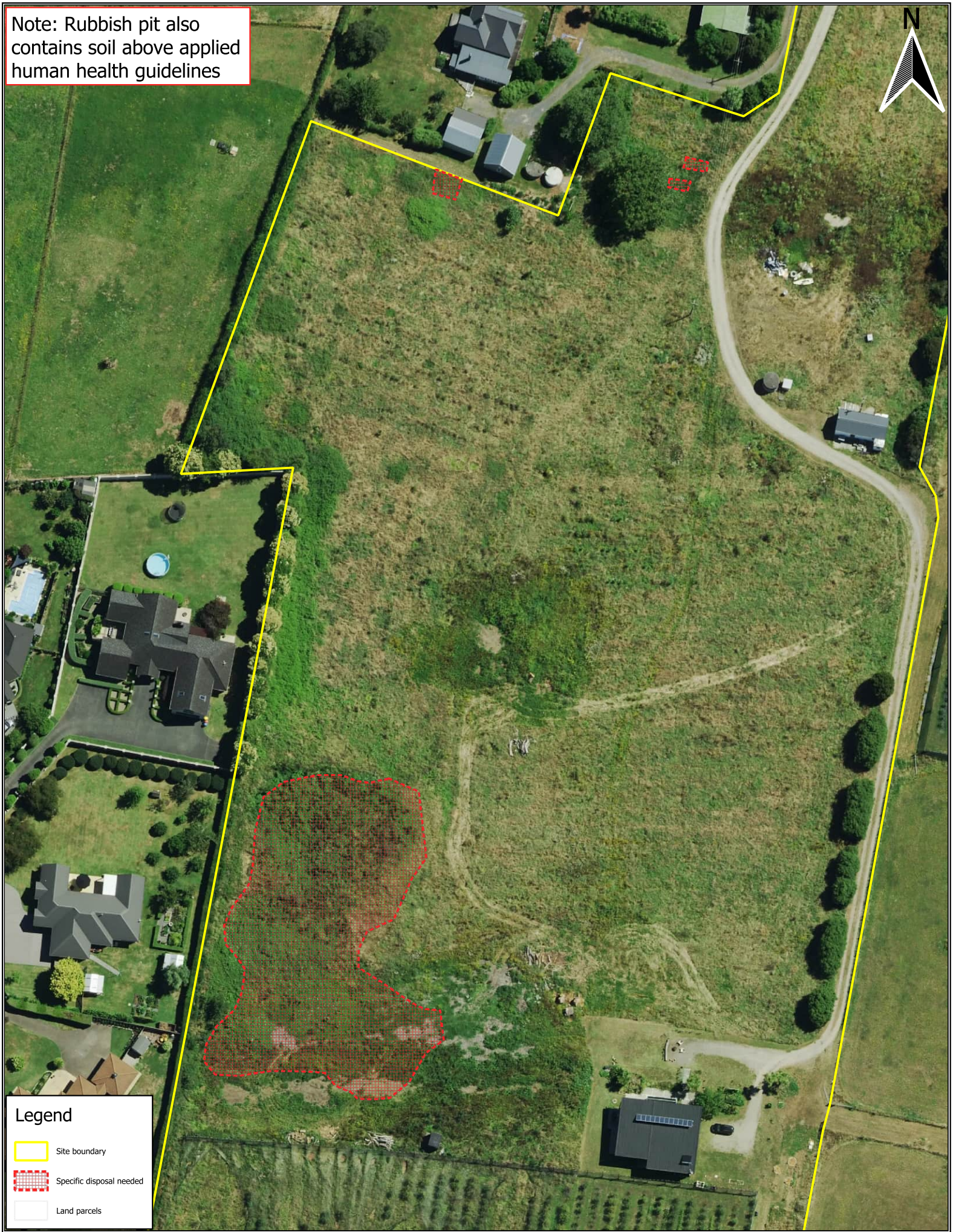
GENERAL NOTES AND DISCLAIMER

1. Coordinates are in NZTM
2. Imagery and cadastral information sourced from LINZ. Crown copyright reserved
3. Areas and dimensions are approximate only, any use or reliance on this plan is at the users risk

DRAWN	M.MOORE	06/07/23
CHECKED	P.GIBBINS	06/07/23
LOCATION	Cambridge	
JOB NUMBER	HD2964	

REV	BY	CHKD	DATE

DRAWING No	SHEET	REVISION
HD2964-101	1	1



TITLE

318 Lamb Street, Cambridge
Soil above Waikato cleanfill criteria

CLIENT

Waipa Civil Limited

0 10 20 30 40 50 m

Scale: 1:1250

GENERAL NOTES AND DISCLAIMER

1. Coordinates are in NZTM
2. Imagery and cadastral information sourced from LINZ. Crown copyright reserved
3. Areas and dimensions are approximate only, any use or reliance on this plan is at the users risk

DRAWN	M.MOORE	17/07/23
CHECKED	P.GIBBINS	17/07/23
LOCATION	Cambridge	
JOB NUMBER	HD2964	

REV	BY	CHKD	DATE

DRAWING No	SHEET	REVISION
HD2964-102	1	1

APPENDIX B – SITE PHOTOS

HD2964 – 318 Lamb Street photo log – Taken 05.07.23

Photo 1: Former blueberry orchard, facing north

Photo 2: Former blueberry orchard, facing south

Photo 3: Remaining blueberry orchard in central-south portion of site, facing south

HD2964 – 318 Lamb Street photo log – Taken 05.07.23

Photo 4: Inorganic rubbish (metal) on north portion of site, facing north-west

Photo 5: Existing building & location of fertiliser storage, facing north

Photo 6: Typical soil conditions across site (topsoil underlain by silt and sand)

HD2964 – 318 Lamb Street photo log – Taken 05.07.23

Photo 7: Rubbish pit footprint, facing west

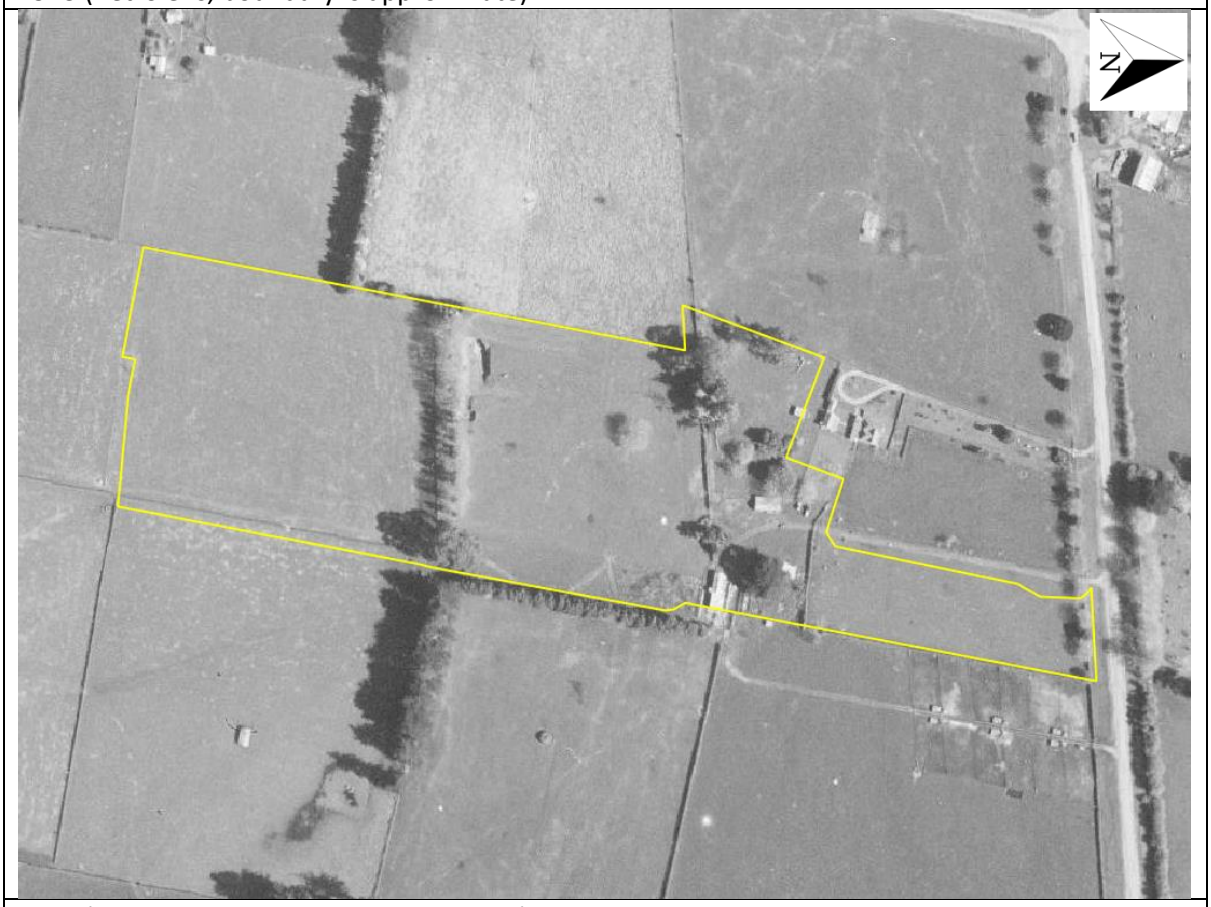
Photo 8: Rubbish pit contents (wood, bricks, ceramics, glass, fabric, metal fragments)

Photo 9: Soil conditions within rubbish pit (organic silt with intermixed sand, gravel, and debris)

APPENDIX C – HISTORIC AERIAL IMAGES

HD2964 – 318 Lamb Street historical aerials – Accessed 03.07.23

1943 (Retrolens, boundary is approximate)



1953 (Retrolens, boundary is approximate)

HD2964 – 318 Lamb Street historical aerials – Accessed 03.07.23

1966 (Retrolens, boundary is approximate)

1979 (Retrolens, boundary is approximate)

HD2964 – 318 Lamb Street historical aerials – Accessed 03.07.23

1995 (Retrolens, boundary is approximate)

2006 (Google Earth Pro, boundary is approximate)

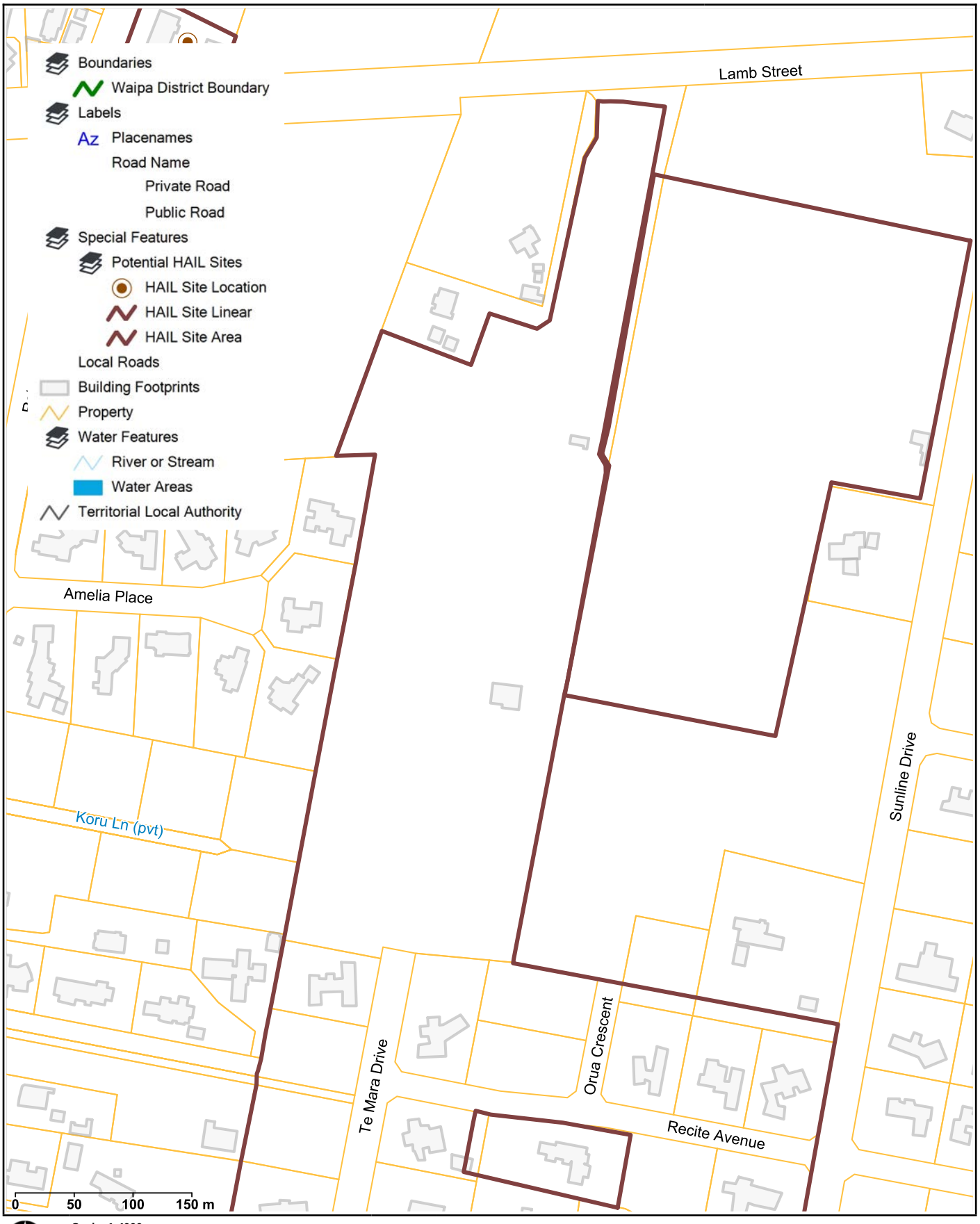
HD2964 – 318 Lamb Street historical aerials – Accessed 03.07.23

2015 (Google Earth Pro, boundary is approximate)

2022 (Google Earth Pro, boundary is approximate)

APPENDIX D – COUNCIL RECORDS

Print Date: 03/07/2023



Scale: 1:4000

Original Sheet Size A4

Projection: # NZGD2000 / New Zealand Transverse Mercator 2000
Bounds: 1817609.68290637,5799588.27118264
1818594.62483531,5800795.4009968

Matt Moore

From: Karl Tutty <Karl.Tutty@waipadc.govt.nz>
Sent: Wednesday, 5 July 2023 11:23 am
To: Matt Moore
Subject: RE: External Sender: HAIL activities information request - 318 Lamb Street, Cambridge

Hi Matt,

Its is showing in the register as unverified HAIL. “large market garden visible in aerial imagery”

I have looked at some old aerials and haven’t spotted it. The noting isn’t dated.

