



Land Information Memorandum



Property address:
38 Cemetery Road

LIM number: H09388125

Page 1

Christchurch City Council
53 Hereford Street, PO Box 73015
Christchurch 8154, New Zealand
Tel 64 3 941 8999
Fax 64 3 941 8984

www.ccc.govt.nz

Application details

Date issued 18 November 2025
Date received 4 November 2025

Property details

Property address 38 Cemetery Road, RD 2, Akaroa
Valuation roll number 23920 12706
Valuation information Capital Value: \$380,000
Land Value: \$380,000
Improvements Value: \$0
Please note: these values are intended for Rating purposes
Legal description Lot 2 DP 588703
Existing owner Betty Eleanor Chand
3 Harrods Court
Christchurch 8053

Council references

Rate account ID 73209646
LIM number H09388125
Property ID 1201367

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Document information

This Land Information Memorandum (LIM) has been prepared for the purpose of section 44A of the Local Government Official Information and Meetings Act 1987 (LGOIMA). It is a summary of the information that we hold on the property. Each heading or "clause" in this LIM corresponds to a part of section 44A.

Sections 1 to 10 contain all of the information known to the Christchurch City Council that must be included under section 44A(2) LGOIMA. Any other information concerning the land as the Council considers, at its discretion, to be relevant is included at section 11 of this LIM (section 44A(3) LGOIMA). If there are no comments or information provided in these sections this means that the Council does not hold information on the property that corresponds to that part of section 44A.

The information included in this LIM is based on a search of Council records only and there may be other information relating to the land which is unknown to the Council. Please note that other agencies may also hold information relevant to the property, or administer legislation relevant to the use of the land, for example, the Regional Council (Ecan), Heritage New Zealand Pouhere Taonga, and Land Information New Zealand.

Council records may not show illegal or unauthorised building or works on the property. The applicant is solely responsible for ensuring that the land is suitable for a particular purpose.

A LIM is only valid at the date of issue as information is based only upon information the Council held at the time of that LIM request being made. It is essential that the applicant undertakes their own due diligence to verify the suitability of the property for their intended use.

Property file service

This Land Information Memorandum does not contain all information held on a property file. Customers may request property files by phoning the Council's Customer Call Centre on (03) 941 8999, or visiting any of the Council Service Centres. For further information please visit www.ccc.govt.nz.

To enable the Council to measure the accuracy of this LIM document based on our current records, we would appreciate your response should you find any information contained therein which may be considered to be incorrect or omitted. Please telephone the Customer Call Centre on (03) 941 8999.

Property address:

38 Cemetery Road

LIM number: H09388125

Page 3

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A search of records held by the Council has revealed the following information:

1. Special features and characteristics of the land

Section 44(A)(2)(aa) LGOIMA. This is information known to the Council but is not apparent from a district plan under the Resource Management Act 1991. It identifies each (if any) special feature or characteristic of the land concerned, including but not limited to the likely presence of hazardous contaminants.

☎ For enquiries, please phone (03) 941 8999 or visit www.ccc.govt.nz.

Natural Hazards

Section 44A(2)(a) LGOIMA. This is information known to the Council about natural hazards that is required by section 44B LGOIMA. This section may also include natural hazard information provided by Environment Canterbury. Christchurch City Council is required to include such information in LIMs where Environment Canterbury considers it meets the criteria under section 44C of LGOIMA.

The following statement has been provided by Environment Canterbury:

This Land Information Memorandum includes natural hazard information deemed by Environment Canterbury to be the most up to date, useful, and relevant, and is provided in accordance with the Local Government (Natural Hazard Information in Land Information Memoranda) Regulations 2025. All due care has been taken to ensure current information required to be provided under the regulations is presented below.

Environment Canterbury may hold superseded or less reliable natural hazards information relating to the land that has not been included in this Land Information Memorandum. Please contact Environment Canterbury if you would like to enquire about this information.

(a) Coastal Hazards

- Sea Spray Zone

This property is in the sea spray zone as defined by NZS 3604 2011.

(b) Earthquakes

- Regional Liquefaction Information

Areas where there was evidence of liquefaction were mapped following the 2010/11 Canterbury earthquakes by Tonkin & Taylor for the Earthquake Commission (urban areas) and by a group of researchers for Environment Canterbury (rural, commercial and industrial areas). These are available in the Christchurch Liquefaction Viewer at <https://apps.canterburymaps.govt.nz/ChristchurchLiquefactionViewer/>.

Technical report information:

Title: Review of liquefaction hazard information in eastern Canterbury, including Christchurch City and parts of Selwyn, Waimakariri and Hurunui Districts.

Date: December 2012.

Author: H Brackley (compiler).

Commissioned by: Environment Canterbury.

Purpose of report: To collate liquefaction occurrence during the 2010/11 Canterbury earthquakes, and to determine liquefaction vulnerability. For use in land use planning, subdivision and building consenting.

Study area: Coastal Canterbury from the Waipara River mouth to the Rakaia River mouth, including Banks Peninsula, and inland to Rangiora, Aylesbury, Selwyn and Southbridge.

Accessible at: <https://www.ecan.govt.nz/document/download?uri=1702192>.

(c) Flooding

- Regional Hazard Information: Flood Photographs

Photographs showing the property during or following past flood events may be available. Flood photographs are available on Environment Canterbury's flood imagery register at <https://apps.canterburymaps.govt.nz/FIR>.

Property address:

38 Cemetery Road

LIM number: H09388125

Page 4

Christchurch City Council

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- Regional Hazard Information: Flood Assessment Request

You can request a new site-specific flood hazard assessment for the property from Environment Canterbury at: <https://www.ecan.govt.nz/do-it-online/property-information/flood-hazard-assessments>.

(d) Landslides

- Consultant Report Available

This property is located within the area where a consultant geotechnical report exists on slope hazard susceptibility. It may potentially impact your property. The report can be viewed online at www.ccc.govt.nz/technical-reports or at Christchurch City Councils Civic Offices or Akaroa Service Centre. You can also contact the Council for a copy of the report by phoning 941 8999. There will be a charge for any copies.

Title of report: Slope hazard susceptibility assessment - Akaroa Harbour settlements

Purpose of report: Delineate areas most suitable for development in the defined study areas in terms of slope and ground stability. An assessment of land stability within eight defined settlement areas (1900 ha) of Akaroa Harbour. Slope instability/landslide susceptibility and potential for liquefaction are two constraints to be considered by the Council in potential future growth of existing settlements.

Scope of report: Akaroa Harbour settlements

Where or how to access the report: <https://www.ccc.govt.nz/assets/Documents/The-Council/Plans-Strategies-Policies-Bylaws/Plans/area-plans/akaroa-harbour-basin-settlements/LandInstabilityFull-akaroaharbourbasin.pdf>

Date of report: March 2008

Name of person/entity that commissioned report: Christchurch City Council

The name of person/entity that prepared the report: Tonkin & Taylor Ltd

- Land Instability

Maps prepared for the Banks Peninsula District Council (prior to amalgamation with the Christchurch City Council in 2006) show that this property or part of this property is in an area of low/moderate and/or moderate/high risk for land instability.

- Potential for Erosion

Records indicate that this property may be susceptible to erosion. Type of Erosion: Unknown. Severity of Risk: Slight to Moderate.

(e) Subsidence

As at the date of this LIM, Council research found no information under this heading.

(f) Tsunamis

As at the date of this LIM, Council research found no information under this heading.

(g) Volcanic and Geothermal Hazards

As at the date of this LIM, Council research found no information under this heading.

(h) Wind

As at the date of this LIM, Council research found no information under this heading.

(i) Any Other Natural Hazards

- Snow Load Design Required

Contour maps held by the Council indicate that this site is at or above 40 metres above mean sea level. The effects of snow on the design of any proposed buildings will need to be considered and addressed.

(j) District Plan Natural Hazard Information

Please refer to *Section 8. Land use and conditions* of this report for District Plan related natural hazard information.

(k) Building Notices

Please refer to *Section 5. Consents, certificates, notices, orders, or requisitions affecting the land and buildings* of this report for Building Act notice information.

Other Special Features or Characteristics of the Land

- Borelog/Engineer Report Image Available
Borelog/Engineer Report Image Available

Related Information

- There is attached a subdivision soil investigation report covering this property.
- Akaroa Harbour Settlement Study Areas Report contains information around historical flooding events in the Akaroa Basin. The report may or may not reference to information about your individual property. The report can be viewed on the Council website: www.ccc.govt.nz/technicalreports

Property address:

38 Cemetery Road

LIM number: H09388125

Page 6

Christchurch City Council

53 Hereford Street, PO Box 73015
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www.ccc.govt.nz

2. Private and public stormwater and sewerage drains

Section 44A(2)(b) LGOIMA. This is information about private and public stormwater and sewerage drains as shown in the Council's records.

 For stormwater and sewerage enquiries, please phone (03) 941 8999 or visit www.ccc.govt.nz.

Related Information

- Sewer drainage for this site is not provided by Christchurch City Council. This is to be arranged by the property owner.
- The Council plan shows no public stormwater lateral to this site.
- Attached are all drainage plans that Council hold for details of private and public drainage. Not all plans provided are verified by Council, and therefore Council cannot be liable for inaccuracies. Site investigation will be required by owners to determine exact layouts.

3. Drinking Water Supply

Section 44A(2)(ba) and (bb) LGOIMA. This is information notified to the Council about whether the land is supplied with drinking water, whether the supplier is the owner of the land or a networked supplier, any conditions that are applicable, and any information the Council has about the supply.

Please note the council does not guarantee a particular water quality to its customers. If you require information on current water quality at this property please contact the Three Waters & Waste Unit.

☎ For water supply queries, please phone (03) 941 8999 or visit www.ccc.govt.nz.

Water supply

There is either a water meter not in use or no water connection to this property. Christchurch City Council is the networked supplier of water to this property. An application can be made to the Christchurch City Council for a water connection. The conditions of supply are set out in the Christchurch City Council Water Supply and Wastewater Bylaw (2022), refer to www.ccc.govt.nz.

Christchurch City Council is the networked supplier of water to this property. This property can be connected to the Christchurch City Council Water Supply. The conditions of supply are set out in the Christchurch City Council Water Supply and Wastewater Bylaw (2022), refer to www.ccc.govt.nz.

Restricted Rural Water Supply

The conditions of supply of water are set out in the Christchurch City Council Water Supply and Wastewater Bylaw 2022, Refer to www.ccc.govt.nz.

Restricted Rural Water Supply

Christchurch City Council is the networked supplier. This lot is entitled to a water connection with flow restricted to 1,000 litres per day and the property owner must install a water tank with a recommended minimum volume of 2,000 litres. The cost of connection to this system is listed under the fees and charges in the current annual plan.

Related Information

- For all new residential or commercial properties constructed within the Council water supply areas of Akaroa (including Takamatua), Duvauchelle, Wainui, Pigeon Bay, Little River and Birdlings Flat, and where connection to the Council water supply is sought; the customer must install a tank or facility with a minimum capacity of 5,000 litres for the purpose of collecting and storing rainwater for non-potable usage. Full details of these requirements are set out in section 17 of the Christchurch City Council Water Supply and Wastewater Bylaw 2022.

Property address:

38 Cemetery Road

LIM number: H09388125

Page 8

Christchurch City Council

53 Hereford Street, PO Box 73015
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4. Rates

Section 44A(2)(c) LGOIMA. This is information on any rates owing in relation to the land.

☎ For rates enquiries, please phone (03) 941 8999 or visit www.ccc.govt.nz.

(a) Annual rates

Annual rates to 30/06/2026: \$1,738.13

	Instalment Amount	Date Due
Instalment 1	\$434.48	15/08/2025
Instalment 2	\$434.48	15/11/2025
Instalment 3	\$434.48	15/02/2026
Instalment 4	\$434.69	15/05/2026

Rates owing as at 18/11/2025: \$0.00

(b) Excess water charges

For excess water charge enquiries, please phone (03) 941 8999 or visit www.ccc.govt.nz/contact-us

(c) Final water meter reading required at settlement?

Property settlements must now ensure all water usage and outstanding debts are accurately accounted for.

To advise of a commercial property settlement, please complete the request for settlement information form at www.ccc.govt.nz/services/rates-and-valuations/solicitors-request

Property address:

38 Cemetery Road

LIM number: H09388125

Page 9

Christchurch City Council

53 Hereford Street, PO Box 73015
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www.ccc.govt.nz

5. Consents, certificates, notices, orders, or requisitions affecting the land and buildings

Section 44A(2)(d) LGOIMA. This is information concerning any consent, certificate, notice, order, or requisition, affecting the land or any building on the land, previously issued by the Council. The information in this section may also cover building consent and/or code compliance information issued by building certifiers under the Building Act 1991 and building consent authorities that are not the Council under the Building Act 2004.

You can check the property file to identify whether any consent or certificate was issued by a building certifier under the Building Act 1991.

Section 44A(2)(da) LGOIMA. The information required to be provided to a territorial authority under section 362T(2) of the Building Act 2004. There is currently no information required to be provided by a building contractor to a territorial authority under section 362T(2) of the Building Act 2004. The Building (Residential Consumer Rights and Remedies) Regulations 2014 only prescribed the information that must be given to the clients of a building contractor.

Sections 71 to 74 of the Building Act 2004 require the Building Consent Authority to consider natural hazards when it receives a building consent application for the construction or major alteration of a building on land that is subject to, or likely to be subject to, a natural hazard. A building consent for this property may have been issued subject to a section 72 or 73 notice. This means at the time of building consent the Building Consent Authority was not satisfied that adequate provision would be made to protect the building and land from the natural hazard and was subsequently required to notify the Registrar-General of Land to record the natural hazard on the Record of Title. The Building Act 2004 defines natural hazards as erosion (including coastal erosion, bank erosion, and sheet erosion), falling debris (including soil, rock, snow, and ice), subsidence, inundation (including flooding, overland flow, storm surge, tidal effects, and ponding), and slippage.

If your property contains a notice under s73 of the Building Act 2004, this will be identified on the building consent decision below (decision under s72 of the Building Act 2004) and on the properties' Record of Title. The Record of Title may also record this as a s36 notice under the Building Act 1991, or a s641A notice under the Local Government Act 1974.

☎ For building enquiries, please phone (03) 941 8999, email EPADutyBCO@ccc.govt.nz or visit www.ccc.govt.nz.

(a) Consents

- BCN/2022/713 Applied: 09/02/2022 Status: Completed
20 Cemetery Road Wainui
Exemption from building consent approved 20/04/2023
Subdivision Services - Stormwater & Water reticulation systems - 11 Lots & Retaining Wall

(b) Certificates

Note: Code Compliance Certificates were only issued by the Christchurch City Council since January 1993.

(c) Notices

(d) Orders

(e) Requisitions

Property address:

38 Cemetery Road

LIM number: H09388125

Page 10

Christchurch City Council

53 Hereford Street, PO Box 73015
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Fax 64 3 941 8984

www.ccc.govt.nz

6. Certificates issued by a building certifier

Section 44A(2)(e) LGOIMA. This is information notified to the Council concerning any certificate issued by a building certifier pursuant to the Building Act 1991 or the Building Act 2004.

☎ For building enquiries, please phone (03) 941 8999, email EPADutyBCO@ccc.govt.nz or visit www.ccc.govt.nz.

7. Weathertightness

Section 44A(2)(ea) LGOIMA. This is information notified to the Council under section 124 of the Weathertight Homes Resolution Services Act 2006.

 For weathertight homes enquiries, please phone (03) 941 8999 or visit www.ccc.govt.nz.

If there is no information below this means Council is unaware of any formal Weathertight Homes Resolution Services claim lodged against this property.

Property address:

38 Cemetery Road

LIM number: H09388125

Page 12

Christchurch City Council

53 Hereford Street, PO Box 73015
Christchurch 8154, New Zealand
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Fax 64 3 941 8984

www.ccc.govt.nz

8. Land use and conditions

Section 44A(2)(f) LGOIMA. This is information relating to the use to which the land may be put and conditions attached to that use. The planning information provided below is not exhaustive and reference to the Christchurch District Plan and any notified proposed changes to that plan is recommended: <https://ccc.govt.nz/the-council/plans-strategies-policies-and-bylaws/plans/christchurch-district-plan/>.

There may be some provisions of the Christchurch City Plan or Banks Peninsula District Plan that affect this property that are still operative.

☎ For planning queries, please phone (03) 941 8999, email DutyPlanner@ccc.govt.nz or visit www.ccc.govt.nz.

- **Regional plan or bylaw**

There may be objectives, policies or rules in a regional plan or a regional bylaw that regulate land use and activities on this site. Please direct enquiries to Canterbury Regional Council (Environment Canterbury).

(a)(i) Christchurch City Plan & Banks Peninsula District Plan

- **Banks Peninsula District Plan Coastal Hazards**

The subdivision provisions of the Banks Peninsula District Plan relating to coastal hazards still apply and are included in this table (<https://ccc.govt.nz/news-and-events/public-notice/show/88>).

(ii) Christchurch District Plan

- **Development Constraint Conditions**

Council records show there is a specific condition on the use of this site: Consent Notice

- **Sites of Ngai Tahu Cultural Significance**

Property or part of property within the Nga Turanga Tupuna overlay, which is operative.

- **Remainder Slope Instability Management Area**

Property or part of property within the Christchurch District Plan Remainder of Port Hills and Banks Peninsula Slope Instability Management Area overlay, which is operative.

- **District Plan Zone**

Property or part of property within the Residential Banks Peninsula Zone, which is operative.

(b) Resource consents

If there are any land use resource consents issued for this property the Council recommends that you check those resource consents on the property file. There may be conditions attached to those resource consents for the property that are still required to be complied with.

Property address:

38 Cemetery Road

LIM number: H09388125

Page 13

Christchurch City Council

53 Hereford Street, PO Box 73015
Christchurch 8154, New Zealand
Tel 64 3 941 8999
Fax 64 3 941 8984

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- RMA/2005/2991 - Subdivision Consent
22 Cemetery Road Wainui
FEE SIMPLE SUBDIVISION - Historical Reference RMA20022316
Status: Withdrawn
Applied 04/05/2005
04/06/2014
- RMA/2007/1510 - Subdivision Consent
22 Cemetery Road Wainui
FEE SIMPLE SUBDIVISION 37 additional residential allotments - Historical Reference RMA92008779
Status: Withdrawn
Applied 19/06/2007
26/02/2016
- RMA/2014/1702 - Subdivision Consent
22 Cemetery Road Wainui
Fee Simple Subdivision - 14 Lots - Historical Reference RMA92026368
Status: Consent issued
Applied 09/07/2014
Granted 29/09/2014
Decision issued 29/09/2014
- RMA/2020/3091/A - s127 Change / cancellation of condition(s)
22 Cemetery Road Wainui
Change of Conditions to Subdivision Consent RMA/2020/3091
Status: Processing complete
Applied 23/06/2023
22/08/2023
17/08/2023
Granted 17/08/2023
Decision issued 17/08/2023
- RMA/2020/3091 - Combined subdivision / land use consent
22 Cemetery Road Wainui
Fee Simple subdivision in ten lots with land use
Status: Processing complete
Applied 23/12/2020
03/09/2021
Conditions amended - s357 02/12/2021
Conditions changed/cancelled - s127 17/08/2023
s223 Certificate issued 13/09/2023
s224 Certificate issued 16/10/2023
Granted 03/09/2021
Decision issued 03/09/2021
- RMA/2021/3246 - s357 Objection
22 Cemetery Road Wainui
Objection to conditions - RMA/2020/3091
Status: Processing complete
Applied 28/09/2021
Objection upheld 02/12/2021
Decision issued 02/12/2021

Property address:

38 Cemetery Road

LIM number: H09388125

Page 14

Christchurch City Council

53 Hereford Street, PO Box 73015
Christchurch 8154, New Zealand
Tel 64 3 941 8999
Fax 64 3 941 8984

www.ccc.govt.nz

Related Information

- The Development Constraint conditions for this property are as follows:
Building Consent conditions
- Engineering/geotechnical investigation
- The Council system shows a Development Constraint/Ongoing Condition Consent notice for this property. The consent notice should be registered against the record of title for the property and a search of that title and the consent notice will provide details in respect of the constraint / condition. If a search of the title does not record the consent notice or the consent notice is not clear then we suggest you contact the duty planner by either calling 941 8999 or emailing DutyPlanner@ccc.govt.nz. The Consent notice is as follows:
 1. Any new dwelling shall be located within nominated location for each lot as shown on attached plan.
 2. Provided with a restricted flow water supply. Requires on-site water storage minimum 48hr. 1, 2 or 3 m3 connection at consent stage.
 3. S/W via 10m3 detention tank. Maintenance and operation to be owners responsibility in accordance with manual attached.
 4. S/W from driveways and hardstand via one of the options on consent notice (swale / proprietary device).
 5. Specific foundation design. All concentrated S/W / groundwater to be discharged in controlled manner.

Property address:

38 Cemetery Road

LIM number: H09388125

Page 15

Christchurch City Council

53 Hereford Street, PO Box 73015
Christchurch 8154, New Zealand
Tel 64 3 941 8999
Fax 64 3 941 8984

www.ccc.govt.nz

9. Other land and building classifications

Section 44A(2)(g) LGOIMA. This is information notified to the Council by any statutory organisation having the power to classify land or buildings for any purpose.

 For land and building enquiries, please phone (03) 941 8999 or visit www.ccc.govt.nz.

Please refer to Section 1 for details

Property address:

38 Cemetery Road

LIM number: H09388125

Page 16

Christchurch City Council

53 Hereford Street, PO Box 73015
Christchurch 8154, New Zealand
Tel 64 3 941 8999
Fax 64 3 941 8984

www.ccc.govt.nz

10. Network utility information

Section 44A(2)(h) LGOIMA. This is information notified to the Council by any network utility operator pursuant to the Building Act 1991 or the Building Act 2004.

 For network enquiries, please phone (03) 941 8999 or visit www.ccc.govt.nz.

- **None recorded for this property**

11. Other information

Section 44A(3) LGOIMA. This is information concerning the land that the Council has the discretion to include if it considers it to be relevant.

