Te Kaunihera o Te Hiku o te Ika
Far North District Council

Office Use Only
Application Number:

Application for change or cancellation of resource consent condition (S.127)

(Or Associated Consent Pursuant to the Resource Management Act 1991 (RMA)) Prior to, and during, completion of this application form, please refer to Resource Consent Guidance Notes and Schedule of Fees and Charges — both available on the Council's web page.

1. Pre-Lodgement Meeting

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

If yes, who have you spoken with? _____

2. Type of Consent being applied for

◉ **Change of conditions (s.127)**

3. Consultation:

Have you consulted with Iwi/Hapū? ◉ **Yes** ○ **No**

If yes, which groups have you consulted with? Te Runanga o Whaingaroa

Who else have you consulted with?

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

4. Applicant Details:

Name/s: Far North District Council

Email: margriet.veenstra@fndc.govt.nz

Phone number: Work 027 253 8072 Home

Postal address:
(or alternative method of service under section 352 of the act)

_____

_____

_____

Postcode 0440

Office Use Only
Application Number:

5. Address for Correspondence

Name and address for service and correspondence (if using an Agent write their details here)

Name/s: Northland Planning & Development 2020 Ltd c/o Rochelle Jacobs

Email:

Phone number: Work | Home

Postal address:
(or alternative method of service under section 352 of the act)

9/6 Fairway Drive, Kerikeri

Postcode

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

6. Details of Property Owner/s and Occupier/s

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

Name/s: Far North District Council

Property Address/ Location: 574 Whangaroa Road, Kaeo

Postcode

7. Application Site Details

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

Name/s: Far North District Council

Site Address/ Location: 574 Whangaroa Road, Kaeo

Postcode 0478

Legal Description: Lot 1 DP 190160 **Val Number:**

Certificate of title: NA 118B/579

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

Site visit requirements:

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

Is there a dog on the property? ◯ **Yes** ✔ **No**

7. Application Site Details (continued)

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

8. Detailed description of the proposal:

This application relates to the following resource consent: RC 2250199

Specific conditions to which this application relates:

Conditions 1, 2, & 3.
Variation to Advice notes also sought.

Describe the proposed changes:

Redesign of retaining walls which changes earthworks volumes, retaining wall heights and lengths, & stormwater drainage.

9. Would you like to request Public Notification?

◯ **Yes** ✔ **No**

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

✔ **Building Consent** Enter BC ref # here (if known)
◯ **Regional Council Consent (ref # if known)** Ref # here (if known)
◯ **National Environmental Standard consent** Consent here (if known)
◯ **Other (please specify)** Specify 'other' here

11. Assessment of Environmental Effects:

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

Your AEE is attached to this application ✔ **Yes**

12. Draft Conditions:

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

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

13. Billing Details:

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

Name/s: (please write in full) Margriet Veenstra

Email:

Phone number: Work Home

Postal address: (or alternative method of service under section 352 of the act)
Memorial Avenue, Kaikohe

Postcode 0440

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

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

Name: (please write in full) Margriet Veenstra

Signature: (signature of bill payer) Date 02-Dec-2025

MANDATORY

14. Important Information:

Note to applicant
You must include all information required by this form. The information must be specified in sufficient detail to satisfy the purpose for which it is required.
You must pay the charge payable to the consent authority for the resource consent application under the Resource Management Act 1991.

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

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

Name: (please write in full) Rochelle Jacobs

Signature: Date 02-Dec-2025

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

Checklist (please tick if information is provided)

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

Please refer to chapter 4 (Standard Provisions) of the Operative District Plan for details of the information that must be provided with an application. This contains more helpful hints as to what information needs to be shown on plans.

Land Use Resource Consent Proposal

Far North District Council

Lot 1 DP 190160

2 December 2025

Attention: Liz Searle and Nick Williamson – Resource Consents Team Leaders and Aroha Chase – Consents Planner

Please find attached:

- An application to vary conditions or an existing land use consent to undertake road slip repairs affecting the Whangaroa Community Hall; and
- An Assessment of Environmental Effects.

Pursuant to Section 127 of the Resource Management Act, the Far North District Council (FNDC) is seeking to vary the conditions of an existing resource consent (RC 2250199-RMALUC) that enables slip repairs within a Council owned site at 574 Whangaroa Road. Under slipping on the western side of Old Church Road has impacted the historic Hall site and resulted in debris material accumulating around the Category II historic building. The proposed works include the construction of retaining walls to protect the site from further slipping.

Aroha Chase was the processing planner for the original landuse consent and discussions have been had with her directly prior to this consents lodgement. The variation to RC 2250199-RMALUC is a **Discretionary Activity** under Section 127 of the RMA.

If you require further information, please do not hesitate to contact me.

Regards,

Rochelle Jacobs
Director/Senior Planner
NORTHLAND PLANNING & DEVELOPMENT 2020 LIMITED

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Appendices

1. **Far North District Council Application Form**
2. **Record of Title** – *LINZ*
3. **Application Plans –** *Haigh Workman*
4. **Slip Remediation Design Report RP35 Old Church Road, Whangaroa for FNDC –** *Haigh Workman*
5. **RC 2250199-RMALUC (Decision & Plans)** – *FNDC*
6. **Archaeological Assessment and Management Plan –** *Context Archaeology*
7. **Archaeological Authority –** *Heritage NZ*
8. **Approved OPW -** FNDC

Assessment of Environment Effects Report

1. Description of the Proposed Activity

1.1. Far North District Council is seeking to vary an existing land use consent resource consent (RC 2250199-RMALUC) that authorises repairs and stabilisation work at the Whangaroa Community Hall site that has resulted from slipping on the adjacent Old Church Road. The site location is 574 Whangaroa Road, Whangaroa and is legally described as Lot 1 DP 190160.

1.2. The previously consented slip repair works have been redesigned to remedy more recent slipping that occurred during Cyclone Tam earlier this year in April. The project scope now includes remedial works required within the adjacent Old Church Road that is within the FNDC designated road network.

1.3. A plan prepared by Haigh Workman Engineers showing the slip location within the application site area and the adjacent Old Church Road is shown in ***Figure 1*** below.

Figure 1 – Site and slip location plan

1.4. The original drafting of this application included an Outline Plan Waiver for works within a public road. These works have since been approved under RC 2260232 OPW. The decoupling of this application has resulted in a number of references to these works within legal road remaining, including the inclusion of plans showing both the works within the site and within the legal road. For completeness the full set of plans remains referenced in this application.

1.5. The application plans for works within the subject site and the adjacent road have been prepared by Haigh Workman are attached at **Appendix 3**. These include the plans listed below.

- *Site Plan – Project No. 25 101, Dwg # G01, Rev A, dated 07/07/25;*
- *Site Investigation Plan and Features – Project No. 25 101, Dwg # G02, dated 08/07/25 Rev A;*
- *Geological Cross Section A-A' – Project No. 25 101. Dwg # G03, dated 08/07/25, Rev A*
- *Geological Cross Section B-B' – Project No. 25 101, Dwg # G04, dated 08/07/25, Rev A*
- *Site Retaining Plan – Project No. 25 101, Dwg # G05, dated 08/07/25*
- *Old Church Road Stormwater and Drainage Plan – Project No. 25 101, Dwg # G06, dated 09/07/25, Rev A*
- *Whangaroa Hall Stormwater and Drainage Plan – Project No. 25 101, Dwg # G07, dated 09/07/25, Rev A*
- *Typical Retained Wall Details (RW01) – Project No. 25 101, Dwg # G08, dated 08/07/25, Rev A*
- *Typical Retained Wall Details (RW02) – Project 25 101, Dwg # G09, dated 08/07/25, Rev A*
- *Typical Retained Wall Details (RW03) – Project 25 1010, Dwg # G10, dated 08/07/25, Rev A*
- *Typical Retained Wall Details (RW04) – Project 25 101, Dwg # G11, dated 30/07/25, Rev A*
- *Typical Details – Project 25 101, Dwg # G12, dated 08/07/25, Rev A*
- *Retrofit to Existing Retaining Wall on Old Church Road – Project 25 101, Dwg # G13, dated 21/10/25*
- *Whangaroa Hall NES-CS Plan – Project 25 101, Dwg # G14, dated 17/11/25*

1.6. The plan set included at ***Appendix 3*** also includes extracts from FNDC 2023 standards applicable to this design.

1.7. The works will be undertaken in accordance with the Haigh Workman *'Slip Remediation Design Report RP35 Old Church Road, Whangaroa for FNDC, Reference 25 101,* dated November 2025. This also now includes permitted activities associated with earthworks required to strengthen an existing stormwater culvert adjacent to an identified HAIL site.

1.8. The proposed remediation, excavations, and construction work activity include the following activities:

Whangaroa Hall site – Lot 1 DP 190160 – variation to resource consent

1.9. RC 2250199-RMALUC is to *'undertake earthworks, construct retaining walls and install stormwater control measures within 20m of a Scheduled Heritage Resource'.* A copy of the approved resource consent and plans is attached at **Appendix 5**.

1.10. The table below sets out the variation to the proposed activities. The proximity of earthworks and retaining walls (buildings) within 20m of a Scheduled Heritage Resource requiring resource consent under the PDP has not changed. There is an overall reduction in the size and scale of remedial repair works being undertaken within the Hall site.

Table 1: Variation to proposed activities

Consented Activity	***Variation Proposal***
Excavation Earthworks	
Volume = 50m^3 *Depth = 300mm* Approved Plan G02	*Volume = 35m^3* *Depth = 150mm* Revised Plan G03 & G07
Retaining Walls	
RW01	
Height = 1m *Length = Not specified* Approved Plan(s) G01 & G04	*Height = 1m* *Length = 7.2m* Proposed Plan(s) G05 & G08
RW02	
Height = 1m	*Height = 0.75m*

Length = Not specified Approved Plan(s) G01 & G05	*Length = 3.6m* Proposed Plan(s) G05 & G09
RWO3	
Height = 1m *Length = Not specified* Approved Plan(s) G01 & G06	*Height = 0.5m* *Length = 4.1m* Proposed Plan G05 & G10
Stormwater Drainage	
Dish drain above retaining wall to divert stormwater entering the side in a westward direction. Approved Plan G01	*Subsoil drains and concrete lined channel behind retaining walls to direct stormwater around perimeter of the building to Whangaroa Road street drainage via existing stormwater culvert on northern side of building and concrete lined channel on southern side.* Proposed Plan G07

1.11. The extent, volume and depth of earthworks around the perimeter of the Hall will be reduced. The overall length and height of retaining wall(s) within the site is also reduced.

1.12. As shown on the Stormwater and Drainage Plan G07, new subsoil drains and a concrete lined channel will be installed along the southern and eastern sides of the Hall building to direct stormwater westward to the kerb drainage on Whangaroa Road. On the northern side of the Hall building, stormwater from subsoil drains and a new concrete lined channel drain above the retaining wall will be conveyed to an existing FNDC stormwater culvert. The concrete lined channel will prevent overland stormwater flows from entering the Whangaroa Hall building footprint. Works involving the installation of a reinforced concrete slab required to strengthen the existing culvert will be undertaken. A new kerb block and channel will be constructed along the northern side of the Hall building adjacent to the access ramp. The proposed concrete slab protection works to the existing stormwater culvert on the northern side of the building will be undertaken adjacent to an identified HAIL site that is a former petrol station.

1.13. As previously proposed, the existing water tank at the rear of the Hall building will be removed for excavation and relocated to a level 200mm compacted hardfill pad. Water connections will

be reinstated and overflow directed to the concrete lined channel on the southern side of the hall.

1.14. To enable the revised design, the application seeks to vary the following conditions as follows:

CONDITIONS:

- *Condition 1 – The activity shall be carried out in general accordance with the approved plans prepared by Haigh Workman Ltd, referenced ~~24 079~~ 25 101, ~~dated~~ ' ~~May 2024~~, and attached to this consent with the Council's "Approved Stamp" affixed to them.*

NB: The revised plans to be included in the approved plan set are set out in paragraph 1.4 above. There are various plan dates so suggest these are listed in the consent condition 1.

- *Condition 2 – The consent holder must ensure that the works are carried out in general accordance with the ~~Geotechnical Assessment and Retaining Wall Design Report prepared by Haigh Workman Ltd, referenced 24 079, dated 15/05/2024 and provided with the application (RC2250199 – RMALUC).~~ Slip Remediation Design Report RP35 Old Church Road, Whangaroa for FNDC, prepared by Haigh Workman Ltd referenced 25 101, dated November 2025 and provided with the application (RC xxx – RMALUC)*

- *Condition 3* – Delete as FNDC stormwater pipe location has been CCTV'd and shown on the plans. Retaining walls have been redesigned to avoid the stormwater pipe.

- *Condition 4 – Retain as per RC 2250199-RMALUC*

- *Condition 5 - Retain as per RC 2250199-RMALUC*

- *Condition 6 - Retain as per RC 2250199-RMALUC*

- *Condition 7 - Retain as per RC 2250199-RMALUC*

ADVICE NOTES:

Lapsing of Consent

1. *Retain as per RC 2250199-RMALUC*

Right of Objection

2. *Retain as per RC 2250199-RMALUC*

Archaeological Sites

3. *Retain as per RC 2250199-RMALUC*

4. *The consent holder is advised that the works associated with carrying out this activity are subject to a granted Heritage New Zealand Pouhere Taonga Archaeological Authority (AUTHORITY NO: 2025/637, and expiry date of 23rd July 2030) which contains conditions of authority that are to be adhered to.*

General Advice Notes

5. *Retain as per RC 2250199-RMALUC*

6. *As per the surveyed CCTV pipe location previously provided to the Council, it is recommended that the consent holder complete the capping of the stormwater culvert pipe prior to removal of the cut material. ~~The consent holder is advised that a stormwater pipe is located on the subject site. It is recommended that pre and post CCTV footage is undertaken of the stormwater pipe in order to determine the condition of the stormwater pipe pre and post construction of the retaining walls.~~*

Old Church Road – proposed works within a designated road

1.15. I note that consent has recently been approved for these works within the legal road as part of RC 2260232 OPW ***(Appendix 8).*** This consent does not seek to renew consent for these works, however as the information provided in the engineering report covers both walls is has been included for information purposes.

2. Background to the Proposal

2.1. The proposed slip repair works are required to remedy historic slipping that has undermined a part of the adjacent Old Church Road above the historic Whangaroa Hall site. Early slipping in 2011 recorded on the Council's Whangaroa Hall property file made note of a breached culvert on Old Church Road that had directed stormwater and debris over the road and into the Hall site. The slip was repaired with the existing 32m retaining wall that is upslope of the current slip area (refer ***Figures 3 and 4*** of the Haigh Workman Design Report attached at **Appendix 4**).

2.2. Further slipping occurred during the storm events associated with Cyclone Gabrielle in 2022/2023 and was significantly worsened during Cyclone Tam in April 2025. The slipping resulted in debris material accumulating around the Whangaroa Hall building requiring its' removal and to protect the Hall from further stormwater intrusion.

2.3. Following the Cyclone Gabrielle storm events, an application for a Discretionary Activity resource consent to excavate the debris material to a depth of 300mm and to construct retaining walls and stormwater drainage around the perimeter of the building (that is a scheduled heritage resource) was granted in November 2024. A copy of RC 2250199-RMALUC is attached at **Appendix 5**. A building consent EBC-2025-264/- was also granted.

2.4. The proposed remedial works were not undertaken prior due to further slipping occurring in April 2025. At that time, FNDC determined that further remedial works to extend the retained northern side of Old Church Road and to direct stormwater away from the Hall down to Whangaroa Road was required. Furthermore, the depth of excavation proposed around the perimeter of the Hall was deemed inappropriate, with the potential to undermine the building foundations. The revised design reduces the depth of excavation required and consequently the extent and height of retaining walls around the building. Stormwater from above the retained areas will be directed to the existing stormwater culvert that runs down the site along the northern side of the Hall building and out to the kerb channel on Whangaroa Road.

2.5. Haigh Workman Engineers have been engaged to undertake the above design. In July 2025, Heritage NZ granted an archaeological authority for the earlier proposed works that were more extensive than the current proposal. A copy of that authority is attached at **Appendix 7**.

2.6. In November 2025, an Outline Plan RC 2260232 was granted for works within the legal road corridor.

3. Description of the Site and Surrounding Environment

3.1. The application site is located at 574 Whangaroa Road, Whangaroa. The site is legally described as Lot 1 DP 190160 and is owned by Far North District Council. The site has western main street frontage to Whangaroa Road. Old Church Road is adjacent to the site's southern boundary and is part of the designated Far North District Council road network.

3.2. A part of the adjacent Old Church Road forms part of the application site where historic land slips have inundated the Whangaroa Hall site that requires reinstatement via retained walls and new stormwater drainage.

3.3. Lot 1 DP 190160 contains the historic Whangaroa Community Hall that was a former church building constructed in 1840 (refer **Photo 1** below). The timber building is an HPT Category II registered building. The site is a mapped scheduled heritage site in the ODP and PDP. The church building is located on the lower western part of the site. The site slopes upward towards the southern boundary with Old Church Road to the rear. Site vehicle access and parking is on the northern side of the building.

Figure 2- Whangaroa Community Hall site Lot 1 DP 190160

3.4. As a site of historic interest, Doug Gaylard of Context Archaeology has undertaken an archaeological assessment and prepared a management plan for the proposed works. A copy of this report and the management plan is attached at **Appendix 6**. The site is identified as an HPT archaeological site P04/814 (historic St Pauls Chapel constructed in 1840) as indicated on the FNDC Far North Atlas map. Other nearby registered sites include shell midden (PO4/812) that have been exposed by the slip and a gravel layer associated with an historic road surface (PO4/813). The site contains an FNDC scheduled heritage resource #223, which is the Whangaroa Public Hall. The assessed plans refer to an earlier design that has been modified to reduce the extent of the works. This includes the overall earthworks volumes and the extent of retaining walls. The site works are subject to an archaeological authority that was issued to Haigh Workman in July 2025 (2025-637).

3.5. The works site is located adjacent to a registered HAIL site as shown on the NRC selected land use registered database and map. The HAIL site is a former garage and service station and straddles the northern boundary with 576 Whangaroa Road. As described in Section 6.6 of the Haigh Workman Design Report, the associated fuel tanks were removed in 2002 with minor contamination of the tank pit walls noted during removal such that no further remediation was deemed necessary.

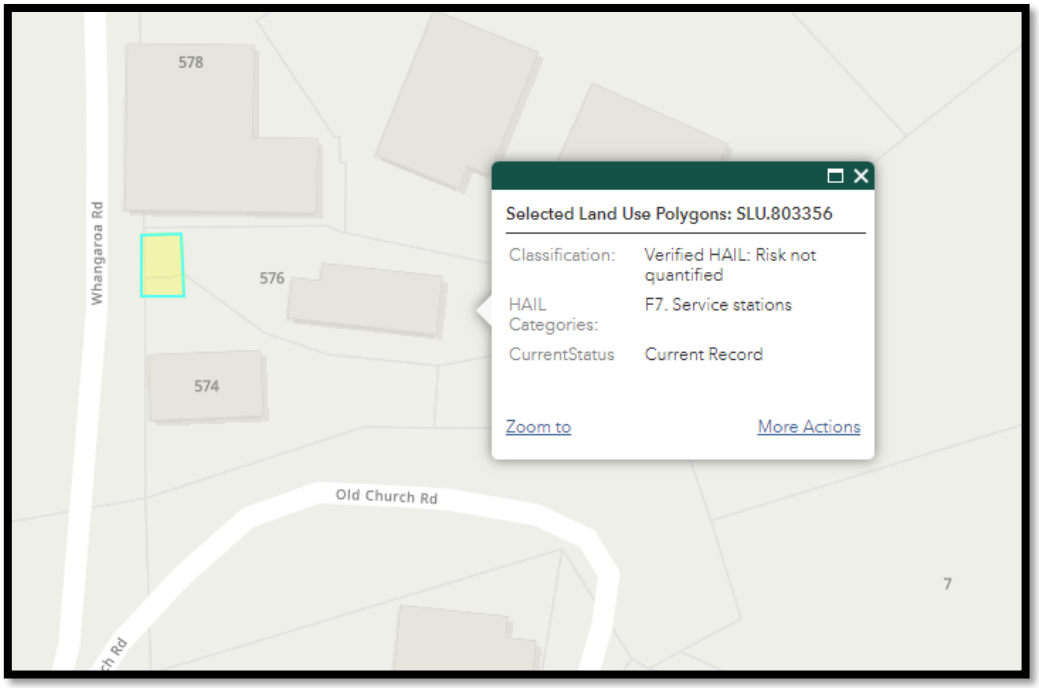

Figure 3 – Adjacent HAIL site

3.6. There are no works proposed within the identified HAIL site. For the purposes of this application, Haigh Workman has implemented a conservative 5m buffer zone around the identified HAIL area in the event Activity H on the HAIL is applicable. This has resulted in a 236m^2 HAIL area. Within this buffer area a small area of concrete culvert capping involving 1.3m^3 of surface material being cut will occur within 2.4m of the mapped extent of the HAIL site.

4. Reasons for Consent

Section 127 of the Resource Management Act (RMA)

4.1. This application seeks to vary the conditions of an existing resource consent RC 2250199-RMALUC as described in Section 1.0 above resulting from a change to the scope of works required to stabilise the site. Section 127(3) states that Sections 88-121 apply, with all the necessary modifications, as if the application were an application for a resource consent for a Discretionary Activity.

4.2. The Lot 1 DP 190160 site is zoned 'Commercial' under the ODP and 'Mixed Use' under the PDP. The reasons for consent under the PDP remain the same as the original application. That is to undertake earthworks, construct retaining walls and install stormwater control measures within 20m of a scheduled heritage resource. There are no other works proposed that would require additional consents under either of the applicable district plans.

National Environmental Standards

National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health 2011 (NESCS)

4.3. The application site Lot 1 DP 190160 contains a HAIL site that is a former petrol station where underground fuel tanks have been previously removed. As previously described, minor earthworks to remove surface material from above the existing public stormwater culvert that runs along the northern side of the Hall building. A small area of works would be within the conservative 5m buffer area that is potentially considered to be a HAIL site under category H. This is a previously disturbed area of the site. As described in Section 6.6 of the Haigh Workman report, an approximate 1.3m^3 of material will be cut and removed from within the buffer area to an approved disposal facility. The proposed volume is within the threshold set

by the NES Section 8(3) permitted standards, and the activity will adhere to all permitted standards throughout.

National Environmental Standards for Freshwater Management 2020

4.4. There are no identified inland wetlands or freshwater resources that would be affected by the proposal. THE NES-FM does not apply.

5. Statutory Assessment

Section 104 of the Resource Management Act 1991

5.1. Applications to vary or cancel conditions of a resource consent are subject to Sections 88-121 where they are applicable. This includes Section 104, which sets out matters for consideration when deciding a resource consent.

5.2. Section 104(1) of the RMA states that when considering an application for resource consent –

"the consent authority must, subject to Part II, have regard to –

(a) any actual and potential effects on the environment of allowing the activity; and

(ab) any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment that will or may result from allowing the activity; and

(b) any relevant provisions of –

i. a national environmental standard:

ii. other regulations:

iii. a national policy statement:

iv. a New Zealand Coastal Policy Statement:

v. a regional policy statement or proposed regional policy statement:

vi. a plan or proposed plan; and

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

5.3. The Council has previously granted resource consent to undertake the remedial slip repair works within the site. Necessary works within the adjacent Old Church Road have recently been approved under RC 2260232 and will result in better stabilisation and drainage outcome, and which also allows works within the Hall site to be reduced in size and scale. In particular, the extent of excavation earthworks which will avoid undermining the building foundations, and the overall length and height of the retaining walls. The proposed works will result in positive effects within and adjacent to the site through stabilisation to prevent future under slipping of the roadway affecting the historic heritage site.

5.4. In respect of potential adverse effects, the Council has previously concluded that any potential adverse effects will be no more than minor and that there are no affected persons. The extent of works is reduced and correspondingly the potential adverse effects. The proposed design is an improvement on the previous proposal in that it will result in better, long-term stabilisation of the site and the adjacent roadway.

5.5. The Whangaroa Hall is zoned Commercial in the ODP and Mixed Use in the PDP. The site contains a scheduled heritage resource that is the Whangaroa Community Hall that is a former church constructed in 1840. The ODP Commercial Zone provides for commercial activity in the zone with limited building or site development controls other than appropriate management of stormwater. The proposed works would not be contrary to the objectives and policies of the Commercial Zone. The PDP Historic Heritage overlay rules have immediate legal effect. HH-O1 seeks to identify and manage heritage resources to ensure their long-term protection for current and future generations.

5.6. Similarly, HH-P2 seeks to protect scheduled heritage resources by 'avoiding significant adverse effects on the recognised heritage values of scheduled heritage resources'. The proposed slip repair works are designed to remediate existing damage to the Hall site area around the building and to prevent further slipping. The proposed works will include retaining and better stormwater drainage to direct runoff away from the building and to stabilise the slope above the Hall site. The proposed works will give effect to the PDP historic heritage objectives and policies as applied to the Whangaroa Hall scheduled heritage resource.

6. Part 2 Assessment

6.1. The application must be considered in relation to the purpose and principles of the Resource Management Act 1991 which are contained in Section 5 to 8 of the Act inclusive.

6.2. The proposal will meet Section 5 of the RMA by promoting the sustainable management of identified heritage resources within the district that have recognised heritage value. The purpose of the proposed works is to prevent further slipping and potential damage to the historic building.

6.3. Section 6 of the Act sets out matters of national importance. Of direct relevance to this application is Section 6(f) which is the protection of historic heritage from inappropriate use and development. As stated above, the proposed works are designed to protect the existing heritage site and to remedy historic slipping within the adjacent road.

6.4. Section 7 identifies "other matters" to be given particular regard by a Council when assessing an application for resource consent, including the maintenance and enhancement of amenity values. The proposal maintains amenity values in the area as the proposal is in keeping with the existing character of the surrounding environment. The quality of the existing site and road environment will be improved.

6.5. Section 8 requires Council to 'take into account' the principles of the Treaty of Waitangi (Te Tiriti o Waitangi). It is considered that the proposal would not be contrary to the principles of Te Tiriti.

6.6. Overall, the application is consistent with the relevant provisions of Part 2 of the RMA, as expressed through the objectives, policies and rules reviewed in earlier sections of this application. Given that consistency, it is concluded that the proposal achieves the purpose of sustainable management set out by Sections 5-8 of the Act.

7. Conclusion

7.1. Far North District Council is seeking to vary the conditions of an existing resource consent and undertake works within a designated road. The previously consented works have been redesigned to include remedial works within the adjacent Old Church Road, that will positively reduce the extent of works required in the Whangaroa Hall site and be more appropriate in terms of proposed excavation of accumulated soil material around the perimeter of the Hall building.

7.2. The proposal to vary the existing conditions of consent is Discretionary Activity under Section 127 of the RMA. An outline plan waiver for proposed works within the adjacent Old Church Road has recently been approved. The application includes reference to a Heritage NZ Archaeological Authority that was approved in June 2025 and which authorises works within the Hall site. Construction works will be undertaken with an archaeologist and Te Runanga o Whaingaroa representative present.

7.3. The Council has previously assessed potential adverse effects arising from the proposed works and concluded that the proposed activity will not have, and is not likely to have, adverse effects on the environment that are more than minor. There are no affected persons.

8. Limitations

8.1. This report has been commissioned solely for the benefit of our client, in relation to the project as described above, and to the limits of our engagement, with the exception that the Far North District Council or Northland Regional Council may rely on it to the extent of its appropriateness, conditions and limitations, when issuing their subject consent.

8.2. Copyright of Intellectual Property remains with Northland Planning and Development 2020 Limited, and this report may NOT be used by any other entity, or for any other proposals, without our written consent. Therefore, no liability is accepted by this firm or any of its directors, servants or agents, in respect of any information contained within this report.

8.3. Where other parties may wish to rely on it, whether for the same or different proposals, this permission may be extended, subject to our satisfactory review of their interpretation of the report.

8.4. Although this report may be submitted to a local authority in connection with an application for a consent, permission, approval, or pursuant to any other requirement of law, this disclaimer shall still apply and require all other parties to use due diligence where necessary.

Quickmap Title Details

Information last updated as at 30 Nov 2025

RECORD OF TITLE
DERIVED FROM LAND INFORMATION NEW ZEALAND
FREEHOLD

Identifier **NA118B/579**

Land Registration District **North Auckland**

Date Issued 22 May 1998

Prior References

NA12D/58

Type Fee Simple

Area 386 square metres more or less

Legal Description Lot 1 Deposited Plan 190160

Purpose Site for a public hall

Registered Owners

Far North District Council

SUBJECT TO THE RESERVES ACT 1977

NOTES:

1. LOT BOUNDARIES AND AERIAL PHOTO INFORMATION TAKEN FROM LAND INFORMATION NEW ZEALAND (LINZ).
2. CONTOURS ARE FROM LINZ LIDAR DATA.
3. LOCATIONS HAVE NOT BEEN SURVEYED AND ARE INDICATIVE ONLY.

Issue	Date	Revision
A	7/07/2025	FIRST ISSUE

DWG: SITE PLAN

Scale 1:500 @A3 | Date JULY 2025

Drawn JC | Checked WT | Approved WT

File T:\CLIENTS\FNDC\JOBS\25 101 - OLD CHURCH ROAD, WHANGAROA\ENGINEERING\2 DRAWINGS\25 101 GEO PLANS.DWG

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Project: OLD CHURCH ROAD SLIP REMEDIATION
574 WHANGAROA ROAD, WHANGAROA

Client: FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

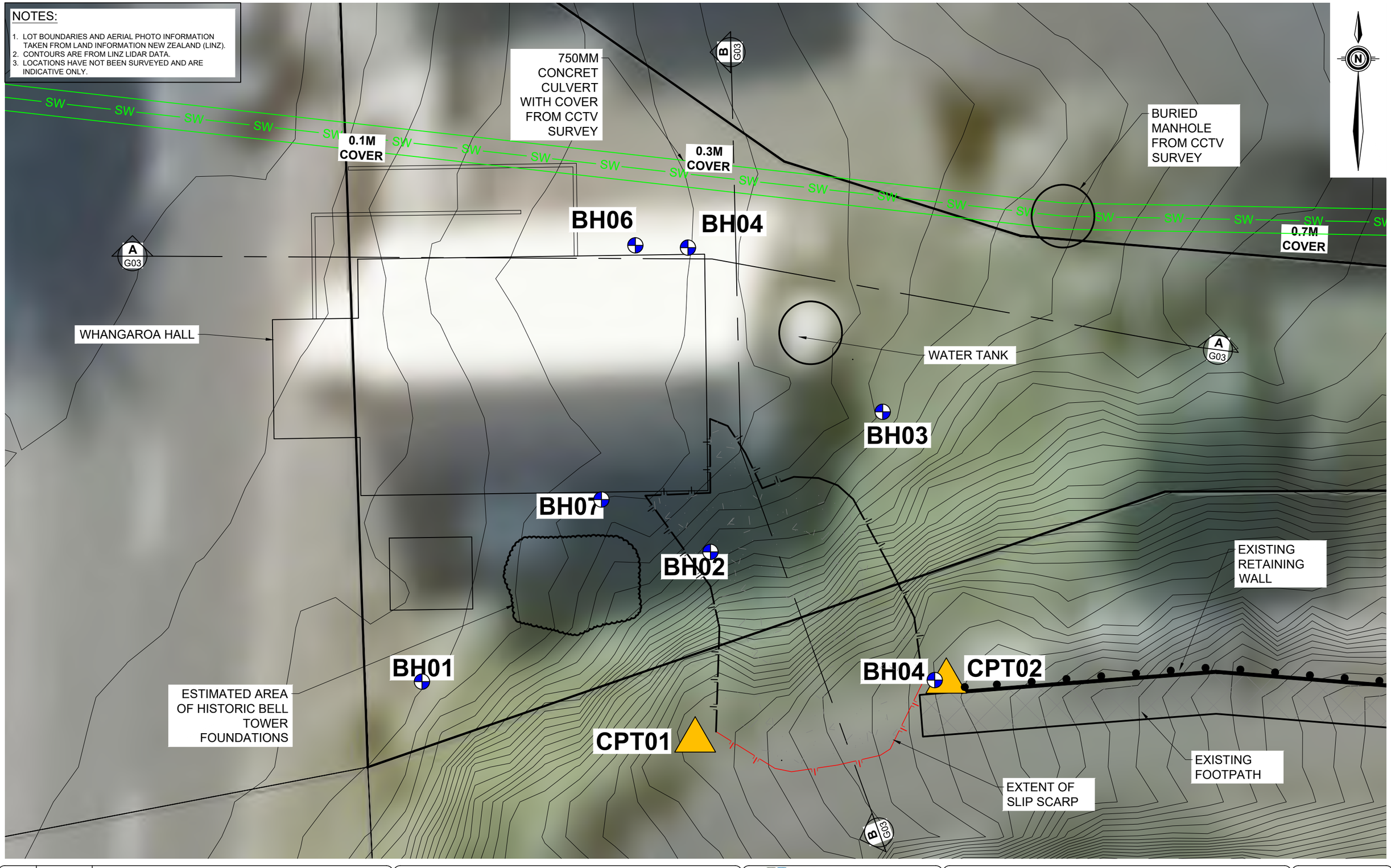
DWG No. **G01**

Sheet No. **1** of **13**

Plotted By Jonathan Corskie at 7/07/2025 4:36:36 pm

NOTES:

1. LOT BOUNDARIES AND AERIAL PHOTO INFORMATION TAKEN FROM LAND INFORMATION NEW ZEALAND (LINZ).
2. CONTOURS ARE FROM LINZ LIDAR DATA.
3. LOCATIONS HAVE NOT BEEN SURVEYED AND ARE INDICATIVE ONLY.



Issue	Date	Revision
A	8/07/2025	FIRST ISSUE

DWG
SITE INVESTIGATION PLAN AND FEATURES

Scale 1:100 @A3 | Date JULY 2025
Drawn JC | Checked WT | Approved WT
File T:\CLIENTS\FNDC\JOBS\25 101 - OLD CHURCH ROAD, WHANGAROA\ENGINEERING\2 DRAWINGS\25 101 GEO PLANS.DWG

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Project OLD CHURCH ROAD SLIP REMEDIATION
574 WHANGAROA ROAD, WHANGAROA

Client FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

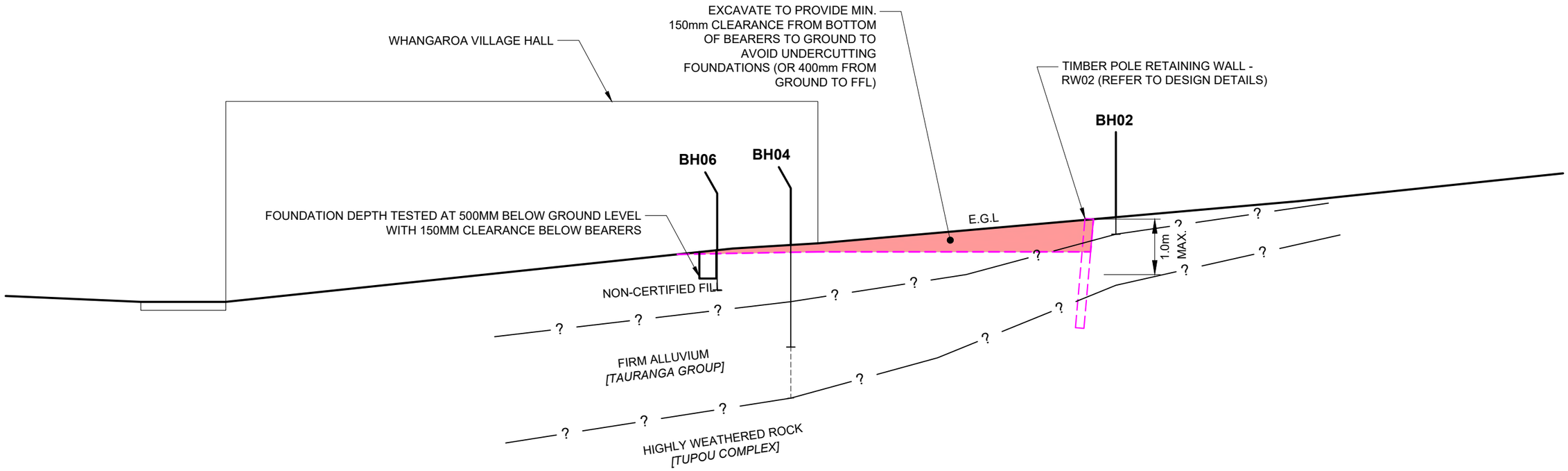
DWG No. **G02**

Sheet No. **2** of **13**

Plotted By Jonathan Corskie at 8/07/2025 12:09:46 pm

NOTES:

1. THIS DRAWING IS BASED ON MEASUREMENTS BY TAPE AND CLINOMETER AND IS APPROXIMATE ONLY.
2. THE GROUND MODEL HAS BEEN INFERRED FROM THE BOREHOLE DATA. INFERENCES ABOUT THE SOILS CONDITIONS BETWEEN TEST LOCATIONS HAVE BEEN MADE BUT CANNOT BE GUARANTEED.



Issue	Date	Revision
A	8/07/2025	FIRST ISSUE

DWG: Geological Cross Section A-A'

Scale 1:75 @A3 | Date JULY 2025

Drawn JC | Checked WT | Approved WT

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Project: OLD CHURCH ROAD SLIP REMEDIATION
574 WHANGAROA ROAD, WHANGAROA

Client: FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

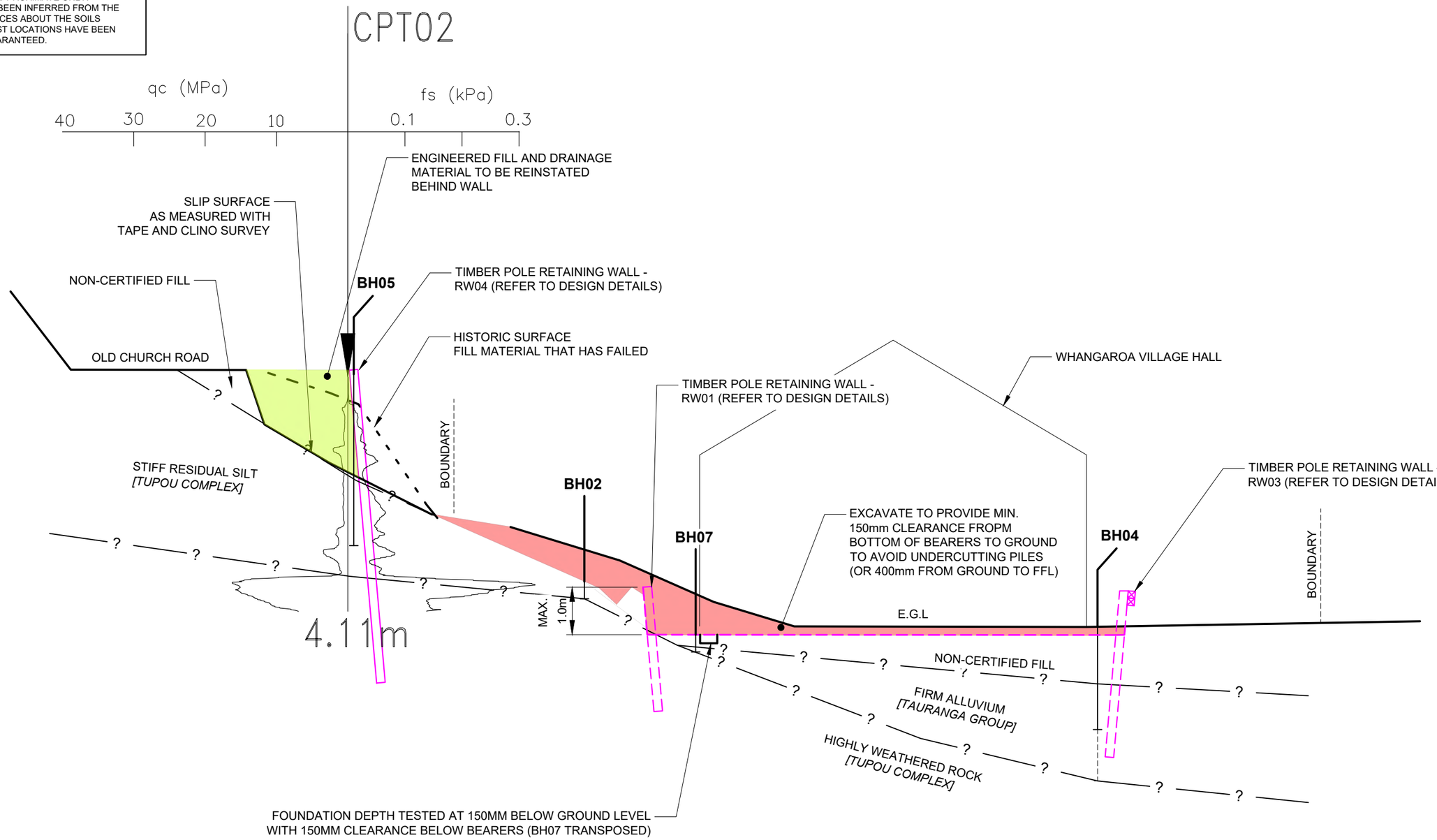
DWG No. **G03**

Sheet No. **3** of **13**

Plotted By Jonathan Corskie at 8/07/2025 12:21:15 pm

NOTES:

1. THIS DRAWING IS BASED ON MEASUREMENTS BY TAPE AND CLINOMETER AND IS APPROXIMATE ONLY.
2. THE GROUND MODEL HAS BEEN INFERRED FROM THE BOREHOLE DATA. INFERENCES ABOUT THE SOILS CONDITIONS BETWEEN TEST LOCATIONS HAVE BEEN MADE BUT CANNOT BE GUARANTEED.