If I remember correctly, the southern portion was subdivided without the NES being applied. This was later identified when someone (from memory) wanted to build a pool, and it flagged up. Terre did a PSI focused on 69 Te Mara drive that from memory considered the whole site. You may be able to find that quicker than me!

WRC have not updated their records however, so they might not have received it/accepted it.

Karl Tutty Manager Compliance **WAIPA DISTRICT COUNCIL**
karl.tutty@waipadc.govt.nz | www.waipadc.govt.nz
PH: 07 872 0030 | **MOB:** 027 584 7072| **FAX:** 07 872 0033

From: Matt Moore <Matt@hdgeo.co.nz>
Sent: Monday, July 3, 2023 11:00 AM
To: Karl Tutty <Karl.Tutty@waipadc.govt.nz>
Subject: External Sender: HAIL activities information request - 318 Lamb Street, Cambridge

Hi Karl,

Hope you had a great weekend!

I’m currently investigating 318 Lamb Street, Cambridge, which is listed as a HAIL in Waipa DC’s Intra Maps. Can I please confirm whether Waipa DC holds any additional information around the HAIL status of the site?

Site address: 318 Lamb Street Leamington Cambridge 3432
Legal description: LOT 2003 DP 535418; LOT 2005 DP 535418
Assessment no: 04525/296.25

Kind regards,

Matt Moore - CEnvP
Environmental Consultant
E. matt@hdgeo.co.nz | **W.** hdgeo.co.nz
M. 027 701 9529 | **P.** 07 957 2727
Hamilton | Auckland | Tauranga | New Plymouth

Geotechnical | Environmental | Observation

APPENDIX E – RESULTS SUMMARY TABLE

HD2964 - 318 Lamb Street, Cambridge
Laboratory results summary table (rubbish pit)

	Sample Name:	Rural residential assessment criteria*	Waikato regional cleanfill criteria[1]	Waikato background concentrations[2]	ES01-0-0.5 04-07-23	ES01-0.5-1.0 04-07-23	ES01-1.0-2.0 04-07-23	ES01-2.0-2.9 04-07-23	ES02-0-0.5 04-07-23	ES02-0.5-1.0 04-07-23	ES21-0-0.6 04-07-23	ES22-DF 04-07-23
	Lab Number:				3315485.1	3315485.2	3315485.3	3315485.4	3315485.5	3315485.6	3315485.7	3315485.8
Dry Matter	g/100g as rcvd				68	71	66	65	73	78	72	68
Heavy Metals, Screen Level												
Total Recoverable Arsenic	mg/kg dry wt	17	17	6.8	10	16	11	15	4	25	10	6
Total Recoverable Cadmium	mg/kg dry wt	0.8	0.8	0.22	0.38	0.4	0.42	0.4	0.21	0.4	0.21	0.3
Total Recoverable Chromium	mg/kg dry wt	290	56	30	11	13	11	12	8	29	8	7
Total Recoverable Copper	mg/kg dry wt	>10,000	120	25	24	27	25	28	12	35	14	20
Total Recoverable Lead	mg/kg dry wt	160	78	20	99	230	270	119	11.2	75	29	21
Total Recoverable Nickel	mg/kg dry wt	400	33	7.6	5	5	5	5	4	4	3	4
Total Recoverable Zinc	mg/kg dry wt	8,000	175	53	135	210	183	133	48	200	57	103
Polycyclic Aromatic Hydrocarbons Screening in Soil												
Total of Reported PAHs in Soil	mg/kg dry wt				0.4	1.6	0.4	< 0.4	< 0.4	< 0.3	0.5	< 0.4
1-Methylnaphthalene	mg/kg dry wt				< 0.015	< 0.014	< 0.015	< 0.015	< 0.014	< 0.013	< 0.014	< 0.015
2-Methylnaphthalene	mg/kg dry wt				< 0.015	< 0.014	< 0.015	< 0.015	< 0.014	< 0.013	< 0.014	< 0.015
Acenaphthylene	mg/kg dry wt				< 0.015	0.024	< 0.015	< 0.015	< 0.014	< 0.013	< 0.014	< 0.015
Acenaphthene	mg/kg dry wt				< 0.015	< 0.014	< 0.015	< 0.015	< 0.014	< 0.013	< 0.014	< 0.015
Anthracene	mg/kg dry wt				< 0.015	0.027	< 0.015	< 0.015	< 0.014	< 0.013	< 0.014	< 0.015
Benzo[a]anthracene	mg/kg dry wt				0.026	0.128	0.028	< 0.015	< 0.014	< 0.013	0.032	< 0.015
Benzo[a]pyrene (BAP)	mg/kg dry wt				0.04	0.151	0.042	< 0.015	< 0.014	< 0.013	0.05	< 0.015
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	6	2		0.054	0.22	0.062	< 0.036	< 0.033	< 0.030	0.073	< 0.035
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt				0.053	0.22	0.062	< 0.036	< 0.033	< 0.030	0.072	< 0.035
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt				0.052	0.157	0.048	< 0.015	< 0.014	< 0.013	0.056	< 0.015
Benzo[e]pyrene	mg/kg dry wt				0.026	0.088	0.027	< 0.015	< 0.014	< 0.013	0.031	< 0.015
Benzo[g,h,i]perylene	mg/kg dry wt				0.029	0.089	0.029	< 0.015	< 0.014	< 0.013	0.036	< 0.015
Benzo[k]fluoranthene	mg/kg dry wt				0.021	0.063	0.019	< 0.015	< 0.014	< 0.013	0.02	< 0.015
Chrysene	mg/kg dry wt				0.031	0.125	0.031	< 0.015	< 0.014	< 0.013	0.038	< 0.015
Dibenzo[a,h]anthracene	mg/kg dry wt				< 0.015	0.022	< 0.015	< 0.015	< 0.014	< 0.013	< 0.014	< 0.015
Fluoranthene	mg/kg dry wt				0.056	0.23	0.053	0.016	< 0.014	< 0.013	0.074	< 0.015
Fluorene	mg/kg dry wt				< 0.015	< 0.014	< 0.015	< 0.015	< 0.014	< 0.013	< 0.014	< 0.015
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt				0.029	0.09	0.029	< 0.015	< 0.014	< 0.013	0.038	< 0.015
Naphthalene	mg/kg dry wt	63			< 0.08	< 0.07	< 0.08	< 0.08	< 0.07	< 0.07	< 0.07	< 0.08
Perylene	mg/kg dry wt				< 0.015	0.032	< 0.015	< 0.015	< 0.014	< 0.013	< 0.014	< 0.015
Phenanthrene	mg/kg dry wt				0.019	0.1	0.02	< 0.015	< 0.014	< 0.013	0.026	< 0.015
Pyrene	mg/kg dry wt	1,600			0.055	0.25	0.055	0.017	< 0.014	< 0.013	0.085	< 0.015
Asbestos					Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

* Nickel and zinc from the NEMP. All other heavy metals and benzo(a)pyrene from the NESCS. Asbestos from the NZ GAMAS. All other assessment criteria from the Petroleum Hydrocarbon Tier 1 guidelines, using sandy silt soil <1 m depth. Rural residential assumes 25% of consumed produce will be grown on site.

[1] Waikato Regional Council. Standard operating policies for defining cleanfill acceptance criteria. Revised 15/09/2018

[2] Waikato Regional Council, *Upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data* .

HD2964 - 318 Lamb Street, Cambridge
Laboratory results summary table (stockyard, buildings, and orchard)

	Sample Name:	Rural residential assessment criteria*	Waikato regional cleanfill criteria[1]	Waikato background concentrations[2]	ES03-50 04-07-23	ES04 04-07-23	ES05 04-07-23	ES06 04-07-23	ES07 04-07-23	ES08 04-07-23	ES09 04-07-23	ES10 04-07-23	ES11-50 04-07-23	ES12-50 04-07-23	ES13-50 04-07-23	ES14-50 04-07-23	ES15-50 04-07-23	ES16-50 04-07-23	ES17-50 04-07-23	ES18-50 04-07-23	ES19-50 04-07-23	ES20-50 04-07-23	ES12r-50 04-07-23	ES20r-50 04-07-23
	Lab Number:				3315486	3315485	3315485	3315485	3315485	3315485	3315486	3315485	3315485	3315485	3315485	3315485	3315485	3315485	3315485	3315485	3315485	3315485	3315485	3315485
Dry Matter	g/100g as rcvd				69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heavy Metals, Screen Level																								
Total Recoverable Arsenic	mg/kg dry wt	17	17	6.8	3	-	-	-	-	-	-	-	5	5	5	4	5	4	5	4	5	4	5	4
Total Recoverable Cadmium	mg/kg dry wt	0.8	0.8	0.22	-	-	-	-	-	-	-	-	0.54	0.65	0.57	0.47	0.61	0.53	0.62	0.57	0.59	0.61	0.67	0.63
Total Recoverable Chromium	mg/kg dry wt	290	56	30	-	-	-	-	-	-	-	-	9	11	10	8	8	6	9	8	8	8	9	8
Total Recoverable Copper	mg/kg dry wt	>10,000	120	25	-	-	-	-	-	-	-	-	21	26	32	18	23	21	19	14	15	18	23	18
Total Recoverable Lead	mg/kg dry wt	160	78	20	-	79	88	64	26	20	-	103	12.9	13.1	35	12.6	11.2	9.3	9.5	8.2	9.3	9.6	12.2	9.5
Total Recoverable Nickel	mg/kg dry wt	400	33	7.6	-	-	-	-	-	-	-	-	4	5	7	5	6	5	5	4	4	5	5	4
Total Recoverable Zinc	mg/kg dry wt	8,000	175	53	-	-	-	-	-	-	-	-	79	94	114	71	98	80	59	51	50	55	82	57
Organochlorine Pesticides Screening in Soil																								
Aldrin	mg/kg dry wt	1.1			< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
alpha-BHC	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
beta-BHC	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
delta-BHC	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-Chlordane	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-Chlordane	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDD	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDD	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDE	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDE	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDT	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDT	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DDT Isomers	mg/kg dry wt	45	0.7		< 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dieldrin	mg/kg dry wt	1.1	0.2		< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan I	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan II	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan sulphate	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin aldehyde	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin ketone	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor epoxide	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methoxychlor	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Asbestos (presence/absence)					-	Absent	Absent	Absent	Absent	Absent	Absent	Absent	-	-	-	-	-	-	-	-	-	-	-	-

* Nickel and zinc from the NEMP. Asbestos from the NZ GAMAS. All other assessment criteria from the NESCS.Rural residential assumes 25% of consumed produce will be grown on site.

[1] Waikato Regional Council. Standard operating policies for defining cleanfill acceptance criteria. Revised 15/09/2018

[2] Waikato Regional Council, *Upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data* .

Relative percent differences

Sample Name:	ES12	ES12r	**RPD****	ES20	ES20r	**RPD****
Arsenic	5	5	0%	4	4	0%
Cadmium	0.65	0.67	3%	0.61	0.63	3%
Chromium	11	9	20%	8	8	0%
Copper	26	23	12%	18	18	0%
Lead	13.1	12.2	7%	9.6	9.5	1%
Nickel	5	5	0%	5	4	22%
Zinc	94	82	14%	55	57	4%

**Relative Percent Difference. Calculated as (|x2 - x1|/((x2 + x1)/2)

APPENDIX F – LABORATORY REPORTS

Hill Laboratories
TRIED, TESTED AND TRUSTED

ANALYSIS REQUEST

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Job No: **331 5485**
Date Recv: 04-Jul-23 15:51
Received by: Arneka Phillips

3133154850

Quote No 91878
Primary Contact Matt Moore
Submitted By Matt Moore
Client Name HD Geo Limited 245781
Address PO Box 9266, Waikato Mail Centre
Hamilton 3240
Phone 07 957 2727 *Mobile* 027 701 9529
Email matt@hdgeo.co.nz
Charge To HD Geo Limited 245781
Client Reference HD 2964
Order No

Results To *Reports will be emailed to Primary Contact by default. Additional Reports will be sent as specified below.*
☑ Email Primary Contact ☐ Email Submitter ☐ Email Client
☑ Email Other paul@hdgeo.co.nz
☐ Other
Dates of testing are not routinely included in the Certificates of Analysis. Please inform the laboratory if you would like this information reported.

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
☑ Tick if you require COC to be emailed back
Date & Time: 4-7-23 15:15
Name: Matt Moore
Signature:

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition ☐ Room Temp ☐ Chilled ☐ Frozen
Temp: 17.6

☐ Sample & Analysis details checked
Signature:

ADDITIONAL INFORMATION / KNOWN HAZARDS

Priority ☐ Low ☐ Normal ☑ High
☐ **Urgent** (ASAP, extra charge applies, please contact lab first)
NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 10 working days following the day of receipt of the samples at the laboratory.