☎ For any enquiries, please phone (03) 941 8999 or visit www.ccc.govt.nz.

(a) Kerbside waste collection

- This property is not on an organic collection route
- This property is not on a recycling collection route. . Please leave your recycling at your nearest depot. Your nearest recycling depot is the Barrys Bay Transfer Station.
- This property is not on a refuse collection route. . Please leave your rubbish at your nearest depot. Your nearest rubbish depot is the Barrys Bay Transfer Station.

(b) Other

• Floor Levels Information

Council holds a variety of information on requirements for building or property development. This includes:

- required minimum finished floor levels, which need to be set to meet the surface water requirements in clause E1.3.2 of the Building Code (where this applies); and
- the requirements of the Christchurch District Plan (where a property is in the Flood Management Area).

Where this information has been processed for your property, you can view it online at <https://ccc.govt.nz/flooding-and-floor-levels>.

Otherwise, if you are building or developing on this land, you can request a calculation on required finished floor levels for your proposed building by emailing us at floorlevels@ccc.govt.nz.

• Guest Accommodation

Guest accommodation (including whole unit listings on Airbnb; BookaBach; etc.) generally requires a resource consent in this zone when the owner is not residing on the site. For more information, please refer to: <https://ccc.govt.nz/providing-guest-accommodation/>.

• Tsunami Evacuation Zone

This property is not in a tsunami evacuation zone. It is not necessary to evacuate in a long or strong earthquake or during an official Civil Defence tsunami warning. Residents may wish to offer to open their home to family or friends who need to evacuate from a tsunami zone, and should plan with potential guests to do so in advance. More information can be found at <https://ccc.govt.nz/services/civil-defence/hazards/tsunami-evacuation-zones-and-routes/>

• Electoral Ward

Property located in Banks Peninsula Electoral Ward

• Listed Land Use Register

Hazardous activities and industries involve the use, storage or disposal of hazardous substances. These substances can sometimes contaminate the soil. Environment Canterbury identifies land that is used or has been used for hazardous activities and industries. This information is held on a publically available database called the Listed Land Use Register (LLUR). The Christchurch City Council may not hold information that is held on the LLUR. Therefore, it is recommended that you check Environment Canterbury's online database at www.llur.ecan.govt.nz

• Spatial Query Report

Property address:

38 Cemetery Road

LIM number: H09388125

Page 18

Christchurch City Council

53 Hereford Street, PO Box 73015
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Tel 64 3 941 8999
Fax 64 3 941 8984

www.ccc.govt.nz

A copy of the spatial query report is attached at the end of this LIM. The spatial query report lists land use resource consents that have been granted within 100 metres of this property.

Property address:

38 Cemetery Road

LIM number: H09388125

Page 19

Christchurch City Council

53 Hereford Street, PO Box 73015
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Tel 64 3 941 8999
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www.ccc.govt.nz

21 September 2023

Project Ref: 2110121

Rev.: 01

Survus Consultants Ltd
James Cowan
jim@survus.co.nz

Geotechnical Completion Report – 22 Cemetery Road, Wainui

1 INTRODUCTION

Kirk Roberts has been engaged by the client to provide a Geotechnical Completion Report for the residential subdivision at 22 Cemetery Road, Wainui (Pt Lot 1 DP 43190).

2 DESCRIPTION OF EARTHWORKS

2.1 Overview

Based on the Kirk Roberts Civil Earthworks Plan for Construction (Job No 2110121, RevA, Sheet C4.0) and substantiated by conversations with the client and site visits by a Kirk Roberts representative, supervised earthworks have only occurred within the extent of the accessway and MSE wall. Refer to Appendix A for the civil cut and fill plan.

No engineered fill has been placed within the respective lots under the supervision of Kirk Roberts.

2.2 Accessway

Based on the Kirk Roberts civil construction monitoring records, earthworks for the accessway construction resulted in:

- Cut earthworks up to 2.0 – 3.0m (max), followed by minor fill earthworks during placement of granular AP40 basecourse.

Placement and compaction of basecourse has been overseen by Kirk Roberts Civil and is not covered by this completion report.

Through correspondence with Survus Consulting Ltd, it is understood that the cut faces have been hydroseeded. Refer to Figure 1 below for image of slope stabilisation works.



Figure 1: Figure provided by Survus showing accessway slope stabilisation works.

2.3 Temporary Stormwater Pond

A temporary stormwater/sediment pond was constructed within Lot 7. This pond was subsequently decommissioned and backfilled with uncontrolled fill. The backfilling operation was not subject to engineering supervision. Refer to Appendix B.

2.4 MSE Wall Construction and Culvert Installation

Based on Kirk Roberts construction monitoring records, earthworks during the construction of the MSE wall and installation of the culvert resulted in:

- Cutting the area by circa 3.0 – 4.0m followed by placement and compaction of site won loess fill back up to level.

Kirk Roberts have overseen all earthworks associated with the construction of the MSE wall and have provided a PS4 with associated site inspection reports. Refer to Appendix C.

3 EVALUATION OF COMPLETED LANDFORM

3.1 Earthfill Suitability

Based on the compaction test reports supplied for fill placed within the extent of the MSE wall we are satisfied that the fill has been placed and compacted to an adequate standard.

No engineered fill has been placed across the individual lots or future likely building envelopes under the supervision of Kirk Roberts.

3.2 Uncontrolled Fill

Uncontrolled fill was identified within Lot 5 as noted in Kirk Roberts Natural Hazard Assessment Report for Subdivision (rev A, dated 18/12/2020). Survus Consulting Ltd have confirmed that this material has been removed by the site contractor. This was not supervised by Kirk Roberts.

The temporary sediment pond within Lot 7 was backfilled with uncontrolled fill material and is not suitable to support an overlying structure without further geotechnical investigation, analysis, and reporting to prove otherwise.

3.3 Fill Induced Settlements

All engineered fill placed within the extent of the accessway, MSE wall, and culvert has been compacted to an acceptable standard. We consider fill induced settlements of this material unlikely.

Uncontrolled fill may be susceptible to settlements outside of building code tolerances and are not suitable to support an overlying structure without further geotechnical investigation, analysis, and reporting to prove otherwise.

3.4 Slope Stability

It is our professional opinion that the subdivision works have not resulted in a heightened risk of slope instability to future building footprints or neighbouring properties. However, this does not negate the requirement for appropriate engineering assessment as part of the Building Consent. Suitable mitigation measures could include:

- Suitable offset distances from the crest of any slope to future buildings; and/or
- Specific engineering design of integrated or standalone retention systems to form level building platforms.

3.5 Erosion and Sedimentation

The dispersive nature of loess soils makes them highly susceptible to erosion producing sediment and can lead to under-runner and tunnel gully formation.

We do not consider that the subdivision works have worsened this risk subject to maintaining vegetative cover of all slopes and cut faces and ensuring that all civil infrastructure remains in good working order.

3.6 Retaining Walls

Subdivision earthworks have resulted in the construction of an MSE wall to support the accessway around the culvert. Kirk Roberts have undertaken the necessary construction monitoring and have provided a PS4 for this work. Refer to Appendix C.

It is our professional opinion that the wall provides adequate support and achieves the required Factor of Safety (FoS) under static and loading scenarios.

3.7 Lot-Specific Development

To our knowledge the subdivision earthworks have not resulted in the placement of any fill earthworks within likely building platforms. However, the presence of historical uncontrolled filling cannot be discounted.

At the time of writing this report, it is our professional opinion that earthworks have not worsened any pre-existing natural hazards, as defined within s71(3) of the Building Act 2004, to the finished lots or neighboring properties. However, lot-specific geotechnical investigation, analysis and reporting shall be undertaken to inform future residential development and to support future Building Consent applications with Christchurch City Council.

4 FURTHER WORK

4.1 Remediation of Concrete Outlet Channel from Existing Pond

It is understood that the existing concrete-lined outlet channel from the existing pond will be repaired/replaced later.

5 LIMITATIONS

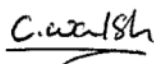
This report has been prepared on the specific instructions of our client in connection with the above site.

This report is not suitable to support Building Consent applications. Further lot-specific investigations and reporting shall be undertaken to support the Building Consent applications for buildings constructed within the respective lots.

Only our client and the Council are entitled to rely upon this report, and then only for the purpose stated above. Kirk Roberts Consulting Engineers Ltd accepts no liability to anyone other than these parties in any way in relation to this report and the content of it and any direct or indirect effect this report may have. Kirk Roberts Consulting Engineers Ltd does not contemplate anyone else relying on this report or that it will be used for any other purpose.

Yours faithfully,

Prepared by:



Charlie Walsh
BE hons
Geotechnical Engineer

Reviewed and approved by:



Jordan Walker
BScGE, CMEngNZ, CPEng, IntPE(NZ), PEng (APEGNB)
Principal Geotechnical Engineer

Appendix A – Civil Earthworks Plan

Appendix B – Location Plan for Temporary Stormwater Pond

Appendix C – Kirk Roberts PS4 and Site Monitoring Records for MSE Wall

Appendix A Civil Cut and Fill Plan



NOTES:
THIS DRAWING IS THE PROPERTY AND COPYRIGHT
OF KIRK ROBERTS CONSULTING ENGINEERS LTD
AND SHALL NOT BE COPIED REPRODUCED OR
COMMUNICATED TO A THIRD PARTY WITHOUT
WRITTEN CONSENT (C) 2017.

THIS DRAWING TO BE READ IN CONJUNCTION WITH
THE LATEST DRAWINGS AND SPECIFICATIONS FROM
ALL OTHER DISCIPLINES. PROJECT MANAGER TO BE
NOTIFIED OF ANY VARIATION BETWEEN SITE
DIMENSIONS AND THOSE ON DRAWINGS ALL
DIMENSIONS ARE SHOWN IN METRES UNLESS
OTHERWISE STATED.

THIS PLAN IS FOR CONSTRUCTION PURPOSES ONLY.

**EARTHWORKS VOLUME
(INCLUDING BUILDING FOOTPRINT)**
1346 m³ CUT
339 m³ FILL

BETWEEN EXISTING SURFACE LEVELS TO THE
FINISHED SURFACE LEVELS.

Surface Analysis: Cut & Fill Depth			
Number	Color	Minimum Depth (m)	Maximum Depth (m)
1	Red	-3.474	-3.000
2	Red	-3.000	-2.000
3	Red	-2.000	-1.000
4	Red	-1.000	-0.050
5	Grey	-0.050	0.050
6	Light Green	0.050	1.000
7	Light Green	1.000	2.000
8	Light Green	2.000	3.000
9	Light Green	3.000	4.100

A	28-06-2022 FOR CONSTRUCTION	DM
REV	DATE	ISSUED FOR
		BY

PROJECT
22 CEMETERY ROAD - CIVIL

22 CEMETERY ROAD
WAINUI

CLIENT
SURVUS CONSULTANTS

TITLE
EARTHWORKS PLAN

REVIEWED BY: DM 28-06-2022

DESIGNED BY: WM

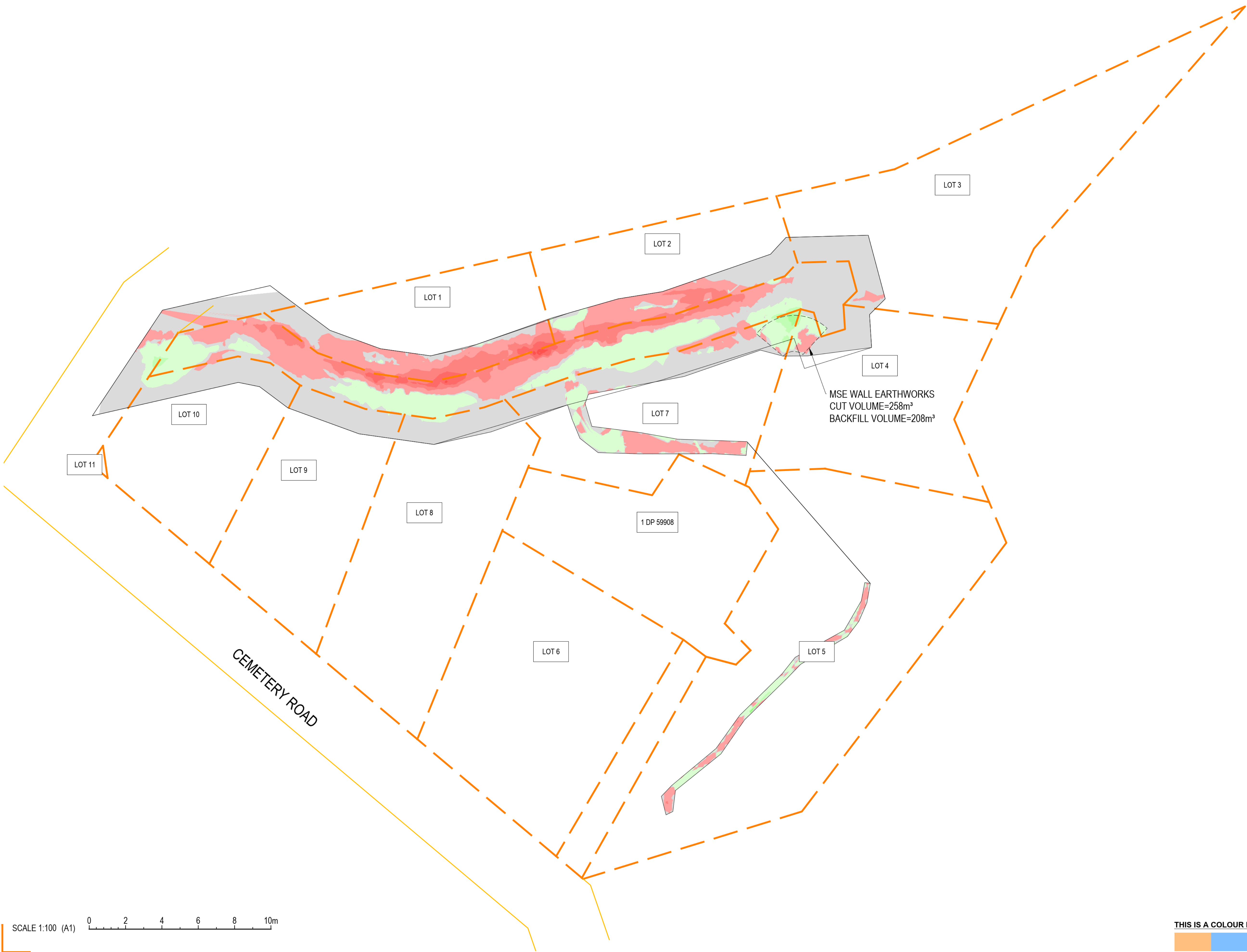
DRAWN BY: PP

SCALE: 1:500 (A1) JOB NO. 2110121

DRAWING NO. REV.

C4.0 A

CONSTRUCTION



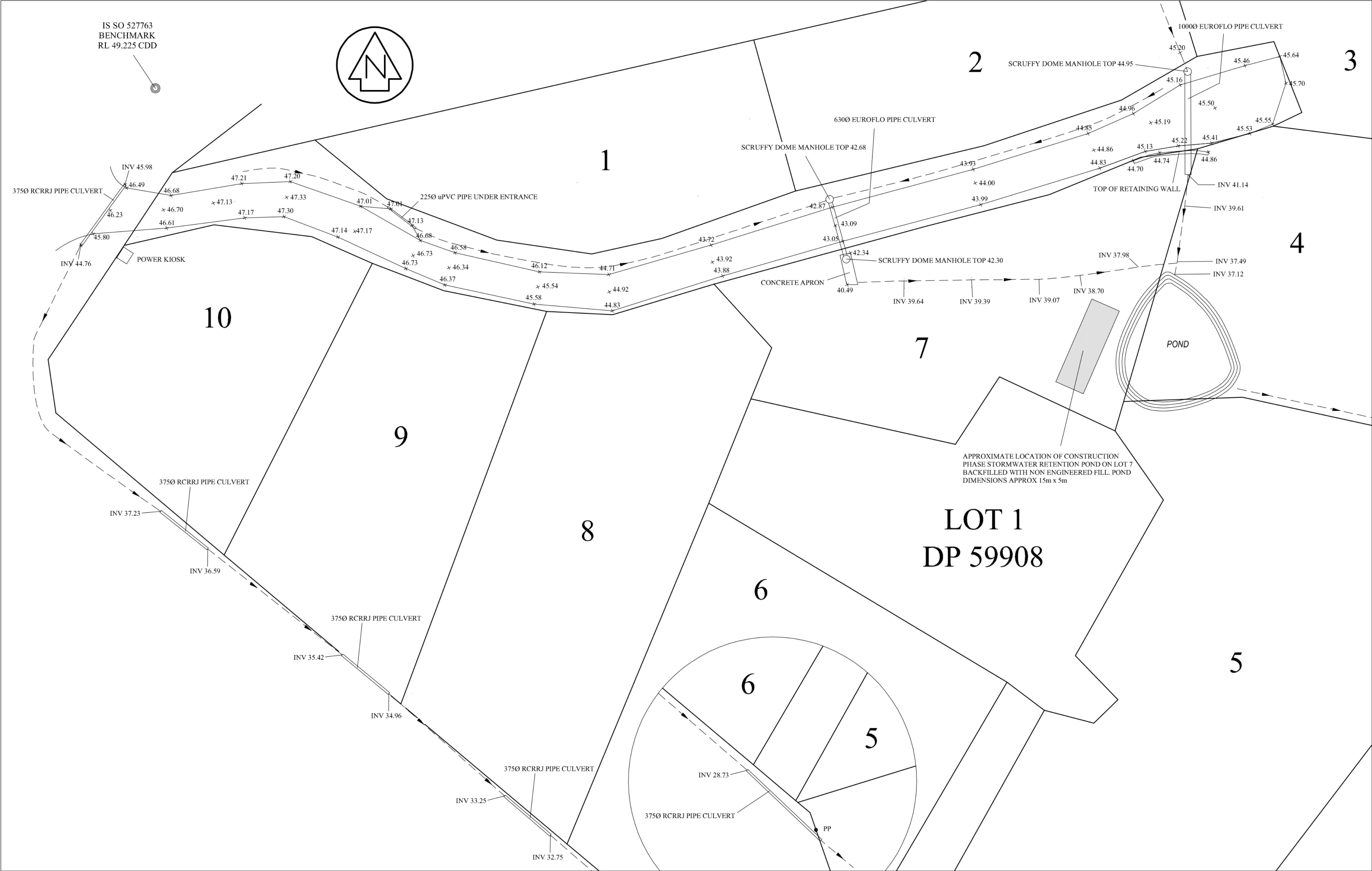
Cad File: Z:\PROJ_2021\10121\22_CEMETERY_ROAD\CIVIL3_DELIVERY\DELIVERY\DRAWING\CONSTRUCTION\2110121-C4-0-EARTHWORKS_PLAN.DWG Plot Date: 06/06/2022 4:28:50 pm Name: Ajay Chandra Xrefs:

SCALE 1:100 (A1) 0 2 4 6 8 10m

ORIGINAL SHEET SIZE A1 (841X594) - Do not scale from Drawing



Appendix B Location Plan for Temporary Sediment Pond



REV	DATE	REVISION DETAILS	
A	01/08/23	ISSUE FOR SEC 224 APPROVAL	J L COWAN

DESIGNED JLC	VERIFIED
APPROVED	

PROJECT
WAINUI RISE SUBDIVISION - CEMETERY ROAD WAINUI
TITLE
RIGHT OF WAY & STORMWATER WORKS AS BUILT DETAILS

FOR APPROVAL	
PROJECT NO 14766	
SCALE 1:400 (A2)	SIZE A2
DRAWING NO AB-01	REV A

Appendix C PS4 and Site Monitoring Records for MSE Wall

21st September 2023

Jim Cowan
Survus Consultants
jim@survus.co.nz (Via Email)

Attention: Jim Cowan

Project Ref: #2110121
Letter Ref: E-LTR-G-002-Rev.A

PRODUCER STATEMENT (PS4) - 22 Cemetery Road, Wainui (BCN/2022/713)

Hi Jim,

Please find attached PS4 for the MSE Wall constructed at 22 Cemetery Road, Wainui.

If you have any questions please do not hesitate to contact us.

Yours faithfully

A handwritten signature in blue ink that reads 'C. Walsh' with a horizontal line underneath.

Charlie Walsh
Geotechnical Engineer
BE (Hons) Civil
P: 03 379 8600

Attachments

Attachment 1- PS4 for MSE Wall

[@2110121_GEO_2023-09-20_PS4_for_MSE_Wall_auCW_apFS.pdf](#)

Disclaimer

Third Parties: This letter has been prepared for the sole use of our client, for the particular brief and on the terms and conditions agreed with our client. It may not be used or relied on (in whole or part) by anyone else, or for any other purpose, or in any other contexts, without our prior written agreement. We will not be liable for any loss, damage, cost, or expense incurred by such other persons.

Disciplines are limited to those stated: Although we are a multi-disciplinary organisation, we only provide input on each project from the particular disciplines engaged by our client and expressly stated in this document and our obligations are limited to the inputs expected from those specified disciplines. Please let us know if you would like to engage additional services or disciplines for your project.

22 February 2022

Project Ref: 2110121
Rev.: 01

Survus Consultants
Hamish Frizzell
hamish@survus.co.nz

Re: MSE Wall Design – 22 Cemetery Road, Wainui, Canterbury

1. Introduction

Kirk Roberts has been engaged by the client to undertake geotechnical investigations and MSE retaining wall design for a culvert outlet at 22 Cemetery Road, Wainui, Christchurch (hereafter referred to as 'the site'). This report presents the findings of site-specific geotechnical investigations and a discussion of the following:

- Design assumptions and slope stability assessment for MSE retaining wall.
- Geotechnical recommendations for FLEX MSE retaining wall.

2. Site Description

The area subject to the most recent geotechnical investigation by Kirk Roberts is located within the immediate vicinity of the culvert outlet near the north-central part of the site. Refer to Attachment 1 for the location plan.