Issue	Date	Revision
A	8/07/2025	FIRST ISSUE

DWG: Geological Cross Section B-B'

Scale 1:75 @A3 | Date JULY 2025

Drawn JC | Checked WT | Approved WT

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574 WHANGAROA ROAD, WHANGAROA

Client: FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

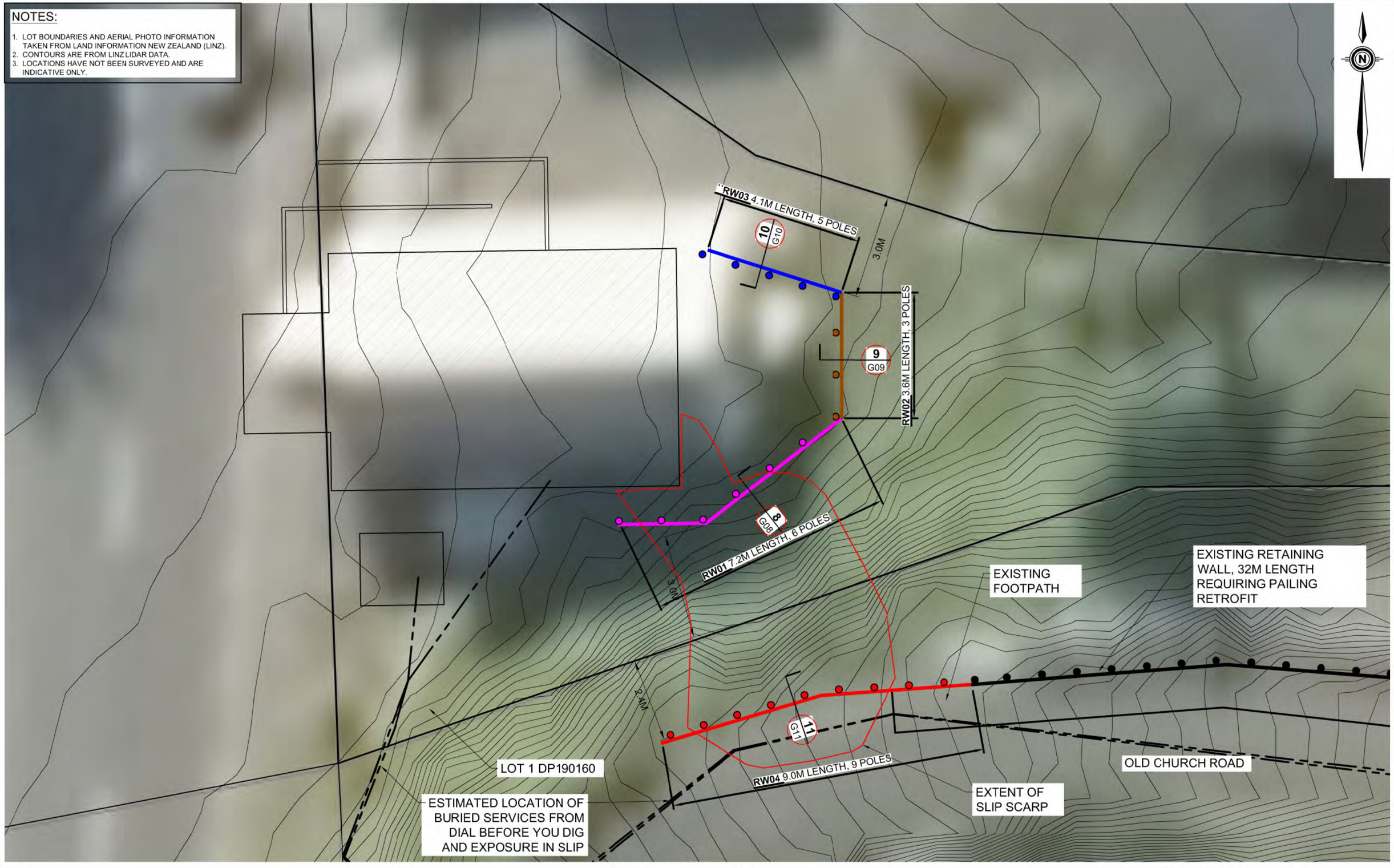
DWG No. **G04**

Sheet No. **4** of **13**

Plotted By Jonathan Corskie at 8/07/2025 12:45:26 pm

NOTES:

1. LOT BOUNDARIES AND AERIAL PHOTO INFORMATION TAKEN FROM LAND INFORMATION NEW ZEALAND (LINZ).
2. CONTOURS ARE FROM LINZ LIDAR DATA.
3. LOCATIONS HAVE NOT BEEN SURVEYED AND ARE INDICATIVE ONLY.



Issue	Date	Revision
A	8/07/2025	FIRST ISSUE

DWG: SITE RETAINING PLAN

Scale 1:100 @A3 | Date JULY 2025

Drawn JC | Checked WT | Approved WT

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Project: OLD CHURCH ROAD SLIP REMEDIATION
574 WHANGAROA ROAD, WHANGAROA

Client: FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

DWG No. G05

Sheet No. 5 of 9

Plotted By Jonathan Corskie at 5/08/2025 12:37:55 pm

NOTES:

1. LOT BOUNDARIES AND AERIAL PHOTO INFORMATION TAKEN FROM LAND INFORMATION NEW ZEALAND (LINZ).
2. CONTOURS ARE FROM LINZ LIDAR DATA.
3. LOCATIONS HAVE NOT BEEN SURVEYED AND ARE INDICATIVE ONLY.

LEGEND

- EXISTING BOUNDARY
- EXISTING DRAIN
- EXISTING SERVICES
- EXISTING ROAD EDGE OF SEAL
- EXISTING SLIP
- PROPOSED KERB BLOCK
- PROPOSED KERB BLOCK AND CHANNEL
- PROPOSED CONCRETE LINED DRAIN
- PROPOSED SUBSOIL DRAIN

RW03

RW02

RW01

RW04

110MM SUBSOIL DRAINS DISCHARGING DOIWNSLOPE

35M OF CONCRETED KERB BLOCK ALONG RETAINING WALL BASE BOARD

10M2 OF CONCRETE FOOTPATH 125mm THICK WITH 665 MESH AND 125mm GAP 40 SUBBASE. ASPHALT REINSTATEMENT BETWEEN FOOTPATH AND ROAD

ESTIMATED LOCATION OF EXISTING SERVICES TO BE LOCATED BY CONTRACTOR

30M OF KERB BLOCK KERB AND CHANNEL PROFILE WITH LESS THAN 300M WIDTH ASPHALT BETWEEN EXISTING SEAL.

Issue	Date	Revision
A	9/07/2025	FIRST ISSUE

DWG: OLD CHURCH ROAD STORMWATER AND DRAINAGE PLAN

Scale 1:150 @A3 | Date JULY 2025

Drawn JC | Checked WT | Approved WT

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Project: OLD CHURCH ROAD SLIP REMEDIATION
574 WHANGAROA ROAD, WHANGAROA

Client: FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

DWG No. G06

Sheet No. 6 of 13

Plotted By Jonathan Corskie at 9/07/2025 11:36:16 am

NOTES:

1. LOT BOUNDARIES AND AERIAL PHOTO INFORMATION TAKEN FROM LAND INFORMATION NEW ZEALAND (LINZ).
2. CONTOURS ARE FROM LINZ LIDAR DATA.
3. LOCATIONS HAVE NOT BEEN SURVEYED AND ARE INDICATIVE ONLY.

LEGEND

- EXISTING BOUNDARY
- EXISTING DRAIN
- EXISTING SERVICES
- EXISTING ROAD EDGE OF SEAL
- EXISTING SLIP
- PROPOSED EXCAVATION EXTENT
- PROPOSED KERB BLOCK AND CHANNEL
- PROPOSED CONCRETE LINED DRAIN
- PROPOSED SUBSOIL DRAIN

7M KERB BLOCK AND CHANNEL ADJACENT TO ACCES RAMP

14M LENGTH OF REINFORCED CONCRETE SLAB PROTECTION FOR CULVERT

40M OF CONCRETE LINED CHANNEL

160MM SUBSOIL DRAINS BELOW CONCRETE LINED CHANNEL OFFSET MINIMUM 0.5M FROM BUILDING, MAXIMUM DEPTH OF TRENCH 0.4M

REINSTATE WATER TANK ON LEVEL PAD 200MM THICK COMP[ACTED GAP65. OVERFLOW EXTENDED TO CONCRETE LINED CHANNEL AND CONNECTIONS REINSTATED

EXTENT OF EXCAVATION
35M3 EXCAVATION TO 150MM CLEARANCE BELOW BEARERS TO GROUND LEVEL.
SUBJECT TO GENERAL ARCHAEOLOGICAL AUTHORITY AND MONITORING

CONCRETE LINED CHANNEL TO EXTEND TO EXISTING FOOTPATH PVC PIPE CROSSING

ESTIMATED LOCATION OF EXISTING SERVICES TO BE LOCATED BY CONTRACTOR

Issue	Date	Revision
A	21/10/2025	FIRST ISSUE

DWG: WHANGAROA HALL STORMWATER AND DRAINAGE PLAN

Scale 1:100 @A3 | Date OCTOBER 2025 | Drawn JC | Checked WT | Approved WT

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Project: OLD CHURCH ROAD SLIP REMEDIATION
574 WHANGAROA ROAD, WHANGAROA

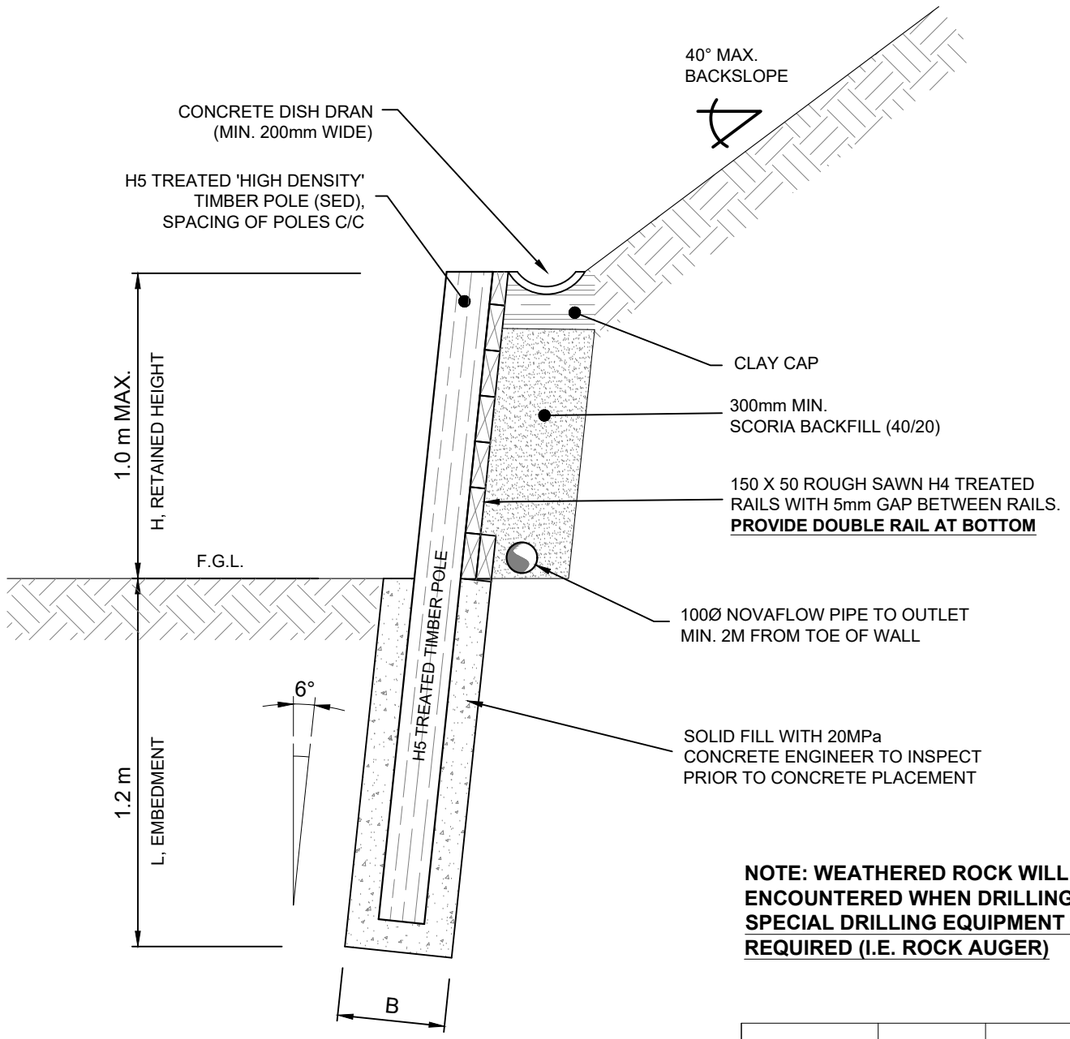
Client: FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

DWG No. G07

Sheet No. 7 of 12

Plotted By Jonathan Corskie at 21/10/2025 7:37:02 am



8 / G08 TYPICAL DETAIL - **RW01**

Scale 1 : 20 @ A3

TIMBER SPECIFICATION NOTES:

1. CAUTION:
   DEEP EXCAVATIONS UNSUPPORTED DURING CONSTRUCTION MAY BE HAZARDOUS PARTICULARLY WHEN WORKING IN CONFINED SPACES. THE DEPARTMENT OF LABOUR'S EXCAVATION GUIDE GIVES RECOMMENDED SAFETY PROCEDURES FOR SUCH SITUATIONS. THE EXCAVATION AND EARTHWORKS CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT ADEQUATELY ALL PERSONS AND PROPRETY LIABLE TO THE BE AFFECTED BY THE EXCAVATION AND EARTHWORKS OPERATIONS.

2. MATERIALS:
   TIMBER:
   TIMBER POLES SHALL BE PEELED RADIATA PINE LOGS COMPLYING WITH THE REQUIREMENT OF NZS 3605 "LOAD BEARING ROUND TIMBER PILES AND POLES" TREATED TO TPA COMMODITY SPECIFICATION H5. ALL TIMBER POLES TO BE HIGH DENSITY.
   DIMENSIONS OF POLES ARE SPECIFIED AS MINIMUM SMALL END DIAMETERS.
   ACTUAL DIAMETERS WILL BE GREATER DUE TO TAPER AND TIMBER GRADING. SAWN TIMBER IN GROUND CONTACT SHALL BE RADIATA PINE TREATED TO SPECIFICATION H4.
   ALL TIMBER SHALL HAVE TPA IDENTIFICATION BRANDS VISIBLE WHEN DELIVERED TO THE SITE AND SHALL BE PROTECTED AGAINST DAMAGE DURING STORAGE AND HANDLING

3. CONCRETE:
   CONCRETE FOR FOUNDATION BACKFILL SHALL BE ORDINARY GRADE CONCRETE COMPLYING WITH NZS 3109 'SPECIFICATION FOR CONCRETE', AND WITH A 28-DAY STRENGTH OF 20 MPa.
   CONCRETE SHALL BE PLACED UNDER AND AROUND POLES AND WELL COMPACTED BY VIBRATING. POLES SHALL BE TEMPORARILY PROPPED AND PROTECTED AGAINST DISTURBANCE FOR AT LEAST TWO DAYS AFTER PLACEMENT OF CONCRETE

4. EXCAVATION:
   EXCAVATION IN STAGES TO ALLOW FOR TEMPORARY SUPPORT DURING CONSTRUCTION IS REQUIRED. NO MORE THAN 3.0m OF UNSUPPORTED LENGTH OF SLOPE SHALL EXIST AT ANY ONE TIME.
   EXCAVATION FOR POLES SHALL BE TAKEN OUT BY AUGERING TO THE DIMENSIONS DETAILED, WITH ALL SURPLUS SOIL BEING DISPOSED OF AWAY FROM THE SITE. ALLOWANCE SHALL BE MADE IN POSITIONING AUGERED HOLES FOR THE SLOPE OF THE WALL AND FOR CONCRETE TO SURROUND THE POLES. DRIVING OF POLES IS NOT ACCEPTABLE AS AN ALTERNATIVE TO AUGERING. POLES SHALL BE INSTALLED AS SOON AS POSSIBLE AFTER EXCAVATION. EXCAVATIONS FOR POLES SHALL BE FREE OF WATER AND LOOSE MATERIAL BEFORE CONCRETING. IF NECESSARY THE CONTRACTOR SHALL ALLOW FOR HANDCLEANING AND PUMPING OF EXCAVATION.

5. INSTALLATION:
   DRIVING OF POLES IS NOT ACCEPTABLE AS AN ALTERNATIVE TO AUGERING. FIXING OF HORIZONTAL TIMBERS TO POLES SHALL UTILISE GALVANISED NAILS AS DETAILED. TIMBERS SHALL BE LAYED IN POSITION COMMENCING AT THE BOTTOM OF THE WALL WITH JOINTS BETWEEN TIMBERS STAGGERED BETWEEN THE POLES BY USE OF SHORT TIMBERS AT ENDS OF ALTERNATIVE ROWS. IF CUTTING IS NECESSARY THE EXPOSED SURFACES SHALL BE FLOODED WITH A COPPER NAPTHENATE TYPE OF WOOD PRESERVATIVE.
   CARE SHALL BE TAKEN IN SELECTING AND LAYING HORIZONTAL TIMBERS TO MAINTAIN THE SPECIFIED MINIMUM THICKNESS OF TIMBERS, PARTICULARLY NEAR THE BASE OF THE WALL AND TO ACHIEVE NEAT STRAIGHT LINES AT THE TOP OF THE WALL.

6. BACKFILLING:
   A PERFORATED OR OPEN JOINTED SUBSOIL DRAIN SHALL BE LAID AND SURROUNDED IN FINE GRANULAR MATERIAL WITH THE INVERT BELOW LOWER GROUND LEVELS AND LED TO A FREE OUTLET AT A POINT OF SAFE DISCHARGE.
   REMAINING BACKFILL TO WITHIN 300mm OF FINISHED SURFACE LEVEL SHALL BE DRAINED COMPACTED GRANULAR FILL NOT LARGER THAN 65mm DIMENSIONS (eg RUN OF PIT SCORIA OR SIMILAR).
   THE FINISHED SURFACE OF BACKFILL SHALL BE SEALED AGAINST ENTRY OF SURFACE WATER WITH A LAYER OF TOPSOIL, CLAY OR CONCRETE.

NOTE: WEATHERED ROCK WILL BE ENCOUNTERED WHEN DRILLING PILE HOLES. SPECIAL DRILLING EQUIPMENT WILL BE REQUIRED (I.E. ROCK AUGER)

H, HEIGHT (m)	D (SED) (mm)	B, BORED Ø (mm)	SPACING OF POLES c/c (m)	L, EMBEDMENT (m)	TOTAL POLE LENGTH (m)
1.0	200	400	1.20	1.2	2.2

Issue	Date	Revision
A	8/07/2025	FIRST ISSUE

DWG: TYPICAL RETAININED WALL DETAILS **RW01**

Scale 1: 20 @A3 | Date JULY 2025
Drawn JMC | Checked WT | Approved WT
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Project: PROPOSED RETAINING WALLS
574 WHANGAROA ROAD, WHANGAROA

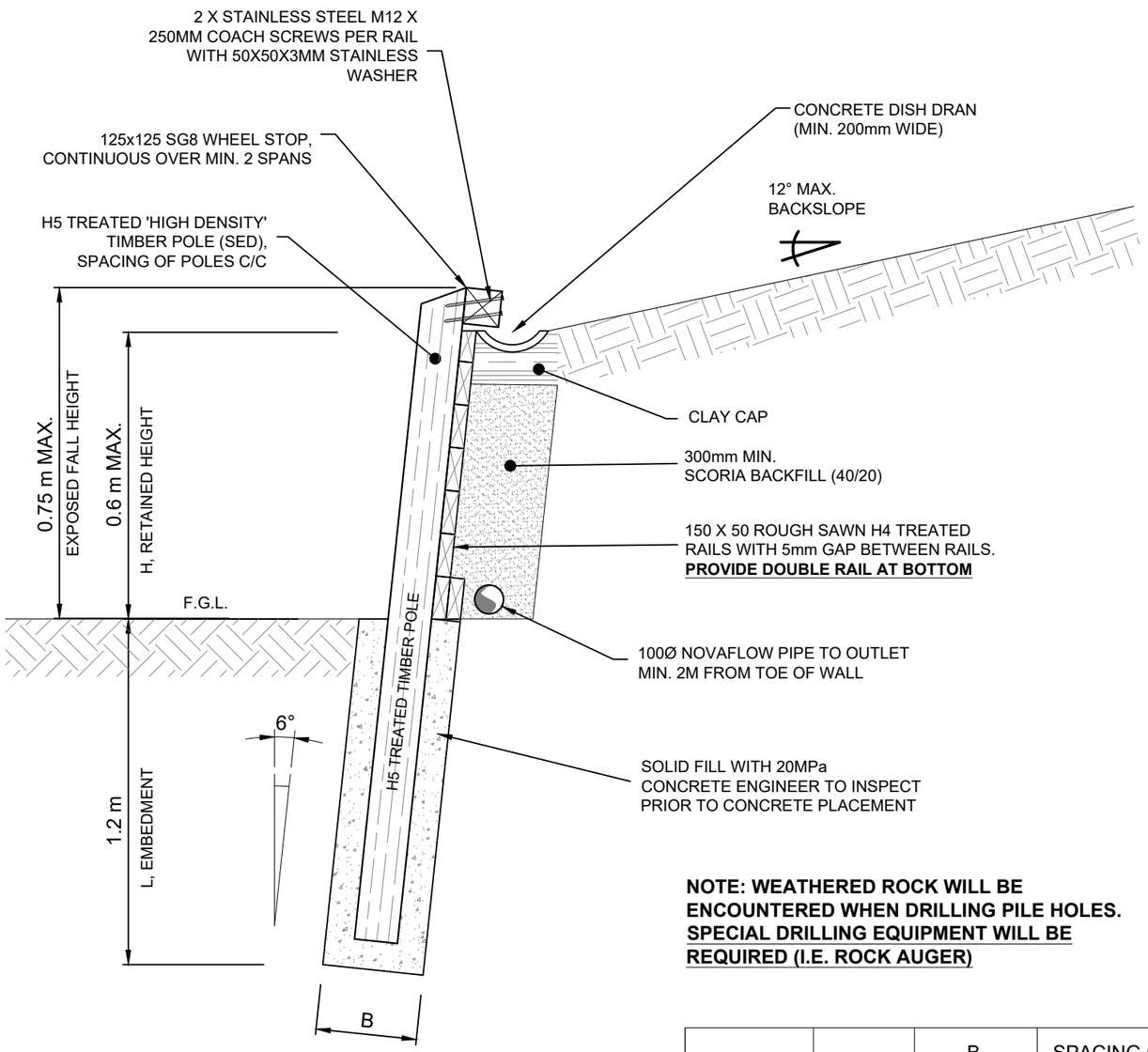
Client: FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

DWG No. **G08**

Sheet No. **8** of **13**

Plotted By Jonathan Corskie at 5/08/2025 12:10:24 pm



9 G09 TYPICAL DETAIL - **RW02**

Scale 1 : 20 @ A3

NOTE: WEATHERED ROCK WILL BE ENCOUNTERED WHEN DRILLING PILE HOLES. SPECIAL DRILLING EQUIPMENT WILL BE REQUIRED (I.E. ROCK AUGER)

H, HEIGHT (m)	D (SED) (mm)	B, BORED Ø (mm)	SPACING OF POLES c/c (m)	L, EMBEDMENT (m)	TOTAL POLE LENGTH (m)
0.6	200	400	1.20	1.2	2.2

TIMBER SPECIFICATION NOTES:

1. CAUTION:
   DEEP EXCAVATIONS UNSUPPORTED DURING CONSTRUCTION MAY BE HAZARDOUS PARTICULARLY WHEN WORKING IN CONFINED SPACES. THE DEPARTMENT OF LABOUR'S EXCAVATION GUIDE GIVES RECOMMENDED SAFETY PROCEDURES FOR SUCH SITUATIONS. THE EXCAVATION AND EARTHWORKS CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT ADEQUATELY ALL PERSONS AND PROPRETY LIABLE TO THE BE AFFECTED BY THE EXCAVATION AND EARTHWORKS OPERATIONS.

2. MATERIALS:
   TIMBER:
   TIMBER POLES SHALL BE PEELED RADIATA PINE LOGS COMPLYING WITH THE REQUIREMENT OF NZS 3605 "LOAD BEARING ROUND TIMBER PILES AND POLES" TREATED TO TPA COMMODITY SPECIFICATION H5. ALL TIMBER POLES TO BE HIGH DENSITY.
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   ACTUAL DIAMETERS WILL BE GREATER DUE TO TAPER AND TIMBER GRADING. SAWN TIMBER IN GROUND CONTACT SHALL BE RADIATA PINE TREATED TO SPECIFICATION H4.
   ALL TIMBER SHALL HAVE TPA IDENTIFICATION BRANDS VISIBLE WHEN DELIVERED TO THE SITE AND SHALL BE PROTECTED AGAINST DAMAGE DURING STORAGE AND HANDLING

3. CONCRETE:
   CONCRETE FOR FOUNDATION BACKFILL SHALL BE ORDINARY GRADE CONCRETE COMPLYING WITH NZS 3109 'SPECIFICATION FOR CONCRETE', AND WITH A 28-DAY STRENGTH OF 20 MPa.
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   CARE SHALL BE TAKEN IN SELECTING AND LAYING HORIZONTAL TIMBERS TO MAINTAIN THE SPECIFIED MINIMUM THICKNESS OF TIMBERS, PARTICULARLY NEAR THE BASE OF THE WALL AND TO ACHIEVE NEAT STRAIGHT LINES AT THE TOP OF THE WALL.

6. BACKFILLING:
   A PERFORATED OR OPEN JOINTED SUBSOIL DRAIN SHALL BE LAID AND SURROUNDED IN FINE GRANULAR MATERIAL WITH THE INVERT BELOW LOWER GROUND LEVELS AND LED TO A FREE OUTLET AT A POINT OF SAFE DISCHARGE.
   REMAINING BACKFILL TO WITHIN 300mm OF FINISHED SURFACE LEVEL SHALL BE DRAINED COMPACTED GRANULAR FILL NOT LARGER THAN 65mm DIMENSIONS (eg RUN OF PIT SCORIA OR SIMILAR).
   THE FINISHED SURFACE OF BACKFILL SHALL BE SEALED AGAINST ENTRY OF SURFACE WATER WITH A LAYER OF TOPSOIL, CLAY OR CONCRETE.

Issue	Date	Revision
A	8/07/2025	FIRST ISSUE

DWG TYPICAL RETAININED WALL DETAILS **RW02**

Scale 1: 20 @A3 | Date JULY 2025
Drawn JC | Checked WT | Approved WT
File T:\CLIENTS\FNDC\JOBS\25 101 - OLD CHURCH ROAD, WHANGAROA\ENGINEERING\2 DRAWINGS\RW DETAILS.DWG

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Project PROPOSED RETAINING WALLS
574 WHANGAROA ROAD, WHANGAROA

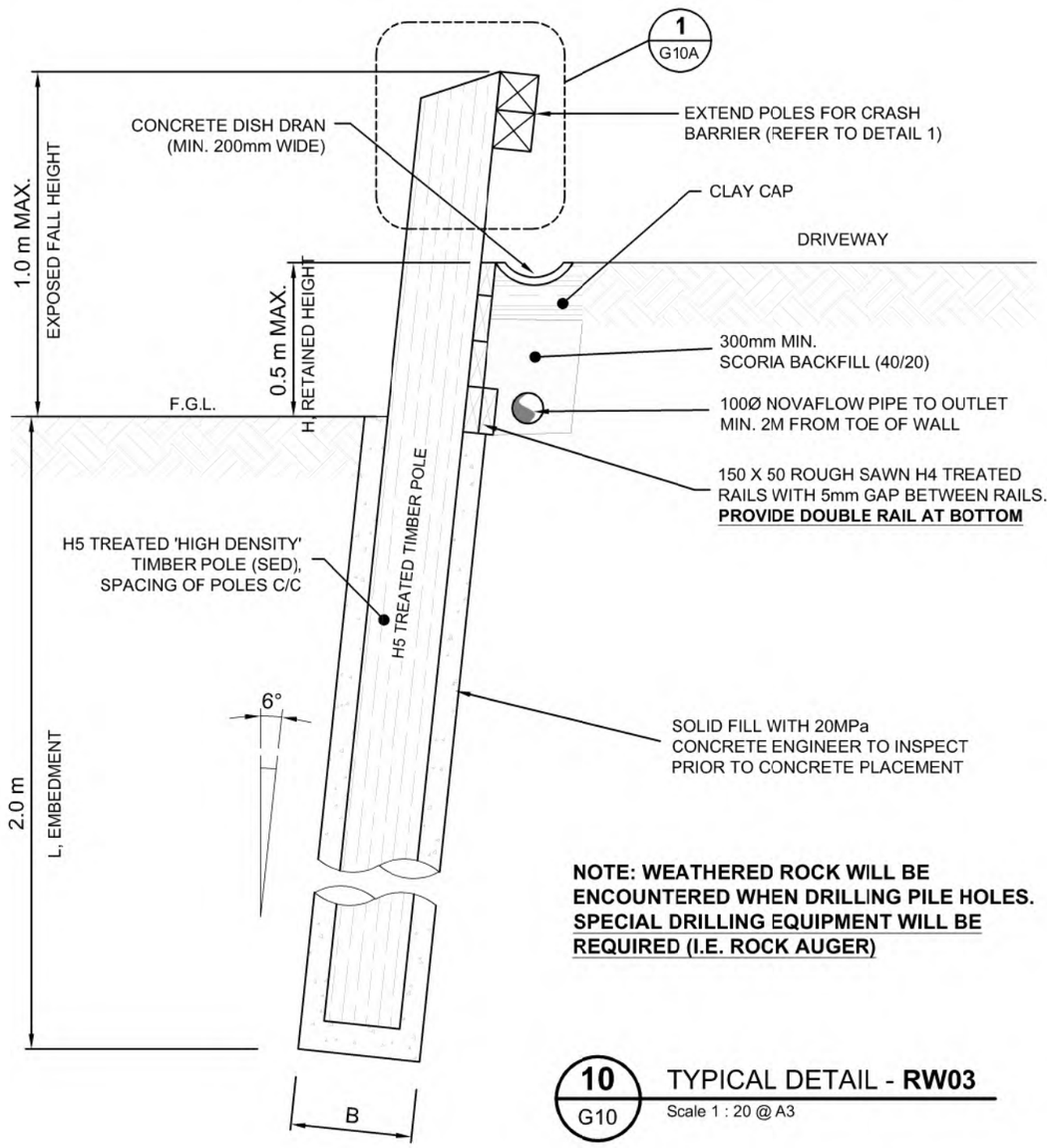
Client FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

DWG No. **G09**

Sheet No. **9** of **13**

Plotted By Jonathan Corskie at 6/08/2025 10:57:50 am



NOTE: WEATHERED ROCK WILL BE ENCOUNTERED WHEN DRILLING PILE HOLES. SPECIAL DRILLING EQUIPMENT WILL BE REQUIRED (I.E. ROCK AUGER)

10 / G10 TYPICAL DETAIL - **RW03**
Scale 1 : 20 @ A3

H, HEIGHT (m)	D (SED) (mm)	B, BORED Ø (mm)	SPACING OF POLES c/c (m)	L, EMBEDMENT (m)	TOTAL POLE LENGTH (m)
0.5	250	400*	1.0	2.0	3.0

** 400 diameter used for design purposes but can use nearest larger size*

TIMBER SPECIFICATION NOTES:

1. CAUTION:
DEEP EXCAVATIONS UNSUPPORTED DURING CONSTRUCTION MAY BE HAZARDOUS PARTICULARLY WHEN WORKING IN CONFINED SPACES. THE DEPARTMENT OF LABOUR'S EXCAVATION GUIDE GIVES RECOMMENDED SAFETY PROCEDURES FOR SUCH SITUATIONS. THE EXCAVATION AND EARTHWORKS CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT ADEQUATELY ALL PERSONS AND PROPRETY LIABLE TO THE BE AFFECTED BY THE EXCAVATION AND EARTHWORKS OPERATIONS.

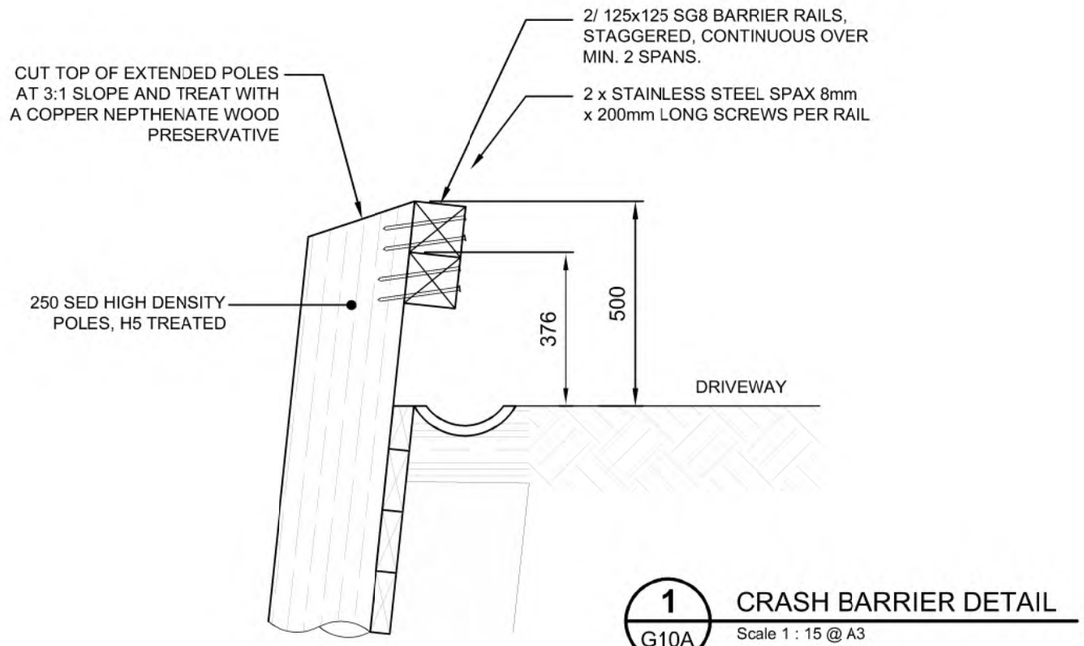
2. MATERIALS:
TIMBER:
TIMBER POLES SHALL BE PEELED RADIATA PINE LOGS COMPLYING WITH THE REQUIREMENT OF NZS 3605 "LOAD BEARING ROUND TIMBER PILES AND POLES" TREATED TO TPA COMMODITY SPECIFICATION H5. ALL TIMBER POLES TO BE HIGH DENSITY.
DIMENSIONS OF POLES ARE SPECIFIED AS MINIMUM SMALL END DIAMETERS.
ACTUAL DIAMETERS WILL BE GREATER DUE TO TAPER AND TIMBER GRADING. SAWN TIMBER IN GROUND CONTACT SHALL BE RADIATA PILE TREATED TO SPECIFICATION H4.
ALL TIMBER SHALL HAVE TPA IDENTIFICATION BRANDS VISIBLE WHEN DELIVERED TO THE SITE AND SHALL BE PROTECTED AGAINST DAMAGE DURING STORAGE AND HANDLING

3. CONCRETE:
CONCRETE FOR FOUNDATION BACKFILL SHALL BE ORDINARY GRADE CONCRETE COMPLYING WITH NZS 3109 'SPECIFICATION FOR CONCRETE', AND WITH A 28-DAY STRENGTH OF 20 MPa.
CONCRETE SHALL BE PLACED UNDER AND AROUND POLES AND WELL COMPACTED BY VIBRATING. POLES SHALL BE TEMPORARILY PROPPED AND PROTECTED AGAINST DISTURBANCE FOR AT LEAST TWO DAYS AFTER PLACEMENT OF CONCRETE

4. EXCAVATION:
EXCAVATION IN STAGES TO ALLOW FOR TEMPORARY SUPPORT DURING CONSTRUCTION IS REQUIRED. NO MORE THAN 3.0m OF UNSUPPORTED SLOPE SHALL EXIST AT ANY ONE TIME.
EXCAVATION FOR POLES SHALL BE TAKEN OUT BY AUGERING TO THE DIMENSIONS DETAILED, WITH ALL SURPLUS SOIL BEING DISPOSED OF AWAY FROM THE SITE. ALLOWANCE SHALL BE MADE IN POSITIONING AUGERED HOLES FOR THE SLOPE OF THE WALL AND FOR CONCRETE TO SURROUND THE POLES. DRIVING OF POLES IS NOT ACCEPTABLE AS AN ALTERNATIVE TO AUGERING. POLES SHALL BE INSTALLED AS SOON AS POSSIBLE AFTER EXCAVATION. EXCAVATIONS FOR POLES SHALL BE FREE OF WATER AND LOOSE MATERIAL BEFORE CONCRETING. IF NECESSARY THE CONTRACTOR SHALL ALLOW FOR HANDCLEANING AND PUMPING OF EXCAVATION.

5. INSTALLATION:
DRIVING OF POLES IS NOT ACCEPTABLE AS AN ALTERNATIVE TO AUGERING. FIXING OF HORIZONTAL TIMBERS TO POLES SHALL UTILISE GALVANISED NAILS AS DETAILED. TIMBERS SHALL BE LAYED IN POSITION COMMENCING AT THE BOTTOM OF THE WALL WITH JOINTS BETWEEN TIMBERS STAGGERED BETWEEN THE POLES BY USE OF SHORT TIMBERS AT ENDS OF ALTERNATIVE ROWS. IF CUTTING IS NECESSARY THE EXPOSED SURFACES SHALL BE FLOODED WITH A COPPER NAPTHENATE TYPE OF WOOD PRESERVATIVE.
CARE SHALL BE TAKEN IN SELECTING AND LAYING HORIZONTAL TIMBERS TO MAINTAIN THE SPECIFIED MINIMUM THICKNESS OF TIMBERS, PARTICULARLY NEAR THE BASE OF THE WALL AND TO ACHIEVE NEAT STRAIGHT LINES AT THE TOP OF THE WALL.

6. BACKFILLING:
A PERFORATED OR OPEN JOINTED SUBSOIL DRAIN SHALL BE LAID AND SURROUNDED IN FINE GRANULAR MATERIAL WITH THE INVERT BELOW LOWER GROUND LEVELS AND LED TO A FREE OUTLET AT A POINT OF SAFE DISCHARGE.
REMAINING BACKFILL TO WITHIN 300mm OF FINISHED SURFACE LEVEL SHALL BE DRAINED COMPACTED GRANULAR FILL NOT LARGER THAN 65mm DIMENSIONS (eg RUN OF PIT SCORIA OR SIMILAR).
THE FINISHED SURFACE OF BACKFILL SHALL BE SEALED AGAINST ENTRY OF SURFACE WATER WITH A LAYER OF TOPSOIL, CLAY OR CONCRETE.