Requested Reporting Date:

Quoted Sample Types
Soil (Soil), Dried Paint (Paint), Building Material (BM), Ground Water (GW)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	ES01-0-0.5, ES01-0.5-1.9, ES01-1.0-2.0, ES01-2.0-2.9	4-7-23	Soil	Heavy metals, PAH, semi Q asbestos
2	ES02-0-0.5, ES02-0.5-1.0, ES21-0-0.6, ES22-DF	"	"	"
3	ES03-50	"	"	Arsenic + OCPs
4	ES04 to ES08, ES10	"	"	Lead + p/a asbestos
5	ES09	"	"	p/a asbestos
6	ES11-50 to ES20-50	"	"	Heavy metals
7	ES21-50, ES20-50	"	"	Heavy metals
8	~~Multiple~~ samples	"	"	-
9	ES11-300 to ES20-300, ES03-300	"	"	Hold cold
10				

R J Hill Laboratories Limited
101C Waterloo Road
Hornby
Christchurch 8042 New Zealand

0508 HILL LAB (44 555 22)
+64 7 858 2000
mail@hill-labs.co.nz
www.hill-labs.co.nz

Certificate of Analysis

Client:	HD Geo Limited	**Lab No:**	3315486	A2Pv1
Contact:	Matt Moore	**Date Received:**	04-Jul-2023	
	C/- HD Geo Limited	**Date Reported:**	07-Jul-2023	
	PO Box 9266	**Quote No:**	91878	
	Waikato Mail Centre	**Order No:**		
	Hamilton 3240	**Client Reference:**	HD 2964	
		Submitted By:	Matt Moore	

Sample Type: Soil

Sample Name	Lab Number	As Received Weight Presence / Absence Testing (g)	Dry Weight Presence / Absence Testing (g)	<2mm Subsample Weight Presence / Absence Testing (g dry wt)	Asbestos Presence / Absence from Presence / Absence Testing	Description of Asbestos Form Presence / Absence Testing
ES04	3315486.9	115.8	74.5	53.6	Asbestos NOT detected.	-
ES05	3315486.10	164.2	105.6	56.1	Asbestos NOT detected.	-
ES06	3315486.11	136.7	79.2	63.7	Asbestos NOT detected.	-
ES07	3315486.12	102.5	63.6	50.3	Asbestos NOT detected.	-
ES08	3315486.13	150.5	120.6	55.1	Asbestos NOT detected.	-
ES09	3315486.14	129.6	101.8	54.3	Asbestos NOT detected.	-
ES10	3315486.15	112.3	64.8	45.8	Asbestos NOT detected.	-

Sample Type: Soil

		Sample Name:	ES01-0-0.5 04-Jul-2023	ES01-0.5-1.0 04-Jul-2023	ES01-1.0-2.0 04-Jul-2023	ES01-2.0-2.9 04-Jul-2023	ES02-0-0.5 04-Jul-2023
		Lab Number:	3315486.1	3315486.2	3315486.3	3315486.4	3315486.5
Asbestos Presence / Absence			Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form			-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g		600.0	454.1	690.7	735.9	596.8
Dry Weight	g		425.4	327.6	478.5	491.2	434.1
Moisture*	%		29	28	31	33	27
Sample Fraction >10mm	g dry wt		3.9	8.7	11.3	3.7	8.8
Sample Fraction <10mm to >2mm	g dry wt		78.0	90.2	87.9	94.7	98.6
Sample Fraction <2mm	g dry wt		333.9	228.6	377.0	392.6	326.3
<2mm Subsample Weight	g dry wt		59.2	50.5	55.6	51.3	51.0
Weight of Asbestos in ACM (Non-Friable)	g dry wt		< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt		< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt		< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.
The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Soil				
Sample Name:		ES02-0.5-1.0 04-Jul-2023	ES21-0-0.6 04-Jul-2023	ES22-DF 04-Jul-2023
Lab Number:		3315486.6	3315486.7	3315486.8
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001
As Received Weight	g	653.2	509.5	701.4
Dry Weight	g	492.3	343.6	491.2
Moisture*	%	25	33	30
Sample Fraction >10mm	g dry wt	8.0	5.1	26.1
Sample Fraction <10mm to >2mm	g dry wt	118.5	61.8	98.9
Sample Fraction <2mm	g dry wt	365.5	276.5	365.6
<2mm Subsample Weight	g dry wt	59.8	55.4	54.2
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001

Glossary of Terms

• Loose fibres (Minor) - One or two fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• Loose fibres (Major) - Three or more fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• ACM Debris (Minor) - One or two small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• ACM Debris (Major) - Large (>2mm) piece, or more than three small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• Unknown Mineral Fibres - Mineral fibres of unknown type detected by polarised light microscopy including dispersion staining. The fibres detected may or may not be asbestos fibres. To confirm the identities, another independent analytical technique may be required.
• Trace - Trace levels of asbestos, as defined by AS4964-2004.
For further details, please contact the Asbestos Team.

Please refer to the BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil.
https://www.branz.co.nz/asbestos

The following assumptions have been made:

1. Asbestos Fines in the <2mm fraction, after homogenisation, is evenly distributed throughout the fraction
2. The weight of asbestos in the sample is unaffected by the ashing process.

Results are representative of the sample provided to Hill Laboratories only.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Asbestos in Soil			
As Received Weight Presence / Absence Testing	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	9-15
Dry Weight Presence / Absence Testing	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	9-15
<2mm Subsample Weight Presence / Absence Testing	Sample dried at 100 to 105°C, weight of <2mm sample fraction taken for asbestos identification if less than entire fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	-	9-15
Asbestos Presence / Absence from Presence / Absence Testing	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	9-15

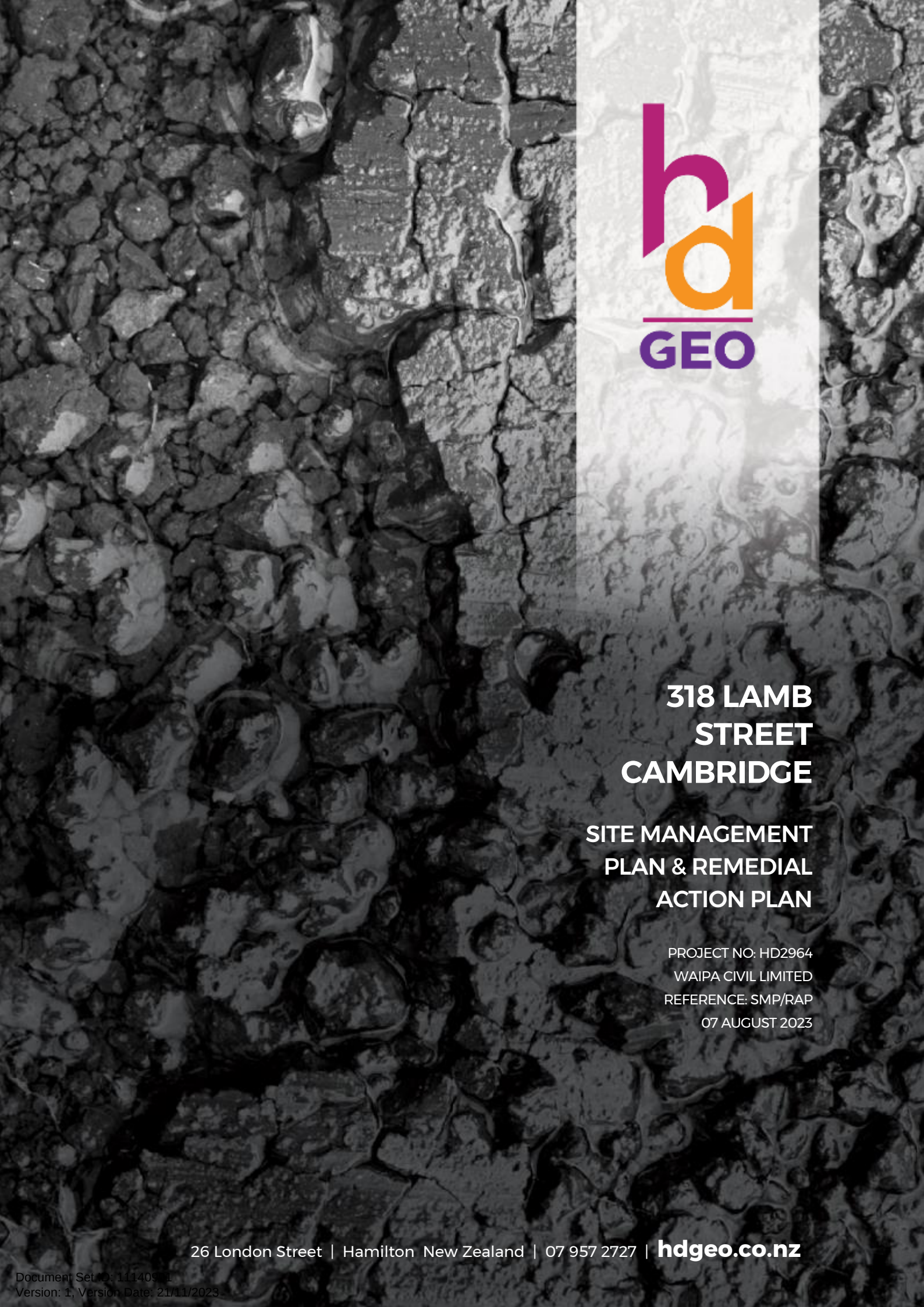
Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Description of Asbestos Form Presence / Absence Testing	Description of asbestos form and/or shape if present.	-	9-15
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-8
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-8
Moisture*	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-8
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-8
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-8
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-8
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1-8
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-8
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-8
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-8
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-8
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-8
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-8
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-8
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-8

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed on 07-Jul-2023. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

Rhodri Williams BSc (Hons)
Technical Manager - Asbestos



318 LAMB STREET CAMBRIDGE

SITE MANAGEMENT PLAN & REMEDIAL ACTION PLAN

PROJECT NO: HD2964
WAIPA CIVIL LIMITED
REFERENCE: SMP/RAP
07 AUGUST 2023

26 London Street | Hamilton New Zealand | 07 957 2727 | hdgeo.co.nz

Introduction

Waipa Civil Limited (the client) wish to subdivide 318 Lamb Street, Cambridge (the site) into a total of 19 lots and change the land use from production land to rural residential. We have included a site plan in Appendix A.

We (HD Geo) were engaged to complete a detailed site investigation[1] (DSI). During our DSI, we identified a rubbish pit on the central-west side of the site. Rubbish pits are listed as a hazardous activities and industries list (HAIL) activity (HAIL G5). We found concentrations of arsenic and lead in the soil within the rubbish pit at concentrations above the applied human health guideline for a rural residential land use. As such, we have prepared this site management plan (SMP) and remedial action plan (RAP). The purpose of the SMP is to help manage the risk to human health during the proposed soil disturbance works. The purpose of the RAP is to set remedial targets/goals to ensure the land is remediated to a standard suitable for the proposed rural residential development.

This report is consistent with guidance from the Ministry for the Environment's Contaminated Land Management Guidelines (CLMG) No.1: Reporting on Contaminated Sites in New Zealand[2].

Site details

Site details are included in Table 1 and site photos are provided in Appendix B.

Table 1: Site details[3]

Item	Description
Site address	318 Lamb Street, Cambridge
Current legal descriptions	LOT 2003 DP 535418 LOT 2005 DP 535418
Zoning	Large lot residential
Approximate site area	61,142 m^2
Current site use	Vacant pasture, rural residential
Proposed site use	Rural residential
District Council	Waipā District Council
Regional Council	Waikato Regional Council
Approximate elevation	73 m to 75 m above local datum

Site description

The site is located at 318 Lamb Street, Cambridge. It is bounded by Lamb Street and a residential house to the north, a blueberry orchard and pasture to the east, and residential houses and pasture to the south and west.

Most of the site is vacant pasture. The site contains:

- a residential house, located in the central-east portion of the site
- a shed and water tank, located in the central-east portion of the site
- an access track, running through the east portion of the site from Lamb Street to the residential house
- a rubbish pit, located in the central-west portion of the site
- a small blueberry orchard, located in the south-east portion of the site

[1] HD Geo Limited. *318 Lamb Street, Cambridge – Detailed site investigation*. Job no: HD1964, dated 17/07/23
[2] Ministry for the Environment. 2021. *Contaminated land management guidelines No 1: Reporting on contaminated sites in New Zealand (Revised 2021)*. Wellington: Ministry for the Environment
[3] Waipa District Council, Intra Maps, accessed 07/07/23. https://waipadc.spatial.t1cloud.com/spatial/IntraMaps/?configId=6aa41407-1db8-44e1-8487-0b9a08965283&project=affd0934-6c16-44e6-90d4-b245ea9bdd6c

Most of the site is relatively flat and is located between 73 m to 75 m above local datum. We have included a plan showing the site in Appendix A[4] and site photos in Appendix B.

Background – HD Geo DSI

We completed a DSI report for the site in July 2023. During our desktop study, we identified that the site had been subject to multiple confirmed and potential HAIL activities. We have summarised the identified HAIL activities and associated contaminants of potential concern (COPC) in Table 2.