At the time of investigation, the following observations were noted:

- There was scouring of the near surface soils at the top of the slope above the existing culvert which is likely attributed to stormwater runoff.
- The slope had a height of circa 4.0 m, a gradient of circa 30 degrees, and a horizontal extent of 5.0 m. The slope transitions to a shallower gradient of circa 15 degrees which conveys water from the culvert outlet down to an existing pond.
- Rocks had been placed on the slope below the culvert discharge point presumably to mitigate erosion of near-surface soils. These appeared to have been in place for a long time and were covered in vegetation.
- The slope appeared stable and no signs of deep-seated instability were identified.

Refer to Attachment 2 for photos of the inspected area.

3. Geotechnical Investigation

Kirk Roberts carried out a shallow geotechnical investigation on the 7th of December 2021. Testing comprised two hand auger boreholes (HA-1 & HA-2) with associated Scala Penetrometer tests (SP-1 & SP-2) to a target depth of 3.0 - 4.0 m below ground level (bgl) or early practical refusal.

The tests were undertaken above the culvert within the central northern region of the site (refer to Attachment 1 for test location plan). Shallow testing was also attempted at several locations at the bottom of the slope below the culvert but met practical refusal close to the ground surface due to shallow floating rocks.

4. Subsurface Conditions

HA-1 and HA-2 encountered topsoil to 0.1 m bgl, overlying loess to 0.7 - 1.3 m bgl where the tests met practical refusal on inferred floating rocks.

SP-1 and SP-2 were advanced to 2.2 m and 2.4 m bgl, respectively, before reaching effective refusal on inferred floating or weathered rock.

Based on our observations while on-site, it is our opinion that the slope by the culvert outlet comprises non-engineered fill characterised by a mix of silt and rock. However, we were not able to confirm this using hand-test equipment.

Refer to Attachment 1 for the geotechnical investigation logs.

5. MSE Retaining Wall Design

5.1. Overview

As part of the civil design works for the proposed subdivision, it is understood that a retaining wall is required to retain the slope by the culvert outlet and provide support for the internal access road above. We also understand that the client wishes to use the FLEX MSE system which comprises stacking filled geobags which are held together by plastic interlocking plates. Geogrid can be introduced into the backfill to provide additional stability.

5.2. Stability Assessment

The stability of the proposed MSE wall was modelled in SLIDE2 based on the following geotechnical assumptions:

- The cross-section was based on a 'tape and Abney' exercise undertaken while on-site together with publicly available topographic contours.
- The retaining wall was given a backslope of 30 degrees which is consistent with the existing slope profile by the culvert outlet. Therefore, the proposed design is consistent with the existing topography (i.e. the cross-section post-retaining wall installation will be consistent with the existing cross-section).
- A loading of 12 kPa was applied at the top of the retaining wall to account for anticipated surcharge from traffic using the accessway.
- Strength parameters for the in-situ soils, retaining wall backfill, and the FLEX MSE wall are summarised in [Table 1](#) below.
- Three layers of geogrid were introduced into the backfill and were assumed to provide a capacity of 30 kN/m, and adhesion of 5 kPa, and friction angle of 40 degrees.
- Seismic analysis was undertaken using PGA values specified for Christchurch corresponding to seismic events SLS1 (0.13g), SLS2 (0.19g), and ULS (0.35g).

The calculated factor of safety (FoS) for different loading scenarios are summarised in [Table 2](#). Refer to Attachment 3 for the worst-case predicted failure planes.

The predicted factor of safety for a 1/500-year ULS event was 0.95. However, it is our professional opinion that the retaining wall will satisfy ULS seismic design considering that:

- The predicted failure plane is deep seated and extends below the proposed retaining wall which we consider unlikely.
- The factor of safety for the ULS seismic case is very close to unity.
- Research undertaken by Gazetas et al, 2014¹ states that a seismic factor of safety less than 1 does not necessarily signify failure as "Seismic loading is cyclic" meaning that "the duration of $FoS < 1$ is limited and the displacements are reversed before they reach the point of no return, due to load reversal".

¹ Gazetas, G. Anastasopoulos, I. & Garini, E. (2014) "Geotechnical design with apparent seismic safety factors well-below 1", Soil Dynamics and Earthquake Engineering 57 (2014) 37–45

Table 1: Assumed Parameters for Slope Stability Analysis

Parameter	Unit Weight (γ)	Cohesion c'	Angle of Friction, ϕ'
Natural Silt (Loess)	18 kN/m ³	3 kN/m ²	28°
Engineered Silt Backfill	18 kN/m ³	3 kN/m ²	28°
MSE Wall	18 kN/m ³	100 kN/m ²	35°

Table 2: Achieved Factor of Safety (FoS) from Slope Stability Analysis.

Load Case	FoS
Static + 12 kPa Surcharge	2.15
Seismic SLS1 (PGA=0.13g) + 12 kPa Surcharge	1.48
Seismic SLS2 (PGA=0.19g) + 12 kPa Surcharge	1.29
Seismic ULS (PGA=0.35g) + 12 kPa Surcharge	0.95

6. Geotechnical Recommendations

6.1. Earthworks and Backfilling Operation

The construction sequence and temporary stability works are the responsibility of the contractor; however, the wall must be constructed in accordance with the consented plans by a registered installer of the flex MSE system. The general construction methodology is outlined below:

- Excavate all material within a 3.0 m offset from the slope edge and batter cut face to a maximum gradient of 2V:1H.
- First two rows of geobags shall be embedded in the ground.
- FLEX MSE wall shall be installed at a 30-degree slope measured from the horizontal.
- Geogrid shall be installed after every sixth bag (four layers total) and extend back to the battered cut face. The geogrid must be sufficiently tensioned to remove any wrinkles/bulges.
- Tensar TriAx TX160 geogrid is recommended; However, this may be substituted for DuraGridx30/30, Tensar SS30 or TGSG3030 geogrid or another product of equivalent tensile capacity and performance, subject to confirmation in writing by the geotechnical engineer.
- Backfill may comprise site-won or imported material. Suitable backfill materials include non-plastic silts or granular material. The backfill material shall be approved by a Kirk Roberts geotechnical engineer prior to placement.
- Drainage material (Enka drain sheet) shall be placed behind along the cut face effectively connected to the Megaflo drain placed along the base of the excavation.
- NDM testing of the compacted material shall be undertaken every 500 mm lift and the results shall be supplied to Kirk Roberts for review and approval. The laboratory certificate (MDD/OMC) shall be provided to Kirk Roberts.

Refer to Kirk Roberts and PS1 and MSE Wall Drawings in Attachment 5 and 6, respectively.

7. Limitations

Whilst every care was taken during our desktop review, site investigation and interpretation of subsurface conditions, there may well be subsoil strata and features that were not detected.

It must be appreciated that the actual characteristics of the subsurface materials may vary significantly between adjacent test locations and sample intervals other than where observations, explorations and investigations have been made.

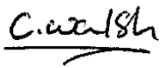
It should be noted that because of the inherent uncertainties in subsurface evaluations, changed or unanticipated subsurface conditions may occur that could affect total project cost and/or execution. Kirk Roberts Consulting does not accept responsibility for the consequences of significant variances in the conditions and the requirements for execution of the works.

This report is considered suitable for submission with Building Consent application for the proposed MSE retaining wall.

This report has been prepared at the specific instructions of our client in connection with the above project. No liability is accepted by Kirk Roberts or any of their employees with respect to the use of this report by any other party.

Yours faithfully,

Prepared by:



Charlie Walsh
BE hons (CIVIL)
Graduate geotechnical Engineer

Reviewed & approved by:

Firas Salman
PhD, CMEngNZ, CPEng
Senior Geotechnical Engineer

Attachments:

Attachment 1 – Site Location Plan & Investigation Logs	(3 Pages)
Attachment 2 – Photos from investigation	(1 Page)
Attachment 3 – Stability Analysis	(4 Pages)
Attachment 4 – FLEX MSE Wall Specification	(10 Pages)
Attachment 5 – PS1	(2 Pages)
Attachment 6 – MSE Wall Drawings	(9 Pages)

Attachment 1 Site Location Plan and Investigation Logs



LOCATION OF
PROPOSED MSE
WALL

HA-2,
SP-2

HA-1,
SP-1

Legend



Hand-auger and Scala penetrometer
test locations, December 2021

Satellite image obtained from Canterbury maps (2021), therefore Kirk Roberts consulting cannot verify that these are accurate. All test locations are approximate only.

PROJECT: 2110121
CREATED BY: CW
DATE: 2022-02-01
REVISION: A

22 Cemetery Road, Wainui

GEOTECHNICAL INVESTIGATION LOCATION PLAN



SCALA PENETROMETER & HAND AUGER RESULTS



Client: SURVUS Consultants
 Site Address: 22 Cemetery Road, Wainui
 Town/City:

Scala Penetrometer: SP-1
 Hand Auger No. HA-1
 Job No.: 2110121

Logged By: CW Checked By: FS
 Logged Date: 07/12/21 Checked Date: 07/12/21

Date: 07/12/21
 Weather: Fine
 Operator: CW & FS

Geological Formation	Depth (m)	Sample Description	Graphic	USCS	D _r	Water Table	Undrained Shear Strength S _u (kPa)	Blows per 100 mm of Penetration																		
								1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	0.5	TOPSOIL (OL); dark brown. Moist.		OL									5													
		SILT (M); light brown. Firm, moist, non-plastic; Loess.		M									6													
		EOH: 0.70m											5													
	1.0	0.7m: EOH: Grinding on floating rock				Groundwater Not Encountered							11													
													9													
													6													
													4													
													2													
													4													
													5													
													3													
													2													
													1													
	1.5					Groundwater Not Encountered							1													
													7													
													4													
													4													
													4													
													4													
													4													
													10													
	2.0					Groundwater Not Encountered																				
	2.5					Groundwater Not Encountered																				

Remarks: Scala Penetrometer and Test Bore log tests give an indication of the ground condition at the location of the tests only. While they are representative of typical conditions across the site, they do not identify variations in the ground away from the test locations.

337 Saint Asaph Street, CHRISTCHURCH 8011

SCALA PENETROMETER & HAND AUGER RESULTS



Client: SURVUS Consultants
 Site Address: 22 Cemetery Road, Wainui
 Town/City:

Scala Penetrometer: SP-2
 Hand Auger No. HA-2
 Job No.: 2110121

Logged By: CW
 Logged Date: 07/12/21
 Checked By: FS
 Checked Date: 07/12/21

Date: 07/12/21
 Weather: Fine
 Operator: CW & FS

Geological Formation	Depth (m)	Sample Description	Graphic	USCS	D _r	Water Table	Undrained Shear Strength Su (kPa)	Blows per 100 mm of Penetration																		
								1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	0.5	TOPSOIL (OL); dark brown. Moist.		OL																						
		SILT (M); light brown. Firm, moist, non-plastic; Loess.		M																						
	1.0																									
	1.5	EOH: 1.50m																								
		1.5m: EOH: Grinding on floating rock																								
	2.0																									
	2.5																									

Remarks:
 Scala Penetrometer and Test Bore log tests give an indication of the ground condition at the location of the tests only. While they are representative of typical conditions across the site, they do not identify variations in the ground away from the test locations.

337 Saint Asaph Street, CHRISTCHURCH 8011

Attachment 2 Photos from Investigation

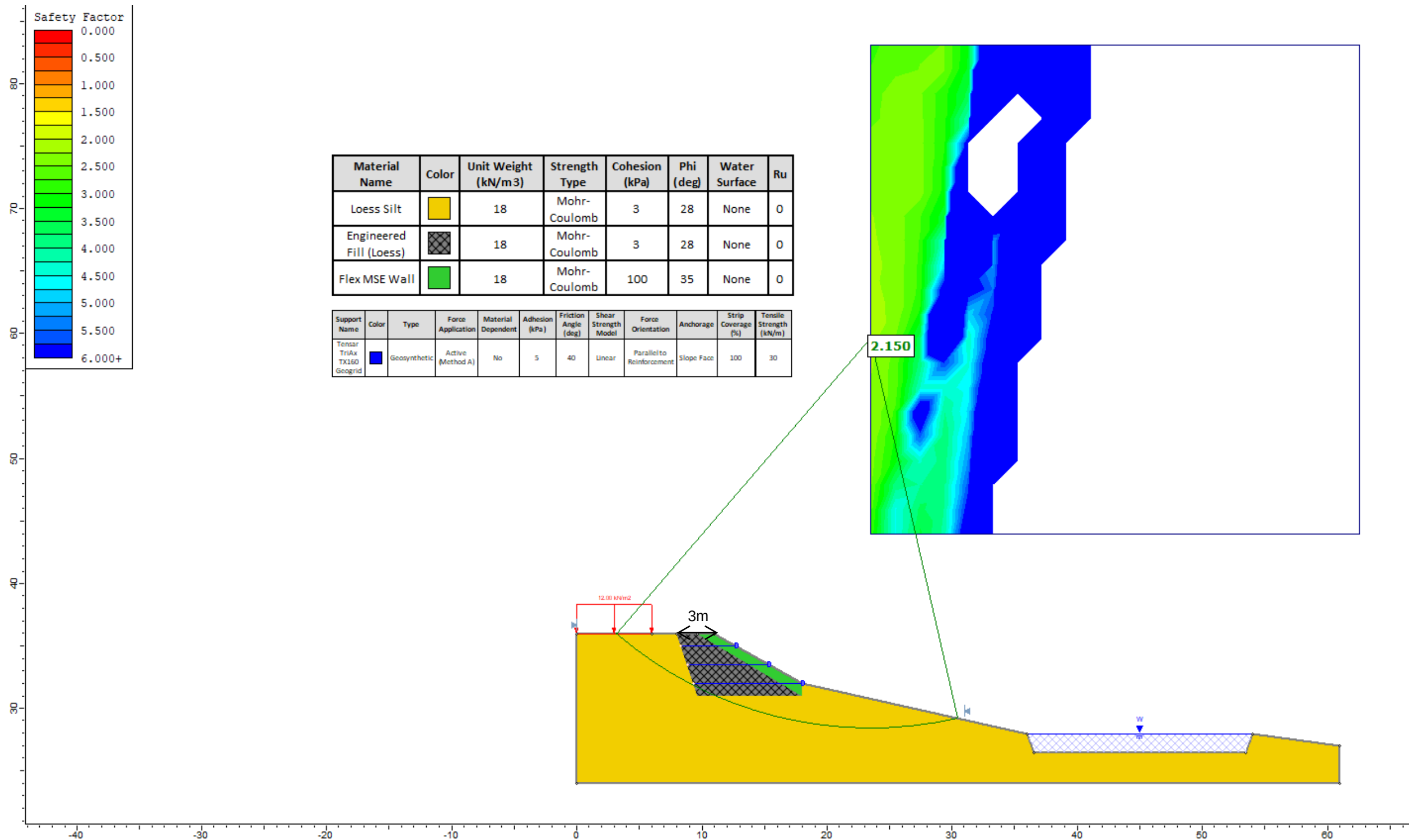


Image 1 - Image showing scoured soil above culvert outlet.



Image 2 - Image showing slope below culvert outlet where MSE wall will be constructed.

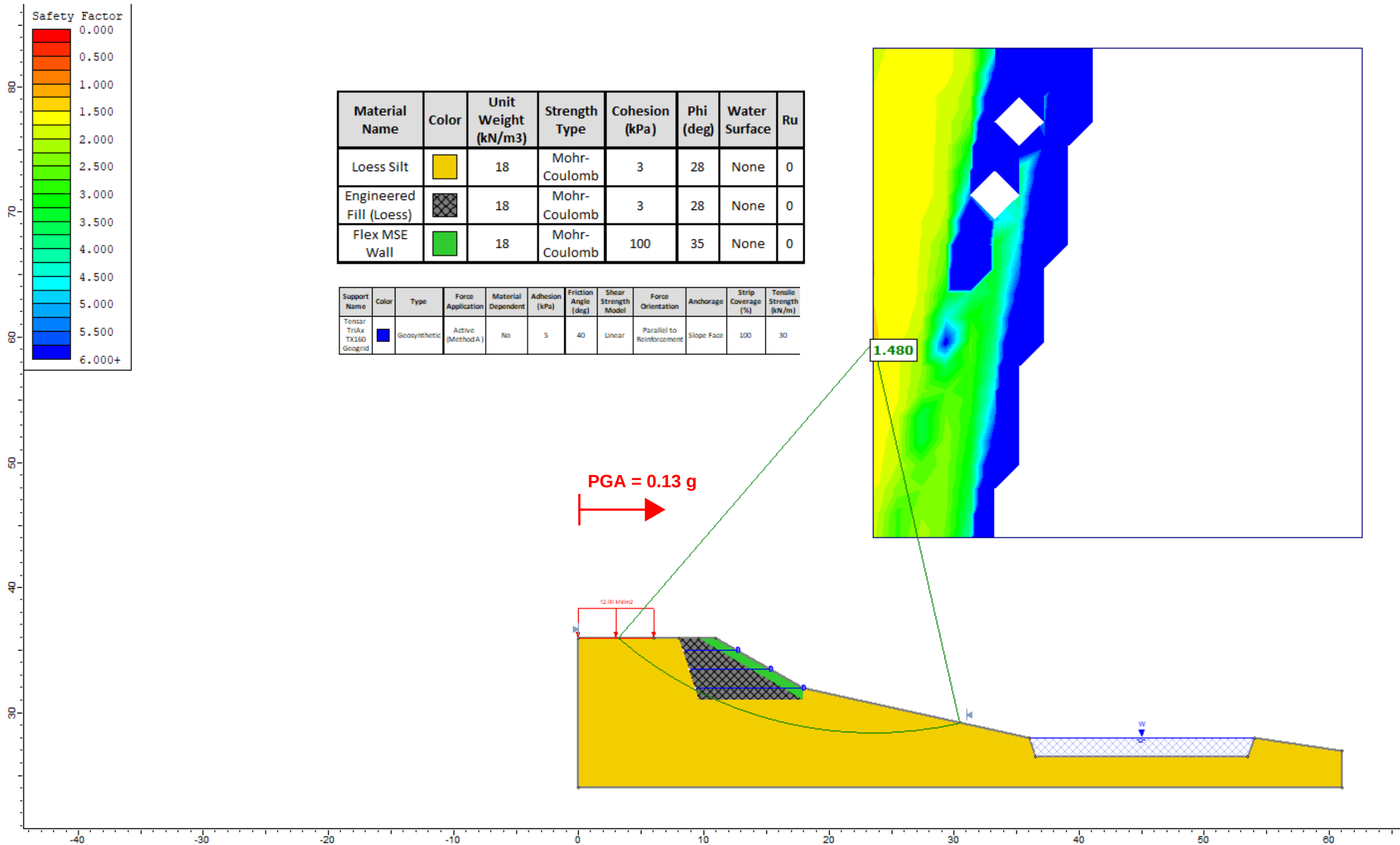
Attachment 3 Slope Stability Analysis Results