1 / G10A CRASH BARRIER DETAIL
Scale 1 : 15 @ A3

Issue	Date	Revision
A	08/07/2025	FIRST ISSUE

DWG TYPICAL RETAININED WALL DETAILS **RW03**

Scale AS SHOWN | Date JULY 2025
Drawn JC | Checked WT | Approved WT
File T:\CLIENTS\FNDC\JOBS\25 101 - OLD C-HURCH ROAD, WHANGAROA\ENGINEERING\2 DRAWINGS\RW DETAILS.DWG

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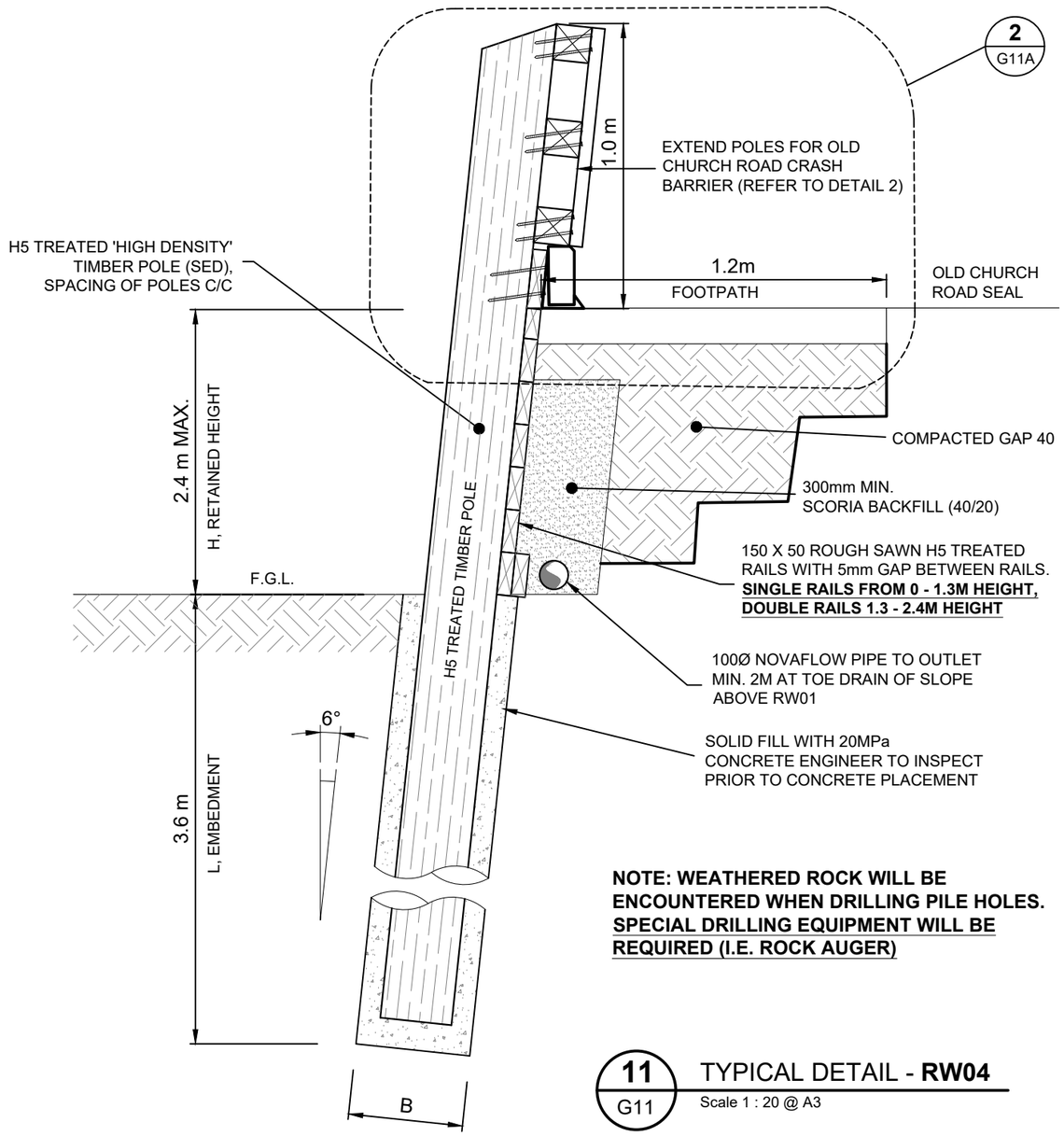
Project PROPOSED RETAINING WALLS
574 WHANGAROA ROAD, WHANGAROA
Client FAR NORTH DISTRICT COUNCIL
Project No. 24 079 | RC no. N/A

DWG No. **G10**
Sheet No. **10** of **13**

Plotted By Jonathan Corskie at 5/08/2025 11:36:34 am



NOTE: WEATHERED ROCK WILL BE ENCOUNTERED WHEN DRILLING PILE HOLES. SPECIAL DRILLING EQUIPMENT WILL BE REQUIRED (I.E. ROCK AUGER)

11 / G11 — TYPICAL DETAIL - **RW04**
Scale 1 : 20 @ A3

H, HEIGHT (m)	D (SED) (mm)	B, BORED Ø (mm)	SPACING OF POLES c/c (m)	L, EMBEDMENT (m)	TOTAL POLE LENGTH (m)
2.4	400	600	1.0	3.6	7.0

TIMBER SPECIFICATION NOTES:

1. CAUTION:
   DEEP EXCAVATIONS UNSUPPORTED DURING CONSTRUCTION MAY BE HAZARDOUS PARTICULARLY WHEN WORKING IN CONFINED SPACES. THE DEPARTMENT OF LABOUR'S EXCAVATION GUIDE GIVES RECOMMENDED SAFETY PROCEDURES FOR SUCH SITUATIONS. THE EXCAVATION AND EARTHWORKS CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT ADEQUATELY ALL PERSONS AND PROPRETY LIABLE TO THE BE AFFECTED BY THE EXCAVATION AND EARTHWORKS OPERATIONS.

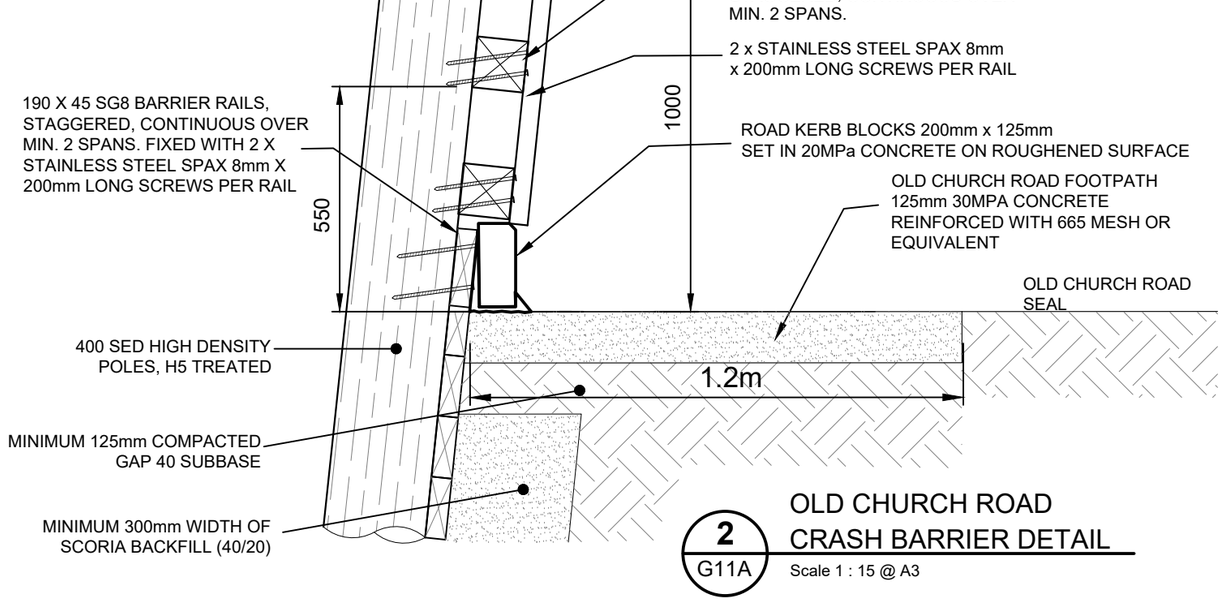
2. MATERIALS:
   TIMBER:
   TIMBER POLES SHALL BE PEELED RADIATA PINE LOGS COMPLYING WITH THE REQUIREMENT OF NZS 3605 "LOAD BEARING ROUND TIMBER PILES AND POLES" TREATED TO TPA COMMODITY SPECIFICATION H5. ALL TIMBER POLES TO BE HIGH DENSITY.
   DIMENSIONS OF POLES ARE SPECIFIED AS MINIMUM SMALL END DIAMETERS.
   ACTUAL DIAMETERS WILL BE GREATER DUE TO TAPER AND TIMBER GRADING. SAWN TIMBER IN GROUND CONTACT SHALL BE RADIATA PINE TREATED TO SPECIFICATION H4.
   ALL TIMBER SHALL HAVE TPA IDENTIFICATION BRANDS VISIBLE WHEN DELIVERED TO THE SITE AND SHALL BE PROTECTED AGAINST DAMAGE DURING STORAGE AND HANDLING

3. CONCRETE:
   CONCRETE FOR FOUNDATION BACKFILL SHALL BE ORDINARY GRADE CONCRETE COMPLYING WITH NZS 3109 'SPECIFICATION FOR CONCRETE', AND WITH A 28-DAY STRENGTH OF 20 MPa.
   CONCRETE SHALL BE PLACED UNDER AND AROUND POLES AND WELL COMPACTED BY VIBRATING. POLES SHALL BE TEMPORARILY PROPPED AND PROTECTED AGAINST DISTURBANCE FOR AT LEAST TWO DAYS AFTER PLACEMENT OF CONCRETE

4. EXCAVATION:
   EXCAVATION IN STAGES TO ALLOW FOR TEMPORARY SUPPORT DURING CONSTRUCTION IS REQUIRED. NO MORE THAN 3.0m OF UNSUPPORTED LENGTH OF SLOPE SHALL EXIST AT ANY ONE TIME.
   EXCAVATION FOR POLES SHALL BE TAKEN OUT BY AUGERING TO THE DIMENSIONS DETAILED, WITH ALL SURPLUS SOIL BEING DISPOSED OF AWAY FROM THE SITE. ALLOWANCE SHALL BE MADE IN POSITIONING AUGERED HOLES FOR THE SLOPE OF THE WALL AND FOR CONCRETE TO SURROUND THE POLES. DRIVING OF POLES IS NOT ACCEPTABLE AS AN ALTERNATIVE TO AUGERING. POLES SHALL BE INSTALLED AS SOON AS POSSIBLE AFTER EXCAVATION. EXCAVATIONS FOR POLES SHALL BE FREE OF WATER AND LOOSE MATERIAL BEFORE CONCRETING. IF NECESSARY THE CONTRACTOR SHALL ALLOW FOR HANDCLEANING AND PUMPING OF EXCAVATION.

5. INSTALLATION:
   DRIVING OF POLES IS NOT ACCEPTABLE AS AN ALTERNATIVE TO AUGERING. FIXING OF HORIZONTAL TIMBERS TO POLES SHALL UTILISE GALVANISED NAILS AS DETAILED. TIMBERS SHALL BE LAYED IN POSITION COMMENCING AT THE BOTTOM OF THE WALL WITH JOINTS BETWEEN TIMBERS STAGGERED BETWEEN THE POLES BY USE OF SHORT TIMBERS AT ENDS OF ALTERNATIVE ROWS. IF CUTTING IS NECESSARY THE EXPOSED SURFACES SHALL BE FLOODED WITH A COPPER NAPTHENATE TYPE OF WOOD PRESERVATIVE.
   CARE SHALL BE TAKEN IN SELECTING AND LAYING HORIZONTAL TIMBERS TO MAINTAIN THE SPECIFIED MINIMUM THICKNESS OF TIMBERS, PARTICULARLY NEAR THE BASE OF THE WALL AND TO ACHIEVE NEAT STRAIGHT LINES AT THE TOP OF THE WALL.

6. BACKFILLING:
   A PERFORATED OR OPEN JOINTED SUBSOIL DRAIN SHALL BE LAID AND SURROUNDED IN FINE GRANULAR MATERIAL WITH THE INVERT BELOW LOWER GROUND LEVELS AND LED TO A FREE OUTLET AT A POINT OF SAFE DISCHARGE.
   REMAINING BACKFILL TO WITHIN 300mm OF FINISHED SURFACE LEVEL SHALL BE DRAINED COMPACTED GRANULAR FILL NOT LARGER THAN 65mm DIMENSIONS (eg RUN OF PIT SCORIA OR SIMILAR).
   THE FINISHED SURFACE OF BACKFILL SHALL BE SEALED AGAINST ENTRY OF SURFACE WATER WITH A LAYER OF TOPSOIL, CLAY OR CONCRETE.



2 / G11A — OLD CHURCH ROAD CRASH BARRIER DETAIL
Scale 1 : 15 @ A3

Issue	Date	Revision
A	21/10/2025	FIRST ISSUE

DWG: TYPICAL RETAININED WALL DETAILS **RW04**

Scale AS SHOWN | Date OCTOBER 2025
Drawn JC | Checked WT | Approved WT
File T:\CLIENTS\FNDC\JOBS\25 101 - OLD CHURCH ROAD, WHANGAROA\ENGINEERING\2 DRAWINGS\RW DETAILS.DWG

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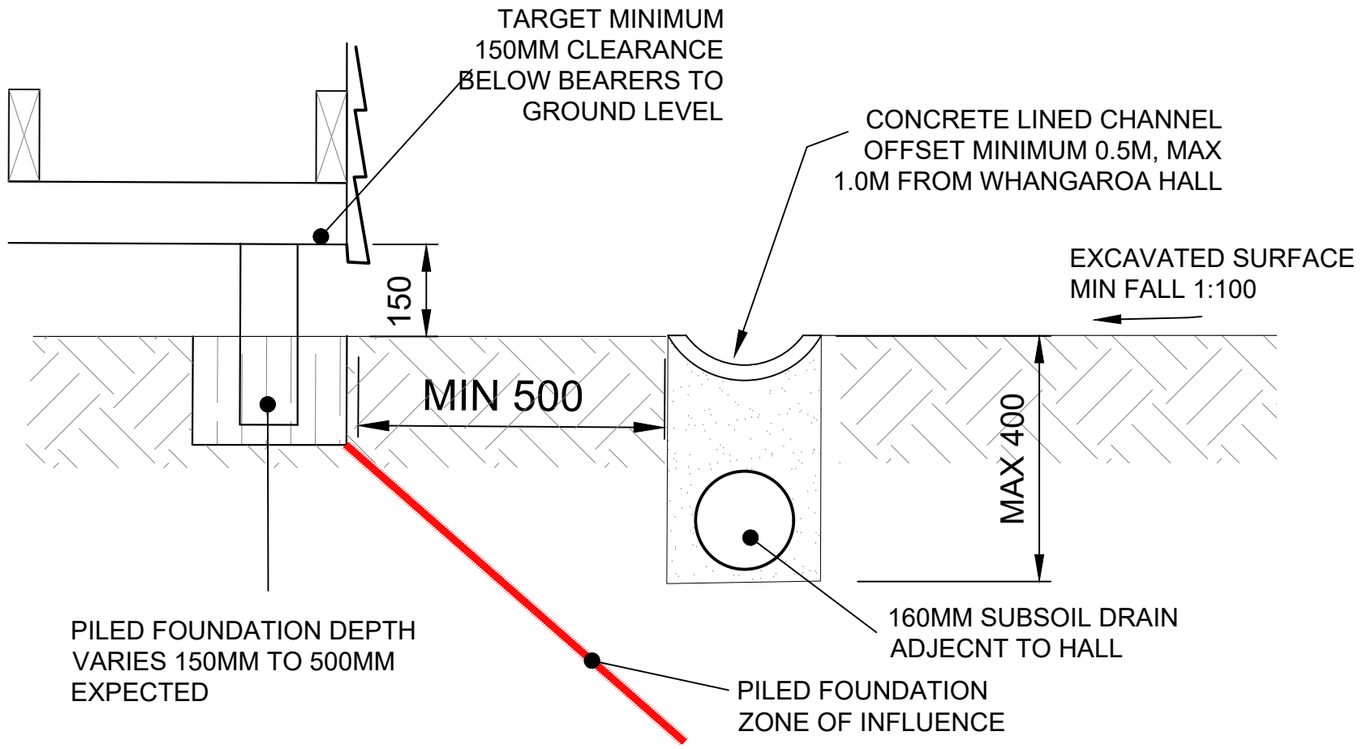
Project: PROPOSED RETAINING WALLS
574 WHANGAROA ROAD, WHANGAROA
Client: FAR NORTH DISTRICT COUNCIL
Project No. 25 101 | RC no. N/A

DWG No. **G11**
Sheet No. **11** of **13**

Plotted By Jonathan Corskie at 21/10/2025 7:39:40 am



DRAINAGE SPECIFICATION SUMMARY (REFER TO FULL SPECIFICATIONS AS ATTACHED)

1. EXCAVATION PROTECTION
   The excavation and earthwork Contractor shall take all necessary precautions to protect adequately all persons and property liable to be affected by the excavation and earthworks operations. All work must comply with the relevant Labor Department Safety Regulations. All excavations are to meet the requirements of General Archaelogical Authority application 2025-637

2. EXCAVATION
   Excavation shall not undercut the foundation zone of influence to the depths and sizes shown. All excavations for drainage must not be left open for more than 24hrs. If any slumping of the excavation occurs, the trench should be immediately backfilled in the area of slumping.

3. SUBSOIL DRAINS
   All subsoil drains surrounding the Whangaroa Hall shall be 160mm diameter and installed with 20 / 7 drainage metal and installe3d to NZTA F2:2013. All subsoil drains should have a minimum fall of 1:100

4. CONCRETE LINED CHANNELS - WHANGAROA HALL
   Concrete lined channel to be formed with 20MPa concrete and have a minimum fall of 1:100. Channels are to be formed approximately to FNDC engineering standards with consideration given to building maintenance.

5. DRAINAGE
   Excavated surfaces should have a minimum gradient of 1:120 towards drainage infrastructre around the Whangaroa Hall.

12 / G12 WHANGAROA HALL PERIMETER DRAIN

Scale 1 : 10 @ A3

Issue	Date	Revision
A	8/07/2025	FIRST ISSUE

DWG: TYPICAL DETAILS

Scale: AS SHOWN | Date: JULY 2025
Drawn: JC | Checked: WT | Approved: WT
File: T:\CLIENTS\FNDC\JOBS\25 101 - OLD CHURCH ROAD, WHANGAROA\ENGINEERING\2 DRAWINGS\RW DETAILS.DWG

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Project: PROPOSED RETAINING WALLS
574 WHANGAROA ROAD, WHANGAROA

Client: FAR NORTH DISTRICT COUNCIL

Project No.: 25 101 | RC no.: N/A

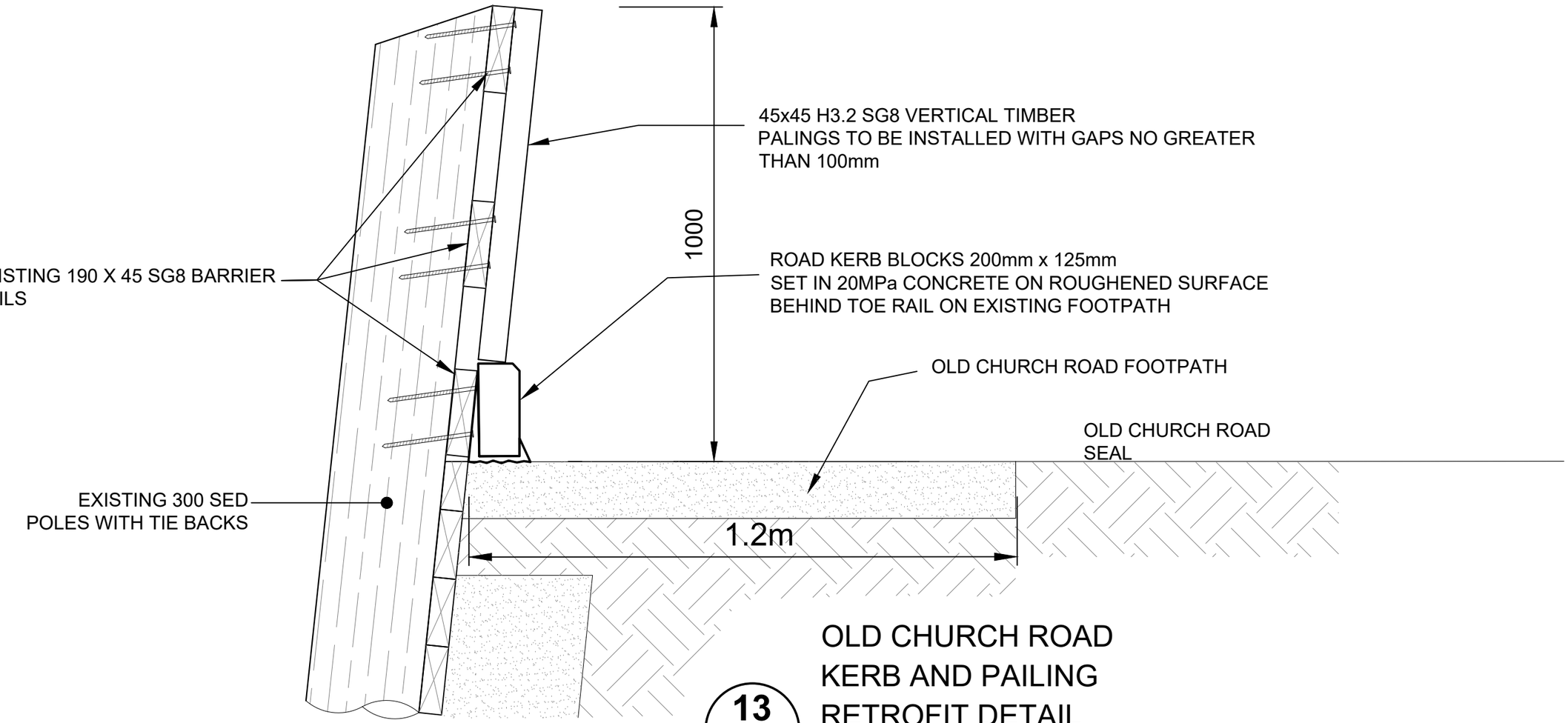
DWG No.: G12

Sheet No.: 12 of 13

Plotted By Jonathan Corskie at 10/07/2025 11:32:09 am

SPECIFICATION NOTES:

1. MATERIALS:
   TIMBER:
   SAWN TIMBER IN GROUND CONTACT SHALL BE RADIATA PILE TREATED TO SPECIFICATION H4. ALL OTHER TIMBER H3.2.
   ALL TIMBER SHALL HAVE TPA IDENTIFICATION BRANDS VISIBLE WHEN DELIVERED TO THE SITE AND SHALL BE PROTECTED AGAINST DAMAGE DURING STORAGE AND HANDLING.
2. FIXINGS:
   TIMBER PAILINGS SHALL BE ADEQUATELY FIXED MINIMUM 2 X 3.1 X 75MM STAINLESS STEEL NAILS PER FIXING POINT.
3. CONCRETE:
   CONCRETE FOR KERB AND CHANNEL SHALL BE ORDINARY GRADE CONCRETE COMPLYING WITH NZS 3109 'SPECIFICATION FOR CONCRETE', AND WITH A 28-DAY STRENGTH OF 20 MPa.
4. KERB BLOCKS:
   KERB BLOCKS SHALL MEET FNDC ENGINEERING STANDARD.



OLD CHURCH ROAD KERB AND PAILING RETROFIT DETAIL

13 / G13

Scale 1 : 10 @ A3

Issue	Date	Revision
A	21/10/2025	FIRST ISSUE

DWG RETROFIT TO EXISTING RETAINING WALL ON OLD CHURCH ROAD

Scale AS SHOWN | Date OCTOBER 2025

Drawn JC | Checked WT | Approved WT

File T:\CLIENTS\FNDC\JOBS\25 101 - OLD CHURCH ROAD, WHANGAROA\ENGINEERING\2 DRAWINGS\RW DETAILS.DWG

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Project PROPOSED RETAINING WALLS
574 WHANGAROA ROAD, WHANGAROA

Client FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

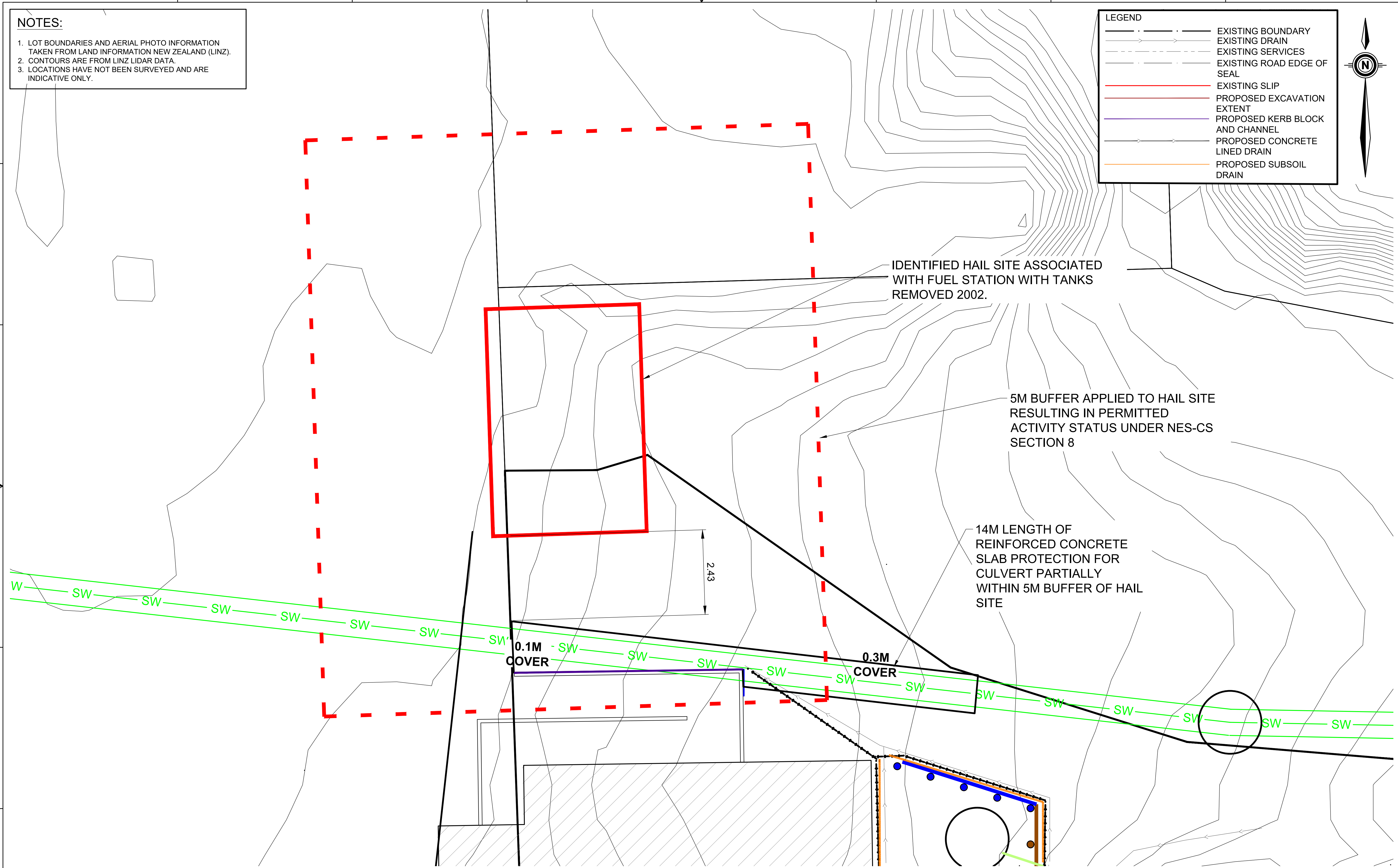
DWG No. **G13**

Sheet No. **13** of **13**

Plotted By Jonathan Corskie at 21/10/2025 7:38:33 am

NOTES:

1. LOT BOUNDARIES AND AERIAL PHOTO INFORMATION TAKEN FROM LAND INFORMATION NEW ZEALAND (LINZ).
2. CONTOURS ARE FROM LINZ LIDAR DATA.
3. LOCATIONS HAVE NOT BEEN SURVEYED AND ARE INDICATIVE ONLY.



Issue	Date	Revision
A	17/11/2025	FIRST ISSUE

DWG: WHANGAROA HALL NES-CS PLAN

Scale 1:100 @A3 | Date NOVEMBER 2025

Drawn JC | Checked WT | Approved WT

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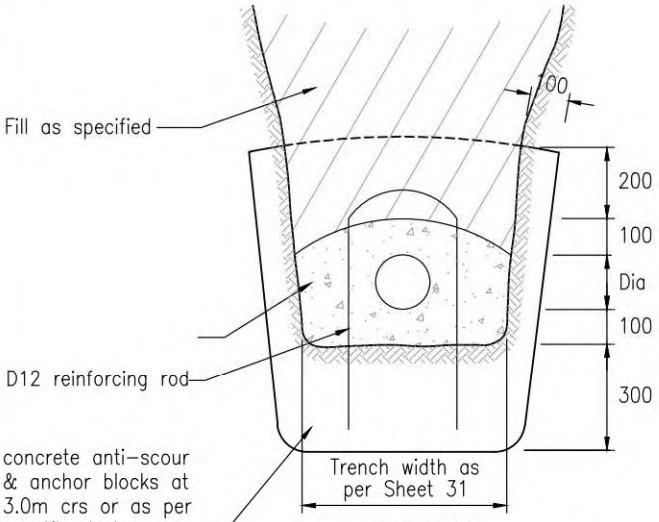
Project: OLD CHURCH ROAD SLIP REMEDIATION
574 WHANGAROA ROAD, WHANGAROA

Client: FAR NORTH DISTRICT COUNCIL

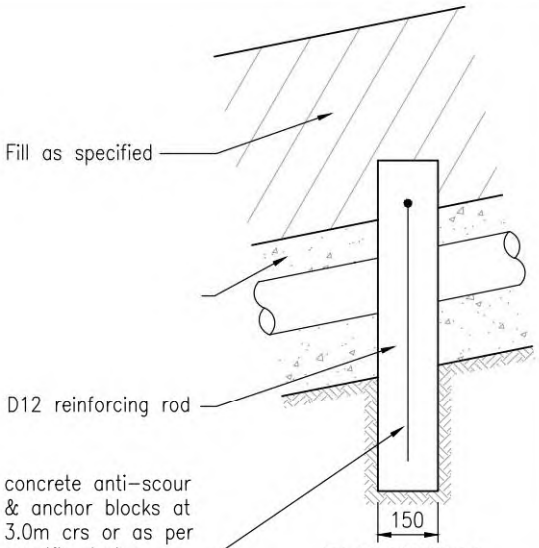
Project No. 25 101 | RC no. N/A

DWG No. G14

Plotted By Jonathan Corskie at 17/11/2025 2:36:30 pm



SECTION



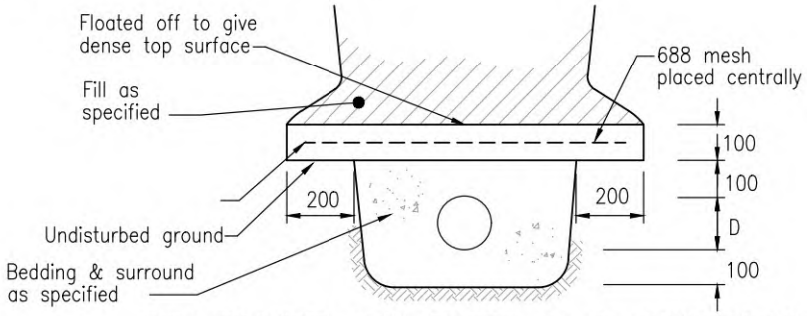
ELEVATION

STEEP PIPE DETAILS

(For pipeline gradients 1:3 or steeper and diameter ⩽ 450mm)

NOTES:

1) Some variation is possible using aluminium plate cut off walls bolted to larger diameter pipes.
2) Larger diameter pipes will require specific pier design to counter the downward component of water and pipe weight.

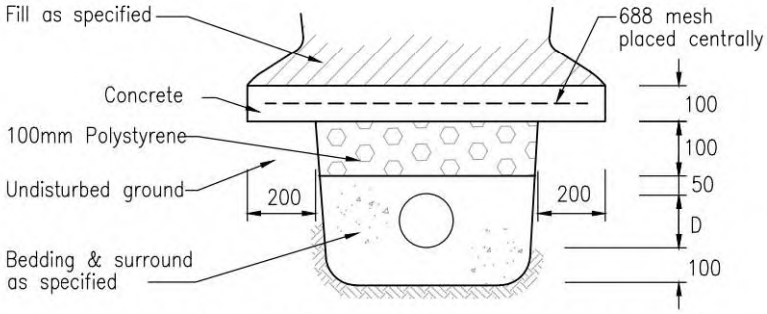


REINFORCED CONCRETE SLAB PROTECTION FOR STORMWATER AND WASTEWATER

(Where additional loading or other requirements necessitate)

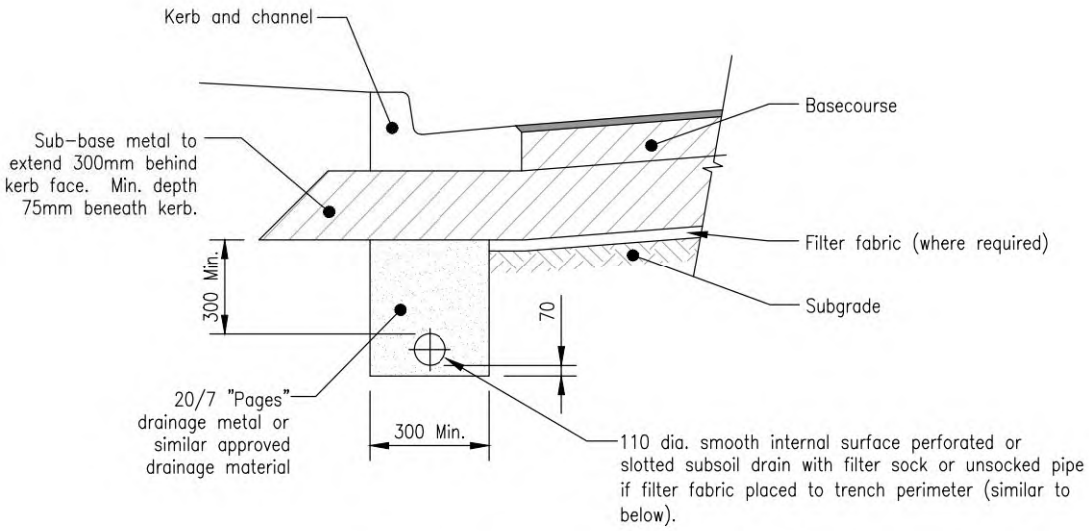
GENERAL:

A. All concrete to be 20MPa at 28 days as per NZS 3104:2021
B. Cement stabilised bedding and back fill: 1 part cement to 20 parts aggregate.
C. Allow 48 hours curing prior to back filling any concrete or stabilised material.
. Slab protection to be laid in lengths no greater than 2.0M

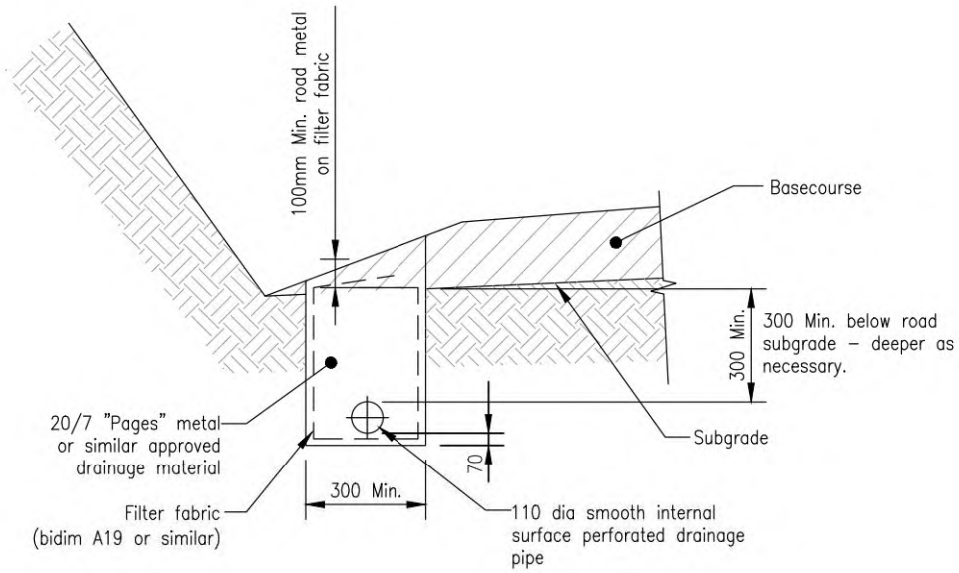


REINFORCED CONCRETE SLAB PROTECTION FOR WATER PIPELINES

PIPE PROTECTION AND BULKHEAD DETAILS (FOR ALL ENVIRONMENTS)	Date: FEB 2022
	Revision: 0.2
FAR NORTH DISTRICT COUNCIL ENGINEERING STANDARDS	Scale: AS SHOWN
	SHEET No. 32



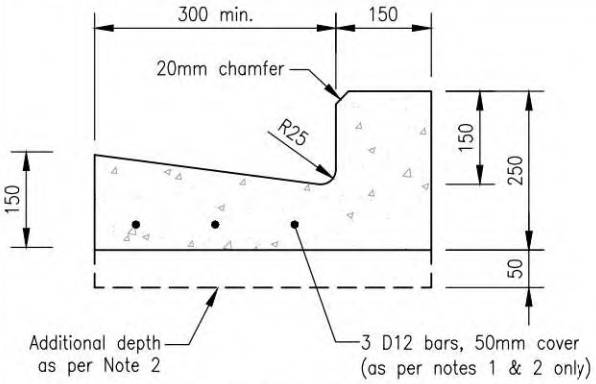
UNDER KERB DRAINAGE



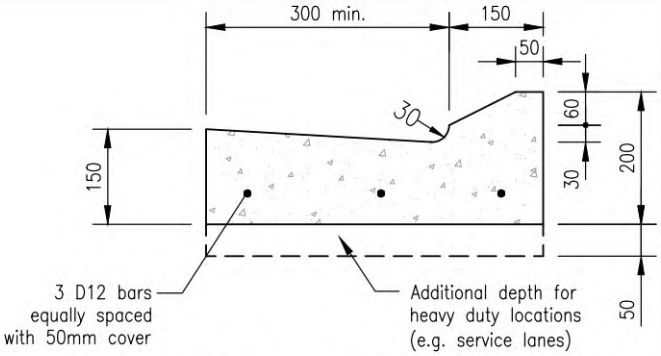
RURAL SUBSOIL DRAINAGE

NOTES:
1. Construct subsoil drain after stabilisation of subgrade.
2. Subsoil drain is to connect to the downstream sump (urban) above the soffit level of the outlet pipe. Subsoil drain depth to be adjusted to meet this criteria.
3. For scour protection refer Section 1.2.14.3
4. Subsoil drains in clays to be PAP 7 or BMF (blue metal fines)

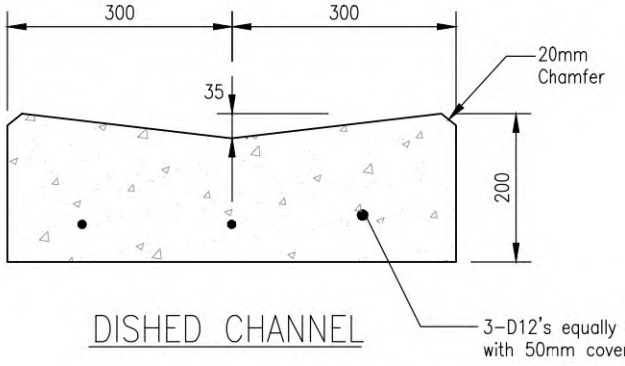
TYPICAL SUBSOIL DRAINAGE DETAILS	Date: JAN 2021
	Revision: 0.1
FAR NORTH DISTRICT COUNCIL ENGINEERING STANDARDS	Scale: AS SHOWN
	SHEET No. 14



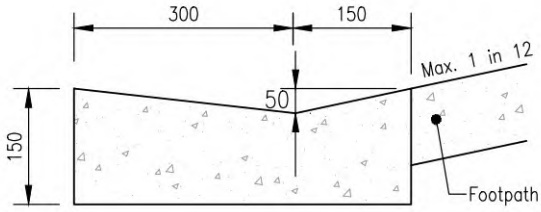
STANDARD KERB AND CHANNEL



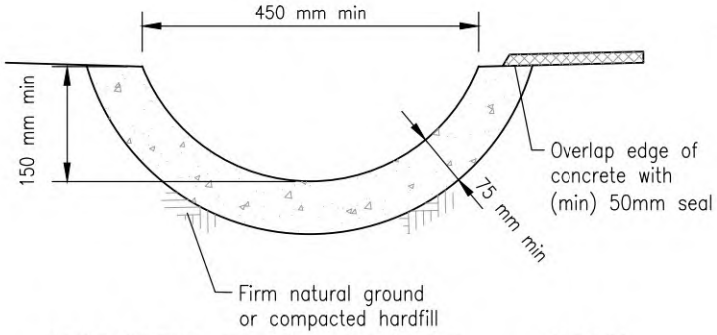
MOUNTABLE KERB AND CHANNEL



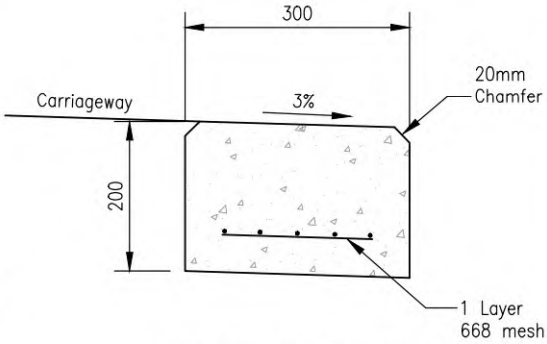
DISHED CHANNEL



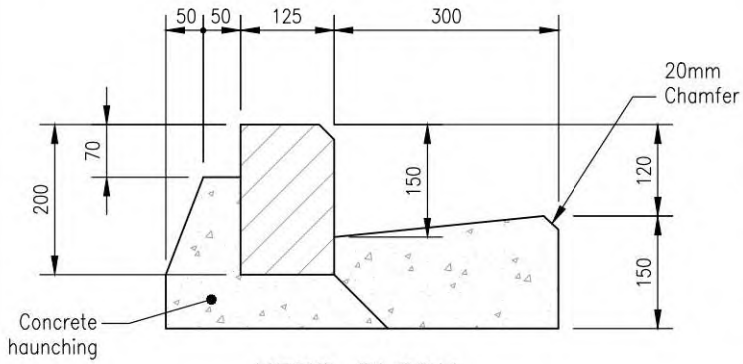
PRAM CROSSING



CONCRETE LINED CHANNEL – RURAL



FLUSH EDGE BEAM



KERB BLOCK

NOTES:

1. 3/D12 reinforcing bars to be placed around all curves, and intersections between tangent points in Business environments.
2. Commercial and industrial crossings to be additional 50mm in depth as well as having 3–D12's equally spaced in the channel.
3. Concrete for Standard Kerb and Channel shall be 20MPa at 28 days.
4. Concrete for Dished Channel, Flush Edge Beam and Mountable Kerb and Channel shall be 30MPa at 28 days.
5. Concrete for Concrete Lined Channel – Rural shall be 25MPa at 28 days.
6. Crack control joints to be formed at maximum of 3.5 metre intervals. To be a minimum depth of 30mm.
7. Profiles may be modified slightly to suit kerbing machine.
8. Mountable kerbs may only to be used for service lanes and traffic islands.
9. Use of kerb blocks subject to specific approval. Haunching to be 20 MPa at 28 days.