Table 2: Identified HAIL activities

HAIL activity	Location/association	COPC
HAIL A8 - Livestock dip or spray race operations	Historic stockyards located in the north-east portion of the site (removed)	Arsenic Organochlorine pesticides (OCPs)
HAIL A10 - Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds	Historic blueberry orchard located throughout the site (partially removed)	Heavy metals
HAIL G5 - Waste disposal to land (excluding where biosolids have been used as soil conditioners)	Rubbish pit located in the central-west portion of the site	Heavy metals Polycyclic aromatic hydrocarbons (PAH) Asbestos
HAIL I - Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment	All buildings potentially surfaced with lead-based paint (pre-1960s construction)	Lead
	All buildings suspected of using ACM in their construction (pre-2000s construction)	Asbestos

To investigate the identified COPC, we collected:

- samples from 4 locations up to 2.9 m below ground level (bgl) across the rubbish pit (ES01, ES02, ES21, ES22) and had targeted samples analysed for heavy metals, PAH, and asbestos
- near-surface and shallow subsurface (250 mm to 300 mm bgl) samples from the footprint of the former stockyard (ES03) and had the near-surface sample analysed for arsenic and OCPs
- near-surface samples from the approximate curtilage of existing and former buildings (ES04 to ES10) and had targeted samples analysed for lead and/or asbestos
- near-surface and shallow subsurface samples from the footprint of the current and former blueberry orchard (ES11 to ES20) and had the near-surface samples analysed for heavy metals
- duplicate samples from ES12 and ES20 for quality control and analysed them for heavy metals

The analysis found that:

- lead and arsenic are present in soil within the rubbish pit above the applied human health guidelines
- low concentrations of PAHs were detected in soil within the rubbish pit below the applied human health guidelines
- no asbestos was detected in soil within the rubbish pit
- arsenic is present in soil within the stockyards below background concentrations
- no OCPs were detected in soil within the stockyards
- lead is present in soil around the former buildings below the applied human health guidelines
- no asbestos was detected in soil around the former and current buildings
- heavy metals in soil are present within the footprint of the orchard below the applied human health guidelines and generally below background concentrations

[4] The aerial image in Appendix A shows the footprint of the blueberry orchard and a shed at sample location ES08. Both have been removed from site

Based on our desktop study, site investigation, and interpretation of laboratory results, we recommended that:

- the DSI report was submitted to Waipā District Council (WDC) to support an application for restricted discretionary consent under the NESCS for the proposed subdivision
- as a condition of consent, Council required that a SQEP:
  - develops a SMP to guide the safe management of soil during earthworks required for the subdivision
  - develops and submits a RAP to WDC for approval. The RAP will guide soil remediation works and set remedial goals/targets for the identified 'piece of land' (the rubbish pit)
  - develops and submits a site validation report (SVR) to WDC for approval. The SVR will document compliance with the SMP and assess whether the remedial goals/targets outlined in the RAP have been met including a statement regarding the suitability of the site for rural residential land use
- any soil proposed for off-site disposal had a copy of the relevant laboratory reports (Appendix F) provided to the chosen disposal facility to confirm that they can accept the soil

Remedial action plan

Because of the presence of lead and arsenic above the applied human health guidelines in the soil within the rubbish pit on site, soil remediation is required to make the site suitable for the proposed rural residential land use.

Remedial strategy and method

We have included a figure showing the proposed remedial extents in Appendix A.

To ensure the site is suitable for rural residential land use, the remedial strategy is to retain all soil above the applied human health guidelines in an on-site waste cell. This waste cell will be in the footprint of the existing rubbish pit.

The chosen remedial method is to:

- excavate the entire rubbish pit, with the estimated excavation depth up to 5.5 m below current ground level
- sift out any large plant/building debris (tree stumps, concrete, rebar, etc) and dispose them off-site at a suitably licensed facility
- backfill the excavation with the contaminated soil and cap it with at least 0.5 m imported cohesive fill underlain by a geotextile marker layer. The cohesive fill must:
  - be tested by a suitably qualified and experienced practitioner (SQEP), with laboratory results confirming it is suitable for rural residential land use
  - be compacted in layers to ensure adequate compaction is achieved and to minimise settlement
- complete the remedial works while implementing our SMP to minimise risk to workers, neighbours, and future residents
- develop an ongoing site management plan (OSMP). The OSMP will communicate potential risk to future land users and set out risk management controls should the land be disturbed in the future

The remedial works will be considered complete when the uppermost 500 mm of surficial soil within the remedial area meets the applied human health guidelines for rural residential land use.

Remedial action oversight and validation

The remedial action must be overseen by a SQEP with experience in contaminated land management.

As the client proposes to retain all contaminated soil on-site within a waste cell, only the imported clay fill requires sampling to validate that the remedial goals have been achieved. A suitably qualified and experienced practitioner (SQEP) must oversee the soil excavation and to identify any unexpected signs of contamination.

Should unexpected potential soil contamination be discovered, a SQEP will attend site to determine if sampling and analysis is required, or if works can continue. If sampling is required, the SQEP will develop an appropriate sampling plan for the nature and extent of the contamination, including the number of samples and the soil contaminants for analysis at the laboratory.

The outcomes will be presented in a SVR prepared in general accordance with the Contaminated Land Management Guidelines No. 1. The SVR will summarise the remedial works, any deviations from the RAP, and provide any necessary recommendations. The SVR will be provided to WDC within 2 months of the soil disturbance work being completed.

Site management plan

This SMP details requirements for the safe management of the disturbance of contaminated soil on site. All contaminated soil excavated during earthworks is proposed for on-site retention in a waste cell. While not expected, we have included protocols for off-site disposal.

Roles and responsibilities

Roles and responsibilities associated with the implementation of this SMP are outlined in Table 4.

Table 4: Roles and responsibilities

Role	Responsibility
Consent holder	Ensuring the SMP is made available, is implemented, and is followed by other parties involved in the works
Site/project manager	The site/project manager is responsible for communicating the SMP to the lead contractor and other site personnel, implementation and monitoring of SMP compliance on site, and notifying the SQEP and territorial authority of any contamination discoveries that may arise during site works. The site/project manager engages the SQEP and is the project contact point.
Suitably qualified and experienced practitioner specialising in contaminated land	Provides advice to the site/project manager on contaminated land issues encountered. Responsible for soil sampling, disposal recommendations, and validation reporting. The SQEP will be available to provide ongoing environmental advice and support the site/project manager, and contractor as needed.
Lead contractor	The lead contractor is responsible for ensuring that all employees and subcontractors are fully aware of the SMP, and that it is implemented. The contractor is responsible for monitoring the SMP requirements during earthworks, and reporting complications/contaminated materials to the site/project manager.

Contacts

We have compiled the main regulatory authorities to be consulted in respect of the site management controls proposed, any unexpected discoveries related to potential contamination, and emergencies in Table 5.

Table 5: Contacts during construction

Organisation	Contact	Telephone
Waipā District Council	Call centre	0800 924 723
Waikato Regional Council	Pollution Hotline	0800 800 402
SQEP	Paul Gibbins – HD Geo	022 155 8308
New Zealand Police, Fire and Ambulance		111
National Poisons and Hazardous Chemicals Information Hotline		0800 764 766
Worksafe New Zealand		0800 030 040
Contractor		TBD

Site management and establishment

We have outlined site management procedures to ensure proper and safe handling of the soil that is to be disturbed during the proposed works. The procedures have been developed to provide a framework for managing potential contamination-related effects at the site. These protocols are not intended to relieve the contractor of their responsibility for the health and safety of their workers, contractors, and the public, or of their responsibility to protect the environment.

Erosion and sediment control measures

Erosion and sediment controls will be undertaken in accordance with industry best practice, including the commonly used Waikato Stormwater Management Guideline.

General erosion and sediment control measures require site workers to:

- avoid working in rain likely to cause significant sedimentation or erosion
- install silt fences and runoff diversion bunds to capture sediment in surface water runoff
- regularly check erosion and sediment controls to ensure they are in good working condition
- remove and properly dispose of any sediment that breaches stormwater control systems
- inspect and repair stormwater controls and erosion and sediment controls, after rain events
- cover stockpiles containing potentially contaminated material needs to be covered, except when material is being added or removed
- place stockpiles in areas where runoff can be controlled

The lead contractor will put controls in place before excavation works begin. This ensures that the generation of potentially contaminated sediment and stormwater during development is minimised and managed within the works area. The lead contractor will ensure excavations are stabilised as soon as possible once completed.

Excavation, transportation, and disposal

The remedial strategy does not require off-site disposal of contaminated material. Should off-site disposal of contaminated material be required, the following protocol must be followed.

When excavating and loading trucks for transportation, the contractor will:

- where possible, load excavated material for off-site disposal directly onto trucks. If immediate disposal is not possible, the contractor will temporarily stockpile contaminated material in accordance with the stockpiling procedures described in this plan
- load trucks in areas where runoff and possible spills can be controlled
- ensure the site is well-maintained to avoid the spread of potentially contaminated material outside the construction site boundary

When transporting soil off site, the contractor will:

- have a tracking document for each load signed onsite and collected at the receiving facility
- cover their loads with properly fitted tarpaulins during transport to avoid creating dust
- take care not to overload trucks and to avoid spills, particularly onto roadways. If covering is not practicable, material must be wet down to minimise the creation of dust

When disposing of soil off site, the contractor will:

- obtain approval from the disposal facility prior to transport
- have a copy of the relevant laboratory reports (Appendix D) provided to the chosen disposal facility to confirm that they can accept the soil
- keep a record and evidence of every load of material taken off site, including volume estimates and/or weighbridge receipts
- provide disposal records to the project manager for recording purposes

The acceptance criteria for disposal facilities are generally defined by the consent conditions for the individual disposal sites.

Groundwater

If groundwater is encountered, it will not be discharged to stormwater or sanitary sewer unless prior consent has been obtained. It will be maintained on site by the contractor (in tanks if required) and disposed off-site at an appropriate facility unless consent is obtained to discharge to stormwater or sewer systems.

Stockpiling

Excavated material will be stockpiled within the site extent. The contractor will ensure that stockpiles are:

- bunded around the perimeter to minimise and control stormwater run-on and run-off
- surrounded by an additional silt fence (as needed)

Additionally, if contaminated soils on site require stockpiling, they will be:

- placed on hardstand or plastic sheeting
- kept covered with plastic sheeting or a geotextile layer when not in use

If neither of the above are possible, the soils beneath and immediately surrounding the stockpile will be excavated and the remaining soil sampled to validate that it is suitable for rural residential land use.

Dust control

Dust generated from the excavated material has the potential to discharge contaminants off-site. Dust management during the excavation works needs to generally comply with the Good Practice

Guide for Assessing and Managing the Environmental Effects of Dust Emissions, published by the Ministry for the Environment (2016).

To control the generation of dust on and off-site, the contractor will:

- ensure dust suppressing equipment is available if required
- use a water truck or portable water sprays to dampen exposed high traffic areas during dry and windy conditions. When using water to control dust, the contractor will ensure that:
    - the volume of water used does not cause surface run-off that could discharge to stormwater systems or other waterways
    - the application of water does not induce soil erosion and/or soil pugging
- cover stockpiled material
- limit vehicle access onto the works area
- load trucks in a manner that soil is deposited from the lowest practicable height
- avoid working in windy conditions

Unexpected discovery of contamination

There is a potential for contamination to be discovered during the proposed works. It is up to the contractor to note where visual and/or olfactory indicators of contamination exist and liaise with a SQEP with contaminated land expertise to ensure the controls in place remain appropriate to the type and level of contamination encountered. Typical visual and olfactory indicators of contamination could include the following:

- odour (petroleum hydrocarbons, oil, creosote, solvents)
- discoloured soil (black, green, and blue staining are the most common)
- clinker (black gravel-like material)
- refuse (brick, wire, plastic, crockery)
- ACM, as fragments or free fibres

If unexpected contamination is suspected, work will stop immediately, and the contractor contact the appointed SQEP to assess the nature of the material. The contingency plan provided in Table 6 below will be followed.

Table 6: Contingency plans for unexpected discovery of contamination

Discovery	Potential impacts	Contingency plan
Uncovering or disturbing unexpected contamination, such as: • discoloured soils • staining • odours • general refuse • fibrous materials or fragments	Discharges to environment and risk to health and safety of workers and public	Stop work in area of discovery. Area must be cordoned off until material has been identified and evaluated.
		The contractor Project Manager to be notified of discovery of potential contaminated material
		Contractor to notify SQEP to assess the material. The SQEP will notify council of any event they consider to be outside the scope of this SMP, including any unexpected discoveries or potential contamination not covered by the existing investigations
		Work may recommence only once advised by SQEP

General safety requirements and training

All relevant staff should undergo a contaminated soil safety induction including the requirements of this SMP before commencing work. The purpose of the safety induction is to make sure workers are aware of the hazards associated, and safety equipment requirements.

Hazard identification and management

The following contaminated land related hazards could be encountered during the proposed construction works:

- dermal (skin) contact with contaminated soil
- inhalation of contaminated dust
- ingestion of contaminated soil or groundwater

Other hazards may be identified during the works. The hazards identified above will be managed by wearing appropriate personal protective equipment (PPE) and by the site management procedures set out in this SMP.

Hazard minimisation procedures

The following procedures to minimise hazards related to contaminated soil shall be implemented by the contractor:

- establishing dust controls, according to the procedures set out above
- maintaining good personal hygiene, including:
    - no eating, drinking, or smoking in the works area whilst soils are being excavated
    - avoiding hand to mouth and hand to face contact during work
    - hands and face shall be washed before eating, drinking, or smoking which is only permitted where site personnel are offsite or in designated areas
- wash work clothing separately from family laundry

Personal protection equipment

As a minimum, standard PPE (hard hat, safety boots, high-viz) is required, along with work gloves. When working with contaminated soil, gloves must be worn.

If workers are required to directly handle contaminated soil, they should also wear disposable Tyvek (or equivalent) suits. Dust masks (respiratory protection) are required for personnel working directly with contaminated soil. Additional PPE may be required at the direction of the SQEP.

Workers must wash their hands and face after working with contaminated soil and before eating, drinking, or smoking. Workers must be advised not to launder worker clothing with family laundry – it must be washed in a separate load. Work footwear should be removed before entering their home so contaminants are not tracked through their home.

Limitations

This document does not include a full assessment or consideration of potential health and safety issues under the Health and Safety at Work Act 2015 (e.g., working at heights, equipment operation, electrical hazards, etc). HD Geo has relied upon information provided by the Client and other third parties to prepare this document, some of which has not been fully verified by HD Geo. This document may be transmitted, reproduced, or disseminated only in its entirety. This report has been prepared for our client, their professional advisers, and the relevant territorial and regional authorities for the purposes detailed above and may not be relied on by any other party for any other purposes.