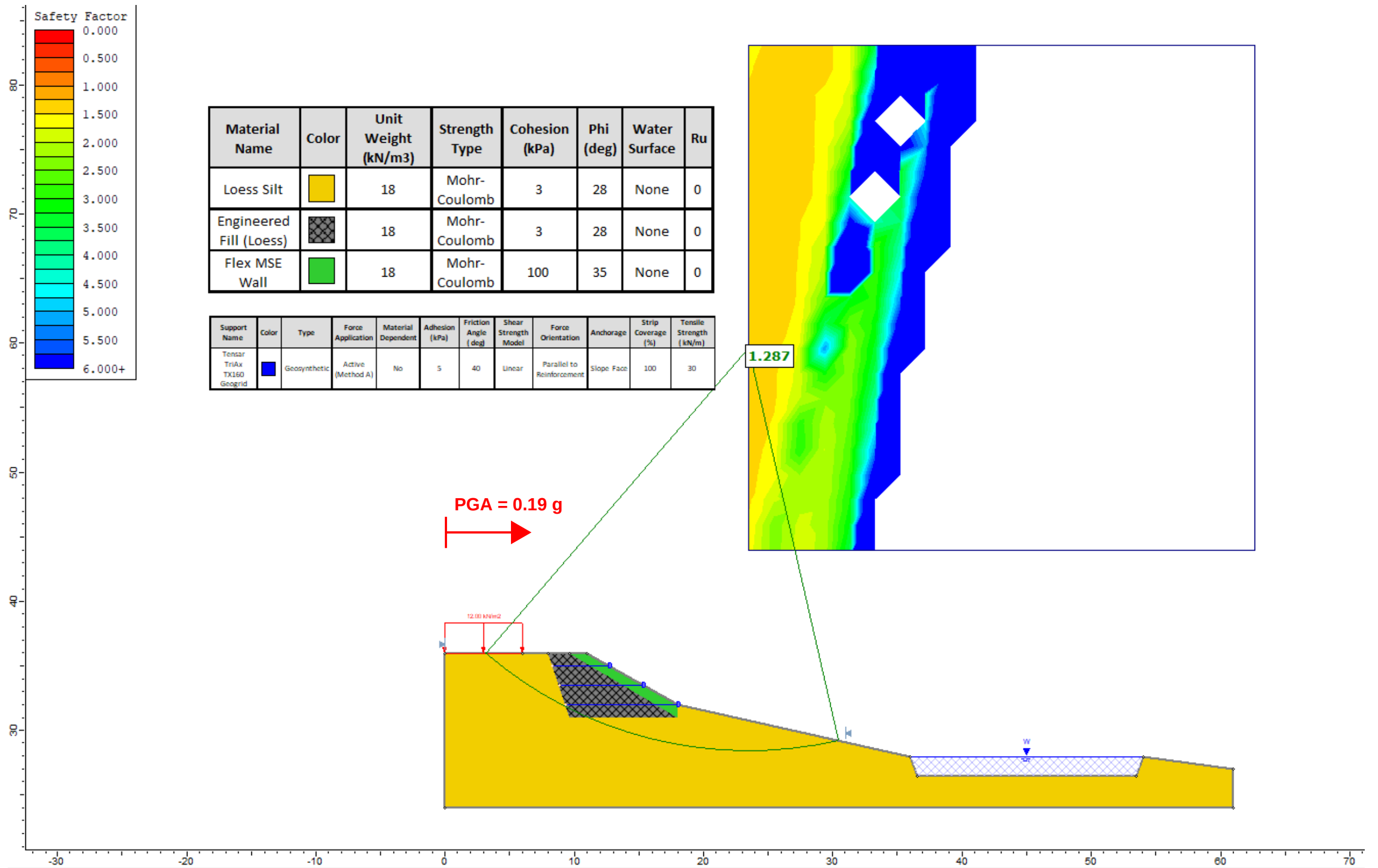


PROJECT: 2110221
 CREATED BY: CW
 DATE: February 2022
 REVISION: A

22 Cemetery Road, Wainui,
 Canterbury

Slope Stability Analysis Static Case + 12 kPa Surcharge



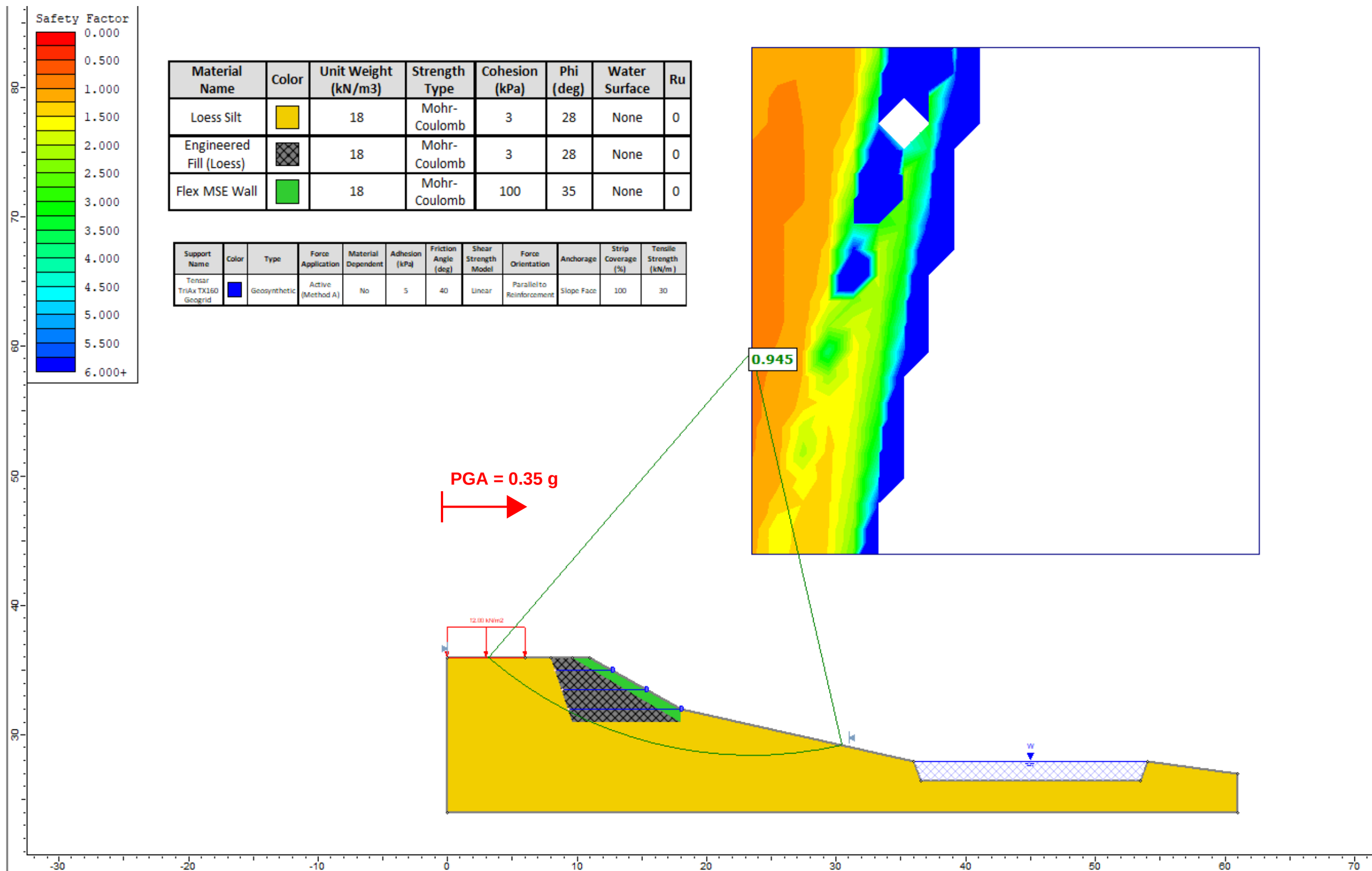


PROJECT: 2110221
 CREATED BY: CW
 DATE: February 2022
 REVISION: A

22 Cemetery Road, Wainui,
 Canterbury

**Slope Stability Analysis Earthquake (SLS2) +
 12 kPa Surcharge**





PROJECT: 2110221
 CREATED BY: CW
 DATE: February 2022
 REVISION: A

22 Cemetery Road, Wainui,
 Canterbury

**Slope Stability Analysis Earthquake (ULS) + 12
 kPa Surcharge**



Attachment 4 Flex MSE Wall Specification

System Specification – Flex MSE Vegetated Wall System

PART 1 – GENERAL

1.01 Description of Work Included:

- .1 Safety Monitoring & Response.
- .2 Protection of Existing Features and Work in Progress.
- .3 Review of the existing site conditions including soil, groundwater, geometry and loading conditions.
- .4 Survey for horizontal and vertical control of all work of the Contract.
- .5 Excavation and Foundation Soil Preparation.
- .6 Supply, Placement, and Compaction of backfill materials to Engineering Specifications.
- .7 Supply, Placement and Compaction of free draining material near Flex MSE installation (if specified).
- .8 Supply and Placement of Bag fill medium in Flex MSE modular Bags.
- .9 Supply and Placement of the Flex MSE System components.
- .10 Supply and Placement of geogrid or other reinforcement (if specified).
- .11 Supply and Placement of vegetation materials.

1.02 Related Sections:

- .1 Section [] - Site Preparation
- .2 Section [] – Earthwork, Excavation and preparation
- .3 Section [] - Fill and Backfill
- .4 Section [] – Geotextile
- .5 Section [] - Drainage
- .6 Section [] - Hydro seeding for Lawn Areas
- .7 Section [] - Landscape Plantings

1.03 Submittals:

.1 In accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
.2 Shop drawings sealed by a registered professional Engineer in the [province] [state] (5 sets) submitted in accordance with Section []. Shop drawings to include:

- a. Retaining wall profile
- b. Cross sections
- c. Site Specific details (if applicable) [corners, steps, etc]
- d. Segmental retaining wall unit dimensions and details
- e. Project notes

.3 Sieve analysis of granular base and backfill materials.

.4 Segmental unit System:

- a. Samples of segmental units to indicate product standards.
- b. Accepted samples become the standard of acceptance for work.
- c. Test results from an independent testing laboratory for compliance of **Flex MSE** unit requirements.
- d. Manufacturer's product data, installation manual and material safety data sheets for the safe handling of the specified materials and products.

1.03 References:

.1 **Trexiana Wholesale & Distribution Ltd.** Website: www.FlexMSE.com

.2 **Flex MSE** System materials meet the requirements of the following American Standards Test Methods:

(For **Flex MSE** Geotextile)

- a) Weight (typical) ASTM D5261,
- b) Grab Tensile ASTM D4632,
- c) Grab Elongation ASTM D4632,
- d) Trap Tear ASTM D4533,
- e) CBR Puncture ASTM D6241,
- f) Mullen Burst ASTM D6786 (modified),
- g) A.O.S. ASTM D 4751,
- h) Permittivity ASTM D 4491,
- i) Water Flow ASTM D 4491,
- j) U.V. Resistance ASTM D4355,
- k) ASTM D256

1.04 Engineering Requirements:

- .1 Engineered specifications will be considered in the design and construction of any **Flex MSE System** application exceeding the local regulations for total or exposed vertical height or where used in any water related sites.
- .2 Engineering considerations, depending on the **Flex MSE** application, should include but not be limited to:

Application height, wall or slope face angle/ batter, site soils, backfill soils, slope above structure, slope below structure, surcharge loading, hydrostatic loading, seismic qualifications, site drainage & run off patterns, wave action, current flow velocities, stream scour depths, anticipated settlement, geogrid soil reinforcement or other mechanical soil stabilization devices included in the design of the wall.
- .3 Provide Engineer drawings and specifications prepared by a qualified Engineer for the construction of all **Flex MSE** structures shown on the construction drawings and as described by the Contract Specifications.
- .4 Provide geotechnical soils report from a qualified Geotechnical Engineer to ascertain that the site soils can be compacted to specification. Should site soil be used to fill the **Flex MSE** Bags, the soil will be analyzed to ensure that sufficient nutrients exist to sustain the chosen vegetation and meet the minimum mineral specification outlined in Section 2.5.
- .5 Provide a combined Sieve/Nutritional analysis for the Bag Fill Medium guaranteeing it meets minimum, or Engineer specific mineral requirements, as well as local Landscape Materials specifications for the specified vegetation.
- .6 The **Flex MSE System** Bag and Bag Fill Medium is Engineered for water permeability and therefore drainage systems are usually not required if adjacent soils are free draining & no abnormal hydrostatic pressure exists. Should a drainage system be required by a Design Engineer, construct a drainage system as specified.
- .7 **Flex MSE** System's "**Tie Back**" design can be used for no surcharge gravity walls under 2.0m in height where geogrid is not specified. Depending on the dimensions of the wall/slope and surcharge, the Engineer may specify rotating some or all of the **Flex MSE** Bags 90 degrees. This is typical for repairs/upgrades of road side slips/erosion and culvert headwalls. For culvert headwalls with a 1H:2V slope it is recommended to rotate 90 degrees every 2nd Bag on every 2nd row for up to 1.5m height. For heights up to 2m, rotating 90 degrees every 2nd Bag on every row is recommended. For steeper slopes, rotating every Bag may be required.

PART 2 – COMPONENTS

2.01 Flex MSE Vegetated Wall System Components:

Purchasing:

Purchase warranted **Flex MSE** materials and suitable geosynthetic reinforcement from your nearest authorized Flex MSE agent or dealer. Visit <http://www.flexmse.com/find-a-flex-mse-dealer-global/> to find a local dealer.

Flex MSE System Description:

Flex MSE uses industry standard soil stabilization practices and Engineered components to create near vertical ‘soft armour’ faced segmental walls that accept and integrate vegetation into the system’s performance.

.1 Flex MSE Plate

.1 The patented and branded **Flex MSE** Plate is composed of 100% polypropylene (100% recycled post industrial content), must be weather resistant to minus 30 Degrees Celsius and must be 100% recyclable. 3 conical spikes protrude from the top and 8 conical spikes protrude from the bottom of the unit to interlock a total of three filled **Flex MSE** Bags. 2 ‘Friction Strips’ with Geogrid Hooks cross the width of the top of the Plate, providing additional shear strength and frictional contact. The **Flex MSE** Plate is to be used in all applications, including those using geogrid for reinforced walls and slopes, gravity walls, and erosion control applications.

.2 Flex MSE Bags

.2 The labeled **Flex MSE GTX Bag** is sewn from a proprietary non-woven geotextile that will not rot or mildew, is non-biodegradable and able to withstand significant cutting or tearing without negatively affecting system performance. **Flex MSE** Bags provide a filtering functionality and are water permeable and root friendly. **Flex MSE** Bags have met all applicable ASTM standards for geotextile testing (pursuant to Section 1.03.2).

2.02 Geosynthetic Soil Reinforcement:

.1 Engineer recommended geosynthetic reinforcement is available from authorized Distributors or Dealers in your region.

.2 Install geosynthetic reinforcement layers according to the manufacturer’s guidelines.

.3 Spacing and length of reinforcement is to be specified on Engineer Drawings. The **Flex MSE System** can accommodate minimum reinforcement spacing of 15cm (6in).

.4 Reinforcement in the form of the Tie Back Method or appropriate geogrids must be used in all Flex MSE installations greater than .6m (24”) exposed height.

2.03 Reinforced Backfill:

- .1 Shall consist of granular or low plastic site soils
- .2 A plasticity index less than 10 per ASTM D4318
- .3 An effective internal angle of friction > 28° per ASTM D2166 or D3080 at the compaction standard
- .4 Less than 0.5% organic material
- .5 Material can be site-excavated soils where the above requirements can be met. Unsuitable soils for backfill including ML, CL, MH, CH, OH or Pt shall not be used in the backfill or in the reinforced soil mass.
- .6 Use of an effective friction angle greater than 34 degrees for design shall be verified by appropriate testing submitted to and approved by the owner's Engineer prior to construction.

2.04 Flex MSE Bag Fill Material:

- .1 Bag fill material is selected with the desired vegetation and application in mind. Bag fill soils must be approved by the designing Engineer and/or Trexiana.

.2 Walls, Slopes and above High Water line applications

- .1 Freely draining soils and granular materials cleaned of all debris, roots, branches, stones in excess of 20 mm diameter and other deleterious materials. Remove soil contaminated with calcium chloride, toxic materials and petroleum products.

- .2 Properties should include:

Approximate Organic Content: 30% by total mixed volume

Granular Content smaller than 20 mm - larger than .075mm: 70% by volume (less than 5% Fines by mass)

*Total Fines of mixed Bag medium: Less than 8% by mass

Percolations shall be such that no standing water is visible 60 minutes after at least 10 minutes of moderate to heavy rain or irrigation.

- .3 Organic additive materials must be a viable commercial compost product and/or a native soil tested for nutritional content. Flex MSE Bag Fill properties are to be confirmed with an up to date combined sieve and nutritional analysis.

- .4 Thoroughly mix all constituents of the Flex MSE Bag Fill material.

- .5 Other criteria may be required in project specific Engineer Drawings. Refer to Contract Documents.

.3 Below Water line Applications

- .1 Poorly Graded Clean Granular material; maximum 20 mm gravel - minimum particle size 2 mm.

- .2 Vegetation: Bag medium may be preseeded at specified rates with appropriate species to promote vegetation of **Flex MSE** Bags below the high water line. Brush layering or Live Staking around Bags may also be accomplished, paying care to not puncture the face of any Bags below high water line.

2.05 Flex MSE System Vegetation

- .1 Vegetation can be applied through a variety of planting methods. Vegetation is selected with consideration to the environmental and application conditions, as well as the desired end result. A vegetation specialist is recommended to assist in the selection of plant materials. Trexiana Wholesale is available to provide vegetation resources and references to parties involved in the Contract.

Depending on location, climate, and overall slope, an irrigation system may need to be incorporated into the **Flex MSE** installation. For best results, use soaker hoses, spray heads, or drip irrigation located with appropriate spacing. Engage a qualified irrigation professional for design and installation on all engineered installations.

.2 Approved vegetation methods include:

- .1 Seeding – Hydroseeding & Pre-Seeding the **Flex MSE** Bag
- .2 Live Planting
- .3 Live Staking
- .4 Brush Layering

See Section 3.09, Flex MSE Vegetation Best Practices and Contract Design Notes for full descriptions of methods.

PART 3 - INSTALLATION

Verify Project Engineer Drawings are consistent with on-site conditions prior to starting construction. Any additional or changed conditions that may affect the project design are the sole responsibility of the Contractor to report.

3.01 Site Preparation

- .1 Clear and grub existing area.
- .2 If site soil is to be used as fill, test native soils for suitability as **Flex MSE Bag** and back fill material.
- .3 If **Flex MSE** Bags are filled on site, prepare a suitable “work area” located in close proximity to the site that allows for safe stockpiling.

3.02 Subgrade

- .1 Refer to Engineer drawings for specified excavation, embedment depths and compaction for each application type and comply with requirements.
- .2 Excavate to depths shown on drawings allowing for specified number of below grade **Flex MSE** Bag layers on top of specified depth of compacted granular base or compacted native mineral layer.
- .3 Prepare a stable, reasonably level base and proof compact to specified density.

3.03 Granular Base

- .1 Where specified by Geotechnical Engineer, place granular base materials to lines and depths as shown in contract drawings and compact as specified. Minimum **Flex MSE** system requirements for the wall facing are a 300mm deep trench at the toe, lined with 150mm of 20mm clear crush for drainage and leveling. ‘At grade’ installations will have the equivalent of

one **Flex MSE** course high and 600mm wide of approved fill compacted to 95% Standard Proctor (SP) in front of the initial course.

3.04 Preparation of **Flex MSE** Bags

- .1 Ensure the Bag Fill Material is thoroughly mixed with any required additives. Recommended mix is 70% clean sandy/granular material and 30% organic material by volume. Mix constituents may vary dependent on the application, plant/vegetation selection, site location and climate, and Engineer/Designer specifications.
- .2 Fill the **Flex MSE** Bags completely, to a consistent weight and size, allowing just enough geotextile material for the secure closure of the Bag.
- .3 Secure the closure at a consistent place on every Bag. Bag closure methods include but are not limited to cable or rebar ties, hog rings, or machine sewing with appropriate hardware and industrial threads.

3.05 Drainage

- .1 Certain projects may require Engineered drainage solutions depending on variable site conditions as stated in section 1.04 of this guideline, or due to characteristics of the **Flex MSE** Bag fill medium.
- .2 Refer to Engineering Drawings and Specifications for drainage structures, and comply with all requirements.

3.06 **Flex MSE** Construction

- .1 Refer to Engineer drawings for layout dimensions and installation techniques.
- .2 Begin by placing a **Flex MSE** Plate between the base layer (eg: crush, native material, or leveling pad) and first row.
- .3 Install the base course of filled **Flex MSE** Bags as per Engineer drawings. Start installation at the lowest point and dig Bags into the material at appropriate elevation changes. Leave no more than an inch between each Bag to allow for spread during compaction. Place Bags with the seam level and facing inwards towards backfill material. Hand tamp or machine compact each layer. There shall be no gaps between tamped/compacted Bags to ensure backfill material containment. Place a **Flex MSE** Plate equally over the juncture of each bag in the row. Plate placement must be set back specific so that Plates are fully enveloped by successive Bags and gain full reinforcement engagement. For successive layers, lay **Flex MSE** Bags over the Plate and joint of the two Bags underneath, maintaining the typical Segmental Retaining Wall 'running bond' pattern. If the ends of Bags on the working layer get within 8 inches (200mm) of the Bag joints underneath, lay a spacing Tie-Back unit down to reset the running bond pattern (refer to the *Flex MSE Tie Back CAD* for illustration). Hand tamp or lightly (1000lb) machine compact each layer to fully engage the spikes of the **Flex MSE** Plate to the Bags on top and underneath.
- .4 Install drainage system per drawings if required.

.5 Place and compact backfill to Specification every two courses of compacted **Flex MSE** Bags (280 mm) or per Engineer's specification. Structures with lower slopes and greater setback may require placement and compaction of backfill every row to prevent slumping of Bags backwards. Bags are hand tamped every Row or machine compacted every two rows with light weight compaction equipment.

.6 Maintain the specified batter or slope as rows of **Flex MSE** Bags and Interlocking Plates are placed through measurement, Batter Board/Jig or level. Any change in batter from the drawing must be approved by the Designing Engineer. Account for changes in Unit set back and profile as a result of **Flex MSE** Bag compaction.

3.07 Backfill

.1 Back fill shall be placed in maximum 10 inch (250mm) uncompacted lift thickness and compacted to 98 percent Standard Proctor density as determined in accordance with ASTM D-698. The in-place moisture content shall not exceed the optimum moisture content as determined in accordance with ASTM D-698 and shall be no lower than 3 percentage points below optimum moisture content.

.2 Backfill shall be placed, spread, and compacted from the facing units toward the back of the fill zone to maintain reinforcement tension.

.3 Only light weight hand operated compaction equipment shall be operated with 3 feet (1m) of the back of the Flex MSE units.

.4 Tracked equipment shall not be operated directly on the reinforcing. A minimum thickness of 6 inch (150mm) of fill is required prior to operating tracked equipment over the reinforcing.

.5 Rubber tired equipment may be operated on the reinforcing, avoiding sudden braking and sharp turns.

.6 At the end of each workday, the Contractor shall grade the backfill away from the wall area to Engineer's specifications and direct runoff away from the wall area. Surface runoff from adjacent areas must be directed away from the work area.

3.08 Geogrid

.1 To secure a geogrid reinforcement layer to the **Flex MSE** unit, extend the geogrid 1 inch (25mm) over the unit edge for inspection purposes. Lay the geogrid into the embedment area in the appropriate strength orientation and press the **Flex MSE** Plate firmly on top of the Bag and geogrid, locking the geogrid into place. The Geogrid Hook on the top of Plate may also be used to secure geogrid into place. Lay backfill from the back of the Bag to the furthest excavated point to maintain tension between the geogrid layer and the facing unit.

.2 Install geogrid to the manufacturer's specifications and in accordance with Engineer's drawings and Specifications.

3.09 Vegetation

Consistent vegetation growth is integral to the long term success of **Flex MSE** structures. Attention is paid to environmental, structural, and aesthetic parameters to achieve consistent results. Vegetation is completed through single or combined methods of propagation during or after construction. Thoroughly water the installation prior to undertaking any vegetation method. Refer to the **Flex MSE Vegetation Best Practices** and contact Trexiana for additional information.

.1 Seeding:

Hydroseeding is the preferred method of seeding. Apply hydroseeded material to the face of the **Flex MSE** structure in a manner that achieves complete coverage of all contours of the exposed Bag face. **Mulch type must be consistent with the application's Slope. Engineered hydroseed products for Extreme Slopes must be used in applications steeper than 1H:2V. Contact Trexiana Wholesale for recommendations of proprietary BFM (Bonded Fibre Matrix) and FGM (Flexible Growth Medium) products.**

Pre-Seeding of **Flex MSE** Bags may be undertaken in certain situations, but is typically not employed as the primary method of vegetation. Proper mixing at Specified weight/volume rates must be followed to expose as much seed as possible to surface light, warmth, and moisture. Preseed mixture rates for seed/m³ of Bag Fill Medium are typically 5 times the m² hydroseed application rates for the chosen blend but may vary.

On Slopes greater than 1H:4V, seed varieties with mature heights below 18 inches (460mm) are used to prevent lodging. Seed mixtures are purchased from accredited sources with guaranteed standard germination rates.