KERB & CHANNEL DETAILS
FOR ALL ENVIRONMENTS

FAR NORTH DISTRICT COUNCIL
ENGINEERING STANDARDS

Date:	JAN 2021
Revision:	0.1
Scale:	NTS
SHEET No.	13

Slip Remediation Design Report

RP35 Old Church Road, Whangaroa

For

FNDC

Haigh Workman reference 25 101

November 2025

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Revision History

Revision Nº	Issued By	Description	Date
A	Jonathan Corskie	First Issue	July 2025

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Executive Summary

Haigh Workman Limited (Haigh Workman) were engaged by Far North District Council (the Client) to undertake a geotechnical investigation and design to remediate a underslip at RP35 Old Church Road, Whangaroa. Ground investigations included hand augers and CPT investigations for assessing the slope stability and remediation design. The soils directly underlying the site comprise of soils from the Northland Allochthon Group underlying uncontrolled fill and colluvium. The slip is primarily caused by a wash out from stormwater flow from Old Church Road above. It should be noted that this is the same mechanism that caused the 2009 failure immediately upslope of current slip.

This detailed design report follows the Geotechnical Assessment and Retaining Wall Design at Whangaroa Village Hall (May 2024) where the Far North District Council commissioned retaining wall design at the toe of the slip to protect the Hall while Old Church Road was the responsibility of NTA. Retaining wall design has incorporated the design of three walls from this report (RW01, RW02 and RW03) into the scope of works for the Old Church Road Slip remediation.

The retaining wall (RW04) was designed using WALLAP with surcharge loading due to vehicle loadings (as defined in the New Zealand Bridge Manual) and topography above and below the walls. A retained height of 2.4m depth was designed for the retaining wall based on the investigation data and ground model. Loss of passive support of soil downslope was allowed for as well as groundwater conditions. The retaining wall was designed for static loading, road overloading, elevated groundwater and seismic loading. RW04 retaining wall is proposed to be constructed of H5 treated high density timber poles encased in 20MPa concrete with H5 timber lagging. Drawings are provided in Appendix A. The retaining walls have the following geotechnical design;

Table 1 - Summary of Retaining Wall Design

Details	RW01	RW02	RW03	RW04
Maximum Retained Height	1.0m	1.0m	1.0m	2.4m
Pole Diameter – 'High density'	200 mm (SED)	200mm (SED)	250 mm (SED)	400mm (SED)
Hole Diameter	400 mm	400 mm	400 mm	600 mm
Spacing (centre to centre)	1.2m	1.2m	1.0m	1.0m
Embedment depth (minimum)	1.2m	1.2m	2.0m	3.6m
Total pole length (maximum)	2.2m	2.2m	3.7m*	7.0m*

**pole lengths include an extension to form a vehicle barrier/handrail.*

Retaining wall holes are expected to encounter rock and specialist drilling equipment of adequate size (rock auger) is required for the works. Proof drilling of two holes in RW01 to 600mm diameter is recommended prior ordering poles and establishing traffic management on Old Church Road.

Earthworks are to be completed under a General Archaelogical Authority (application 2025-637) with an Archaeologist and representative from Te Rūnanga o Whaingaroa present. Earthworks are to remove the slip

material and accumulated material around the Whangaroa Hall and establish drainage to reduce damage to the Hall. Earthworks are to establish a minimum 150mm clearance to the base of the bearers and care must be taken not to undercut the Whangaroa Hall foundations as they are of variable depth. The water tank is to be removed and reinstated, with concrete lined channels and subsoil drains around the Hall and the landform shaped to facilitate drainage. A reinforced concrete slab protection is required for the existing culvert with kerb block channel.

There are power and Chorus cables around the Whangaroa Hall and Old Church Road indicated from plans. These cross paths with drainage around the Hall and slip remediation on Old Church Road. The services on Old Church Road are exposed in the slip at 700mm depth. The contractor is responsible for locating and potholing services prior to excavation.

All works on Old Church Road are to be completed under a stop/go operation retaining the 1m lateral safety zone required for workers. No full road closures are to be allowed for.

Retaining RW04 is to be constructed with compacted GAP40 reinstated behind the wall. A vehicle barrier and handrail forms part of the wall and a footpath is to be reinstated behind the retaining wall and a kerb block installed at the toe. The existing retaining wall upslope is to have kerb blocks installed at the toe board and timber pailings retrofitted to the barrier. Down slope of RW04, a kerb block kerb and channel profile with a subsoil drain is to be constructed to within 2m of Whangaroa Road, where a concrete lined channel is used to change the direction of the stormwater.

Asphalt gaps between the kerb and channel, footpath and edge of seal on Old Church Road is required to reinstate the road and top soil used to fill behind the kerb and channel.

We consider the following specific items for the retaining wall building consent and stormwater improvements, but not limited to, will require addressing prior to and at the time of construction to ensure the foundation soils and construction is consistent with the assumptions made in this geotechnical report:

1. Retaining wall bored holes prior to poles being put in and concrete poured;
2. Inspection of the retaining wall poles (must be high density poles);
3. Concrete and timber dockets to be provided to Engineer;
4. Inspection of the retaining wall drainage coil, timber lagging and drainage material before it is placed.
5. Inspection of stormwater controls – final completion.

1 Introduction

1.1 Project Background

Haigh Workman Ltd (Haigh Workman) has been commissioned by Far North District Council (the Client) to undertake a geotechnical investigation and remediation design for a underslip at RP35 Old Church Road that has impacted the Whangaroa Community Hall. Haigh Workman completed retaining wall design, reference 24 079 dated 15/05/2024, at the Whangaroa Community Hall to facilitate improvements to the hall as recommended by a T & A Structures Ltd engineering assessment (dated 20/01/2024). This design work involved retaining walls to allow removal of accumulated slip debris from around the hall and retain the toe of the slope below the slip. Retaining of the slip on Old Church Road was not part of the scope as Northern Transport Alliance managed works within the Road Access Corridors.

The scope of this design is to retain the slip on Old Chruch Road, incorporate kerb and channel stormwater design and incorporate upgrade works around Whangaroa Community Hall to address issues raised in the engineering assessment. The site location is shown in the figure below.

Figure 1 – Old Church Road and Whangaroa Community Hall Location

Old Church Road is a no exit road that services approximately 8 dwellings, a Church, motel and the boat storage facility associated with the marina.

1.2 Project Scope

The slip repair design shall be based on the most-cost effective solution over a 50 year (minimum) asset life considering practical construction and maintenance considerations. Stormwater management with kerb and channel options is included in the scope of works. Upgrading of the stormwater culvert systems is not included as an option. Design of the retaining walls around Whangaroa Community Hall is not included in the scope of this report, although the extent of these walls has been changed as a result of the investigations.

The geotechnical assessment is required to determine ground conditions, determine potential failure mechanisms and detailed remedial design.

The assessment comprised:

- A preliminary assessment and walkover by Haigh Workman engineers (13th May 2025);
- A subsurface geotechnical investigation comprising of two cone penetrometer testing holes to a maximum of 5.87 m bgl, six hand augers with scala penetrometers to a maximum depth of 3.0 m bgl;
- CCTV survey of the stormwater culvert modelled to traverse beneath Whangaroa Community Hall;
- Assessment of the pile depths of the Whangaroa Community Hall;
- Assessment of the ground conditions encountered during the investigation;
- Slope stability assessment and retaining design parameters; and
- Design of the Old Church Road retaining wall.

1.3 Old Church Road Slip Site Description

The underslip is located on the northern side of Old Chruch Road, approximately 35m upslope of the Whangaroa Road intersection at road position RP35. More recent slippage has occurred during high intensity rainfall events in late April 2025 with 607.5mm of rain recorded for the month at Bramleys in Kaeo. The underslip is interpreted to have occurred due to secondary flow from stormwater cuylverts, flowing down Old Church Road along the base boards of the existing retaining wall and discharging over the slope at the slip.

The setting is urban and the road is best classified as low volume access that does not meet the carriageway requirements as per Table 3.2 of FNDC Engineering Standards as the carriageway width is approximately 3.0m and single lane with passing lane width provided by the flush footpath upslope of the slip.

The slip is an underslip, (i.e., below and downslope of the existing road) that has directly impacted the footpath with partial failure of the existing road shoulder. The slip occurred where the road was single lane and visibility is restricted around the corner with sight distance estimated at 20m which is considered adequate with the low operating speed of the road.

Further upslope of the slip is a retaining wall with tie back anchors that was installed in 2013 following debris flowing through the infrastructure below in 2011. The retaining wall was constructed by Rintoul Civil and signed

off by PK Engineering. The existing retaining wall upslope consists of 300 SED poles embedded 3.0-3.2m (above rock) with RB32 anchors of unspecified length (estimated as 10m from drawings).

Figure 2 – Old Church Road looking west

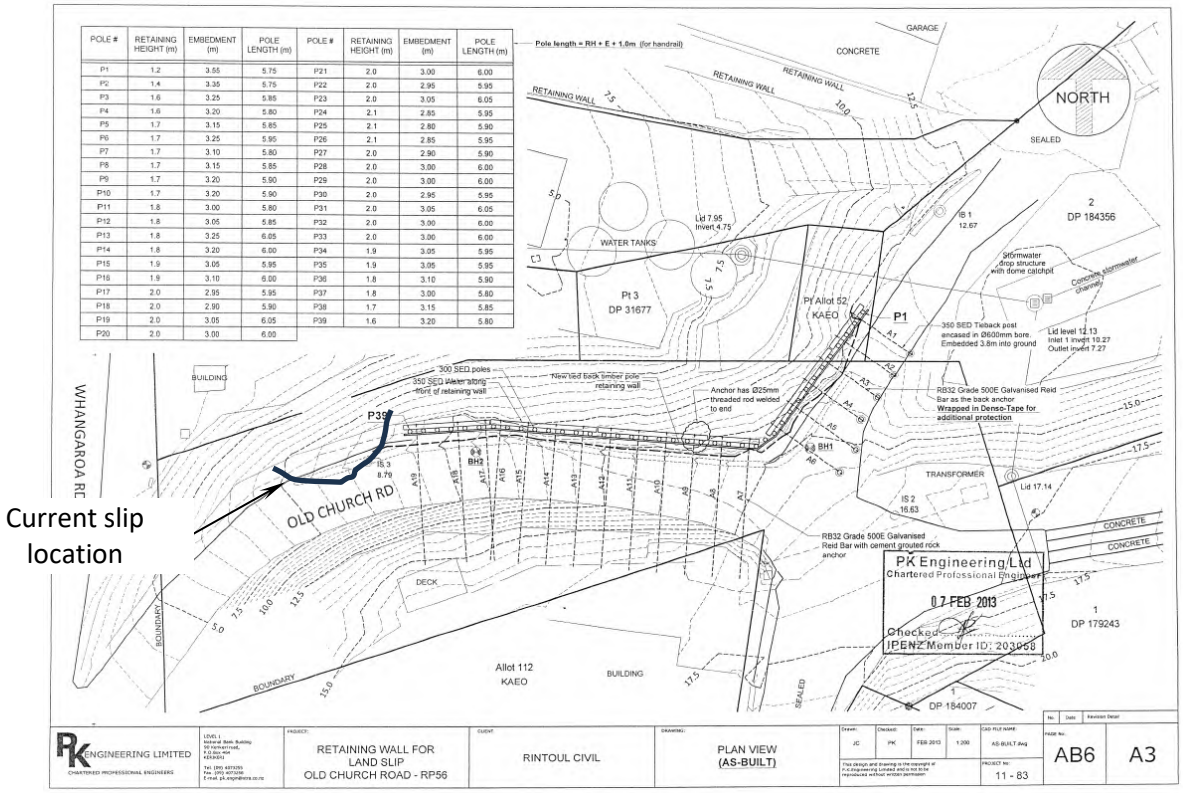

Figure 3 – Upslope retaining wall plan from PS4 records

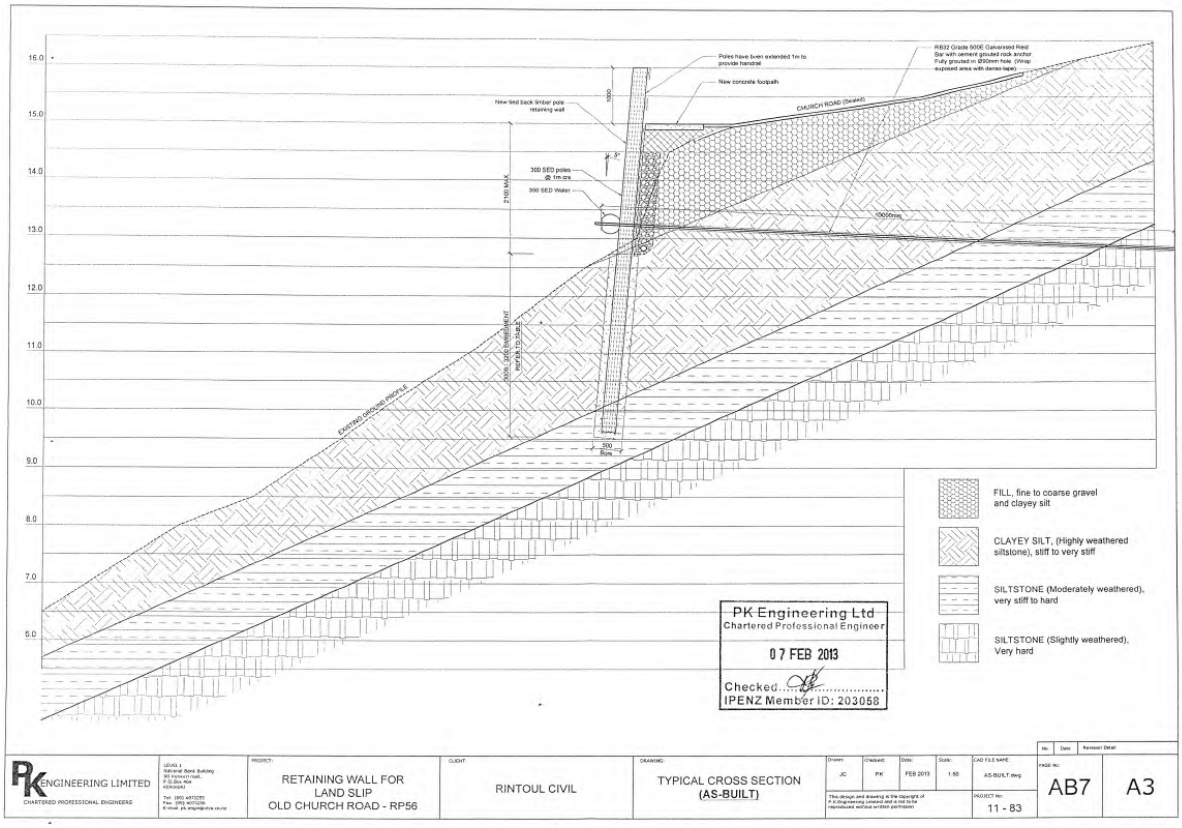

Figure 4 – Upslope retaining wall typical cross section

The toe of the slip is located on was the historic foreshore prior to reclaimation occurring in approximately 1980 to form the current foreshore, marine facilities and sportfishing club. The toe of the slope no longer is subject to active coastal erosion processes although coastal flooding is mapped on Whangaroa Road immediately to the north of Whangaroa Community Hall.

The slip is located on the northern slopes of a ridgeline extending down from Ohakiri (St Pauls Rock) above on the Whangaroa peninsula. The road has been constructed using sidling fill at an unknown date. The underlying contour of the land beneath the existing road and slip dips at approximately 31 degrees toward the north at the historic coastline. Above this, the slope dips at a gentler 11 degrees. Further to the east of the open drain, the ground contour becomes progressively steeper rising to approximately 57m above sea level. This hillside to the east provides a catchment that channels stormwater flows to the open drain at the toe of the slope.

1.4 Whangaroa Community Hall Site Description

Whangaroa Hall is located on Lot 1 DP 190160 North Auckland located on an alluvial flats site within a small gully with the slope immediately to the south extending to Old Church Road above. The site is bounded immediately to the north by a residential dwelling without fencing. To the east, a vacant section is fenced and the land rises gradually up the gully to a retained access above. The Whangaroa Hall is a Category 2 historic building and was built 1840 by the missionary James Shepherd as a non-denominational church. The building

has been managed by the Shepherd family for many years before being transferred to Far North District Council where it is now used as a community hall.

The Whangaroa Community Hall is located at the base of a small gully with a catchment area of approximately 10Ha. Changes in the catchment have occurred with the development of facilities upslope of the hall with major changes noted with the development of the boat laydown facility in approximately 2009.

The property file for the Whangaroa Community Hall has not been viewed but it is understood that it does not contain anything of significance due to the age of the building. From work on adjacent properties, it is understood that in 2011 a slip occurred with debris flowing through the immediate boundary of the site. A risk of damage to the church is noted from files. The culvert on Old Church Road breached and directed water over the road which caused undermining with mud and debris depositing around the Whangaroa Hall.

Figure 5 – Undermining/slip on old church road immediately upslope of Whangaroa Community Hall

This slip that was repaired by the wall outlined in Section 1.3 (Figure 3 and 4) above.

Debris have accumulated around Whangaroa Hall and T & A Structures 2024 engineering assessment recommended the Hall needs further protection from stormwater intrusion. The following points were noted;

1. A small timber retaining wall be built around the building and the ground shaped to achieve 300mm clearance below the existing hall bearers.

2. The existing stormwater pipe condition should be assessed as it is recorded as being located beneath the Whangaroa Hall on FNDC maps.

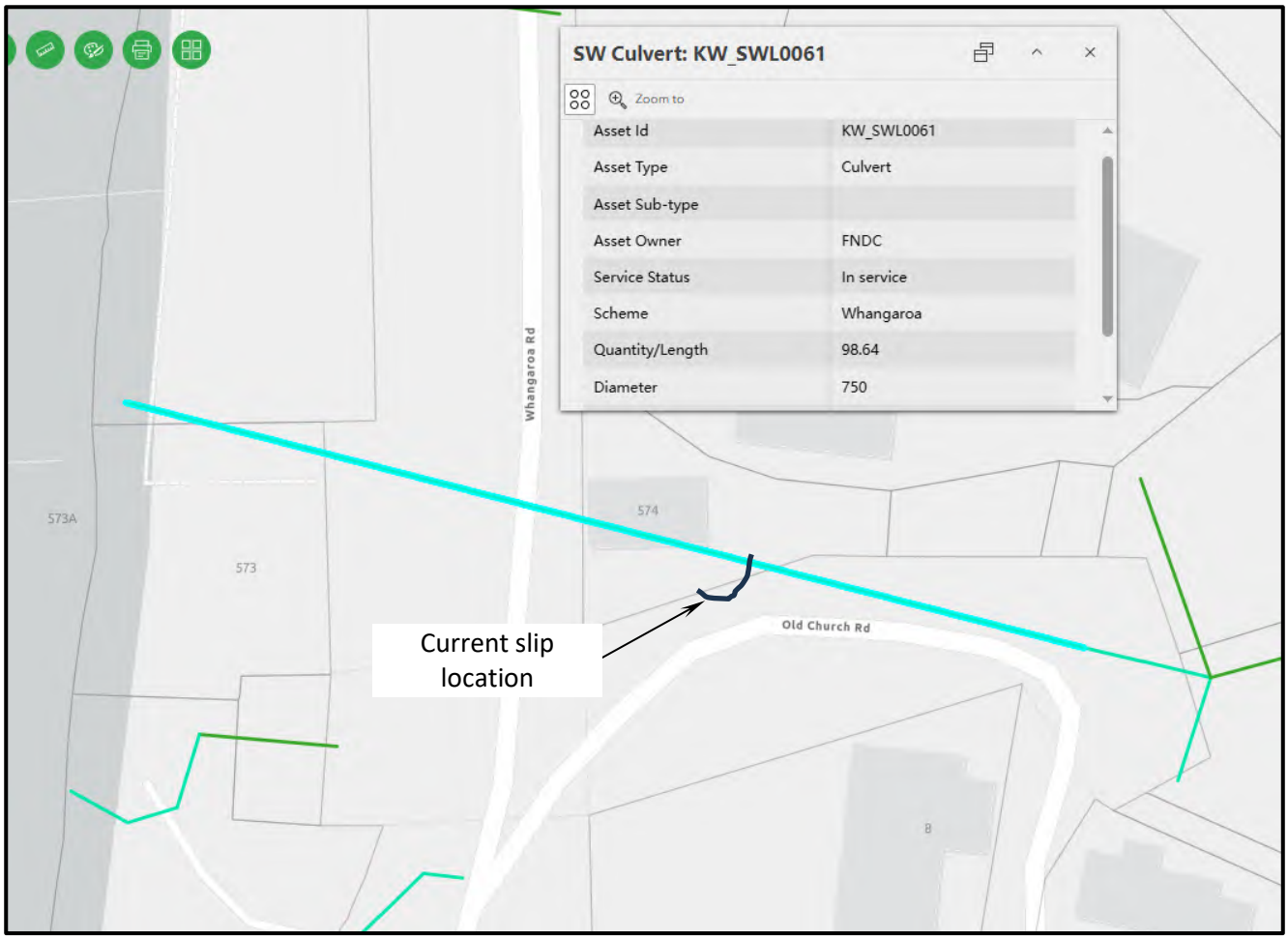

Figure 6 – FNDC Maps showing 750mm Stormwater Line KW_SWL0061 traversing the Old Church Road slip and Whangaroa Hall

1.5 Historical Aerial Photography

Historical aerial imagery was reviewed via Retrolens and Google Earth with the earliest usable records from 1950. The 1950 aerial image clearly shows the Whangaroa Hall prior to Old Church road being built and the marina reclaimation across the road. The foreshore position was approximately 7m in front the Whangaroa Hall prior to reclaimation. 1977 imagery shows Old Church Road constructed and a reclaimation immediately across the road extending to the north approximately 50m.

The next imagery is from 2004 where further reclaimation has occurred north of the Whangaroa Hall and a building has been removed immediately north east of the Hall. By 2007 a new building has been constructed to the north of the Whangaroa Hall on 576 Whangaroa Road. Works upslope of the Hall at the boat storage facility

are visible in 2009 imagery. A large tree upslope of the Hall is removed between 2013 and 2016. A date palm immediately behind the Hall is removed between 2021 and 2022. In 2023 imagery the slip is visible along with soil disturbance below the existing retaining wall approximately 20m upslope of the current slip. The access to 5 Old Church Road is concreted in the 2023 image.

Images from Google Maps street view 2010 indicate minor cracks in the seal upslope of the current failure. The road is estimated as 4m wide without shoulders.

1.6 Natural Hazards

Coastal flooding (CHFZ0) is mapped on Whangaroa Road approximately 45m the north of the Hall. The CHFZ1 (50 years) is located 8m north of the Whangaroa Hall. The CHFZ2 (100 years) impacts on the land at the western end of Whangaroa Hall by approximately 3m. The CHFZ3 (100 years plus rapid sea level rise scenario) impacts the western half of Whangaroa Hall by approximately 6m.

No coastal erosion mapping is present but due to the revetment protecting the reclaimation, the sheltered aspect of Whangaroa Harbour and distance from the Whanagroa Hall, this is not considered a hazard applicable to the project.

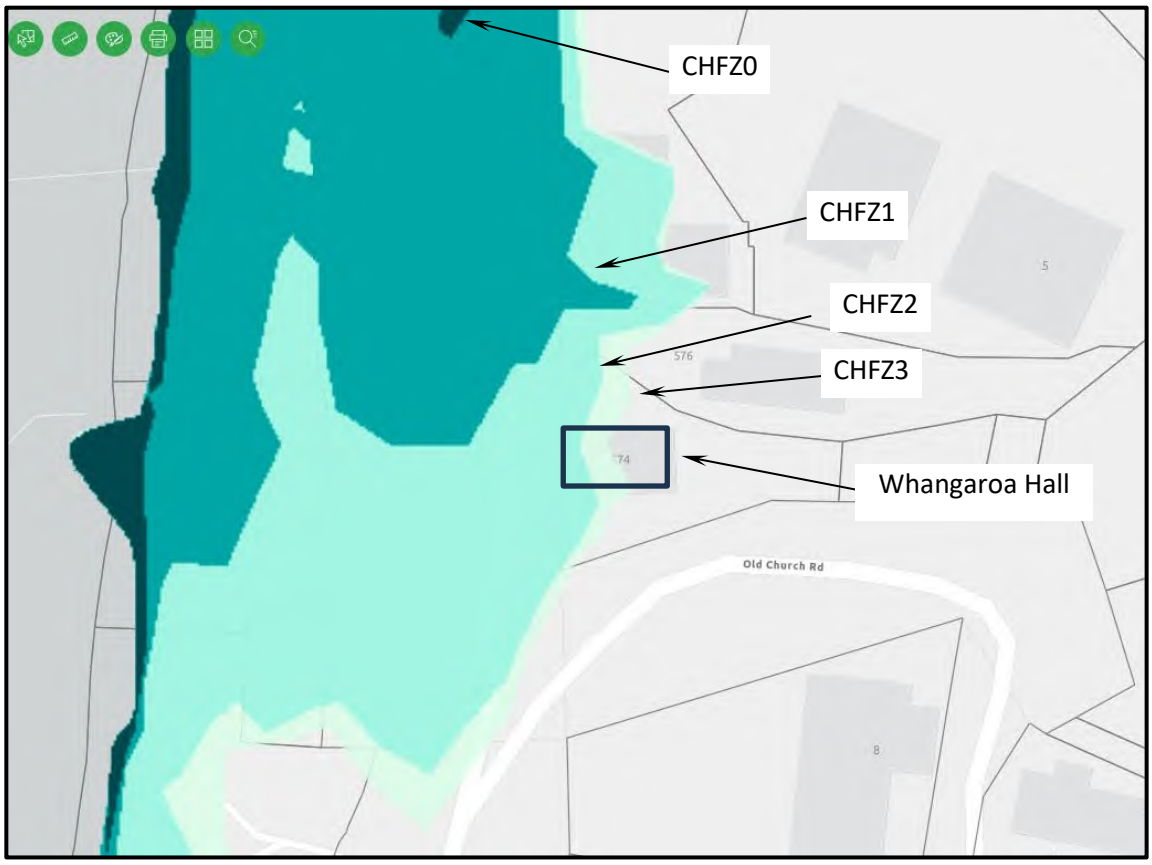

Figure 7 – Coastal Flooding Hazard Zones from FNDC Maps

2 Geology

2.1 Published Geology

Sources of Information:

- Institute of Geological & Nuclear Sciences 1:250,000 Geological Map 2, 2009: "*Geology of the Whangarei area*";
- NZMS 290 Sheet P04/05, 1: 100,000 scale, 1982: *"Rock types map of the Whangaroa-Kaikohe area";*

The published geology shows the site to be underlain by the Tupou Complex (Ku) of the Northland Allochthon, comprising a '*Strongly indurated, massive sandstone and thin-bedded sandstone and mudstone with interbedded conglomerate minor chert*.' The Tupou Complex is of Early Cretaceous age. Holocene age deposits of the Tauranga Group (Q1a) comprising *'unconsolidated to poorly consolidated mud, sand, gravel and peat deposits of alluvium, swamp and estuarine origin'*, are not mapped but potentially located within the low lying valley floor and historic foreshore at the site. Thrust faults are bounded immediately to the west in the vicinity of the site as this forms the outer the boundary of the Northland Allocthon emplacement. An extract of the geological map is shown below.

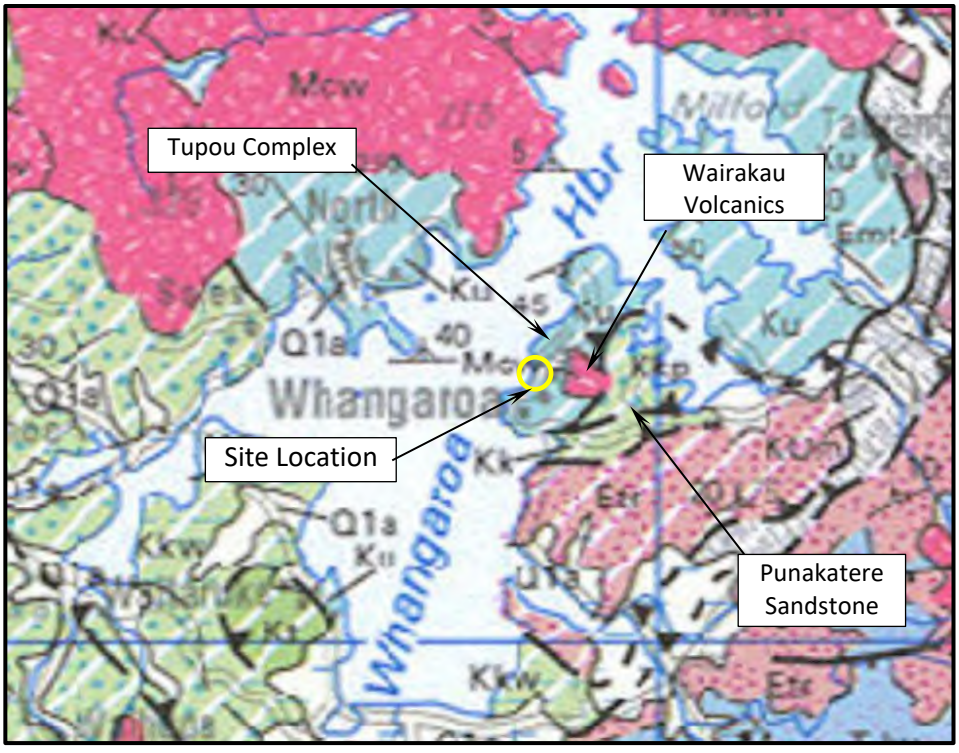

Figure 8 - Geological Map (Whangarei Map, 1:250,000)

Table 2 - Geological Legend

Symbol	Unit Name	Description

Ku	Tupou Complex	Strongly indurated, poorly stratified conglomerate, sandstone and argillite.
Kkp	Punakitere Sandstone	Weakly to moderately indurated, alternating thin to thick bedded, quartzofeldspathic, commonly micaceous sandstone and mudstone. Minor mudstone-dominated flysch facies and conglomerate.
Etr	Ruatangata Sandstone	Calcareous glauconitic sandstone.

3 Ground Investigations

3.1 General

Haigh Workman conducted geotechnical investigation on the 21st of May 2025 on the downslope and upslope road shoulder in the slip comprising of CPT's. CPT tests (CPT01-CPT02) were extended to a maximum depth below ground level of 4.2m (CPT02 started at footpath concrete level).

Four hand augers (BH01 to BH04) with dynamic cone penetrometers were completed on the 17th of April 2024 to design the retaining walls around the Hall as recommended in T & A Structures Report. The were extended to a maximum depth below ground level of 2.7m. Additional hand auger testing (BH05) was completed 21st of May 2025 focussing on the Old Church Road Slip. Following discussions regarding the unknown depth of Whangaroa Hall foundations, additional testing (BH06 and BH07) was completed on the 29th of May 2025 to determine the depth of foundations. Hand augers measured the strength of cohesive soils downhole every 500mm, using a handheld shear vane.

Materials recovered were logged in general accordance with the methods and procedures in the New Zealand Geotechnical Society's *"Guideline for the Field Description of Soil and Rock for Engineering Purposes"* (2005). Shear vane testing was undertaken in accordance with the New Zealand Geotechnical Society's *"Guideline for Hand Held Shear Van Test"* (2001). The peak and remoulded vane shear strength values in the logs are adjusted for the calibration of the instrument according to BS 1377.

Location of the boreholes are detailed in Appendix A. Boreholes were located using a tape measure from site features and handheld GPS therefore the locations are approximate only.

3.2 Ground Conditions

Based on the results of the geotechnical investigation conducted by Haigh Workman and review of published geological maps, it is considered that the soils directly underlying the site comprise of non-engineered fill, Tauranga Group alluvium and Northland Allochthon Group. A geological cross section is provided in Appendix A and summary of units intersected in drill holes summarised in the table below.

Table 3 – Summary of CPT and Hand Auger Testing

Borehole Number	Fill (predominantly silty clay)	Tauranga Group (predominantly silty clay)	Tupou Complex (predominantly silt)	Tupou Complex (predominantly completely to highly weathered rock)	Groundwater
BH01	0.0m to 1.5m	1.5m to 1.7m	1.7 m to 1.9m	1.9m+	1.8m
BH02	0.0m to 0.3m	NE	NE	0.3m+	NE
BH03	0.0m to 0.3m	NE	0.3m to 1.2m	1.2m+	NE
BH04	0.0m to 1.0m	1.0m to 1.8m	NE	2.7m+	1.5m
BH05	0.0m to 2.2m	NE	2.2m to 3.0m	NE	NE
BH06	0.0 m to 0.5m	0.5m to 0.7m+	NE	NE	NE
BH07	0.0 m to 0.1m	0.1m to 0.3m+	NE	NE	NE
CPT01	0.0m to 2.5m	NE	2.5m to 3.2m	3.2m to 3.9m	NE
CPT02	0.0m to 2.6m	NE	2.6m to 3.5m	3.5m to 4.2m	NE

Note – Depths measured from existing ground surface level. NE – not encountered, NM – not measured.

The materials encountered are summarised below;

- **Fill (cohesive):** This fill consists of fill placed from works around the historic Whangaroa Hall and also deposited material following slips on Old Church Road and retaining wall construction. Fill on Old Church Road is interpreted as sidling fill and road base. The fill extends on the outer edge of the road and at the gully base around the Hall and has varying depths. The cohesive fill comprised mainly of clayey silt with varying amounts of sand, gravel and organic matter. Firm topsoil and intermixed fill was encountered at the base of the fill unit. The cohesive fill was moist to wet and very soft to very stiff.
- **Residual Tupou Complex (Northland Allochthon):** Underlying the cohesive fill, residual soils extended to a depth up to 3.5 m bgl. Tupou Complex soils comprised mainly of silt with varying amounts of fine clay and gravel. The cohesive soils were predominantly moist and very stiff.
- **Tupou Complex Completely Weathered Rock:** Below the residual Tupou Complex, Tupou Complex Completely Weathered rock was interpreted from scala and CPT testing. Completely weathered rock is also visible in the excavations on the opposite side of Old Church Road. It is interpreted to the maximum investigated depth of 4.2m bgl.
- **Groundwater:** Groundwater was encountered at select locations surrounding the Whangaroa Hall at 1.5m to 1.8m below ground level (approximately highest astronomical tide). The alluvial deposits of the Tauranga Group are expected to act as an aquifer where rainwater and seawater can travel easily through due to being highly permeable. Groundwater levels do fluctuate and higher/perched groundwater levels may be encountered following periods of prolonged or heavy rainfall and tidal variations.

3.3 CPT Testing

Underground Investigation Limited were engaged by Haigh Workman to conduct two tests to maximum depth of 4.2m. CPT holes were dipped for groundwater depth at the end of the day of testing but groundwater was not encountered.

CPT interpretations of undrained shear strength are presented in the figures below. Test results are shown in Appendix C.

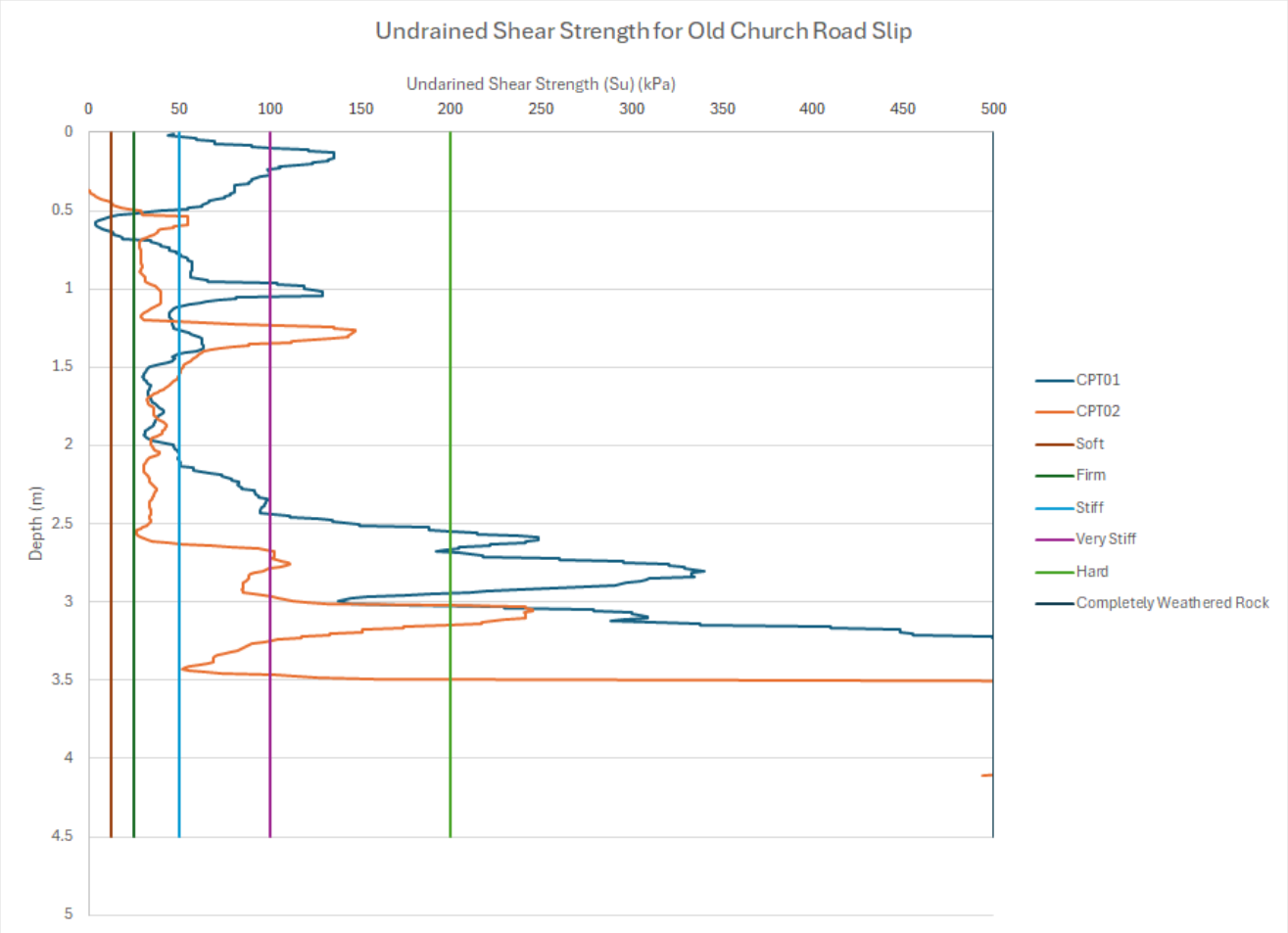

Figure 9 - Undrained shear strength CPT01 to CPT02

4 *Slope Stability Assessment*

4.1 Cause of Slip

Haigh Workman understands the slip occurred during one of the major storm events and Cyclone Gabriele in 2022/2023. It was significantly worsened during Cyclone Tam 17th April 2025. 607.5mm of rain was recorded at Bramleys in Kaeo over the month of April 2025. High intensity rainfall events occurred during April and it is expected that these rainfall events overwhelmed the 300mm diameter culvert upstream on Old Church Road resulting in secondary flow down Old Church Road. This overflow, flows down the road and due to the road camber ends up on the outer edge of the road flowing along the toe board/footpath above the retaining wall completed in 2013. The flow then flows over the slope at the end of the retaining wall where the slip is located. As such the slip is primarily caused by a wash out from stormwater flow above. It should be noted that this is the same 2009 mechanism that caused the failure immediately upslope of current slip.

Back analysis of the slip under elevated groundwater conditions confirms the failure conditions within the non-engineered fill material.

4.2 Slope Stability Modelling

The model was setup utilising the soil profile intersected with hand auger drilling and CPT testing. Section B-B' was used for back analysis.

Geotechnical design parameters used for the slope stability model are detailed in appended modelling results based off experience, back analysing of the slips.

Table 4 - Summary of Slope Stability Analysis Inputs

Geotechnical Unit	Cohesion – C' (kPa)	Friction Angle - ϕ' (degrees)	Groundwater Coefficient Ru	Unit Weight – ϒ' (kN/m³)
Non-Engineered Fill	3	28	0.2 (0.35)	16
Firm Tauranga Group	3	28	0.2 (0.3)	16
Stiff Residual Tupou Complex	5	30	0.15 (0.25)	17
Completely Weathered Tupou Complex	20	35	0 (0.1)	20
Colluvium	0	28	0.2 (0.3)	16
Engineered Hardfill	0	32	0 (0.2)	20

Note – Groundwater Coefficient Ru values in parenthesis represent elevated groudwater conditions

For ULS seismic loading (New Zealand Bridge Manual, SP/M/022, Third Edition);

$$Peak\ Ground\ Acceleration\ (ULS) = C_{0,1000} \times \frac{R_u}{1.3} \times f \times g = 0.13g$$

Where for Kaitaia, Northland;

$C_{0,1000} = 0.12$ – From New Zealand Bridge Manual v 3.4

R_u= 1.0 – for a 1/50 return period for importance level 2

f=1.33 – for Class C shallow soil site

For Damage Control Limit State PGA (DLS) = 0.19g has been adopted.