From a technical perspective, the subsurface environment at the site may present substantial uncertainty. It is a heterogeneous, complex environment, in which small subsurface features or changes in geologic conditions can have substantial impacts on water, vapour, or chemical movement. HD Geo's professional opinions are based on its professional judgement, experience, and training. It is possible that testing and analysis might produce different results and/or different opinions. Should additional information become available, this report should be updated accordingly.

Certification

This report presents information from an environmental site investigation conducted by and under the oversight of a SQEP with contaminated land expertise, as required by the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health and who is a Certified Environmental Practitioner. Detailed qualifications are available upon request.

Matt Moore

Certified Environmental Practitioner, CEnvP #1703

PREPARED BY: **Matt Moore, CEnvP**

Environmental Consultant
Matt@hdgeo.co.nz
Tel 027 701 9529

REVIEWED BY: **Paul Gibbins, CEnvP**

Senior Environmental Consultant
Paul@hdgeo.co.nz
Tel 022 155 8308

APPENDIX A – SITE PLANS

COGSWELL
SURVEYING | ENGINEERING | PLANNING
5 MILICICH PLACE, P.O BOX 156, CAMBRIDGE
P: (07)8275071 E: office@cogswell.co.nz

Concept Plan for Development at 318 Lamb St, Cambridge

PREPARED FOR: Te Mara Properties Ltd

SCALE: 1:1500
ORIGINAL PLAN SIZE: A3
SHEET: 1 of 1
DRAWN: AW
DESIGNED: AW
CHECKED:
DATE: DEC 2022
NOTE: BOUNDARIES AND DIMENSIONS AND AREAS ARE APPROXIMATE AND SUBJECT TO ALTERATION BY APPROVAL OR SURVEY. LEVELS ARE IN TERMS OF N/A. ORIGIN OF LEVELS - N/A.
REV: 13

TITLE

318 Lamb Street, Cambridge
Sample locations

CLIENT

Waipa Civil Limited

0 20 40 60 80 100 m

Scale: 1:2750

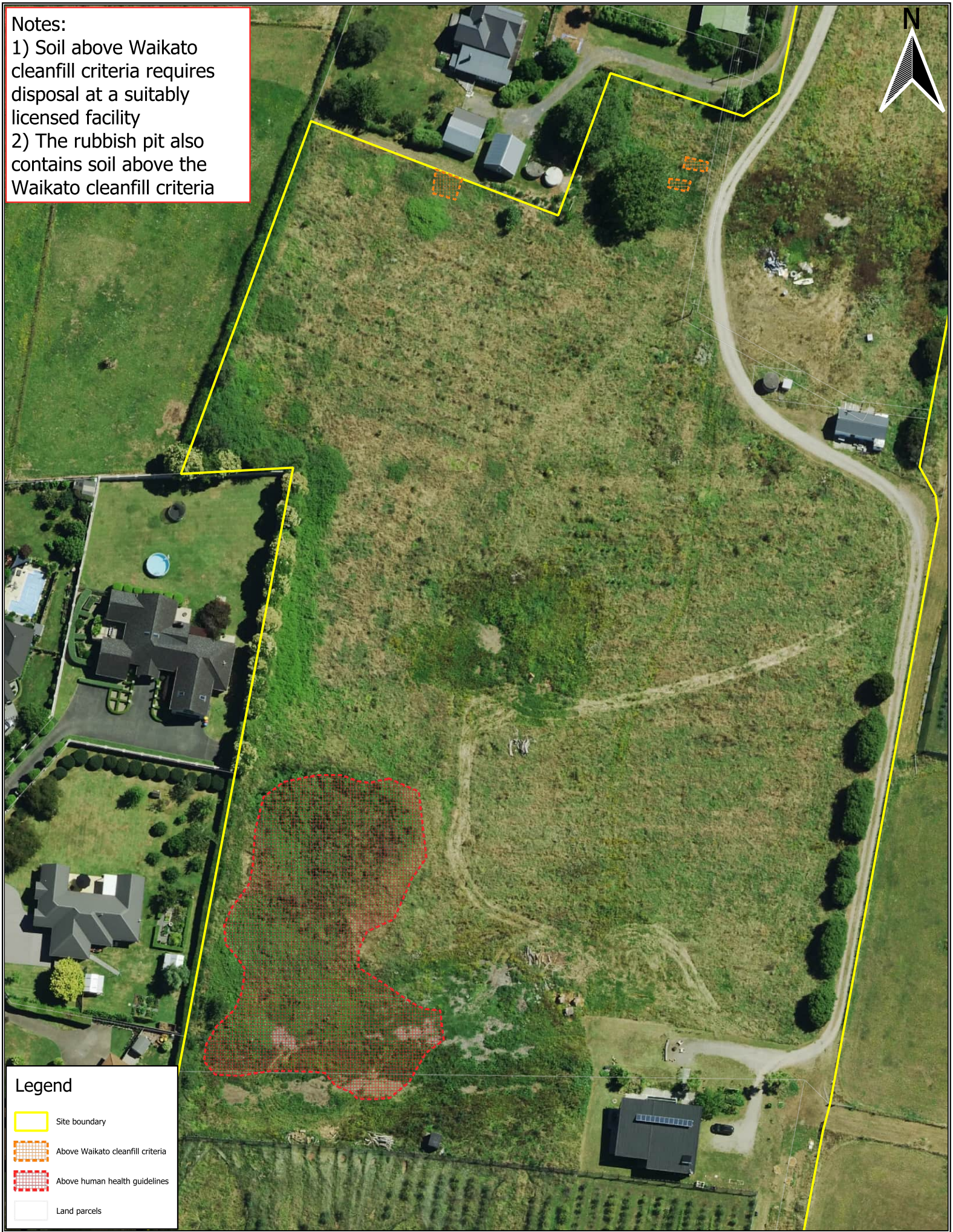
GENERAL NOTES AND DISCLAIMER

1. Coordinates are in NZTM
2. Imagery and cadastral information sourced from LINZ. Crown copyright reserved
3. Areas and dimensions are approximate only, any use or reliance on this plan is at the users risk

DRAWN	M.MOORE	06/07/23
CHECKED	P.GIBBINS	06/07/23
LOCATION	Cambridge	
JOB NUMBER	HD2964	

REV	BY	CHKD	DATE

DRAWING No	SHEET	REVISION
HD2964-101	1	1



TITLE

318 Lamb Street, Cambridge
Soil remedial extent

CLIENT

Waipa Civil Limited

0 10 20 30 40 50 m

Scale: 1:1250

GENERAL NOTES AND DISCLAIMER

1. Coordinates are in NZTM
2. Imagery and cadastral information sourced from LINZ. Crown copyright reserved
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DRAWN	M.MOORE	07/08/23
CHECKED	P.GIBBINS	07/08/23
LOCATION	Cambridge	
JOB NUMBER	HD2964	

REV	BY	CHKD	DATE

DRAWING No	SHEET	REVISION
HD2964-102	1	1

APPENDIX B – SITE PHOTOS

HD2964 – 318 Lamb Street photo log – Taken 05.07.23

Photo 1: Former blueberry orchard, facing north

Photo 2: Former blueberry orchard, facing south

Photo 3: Remaining blueberry orchard in central-south portion of site, facing south

HD2964 – 318 Lamb Street photo log – Taken 05.07.23

Photo 4: Inorganic rubbish (metal) on north portion of site, facing north-west

Photo 5: Existing building & location of fertiliser storage, facing north

Photo 6: Typical soil conditions across site (topsoil underlain by silt and sand)

HD2964 – 318 Lamb Street photo log – Taken 05.07.23

Photo 7: Rubbish pit footprint, facing west

Photo 8: Rubbish pit contents (wood, bricks, ceramics, glass, fabric, metal fragments)

Photo 9: Soil conditions within rubbish pit (organic silt with intermixed sand, gravel, and debris)

APPENDIX C – RESULTS SUMMARY TABLE

HD2964 - 318 Lamb Street, Cambridge
Laboratory results summary table (rubbish pit)

	Sample Name:	Rural residential assessment criteria*	Waikato regional cleanfill criteria[1]	Waikato background concentrations[2]	ES01-0-0.5 04-07-23	ES01-0.5-1.0 04-07-23	ES01-1.0-2.0 04-07-23	ES01-2.0-2.9 04-07-23	ES02-0-0.5 04-07-23	ES02-0.5-1.0 04-07-23	ES21-0-0.6 04-07-23	ES22-DF 04-07-23
	Lab Number:				3315485.1	3315485.2	3315485.3	3315485.4	3315485.5	3315485.6	3315485.7	3315485.8
Dry Matter	g/100g as rcvd				68	71	66	65	73	78	72	68
Heavy Metals, Screen Level												
Total Recoverable Arsenic	mg/kg dry wt	17	17	6.8	10	16	11	15	4	25	10	6
Total Recoverable Cadmium	mg/kg dry wt	0.8	0.8	0.22	0.38	0.4	0.42	0.4	0.21	0.4	0.21	0.3
Total Recoverable Chromium	mg/kg dry wt	290	56	30	11	13	11	12	8	29	8	7
Total Recoverable Copper	mg/kg dry wt	>10,000	120	25	24	27	25	28	12	35	14	20
Total Recoverable Lead	mg/kg dry wt	160	78	20	99	230	270	119	11.2	75	29	21
Total Recoverable Nickel	mg/kg dry wt	400	33	7.6	5	5	5	5	4	4	3	4
Total Recoverable Zinc	mg/kg dry wt	8,000	175	53	135	210	183	133	48	200	57	103
Polycyclic Aromatic Hydrocarbons Screening in Soil												
Total of Reported PAHs in Soil	mg/kg dry wt				0.4	1.6	0.4	< 0.4	< 0.4	< 0.3	0.5	< 0.4
1-Methylnaphthalene	mg/kg dry wt				< 0.015	< 0.014	< 0.015	< 0.015	< 0.014	< 0.013	< 0.014	< 0.015
2-Methylnaphthalene	mg/kg dry wt				< 0.015	< 0.014	< 0.015	< 0.015	< 0.014	< 0.013	< 0.014	< 0.015
Acenaphthylene	mg/kg dry wt				< 0.015	0.024	< 0.015	< 0.015	< 0.014	< 0.013	< 0.014	< 0.015
Acenaphthene	mg/kg dry wt				< 0.015	< 0.014	< 0.015	< 0.015	< 0.014	< 0.013	< 0.014	< 0.015
Anthracene	mg/kg dry wt				< 0.015	0.027	< 0.015	< 0.015	< 0.014	< 0.013	< 0.014	< 0.015
Benzo[a]anthracene	mg/kg dry wt				0.026	0.128	0.028	< 0.015	< 0.014	< 0.013	0.032	< 0.015
Benzo[a]pyrene (BAP)	mg/kg dry wt				0.04	0.151	0.042	< 0.015	< 0.014	< 0.013	0.05	< 0.015
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	6	2		0.054	0.22	0.062	< 0.036	< 0.033	< 0.030	0.073	< 0.035
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt				0.053	0.22	0.062	< 0.036	< 0.033	< 0.030	0.072	< 0.035
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt				0.052	0.157	0.048	< 0.015	< 0.014	< 0.013	0.056	< 0.015
Benzo[e]pyrene	mg/kg dry wt				0.026	0.088	0.027	< 0.015	< 0.014	< 0.013	0.031	< 0.015
Benzo[g,h,i]perylene	mg/kg dry wt				0.029	0.089	0.029	< 0.015	< 0.014	< 0.013	0.036	< 0.015
Benzo[k]fluoranthene	mg/kg dry wt				0.021	0.063	0.019	< 0.015	< 0.014	< 0.013	0.02	< 0.015
Chrysene	mg/kg dry wt				0.031	0.125	0.031	< 0.015	< 0.014	< 0.013	0.038	< 0.015
Dibenzo[a,h]anthracene	mg/kg dry wt				< 0.015	0.022	< 0.015	< 0.015	< 0.014	< 0.013	< 0.014	< 0.015
Fluoranthene	mg/kg dry wt				0.056	0.23	0.053	0.016	< 0.014	< 0.013	0.074	< 0.015
Fluorene	mg/kg dry wt				< 0.015	< 0.014	< 0.015	< 0.015	< 0.014	< 0.013	< 0.014	< 0.015
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt				0.029	0.09	0.029	< 0.015	< 0.014	< 0.013	0.038	< 0.015
Naphthalene	mg/kg dry wt	63			< 0.08	< 0.07	< 0.08	< 0.08	< 0.07	< 0.07	< 0.07	< 0.08
Perylene	mg/kg dry wt				< 0.015	0.032	< 0.015	< 0.015	< 0.014	< 0.013	< 0.014	< 0.015
Phenanthrene	mg/kg dry wt				0.019	0.1	0.02	< 0.015	< 0.014	< 0.013	0.026	< 0.015
Pyrene	mg/kg dry wt	1,600			0.055	0.25	0.055	0.017	< 0.014	< 0.013	0.085	< 0.015
Asbestos					Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

* Nickel and zinc from the NEMP. All other heavy metals and benzo(a)pyrene from the NESCS. Asbestos from the NZ GAMAS. All other assessment criteria from the Petroleum Hydrocarbon Tier 1 guidelines, using sandy silt soil <1 m depth. Rural residential assumes 25% of consumed produce will be grown on site.

[1] Waikato Regional Council. Standard operating policies for defining cleanfill acceptance criteria. Revised 15/09/2018

[2] Waikato Regional Council, *Upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data* .