.2 Live Planting:

Live Planting with locally viable native plants or cultivars that are proven performers in the site area may be used to vegetate the structure. The **Flex MSE** Bags can be cut to accommodate live planted 2-3 inch plugs directly into the Bag medium. Up to three inverted 'T-cuts' measuring 3"x3" can be made in each Bag. A planting tool such as a dibble may also be used. Depending on the chosen plants and site location, a 10gm fertilizer tablet sitting on top of the root ball may be required. Refer to construction documents for plant list, spacing and placement instructions.

.3 Live Staking:

Live staking with viable native species such as willows may be used to vegetate the structure. Proper harvest and storage are critical to ensure viable live stakes. Live staking is achieved by punching the stake/branch directly into the **Flex MSE** Bags or in between the Bags into the back fill. Inserting the stake downward into Bags underneath is permitted. 80% of the stake's length should be embedded in the soils to prevent dehydration, and stakes should be a minimum of 1" (25mm) in diameter at the base. Bags under the high water mark are not to be punctured. See *Flex MSE Vegetation Best Practices* for further information on Live Staking.

.4 Brush Layering:

The root ball of a more established plant can be positioned behind the **Flex MSE** Bags, pointing down into the backfill with the stem protruding between Bags. This method is recommended with applications near water. If Brush Layering is to be used, it is recommended that a well graded soil be selected for Backfill.

3.10 Field Review

.1 Pursuant to the Contract, **field review** should be undertaken at regular intervals to ensure satisfactory germination and/or coverage of the **Flex MSE** Bags.

.2 At six months, if selected plants have performed below optimal rates in the **Flex MSE** Bags, it is recommended that regular watering, reseeding or remedial planting be performed. Some spray on liquid fertilizer or fertilizer added to the existing irrigation system may also be warranted.

3.11 Field Quality Control

.1 Field Quality Assurance - The Owner shall engage inspection and testing services, including independent laboratories, to provide quality assurance and testing services during construction. As a minimum, quality assurance testing should include foundation soil inspection, inspection for the need for any additional drainage, soil and backfill testing, verification of design parameters, and observation of construction for general compliance with design drawings and specifications. The Contractor will also secure the necessary construction quality control testing during construction.

.2 The Contractor's quality control testing and construction inspection services shall only be performed by independent, qualified and experienced technicians and Engineers. The Contractor's quality control testing shall include:

.1 Field density testing

.2 Sub grade: one test for every 2500 square feet (230 m²) of sub grade.
Reinforced Backfill: one test for every 2500 square feet (230 m²) per lift with a minimum of one test for every other lift.

.3 Retained and Foundation Soil: per Section 02200.

.4 Laboratory Moisture Density - minimum one test per soil type.

.5 Gradation Analysis

a) Unit Fill: one test per 500 CY (400 cm)

b) Backfill: one test per 1000 CY (800 cm)

Attachment 5 PS1

PRODUCER STATEMENT – PS1 – DESIGN

ISSUED BY: Kirk Roberts Consulting Engineers
(Design Firm)

TO: Survus Consultants
(Owner/Developer)

TO BE SUPPLIED TO: Christchurch City Council
(Building Consent Authority)

IN RESPECT OF: FLEX MSE Wall
(Description of Building Work)

AT: 22 Cemetery Road, Wainui, Canterbury
(Address)

Town/City: Wainui (Address) **LOT** 1 **DP** 43190 **SO**

We have been engaged by the owner/developer referred to above to provide:
Design of FLEX MSE wall for culvert outlet.

(Extent of Engagement)

services in respect of the requirements of Clause(s) **B1** of the Building Code for:

☐ All or ☒ Part only (as specified in the attachment to this statement), of the proposed building work.

The design carried out by us has been prepared in accordance with:

☐ Compliance Documents issued by the Ministry of Business, Innovation & Employment.....or
(verification method/acceptable solution)

☒ Alternative solution as per the attached schedule. FLEX MSE Wall Design Report by Kirk Roberts (2110121, 22/02/2022)

The proposed building work covered by this producer statement is described on the drawings titled:

22 Cemetery Road, Wainui - 2110121 - Building Consentand numbered S0.01 - S1.05
together with the specification, and other documents set out in the schedule attached to this statement.

On behalf of the Design Firm, and subject to:

- (i) Site verification of the following design assumptions Refer to sheet S0.04 in referenced drawings for inspection schedule
(ii) All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds that a) the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building Code and that b), the persons who have undertaken the design have the necessary competency to do so. I also recommend the following level of construction monitoring/observation:

☐ CM1 ☐ CM2 ☒ CM3 ☐ CM4 ☐ CM5 (Engineering Categories)

I, Firas Salman am: ☐ CPEng # 1023569
(Name of Design Professional)

I am a member of: ☐ Engineering New Zealand and hold the following qualifications: PhD, CMEngNZ, CPEng.....

The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000*.

The Design Firm is a member of ACE New Zealand: ☐

SIGNED BY: Firas Salman(Signature)
(Name of Design Professional)

ON BEHALF OF: Kirk Roberts Consulting EngineersDate: 22/02/2022
(Design Firm)

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

This form is to accompany **Form 2 of the Building (Forms) Regulations 2004** for the application of a Building Consent.
THIS FORM AND ITS CONDITIONS ARE COPYRIGHT TO ACE NEW ZEALAND AND ENGINEERING NEW ZEALAND

GUIDANCE ON USE OF PRODUCER STATEMENTS

Producer statements were first introduced with the Building Act 1991. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects, Institution of Professional Engineers New Zealand (now Engineering New Zealand), ACE New Zealand in consultation with the Building Officials Institute of New Zealand. The original suit of producer statements has been revised at the date of this form as a result of enactment of the Building Act (2004) by these organisations to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

PS1 Design Intended for use by a suitably qualified independent design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent;

PS2 Design Review Intended for use by a suitably qualified independent design professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent;

PS3 Construction Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2013 or Schedules E1/E2 of NZIA's SCC 2011²

PS4 Construction Review Intended for use by a suitably qualified independent design professional who undertakes construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate.

This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACE New Zealand and Engineering New Zealand to interpret the Producer Statement.

Competence of Design Professional

This statement is made by a Design Firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its designers.

A competent design professional will have a professional qualification and proven current competence through registration on a national competence based register as a Chartered Professional Engineer (CPEng).

Membership of a professional body, such as Engineering New Zealand (formerly IPENZ) provides additional assurance of the designer's standing within the profession. If the design firm is a member of ACE New Zealand, this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent design professional".

*Professional Indemnity Insurance

As part of membership requirements, ACE New Zealand requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI Insurance minimum stated on the front of this form reflects standard, small projects. If the parties deem this inappropriate for large projects the minimum may be up to \$500,000.

Professional Services during Construction Phase

There are several levels of service which a Design Firm may provide during the construction phase of a project (CM1-CM5 for Engineers³). The Building Consent Authority is encouraged to require that the service to be provided by the Design Firm is appropriate for the project concerned.

Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design firm's engagement.

Attached Particulars

Attached particulars referred to in this producer statement refer to supplementary information appended to the producer statement.

Refer Also:

- ¹ Conditions of Contract for Building & Civil Engineering Construction
NZS 3910: 2013
- ² NZIA Standard Conditions of Contract SCC 2011
Guideline on the Briefing & Engagement for Consulting Engineering Services
(ACE New Zealand/Engineering New Zealand 2004)
- ⁴ PN Guidelines on Producer Statements

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www.engineeringnz.org



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consulting and
engineering

Attachment 6 MSE Wall Drawings

SURVUS CONSULTANTS

22 CEMETERY ROAD

22 CEMETERY ROAD

WAINUI

2110121

BUILDING CONSENT

CONTENTS

Sheet No.	Sheet Name	Current Revision	Revision Date
S0.01	GENERAL NOTES	A	21-02-2022
S0.04	RETAINING WALL	A	21-02-2022
S0.05	RETAINING WALL	A	21-02-2022
S1.01	EXISTING CROSS SECTION	A	21-02-2022
S1.04	GEOGRID CONNECTION DETAILS	A	21-02-2022
S1.02	FLEX MSE WALL	A	21-02-2022
S1.05	CULVERT OUTLET DETAIL	A	21-02-2022



LOCATION MAP

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Cad File: 2-PROJ_202101210121-22.CEMETERY_ROAD.CIVIL3_DELIVERY8.DWG Pld Date: 2/2/2022 4:52:53 pm Name: Ben Williams Xref:

GENERAL

1. THE STRUCTURAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL AND OTHER CONSULTANTS DRAWINGS & SPECIFICATIONS AND WITH SUCH OTHER INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT.
2. MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE NEW ZEALAND BUILDING CODE, THE CURRENT EDITION OF THE RELEVANT NEW ZEALAND STANDARDS.
3. ALL WORK SHALL COMPLY WITH THE HEALTH AND SAFETY AT WORK ACT 2015 AND HEALTH AND SAFETY AT WORK (GENERAL RISK AND WORKPLACE MANAGEMENT) REGULATIONS 2016.
4. ALL DISCREPANCIES SHALL BE REFERRED TO THE DESIGNER BEFORE PROCEEDING WITH WORK.
5. ALL DIMENSIONS RELEVANT TO SETTING OUT AND OFF-SITE WORK SHALL BE VERIFIED BY THE CONTRACTOR BEFORE THE CONSTRUCTION AND FABRICATION IS COMMENCED. THE ENGINEERS DRAWINGS SHALL NOT BE SCALED.
6. DURING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE STRUCTURE IN A STABLE CONDITION AND ENSURE NO PART SHALL BE OVERSTRESSED UNDER CONSTRUCTION ACTIVITIES. THIS INCLUDES ALL EXISTING STRUCTURES FORMING PART OF, OR AFFECTED BY, THE WORKS.
7. IF DURING CONSTRUCTION, ANY PART OF THE WORKS SHOWS SIGNS OF DISTRESS, EXCESSIVE DEFLECTION, CONFLICT OF COMPONENTS OR OTHER PROBLEMS, THE CONTRACTORSHALL IMMEDIATELY NOTIFY THE ENGINEER, WHO SHALL INVESTIVATE & ISSUE SUCH INSTRUCTIONS AS ARE CONSIDERED NECESSARY.
8. REFER TO THE SCHEDULE OF INSPECTIONS REQUIRED BY THE LOCAL TERRITORIAL AUTHORITY (COUNCIL) FOR THE REQUIRED INSPECTIONS (BY THE COUNCIL AND/OR ENGINEER). PROVIDE AT LEAST 4 WORKING DAYS NOTICE OF ANY INSPECTION REQUIRED BY THE ENGINEER. A CONTRUCTION OBSERVATION CERTIFICATE, PS4, WILL NOT BE ISSUED FOR ANY WORK NOT INSPECTED DURING CONSTRUCTION.

SITE AND EARTHWORKS

1. ALL VEGETATION, TURF AND ORGANIC TOP SOIL SHALL BE STRIPPED FROM THE BUILDING PLATFORM AREA AND EXTEND A MINIMUM OF 0.6m IN PLAN BEYOND THE EDGE OF THE FOUNDATIONS AND COMPLY WITH FIGURE 3.1 OF NZS3604:2011 WITH REGARD TO RELATIONSHIP OF SLOPING GROUND SURFACE. THE DEPTH OF TOPSOIL STRIPPING SHALL BE SUFFICIENT TO REMOVE ALL ORGANIC MATERIAL, TURF AND PLANT ROOTS GREATER THAN 20mm DIAMETER.
2. EARTH SHALL MEET THE REQUIREMENTS OF NZS4431:1989 - CODE OF PRACTICE FOR EARTH FILL FOR RESIDENTIAL DEVELOPMENT.
3. FILL PLACEMENT:
 - a. THE AREA ON WHICH FILL IS TO BE PLACED SHALL BE STRIPPED OF ALL VEGETATION, TOPSOIL AND MATERIAL DEEMED UNSUITABLE.
 - b. THE EXPOSED SUBGRADE SHALL BE PROOF ROLLED, WHERE POSSIBLE, TO PROVIDE A LEVEL AND FIRM PLATFORM ON WHICH TO PLACE THE FILL.
 - c. REFER TO GEOTECHNICAL ENGINEERS REPORT FOR THE SPECIFICATION OF GEOTEXTILE FABRICS, IF ANY, AS WELL AS SPECIFICATIONS FOR LAP LENGTHS, TERMINATION AT ENDS AND THE LIKE.
 - d. SUITABLE FILL MATERIAL SHALL BE PLACED IN LAYERS NOT EXCEEDING 200mm THICK (PRIOR TO COMPACTION).
 - e. APPROPRIATE COMPACTION EQUIPMENT SHALL BE USED TO ACHIEVE THE SPECIFIED COMPACTION CRITERIA. (AN ULTIMATE GEOTECHNICAL BEARING CAPACITY OF 300 kPa IN ACCORDANCE WITH NZS3604:2011 UNLESS OTHERWISE SPECIFIED BY THE GEOTECHNICAL ENGINEER. IN THE CASE OF ANY DISCREPANCIES THE GEOTECHNICAL ENGINEERS SPECIFICATIONS SHALL TAKE PRECEDENCE.)
 - f. FILL MATERIAL SHALL BE COMPACTED TO ACHIEVE 95% OF THE MATERIALS MAXIMUM DRY DENSITY IN ACCORDANCE WITH NZS4431:1989.
 - g. FILL OVER 600mm DEPTH SHALL BE TESTED AND APPROVED BY A SUITABLY QUALIFIED CHARTERED PROFESSIONAL ENGINEER (UNLESS NOTED OTHERWISE IN THE GEOTECHNICAL REPORT). CONFIRM WITH ENGINEER FOR SOIL TESTING / CERTIFICATION REQUIREMENTS TO ORIGINAL GROUND AND COMPACTED FILL PRIOR TO COMMENCING EXCAVATION.



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NOTES:
THIS DRAWING IS THE PROPERTY AND COPYRIGHT OF KIRK ROBERTS CONSULTING ENGINEERS LTD AND SHALL NOT BE COPIED REPRODUCED OR COMMUNICATED TO A THIRD PARTY WITHOUT WRITTEN CONSENT (C) 2017.

THIS DRAWING TO BE READ IN CONJUNCTION WITH THE LATEST DRAWINGS AND SPECIFICATIONS FROM ALL OTHER DISCIPLINES. PROJECT MANAGER TO BE NOTIFIED OF ANY VARIATION BETWEEN SITE DIMENSIONS AND THOSE ON DRAWINGS ALL DIMENSIONS ARE SHOWN IN METRES UNLESS OTHERWISE STATED.

THIS PLAN IS FOR BUILDING CONSENT PURPOSES ONLY.

A	21-02-2022	BUILDING CONSENT	FS
REV	DATE	ISSUED FOR	BY

PROJECT
22 CEMETERY ROAD

22 CEMETERY ROAD
WAINUI

CLIENT
SURVUS CONSULTANTS

TITLE
GENERAL NOTES
AND SPECIFICATIONS

REVIEWED BY FS 21-02-2022

DESIGNED BY CW

DRAWN BY BW

SCALE JOB NO. 2110121

DRAWING NO. REV.
S0.01 A

BUILDING CONSENT



Cad File: 2-PROJ_20210121-22.CEMETERY_ROAD.CIVIL3_DELIVERY8.DRAFTER\ILLSTRUCTURAL MSE WALL\10121-C1-0-GENERAL_NOTES.DWG Pld Date: 2/2/2022 4:55:57 pm Name: Ben Williams Xref:

GEOTECHNICAL REQUIREMENTS FOR FLEX MSE WALL

- EXCAVATE MATERIAL WITHIN A 3.0m OFFSET FROM THE SLOPE EDGE AND BATTER CUT FACE TO A MAXIMUM GRADIENT OF 2V:1H.
- FIRST TWO ROWS OF GEOBAGS SHOULD BE EMBEDDED IN THE GROUND.
- WALL SHALL BE INSTALLED AT A MAXIMUM GRADIENT OF 30 DEGREES WITH A TOTAL HEIGHT OF 4.0m.
- BACKFILL SHALL BE REINFORCED WITH GEOGRID (TENSAR TRIAX TX 160, DURAGRIDx30/30, TENSAR SS30 OR TGSG3030 GEOGRID OR ANOTHER PRODUCT OF EQUIVALENT TENSILE CAPACITY AND PERFORMANCE, SUBJECT TO CONFIRMATION IN WRITING BY THE GEOTECHNICAL ENGINEER) PLACED AFTER EVERY SIXTH ROW OF GEOBAGS (4 LAYERS OF GEOGRID TOTAL).
- GEOGRID SHALL BE SUFFICIENTLY TENSIONED TO REMOVE ANY WRINKLES/BULGES AND TIED INTO GEOBAG FACING IN ACCORDANCE WITH FLEX MSE STANDARD DETAILS.
- BACKFILL MAY COMPRISE SITE-WON OR IMPORTED MATERIAL. SUITABLE BACKFILL MATERIALS INCLUDE NON-PLASTIC SILTS OR GRANULAR MATERIAL. THE BACKFILL MATERIAL MUST BE APPROVED BY A KIRK ROBERTS GEOTECHNICAL ENGINEER PRIOR TO PLACEMENT.
- DRAINAGE MATERIAL SHALL BE PLACED BEHIND MSE WALL AND WRAPPED WITH GEOTECTILE STRENGTH CLASS C. FIELD DRAIN TO BE PLACED NEAR BASE OF THE WALL.
- REFER TO FOLLOWING PAGE FOR EARTHWORKS SPECIFICATION FOR FILL MATERIAL.
- COMPACTION TESTING SHALL BE UNDERTAKEN EVERY 500mm LIFT AND THE RESULTS SHALL BE SUPPLIED TO KIRK ROBERTS FOR REVIEW AND APPROVAL. THE LABORATORY CERTIFICATE (MDD/OMC) SHALL BE PROVIDED TO KIRK ROBERTS.

FUTURE ALTERATIONS AND REMEDIAL WORKS:

- ALL FUTURE ALTERATIONS SHALL BE COMPLETED UNDER THE GUIDANCE OF A CPENG GEOTECHNICAL ENGINEER WITH ALL WORKS BEING COMPLETED BY A SUITABLY QUALIFIED CONTRACTOR.
- IT IS KR'S OPINION THAT ANY REQUIRED REMEDIAL WORKS COULD BE UNDERTAKEN USING CURRENT CONSTRUCTION TECHNOLOGY SHOULD THE NEED ARISE. IT IS NOTED THAT ANY REMEDIAL WORKS UNDERTAKEN MAY BE COMPLICATED BY POSITION AND ACCESS BUT IT WOULD BE POSSIBLE TO DEVELOP A METHODOLOGY TO SAFELY UNDERTAKE THE WORKS.

SAFETY:

- AS PART OF THE CONTRACTORS CONSTRUCTION PLAN DUE CONSIDERATION SHALL BE GIVEN TO DEVELOPING A SAFE SYSTEM OF WORK, GUIDANCE CAN BE FOUND IN WORKSAFE NEW ZEALAND 'EXCAVATION SAFETY' GOOD PRACTICE GUIDELINES JULY 2016. IRRESPECTIVE OF THESE GUIDELINES KIRK ROBERTS RECOMMEND THAT AT NO STAGE DURING CONSTRUCTION OF THE NEW WALL, ARE PERSONNEL TO PLACE THEMSELVES, OR WORK BETWEEN, THE RETAINING WALL AND THE CUT BATTER.
- SITE SAFETY AND CONSTRUCTION SAFETY IS THE RESPONSIBILITY OF THE CONTRACTOR.

SR. NO.	TIME	NO. OF INSPECTIONS
1	INSPECTION OF SUBGRADE AND SLOPE BATTER PRE INSTALLATION	1
2	INSTALLATION OF ENKA DRAIN AND MEGA FLO DRAINAGE PIPE	1
3	INSTALLATION OF FIRST LAYER OF GEOGRID	1
4	REVIEW OF COMPACTION TEST REPORTS AND PHOTOS FOR BACKFILL AND GEOGRID INSTALLATION	1
5	FINAL INSPECTION UPON COMPLETION OF RETAINING WALL	1



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PROJECT
22 CEMETERY ROAD

22 CEMETERY ROAD
WAINUI

CLIENT
SURVUS CONSULTANTS

TITLE
RETAINING WALL
SPECIFICATION

REVIEWED BY	FS	21-02-2022
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DESIGNED BY	CW
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DRAWN BY	BW
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SCALE	JOB NO.	2110121
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BUILDING CONSENT



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EARTHWORKS SPECIFICATIONS FOR FILL MATERIAL

1.

SCOPE:
THIS SPECIFICATION SETS OUT THE REQUIREMENTS FOR EARTH FILL, WHICH EXPERIENCE HAS SHOWN, PRODUCES FILLS OF SATISFACTORY STABILITY. REFERENCE HAS BEEN MADE TO NZS 4431:1989 "CODE OF PRACTICES FOR EARTH FILL FOR RESIDENTIAL DEVELOPEMENT".
2.

FILL:

THE AREA ON WHICH THE FILL IS TO BE PLACED AND THE AREA FROM WHICH THE CUT IS TO BE REMOVED SHALL BE STRIPPED OF ALL VEGETATION AND TOPSOIL AND OF SUCH SOFT ORGANIC SOILS AS MAY BE DETERMINED BY THE INSPECTION ENGINEER TO BE UNSUITABLE.

TOPSOIL STRIPPED FROM AREAS BEING WORKED SHALL BE STOCK PILED IN LOCATIONS THAT DO NOT CONFLICT WITH THE CONSTRUCTION AREAS ON THE SITE. THE SHALL BE FREQUENTLY WETTED, TO AVOID UNNECESSARY DUST CREATION DURING LONG DRY PERIODS. IF TOPSOIL IS TO BE STOCKPILED FOR AN INDEFINITE PERIOD THEN IT IS RECOMMENDED TO GRASS COVER THE TOPSOIL.
- 2.1.