Groundwater influence was modelled using a porewater coefficient value (Ru) for each geotechnical unit. Ru provides a convenient method for representing perched/transient groundwater conditions on sloping ground. Porewater coefficients have been based off saturation during back analysis of the slope failure and groundwater intercepts for the static case. Groundwater at the toe of the slope associated with sea level is not considered to have contributed to the failure on Old Church Road and as such has been omitted from the analysis.

Live load (LL) of 12kPa for traffic was utilised for HN loading of both live lanes. Traffic overload (OL) utilised HO loading of 24kPa in the lane closest to the retaining structure and HN loading of 12 kPa in the adjacent lane. Collision loading has not been applied as failure will not endanger adjacent property or collapse onto lane.

Traffic overload has been applied to the static scenario. Traffic live load has been applied to the elevated groundwater. No traffic loads have been applied to seismic ULS or DCLS loading.

Modelling has been completed for static, elevated groundwater and seismic scenarios to achieve factors of safety which are deemed to correspond to a 50-year design life. Outputs of stability modelling are shown in Appendix E.

4.3 Slope Stability Model Results

Detailed analysis has been made possible based on the machine ground testing at the site providing confidence on the depth to various geotechnical units.

Analysis with soldier pile walls resulted in negative interslice forces at soldier pile locations. To model this more suitably, the depth of failure was removed and replaced with a surcharge load to better represent forces on the soldier pile wall. This modelling has enabled accurate driving forces for soldier pile wall design. To model the passive resistance on the soldier pile wall, a separate model was used with a tension crack on the wall to enable a potential depth of cracking and loss of passive support. Factors of Safety as summarised in the Table below. Results are shown in Appendix D.

Table 5 - Summary of Slope Stability Analysis

Section	Loading Scenario	Road Loading Applied	Factor of Safety	Required Factor of Safety	Outcome	Actions Required
B-B'	Back Analysis	None	0.92	<1.0	Not OK	Ground stabilisation required at road edge (FOS=0.81 downslope in the colluvium)
	Static	OL	1.50	>=1.5	OK	Retaining wall 32kN shear per m over a 3.2m height with a min. depth of 6.0 m
	Elevated Groundwater	LL	1.53	>=1.3	OK	Soldier pile wall 32kN shear per m with a min. depth of 6.0 m
	Seismic ULS	None	1.54	>=1.0	OK	Soldier pile wall 32kN shear per m with a min. depth of 6.0 m
	Seismic DLS	None	1.37	1.0	OK	Soldier pile wall 32kN shear per m with a min. depth of 6.0 m

4.3.1 *Back Analysis*

Back analysis was completed under elevated groundwater conditions on Section BB with the estimated surface based on contours from the PS4 from the adjacent retaining wall. This resulted in a factor of safety of 0.91 in the sidling fill with failure surfaces extending 2.0m back from the crest vs 1.8m measured onsite.

Within the colluvium downslope, the factor of safety was 0.81 with shallow failures in the deposited material. This is interpreted to consist of the material that has continued to deposit around the hall at the base. Based on site observations, we consider this an appropriate analysis for a recently failed slope subject to erosion during storm events.

4.3.2 *Section BB*

Modelled critical failure surfaces in Section BB showed failure surfaces extending within the residual Tupou complex. Due to the proposed retaining at the toe of the slope, no failure below the retaining wall was shown in modelling. No failure in the residual soils beneath the Old Church Road retaining wall is expected. The retaining wall is considered appropriate for stabilising the slope.

The critical failure surface resulted in a 3.2m failure depth at the retaining wall in the static case with overload applied. The wall resulted in a 32kN shear capacity per meter with loading over a 3.2 m height and a minimum depth of 6.0 m to satisfy stability requirements. The proposed retaining wall will be located continuing the existing retaining wall alignment downslope with a reinstated road verge.

Saturated and seismic loading cases resulted in factors of safety significantly higher than required with failure surfaces contained within the Tupou residual soils but closer to the completely weathered rock interface. Due to the higher factors of safety, these failure surfaces were not considered critical. Damage limit state seismic loading did not result in a as a step change in behaviour.

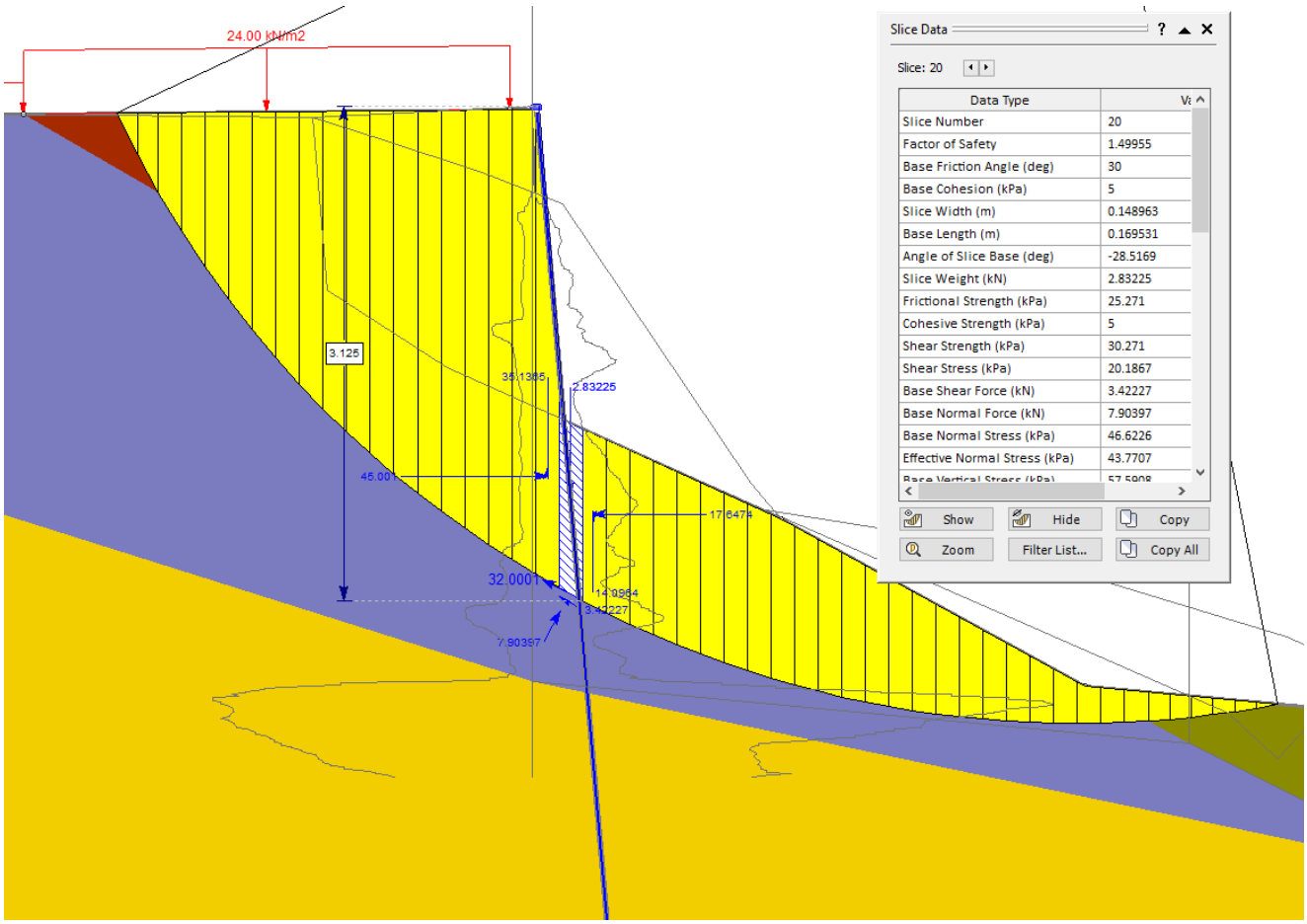

Figure 10 – Interslice forces on critical surface for static slope stability model

5 Retaining Wall Design

5.1 General

RW01 to RW03 retaining walls design is not covered as part of the scope of this report. Haigh Workman report (reference 24 079, issued 15/05/2024) details the design of these retaining walls. The retaining wall extent has been reduced due to changes in excavation levels around the Whangaroa Hall, refer to Section 6.5.

The retaining wall (RW04) design was designed in Wallap (Version 6.09) with one model used to assess the retaining wall, with serviceability limit state, HN-HO-72 overloading (as per NZBM), elevated groundwater and ultimate seismic limit state. The retaining wall has been modelled to retain a maximum 2.4 m height of replaced engineered fill. Soil movement from in front of the wall was not shown in stability modelling. 0.6 meter depth of soil downslope of the wall has been modelled as a surcharge load which is not providing passive support to the wall due to expansivity i.e. the soil mass will act as a buttress only.

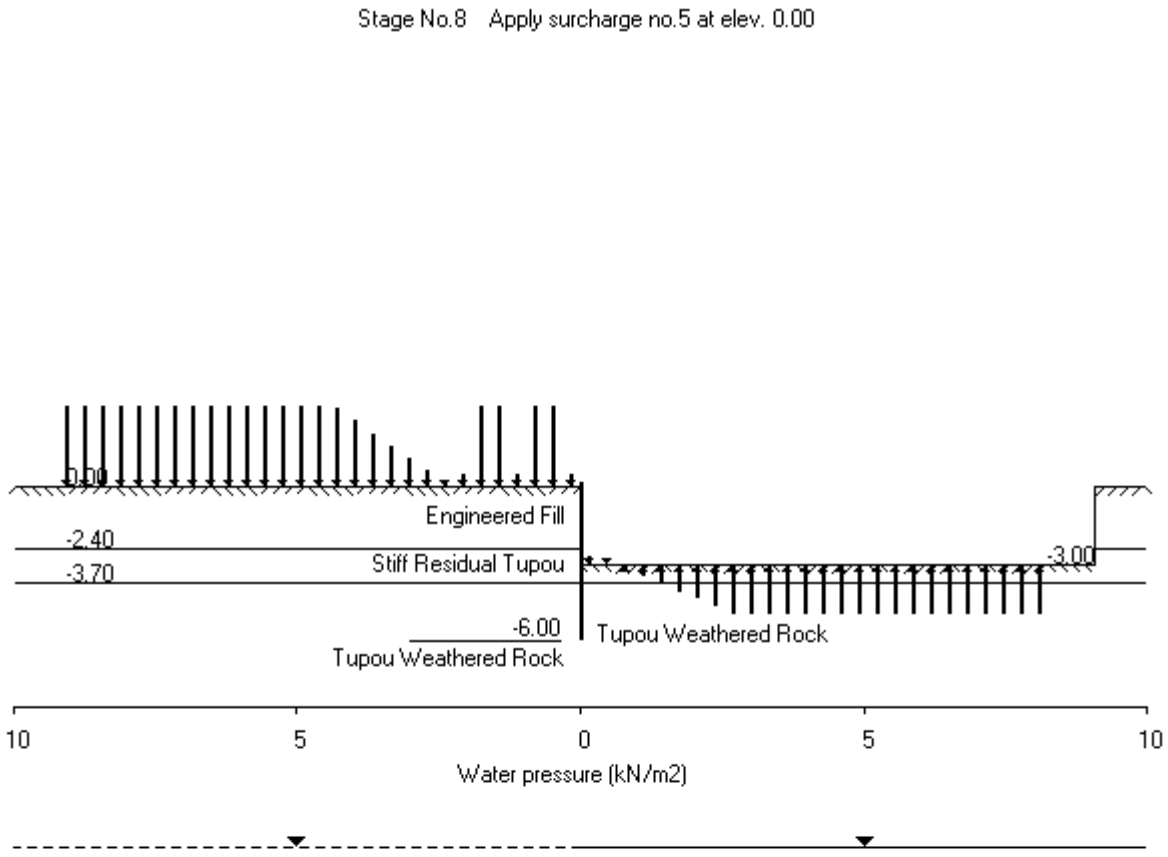

Figure 11 – Wallap model with downslope surcharge loading and HN-HO-72 loading

Due to the embedment requirement into weathered rock, a solution utilising a maximum hole diameter of 600mm has been sought with timber piles up to 0.4m SED to maintain concrete cover.

Poles have been extended up 1.0m to provide a handrail and to match the existing adjacent retaining wall that continues for 40m upslope along Old Church Road. Retaining wall RW04 is on the footpath with vehicle access along the road therefore has been designed with a crash barrier for medium vehicle traffic (Type G) in accordance with AS/NZS 1170.1, i.e. a 40 kN load at 0.5 m above the road level, distributed over a 1.5m length of the wall in conjunction with a 5kPa loading. The design philosophy is based around matching the existing risk profile and for edge protection.

The design has utilised a 2.5B spacing of piles.

5.2 Design Criteria

Detailed design has assessed the following failure modes:

- Kick-out;
- Yielding of structural elements.

The model uses a static loading case before adding an OL surcharge loading of the road applied above the soldier pile wall as per Alternative (a) Figure 3.1: HN-HO-72 traffic loading of the New Zealand Bridge Manual. Road OL loading was then removed and groundwater table elevated. The groundwater table was then relowered and the traffic loading removed prior to seismic loading from ultimate limit state added. Loading is not factored in the static loading case.

For structural design of earth retaining structures, the design horizontal ground acceleration to be used in computing seismic inertia forces is as follows for serviceability limit state (New Zealand Bridge Manual – SP/M/022):

$$C_o g = C_h(T_0) Z R_u g$$

- $C_h(T_0)$ = 1.33 (Class C)
- Z = 0.06 (Northland)
- Ru = 1 (Importance Level 2, APE 1/500)

$C_o g$ (ULS) = 0.13 g

Ultimate limit state forces acting on the soldier pile wall have been estimated using the Mononobe-Okobe theory for flexible walls. Calculations for the retaining wall designs are contained within Appendix E.

Stages of the model presented in Appendix E are as follows;

- Stage 6 – Static Loading
- Stage 8 – Static overload HO-HN loading
- Stage 11 – Elevated groundwater
- Stage 14 – Vehicle impact loading
- Stage 18 – ULS seismic loading

5.3 Retaining Wall Specifications

A summary of the new retaining wall design is as follows:

Table 6 - Summary of Retaining Wall Design

Details	RW04
Maximum Retained Height	2.4 m
Maximum Backslope Angle Behind the Wall	5˚
Pole Diameter – 'High Density'	400 mm (SED)
Drill Hole Diameter	600 mm
Spacing (centre to centre)	1.0 m
Embedment depth (minimum)	3.6 m
Pole 'Stickup'	1.0m
Total Pole length	7.0 m
Maximum Factored Bending moment (design loading – stage 14)	150.1 kNm/m
Maximum Factored Shear force (design loading -stage 14)	101.8 kN/m

Critical loading of the wall was the short term vehicle impact factored loading in all cases. Moment actions and shear forces have been taken from our retaining wall analysis and the capacity of the poles have been checked and are suitable for the design. Lagging/rail details are shown on the typical section. Shear forces actions are in excess of slope stability modelling requirements.

The retaining wall is composed of 400mm SED high-density timber poles encased in 20 MPa of concrete with grade G8 timber horizontal planks, or rough sawn 150 x 50mm H5 treated lagging. Lagging details are provided on the typical sections within Appendix A.

Design actions, deflections and length of embedment were derived from the analysis undertaken using Wallap (Version 6.06) using the subgrade reacting model. Seepage drainage must be installed behind the wall, with the drainage pipe outlet directed downslope.

6 Civil Design

6.1 General

Civil design has aimed to improve the current stormwater and road conditions on Old Church Road and at Whangaroa Hall. Stormwater assessment of surrounding infrastructure (culverts etc.) and road upgrades are outside of the scope of this project. Instead, stormwater improvements are focussed on management of overland flows and roading improvements are focussed on the shoulders and sight distance improvements.

6.2 Condition Assessment for Old Church Road (RP0-90)

Old Church Road is an urban sealed Low Volume Access with an average daily traffic of 54 (estimate30/06/2024 from mobileroad.org) and 4% heavy vehicles. Old Church Road is a narrow no exit road formed on a moderately steep cross slope. There is no turning until RP 90 where a large turnaround where three no exit accesses meet.

The road provides access to 11 existing titles (7 developed) zoned general residential, mixed use and rural lifestyle. Of the existing titles, one title is a church, one a motel and one a boat storage facility, with an estimated 8 H.E.s based on aerial imagery. The road is best described as an urban low volume access with average daily traffic less than 200 based on FNDC Engineering Standards Table 3.2.

The width of the sealed carriageway is 3.0 –3.5m and is single lane, not meeting the requirements of FNDC engineering standards of a dual lane low volume access. Passing width exists at RP50 to RP90 with vehicles using the footpath above the existing retaining wall. Sight distance at the downhill end of the passing bay at RP50 is 24m and at the uphill end (RP85) is 35m. At the slip area where RW04 is proposed, the sight distance is 20m around the corner before the sight distance increases again to the intersection of Whangaroa Road. Users of the road appear adjusted to the conditions with the estimated operating speed of 20kmph. Minimum stopping sight distances calculated from Austroads for a sealed downhill road in alert conditions is 20m at 25kmph at -24% grade and 21m for a truck with a boat trailer.

The calculated stopping sight distance is approximately the same as the sight distance at the RW04 slip. In the same way as the retaining wall above has facilitated a footpath that is utilised as a passing bay, a footpath is recommended to provide additional passing width above RW04. The footpath is to be as per FNDC engineering standards. Vegetation pruning will not significantly alter the sight distance in this location.

6.3 Old Church Road Overland Flows

Currently overland flows travel to a stormwater collection system at RP90. The culverts are 300mm diameter for a catchment area of approximately 2Ha and are considered undersized. When the inlet is overwhelmed, secondary flow occurs down Old Church Road. Due to the corner and camber, this water flows against the batter board of the retaining wall above the slip before discharging at RP36 above the Whangaroa Hall. The retaining wall was not originally designed for a base board so it is assumed that this has been added retrospectively to reduce overland flows overtopping the wall.

As part of this proposal, a more resilient option of a concreted kerb block 200mm high by 125mm profile is proposed along the base board at the existing retaining wall and into the new RW04 wall where a concrete footpath will be constructed.

Downslope of the RW04 wall, a standard kerb block profile as per FNDC Engineering Standards with a 110mm draincoil beneath it. This kerb and channel will extend to immediately above the intersection with Whangaroa Road, where it will transition to a concrete lined channel for ~2.0m to guide the overland flow through a change of direction to discharge into Whangaroa Road kerb and channel. The concrete lined channel is to follow the rural channel specified in FNDC Engineering Standards and is considered applicable in the urban environment as the existing drain on Old Church Road has this profile and vehicles will not transit this steep section of the road. Refer to Appendix A for Kerb and Channel Details.

6.4 Stormwater Culvert KW_SWL0061

T & A Structures 2024 engineering assessment recommended the existing stormwater pipe condition should be assessed as it is recorded as being located beneath the Whangaroa Hall on FNDC maps. A CCTV survey was completed on this culvert which showed that the culvert did not traverse beneath the hall but instead ran down the boundary of Lot 3 DP 210718 with an unmapped buried manhole. The culvert discharges to the sea within the intertidal zone and is not recommended for discharging stormwater into as connections to this are expected to cause a secondary flow path toward the hall during coastal inundation.

CCTV survey showed that the concrete culvert has insufficient cover in the driveway of Whangaroa Hall. To mitigate this, a slab protection is recommended to be poured to protect the culvert. CCTV survey information has been provided to FNDC for records.

6.5 Whangaroa Hall Earthworks

T & A Structures 2024 engineering assessment recommended a small timber retaining wall be built around the building and the ground shaped to achieve 300mm clearance below the existing hall bearers. No assessment of the foundations and impact from lowering the ground level formed part of the T & A Structures assessment. As such, BH06 and BH07 were completed on the northern and southern side of then Whangaroa Hall respectively.

The pile depth below the current ground level was found to be 150mm on the southern side of the hall and 500mm on the northern side. There was 150mm clearance between the bottom of the bearers and the ground on both side of the hall. The pile depth of 150mm is shallower than would be required to meet current building code conditions, but the timber framing, cladding, design and lightweight nature of the building means that it is unlikely to result in any significant damage. Rather seasonal effects, such as door and windows jamming, are possible.

However, further lowering of the ground level resulting in reduced pile embedment is not recommended on the southern side of the dwelling. As such, the excavation should target exposing the historic ground level by removing the deposited soil from slips and wash out from around the building target 150mm ground level clearance below the bearers. Retaining wall extents have been adjusted in Appendix A as part of the reduced earthworks.

6.6 Whangaroa Hall Contaminated Soils

An area identified to the north of the proposed works contains a registered HAIL site within the NRC database. The site is located on 576 and 574 Whangaroa Road and is associated with an old petrol station at the Marlin Hotel. Fuel tanks were located at the north of 574 Whangaroa road and were removed in 2002 with minor contamination of the tank pit walls noted during removal with no remediation.

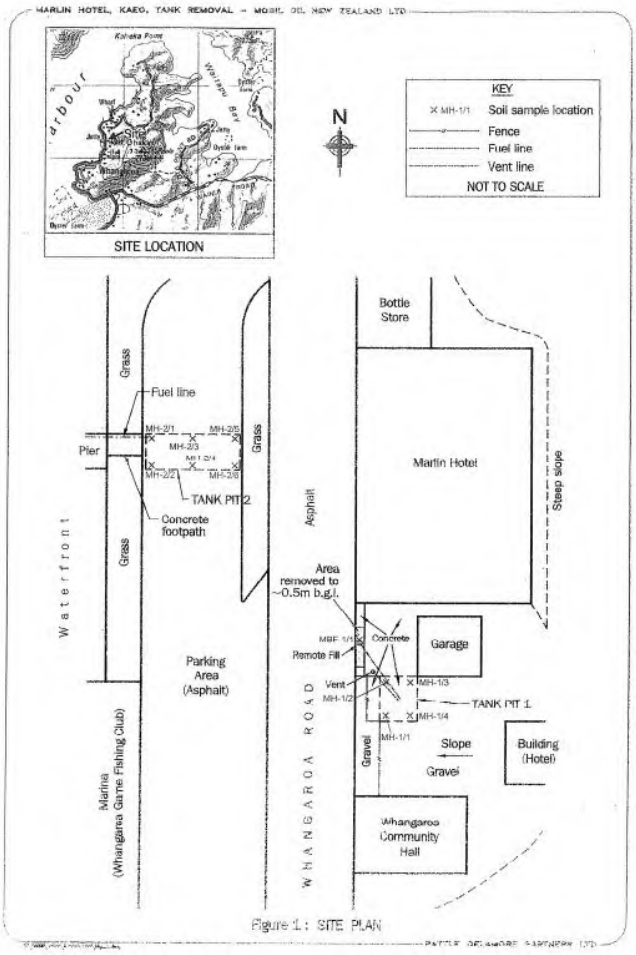

Figure 12 – Map of Fuel Station Marlin Hotel and removal of Tank Pit 1 adjacent to Whangaroa Hall

The proposed earthworks do not coincide with the identified HAIL area, located 2.4m to the south, as shown in Appendix A. The proposed concrete capping of the culvert is anticipated to be located in previously disturbed soil/fill associated with culvert install in 2009.

To assess if the proposed earthworks are more likely than not to encounter contaminated land, a 5m buffer from the identified HAIL site has been applied resulting in a 236m^2 HAIL area. Based upon this, an area where concrete capping of the existing stormwater culvert is proposed within the expanded HAIL area. A section is proposed to be to be excavated to between 0.1-0.15m and a concrete cap cast overtop of the existing stormwater culvert where the culvert cover was recorded as 0.1m during CCTV survey. This will result in 1.3m^3 of material being removed from the site.

Table 7 – Earthworks Volumes and Characteristics

Site	Area of HAIL Site/ Potential Site (m2)	Disturbance Volume (m3)	Permitted Disturbance Volume (m3)	Volume of Removed Material (m3)	Permitted Removed Volume (m3)	Average Earthworks Height (m)
Identified HAIL Site	28.5	0	1.4	0	0.28	0
Identified HAIL Site and 5m buffer zone	236	1.3	11.5	1.3	2.36	0.13

The disturbance of earth works with a 5m buffer applied meets permitted volumes outlined in Section 8 of NES-CS. As a precautionary measure, material removed within the buffer zone will be removed to an approved disposal facility authorised to receive soil with potential hydrocarbon contamination.

As the proposed works do not intersect the mapped HAIL site and meet permitted activities if a 5m buffer zone is applied, the works are not considered more likely than not to intersect contaminated land and associated consenting.

6.7 Whangaroa Hall Stormwater

Stormwater improvements around Whangaroa Hall are aimed to reduce overland flows entering beneath the hall and degrading the building. The main overland flowpath results from groundwater seepage at the toe of the slope to the south and east of Whangaroa Hall.

A concrete lined channel is proposed to channel this water to Whangaroa Road. Additional concrete lined channel and kerb and channel will be used to direct the stormwater away from the building. This will be located below the retaining wall and in the Whangaroa Hall driveway.

7 Construction

7.1 Archaeological Assessment

Whangaroa Hall is a Heritage Listed building constructed in 1840. The area around the building is expected to contain historical artefact due to early occupation. A midden was also uncovered within the slip scarp below the fill on Old Church Road. A general archaeological authority (application 2025-637) has been applied for the works and all construction must adhere to the recommendations of the report with earthworks excavations completed with an Archaelogist and Te Rūnanga o Whaingaroa Representative present.

7.2 Earthworks

At the time of writing, minor earthworks were planned for the site. All cut material should be removed from site as material left onsite is likely to wash back around the Hall.

Earthworks around the Whangaroa Hall are to be completed with an Archaelogist and Te Rūnanga o Whaingaroa Representative present due to the chances of uncovering archaeological artefacts. As such, works have been split into works around the Whangaroa Hall and works within the Old Church Road reserve.

Table 8 – Earthworks Volumes and Characteristics

Appellation	Cut Volume (m3)	Fill Volume (m3)	Area (m2)	Average Earthworks Height (m)
Lot 1 DP190160 (Whangaroa Hall)	35	0	45	0.4
Road Reserve	5	20	10	1.5
Total	**40**	**20**	**65**	**0.8**

Should any excavations be intended with cuts greater than 1.0 m high, then we recommend that all excavations be battered back at appropriate slope angles (1 in 3 minimum) or be supported by a retaining wall designed by an engineer familiar with the geology of the area.

The existing water tank and connections will require removing for reinstatement following the earthworks. Construction should be scheduled to minimise disruptions to the Whangaroa Hall water supply.

7.3 Filling

Filling is not recommended onsite around the Whangaroa Hall. All cut material should not be utilised as site fill.

Filling behind the retaining wall RW04 and below the footpath is to be constructed with granular hardfill (GAP 40 or 65) and separate drainage material. Verification of granular hardfill compaction should be undertaken by the contractor, i.e. inspection at preplacement and every 200 mm thereafter.

Testing of placed granular hardfill fill material shall meet the following specification:

- Average maximum dry density = 95%, with no single value less than 90% over 10 consecutive tests (standard compaction curve to be provided by the quarry source);
- Clegg impact value of 25 Clegg Impact Value (CIV) can be adopted by the contractor prior to organising MDD.

Filling with topsoil is proposed behind the kerb and channel on Old Church Road, downslope of RW04 retaining wall.

7.4 Retaining Walls

Rock is anticipated to be encountered for embedding the retaining walls into. Prior to ordering poles and establishing traffic management, we recommend proof drilling two 600mm diameter holes on RW01 wall into rock to assess the buildability of RW04.

The RW04 retaining wall is to be located continuing the line of the existing retaining wall with a maximum retained height of 2.4 m. A 1m stick up has been designed for RW04 to allow the continuation of the handrail along Old Church Road. A detail of the barrier is provided for RW04 and RW03 and relies upon the poles spaced appropriately to prevent vehicle access while continuing the current handrail design for RW04.

With 1.0 m spacing and 600 mm diameter holes, construction interaction between holes is possible for RW04. As such, we recommend a *'hit and miss'* methodology is adopted for the construction of the retaining walls with every second holes cemented prior to drilling infill holes.

RW01 to RW03 design is provided in Appendix A for reference. These consist of 400mm diameter holes at 1.0m to 1.2m spacing. Pile holes for RW01 to RW03 will be within firm alluvial soils and groundwater is to be expected. Consequently, pile holes will require pumping of water and allowance should be made of casing of holes (for collapsing) if required.

Groundwater is expected to accumulate in the pile holes during construction due to the winter conditions and must be pumped out prior to concreting. The Contractor is expected to have a sump pump onsite if water is encountered to keep the pile holes free of water before concrete pour. Alternatively, the concrete may be poured using tremie pouring techniques, subject to approval onsite by the Engineer. Unless approved otherwise by the Engineer, in a dry pile bore, concrete shall be placed using a chute, hopper and discharge pipe or pump line.

Drilling of all retaining wall pile holes will contain an end socket into weathered rock and will require specialised drilling equipment (i.e. rock auger) and appropriately sized machinery.

All works to be completed on Old Church Road are to be under a stop/go operation retaining the 1m lateral safety zone required for workers. No full road closures are to be allowed for.

7.5 Kerb and Channel with Subsurface Drainage

Kerb and channel is to be constructed up to the existing edge of seal and along the existing footpath. Due to restrictions in working width, roading kerb block profile is proposed to be installed against the toe board of the existing retaining wall and RW04. The kerb and channel on the footpath is shown in the RW04 typical section and stormwater and drainage plan.

Downslope of RW04, the kerb and channel should utilise the kerb block profile as per FNDC engineering standards. Between the kerb and channel to the existing seal, asphalt not exceeding 300mm width should be reinstated. Below the kerb and channel, 110mm subsoil drains are to be installed with a 20/7 drainage metal (or equivalent) placed around.

Subsoil drains are also proposed beneath the drainage surrounding Whangaroa Hall to reduce moisture beneath the building footprint. The drains start from high points shown in Appendix A and drain toward two outlets. All subsoil drains should have a minimum fall of 1:100 and be installed in accordance with NZTA F2:2013.

The kerb block profile extends down Old Church Road until immediately above the Whangaroa Road intersection, where a rural concrete lined channel (similar to the channel already on Old Church Road) as per FNDC engineering standards is to be used as the water changes direction. Small cobbles up to 80mm are to be set in the concrete at the base of the channel to slow down the flow of water and assist the direction change. These are to be spaced at approximately 200mm.

7.6 Footpath Reinstatement

The footpath is to be reinstated behind RW04 to as shown in Appendix A with 30MPa concrete due to the potential for vehicular loading. The footpath is to taper off beyond the retaining wall to provide a transition to the kerb and channel to the edge of seal. Where the footpath is not located in reinstated within the slip zone, it should have a minimum depth of

- 125mm minimum of compacted GAP40 subbase; and
- 125mm 30MPa concrete reinforced with 665 mesh, or equivalent.

7.7 Services

There is Chorus and power cables indicated from plans to be located in the uphill shoulder of Old Church Road and around Whangaroa Hall which will require locating using a specialist asset locator and potholed on site to locate prior to excavation. The site was not potholed due to the cables being exposed in the slip scarp in Old Church Road where they were located 700mm below ground level.

7.8 Concrete Lined Channel

There are concrete lined channels surrounding Whangaroa Hall and above the retaining walls that are designed to prevent overland flows entering the Whangaroa Hall footprint. Concrete is to be 20MPa and formed approximately to FNDC engineering standards with consideration given to building maintenance.

7.9 Culvert Capping

A reinforced concrete slab protection is required over the stormwater culvert with backfill in accordance with FNDC engineering standards as presented in Appendix A.

7.10 Water Tank

The existing water tank is to be carefully removed for excavation around the hall. The water tank is to be reinstated on a level 200mm compacted granular hardfill (GAP40 or GAP65) pad. Water connections are to be reinstated and the PVC overflow is to be directed to the concrete lined channel that flows toward the southern side of the hall.

7.11 Construction Risk Register

A tabulated Safety in Design register is provided in the Table below. This safety in design risk register should be updated and kept live during construction.

Table 9 - Construction risk register

Issue	Risk	Proposed mitigation measure
Rock Augering	Rock is difficult to auger resulting in delays or difficulty to achieve the design	CPT testing has been used to assess weathered rock strength. Beyond where the CPT refused, the strength is unknown. Proof drill 600mm diameter holes is recommended on RW01 prior to ordering RW04 poles and traffic management on Old Church Road.
Undercutting Whangaroa Hall Foundations	Whangaroa Hall foundation depths are not recorded and may vary	Select foundations have been investigated. Only remove to 150mm clearance between ground and bearers, (to similar level as originally built).
Excavations	Collapse of material and potential to strike people	All earthworks to be staged where possible and cuts to remain open for the smallest possible duration. No one to work immediately adjacent to the cut or during poor weather conditions.
Excavated material placed on slope as fill causing slope movement	Placement of cutting on slip may impact stability.	Excavated material to be removed from slip.
Traffic and machinery interactions	Traffic interactions with working machinery.	Traffic control required.
Traffic impediment due to road closure	Impact on local communities from closing the road.	Avoid road closure, operate with traffic control and one lane operable. Piles sized to be installed without specialist equipment.
Damaging power or telecommunications cable	Machinery impacting telecommunications cable during earthworks	Cable can b information on depth. New culvert utilises existing alignment. Use specialist asset locator and potholed on site to locate prior to excavation. Cables to be considered by contractor in any temporary works.
Contaminated soil outside of identified HAIL area	Machinery uncovering	Does not intersect HAIL area. Checked HAIL area and with conservative buffer applied and still meets NES-CS permitted activity. Material excavated within buffer zone to be taken to an approved facility as a precaution.
Open auger holes	Falling from height	No holes to remain open overnight. No one allowed to walk around the construction site, other than those who understand site hazards. Holes should be backfilled with concrete as soon as possible.

Issue	Risk	Proposed mitigation measure
Lifting timber poles and putting into ground	Falling from height (heavy)	Lifting gear (straps and chains) to be in good condition and certified if required.
Groundwater	If encountered, groundwater will make constructability difficult	We expect holes for RW01 and RW02 to remain free of groundwater in the short term. However, RW03 will encounter groundwater. Holes not to remain open overnight and should be backfilled as soon as possible with concrete. Pumping may be required. Casing of pile holes for RW03 may also be required.

8 Construction Monitoring

8.1 Construction Observations

Specific engineering inspections of the retaining wall construction with certification by a Producer Statement, PS4, are often required by Council and outlined in the Building Consent documents. We consider the following specific items, but not limited to will need to be addressed prior to and at the time of construction to ensure the foundation soils and construction is consistent with the assumptions made in this geotechnical report:

1. Retaining wall bored holes prior to poles being put in and concrete poured;
2. Inspection of the retaining wall poles (must be high density poles);
3. Concrete and timber dockets to be provided to Engineer;
4. Inspection of the retaining wall drainage coil, timber lagging and drainage material before it is placed.
5. Inspection of stormwater controls – final completion.

Provision should be allowed for modifying the solution at this time should unforeseen conditions be encountered.

9 Limitations

This report has been prepared for the use of Far North District Council with respect to the brief outlined to us. This report is to be used by our Client and their Consultants and may be relied upon when considering engineering advice. Furthermore, this report may be utilised in the preparation of building and/or resource consent applications with local authorities. The information and opinions contained within this report shall not be used in other context for any other purpose without prior review and agreement by Haigh Workman Ltd.

The recommendations given in this report are based on site data from discrete locations. Inferences about the subsoil conditions away from the test locations have been made but cannot be guaranteed. We have inferred an appropriate geotechnical model that can be applied for our analyses. However, variations in ground conditions from those described in this report could exist across the site.

Should conditions encountered differ to those outlined in this report we ask that we be given the opportunity to review the continued applicability of our recommendations.

Appendix A – Drawings

Drawing No.	Title
25 101/01	Site Plan
25 101/02	Site Investigation Plan
25 101/03	Geotechnical Cross Section A-A’
25 101/04	Geotechnical Cross Section B-B’
25 101/05	Retaining Plan
25 101/06	Old Church Road Stormwater and Drainage Plan
25 101/07	Whangaroa Hall Stormwater and Drainage Plan
25 101/08	Typical Retaining Wall Details RW01
25 101/09	Typical Retaining Wall Details RW02
25 101/10	Typical Retaining Wall Details RW03
25 101/11	Typical Retaining Wall Details RW04
25 101/12	Typical Details
25 101/13	Retrofit to Existing Retaining Wall on Old Church Road
25 101/14	Whangaroa Hall NES-CS Plan
	FNDC Pipe Protection and Bulkhead Details
	FNDC Kerb and Channel Details
	FNDC Typical Subsoil Drainage Details

NOTES:

1. LOT BOUNDARIES AND AERIAL PHOTO INFORMATION TAKEN FROM LAND INFORMATION NEW ZEALAND (LINZ).
2. CONTOURS ARE FROM LINZ LIDAR DATA.
3. LOCATIONS HAVE NOT BEEN SURVEYED AND ARE INDICATIVE ONLY.

Issue	Date	Revision
A	7/07/2025	FIRST ISSUE

DWG: SITE PLAN

Scale 1:500 @A3 | Date JULY 2025

Drawn JC | Checked WT | Approved WT

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Project: OLD CHURCH ROAD SLIP REMEDIATION
574 WHANGAROA ROAD, WHANGAROA

Client: FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

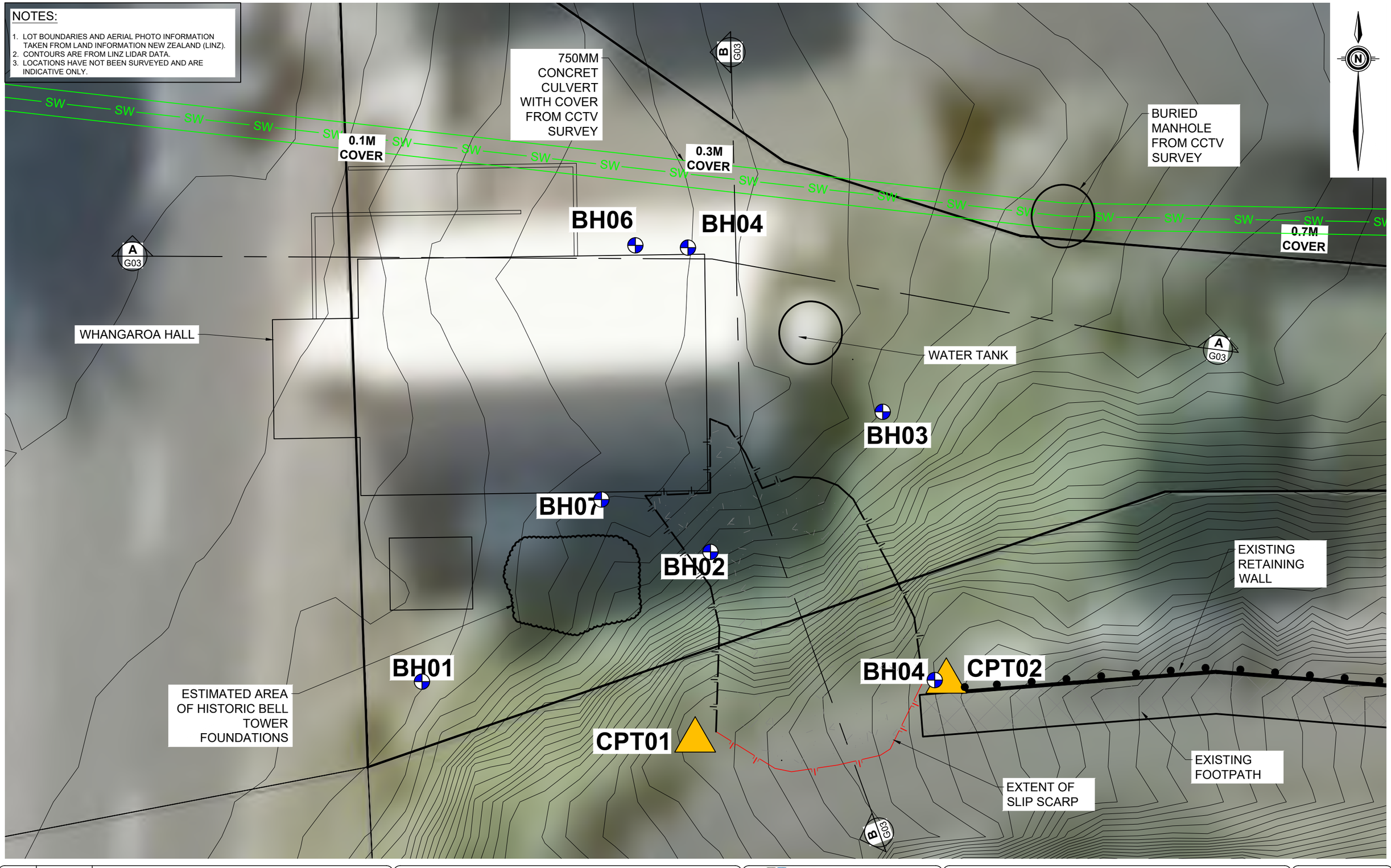
DWG No. **G01**

Sheet No. **1** of **13**

Plotted By Jonathan Corskie at 7/07/2025 4:36:36 pm

NOTES:

1. LOT BOUNDARIES AND AERIAL PHOTO INFORMATION TAKEN FROM LAND INFORMATION NEW ZEALAND (LINZ).
2. CONTOURS ARE FROM LINZ LIDAR DATA.
3. LOCATIONS HAVE NOT BEEN SURVEYED AND ARE INDICATIVE ONLY.