HD2964 - 318 Lamb Street, Cambridge
Laboratory results summary table (stockyard, buildings, and orchard)

	Sample Name:	Rural residential assessment criteria*	Waikato regional cleanfill criteria[1]	Waikato background concentrations[2]	ES03-50 04-07-23	ES04 04-07-23	ES05 04-07-23	ES06 04-07-23	ES07 04-07-23	ES08 04-07-23	ES09 04-07-23	ES10 04-07-23	ES11-50 04-07-23	ES12-50 04-07-23	ES13-50 04-07-23	ES14-50 04-07-23	ES15-50 04-07-23	ES16-50 04-07-23	ES17-50 04-07-23	ES18-50 04-07-23	ES19-50 04-07-23	ES20-50 04-07-23	ES12r-50 04-07-23	ES20r-50 04-07-23
	Lab Number:				3315486	3315485	3315485	3315485	3315485	3315485	3315486	3315485	3315485	3315485	3315485	3315485	3315485	3315485	3315485	3315485	3315485	3315485	3315485	3315485
Dry Matter	g/100g as rcvd				69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heavy Metals, Screen Level																								
Total Recoverable Arsenic	mg/kg dry wt	17	17	6.8	3	-	-	-	-	-	-	-	5	5	5	4	5	4	5	4	5	4	5	4
Total Recoverable Cadmium	mg/kg dry wt	0.8	0.8	0.22	-	-	-	-	-	-	-	-	0.54	0.65	0.57	0.47	0.61	0.53	0.62	0.57	0.59	0.61	0.67	0.63
Total Recoverable Chromium	mg/kg dry wt	290	56	30	-	-	-	-	-	-	-	-	9	11	10	8	8	6	9	8	8	8	9	8
Total Recoverable Copper	mg/kg dry wt	>10,000	120	25	-	-	-	-	-	-	-	-	21	26	32	18	23	21	19	14	15	18	23	18
Total Recoverable Lead	mg/kg dry wt	160	78	20	-	79	88	64	26	20	-	103	12.9	13.1	35	12.6	11.2	9.3	9.5	8.2	9.3	9.6	12.2	9.5
Total Recoverable Nickel	mg/kg dry wt	400	33	7.6	-	-	-	-	-	-	-	-	4	5	7	5	6	5	5	4	4	5	5	4
Total Recoverable Zinc	mg/kg dry wt	8,000	175	53	-	-	-	-	-	-	-	-	79	94	114	71	98	80	59	51	50	55	82	57
Organochlorine Pesticides Screening in Soil																								
Aldrin	mg/kg dry wt	1.1			< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
alpha-BHC	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
beta-BHC	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
delta-BHC	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-Chlordane	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-Chlordane	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDD	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDD	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDE	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDE	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDT	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDT	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total DDT Isomers	mg/kg dry wt	45	0.7		< 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dieldrin	mg/kg dry wt	1.1	0.2		< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan I	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan II	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan sulphate	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin aldehyde	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin ketone	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor epoxide	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methoxychlor	mg/kg dry wt				< 0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Asbestos (presence/absence)					-	Absent	Absent	Absent	Absent	Absent	Absent	Absent	-	-	-	-	-	-	-	-	-	-	-	-

* Nickel and zinc from the NEMP. Asbestos from the NZ GAMAS. All other assessment criteria from the NESCS.Rural residential assumes 25% of consumed produce will be grown on site.

[1] Waikato Regional Council. Standard operating policies for defining cleanfill acceptance criteria. Revised 15/09/2018

[2] Waikato Regional Council, *Upper limit background concentrations for selected elements in soil of the Waikato region, acid recoverable data* .

Relative percent differences

Sample Name:	ES12	ES12r	**RPD****	ES20	ES20r	**RPD****
Arsenic	5	5	0%	4	4	0%
Cadmium	0.65	0.67	3%	0.61	0.63	3%
Chromium	11	9	20%	8	8	0%
Copper	26	23	12%	18	18	0%
Lead	13.1	12.2	7%	9.6	9.5	1%
Nickel	5	5	0%	5	4	22%
Zinc	94	82	14%	55	57	4%

**Relative Percent Difference. Calculated as (|x2 - x1|/((x2 + x1)/2)

APPENDIX D – LABORATORY REPORTS

Hill Laboratories
TRIED, TESTED AND TRUSTED

ANALYSIS REQUEST

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Job No: **331 5485**
Date Recv: 04-Jul-23 15:51
Received by: Arneka Phillips

3133154850

Quote No 91878
Primary Contact Matt Moore
Submitted By Matt Moore
Client Name HD Geo Limited 245781
Address PO Box 9266, Waikato Mail Centre
Hamilton 3240
Phone 07 957 2727 *Mobile* 027 701 9529
Email matt@hdgeo.co.nz
Charge To HD Geo Limited 245781
Client Reference HD 2964
Order No

Results To *Reports will be emailed to Primary Contact by default. Additional Reports will be sent as specified below.*
☑ Email Primary Contact ☐ Email Submitter ☐ Email Client
☑ Email Other paul@hdgeo.co.nz
☐ Other
Dates of testing are not routinely included in the Certificates of Analysis. Please inform the laboratory if you would like this information reported.

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
☑ Tick if you require COC to be emailed back
Date & Time: 4-7-23 15:15
Name: Matt Moore
Signature:

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition ☐ Room Temp ☐ Chilled ☐ Frozen
Temp: 17.6

☐ Sample & Analysis details checked
Signature:

ADDITIONAL INFORMATION / KNOWN HAZARDS

Priority ☐ Low ☐ Normal ☑ High
☐ **Urgent** (ASAP, extra charge applies, please contact lab first)
NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 10 working days following the day of receipt of the samples at the laboratory.

Requested Reporting Date:

Quoted Sample Types
Soil (Soil), Dried Paint (Paint), Building Material (BM), Ground Water (GW)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	ES01-0-0.5, ES01-0.5-1.9, ES01-1.0-2.0, ES01-2.0-2.9	4-7-23	Soil	Heavy metals, PAH, semi Q asbestos
2	ES02-0-0.5, ES02-0.5-1.0, ES21-0-0.6, ES22-DF	"	"	"
3	ES03-50	"	"	Arsenic + OCPs
4	ES04 to ES08, ES10	"	"	Lead + p/a asbestos
5	ES09	"	"	p/a asbestos
6	ES11-50 to ES20-50	"	"	Heavy metals
7	ES21-50, ES20-50	"	"	Heavy metals
8	~~Multiple~~ samples	"	"	-
9	ES11-300 to ES20-300, ES03-300	"	"	Hold cold
10				

R J Hill Laboratories Limited
101C Waterloo Road
Hornby
Christchurch 8042 New Zealand

0508 HILL LAB (44 555 22)
+64 7 858 2000
mail@hill-labs.co.nz
www.hill-labs.co.nz

Certificate of Analysis

Client:	HD Geo Limited	**Lab No:**	3315486	A2Pv1
Contact:	Matt Moore	**Date Received:**	04-Jul-2023	
	C/- HD Geo Limited	**Date Reported:**	07-Jul-2023	
	PO Box 9266	**Quote No:**	91878	
	Waikato Mail Centre	**Order No:**		
	Hamilton 3240	**Client Reference:**	HD 2964	
		Submitted By:	Matt Moore	

Sample Type: Soil

Sample Name	Lab Number	As Received Weight Presence / Absence Testing (g)	Dry Weight Presence / Absence Testing (g)	<2mm Subsample Weight Presence / Absence Testing (g dry wt)	Asbestos Presence / Absence from Presence / Absence Testing	Description of Asbestos Form Presence / Absence Testing
ES04	3315486.9	115.8	74.5	53.6	Asbestos NOT detected.	-
ES05	3315486.10	164.2	105.6	56.1	Asbestos NOT detected.	-
ES06	3315486.11	136.7	79.2	63.7	Asbestos NOT detected.	-
ES07	3315486.12	102.5	63.6	50.3	Asbestos NOT detected.	-
ES08	3315486.13	150.5	120.6	55.1	Asbestos NOT detected.	-
ES09	3315486.14	129.6	101.8	54.3	Asbestos NOT detected.	-
ES10	3315486.15	112.3	64.8	45.8	Asbestos NOT detected.	-

Sample Type: Soil

		Sample Name:	ES01-0-0.5 04-Jul-2023	ES01-0.5-1.0 04-Jul-2023	ES01-1.0-2.0 04-Jul-2023	ES01-2.0-2.9 04-Jul-2023	ES02-0-0.5 04-Jul-2023
		Lab Number:	3315486.1	3315486.2	3315486.3	3315486.4	3315486.5
Asbestos Presence / Absence			Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form			-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g		600.0	454.1	690.7	735.9	596.8
Dry Weight	g		425.4	327.6	478.5	491.2	434.1
Moisture*	%		29	28	31	33	27
Sample Fraction >10mm	g dry wt		3.9	8.7	11.3	3.7	8.8
Sample Fraction <10mm to >2mm	g dry wt		78.0	90.2	87.9	94.7	98.6
Sample Fraction <2mm	g dry wt		333.9	228.6	377.0	392.6	326.3
<2mm Subsample Weight	g dry wt		59.2	50.5	55.6	51.3	51.0
Weight of Asbestos in ACM (Non-Friable)	g dry wt		< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt		< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt		< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.
The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Soil				
Sample Name:		ES02-0.5-1.0 04-Jul-2023	ES21-0-0.6 04-Jul-2023	ES22-DF 04-Jul-2023
Lab Number:		3315486.6	3315486.7	3315486.8
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001
As Received Weight	g	653.2	509.5	701.4
Dry Weight	g	492.3	343.6	491.2
Moisture*	%	25	33	30
Sample Fraction >10mm	g dry wt	8.0	5.1	26.1
Sample Fraction <10mm to >2mm	g dry wt	118.5	61.8	98.9
Sample Fraction <2mm	g dry wt	365.5	276.5	365.6
<2mm Subsample Weight	g dry wt	59.8	55.4	54.2
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001

Glossary of Terms

• Loose fibres (Minor) - One or two fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• Loose fibres (Major) - Three or more fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• ACM Debris (Minor) - One or two small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• ACM Debris (Major) - Large (>2mm) piece, or more than three small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• Unknown Mineral Fibres - Mineral fibres of unknown type detected by polarised light microscopy including dispersion staining. The fibres detected may or may not be asbestos fibres. To confirm the identities, another independent analytical technique may be required.
• Trace - Trace levels of asbestos, as defined by AS4964-2004.
For further details, please contact the Asbestos Team.

Please refer to the BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil.
https://www.branz.co.nz/asbestos

The following assumptions have been made:

1. Asbestos Fines in the <2mm fraction, after homogenisation, is evenly distributed throughout the fraction
2. The weight of asbestos in the sample is unaffected by the ashing process.

Results are representative of the sample provided to Hill Laboratories only.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Asbestos in Soil			
As Received Weight Presence / Absence Testing	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	9-15
Dry Weight Presence / Absence Testing	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	9-15
<2mm Subsample Weight Presence / Absence Testing	Sample dried at 100 to 105°C, weight of <2mm sample fraction taken for asbestos identification if less than entire fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	-	9-15
Asbestos Presence / Absence from Presence / Absence Testing	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	9-15

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Description of Asbestos Form Presence / Absence Testing	Description of asbestos form and/or shape if present.	-	9-15
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-8
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-8
Moisture*	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-8
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-8
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-8
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	1-8
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1-8
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-8
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-8
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-8
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-8
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-8
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-8
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-8
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-8

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed on 07-Jul-2023. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

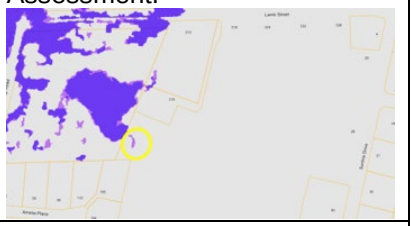
Rhodri Williams BSc (Hons)
Technical Manager - Asbestos

APPENDIX J

WDP RULE ASSESSMENT

Rule		Comment
Section 3 - Large Lot Residential Zone		
3.4.1 Activity Status Tables	(a) Residential activities.	**Permitted activity**
Rule - Minimum building setback from road boundaries	3.4.2.1 The minimum building setback from road boundaries shall be: (a) From the Waikato Expressway (Designation D20) 35m (b) From a strategic road 15m (c) For all other roads 10m	**Complies;** The sole dwelling on Lot 17 will maintain a complying distance from the road boundary.
Rule - Minimum building setback from internal site boundaries	3.4.2.2 The minimum building setback from internal site boundaries shall be: (a) For sites 1,500m^2 or less: 3m (b) For sites 1,501m^2 or greater: 5m Provided that for dwellings and detached habitable rooms where a site boundary adjoins a Rural Zone, the minimum setback from that boundary shall be 10m. (c) Dwellings in the Lake Karāpiro Large Lot Residential Structure Plan Areas subject to Rule 3.4.2.16 are exempt from this rule.	**Complies;** The structure on Lot 17 will have a minimum setback of 5 meters from its internal boundaries. As for all the other lots, they remain free of any development.
Rule - Height	3.4.2.3 Buildings shall not exceed 8m in height.	**Complies;** The height of the existing dwelling on Lot 17 is less than 8 meters.
Rule - Daylight control	3.4.2.4 No building shall penetrate a recession plane at right angles to a boundary inclined inwards and upwards at an angle of 45o from 2.7m above the ground level of the front, side or rear boundaries of a site.	**Will comply;** At this stage, there is no specific house plan available. However, the design and orientation of the houses will be structured in an effort to adhere to the daylight control provisions.
Rules - Neighbourhood amenity and safety	3.4.2.5 Fences between buildings on the site and any road, public walkway or reserve shall be no higher than 1.2m in height if not visually permeable, or no more than 1.8m in height if visually permeable.	**Will comply;** There will be fence on both side of the pedestrian access.
	3.4.2.6 Landscape planting between dwellings on the site and any public place shall allow visibility between the dwelling and the public place.	**Will comply;** There will be landscape planting between dwellings and the pedestrian reserve.
Rule - Site coverage	3.4.2.7 The maximum total building coverage on a site shall not exceed the following: (a) On sites less than or equal to 1000m^2 25% of the net site area (b) On sites between 1000m^2 and 1249m^2 a maximum of 250m^2 (c) On sites between 1250m^2 and 2499m^2 20% of the net site area (d) On sites between 2500m^2 and 3344m^2 a maximum of 500m^2 (e) On all other sites 15% of the net site area Provided that, in all instances the gross floor area of all accessory buildings on a site shall not exceed 100m^2.	**Complies;** With the exception of Lot 17, all the proposed lots are currently vacant. Lot 17 encompasses 5,000m^2, and the existing house occupies less than 15% of the net site area.
Rule - Impermeable surfaces	3.4.2.8 Impermeable surfaces must not exceed: (a) 33% of the net site area on sites less than or equal to 2500m^2; or (b) 1200m^2 of the net site area on sites greater than 2500m^2.	**Complies;** Apart from Lot 17, all the other proposed lots are presently unoccupied. The impervious surfaces on Lot 17 amount to less than 1,200m^2.
Rules - Earthworks	3.4.2.9 Earthworks shall not exceed a total volume of 25m^3 or a total area of 250m^2 in a single activity or in cumulative activities in any one calendar year, provided that this rule	**Does not comply;** **Discretionary Activity**