FOUNDATION COMPACTION
PRIOR TO FILL PLACEMENT, THE STRIPPED AREA SHALL BE PROOF ROLLED AND COMPACTED IN A MANNER SIMILAR TO THAT USED ON THE LAYERS OF FILL. ANY RESULTING SOFT SPOTS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER WHO SHALL DETERMINE IF UNDERCUTTING OF THE SOFT SPOT IS REQUIRED. IN PRACTICE, THE EXPOSED SUB GRADE SOIL SHALL BE PROOF-ROLLED TO ITS NATURAL IN-SITU DENSITY.
- 2.2.

FILL PLACEMENT
PRIOR TO COMPACTION, ALL FILL MATERIAL SHALL BE SPREAD UNIFORMLY IN LOOSE LAYERS AND CONDITIONED TO AN AVERAGE WATER CONTENT OF 5%. FILL MATERIAL SHALL BE LAID IN LAYERS OF LESS THAN 150mm THICKNESS.

THE CONTRACTOR SHALL EXCLUDE ALL ORGANIC MATTER FROM FILL MATERIAL.
- 2.3.

FILL WATER CONTENT CONTROL
FILL MATERIAL SHALL BE COMPACTED ONLY WHILE THE WATER CONTENT OF THE UN-COMPACTED MATERIAL IS WITHIN 3% OF THE OPTIMUM WATER CONTENT.

WHEN THE WATER CONTENT OF UN-COMPACTED MATERIAL FALLS BELOW THE 5% VALUE, THE MATERIAL SHOULD BE WATERED EITHER ON THE FILL SURFACE OR IN THE CUT BEFORE IT IS TRANSPORTED TO THE FILL AREA. WATER SHOULD BE APPLIED AS A FINE SPRAY IN ORDER TO REDUCE NON-UNIFORM DISTRIBUTION.

CONTROL OF WATER CONTENT SHALL BE APPLIED NOT ONLY TO THE UPPER LAYER OF COMPACTED MATERIAL BUT ALSO TO THE LOOSE SURFACE MATERIAL OF THE PREVIOUSLY COMPACTED LAYER. THIS SURFACE MATERIAL SHALL BE BROUGHT TO THE CORRECT WATER CONTENT BEFORE IT IS COVERED BY A NEW LAYER.

IN ADDITION TO REGULAR CONTROL TESTS TO DETERMINE THE WATER CONTENT OF THE MATERIAL BEING COMPACTED, CONTINUED VISUAL AND NON-QUANTITATIVE SOIL CONSISTENCY CHECKS, SHALL BE MADE BY A SUITABLY EXPERIENCED ENGINEER TO PREVENT MATERIAL BEING COMPACTED WHEN ITS WATER CONTENT HAS DEVIATED FROM THE SPECIFIED LIMITS.
- 2.4.

FILL COMPACTION:
2.5.1 EQUIPMENT
THE CONTRACTOR SHALL EMPLOY APPROPRIATE COMPACTION EQUIPMENT TO ACHIEVE THE SPECIFIED COMPACTION. THE NUMBER AND TYPE OF PLANT NECESSARY SHALL BE CONFIRMED BY TRIALS. NO SUBSEQUENT CHANGES SHALL BE INTRODUCED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER.
2.5.2 COMPACTION REQUIREMENTS
THE MAXIMUM RELATIVE DENSITY WILL BE DETERMINED BY THE METHODS OF NZS 4402 WHERE THESE ARE APPROPRIATE.

THE IN SITU DRY DENSITY SHALL BE AT LEAST 95% OF THE MAXIMUM DRY DENSITY (MDD). TESTS COMPLYING WITH NZS 4402 1991 TEST 4.2.2 WILL BE REQUIRED TO CONFIRM THE IN-SITU COMPACTED DENSITY. THE CONTRACTOR SHALL EMPLOY AN INDEPENDENT LABORATORY TO UNDERTAKE SITE TESTS TO VERIFY COMPLIANCE FOR ALL BACKFILLING WHICH SHALL BE AT THE RATE OF 1 PER 30m³ PLACED OR AT ANY OTHER FREQUENCY INSTRUCTED BY THE ENGINEER. ALL COSTS OF TESTING SHALL BE BORNE BY THE CONTRACTOR.
2.5.3 COMPACTION TRIALS
BEFORE FILLING IS STARTED THE CONTRACTOR SHALL DEMONSTRATE TO THE ENGINEER THE ADEQUACY OF THE EQUIPMENT TO BE USED BY SPREADING AND COMPACT A MINIMUM OF THREE INDIVIDUAL SUPERIMPOSED LAYERS OF SOIL (300mm THICKNESS BEFORE COMPACTION) IN WHICH TESTS OF THE STANDARD OF COMPACTION SHALL BE CONDUCTED.

THE REQUIRED STANDARDS OF COMPACTION SHALL BE AS DEFINED IN CLAUSES 2.5.2. DURING THE COMPACTION TRIALS THE CONTRACTOR MAY DEVELOP, IN CONJUNCTION WITH THE ENGINEER, AD HOC TESTS, WHICH THE CONTRACTOR MAY USE HIMSELF AS AN APPROXIMATE GUIDE TO THE STANDARD OF COMPACTION BEING ACHIEVED AT ANY TIME.

SHOULD DIFFERING KINDS OF SOIL BE UNCOVERED DURING THE COURSE OF SUBSEQUENT WORK, FURTHER TRIALS SHALL BE CONDUCTED AT THE DIRECTION OF THE ENGINEER.

THE COMPACTION TRIAL AREA MAY BE INCLUDED IN THE FINAL EARTHWORKS PROVIDED THE TRIAL ACHIEVES THE REQUIRED STANDARD OF COMPACTION AND IS ACCEPTED BY THE ENGINEER.
- 3.0.

TESTING
3.1 GENERAL
THE CONTRACTOR SHALL ARRANGE FOR COMPACTION TESTING BY THE ENGINEER, THE CONTRACTOR SHALL STOP OR DIVERT HIS MACHINES AS REQUIRED BY THE ENGINEER TO ALLOW THE TESTS TO BE CARRIED OUT.

WHERE FIELD TESTS INDICATE THAT THE SPECIFIED STANDARD OF COMPACTION HAS NOT BEEN ACHIEVED, THE ENGINEER MAY ORDER CESSATION OF WORK AND / OR REMOVAL OF THE FILL. SUBJECT TO THE NATURE OF THE FILL CONCERNED. ALL COSTS ASSOCIATED WITH THE RE-TESTING OF ANY FILL AREAS WHICH FAIL TO MEET THE SPECIFIED STANDARDS WILL BE A CHARGE TO THE CONTRACTOR. SUCH COSTS WILL INCLUDE ALL RELATED SUPERVISION AND ADMINISTRATION TIME INCURRED BY THE ENGINEER AND HIS STAFF IN DETERMINING THE EXTENT OF COMPACTED FILL FAILING TO MEET THE SPECIFIED STANDARDS, ITS SUBSEQUENT RE-TESTING AND THE EFFECTING OF THE APPROPRIATED ADVICE TO ALL PARTIES CONCERNED .

AT ANY TIME EITHER PRIOR TO OR DURING THE COURSE OF CONSTRUCTION, THE ENGINEER MAY DIRECT MODIFICATIONS TO THE COMPACTION CRITERIA, WITH THE OBJECT OF ENSURING THAT THE OPTIMUM COMPACTION CRITERIA FOR THE PARTICULAR MATERIALS AND CONDITIONS BEING ENCOUNTERED OR LIKELY TO BE ENCOUNTERED ARE ACHIEVED.
- 3.2.

TESTING PROCEDURE:
THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT THE SPECIFIED COMPACTION PARAMETERS ARE ACHIEVED AND SHALL CARRY OUT SUCH TESTING AS IS NEEDED TO ENSURE THE CONSISTENT QUALITY OF THE FILL. APPROXIMATE TEST METHODS MAY BE EMPLOYED TO OBTAIN RAPID INDICATIVE RESULTS, BUT APPROXIMATED METHODS SHALL NOT BE USED FOR ACCEPTANCE PURPOSES WHERE THE ADEQUACY OF MATERIALS, PROCESSING OR WORKMANSHIP IS IN DOUBT OR THE AMOUNT BY WHICH THE TEST RESULT FAILS, FALLS WITHIN THE CONFIDENCE LIMITS OF THE APPROXIMATE TEST RESULT.

RETAINING WALL SPECIFICATION:

1.

EXCAVATION
EXCAVATION AND EARTH WORKS MAY BE REQUIRED AS PART OF THE CONSTRUCTION WORKS. THE CONTRACTOR IS TO PLAN AND EXECUTE ALL EXCAVATION WORKS REQUIRED.

THE PLANNING OF EXCAVATION WORKS INVOLVES IDENTIFICATION OF HAZARDS, ASSESSING RISKS AND DECIDING SUITABLE CONTROLS. CONSIDERATION IS TO BE GIVEN TO SITE FACTORS, HAZARDS AND ANY UNIQUE CHARACTERISTICS OF THE PROJECT. THE NATURE AND EXTENT OF THE EXCAVATION WORK WILL AFFECT THE SELECTION OF EXCAVATION METHOD AND A SAFE SYSTEM OF WORK. THE GROUND CONDITIONS WILL HAVE A SIGNIFICANT IMPACT ON WHAT EXCAVATION METHOD TO SELECT AND CONTROLS TO BE USED. REFER TO WORKSAFE NEW ZEALAND'S "EXCAVATION SEFETY" GOOD PRACTICE GUIDELINES, JULY 2016.

A SAFE SYSTEM/PLAN OF WORK IS TO BE DEVELOPED PRIOR TO CONSTRUCTION COMMENCING AND IMPLEMENTED ACCORDINGLY.

EXCAVATION IN STAGES, BENCHING, BATTERING AND/OR THE INSTALLATION OF TEMPORARY SUPPORT DURING CONSTRUCTION MAY BE REQUIRED. THE DESIGN OF EXCAVATION AND THE DESIGN OF TEMPORARY SHORING AND SUPPORT OF EXCAVATIONS DURING CONSTRUCTION HAS NOT BEEN UNDERTAKEN BY KIRK ROBERTS CONSULTANTS AND IS NOT INCLUDED IN OUR ENGAGEMENT. THIS WORK SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR UNDERTAKING THE CONSTRUCTION OF THE WORKS. ALL EXCAVATIONS SHALL BE COMPLETED IN ACCORDANCE WITH WORKSAFE NEW ZEALAND "EXCAVATION SAFETY" GOOD PRACTICE GUIDELINES, JULY 2016. THIS MAY REQUIRE THE APPOINTMENT OF A SUITABLY QUALIFIED DESIGNER WHO SHOULD BE COMPETENT TO ASSESS AND MANAGE THE RISKS RELEVANT TO THE EXCAVTION AND ASSOCIATED WORKS.
2.

FUTURE ALTERATIONS AND REMEDIAL WORKS:

ALL FUTURE ALTERATIONS SHALL BE COMPETED UNDER THE GUIDANCE OF A CPENG GEOTECHNICAL ENGINEER WITH ALL WORKS BEING COMPLETED BY A SUITABLY QUALIFIED CONTRACTOR.

IT IS KR'S OPINION THAT ANY REQUIRED REMEDIAL WORKS COULD BE UNDERTAKEN USING CURRENT CONSTRUCTION TECHNOLOGY SHOULD THE NEEDARISE. IT IS NOTED THAT ANY REMEDIAL WORKS UNDERTAKEN MAY BE COMPLICATED BY POSITION AND ACCESS BUT IT WOULD BE POSSIBLE TO DEVELOP A METHODOLOGY TO SAFELY UNDERTAKE THE WORKS.
3.

SAFETY:

AS PART OF THE CONTRACTORS CONSTRUCTION PLAN DUE CONSIDERATION SHALL BE GIVEN TO DEVELOPING A SAFE SYSTEM OF WORK, GUIDANCE CAN BE FOUND IN WORKSAFE NEW ZEALAND "EXCAVATON SAFETY" GOOD PRACTICE GUIDELINES JULY 2016. IRRESPECTIVE OF THESE GUIDELINES KIRK ROBERTS RECOMMEND THAT AT NO STAGE DURING CONSTRUCTION OF THE NEW WALL, ARE PERSONNEL TO PLACE THEMSELVES, OR WORK BETWEEN, THE RETAINING WALL AND THE CUT BATTER.

SITE SAFETY AND CONSTRUCTION SAFETY IS THE RESPONSIBILITY OF THE CONTRACTOR.



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22 CEMETERY ROAD

22 CEMETERY ROAD
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CLIENT
SURVUS CONSULTANTS

TITLE
RETAINING WALL
SPECIFICATION

REVIEWED BY FS 21-02-2022

DESIGNED BY CW

DRAWN BY BW

SCALE JOB NO. 2110121

DRAWING NO. REV.
S0.05 A

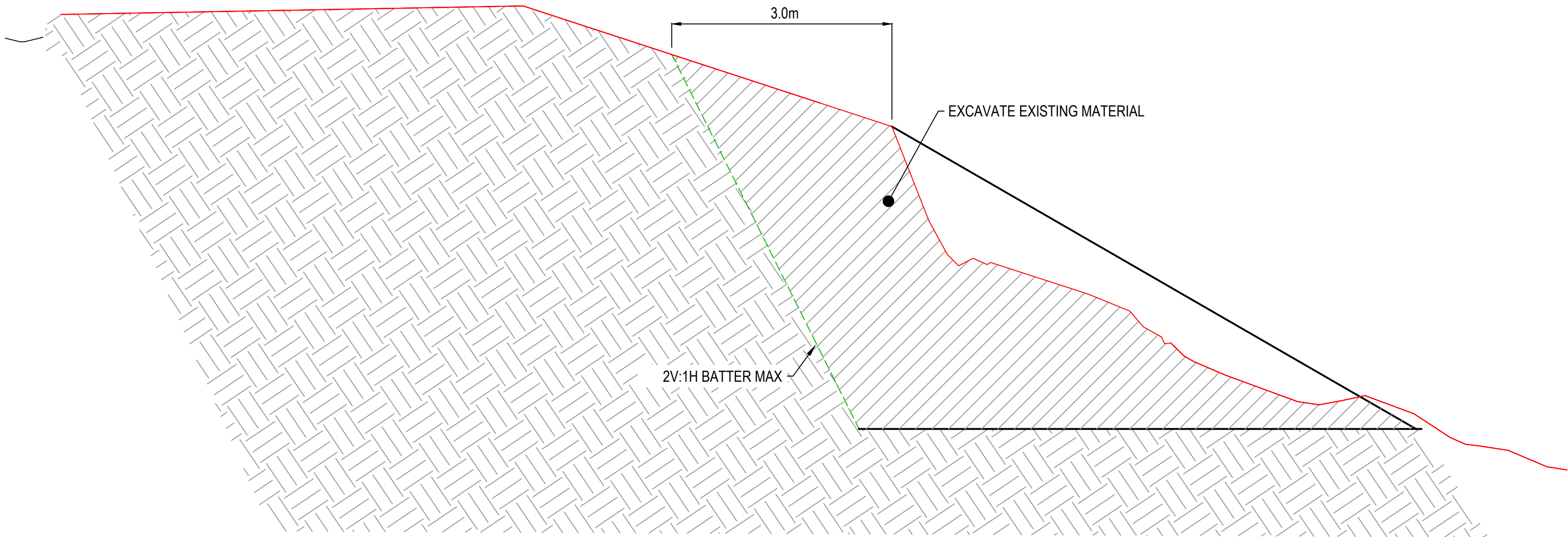
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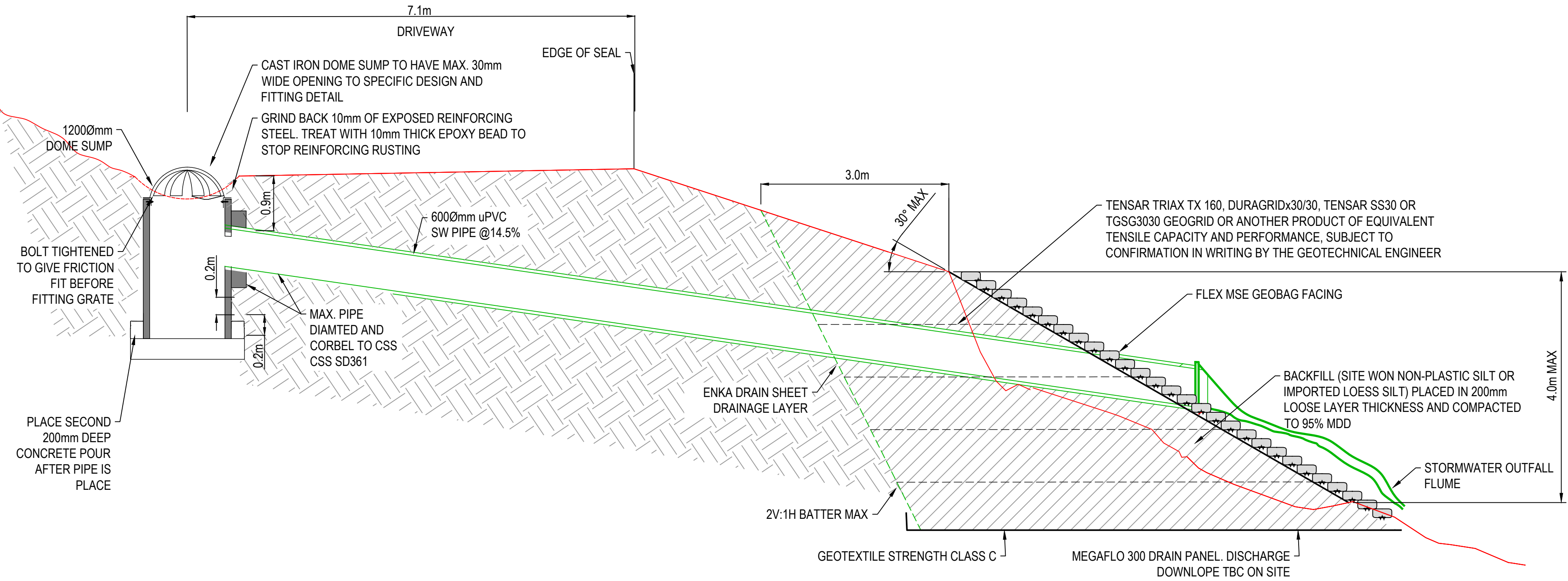
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LEX MSE WALL

CROSS SECTION

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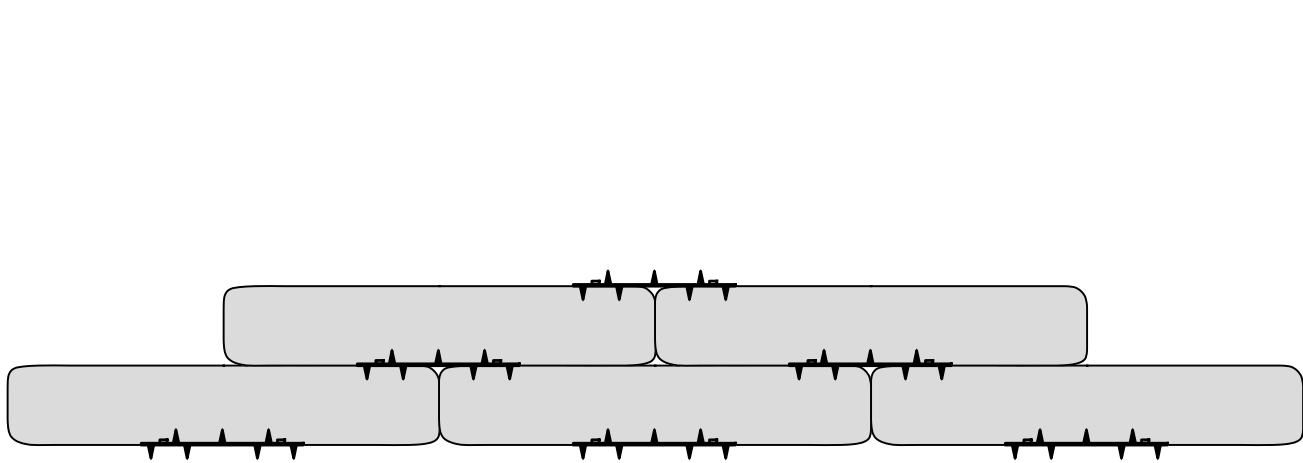
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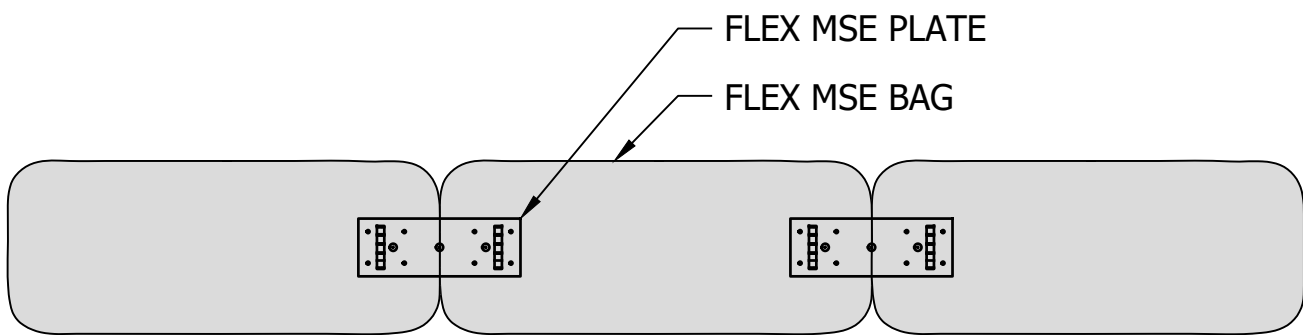
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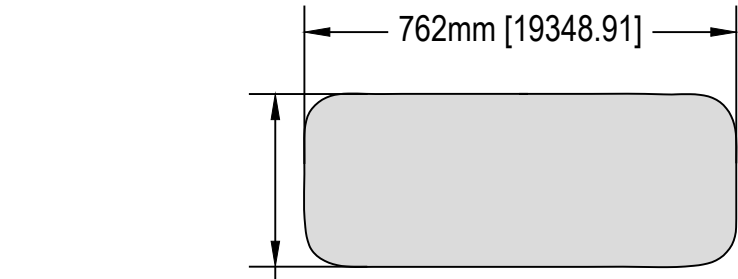