Issue	Date	Revision
A	8/07/2025	FIRST ISSUE

DWG
SITE INVESTIGATION PLAN AND FEATURES

Scale 1:100 @A3 | Date JULY 2025
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Client FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

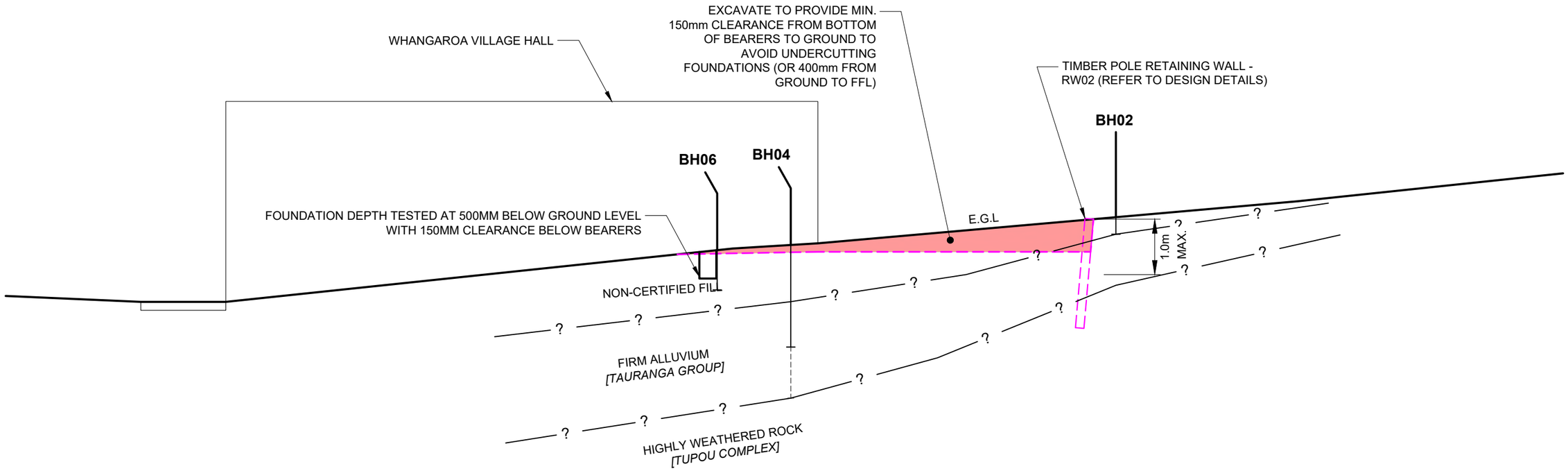
DWG No. **G02**

Sheet No. **2** of **13**

Plotted By Jonathan Corskie at 8/07/2025 12:09:46 pm

NOTES:

1. THIS DRAWING IS BASED ON MEASUREMENTS BY TAPE AND CLINOMETER AND IS APPROXIMATE ONLY.
2. THE GROUND MODEL HAS BEEN INFERRED FROM THE BOREHOLE DATA. INFERENCES ABOUT THE SOILS CONDITIONS BETWEEN TEST LOCATIONS HAVE BEEN MADE BUT CANNOT BE GUARANTEED.



Issue	Date	Revision
A	8/07/2025	FIRST ISSUE

DWG: Geological Cross Section A-A'

Scale 1:75 @A3 | Date JULY 2025

Drawn JC | Checked WT | Approved WT

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Project: OLD CHURCH ROAD SLIP REMEDIATION
574 WHANGAROA ROAD, WHANGAROA

Client: FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

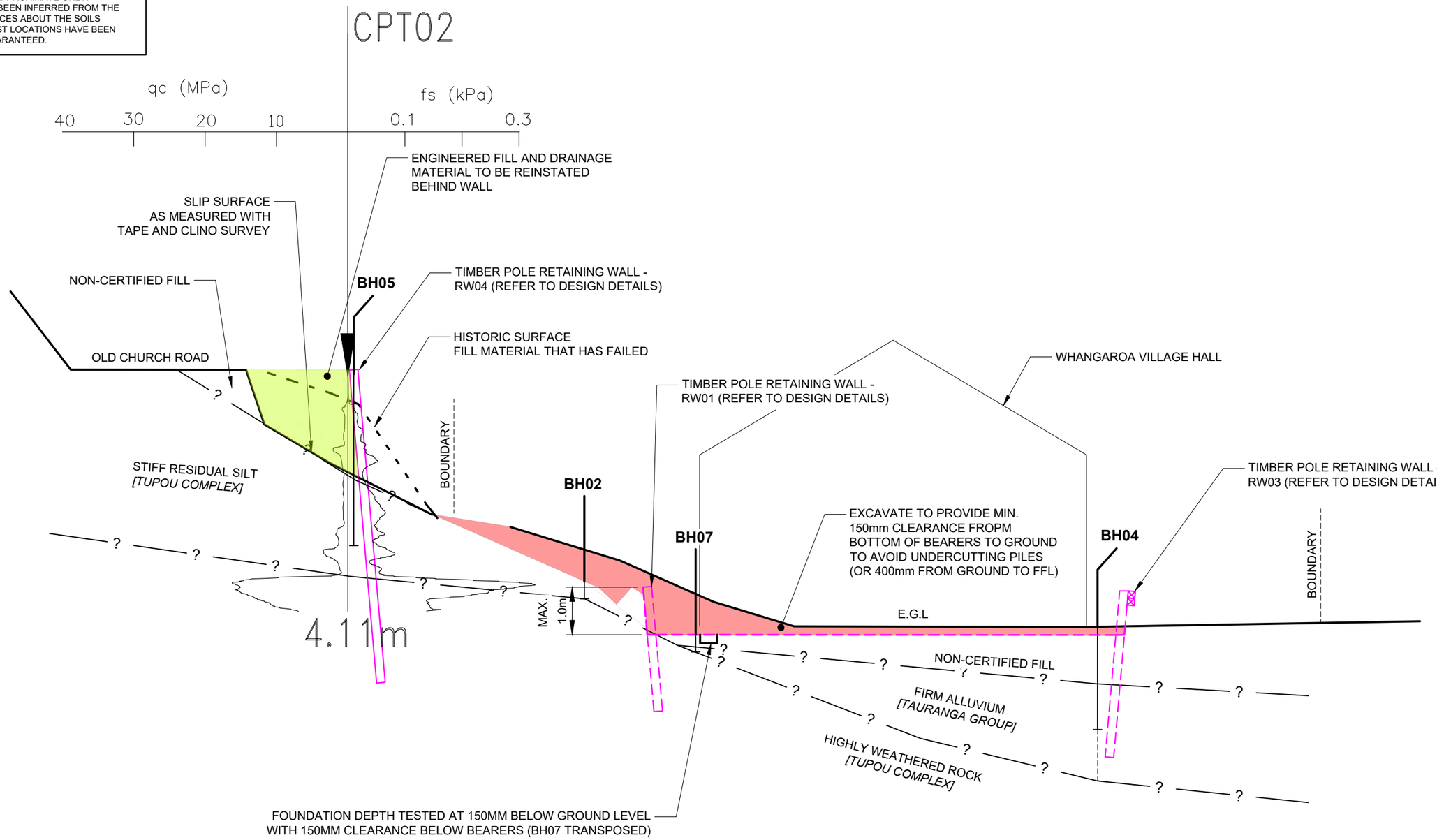
DWG No. **G03**

Sheet No. **3** of **13**

Plotted By Jonathan Corskie at 8/07/2025 12:21:15 pm

NOTES:

1. THIS DRAWING IS BASED ON MEASUREMENTS BY TAPE AND CLINOMETER AND IS APPROXIMATE ONLY.
2. THE GROUND MODEL HAS BEEN INFERRED FROM THE BOREHOLE DATA. INFERENCES ABOUT THE SOILS CONDITIONS BETWEEN TEST LOCATIONS HAVE BEEN MADE BUT CANNOT BE GUARANTEED.



Issue	Date	Revision
A	8/07/2025	FIRST ISSUE

DWG: Geological Cross Section B-B'

Scale 1:75 @A3 | Date JULY 2025

Drawn JC | Checked WT | Approved WT

File T:\CLIENTS\FNDC\JOBS\25 101 - OLD CHURCH ROAD, WHANGAROA\ENGINEERING\2 DRAWINGS\25 101 GEO PLANS.DWG

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Project: OLD CHURCH ROAD SLIP REMEDIATION
574 WHANGAROA ROAD, WHANGAROA

Client: FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

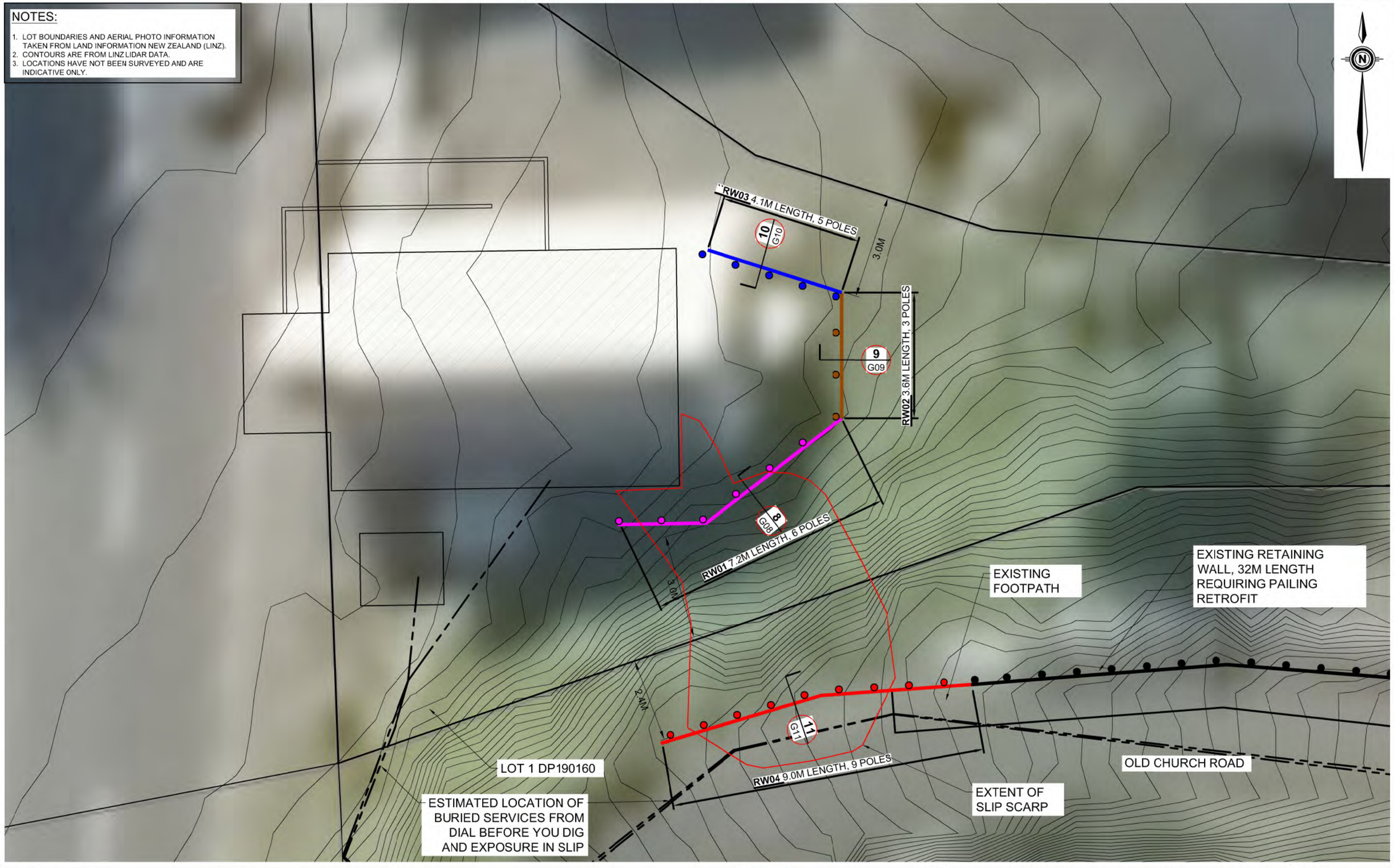
DWG No. **G04**

Sheet No. **4** of **13**

Plotted By Jonathan Corskie at 8/07/2025 12:45:26 pm

NOTES:

1. LOT BOUNDARIES AND AERIAL PHOTO INFORMATION TAKEN FROM LAND INFORMATION NEW ZEALAND (LINZ).
2. CONTOURS ARE FROM LINZ LIDAR DATA.
3. LOCATIONS HAVE NOT BEEN SURVEYED AND ARE INDICATIVE ONLY.



Issue	Date	Revision
A	8/07/2025	FIRST ISSUE

DWG: SITE RETAINING PLAN

Scale 1:100 @A3 | Date JULY 2025

Drawn JC | Checked WT | Approved WT

File T:\CLIENTS\FNDC\JOBS\25 101 - OLD CHURCH ROAD, WHANGAROA\ENGINEERING\2 DRAWINGS\25 101 GEO PLANS.DWG

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Project: OLD CHURCH ROAD SLIP REMEDIATION
574 WHANGAROA ROAD, WHANGAROA

Client: FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

DWG No. G05

Sheet No. 5 of 9

Plotted By Jonathan Corskie at 5/08/2025 12:37:55 pm

NOTES:

1. LOT BOUNDARIES AND AERIAL PHOTO INFORMATION TAKEN FROM LAND INFORMATION NEW ZEALAND (LINZ).
2. CONTOURS ARE FROM LINZ LIDAR DATA.
3. LOCATIONS HAVE NOT BEEN SURVEYED AND ARE INDICATIVE ONLY.

LEGEND

- EXISTING BOUNDARY
- EXISTING DRAIN
- EXISTING SERVICES
- EXISTING ROAD EDGE OF SEAL
- EXISTING SLIP
- PROPOSED KERB BLOCK
- PROPOSED KERB BLOCK AND CHANNEL
- PROPOSED CONCRETE LINED DRAIN
- PROPOSED SUBSOIL DRAIN

RW03

RW02

RW01

RW04

110MM SUBSOIL DRAINS DISCHARGING DOIWNSLOPE

35M OF CONCRETED KERB BLOCK ALONG RETAINING WALL BASE BOARD

10M2 OF CONCRETE FOOTPATH 125mm THICK WITH 665 MESH AND 125mm GAP 40 SUBBASE. ASPHALT REINSTATEMENT BETWEEN FOOTPATH AND ROAD

ESTIMATED LOCATION OF EXISTING SERVICES TO BE LOCATED BY CONTRACTOR

30M OF KERB BLOCK KERB AND CHANNEL PROFILE WITH LESS THAN 300M WIDTH ASPHALT BETWEEN EXISTING SEAL.

Issue	Date	Revision
A	9/07/2025	FIRST ISSUE

DWG: OLD CHURCH ROAD STORMWATER AND DRAINAGE PLAN

Scale 1:150 @A3 | Date JULY 2025

Drawn JC | Checked WT | Approved WT

File T:\CLIENTS\FNDC\JOBS\25 101 - OLD CHURCH ROAD, WHANGAROA\ENGINEERING\2 DRAWINGS\25 101 GEO PLANS.DWG

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Project: OLD CHURCH ROAD SLIP REMEDIATION
574 WHANGAROA ROAD, WHANGAROA

Client: FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

DWG No. G06

Sheet No. 6 of 13

Plotted By Jonathan Corskie at 9/07/2025 11:36:16 am

NOTES:

1. LOT BOUNDARIES AND AERIAL PHOTO INFORMATION TAKEN FROM LAND INFORMATION NEW ZEALAND (LINZ).
2. CONTOURS ARE FROM LINZ LIDAR DATA.
3. LOCATIONS HAVE NOT BEEN SURVEYED AND ARE INDICATIVE ONLY.

LEGEND

- EXISTING BOUNDARY
- EXISTING DRAIN
- EXISTING SERVICES
- EXISTING ROAD EDGE OF SEAL
- EXISTING SLIP
- PROPOSED EXCAVATION EXTENT
- PROPOSED KERB BLOCK AND CHANNEL
- PROPOSED CONCRETE LINED DRAIN
- PROPOSED SUBSOIL DRAIN

7M KERB BLOCK AND CHANNEL ADJACENT TO ACCES RAMP

14M LENGTH OF REINFORCED CONCRETE SLAB PROTECTION FOR CULVERT

40M OF CONCRETE LINED CHANNEL

160MM SUBSOIL DRAINS BELOW CONCRETE LINED CHANNEL OFFSET MINIMUM 0.5M FROM BUILDING, MAXIMUM DEPTH OF TRENCH 0.4M

REINSTATE WATER TANK ON LEVEL PAD 200MM THICK COMP[ACTED GAP65. OVERFLOW EXTENDED TO CONCRETE LINED CHANNEL AND CONNECTIONS REINSTATED

EXTENT OF EXCAVATION
35M3 EXCAVATION TO 150MM CLEARANCE BELOW BEARERS TO GROUND LEVEL.
SUBJECT TO GENERAL ARCHAEOLOGICAL AUTHORITY AND MONITORING

CONCRETE LINED CHANNEL TO EXTEND TO EXISTING FOOTPATH PVC PIPE CROSSING

ESTIMATED LOCATION OF EXISTING SERVICES TO BE LOCATED BY CONTRACTOR

Issue	Date	Revision
A	21/10/2025	FIRST ISSUE

DWG: WHANGAROA HALL STORMWATER AND DRAINAGE PLAN

Scale 1:100 @A3 | Date OCTOBER 2025 | Drawn JC | Checked WT | Approved WT

File T:\CLIENTS\FNDC\JOBS\25 101 - OLD CHURCH ROAD, WHANGAROA\ENGINEERING\2 DRAWINGS\25 101 GEO PLANS.DWG

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Project: OLD CHURCH ROAD SLIP REMEDIATION
574 WHANGAROA ROAD, WHANGAROA

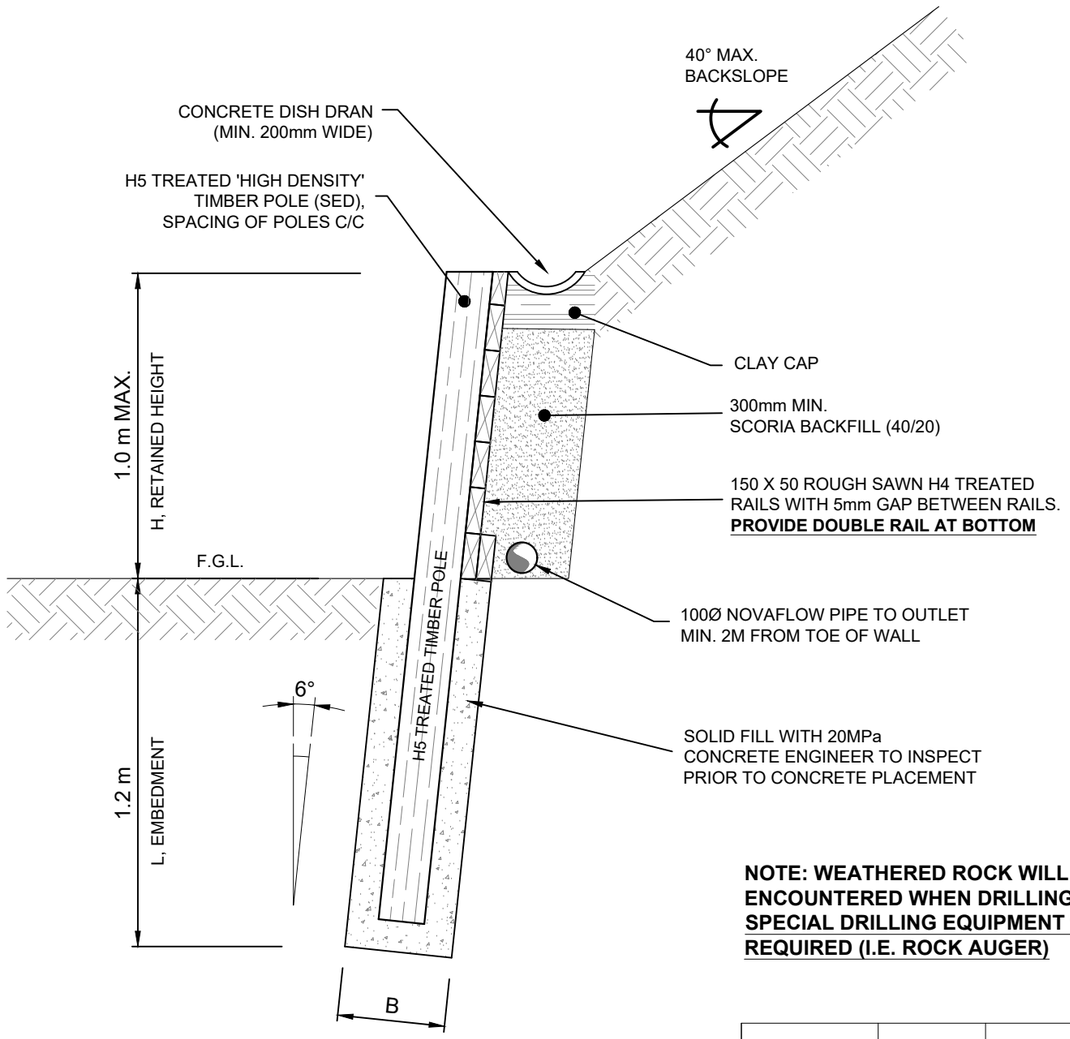
Client: FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

DWG No. G07

Sheet No. 7 of 12

Plotted By Jonathan Corskie at 21/10/2025 7:37:02 am



8 / G08 TYPICAL DETAIL - **RW01**

Scale 1 : 20 @ A3

TIMBER SPECIFICATION NOTES:

1. CAUTION:
   DEEP EXCAVATIONS UNSUPPORTED DURING CONSTRUCTION MAY BE HAZARDOUS PARTICULARLY WHEN WORKING IN CONFINED SPACES. THE DEPARTMENT OF LABOUR'S EXCAVATION GUIDE GIVES RECOMMENDED SAFETY PROCEDURES FOR SUCH SITUATIONS. THE EXCAVATION AND EARTHWORKS CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT ADEQUATELY ALL PERSONS AND PROPRETY LIABLE TO THE BE AFFECTED BY THE EXCAVATION AND EARTHWORKS OPERATIONS.

2. MATERIALS:
   TIMBER:
   TIMBER POLES SHALL BE PEELED RADIATA PINE LOGS COMPLYING WITH THE REQUIREMENT OF NZS 3605 "LOAD BEARING ROUND TIMBER PILES AND POLES" TREATED TO TPA COMMODITY SPECIFICATION H5. ALL TIMBER POLES TO BE HIGH DENSITY.
   DIMENSIONS OF POLES ARE SPECIFIED AS MINIMUM SMALL END DIAMETERS.
   ACTUAL DIAMETERS WILL BE GREATER DUE TO TAPER AND TIMBER GRADING. SAWN TIMBER IN GROUND CONTACT SHALL BE RADIATA PINE TREATED TO SPECIFICATION H4.
   ALL TIMBER SHALL HAVE TPA IDENTIFICATION BRANDS VISIBLE WHEN DELIVERED TO THE SITE AND SHALL BE PROTECTED AGAINST DAMAGE DURING STORAGE AND HANDLING

3. CONCRETE:
   CONCRETE FOR FOUNDATION BACKFILL SHALL BE ORDINARY GRADE CONCRETE COMPLYING WITH NZS 3109 'SPECIFICATION FOR CONCRETE', AND WITH A 28-DAY STRENGTH OF 20 MPa.
   CONCRETE SHALL BE PLACED UNDER AND AROUND POLES AND WELL COMPACTED BY VIBRATING. POLES SHALL BE TEMPORARILY PROPPED AND PROTECTED AGAINST DISTURBANCE FOR AT LEAST TWO DAYS AFTER PLACEMENT OF CONCRETE

4. EXCAVATION:
   EXCAVATION IN STAGES TO ALLOW FOR TEMPORARY SUPPORT DURING CONSTRUCTION IS REQUIRED. NO MORE THAN 3.0m OF UNSUPPORTED LENGTH OF SLOPE SHALL EXIST AT ANY ONE TIME.
   EXCAVATION FOR POLES SHALL BE TAKEN OUT BY AUGERING TO THE DIMENSIONS DETAILED, WITH ALL SURPLUS SOIL BEING DISPOSED OF AWAY FROM THE SITE. ALLOWANCE SHALL BE MADE IN POSITIONING AUGERED HOLES FOR THE SLOPE OF THE WALL AND FOR CONCRETE TO SURROUND THE POLES. DRIVING OF POLES IS NOT ACCEPTABLE AS AN ALTERNATIVE TO AUGERING. POLES SHALL BE INSTALLED AS SOON AS POSSIBLE AFTER EXCAVATION. EXCAVATIONS FOR POLES SHALL BE FREE OF WATER AND LOOSE MATERIAL BEFORE CONCRETING. IF NECESSARY THE CONTRACTOR SHALL ALLOW FOR HANDCLEANING AND PUMPING OF EXCAVATION.

5. INSTALLATION:
   DRIVING OF POLES IS NOT ACCEPTABLE AS AN ALTERNATIVE TO AUGERING. FIXING OF HORIZONTAL TIMBERS TO POLES SHALL UTILISE GALVANISED NAILS AS DETAILED. TIMBERS SHALL BE LAYED IN POSITION COMMENCING AT THE BOTTOM OF THE WALL WITH JOINTS BETWEEN TIMBERS STAGGERED BETWEEN THE POLES BY USE OF SHORT TIMBERS AT ENDS OF ALTERNATIVE ROWS. IF CUTTING IS NECESSARY THE EXPOSED SURFACES SHALL BE FLOODED WITH A COPPER NAPTHENATE TYPE OF WOOD PRESERVATIVE.
   CARE SHALL BE TAKEN IN SELECTING AND LAYING HORIZONTAL TIMBERS TO MAINTAIN THE SPECIFIED MINIMUM THICKNESS OF TIMBERS, PARTICULARLY NEAR THE BASE OF THE WALL AND TO ACHIEVE NEAT STRAIGHT LINES AT THE TOP OF THE WALL.

6. BACKFILLING:
   A PERFORATED OR OPEN JOINTED SUBSOIL DRAIN SHALL BE LAID AND SURROUNDED IN FINE GRANULAR MATERIAL WITH THE INVERT BELOW LOWER GROUND LEVELS AND LED TO A FREE OUTLET AT A POINT OF SAFE DISCHARGE.
   REMAINING BACKFILL TO WITHIN 300mm OF FINISHED SURFACE LEVEL SHALL BE DRAINED COMPACTED GRANULAR FILL NOT LARGER THAN 65mm DIMENSIONS (eg RUN OF PIT SCORIA OR SIMILAR).
   THE FINISHED SURFACE OF BACKFILL SHALL BE SEALED AGAINST ENTRY OF SURFACE WATER WITH A LAYER OF TOPSOIL, CLAY OR CONCRETE.

NOTE: WEATHERED ROCK WILL BE ENCOUNTERED WHEN DRILLING PILE HOLES. SPECIAL DRILLING EQUIPMENT WILL BE REQUIRED (I.E. ROCK AUGER)

H, HEIGHT (m)	D (SED) (mm)	B, BORED Ø (mm)	SPACING OF POLES c/c (m)	L, EMBEDMENT (m)	TOTAL POLE LENGTH (m)
1.0	200	400	1.20	1.2	2.2

Issue	Date	Revision
A	8/07/2025	FIRST ISSUE

DWG: TYPICAL RETAININED WALL DETAILS **RW01**

Scale 1: 20 @A3 | Date JULY 2025
Drawn JMC | Checked WT | Approved WT
File T:\CLIENTS\FNDC\JOBS\25 101 - OLD CHURCH ROAD, WHANGAROA\ENGINEERING\2 DRAWINGS\RW DETAILS.DWG

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Project: PROPOSED RETAINING WALLS
574 WHANGAROA ROAD, WHANGAROA

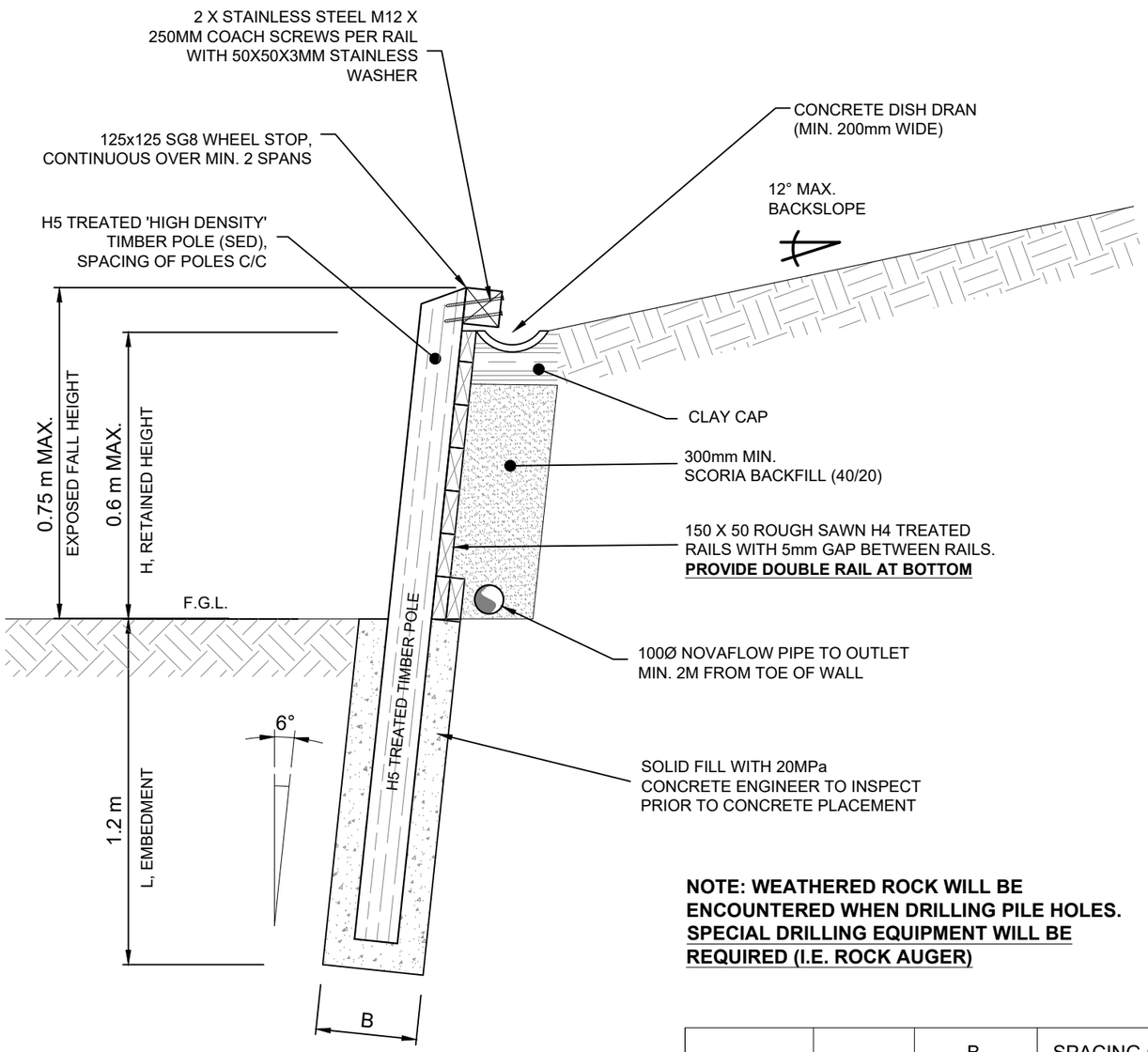
Client: FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

DWG No. **G08**

Sheet No. **8** of **13**

Plotted By Jonathan Corskie at 5/08/2025 12:10:24 pm



9 G09 TYPICAL DETAIL - **RW02**

Scale 1 : 20 @ A3

NOTE: WEATHERED ROCK WILL BE ENCOUNTERED WHEN DRILLING PILE HOLES. SPECIAL DRILLING EQUIPMENT WILL BE REQUIRED (I.E. ROCK AUGER)

H, HEIGHT (m)	D (SED) (mm)	B, BORED Ø (mm)	SPACING OF POLES c/c (m)	L, EMBEDMENT (m)	TOTAL POLE LENGTH (m)
0.6	200	400	1.20	1.2	2.2

TIMBER SPECIFICATION NOTES:

1. CAUTION:
   DEEP EXCAVATIONS UNSUPPORTED DURING CONSTRUCTION MAY BE HAZARDOUS PARTICULARLY WHEN WORKING IN CONFINED SPACES. THE DEPARTMENT OF LABOUR'S EXCAVATION GUIDE GIVES RECOMMENDED SAFETY PROCEDURES FOR SUCH SITUATIONS. THE EXCAVATION AND EARTHWORKS CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT ADEQUATELY ALL PERSONS AND PROPRETY LIABLE TO THE BE AFFECTED BY THE EXCAVATION AND EARTHWORKS OPERATIONS.

2. MATERIALS:
   TIMBER:
   TIMBER POLES SHALL BE PEELED RADIATA PINE LOGS COMPLYING WITH THE REQUIREMENT OF NZS 3605 "LOAD BEARING ROUND TIMBER PILES AND POLES" TREATED TO TPA COMMODITY SPECIFICATION H5. ALL TIMBER POLES TO BE HIGH DENSITY.
   DIMENSIONS OF POLES ARE SPECIFIED AS MINIMUM SMALL END DIAMETERS.
   ACTUAL DIAMETERS WILL BE GREATER DUE TO TAPER AND TIMBER GRADING. SAWN TIMBER IN GROUND CONTACT SHALL BE RADIATA PINE TREATED TO SPECIFICATION H4.
   ALL TIMBER SHALL HAVE TPA IDENTIFICATION BRANDS VISIBLE WHEN DELIVERED TO THE SITE AND SHALL BE PROTECTED AGAINST DAMAGE DURING STORAGE AND HANDLING

3. CONCRETE:
   CONCRETE FOR FOUNDATION BACKFILL SHALL BE ORDINARY GRADE CONCRETE COMPLYING WITH NZS 3109 'SPECIFICATION FOR CONCRETE', AND WITH A 28-DAY STRENGTH OF 20 MPa.
   CONCRETE SHALL BE PLACED UNDER AND AROUND POLES AND WELL COMPACTED BY VIBRATING. POLES SHALL BE TEMPORARILY PROPPED AND PROTECTED AGAINST DISTURBANCE FOR AT LEAST TWO DAYS AFTER PLACEMENT OF CONCRETE

4. EXCAVATION:
   EXCAVATION IN STAGES TO ALLOW FOR TEMPORARY SUPPORT DURING CONSTRUCTION IS REQUIRED. NO MORE THAN 3.0m OF UNSUPPORTED LENGTH ACROSS THE SLOPE SHALL EXIST AT ANY ONE TIME.
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5. INSTALLATION:
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6. BACKFILLING:
   A PERFORATED OR OPEN JOINTED SUBSOIL DRAIN SHALL BE LAID AND SURROUNDED IN FINE GRANULAR MATERIAL WITH THE INVERT BELOW LOWER GROUND LEVELS AND LED TO A FREE OUTLET AT A POINT OF SAFE DISCHARGE.
   REMAINING BACKFILL TO WITHIN 300mm OF FINISHED SURFACE LEVEL SHALL BE DRAINED COMPACTED GRANULAR FILL NOT LARGER THAN 65mm DIMENSIONS (eg RUN OF PIT SCORIA OR SIMILAR).
   THE FINISHED SURFACE OF BACKFILL SHALL BE SEALED AGAINST ENTRY OF SURFACE WATER WITH A LAYER OF TOPSOIL, CLAY OR CONCRETE.

Issue	Date	Revision
A	8/07/2025	FIRST ISSUE

DWG TYPICAL RETAININED WALL DETAILS **RW02**

Scale 1: 20 @A3 | Date JULY 2025
Drawn JC | Checked WT | Approved WT
File T:\CLIENTS\FNDC\JOBS\25 101 - OLD CHURCH ROAD, WHANGAROA\ENGINEERING\2 DRAWINGS\RW DETAILS.DWG

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Project PROPOSED RETAINING WALLS
574 WHANGAROA ROAD, WHANGAROA

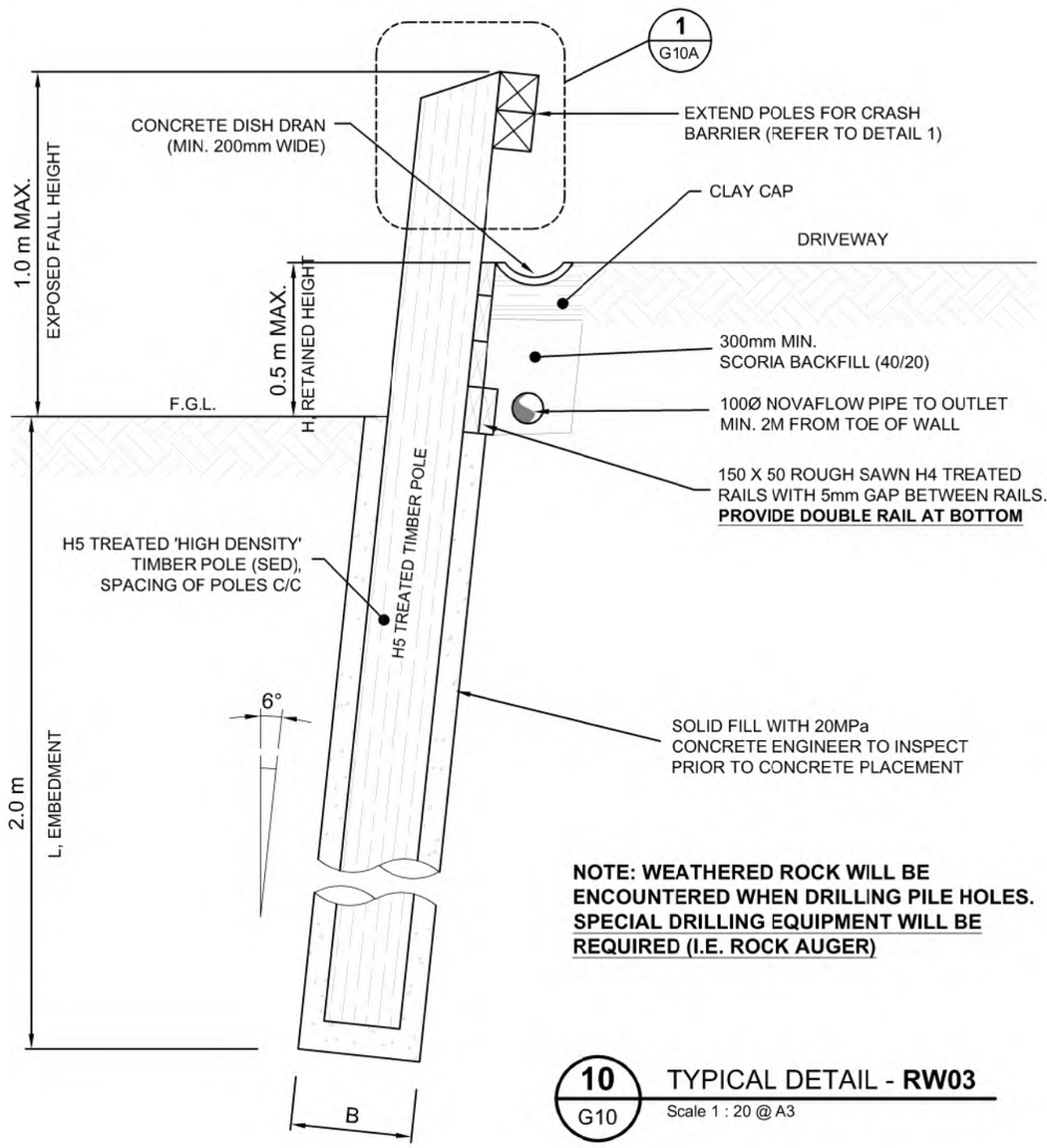
Client FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

DWG No. **G09**

Sheet No. **9** of **13**

Plotted By Jonathan Corskie at 6/08/2025 10:57:50 am



NOTE: WEATHERED ROCK WILL BE ENCOUNTERED WHEN DRILLING PILE HOLES. SPECIAL DRILLING EQUIPMENT WILL BE REQUIRED (I.E. ROCK AUGER)

10 / G10 TYPICAL DETAIL - **RW03**
Scale 1 : 20 @ A3

H, HEIGHT (m)	D (SED) (mm)	B, BORED Ø (mm)	SPACING OF POLES c/c (m)	L, EMBEDMENT (m)	TOTAL POLE LENGTH (m)
0.5	250	400*	1.0	2.0	3.0

** 400 diameter used for design purposes but can use nearest larger size*

TIMBER SPECIFICATION NOTES:

1. CAUTION:
DEEP EXCAVATIONS UNSUPPORTED DURING CONSTRUCTION MAY BE HAZARDOUS PARTICULARLY WHEN WORKING IN CONFINED SPACES. THE DEPARTMENT OF LABOUR'S EXCAVATION GUIDE GIVES RECOMMENDED SAFETY PROCEDURES FOR SUCH SITUATIONS. THE EXCAVATION AND EARTHWORKS CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT ADEQUATELY ALL PERSONS AND PROPRETY LIABLE TO THE BE AFFECTED BY THE EXCAVATION AND EARTHWORKS OPERATIONS.