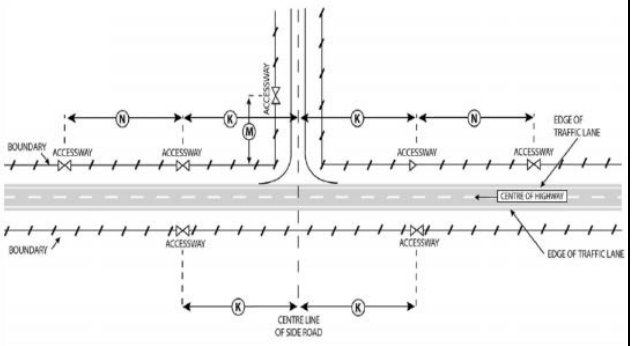
	shall not apply to earthworks incidental to an approved resource consent or building consent. …	The earthworks required will exceed 25m^3 and 250m^2.
Rule - Design and layout of development adjoining water bodies and reserves	3.4.2.21 Within the Large Lot Residential Zone, the design and layout of development shall ensure that water bodies and reserves are fronted by either the front or side façade of a dwelling.	**Not applicable;** The Site does not contain any water bodies.
Rule - Construction noise	3.4.2.24 Construction noise emanating from a site shall meet the limits recommended in and be measured and assessed in accordance with New Zealand Standard NZS 6803:1999 Acoustics – Construction Noise.	**Will comply;** It is expected that the construction noise will be managed to comply with these standards.
Section 15 - Infrastructure, Hazards, Development and Subdivision		
15.4.1 Activity Status Table	(a) Amendments to Flats Plan, Boundary Adjustments.	**Controlled**
	(e) Subdivision that meets all the performance rules in Part A OR; Part A and Part C for 7 or more lots.	**Restricted Discretionary**
15.4.2.1 Net lot area rules	(k) Large Lot Residential Zone of Lamb Street, Leamington (Planning Map 27)… Minimum Net Lot Area = 2,500m² Maximum Net Lot Area or Maximum Number of Lots = 5,000m²	**Does not comply;** **Non-Complying** Lots 7, 10, 12 and 13 are less than 2,500m^2.
Rule - Existing consent notices, bonds, and other legal instruments	15.4.2.2 All existing consent notices, bonds, and other legal instruments registered on a certificate of title in favour of the Waipa District Council which either restrict further subdivision or require ongoing performance of a matter relating to that certificate of title under the provisions of any previous planning regime must continue to be binding against that certificate of title. Activities that fail to comply with this rule will require a resource consent for a non-complying activity	**Complies;** No such interests are present on the Site that prevent further subdivision.
Rules - Lot frontage, lot shape factor and vehicle crossings	15.4.2.3 Large Lot Residential Lot frontage (excluding rear lots): 20m Lot shape factor: 30m diameter circle … Vehicle crossing min and max: 3m minimum, and no maximum	**Does not comply;** **Discretionary activity** Each site will have a minimum frontage of 20 meters. With the exception of Lot 7, each site will also meet the shape factor requirement. All sites will feature a crossing exceeding 3 meters in width.
Rule - Minimum width of vehicle access to rear lots	15.4.2.4 Large Lot Residential/Rural Up to 3 lots - 6m 4-6 lots - 9m 7 lots or more – a public or private road may be required	**Complies;** ROW A is 6m.
Rules - Lot design	15.4.2.5 Each new lot created shall be able to incorporate the lot shape factor in a position which does not encroach on any building setback or easement requirement. 15.4.2.6 Subdivision within the urban limits, and any Large Lot Residential Zone shall not create more than two rear lots, unless provided for by Rule 15.4.2.64. 15.4.2.7 New residential and large lot residential lots, other than corner lots, shall have frontage to only one road or street. 15.4.2.8 In any zone where lots are to be prevented from obtaining direct access to an adjacent road an access denial or segregation strip shall be vested in Council. The	**Does not comply;** **Discretionary activity** The shape factor circle will fit within all setbacks, but it's worth noting that Lot 7 has a smaller 28.43meter diameter circle. The proposal will create 3 rear lots. All buildings can be created outside of the root protection zone.

	performance standards for development and subdivision in the underlying zone do not apply to lots created for the purpose of access denial or segregation. 15.4.2.9 Any new Lot created must be able to accommodate all buildings outside of the Root Protection Zone of a protected tree whether the protected tree is on the new lot or on an adjacent site. 15.4.2.10 The Root Protection Zone of any protected tree must be contained entirely within any new allotment. Activities that fail to comply with Rules 15.4.2.3 to 15.4.2.10 will require a resource consent for a **discretionary activity**.	
Rule - Design and layout of development and subdivision adjoining water bodies and reserves	15.4.2.11 Within the urban limits and the Large Lot Residential Zone, the design and layout of subdivisions shall ensure that water bodies and reserves are fronted by either roads or the front or side boundary of a lot.	**N/A** No reserves or water bodies affected the Site.
Rule - Lots within areas of high value amenity landscapes, viewshafts, river and lake environs, significant natural features and landscapes and visually sensitive hill country	N/A	**N/A** The Site is not within these areas.
Rule - Site suitability: General	15.4.2.13 Subdivision and development shall have a defined building platform in a complying location that is capable of being serviced to the requirements of the zone. Activities that fail to comply with this rule will require a resource consent for a non-complying activity.	**Complies;** A compliant building platform has been shown on each site.
Rules - Site suitability: within or adjoining a Flood Hazard Area	15.4.2.14 Subdivision and Development within or adjoining a Flood Hazard Area identified on the Planning Maps, or as shown on the Houchens Road Large Lot Residential Structure Plan at Appendix S13, shall have building platforms in a complying location that can achieve a minimum free-board level 500mm above the 1% AEP (100 year flood level).	**Complies;** The Site is just outside the Waipa District Council flood modelling extents. A small depression extends inside the Site boundary adjacent to the green belt indicating ponding in the 1% AEP event. This concern has been thoroughly addressed in the attached Three-Water Assessment. 
Rule - High Risk Flood Zone	15.4.2.15 No subdivision and development shall occur within a High Risk Flood Zone.	**Complies;** The proposed subdivision will not occur within a High Risk Flood Zone.

Rule - Infrastructure servicing in all zones	15.4.2.16 All lots in a subdivision and any sites in a development shall be connected to the following infrastructure services: (a) Formed public road or new road; and (b) Electricity; and (c) Telecommunications; and (d) Fibre optic cable.	**Complies;** All lots will have these services.
Rule - Design, location and maintenance of services in infill development	15.4.2.17 Where more than one serviced building (excluding accessory buildings) is erected on a site, all services shall be provided to each building as if the site was being subdivided to create separate titles for each serviced building.	**N/A** No serviced buildings will be built.
Rules - Additional infrastructure servicing for the Residential, Commercial and Industrial Zones within the urban limits	N/A	**N/A** The site is not within urban limits.
Rules - Stormwater	15.4.2.25 All lots or sites shall be of sufficient size to enable on site detention and disposal of stormwater resulting from any future development permitted in the zone, provided that this rule does not apply to stormwater disposal in the (a) Houchens Road Large Lot Residential Structure Plan Area. (b) The C1 and C2/C3 Structure Plan areas, where regional and/or resource district consents for the overall structure plan stormwater system provide for alternative means of stormwater management and disposal. For the avoidance of doubt, on-site soakage within the C3 cell is not anticipated due to the risk of exacerbating slope stability issues. Alternative methods of stormwater management will need to be demonstrated for the C3 cell.	**N/A** The site is not within Houchens Road Large Lot Residential Structure Plan Area or the C1 and C2/C3 Structure Plan areas.
Rules - Stormwater	15.4.2.26 Development shall not obstruct overland and secondary flow paths.	**Complies;** An overland flow path through the Site will be maintained post-development to enable runoff from the upstream catchment (to the east, south-east) to pass through the Site downstream (to the north-west into the Cambridge green belt area).
Rules - Tree Planting on Roads: Residential and Large Lot Residential Zones	15.4.2.27 Where any subdivision in the residential or large lot residential zone includes the creation of new roads; the design, layout, construction and formation of the new road, except for service lanes, must provide for the planting of street trees. 15.4.2.28 Planting of street trees must be at an equivalent rate of one tree per residential property road frontage using an appropriate species for the location. Council may approve groups of trees where the kerb line and location of services and the area available are sufficient to accommodate the group of trees in the long term.	**Complies;** Street trees have been proposed. Please refer to ***Appendix A***. There are 15 front lots, and a total of 17 trees are proposed for both sides of the Te Mara Drive Extension.
Rules - Boundary relocations	15.4.2.33 The number of certificates of title involved in the subdivision will be the same or less after the subdivision has been undertaken.	**Complies;** A minor boundary adjustment is proposed between RT 1143238 and RT 1143237.
	15.4.2.34 New lots created by way of boundary relocation must comply with the rules for the zone within which the	**Complies;**

	subdivision is taking place, provided that titles shall not be considered as titles for the purpose of this rule if they are incapable of accommodating a dwelling for the zone within which the title is located because: (a) The site area cannot comply with the minimum site area under Rule 15.4.2.1; and (b) The site cannot contain a complying lot shape factor under Rules 15.4.2.3 and 15.4.2.5; and (c) The site cannot comply with the minimum setback standards of the zone within which the title is located; and (d) The site is not considered suitable for building under Rule 15.4.2.13; and (e) The site cannot contain within its boundaries a wastewater treatment and disposal system suitable for the site; and (f) The site cannot be provided with a complying vehicular access under Rule 16.4.2.4.	(a) A 253m^2 parcel of land (Lot 300) will be amalgamated with RT 1143237 (8.3026ha) to create a single title exceeding 2,500m^2 in this zone. Please note, Lot 300 (253m^2) is not intended for residential use. It's being used as a small strip of land to be added to a blueberry farm. The purpose of this addition is to allow the owner to pass a mower through the area, making it easier to maintain the farm. (b) Once Lot 300 amalgamated with RT 1143237, there are ample area for a complying lot shape factor. (c) Minimum setback can be met. (d) RT 1143237 along with Lot 300 offer sufficient space for construction (e) RT 1143237 along with Lot 300, provide adequate space for on-site wastewater treatment and disposal systems. (f) There is an existing vehicular access to access RT 1143237.
Part C: Development and subdivision of 7 or more lots in any Zone		
Rule - Design and location of infrastructure services	15.4.2.64 Within the urban limits and the Large Lot Residential Zone, all new subdivision and development of 7 or more lots shall provide a utilities corridor in the road reserve free of tree plantings (Refer to Appendix T3 and T4).	**Can comply;** Refer to the roading plan 23095-00-EN-300 in ***Appendix A***.
Rules - Roads	15.4.2.65 In any zone, unless an approved structure plan provides otherwise, the design and layout, and construction and formation, of a new road and its streetscape shall meet the requirements of Appendix T3, and Appendix T4 - Criteria for Public and Private Roads. Local | 20m | 7m + 0.75m unsealed shoulder both sides | 2 @ 3m + 0.5m sealed shoulder both sides | Not Applicable | Not Applicable | Not Applicable | Both Sides @ 3.7m min | Av. Lot size is 2500m^2 – 5000m^2 1 @ 1.5m | Both Sides @ 0.8m min Cul-de-sac: <20 Lots | 18m | 7m + 0.75m unsealed shoulder both sides | 2 @ 3m + 0.5m sealed shoulder both sides | Not Applicable | Not Applicable | Not Applicable | Both Sides @ 3.7m min | Av. Lot size is 2500m^2 – 5000m^2 1 @ 1.5m | One side @ 0.8m min >20 Lots up to 200m max. length | 20m | 7m + 0.75m unsealed shoulder both sides | As above | Not Applicable | Not Applicable | Not Applicable | Both Sides @ 3.7m min | Av. Lot size is 2500m^2 – 5000m^2 1 @ 1.5m | Both Sides @ 0.8m min Private ROW's (3): ≤ 2 - 3 Lots | 6m | 3m | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable ≤ 4 - 6 Lots | 9m | 5m | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Not Applicable A minimum height clearance of 4.5m shall be provided on all ROWs longer accessways and driveways longer than 90m	**Can comply;** The proposed subdivision will have a new road that meets the requirements of T3 by providing a footpath and having a sufficiently wide and accommodate swales. The new road will also meet the requirements of T4.
	15.4.2.66 Within the urban limits and the Large Lot Residential Zone the layout and design of subdivision and development that incorporates roads to vest in Council, shall create a grid layout that: (a) Has blocks elongated north west to southeast and lots oriented east/west to ensure provision for solar access; and	**Complies;** Please refer to the Scheme Plan in ***Appendix A***. A grid layout is provided. Connectivity to adjoining land will be facilitated.