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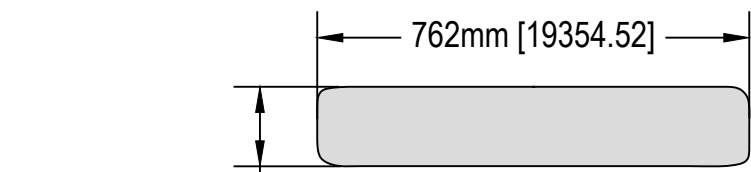


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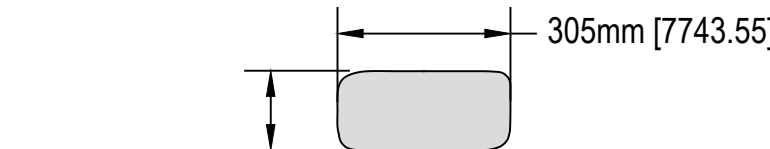
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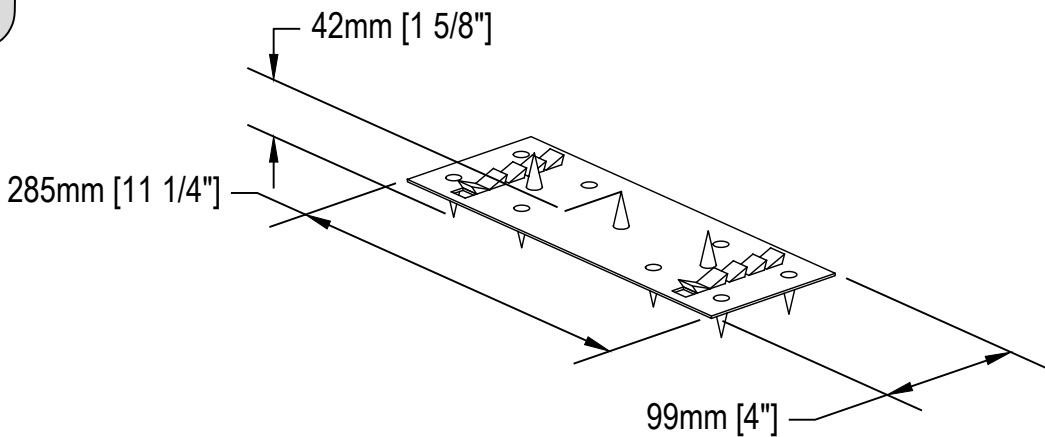


ELEVATION



SECTION

FLEX MSE BAG
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FLEX MSE PLATE
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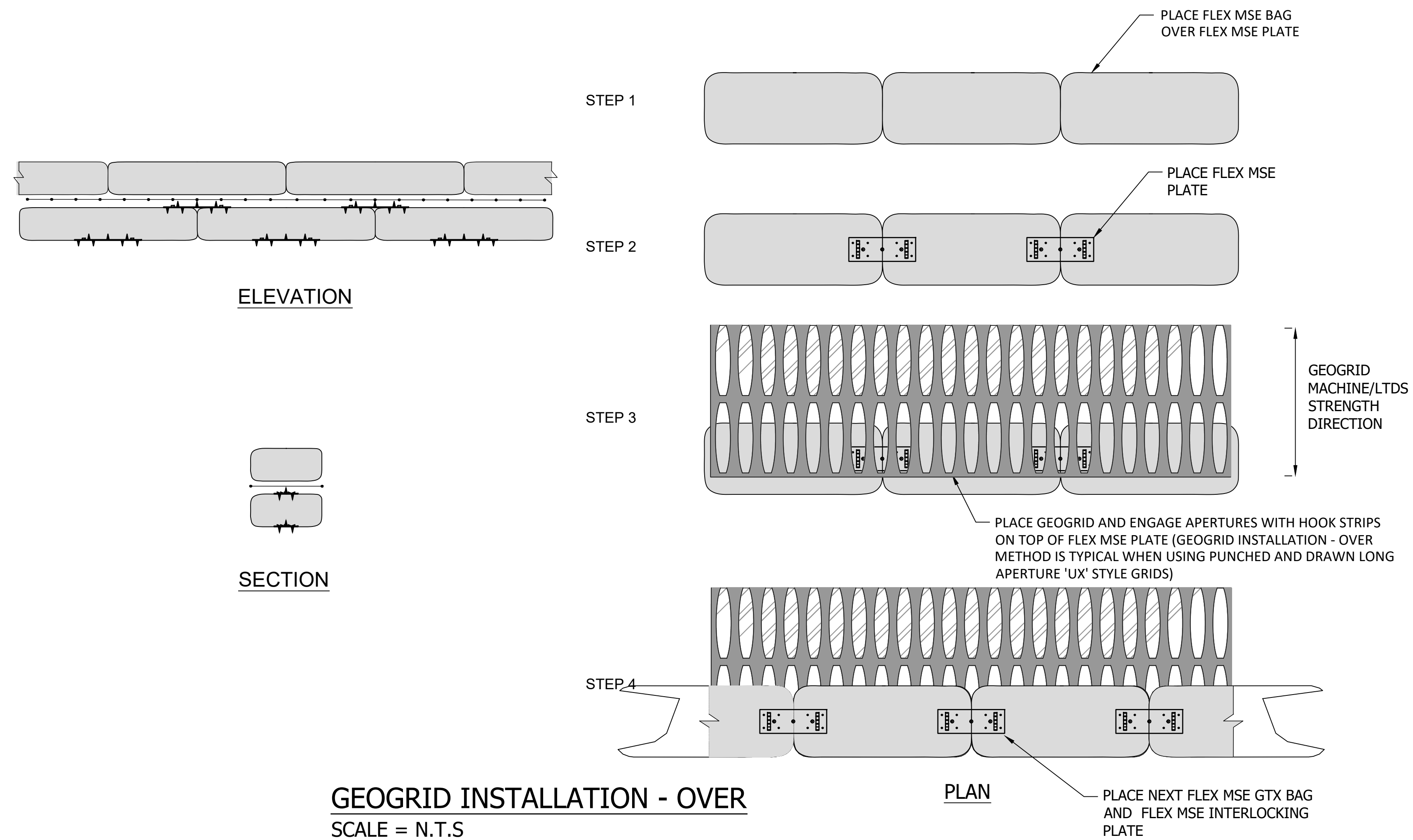
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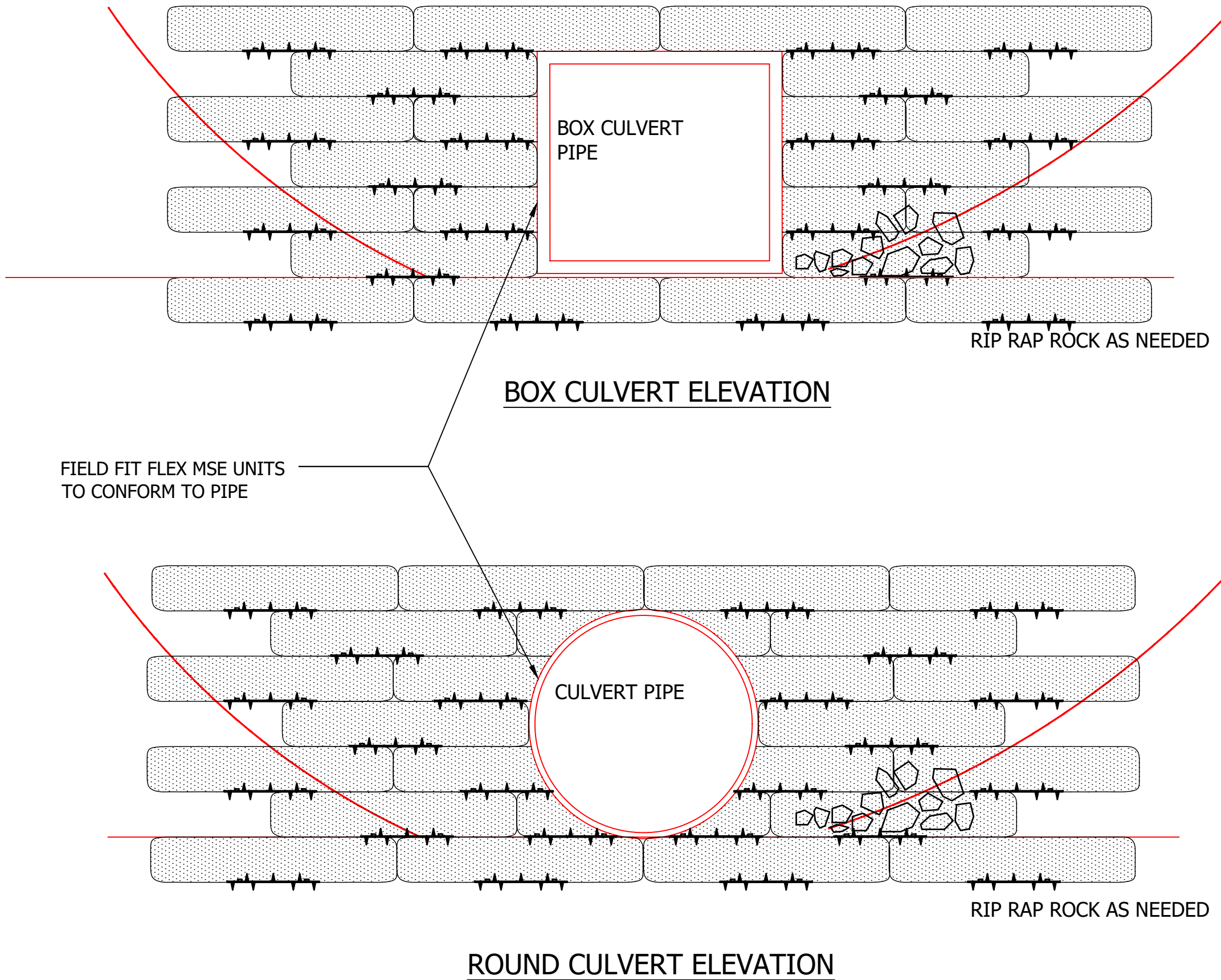
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BUILDING CONSENT

Property of interest address

- WwPrivateDrainFieldNo - WwAccess - Type - Flush Manhole - Flushing Point - Trap - Inspection Point - Sealed Manhole - Standard Manhole - Vacuum Storage Manhole - Vented Manhole - WwValve - WwVent - WwAirGapSeparator - WwLocalPressureBoundary - WwLocalPressureControlPa - WwLocalPressureTankSystem - WwOutfall - WwPipeRestrict - WwFitting - Type - Change - End Cap - Junction - WwEye - Type - Eye - Eye (Vertical) - WwLateralFitting - Type - Raised Inspection Point - Lateral Fitting - WwVacuumBreather - WwVacuumChamber - Type - Collector - Interceptor Tank - Valve - Riser - WwVacuumBreatherPip - WwPipeFlowDirection - WwPipeBlockageCount - NumberOfBlockages 2 or less Blockages 3 or more Blockages - WwPipe - NominalDiameter - Diameter is 200mm or smaller - Diameter is greater than 200mm, up to 450mm - Diameter is greater than 450mm - Other (non-circular pipes) - WwPipe (non-gravity) - NominalDiameter - Diameter is 200mm or smaller - Diameter is greater than 200mm, up to 450mm - Diameter is greater than 450mm - Other (non-circular pipes) - WwLateral - WwPipeProtection - WwFlushTank - WwStructure - WwStation - WwPumpStationCatchme - WwPipe (non CCC) - In Service - Abandoned - Removed	- Out of Service - WwLateral (non CCC) - In Service - Abandoned - Removed - Out of Service - Proposed - SwPrivateDrainFieldNot - SwValve - SwPump - SwFacilityDischargePoint - SwAccess - SwValve - Type - Check - Duck Bill - Flap - Gate - Inline Check - Sluice - Valve - SwHeadwall - SwFitting - Type - Change - End Cap - Junction - WwEye - Type - Eye - Eye (Vertical) - WwLateralFitting - Type - Raised Inspection Point - Lateral Fitting - WwVacuumBreather - WwVacuumChamber - Type - Collector - Interceptor Tank - Valve - Riser - WwVacuumBreatherPip - WwPipeFlowDirection - WwPipeBlockageCount - NumberOfBlockages 2 or less Blockages 3 or more Blockages - WwPipe - NominalDiameter - Diameter is 200mm or smaller - Diameter is greater than 200mm, up to 450mm - Diameter is greater than 450mm - Other (non-circular pipes) - WwPipe (non-gravity) - NominalDiameter - Diameter is 200mm or smaller - Diameter is greater than 200mm, up to 450mm - Diameter is greater than 450mm - Other (non-circular pipes) - WwLateral - WwPipeProtection - WwFlushTank - WwStructure - WwStation - WwPumpStationCatchme - WwPipe (non CCC) - In Service - Abandoned - Removed	- Proposed - SwLateral (non CCC) - In Service - Abandoned - Removed - Out of Service - WwPump - SwValve - NormalPosition,Type - Air Release - Backflow Prevention - Butterfly - Gate - Non Return - Pressure Activated - Sluice - Sluice, Normally Closed - Valve - Washdrant - Washlet - WwConnection - Type - Fire - Restrictor - Toby - Meter - WwOutlet - WwPipeRestrict - WwFieldNote - WwFitting - Type - Belows - End Cap - Connector - WwPipeProtection - WwPipe - NominalDiameter - Diameter is 110mm or smaller - Diameter is greater than 110mm, up to 225mm - Diameter is greater than 225mm - Other (non-circular pipes) - WwPipe (non Potable) - NominalDiameter - Diameter is 110mm or smaller - Diameter is greater than 110mm, up to 225mm - Diameter is greater than 225mm - Other (non-circular pipes) - WwLateral - WwStructure - WwReservoir - WwStation - WwPipe (non CCC) - In Service - Abandoned - Removed - Out of Service - Unknown - WwLateral (non CCC) - In Service - Abandoned - Removed - Out of Service - Proposed - BCConnector - BCEndCap - BCValve - BGPipe
---	--	---



ph: 03 941 8999 web: ccc.govt.nz

Accuracy not guaranteed. Onsite verification required.
Display of data scale dependant.
Client selected legend.

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N

Date: 18/11/2025 10:31 AM

Scale: 1: 950 on A4

0

5

10

20

30

40

Metres



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THIS PLAN IS FOR CONSTRUCTION PURPOSES ONLY.

NOTE:
1. ALL uPVC PIPES HAVING A PIPE SIZE OF LESS THAN 225mm SHALL BE SN16 AND ALL WASTEWATER uPVC PIPES HAVING A PIPES SIZE OF DN225 AND OVER SHALL BE SN8, UNLESS SHOWN OTHERWISE.

PIPE SIZE (Ø)	PIPE GRADIENT (min.)
100	1:120
150	1:150
225	1:350

E	16-02-2023 FOR CONSTRUCTION	DM
D	07-02-2023 FOR CONSTRUCTION	DM
C	22-07-2022 FOR CONSTRUCTION	DM
B	18-07-2022 FOR CONSTRUCTION	DM
A	28-06-2022 FOR CONSTRUCTION	DM
REV	DATE	ISSUED FOR
		BY

PROJECT
22 CEMETERY ROAD - CIVIL

22 CEMETERY ROAD
WAINUI

CLIENT
SURVUS CONSULTANTS

TITLE
SERVICES PLAN

REVIEWED BY: DM 16-02-2023

DESIGNED BY: WM

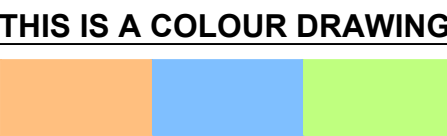
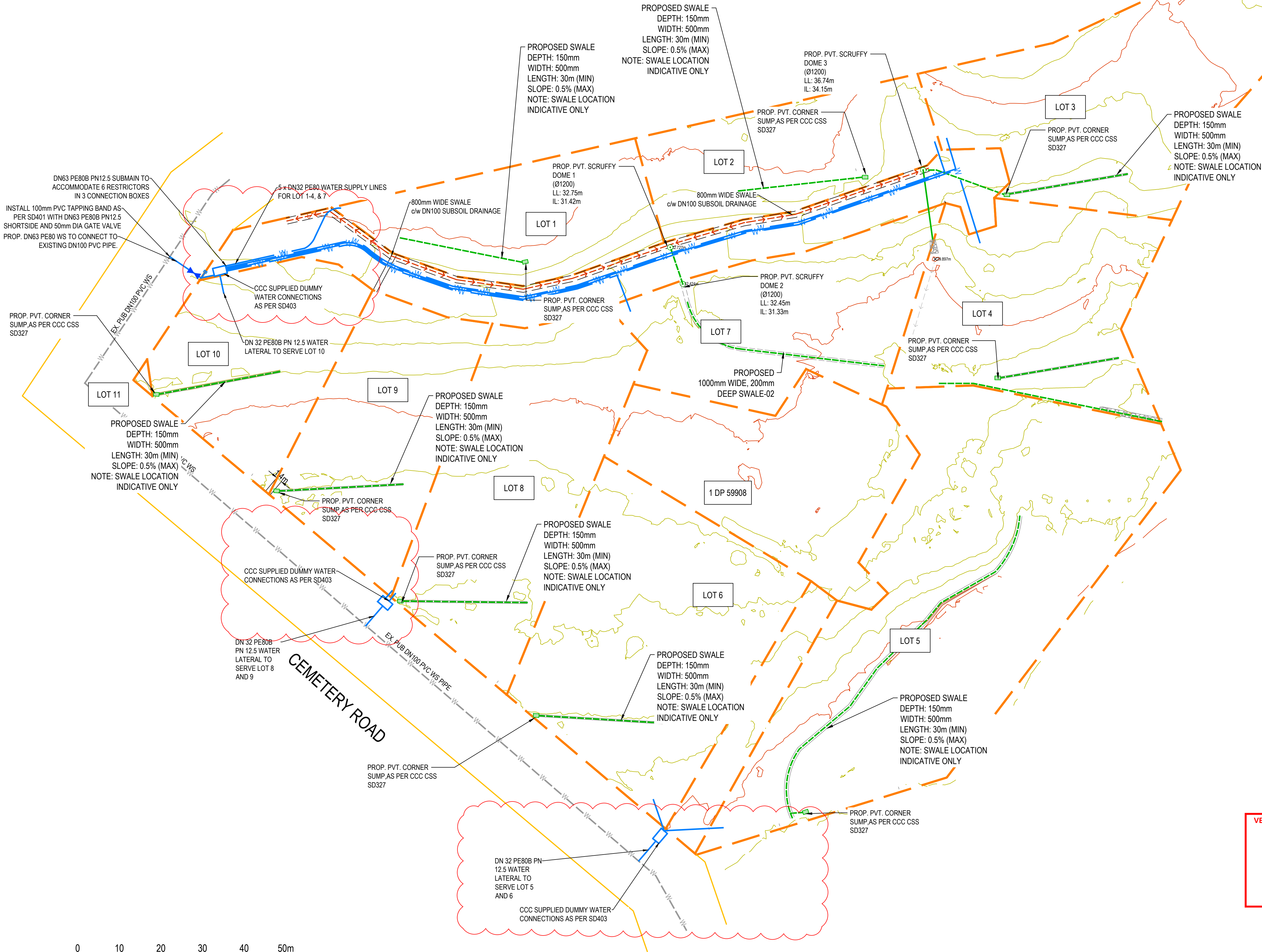
DRAWN BY: PP

SCALE: 1:500 (A1) JOB NO. 2110121

DRAWING NO. REV.

C3.0 E

CONSTRUCTION



Cad File: 2-PROJ_20210101-22-CEMETERY-ROAD-CIVIL3_DELIVERY8_DRAFTING FOR CONSTRUCTION10121-C3.0-SERVICES PLAN.DWG Plot Date: 21/12/2023 3:06:47 pm Name: Ajay Chandra Xref:

SCALE 1:500 (A1) 0 10 20 30 40 50m



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THIS PLAN IS FOR ENGINEERING PLAN APPROVAL PURPOSES ONLY.

NOTE:
1. ALL uPVC PIPES HAVING A PIPE SIZE OF LESS THAN 225mm SHALL BE SN16 AND ALL WASTEWATER uPVC PIPES HAVING A PIPE SIZE OF DN225 AND OVER SHALL BE SN8, UNLESS SHOWN OTHERWISE.

PIPE SIZE (Ø)	PIPE GRADIENT (min.)
100	1:120
150	1:150
225	1:350



G	12-05-2022 EPA ISSUE	DM
F	29-04-2022 EPA ISSUE	DM
E	14-03-2022 EPA ISSUE	DM
D	08-01-2022 EPA ISSUE	DM
C	07-12-2021 EPA ISSUE	DM
B	13-08-2021 RESOURCE CONSENT	DM
A	03-05-2021 RESOURCE CONSENT	DM
REV	DATE	ISSUED FOR

PROJECT
22 CEMETERY ROAD - CIVIL

22 CEMETERY ROAD
WAINUI

CLIENT
SURVUS CONSULTANTS

TITLE
SERVICES PLAN

REVIEWED BY DM 29-04-2022

DESIGNED BY WM

DRAWN BY PP

SCALE 1:500 (A1) JOB NO. 2110121

DRAWING NO. REV.

C3.0 F

ENGINEERING PLAN APPROVAL



SCALE 1:500 (A1) 0 10 20 30 40 50m



KIRK ROBERTS
CONSULTING



Structural | Geotechnical | Civil | Environmental | Fire

ENGINEERING SERVICES

Survus Consultants

22 Cemetery Road

Wainui

JOB No.: 2110121

DATE: 20 September 2023

ISSUE: 3

Stormwater Operation and Maintenance
Manual

find better ways.

QUALITY CONTROL

Title Stormwater OMM

Client Survus Consultants

Version REV 3

Status Engineering Approval

Date 20 September 2023

Project Number 2110121

Authored By Name: Deon Marais
National Civil Manager

Signature:



Updated By Name: Yasmin Thompson
Graduate Civil Engineer

Signature:



Limitations This report has been prepared at the specific instructions of our client in connection with the above project.