2. MATERIALS:
TIMBER:
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4. EXCAVATION:
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6. BACKFILLING:
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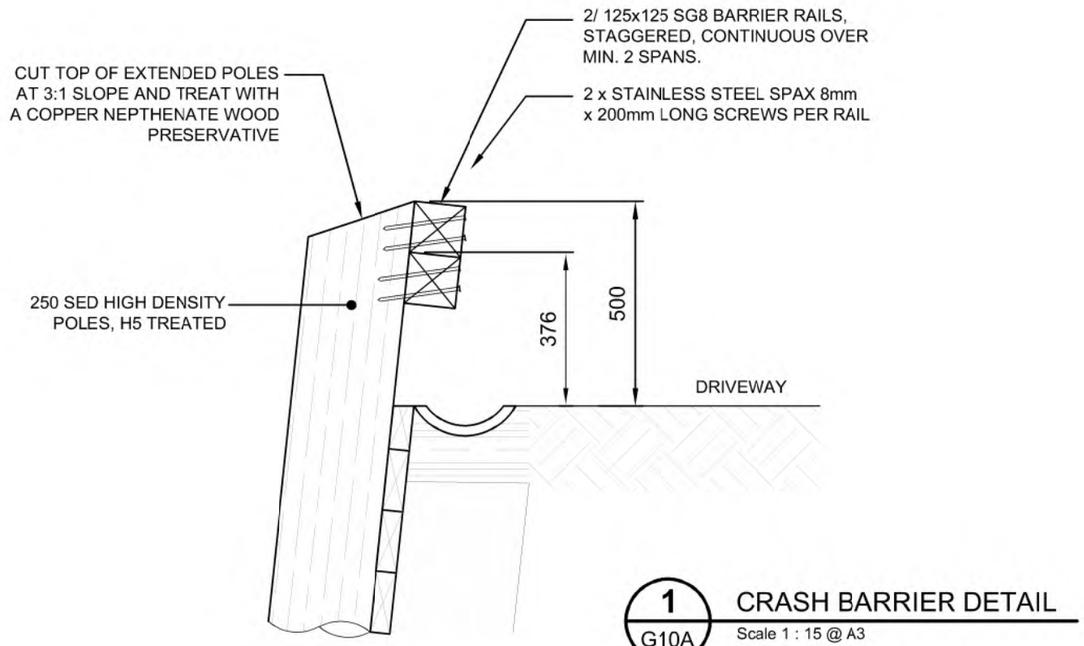

1 / G10A CRASH BARRIER DETAIL
Scale 1 : 15 @ A3

Issue	Date	Revision
A	08/07/2025	FIRST ISSUE

DWG TYPICAL RETAININED WALL DETAILS **RW03**

Scale AS SHOWN | Date JULY 2025
Drawn JC | Checked WT | Approved WT
File T:\CLIENTS\FNDC\JOBS\25 101 - OLD C-HURCH ROAD, WHANGAROA\ENGINEERING\2 DRAWINGS\RW DETAILS.DWG

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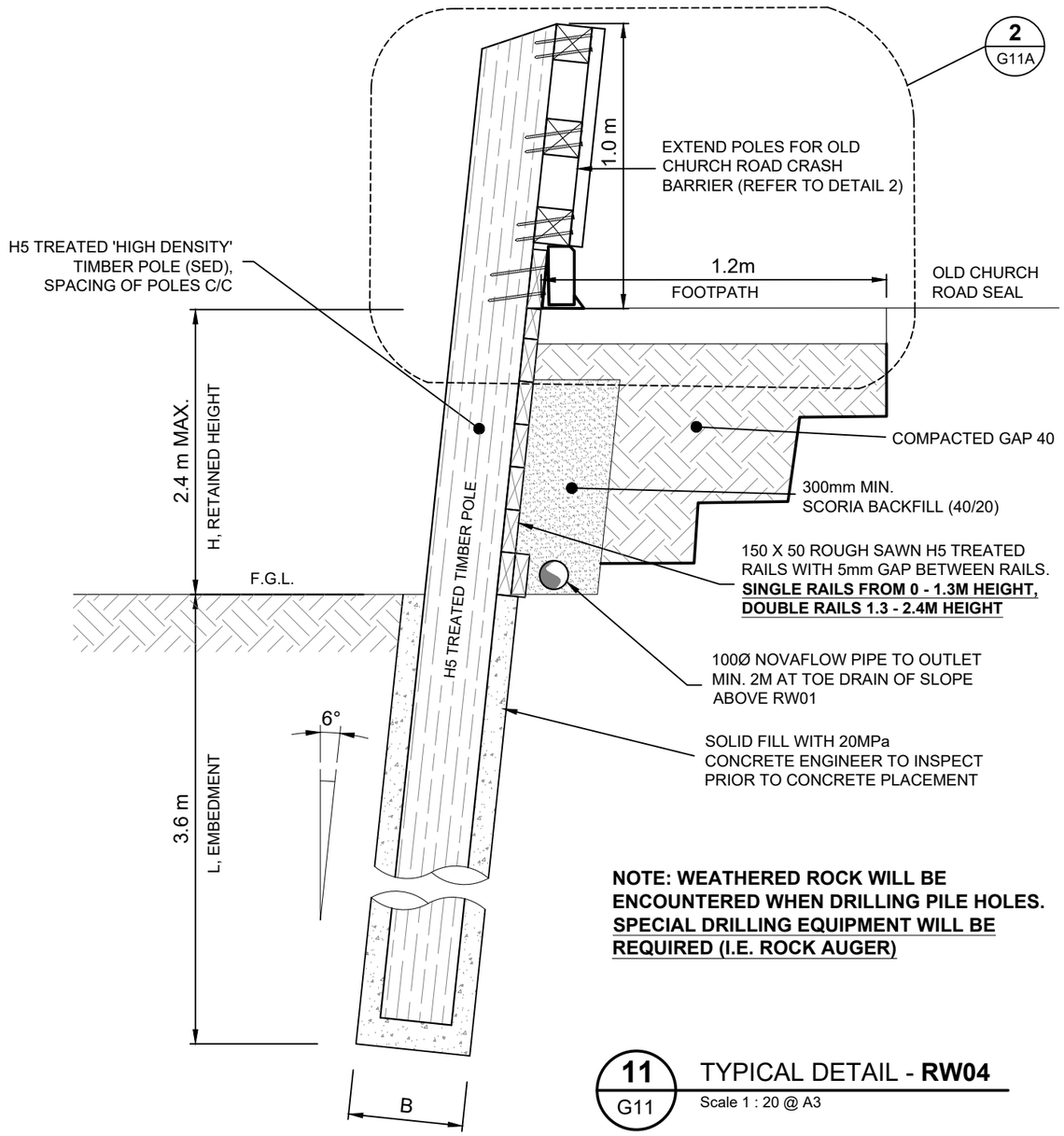
Project PROPOSED RETAINING WALLS
574 WHANGAROA ROAD, WHANGAROA
Client FAR NORTH DISTRICT COUNCIL
Project No. 24 079 | RC no. N/A

DWG No. **G10**
Sheet No. **10** of **13**

Plotted By Jonathan Corskie at 5/08/2025 11:36:34 am



NOTE: WEATHERED ROCK WILL BE ENCOUNTERED WHEN DRILLING PILE HOLES. SPECIAL DRILLING EQUIPMENT WILL BE REQUIRED (I.E. ROCK AUGER)

11 / G11 — TYPICAL DETAIL - **RW04**
Scale 1 : 20 @ A3

H, HEIGHT (m)	D (SED) (mm)	B, BORED Ø (mm)	SPACING OF POLES c/c (m)	L, EMBEDMENT (m)	TOTAL POLE LENGTH (m)
2.4	400	600	1.0	3.6	7.0

TIMBER SPECIFICATION NOTES:

1. CAUTION:
   DEEP EXCAVATIONS UNSUPPORTED DURING CONSTRUCTION MAY BE HAZARDOUS PARTICULARLY WHEN WORKING IN CONFINED SPACES. THE DEPARTMENT OF LABOUR'S EXCAVATION GUIDE GIVES RECOMMENDED SAFETY PROCEDURES FOR SUCH SITUATIONS. THE EXCAVATION AND EARTHWORKS CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT ADEQUATELY ALL PERSONS AND PROPRETY LIABLE TO THE BE AFFECTED BY THE EXCAVATION AND EARTHWORKS OPERATIONS.

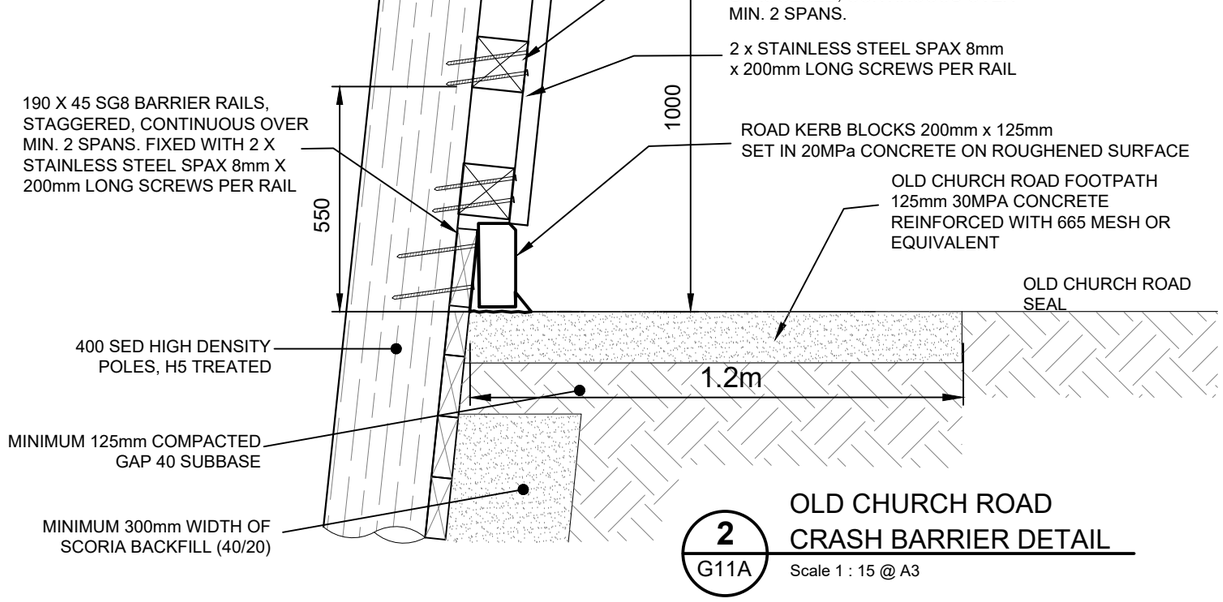
2. MATERIALS:
   TIMBER:
   TIMBER POLES SHALL BE PEELED RADIATA PINE LOGS COMPLYING WITH THE REQUIREMENT OF NZS 3605 "LOAD BEARING ROUND TIMBER PILES AND POLES" TREATED TO TPA COMMODITY SPECIFICATION H5. ALL TIMBER POLES TO BE HIGH DENSITY.
   DIMENSIONS OF POLES ARE SPECIFIED AS MINIMUM SMALL END DIAMETERS.
   ACTUAL DIAMETERS WILL BE GREATER DUE TO TAPER AND TIMBER GRADING. SAWN TIMBER IN GROUND CONTACT SHALL BE RADIATA PINE TREATED TO SPECIFICATION H4.
   ALL TIMBER SHALL HAVE TPA IDENTIFICATION BRANDS VISIBLE WHEN DELIVERED TO THE SITE AND SHALL BE PROTECTED AGAINST DAMAGE DURING STORAGE AND HANDLING

3. CONCRETE:
   CONCRETE FOR FOUNDATION BACKFILL SHALL BE ORDINARY GRADE CONCRETE COMPLYING WITH NZS 3109 'SPECIFICATION FOR CONCRETE', AND WITH A 28-DAY STRENGTH OF 20 MPa.
   CONCRETE SHALL BE PLACED UNDER AND AROUND POLES AND WELL COMPACTED BY VIBRATING. POLES SHALL BE TEMPORARILY PROPPED AND PROTECTED AGAINST DISTURBANCE FOR AT LEAST TWO DAYS AFTER PLACEMENT OF CONCRETE

4. EXCAVATION:
   EXCAVATION IN STAGES TO ALLOW FOR TEMPORARY SUPPORT DURING CONSTRUCTION IS REQUIRED. NO MORE THAN 3.0m OF UNSUPPORTED LENGTH OF SLOPE SHALL EXIST AT ANY ONE TIME.
   EXCAVATION FOR POLES SHALL BE TAKEN OUT BY AUGERING TO THE DIMENSIONS DETAILED, WITH ALL SURPLUS SOIL BEING DISPOSED OF AWAY FROM THE SITE. ALLOWANCE SHALL BE MADE IN POSITIONING AUGERED HOLES FOR THE SLOPE OF THE WALL AND FOR CONCRETE TO SURROUND THE POLES. DRIVING OF POLES IS NOT ACCEPTABLE AS AN ALTERNATIVE TO AUGERING. POLES SHALL BE INSTALLED AS SOON AS POSSIBLE AFTER EXCAVATION. EXCAVATIONS FOR POLES SHALL BE FREE OF WATER AND LOOSE MATERIAL BEFORE CONCRETING. IF NECESSARY THE CONTRACTOR SHALL ALLOW FOR HANDCLEANING AND PUMPING OF EXCAVATION.

5. INSTALLATION:
   DRIVING OF POLES IS NOT ACCEPTABLE AS AN ALTERNATIVE TO AUGERING. FIXING OF HORIZONTAL TIMBERS TO POLES SHALL UTILISE GALVANISED NAILS AS DETAILED. TIMBERS SHALL BE LAYED IN POSITION COMMENCING AT THE BOTTOM OF THE WALL WITH JOINTS BETWEEN TIMBERS STAGGERED BETWEEN THE POLES BY USE OF SHORT TIMBERS AT ENDS OF ALTERNATIVE ROWS. IF CUTTING IS NECESSARY THE EXPOSED SURFACES SHALL BE FLOODED WITH A COPPER NAPTHENATE TYPE OF WOOD PRESERVATIVE.
   CARE SHALL BE TAKEN IN SELECTING AND LAYING HORIZONTAL TIMBERS TO MAINTAIN THE SPECIFIED MINIMUM THICKNESS OF TIMBERS, PARTICULARLY NEAR THE BASE OF THE WALL AND TO ACHIEVE NEAT STRAIGHT LINES AT THE TOP OF THE WALL.

6. BACKFILLING:
   A PERFORATED OR OPEN JOINTED SUBSOIL DRAIN SHALL BE LAID AND SURROUNDED IN FINE GRANULAR MATERIAL WITH THE INVERT BELOW LOWER GROUND LEVELS AND LED TO A FREE OUTLET AT A POINT OF SAFE DISCHARGE.
   REMAINING BACKFILL TO WITHIN 300mm OF FINISHED SURFACE LEVEL SHALL BE DRAINED COMPACTED GRANULAR FILL NOT LARGER THAN 65mm DIMENSIONS (eg RUN OF PIT SCORIA OR SIMILAR).
   THE FINISHED SURFACE OF BACKFILL SHALL BE SEALED AGAINST ENTRY OF SURFACE WATER WITH A LAYER OF TOPSOIL, CLAY OR CONCRETE.



2 / G11A — OLD CHURCH ROAD CRASH BARRIER DETAIL
Scale 1 : 15 @ A3

Issue	Date	Revision
A	21/10/2025	FIRST ISSUE

DWG: TYPICAL RETAININED WALL DETAILS **RW04**

Scale AS SHOWN | Date OCTOBER 2025
Drawn JC | Checked WT | Approved WT
File T:\CLIENTS\FNDC\JOBS\25 101 - OLD CHURCH ROAD, WHANGAROA\ENGINEERING\2 DRAWINGS\RW DETAILS.DWG

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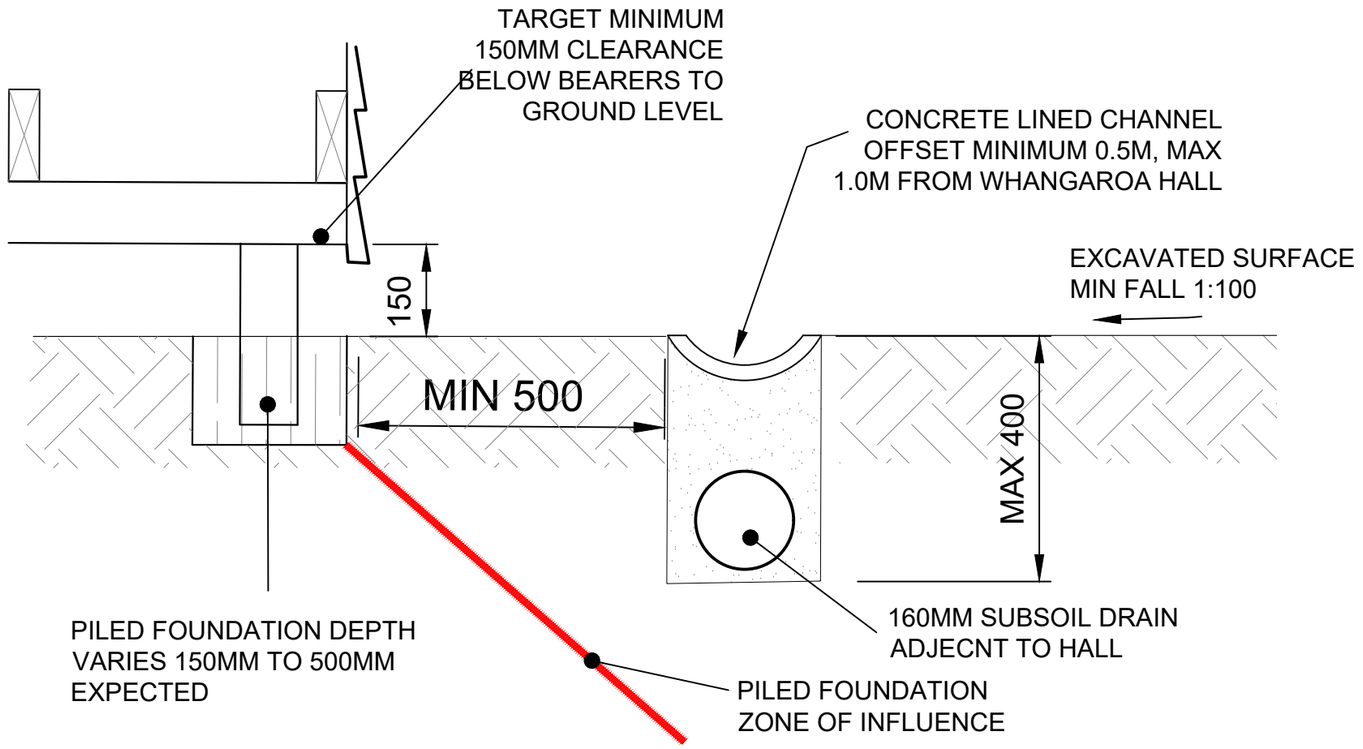
Project: PROPOSED RETAINING WALLS
574 WHANGAROA ROAD, WHANGAROA
Client: FAR NORTH DISTRICT COUNCIL
Project No. 25 101 | RC no. N/A

DWG No. **G11**
Sheet No. **11** of **13**

Plotted By Jonathan Corskie at 21/10/2025 7:39:40 am



DRAINAGE SPECIFICATION SUMMARY (REFER TO FULL SPECIFICATIONS AS ATTACHED)

1. EXCAVATION PROTECTION
   The excavation and earthwork Contractor shall take all necessary precautions to protect adequately all persons and property liable to be affected by the excavation and earthworks operations. All work must comply with the relevant Labor Department Safety Regulations. All excavations are to meet the requirements of General Archaelogical Authority application 2025-637

2. EXCAVATION
   Excavation shall not undercut the foundation zone of influence to the depths and sizes shown. All excavations for drainage must not be left open for more than 24hrs. If any slumping of the excavation occurs, the trench should be immediately backfilled in the area of slumping.

3. SUBSOIL DRAINS
   All subsoil drains surrounding the Whangaroa Hall shall be 160mm diameter and installed with 20 / 7 drainage metal and installe3d to NZTA F2:2013. All subsoil drains should have a minimum fall of 1:100

4. CONCRETE LINED CHANNELS - WHANGAROA HALL
   Concrete lined channel to be formed with 20MPa concrete and have a minimum fall of 1:100. Channels are to be formed approximately to FNDC engineering standards with consideration given to building maintenance.

5. DRAINAGE
   Excavated surfaces should have a minimum gradient of 1:120 towards drainage infrastructre around the Whangaroa Hall.

12 / G12 WHANGAROA HALL PERIMETER DRAIN

Scale 1 : 10 @ A3

Issue	Date	Revision
A	8/07/2025	FIRST ISSUE

DWG: TYPICAL DETAILS

Scale: AS SHOWN | Date: JULY 2025
Drawn: JC | Checked: WT | Approved: WT
File: T:\CLIENTS\FNDC\JOBS\25 101 - OLD CHURCH ROAD, WHANGAROA\ENGINEERING\2 DRAWINGS\RW DETAILS.DWG

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Project: PROPOSED RETAINING WALLS
574 WHANGAROA ROAD, WHANGAROA

Client: FAR NORTH DISTRICT COUNCIL

Project No.: 25 101 | RC no.: N/A

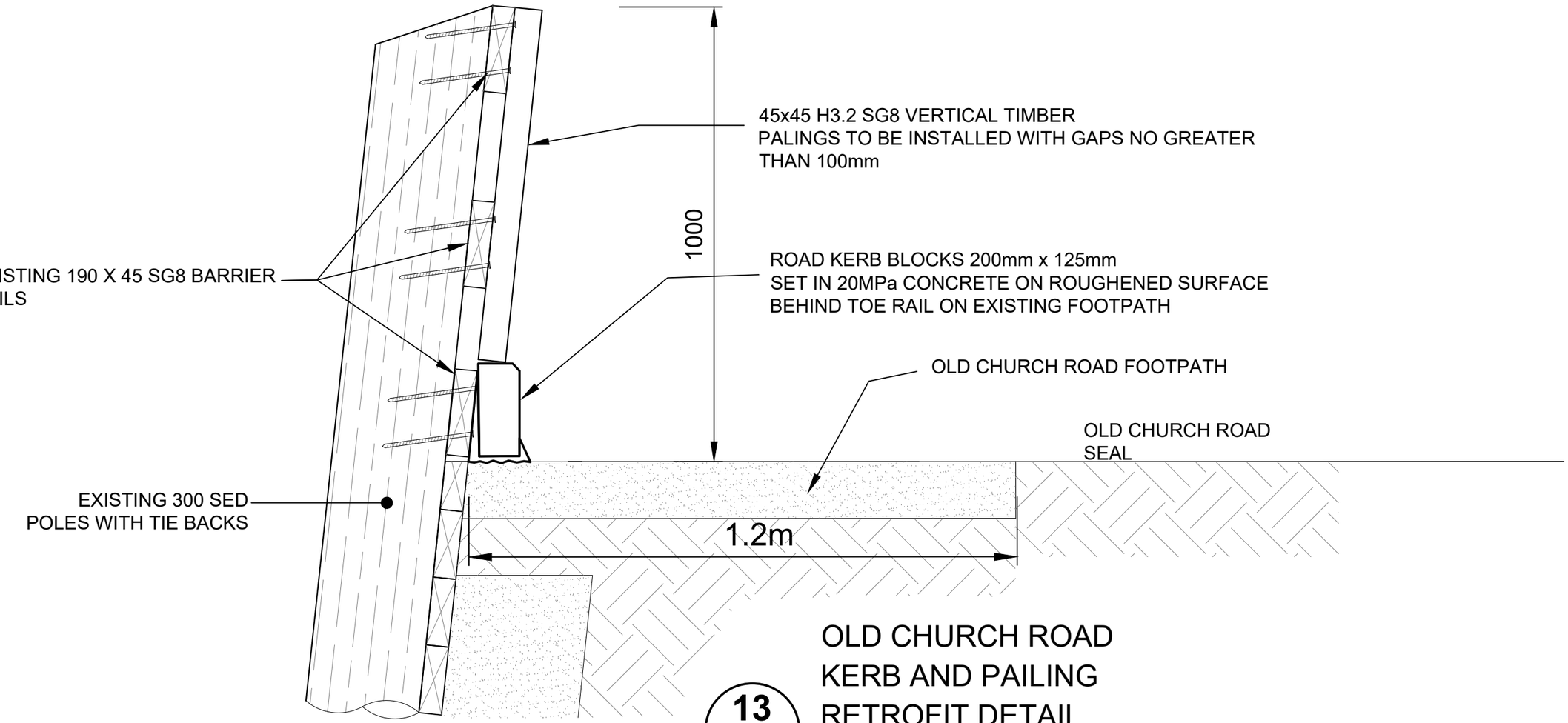
DWG No.: G12

Sheet No.: 12 of 13

Plotted By Jonathan Corskie at 10/07/2025 11:32:09 am

SPECIFICATION NOTES:

1. MATERIALS:
   TIMBER:
   SAWN TIMBER IN GROUND CONTACT SHALL BE RADIATA PILE TREATED TO SPECIFICATION H4. ALL OTHER TIMBER H3.2.
   ALL TIMBER SHALL HAVE TPA IDENTIFICATION BRANDS VISIBLE WHEN DELIVERED TO THE SITE AND SHALL BE PROTECTED AGAINST DAMAGE DURING STORAGE AND HANDLING.
2. FIXINGS:
   TIMBER PAILINGS SHALL BE ADEQUATELY FIXED MINIMUM 2 X 3.1 X 75MM STAINLESS STEEL NAILS PER FIXING POINT.
3. CONCRETE:
   CONCRETE FOR KERB AND CHANNEL SHALL BE ORDINARY GRADE CONCRETE COMPLYING WITH NZS 3109 'SPECIFICATION FOR CONCRETE', AND WITH A 28-DAY STRENGTH OF 20 MPa.
4. KERB BLOCKS:
   KERB BLOCKS SHALL MEET FNDC ENGINEERING STANDARD.



OLD CHURCH ROAD KERB AND PAILING RETROFIT DETAIL

13 / G13

Scale 1 : 10 @ A3

Issue	Date	Revision
A	21/10/2025	FIRST ISSUE

DWG RETROFIT TO EXISTING RETAINING WALL ON OLD CHURCH ROAD

Scale AS SHOWN | Date OCTOBER 2025

Drawn JC | Checked WT | Approved WT

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Project PROPOSED RETAINING WALLS
574 WHANGAROA ROAD, WHANGAROA

Client FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

DWG No. **G13**

Sheet No. **13** of **13**

Plotted By Jonathan Corskie at 21/10/2025 7:38:33 am

NOTES:

1. LOT BOUNDARIES AND AERIAL PHOTO INFORMATION TAKEN FROM LAND INFORMATION NEW ZEALAND (LINZ).
2. CONTOURS ARE FROM LINZ LIDAR DATA.
3. LOCATIONS HAVE NOT BEEN SURVEYED AND ARE INDICATIVE ONLY.

LEGEND

- EXISTING BOUNDARY
- EXISTING DRAIN
- EXISTING SERVICES
- EXISTING ROAD EDGE OF SEAL
- EXISTING SLIP
- PROPOSED EXCAVATION EXTENT
- PROPOSED KERB BLOCK AND CHANNEL
- PROPOSED CONCRETE LINED DRAIN
- PROPOSED SUBSOIL DRAIN

IDENTIFIED HAIL SITE ASSOCIATED WITH FUEL STATION WITH TANKS REMOVED 2002.

5M BUFFER APPLIED TO HAIL SITE RESULTING IN PERMITTED ACTIVITY STATUS UNDER NES-CS SECTION 8

14M LENGTH OF REINFORCED CONCRETE SLAB PROTECTION FOR CULVERT PARTIALLY WITHIN 5M BUFFER OF HAIL SITE

2.43

0.1M COVER

0.3M COVER

SW

Issue	Date	Revision
A	17/11/2025	FIRST ISSUE

DWG: WHANGAROA HALL NES-CS PLAN

Scale 1:100 @A3 | Date NOVEMBER 2025

Drawn JC | Checked WT | Approved WT

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Project: OLD CHURCH ROAD SLIP REMEDIATION
574 WHANGAROA ROAD, WHANGAROA

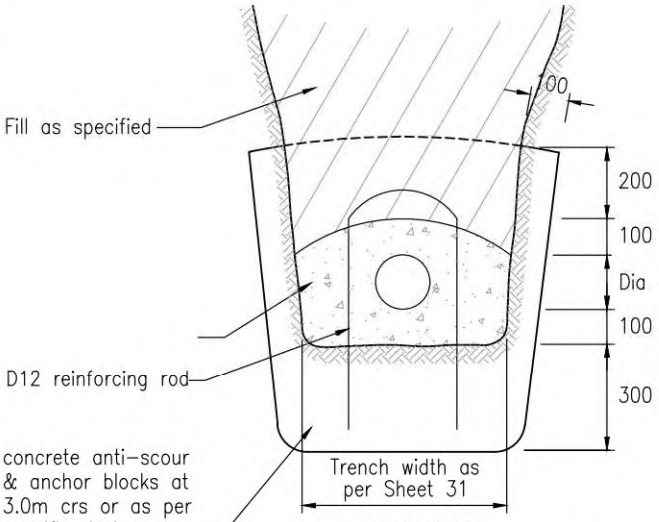
Client: FAR NORTH DISTRICT COUNCIL

Project No. 25 101 | RC no. N/A

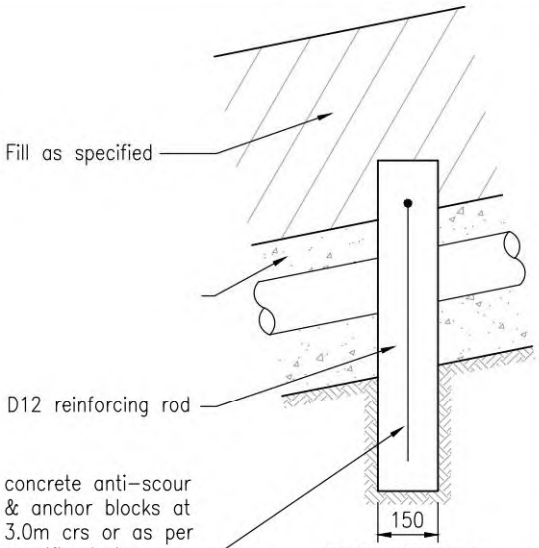
DWG No. G14

Sheet No. 14 of 14

Plotted By Jonathan Corskie at 17/11/2025 2:36:30 pm



SECTION



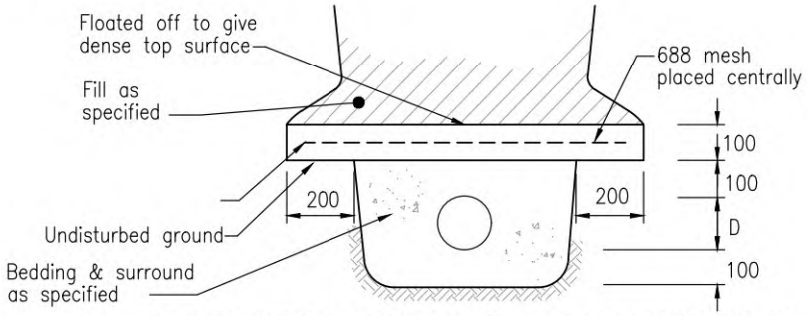
ELEVATION

STEEP PIPE DETAILS

(For pipeline gradients 1:3 or steeper and diameter ⩽ 450mm)

NOTES:

1) Some variation is possible using aluminium plate cut off walls bolted to larger diameter pipes.
2) Larger diameter pipes will require specific pier design to counter the downward component of water and pipe weight.

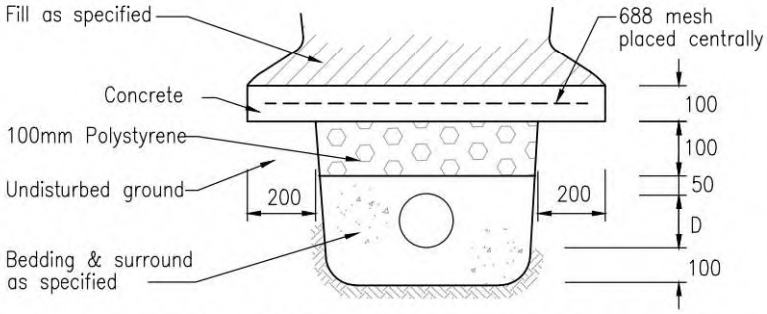


REINFORCED CONCRETE SLAB PROTECTION FOR STORMWATER AND WASTEWATER

(Where additional loading or other requirements necessitate)

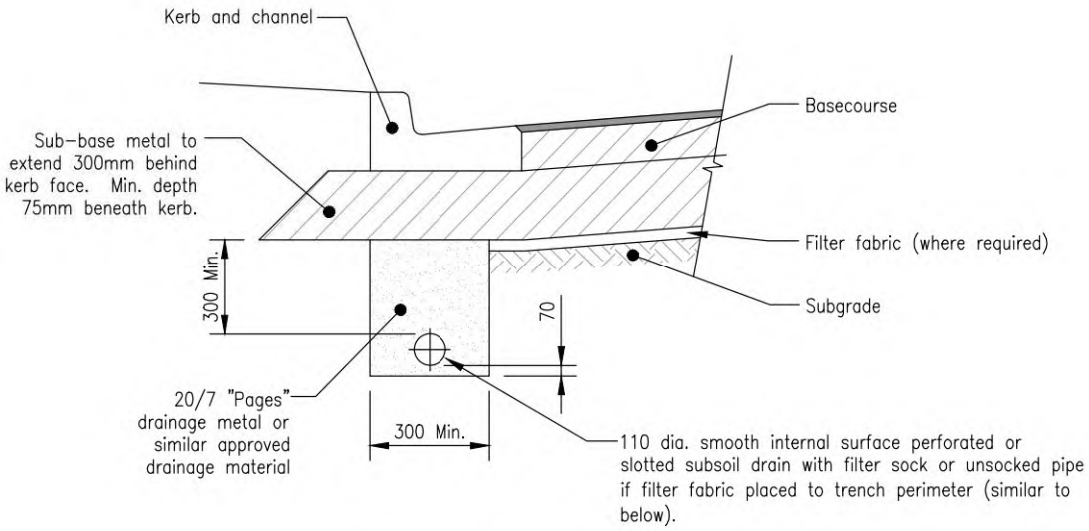
GENERAL:

A. All concrete to be 20MPa at 28 days as per NZS 3104:2021
B. Cement stabilised bedding and back fill: 1 part cement to 20 parts aggregate.
C. Allow 48 hours curing prior to back filling any concrete or stabilised material.
. Slab protection to be laid in lengths no greater than 2.0M

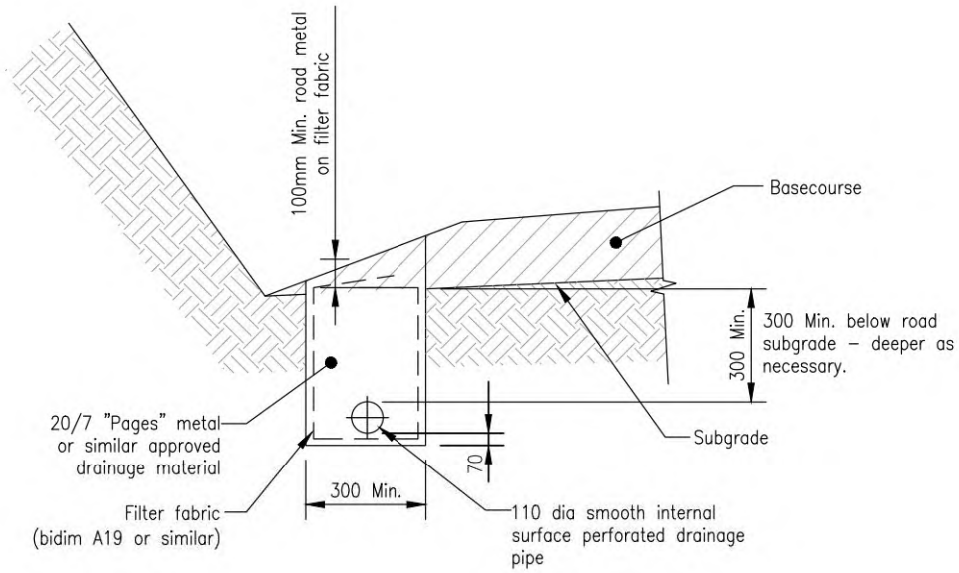


REINFORCED CONCRETE SLAB PROTECTION FOR WATER PIPELINES

PIPE PROTECTION AND BULKHEAD DETAILS (FOR ALL ENVIRONMENTS)	Date: FEB 2022
	Revision: 0.2
FAR NORTH DISTRICT COUNCIL ENGINEERING STANDARDS	Scale: AS SHOWN
	SHEET No. 32



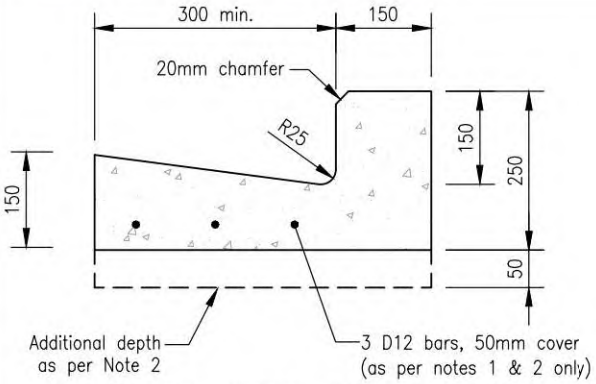
UNDER KERB DRAINAGE



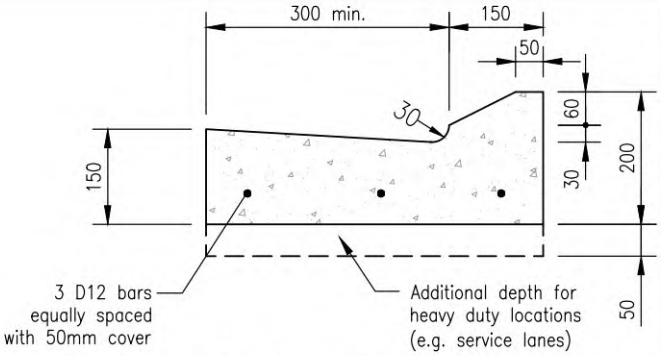
RURAL SUBSOIL DRAINAGE

NOTES:
1. Construct subsoil drain after stabilisation of subgrade.
2. Subsoil drain is to connect to the downstream sump (urban) above the soffit level of the outlet pipe. Subsoil drain depth to be adjusted to meet this criteria.
3. For scour protection refer Section 1.2.14.3
4. Subsoil drains in clays to be PAP 7 or BMF (blue metal fines)

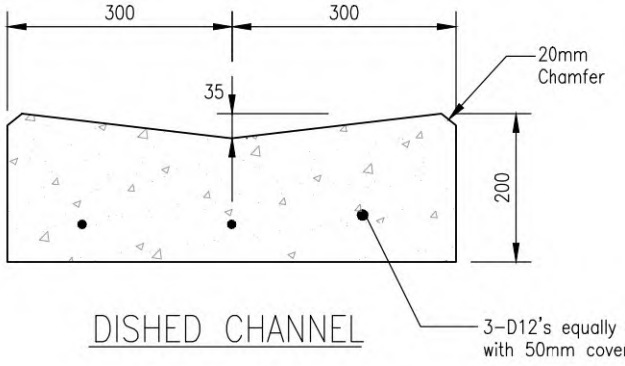
TYPICAL SUBSOIL DRAINAGE DETAILS	Date: JAN 2021
	Revision: 0.1
FAR NORTH DISTRICT COUNCIL ENGINEERING STANDARDS	Scale: AS SHOWN
	SHEET No. 14



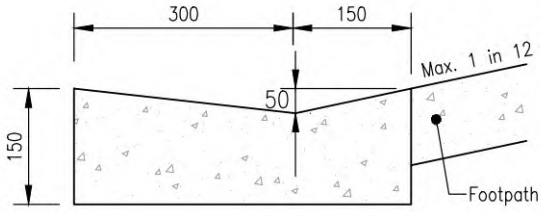
STANDARD KERB AND CHANNEL



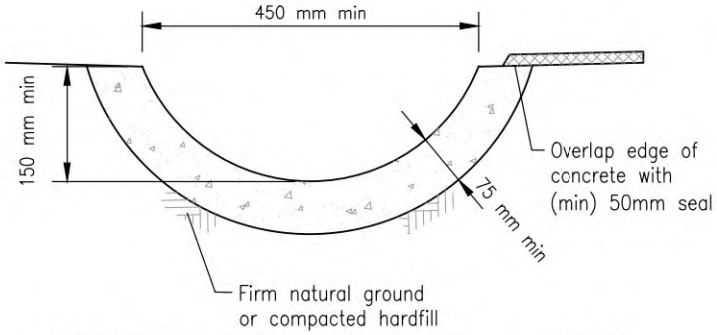
MOUNTABLE KERB AND CHANNEL



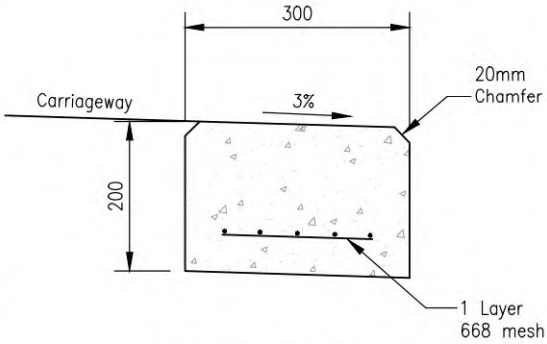
DISHED CHANNEL



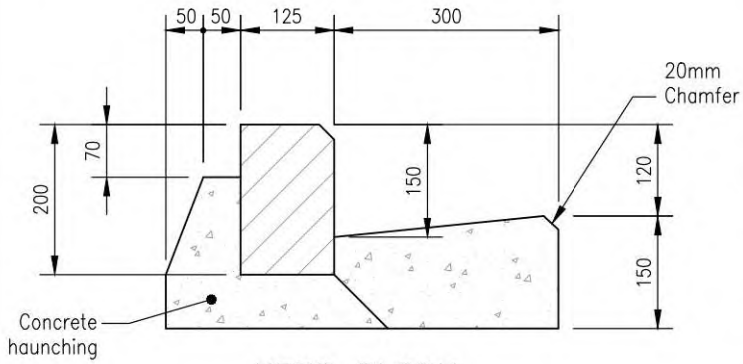
PRAM CROSSING



CONCRETE LINED CHANNEL – RURAL



FLUSH EDGE BEAM



KERB BLOCK

NOTES:

1. 3/D12 reinforcing bars to be placed around all curves, and intersections between tangent points in Business environments.
2. Commercial and industrial crossings to be additional 50mm in depth as well as having 3–D12's equally spaced in the channel.
3. Concrete for Standard Kerb and Channel shall be 20MPa at 28 days.
4. Concrete for Dished Channel, Flush Edge Beam and Mountable Kerb and Channel shall be 30MPa at 28 days.
5. Concrete for Concrete Lined Channel – Rural shall be 25MPa at 28 days.
6. Crack control joints to be formed at maximum of 3.5 metre intervals. To be a minimum depth of 30mm.
7. Profiles may be modified slightly to suit kerbing machine.
8. Mountable kerbs may only to be used for service lanes and traffic islands.
9. Use of kerb blocks subject to specific approval. Haunching to be 20 MPa at 28 days.