	(b) Provides for connectivity to adjoining land that is able to be developed or subdivided in the future or is identified in Appendix S1. Provided that in the Houchens Road Large Lot Residential Structure Plan Area and in a Structure Plan that was approved and included in the Proposed District Plan as at 31 May 2012 a grid layout is not required	
	15.4.2.67 Where any subdivision includes the creation of new roads, the location and design of the roads shall ensure the continuation of vistas as identified on the Planning Maps.	**Complies;** The proposed Te Mara Drive Extension will maintain the identified vistas as outlined on the Planning Maps.
	15.4.2.68 In all zones, the location, layout and design of reserves shall demonstrate: (a) That the reserve is directly linked to footpaths from the surrounding development; and (b) That the reserve is fronted on two sides by roads; and (c) That on street parking is provided adjacent to the reserve.	**Complies;** A local purpose reserve (pedestrian access) is proposed which can fulfil the requirements outlined in points (a) through (c).
Part D: Development and subdivision in a Structure Plan Area		
Rule - All development and subdivision in areas subject to a Structure Plan, Development Plan or Concept Plan	15.4.2.69 All development and subdivision within an area subject to an approved structure plan, development plan or concept plan shall be designed in general accordance with the requirements of that structure plan, concept plan or development plan. For the avoidance of doubt, the following areas are subject to concept plans, development plans and/or structure plans: … (q) Leamington Large Lot Residential Zone Structure Plan	**Does not comply;** **Discretionary Activity** The roading design is in general accordance with the structure plan, with a few alterations made.
Section 1 - Transportation		
16.4 Rules 16.4.1 Activity Status Table	Large Lot Residential (d) Activities generating less than 100 vehicles per day that require a new vehicle entrance onto any State Highway or major arterial road: RD (e) Activities generating 100 vehicles or more per day onto any State Highway or major arterial road: See Rule 16.4.2.25. (f) Activities generating less than 100 vehicles per day that do not require a new vehicle entrance onto any State Highway or major arterial road: P	**Complies;** The development will create more than 100vmpd but will not require direct access to a major arterial road or state highway.
16.4.2 Performance Standards Rules - Road hierarchy	16.4.2.1 All structure plans, plan changes, developments, and subdivisions must be consistent with the road hierarchy, as contained in Appendix T5. 16.4.2.2 To maintain the effectiveness of the road hierarchy, a road network must be designed so that a road connects to a road at the same level in the hierarchy, or directly above or below its place in the hierarchy.	**Complies;** The proposed road will meet the road hierarchy requirements.

<table>
<tr><td></td><td>16.4.2.3 To maintain the effectiveness of the road hierarchy, when a site has two road frontages, vehicle access and egress must be from the lesser road type, as shown in the matrix below:
<table>
<tr><th></th><th>Major Arterial (State Highways)</th><th>Major Arterial (Excluding State Highways)</th><th>Minor Arterial</th><th>Collector Road</th><th>Local Road</th></tr>
<tr><td>Major Arterial (State Highways)</td><td>Road with lower speed or traffic volumes</td><td>Major Arterial</td><td>Minor Arterial</td><td>Collector Road</td><td>Local Road</td></tr>
<tr><td>Major Arterial (Excluding State Highways)</td><td>Major Arterial</td><td>Road with lower speed or traffic volumes</td><td>Minor Arterial</td><td>Collector Road</td><td>Local Road</td></tr>
<tr><td>Minor Arterial</td><td>Minor Arterial</td><td>Minor Arterial</td><td>Road with lower speed or traffic volumes</td><td>Collector Road</td><td>Local Road</td></tr>
<tr><td>Collector Road</td><td>Collector Road</td><td>Collector Road</td><td>Collector Road</td><td>Road with lower speed or traffic volumes</td><td>Local Road</td></tr>
<tr><td>Local Road</td><td>Local Road</td><td>Local Road</td><td>Local Road</td><td>Local Road</td><td>Either - Road with lower speed or traffic volumes (preferred)</td></tr>
</table></td><td></td></tr>
<tr><td>Rule - Vehicular access to sites in all zones</td><td>16.4.2.4 Every site shall be provided with vehicle access to a formed road that is constructed to a permanent standard. The vehicle access shall be designed to accommodate the demands of all traffic from the activity on that site, taking into account the form and function of the road.</td><td>Complies;
Every sites will have vehicle access to a formed road.</td></tr>
<tr><td>Rule - Vehicle entrance separation from intersections and other vehicle entrances</td><td>16.4.2.5 The minimum distance of a vehicle entrance (accessway) from an intersection or o entrance shall be as follows, where the values for K, M and N are included in the follo table:


<table>
<tr><th>Posted Speed limit</th><th>Minimum Distance K=</th><th>Minimum Distance M=</th><th>Minimum Distance N=</th></tr>
<tr><td>40</td><td>30</td><td>20</td><td rowspan="3">For 60km/h- less than 4m or more than 11m</td></tr>
<tr><td>50</td><td>30</td><td>20</td></tr>
<tr><td>60</td><td>30</td><td>20</td></tr>
<tr><td>70</td><td>100</td><td>45</td><td>40</td></tr>
<tr><td>80</td><td>100</td><td>45</td><td>100</td></tr>
<tr><td>90</td><td>200</td><td>60</td><td>200</td></tr>
<tr><td>100</td><td>200</td><td>60</td><td>200</td></tr>
</table>
Advice Note: Varying separation distances for lower speed areas is to provide for the possibility of on street pa (e.g. as close as practicable or at least 5m space and 1.25m clearance between edges of crossings).

Activities that fail to comply with this rule will require a resource consent for a discretio activity.</td><td>Will comply;</td></tr>
<tr><td>Rule - Vehicle entrance separation from railway level crossings</td><td>16.4.2.6 New vehicle access ways shall be located a minimum of 30m from a railway level crossing.</td><td>Can comply</td></tr>
<tr><td>Rule - Minimum sight distance requirements for a railway level crossing</td><td>16.4.2.7 Any buildings, structure or land use shall be located to comply with the minimum rail level crossing sightline requirements within Appendix T2.</td><td>Can comply</td></tr>
<tr><td>Rule - Vehicle access to compact</td><td>N/A</td><td></td></tr>
</table>

housing development		
Rules - Vehicle access to sites in the Commercial Zone	N/A	
Rule - Vehicle access to sites in the Industrial Zone	N/A	
Rules - Parking, loading and manoeuvring area	16.4.2.13 All activities that involve the erection, construction or substantial reconstruction, alteration or addition to a building on any site, or changes the use of any land or building, shall provide parking and loading/unloading for vehicles on the site as set out in Appendix T1. Provided that in the Residential Zone: (a) One of the car parks allocated to a single dwelling may be stacked (i.e. located in such a way that it cannot be accessed directly from the associated access or manoeuvring area) provided that the stacked car park does not: (i) Encroach on or interfere with any shared access on the site; or (ii) Encroach on any required building setback, side boundaries, or outdoor living area; or (iii) Compromise the ability for any vehicle to manoeuvre within the site. 16.4.2.14 Where assessment of the number of parking spaces required results in a fractional space being calculated, any fraction less than one-half shall be disregarded, and any fraction greater than or equal to one-half shall be counted as one space. 16.4.2.15 Vehicle parking, loading/unloading, and manoeuvring areas shall: (a) Not encroach on any setback, outdoor living area, or bicycle parking spaces; and loading/unloading areas and manoeuvring areas shall not encroach over vehicle parking spaces; and (b) Be designed, formed, and constructed to ensure that the surface of the required area provides a dust free environment; and (c) Provide for the safe and efficient disposal of surface stormwater clear of any adjoining access or road surface in a way that does not result in ponding or scouring; and (d) Be constructed to accommodate the anticipated use of the area by all traffic likely to access the site in the zone in which it is located, including construction traffic taking into account pavement, surfacing, demarcation of spaces, aisles and circulation roads; and (e) Be provided on the site on which the building, activity or proposal is located, except where the provisions of Rules 16.4.2.16 and 16.4.2.17 apply. For the avoidance of doubt, rear sites that are served by an access leg/driveway that is in sole ownership are considered to be part of the site. Provided that: (i) In all zones the vehicle entrance may cross the road boundary setback; and (ii) For front and corner sites in the Residential Zone where Rules 16.4.2.16 and 16.4.2.17 do not apply, vehicle parking and manoeuvring areas associated with dwellings may	**Complies;** The proposed subdivision will take place within the large lot residential zone. Each site will be sized to accommodate compliant parking and manoeuvring. Once a dwelling is constructed on each site they will be able to meet the remaining requirements.

<table>
<tr><td></td><td>encroach into the setbacks, provided that a 1m wide setback is retained at the road boundary, excluding the vehicle entrance; and
(iv) For rear sites in the Residential Zone served by an access leg/driveway, vehicle parking and manoeuvring associated with dwellings may encroach into any setback (refer to diagram following Rule 16.4.2.17); and
(iv) In the St Peters School Zone this rule shall not apply and the provisions of Rule 11.2.4.31 shall apply to all vehicle parking, loading/unloading and manoeuvring areas; and
(v) In the Residential and Commercial Zones, vehicle parking, loading/unloading and manoeuvring areas must be sealed and drained; and
(vi) In the Large Lot Residential, Industrial and Airport Business Zones, vehicle parking, loading/unloading and manoeuvring areas must be sealed and drained where granular material or storm water runoff from the area will enter the road corridor; and
(vii) In the Rural and Large Lot Residential Zones private right of ways must have an all weather (metal) surface. Where existing dwellings are located within 15m of a private right of way, the surface must be sealed and drained.</td><td></td></tr>
<tr><td>Rules - Exemption for on-site vehicle manoeuvring areas in the Residential Zone</td><td>N/A</td><td></td></tr>
<tr><td>…</td><td></td><td></td></tr>
<tr><td>Rule - Provision of an integrated transportation assessment</td><td>16.4.2.25 A Simple or Broad Integrated Transport Assessment (ITA) shall be prepared for activities as required by this rule, in accordance with the following trigger thresholds:
<table><tr><th rowspan="3">Activity</th><th colspan="7">Measured in Trip Generation of Activity (vpd = vehicles per day) Annual Average Traffic
▪ vpd thresholds are set in car equivalents. For the purpose of these thresholds, heavy ve (gross vehicle mass exceeding 3.5 tonnes) are to be taken as 10 car equivalents).
▪ Appendix T6 contains a guide for converting vehicles per day into other units of measure can be used for screening proposals to identify whether an ITA is required or not.</th></tr><tr><th colspan="3">Collector and Local Roads</th><th colspan="3">Major and Minor Arterial Roads (including State Highways)</th><th>All Road</th></tr><tr><th>LOW <100 vpd</th><th>MEDIUM 100 - 249 vpd</th><th>HIGH >250 vpd</th><th>LOW <100 vpd</th><th>MEDIUM 100 - 249 vpd</th><th>HIGH >250 vpd</th><th>SIGNIFIC >1500 vpd</th></tr><tr><td>Any Permitted or Controlled Activity</td><td>Not Required</td><td>Not Required</td><td>RD Simple ITA required</td><td>Not Required See Rule 16.4.1.1(d) for State Highways & Major Arterials</td><td>RD Simple ITA required</td><td>RD Broad ITA required</td><td>RD Broad ITA required</td></tr><tr><td>Any Restricted Discretionary Activity</td><td>Not Required</td><td>Not Required</td><td>RD Simple ITA required</td><td>Not Required See Rule 16.4.1.1(d) for State Highways & Major Arterials</td><td>RD Simple ITA required</td><td>RD Broad ITA required</td><td>RD Broad ITA required</td></tr></table>…</td><td>A ITA has been provided as ***Appendix F***.</td></tr>
<tr><td>Appendix T4 - Criteria for Public and Private Roads</td><td></td><td></td></tr>
</table>

Large Lot Residential and Rural	Rural & Large Lot Residential Zones (swale both sides, tree planting – specific design, no lighting)									
	Collector	20m	8m + 0.75m unsealed shoulder both sides	2 @ 3.5m + 0.5m sealed shoulder both sides	Not Applicable	Not Applicable	Not Applicable	Both Sides @ 3.7m min	Av. Lot size is 2500m² – 5000m² 1 @ 1.5m	Both Sides @ 0.8m min
	Local	20m	7m + 0.75m unsealed shoulder both sides	2 @ 3m + 0.5m sealed shoulder both sides	Not Applicable	Not Applicable	Not Applicable	Both Sides @ 3.7m min	Av. Lot size is 2500m² – 5000m² 1 @ 1.5m	Both Sides @ 0.8m min
	Cul-de-sac: <20 Lots	18m	7m + 0.75m unsealed shoulder both sides	2 @ 3m + 0.5m sealed shoulder both sides	Not Applicable	Not Applicable	Not Applicable	Both Sides @ 3.7m min	Av. Lot size is 2500m² – 5000m² 1 @ 1.5m	One side @ 0.8m min
	>20 Lots up to 200m max. length.	20m	7m + 0.75m unsealed shoulder both sides	As above	Not Applicable	Not Applicable	Not Applicable	Both Sides @ 3.7m min	Av. Lot size is 2500m² – 5000m² 1 @ 1.5m	Both Sides @ 0.8m min
	Private ROW's (3) i) 2 - 3 Lots	6m	3m	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	ii) 4 - 6 Lots	9m	5m	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
		A minimum height clearance of 4.5m shall be provided on all ROWs longer accessways and driveways longer than 90m								
	Additional Requirements: ▪ All Urban Collector and Local Roads carrying <500 vehicle per day must incorporate traffic calming measures to ensure traffic speeds do not exceed 30km/h. ▪ An additional 0.6m for each additional trunk water main, sewer main or stormwater main, must be added to the minimum berm width on one side only. ▪ All Residential Service Lanes must incorporate traffic calming measures to ensure traffic speeds do not exceed 20km/h. ▪ Service Lanes must connect at both ends to Local Roads only. ▪ Minimum surface treatment for Private ROW's in the Rural and Large Lot Residential Zones must have an all-weather surface. ▪ Where existing dwellings are located within 25m of the ROW, mitigation of dust nuisance must be undertaken and submitted to Council. Dwellings located within 15m of the ROW, surface must be chip sealed in accordance with Council's standard. ▪ Minimum cross fall to be 5% for all-weather surface.									
	The proposed new road will meet the standards of this table for a local road.									