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TABLE OF CONTENTS

1	INTRODUCTION	1
2	SITE DESCRIPTION	1
3	STORMWATER.....	3
3.1	PROPOSED STORMWATER MANAGEMENT	3
3.2	STORMWATER QUANTITY AND QUALITY MITIGATION.....	3
3.2.1	Construction Stage	3
3.2.2	Operations and Maintenance.....	3
4	CONCLUSIONS.....	5
APPENDIX A	AS-BUILT OF DRAINAGE SERVICES	6

1 INTRODUCTION

Kirk Roberts Consulting Engineers (Kirk Roberts) was Engaged by Survus Consultants, to compile a Stormwater Management Report in connection with the 10 LOT subdivision at 22 Cemetery Road, Wainui Christchurch, the Site.

2 OVER-LAND FLOW-PATH DESCRIPTION

The Topographic Survey shows the Site has a moderately steep slope towards to the South-Eastern Boundary. Based on the Survey and a Site Walk-Over, there are two Over-Land Flow-Paths (OLFP), flowing towards Cemetery Road and the Christchurch City Council (CCC) Reserve, to the South-East.

There is an existing Access. North of the Site, which is intended to be upgraded, to meet Rural Gravel Road Standards. There are currently two low-points on the Access where Upstream Catchment, is intercepted and Discharges across the Site.

“OLFP Catchment – 1” flows to a Pond, before Discharging into the CCC Reserve through the Eastern Boundary. “OLFP Catchment – 2” flows over-land, North of the existing Residential Dwelling and Discharges down-stream, into Cemetery Road.



Figure 1: OLFP through the development site



Figure 2: OLFP Catchment – 02



Figure 3: OLFP Catchment – 01 and Pond Outflow

3 STORMWATER

3.1 Proposed Stormwater Management

Assessment of the OLFP's have been divided into two Catchments. Catchment – 1 has a combined area of 75,704m², generating an estimated Stormwater Run-Off of 195.91 L/s, during the 2% Annual Exceedance Probability (AEP) 60-Minute Rainfall Event. Catchment – 2 has a combined area of 4,814m² generating an estimated Stormwater Run-Off of 9.70 L/s, 2% AEP 60-Minute Rainfall Event, refer to Appendix A.

There is an existing stormwater pipe collecting the stormwater Run-Off from Catchment – 1, north of the Access, following which the stormwater flows to a pond. The overflow from the pond, flows east and discharges into the CCC Reserve. It is proposed to upgrade the existing stormwater pipe with a Grated Inlet (Scruffy Dome) manhole and a new outlet towards the Pond. The outflow and swale downstream of the Pond, will be reshaped and upgraded to be able to have sufficient capacity for stormwater runoff during a 2% AEP 60min rainfall event.

There is a second stormwater pipe collecting the stormwater runoff from Catchment – 2 north of the access road, following which the stormwater flows overland toward the pond. Following a site assessment, it was found that the stormwater flows past the existing residential dwelling south-east toward Cemetery Road.

Additionally, overland flow downstream of the Catchment 2 Swale will flow north-west into Lot 5 past the existing dwelling where a new swale manages flows north toward the Council reserve.

Please refer to Drawing C3.0 of the Civil Design set for detailed information.

Both swales from Catchment 01 and Catchment 02 have been designed to have sufficient capacity for the primary and secondary OLFP flows. Please refer to the Civil drawings for more information.

3.2 Stormwater Quantity and Quality Mitigation

3.2.1 Construction Stage

Discharge of stormwater during construction is addressed in the Erosion and Sediment Control Plan (ESCP). The primary contaminant of concern during the construction phase is total suspended sediment (TSS), as sediments are easily entrained from disturbed earthwork areas during rainfall events. Based on implementing the Best Practicable Option (BPO), and with reference to the Regional Authority Erosion and Sediment Control Guidelines the concentration of TSS in the construction-phase discharge is expected to be less than 50 g/m³.

3.2.2 Operations and Maintenance

The following operation and maintenance items will be implemented by the 8 property owners as detailed below for the built infrastructure, refer to As-built, Appendix A. In addition to the below, maintenance should be in accordance with the Manufacturer's recommendations;

SW Attenuation Tanks – Above Ground Tanks

Frequency				Action
After storm	Quarterly	Annually	2-Yearly	
X	X	X	X	Spouting & downpipes: check for problems such as debris /blockages and leaks and rectify
X	X	X	X	First-flush diverter device: check for blockages; empty debris/sediment
	X	X	X	Tank water quality: check for clarity and odour
	X	X	X	Tank inlet/outlet pipework, orifice, float valve & backflow preventer: perform visual check for problems e.g. debris/blockages/leaks and rectify
		X	X	Tank structure: check for leaks and rectify
		X	X	Pump & electrical system: check and carry out any necessary maintenance

			X	Float valve, backflow preventer and first-flush device: test for correct functioning; repair/replace where faulty or badly worn
			X	Tank water quality: collect water sample (before emptying tank, as below), submit for testing & results to check compliance with DWSNZ, 2000; if exceedances are found, review maintenance practices to identify the cause of the problem(s) and rectify
			X	Tank cleaning: empty the tank and clean out any sediment accumulations and growths
			X	Plumbing: examine plumbing from the tank to the dwelling and rectify any faults

Stormwater Sumps and Scruffy Dome Manholes

Frequency				Action
After storm	Quarterly	Annually	2-Yearly	
		X	X	Removal of debris, litter, and sediment likely to interfere with the operation of the system, within 10 working days of the maintenance visit. Use of sucker truck, as required.
				Check for and repair any cracks in the structure, within 20 working days of maintenance visit.
		X	X	Check for blockages in outlet pipe and flush out if required

Stormwater Swales and Stabilised Channels

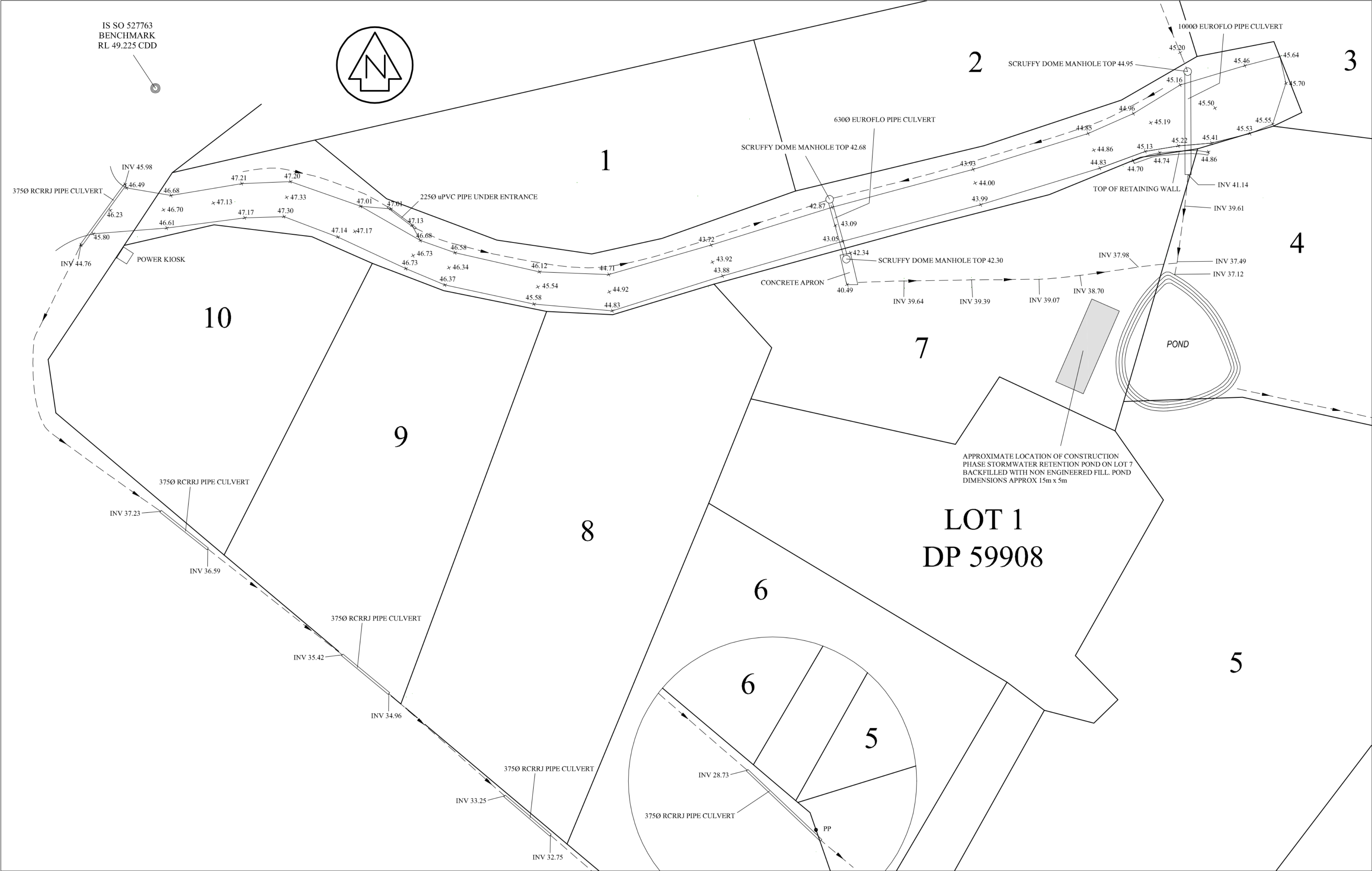
Frequency			Action
Quarterly	Annually	2-Yearly	
X	X	X	Removal of debris, and litter from entry and contributing areas
	X	X	Removal of Hydrocarbons that are visible over a total area of greater than 0.5m ² within 10 working days of the maintenance visit
X	X	X	Mow grass to keep height between 50mm and 150mm
	X	X	Repair and stabilisation of erosion and scour, via the use of revegetation, earthworks, installation of level spreaders, or additional check dams, within 20 days of the maintenance visit.
X	X	X	Reinstate vegetation, where bare or patchy soil cover or sediment build up is the lesser of; greater than 10m ² OR a total of 5% of the area of the device, within 10 working days of the maintenance visit
	X	X	Repair of any cracks (for stabilised channels) in the formed surface within 20 working days of the maintenance visit.
	X	X	Weed Control

4 CONCLUSIONS

- It is recommended the Homeowners implement a regular Maintenance Programme;
- All works are to be carried out by a suitably qualified person for upkeep and maintenance of tanks, manholes, sumps, and swales; and
- All inspections of Devices within the Private Stormwater Network are to be conducted by a suitably qualified professional and regular interval to ensure integrity of system is maintained.



Appendix A As-built of Drainage Services



REV	DATE	REVISION DETAILS	
A	01/08/23	ISSUE FOR SEC 224 APPROVAL	J L COWAN

DESIGNED JLC	VERIFIED
APPROVED	

PROJECT
WAINUI RISE SUBDIVISION - CEMETERY ROAD WAINUI
TITLE
RIGHT OF WAY & STORMWATER WORKS AS BUILT DETAILS

FOR APPROVAL	
PROJECT NO 14766	
SCALE 1:400 (A2)	SIZE A2
DRAWING NO AB-01	REV A

38 Cemetery Road Land Use Consents



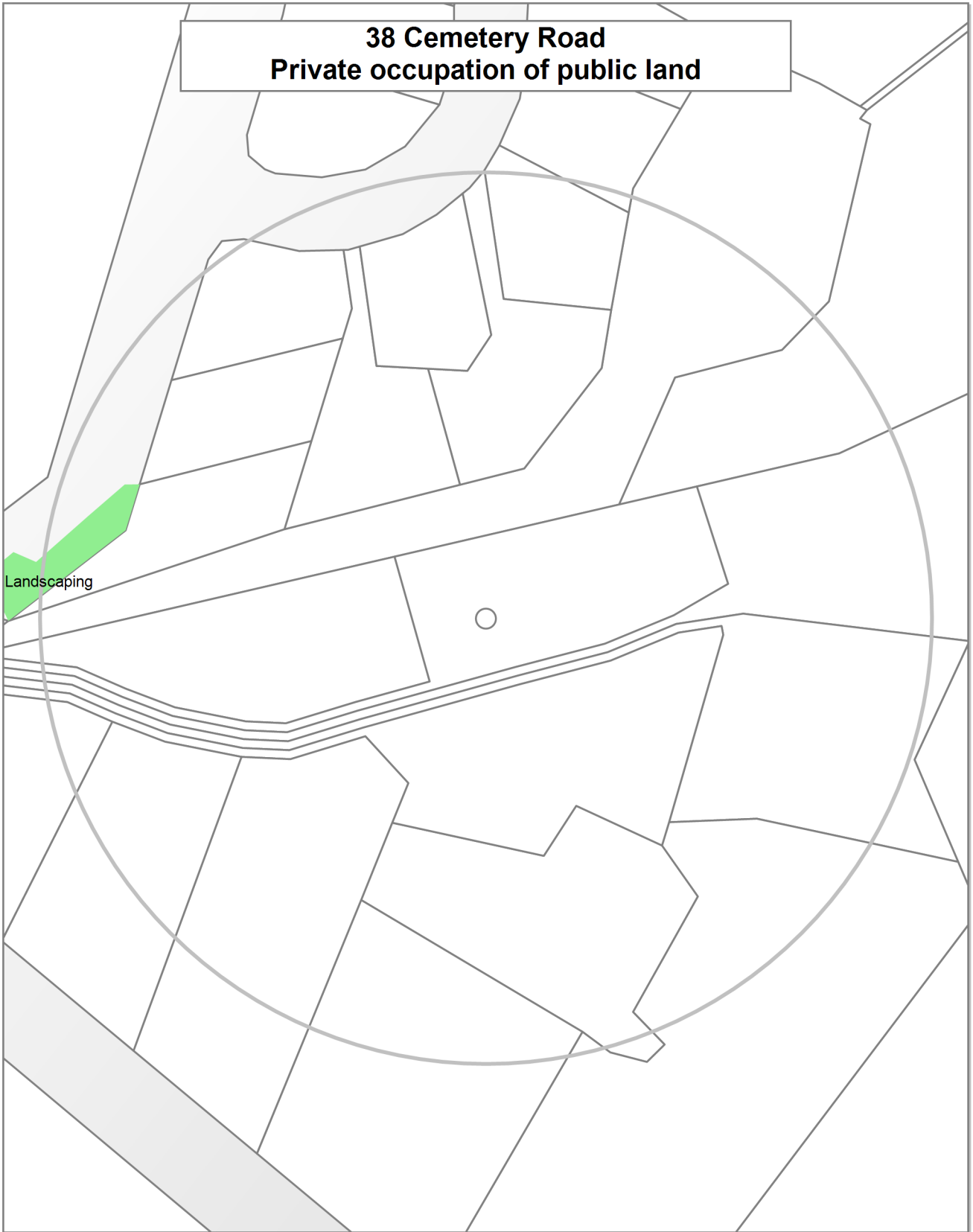
**38 Cemetery Road
Subdivision Consents**



Fee simple
Lots:14
Approved

38 Cemetery Road
Private occupation of public land

Landscaping



Land Use Resource Consents within 100 metres of 38 Cemetery Road

Note: This list does not include subdivision Consents and Certificates of Compliance issued under the Resource Management Act.

20 Cemetery Road

RMA/2020/3091

Fee Simple subdivision in ten lots with land use

Processing complete

Applied 23/12/2020

Conditions changed/cancelled - s127 17/08/2023

s223 Certificate issued 13/09/2023

s224 Certificate issued 16/10/2023

Conditions amended - s357 02/12/2021

Decision issued 03/09/2021

Granted 03/09/2021

RMA/2021/3246

Objection to conditions - RMA/2020/3091

Processing complete

Applied 28/09/2021

Decision issued 02/12/2021

Objection upheld 02/12/2021

22 Cemetery Road

RMA/2020/3091

Fee Simple subdivision in ten lots with land use

Processing complete

Applied 23/12/2020

Conditions changed/cancelled - s127 17/08/2023

s223 Certificate issued 13/09/2023

s224 Certificate issued 16/10/2023

Conditions amended - s357 02/12/2021

Decision issued 03/09/2021

Granted 03/09/2021

RMA/2021/3246

Objection to conditions - RMA/2020/3091

Processing complete

Applied 28/09/2021

Decision issued 02/12/2021

Objection upheld 02/12/2021

26 Cemetery Road

RMA/2024/1481

Construct dwelling with detached garage with earthworks

Processing complete

Applied 24/05/2024

Decision issued 02/08/2024

Granted 02/08/2024

28 Cemetery Road

RMA/2020/3091

Fee Simple subdivision in ten lots with land use

Processing complete

Applied 23/12/2020

Conditions changed/cancelled - s127 17/08/2023

s223 Certificate issued 13/09/2023

s224 Certificate issued 16/10/2023

Conditions amended - s357 02/12/2021

Decision issued 03/09/2021

Granted 03/09/2021

RMA/2021/3246

Objection to conditions - RMA/2020/3091

Processing complete

Applied 28/09/2021

Decision issued 02/12/2021

Objection upheld 02/12/2021

RMA/2025/184

Construction of new 4 bedroom residential dwelling.

Processing complete

Applied 28/01/2025

Decision issued 14/03/2025

Granted 14/03/2025

30 Cemetery Road

RMA/2020/3091

Fee Simple subdivision in ten lots with land use

Processing complete

Applied 23/12/2020

Conditions changed/cancelled - s127 17/08/2023

s223 Certificate issued 13/09/2023

s224 Certificate issued 16/10/2023

Conditions amended - s357 02/12/2021

Decision issued 03/09/2021

Granted 03/09/2021

RMA/2021/3246

Objection to conditions - RMA/2020/3091

Processing complete

Applied 28/09/2021

Objection upheld 02/12/2021

Decision issued 02/12/2021

32 Cemetery Road

RMA/2020/3091

Fee Simple subdivision in ten lots with land use

Processing complete

Applied 23/12/2020

Conditions changed/cancelled - s127 17/08/2023

s223 Certificate issued 13/09/2023

s224 Certificate issued 16/10/2023

Conditions amended - s357 02/12/2021

Decision issued 03/09/2021

Granted 03/09/2021

RMA/2021/3246

Objection to conditions - RMA/2020/3091

Processing complete

Applied 28/09/2021

Decision issued 02/12/2021

Objection upheld 02/12/2021

34 Cemetery Road

RMA/2020/3091

Fee Simple subdivision in ten lots with land use

Processing complete

Applied 23/12/2020

Conditions changed/cancelled - s127 17/08/2023

s223 Certificate issued 13/09/2023

s224 Certificate issued 16/10/2023

Conditions amended - s357 02/12/2021

Decision issued 03/09/2021

Granted 03/09/2021

RMA/2021/3246

Objection to conditions - RMA/2020/3091

Processing complete

Applied 28/09/2021

Decision issued 02/12/2021

Objection upheld 02/12/2021

36 Cemetery Road

RMA/2020/3091

Fee Simple subdivision in ten lots with land use

Processing complete

Applied 23/12/2020

Conditions changed/cancelled - s127 17/08/2023

s223 Certificate issued 13/09/2023

s224 Certificate issued 16/10/2023

Conditions amended - s357 02/12/2021

Decision issued 03/09/2021

Granted 03/09/2021

RMA/2021/3246

Objection to conditions - RMA/2020/3091

Processing complete

Applied 28/09/2021

Decision issued 02/12/2021

Objection upheld 02/12/2021

40 Cemetery Road

RMA/2020/3091

Fee Simple subdivision in ten lots with land use

Processing complete

Applied 23/12/2020

Conditions changed/cancelled - s127 17/08/2023

s223 Certificate issued 13/09/2023

s224 Certificate issued 16/10/2023

Conditions amended - s357 02/12/2021

Decision issued 03/09/2021

Granted 03/09/2021

RMA/2021/3246

Objection to conditions - RMA/2020/3091

Processing complete

Applied 28/09/2021

Decision issued 02/12/2021

Objection upheld 02/12/2021

40 Seaview Lane

RMA/2000/110

OVERHEIGHT DWELLING - Historical Reference RES95101066

Withdrawn

Applied 24/11/2000

RMA/2008/2039

s.125 EXTENSION OF TIME TO RMA92004297 (BPDC 030051) - Historical Reference RMA92012930

Processing complete

Applied 03/10/2008

Decision issued 26/11/2008

Granted 25/11/2008

44 Cemetery Road

RMA/2002/72

ACCESSORY BUILDING ENCROACHING RECESSION PLANE - Historical Reference RES95101287

Processing complete

Applied 28/06/2002

Decision issued 21/08/2002

Granted 21/08/2002

Data Quality Statement

Land Use Consents

All resource consents are shown for sites that have been labelled with an address. For sites that have been labelled with a cross (+) no resource consents have been found. Sites that have no label have not been checked for resource consents. This will be particularly noticeable on the margins of the search radius. If there are such sites and you would like them included in the check, please ask for the LIM spatial query to be rerun accordingly. This will be done free of charge although there may be a short delay. Resource consents which are on land occupied by roads, railways or rivers are not, and currently cannot be displayed, either on the map or in the list. Resource consents that relate to land that has since been subdivided, will be shown in the list, but not on the map. They will be under the address of the land as it was at the time the resource consent was applied for. Resource consents that are listed as Non-notified and are current, may in fact be notified resource consents that have not yet been through the notification process. If in doubt. Please phone (03)941 8999.

The term "resource consents" in this context means land use consents. Subdivision consents and certificates of compliance are excluded.

Subdivision Consents

All subdivision consents are shown for the sites that have been labelled with consent details. For Sites that have been labelled with a cross (+) no records have been found. Sites that have no label have not been checked for subdivision consents. This will be particularly noticeable on the margins of the search radius. If there are such sites and you would like them included in the check, please ask for the LIM spatial query to be rerun accordingly. This will be done free of charge although there may be a short delay.

The term "subdivision consents" in this context means a resource consent application to subdivide land. Non subdivision land use resource consents and certificates of compliance are excluded.

This report will only record those subdivision applications which have not been completed i.e once a subdivision has been given effect to and the new lots/properties have been established the application which created those lots will not be shown

All subdivision consent information is contained on the map and no separate list is supplied