KERB & CHANNEL DETAILS
FOR ALL ENVIRONMENTS

FAR NORTH DISTRICT COUNCIL
ENGINEERING STANDARDS

Date:	JAN 2021
Revision:	0.1
Scale:	NTS
SHEET No.	13

Appendix B – Hand Auger and Machine Borehole Logs

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Borehole Log - BH01

Hole Location: Refer to Site Plan

JOB No. 24 079

CLIENT:	FNDC	**SITE:**	574 Whangaroa Road, Whangaroa - Town Hall		
Date Started:	17/04/2024	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	JMC
Date Completed:	17/04/2024	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

TOPSOIL/FILL; SILT, brown speckled orange brown. Dry, non-plastic

Silty CLAY; orange brown mixed light brown. Stiff, moist, high plasticity. *[NON-CERTIFIED FILL]*

Clayey SILT; minor fine to medium scoria gravel, brown mottled orange brown and reddish brown. Stiff, moist, low plasticity.

Silty CLAY; trace fine gravel, orange brown mixed light brown and grey. Stiff, moist to wet, high plasticity.

CLAY; trace fine gravel and ash, light brown mixed bluish grey. Stiff, wet, high plasticity.

Silty CLAY; light brown and bluish grey, trace fine well weathered clasts. Very stiff, wet, high plasticity. *[TAURANGA GROUP]*

SILT; some fine to medium well weathered clasts, orange brown mottled grey. Hard, moist, non-plastic. *[TUPOU COMPLEX- Completely weathered]*

End of hole at 1.9m (Refusal)

Depth (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

Geology: UN-CERTIFIED FILL; Q1a; Ku

Graphic Log

Water Level: Groundwater at 1.8mbgl

Sensitivity: 6, 7, 11

Vane Shear and Remoulded Vane Shear Strengths (kPa): 121 / 21; 116 / 18; 157 / 14; UTP

Scala Penetrometer (blows/100mm): 0 5 10 15 20

Scala 30+ @ 1.9m

LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. T.S. = Topsoil.
Hand Held Shear Vane S/N: 1698

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New Zealand

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Borehole Log - BH02

Hole Location: Refer to Site Plan

JOB No. 24 079

CLIENT:	FNDC	**SITE:**	574 Whangaroa Road, Whangaroa - Town Hall		
Date Started:	17/04/2024	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	JMC
Date Completed:	17/04/2024	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

SILT; some intermixed topsoil, some fine gravel, brown. Moist, non-plastic *[COLLUVIUM]*

End of hole at 0.3m (Refusal on weathered rock)

Attempted 5 other locations in the vicinity, none of which were deeper than 0.3m

Borehole drilled further downslope (adjacent to building) had fill/colluvium to 0.6m before refusing on inferred weathered rock

Depth (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

Geology: FILL

Graphic Log

Water Level: Groundwater Not Encountered

Sensitivity

Vane Shear and Remoulded Vane Shear Strengths (kPa)

Scala Penetrometer (blows/100mm): 0 5 10 15 20

Scala 30+ @ 0.3m

LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. T.S. = Topsoil.

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New Zealand

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Borehole Log - BH03

Hole Location: Refer to Site Plan

JOB No. 24 079

CLIENT:	FNDC	**SITE:**	574 Whangaroa Road, Whangaroa - Town Hall		
Date Started:	17/04/2024	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	JMC
Date Completed:	17/04/2024	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

Silty CLAY; trace fine gravel, brown mixed orange brown. Stiff, moist, high plasticity. *[NON-CERTIFIED FILL]*

SILT; trace well weathered clasts, trace clay, light orange brown mottled dark orange brown. Very stiff, moist, low plasticity. *[TUPOU COMPLEX]*

SILT; light orange brown and dark orange brown. Hard, moist, non-plastic. (Completely weathered rock)

End of hole at 1.2m (Refusal)

Depth (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

Geology: FILL; TUPOU COMPLEX

Graphic Log

Water Level: Groundwater Not Encountered

Sensitivity: 5

Vane Shear and Remoulded Vane Shear Strengths (kPa): 20, 95

UTP

Scala Penetrometer (blows/100mm): 0 5 10 15 20

Scala 30+ @ 1.2m

LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. T.S. = Topsoil.
Hand Held Shear Vane S/N: 1698

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info@haighworkman.co.nz

Borehole Log - BH04

Hole Location: Refer to Site Plan

JOB No. 24 079

CLIENT:	FNDC	**SITE:**	574 Whangaroa Road, Whangaroa - Town Hall		
Date Started:	17/04/2024	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	JMC
Date Completed:	17/04/2024	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

Silty CLAY; trace fine gravel and shells, brown streaked orange. Stiff, moist, high plasticity. *[NON-CERIFIED FILL]*

Gravelly CLAY; brown mottled grey and orange brown. Wet, high plasticity.

Silty CLAY; light orange brown streaked orange brown and grey. Stiff, wet, high plasticity. *[TAURANGA GROUP]*

SILT; trace clay, light orange brown mottled orange brown. Stiff, saturated, low plasticity.

End of hole at 1.8m (Hole collapsing)

Depth (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

Geology: NON-CERTIFIED FILL; TAURANGA GROUP

Graphic Log

Water Level: Groundwater Not Encountered

Sensitivity: 13; 14

Vane Shear and Remoulded Vane Shear Strengths (kPa): Obstruction; Obstruction; 93; 7; 100; 7

Scala Penetrometer (blows/100mm): 0 5 10 15 20; Scala 20+ @ 2.7m

LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. T.S. = Topsoil.
Hand Held Shear Vane S/N: 1698

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Kerikeri, 0230
New Zealand

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Borehole Log - BH05

Hole Location: Refer to Site Plan

JOB No. 25 101

CLIENT:	FNDC	**SITE:**	RP45 Old Church Road		
Date Started:	21/05/2025	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	JC
Date Completed:	21/05/2025	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

Silty CLAY with some fine to medium gravel; brown mottled yellowish brown. Firm, moist, high plasticity. *[NON-CERIFIED FILL]*

Silty CLAY with trace fine gravel; yellowish brown. Firm, moist, high plasticity.

At 0.9 to 1.1m; with some medium gravel.

SILT; trace clay, light orange brown mottled orange brown. Stiff, saturated, low plasticity.

Clayey SILT; dark brown flecked orangish brown. Stiff, moist, moderate plasticity. [Buried TOPSOIL]

Clayey SILT with some coarse sand and trace organics; brown mottled orangish brown, flk black. Stiff, moist, moderate pl. [TUPOU COMPEX]

SILT with some clay and fine gracel; yellowish brown mottled orangsh brown. Very stiff, moist, low plasticity.

End of hole at 3.0m (Target Depth)

Depth (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

Geology: NON-CERTIFIED FILL; T.S; TUPOU COMPLEX

Graphic Log

Water Level: Groundwater Not Encountered

Sensitivity: 2.3; 3.7; 3.1; 2.7

Vane Shear and Remoulded Vane Shear Strengths (kPa): 46, 20; 86, 23; 107, 35; 79, 30; UTP; UTP

Scala Penetrometer (blows/100mm): 0 5 10 15 20

LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. T.S. = Topsoil.
Hand Held Shear Vane S/N: 440
Located adjacent to CPT02

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Borehole Log - BH06

Hole Location: Refer to Site Plan

JOB No. 25 101

CLIENT:	FNDC	**SITE:**	574 Whangaroa Road, Whangaroa - Town Hall		
Date Started:	29/05/2025	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	JC
Date Completed:	29/05/2025	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

GRAVEL; medium gravel (GAP20). Greyish blue. Medium dense, moist. *[NON-CERIFIED FILL]*

Silty CLAY with some fine to medium gravel**;** dark grey. Firm, wet, high plasticity.

Silty CLAY with some fine gravel and trace organcs**;** yellowish brown, mottled brown, flk black. Stiff, moist, high plasticity. [TAURANGA GROUP]

End of hole at 0.7m (Base of pile confirmed at 0.5m)

Depth (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

Geology: NON-CERTIFIE; TAURANGA GROUP

Graphic Log

Water Level: Groundwater Not Encountered

Sensitivity

Vane Shear and Remoulded Vane Shear Strengths (kPa)

Obstruction

Obstruction

Scala Penetrometer (blows/100mm): 0 5 10 15 20

LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. T.S. = Topsoil.
Hand Held Shear Vane S/N: 440
Ground level, 0.15m below base of bearer
Hand spear used in hole to estimate pile depth of 0.5m

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Borehole Log - BH07

Hole Location: Refer to Site Plan

JOB No. 25 101

CLIENT:	FNDC	**SITE:**	574 Whangaroa Road, Whangaroa - Town Hall		
Date Started:	29/05/2025	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	JC
Date Completed:	29/05/2025	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

Silty CLAY; trace gravel, brown. Firm, wet, high pl. *[NON-CERT FILL]*

Silty CLAY; yellowish brown. Very stiff, moist, high plasticity. *[TAURANGA GROUP]*

End of hole at 0.3m (Pile base confirmed at 0.15m)

Depth (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

Geology: FILL; TAURANGA GROUP

Graphic Log

Water Level: Groundwater Not Encountered

Sensitivity: 2.6; 14

Vane Shear and Remoulded Vane Shear Strengths (kPa): 66; 171

Scala Penetrometer (blows/100mm): 0 5 10 15 20

LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable to penetrate. T.S. = Topsoil.
Hand Held Shear Vane S/N: 440
Ground level, 0.175m below base of bearer
Hand spear used in hole to estimate pile depth of 0.15m

Appendix C – CPT Test Results

CPT Client Engagement / Quote Request

Project Details		Date	21/05/2025
Project Name	Slip Repair	Job Identifier	HW Old Church Rd Slip
Project Address	Old Church Rd, Whangaroa		
Engineering Consultant Company Name	Haigh Workman Ltd	Engineering Project Manager	Jonathan Corskie
Email		Mobile	
Client Name		Client Contact Details	

Test Requirements - CPT		Preferred Job Completion Date	
Target No of CPT Tests Required	2	Maximum Test Depth Required	Refusal
No of CPT Tests Required Through Pavement or Other Hard Surface		Type and Thickness of Hard Surface	
Other Requirements Outside Standard Greenfield Testing			

Please note: Service clearance is to be provided by the client or their agents and details are to be provided to the CPT operator prior to Underground Investigation Ltd commencing work. Any delays due to service clearance or H&S approvals will be at the clients expense and may reduce the amount of testing being able to be completed in the working day.

Test Requirements - Dissipation Testing		Please List Test No and Approximate Target Depth of Dissipation	
Test No	Depth	Test No	Depth

Please note: In order to provide useful dissipation data, UIL recommends carrying out at least one CPT prior to carrying out dissipation in order to select appropriate depths for testing. It is preferred if the Geotechnical Engineer for the project discusses this with the CPT operator after completion of the initial testing.

Any Other Site Requirements

UNDERGROUND INVESTIGATION

CPT Equipment Information

CPT Rig Type	Geotech AB - Georig 220	Maximum Push Capacity	200kN
Any Deviations From Common Setup		Reaction Restraint	Screw Anchors
Cone Penetrometer	Nova Cone 100MPa With Memory	Cone Penetrometer Type	TE2
Manufacturer	Geotech AB	Load Cell Configuration	Compresion
Tip Area	10cm	Pore Pressure Type	U_2
Full Scale Output of Sensors	q_c : 100 MPa	f_s : 1 MPa	u_2 : 2 MPa
Calibration Test Class	ISO 1	Saturation Method	Pump Saturation With Secondary Vacuum
Temprature Sensor	No	Data Interval	10mm
Temprature Conditioning	Cone Warmer set to 20^o C	Typical Cone Temprature at Start of Test	16-20^o C
Any Deviations From Above			

CPT Test Information

Test Hole Number	CPT01	Job Identifier	HW Old Church Rd Slip
Test Date	21/05/2025	Operator	Craig Greenfield
Cone Serial Number	5845	Battery Voltage Start	5.92
Cone Area Ratio	0.85	Start Recording	9:10:00 AM
Probe Radius	0.0178	Finish Recording	9:34:00 AM
Date of First Push Current Calibration	13/03/2024	Measured Ground Water Depth	3.7m, dry
Metres To Next Calibration	187	Total Penetration Depth (m)	3.89
Depth of Predrill	0	Test ended due to:	☑ High Tilt ☑ High Tip Pressure ☐ High Friction ☐ High Pore Pressure ☐ High Total load ☐ Danger of Rods Buckling ☐ Target Depth ☑ Anchor Failure
Depth at Start of Test	0		
Anchor Depth (Left)	2.5		
Anchor Depth (Right)	2.5		

Zero Value Change % FSO

	Point Resistance	Pore Pressure	Sleeve Friction
Zero Shift Since First Push Current Calibration	0.21%	0.11%	0.06%
End of test with tip loosened	0.01%	0.00%	0.60%

Dissipation Testing

Test No	Depth (m)	Duration (secs)	Comments

Notes and Comments

Data loss (typically at rod change points). Either deleted or averaged	qc	fs	u

CPT Test Information

Test Hole Number	CPT02	Job Identifier	HW Old Church Rd Slip
Test Date	21/05/2025	Operator	Craig Greenfield
Cone Serial Number	5654	Battery Voltage Start	5.87
Cone Area Ratio	0.84	Start Recording	10:38:00 AM
Probe Radius	0.0178	Finish Recording	10:51:00 AM
Date of First Push Current Calibration	1/08/2024	Measured Ground Water Depth	collapsed at 2.0m, dry
Metres To Next Calibration	827	Total Penetration Depth (m)	4.177
Depth of Predrill	0	Test ended due to:	☐ High Tilt ☐ High Tip Pressure ☐ High Friction ☐ High Pore Pressure ☐ High Total load ☐ Danger of Rods Buckling ☐ Target Depth ☑ Anchor Failure
Depth at Start of Test	0		
Anchor Depth (Left)	2.5		
Anchor Depth (Right)	4.5		

Zero Value Change % FSO

	Point Resistance	Pore Pressure	Sleeve Friction
Zero Shift Since First Push Current Calibration	0.13%	0.02%	0.12%
End of test with tip loosened	0.01%	0.00%	0.04%

Dissipation Testing

Test No	Depth (m)	Duration (secs)	Comments

Notes and Comments

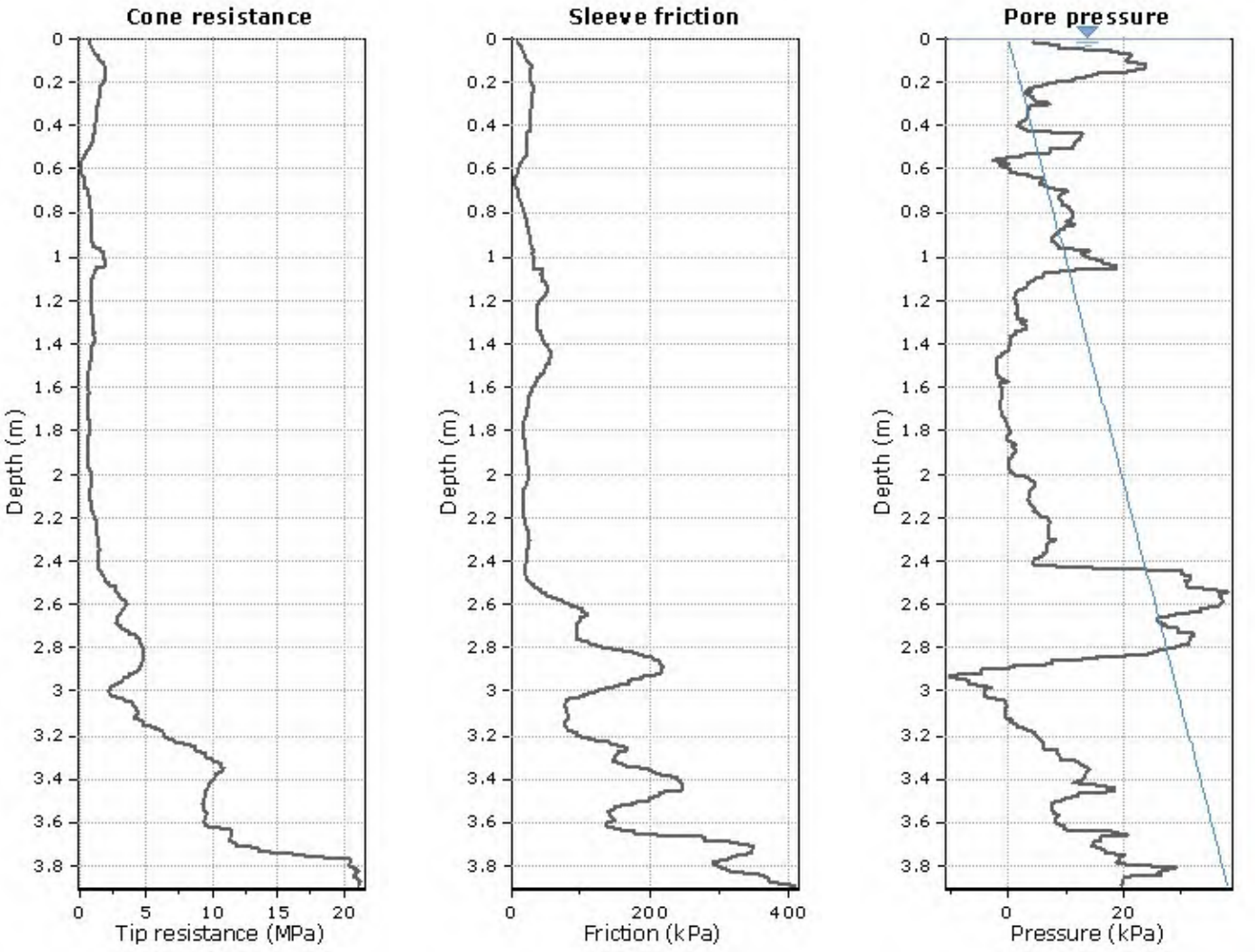
Data loss (typically at rod change points). Either deleted or averaged

qc fs u

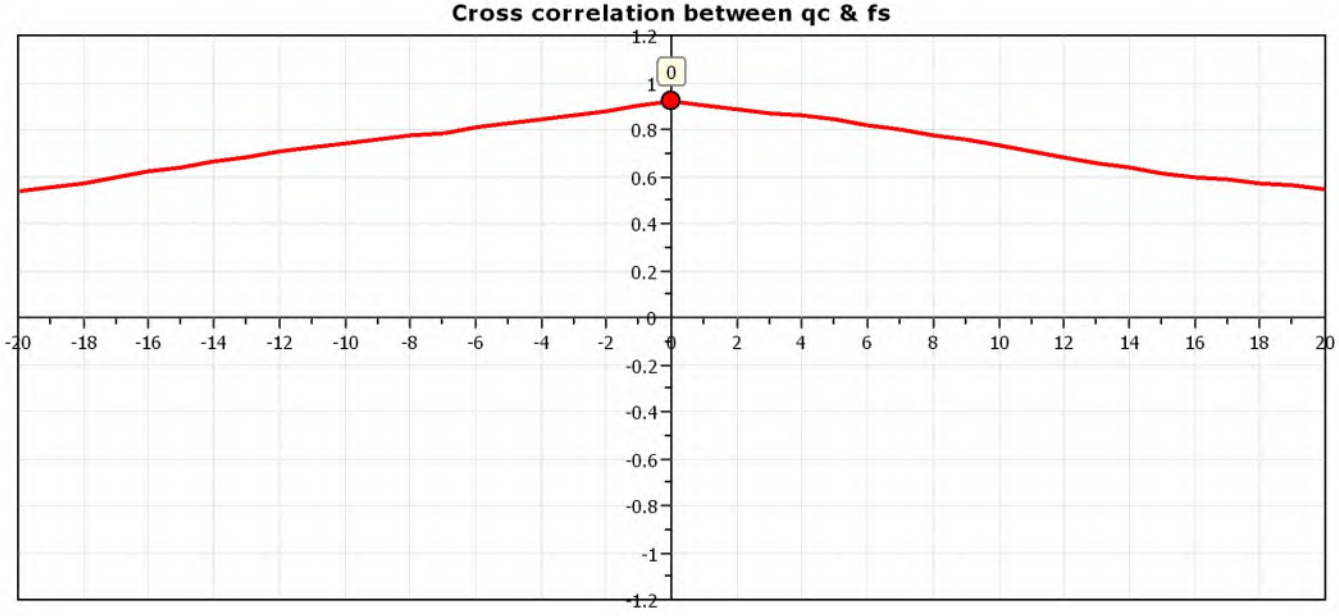
Test started at top of existing foot path slab.

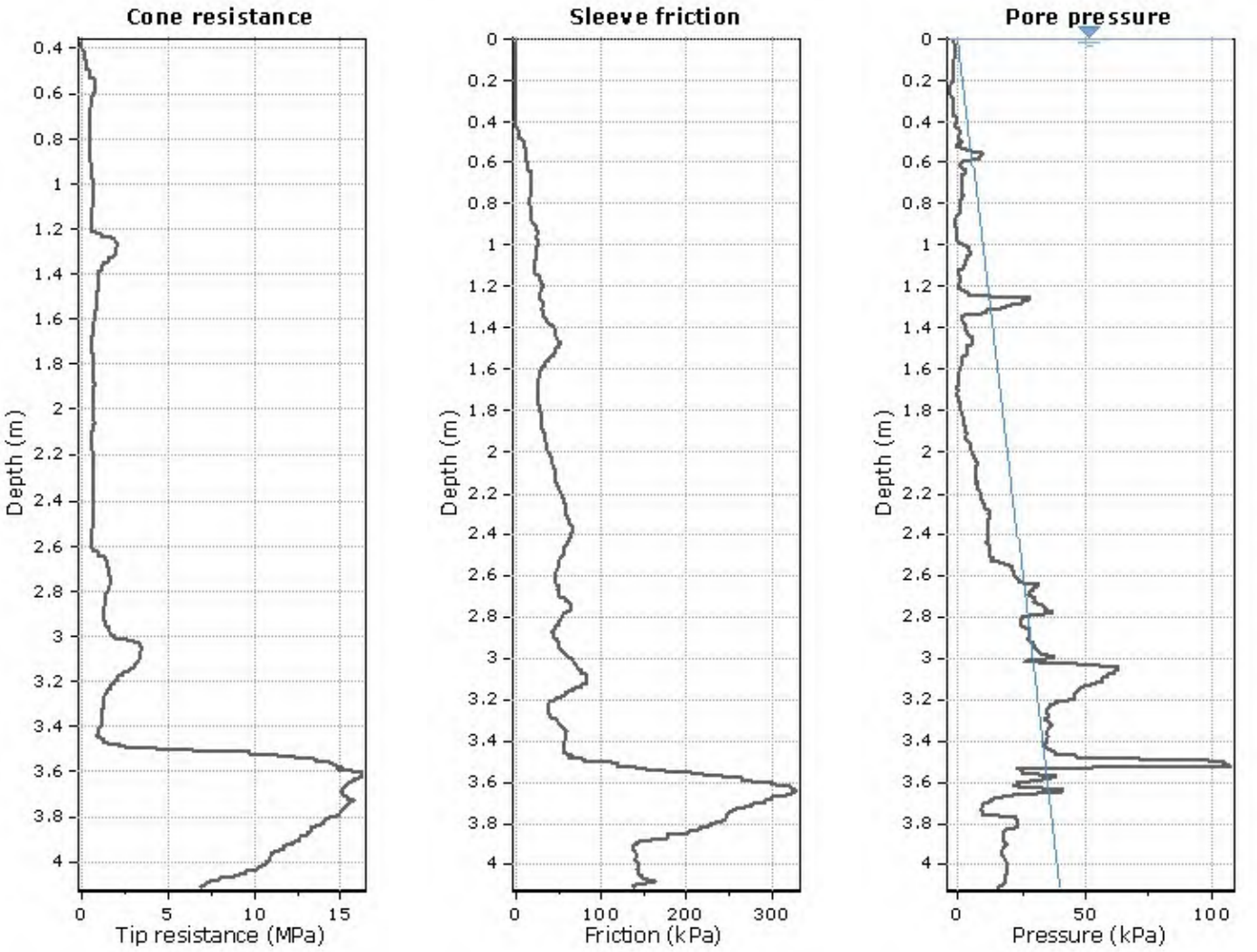
Total depth: 3.89 m, Date: 22/05/2025
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type: Compression
Cone Operator: Underground Investigation Ltd

Project: **Old Church Road Slip**
Location: **Old Chruch Road, Whangaroa**

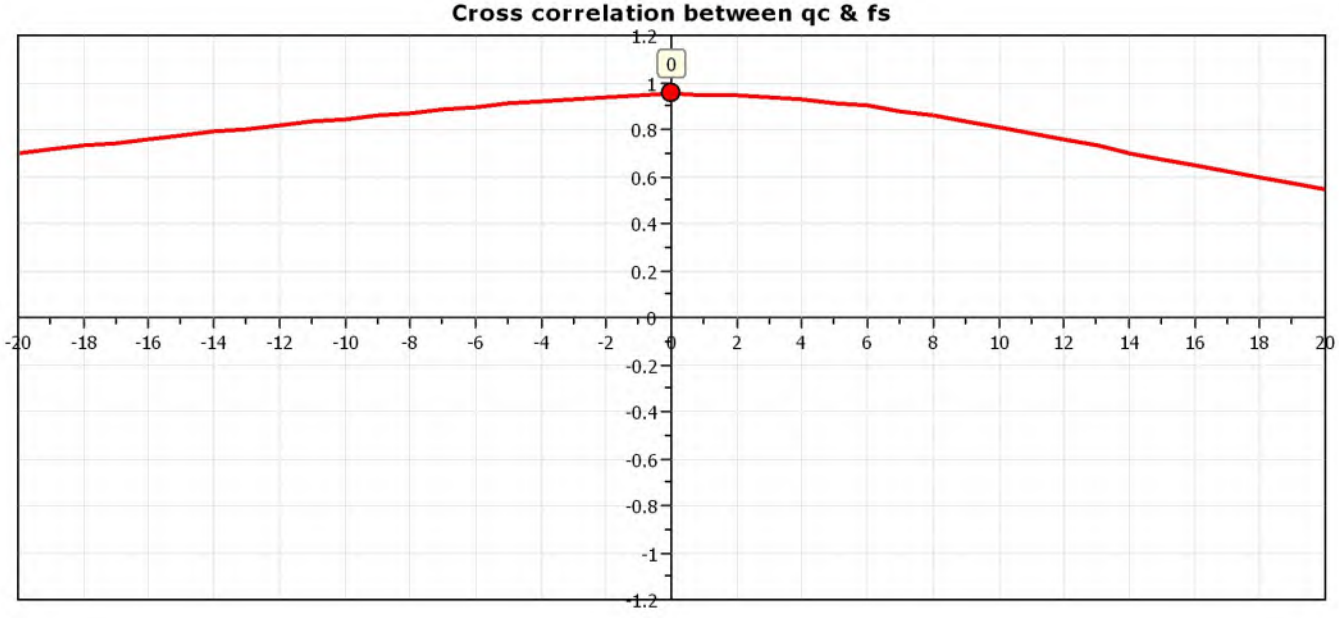


The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).

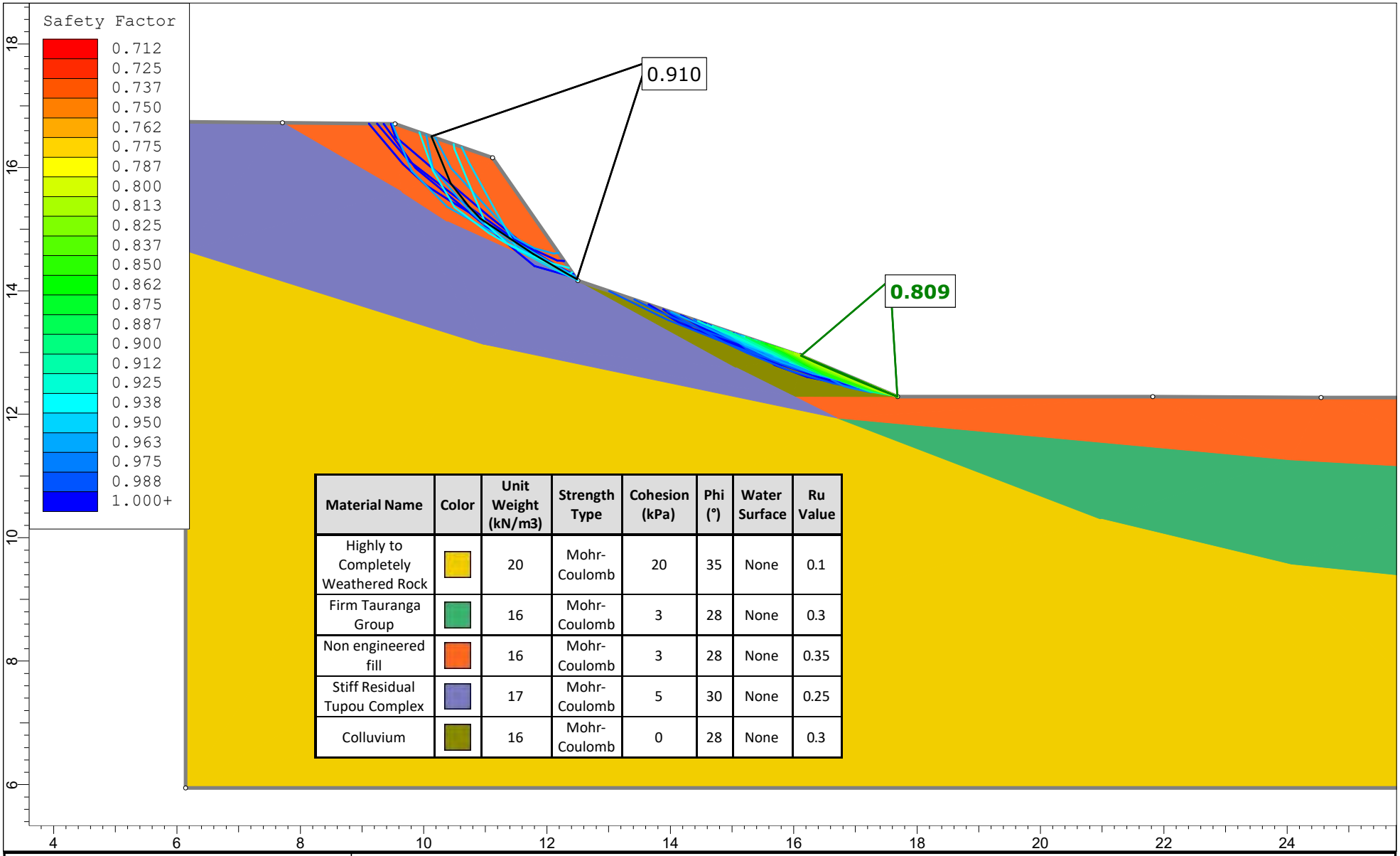




The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



Appendix D – Stability Model Results



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface	Ru Value
Highly to Completely Weathered Rock		20	Mohr-Coulomb	20	35	None	0.1
Firm Tauranga Group		16	Mohr-Coulomb	3	28	None	0.3
Non engineered fill		16	Mohr-Coulomb	3	28	None	0.35
Stiff Residual Tupou Complex		17	Mohr-Coulomb	5	30	None	0.25
Colluvium		16	Mohr-Coulomb	0	28	None	0.3

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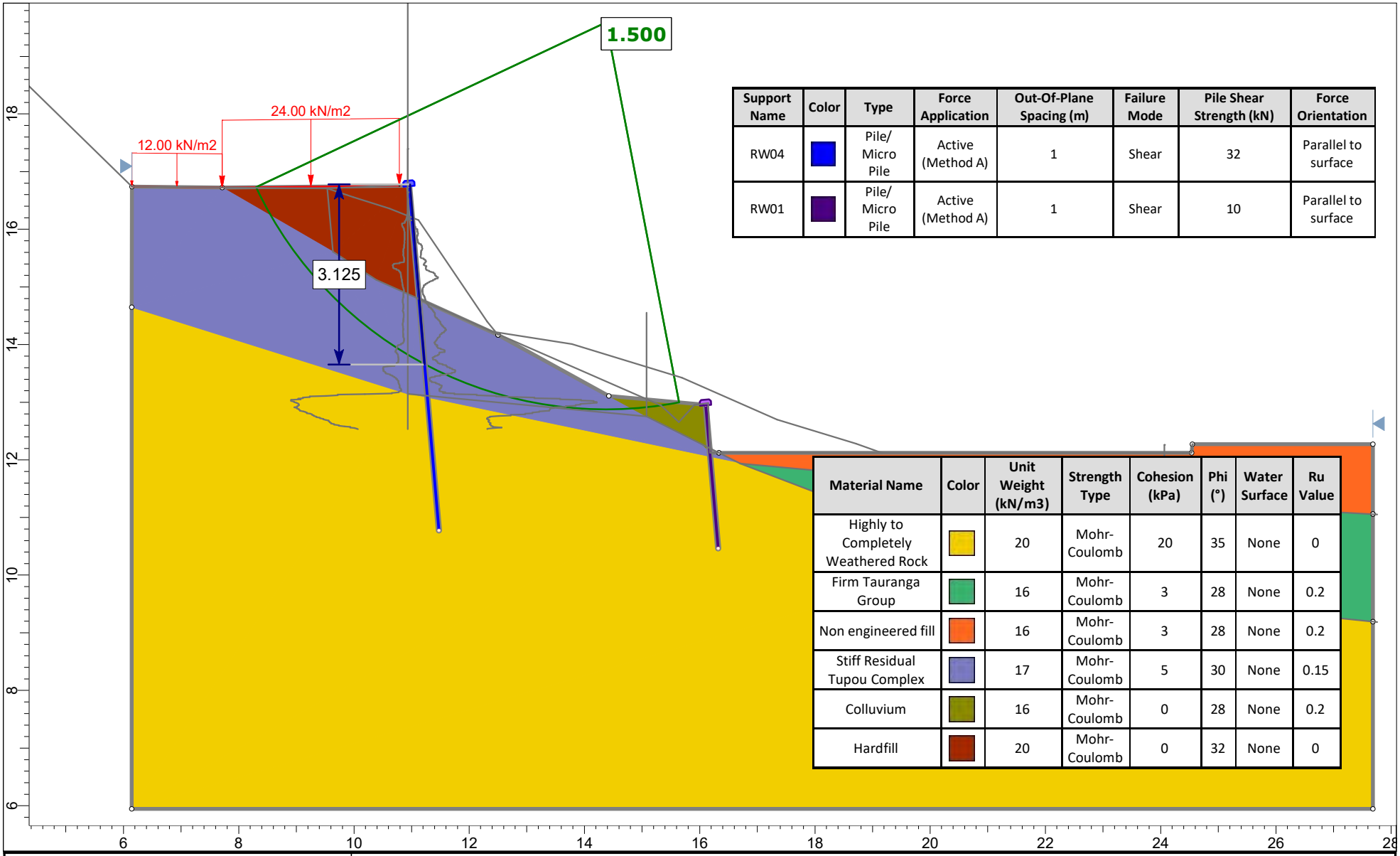
SLIDEINTERPRET 9.036

Project	RP 35 Old Church Road Slip		
Group	Back Analysis	*Scenario*	
Drawn By	J Corskie	*Company*	Haigh Workman
Date	19/06/2025, 10:40:29 am	*File Name*	Section BB Back Anal.slmd



Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (m)	Failure Mode	Pile Shear Strength (kN)	Force Orientation
RW04		Pile/ Micro Pile	Active (Method A)	1	Shear	32	Parallel to surface
RW01		Pile/ Micro Pile	Active (Method A)	1	Shear	10	Parallel to surface

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface	Ru Value
Highly to Completely Weathered Rock		20	Mohr-Coulomb	20	35	None	0
Firm Tauranga Group		16	Mohr-Coulomb	3	28	None	0.2
Non engineered fill		16	Mohr-Coulomb	3	28	None	0.2
Stiff Residual Tupou Complex		17	Mohr-Coulomb	5	30	None	0.15
Colluvium		16	Mohr-Coulomb	0	28	None	0.2
Hardfill		20	Mohr-Coulomb	0	32	None	0

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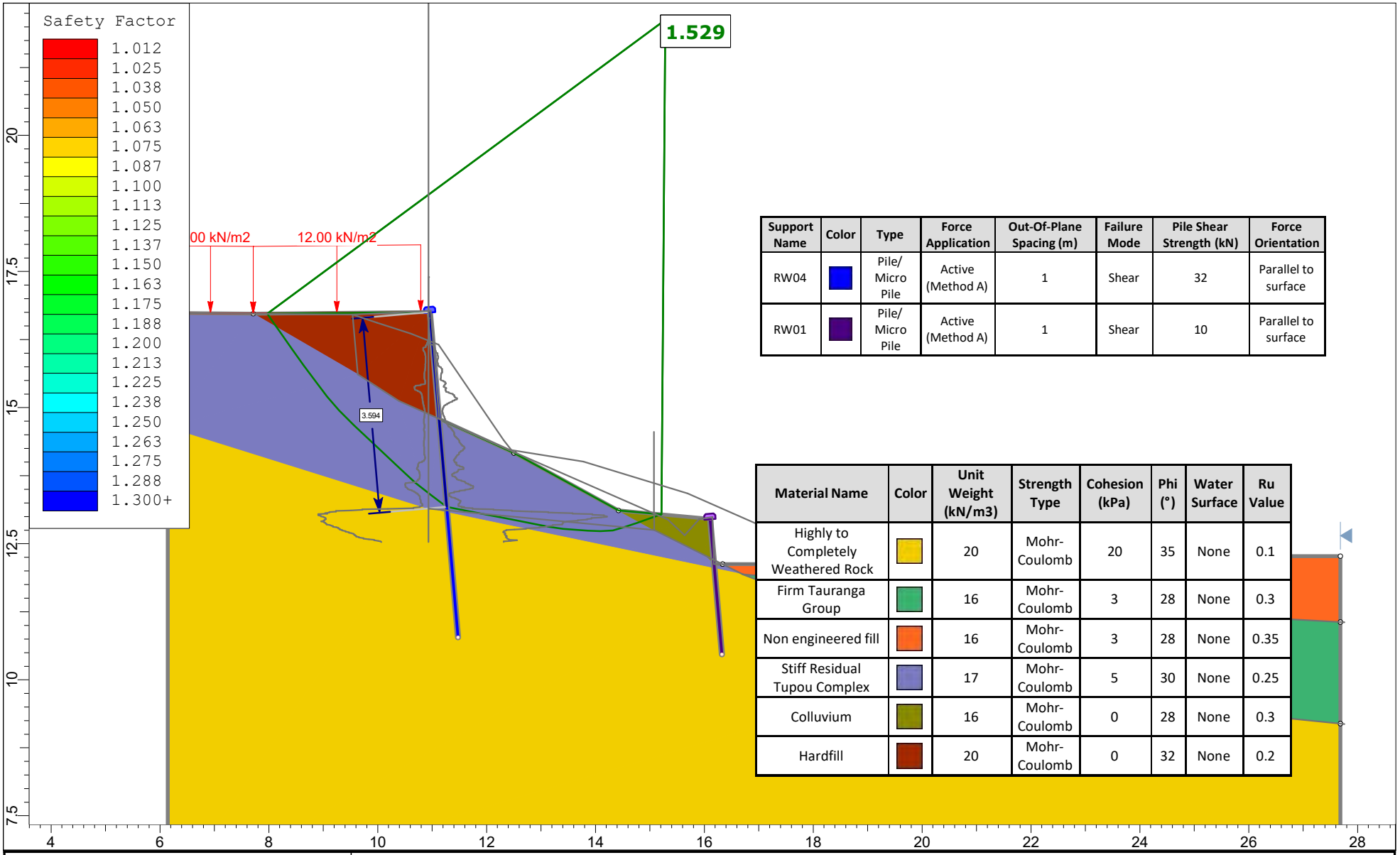
SLIDEINTERPRET 9.036

Project	RP 35 Old Church Road Slip		
Group	Section BB Static	*Scenario*	
Drawn By	J Corskie	*Company*	Haigh Workman
Date	19/06/2025, 10:40:29 am	*File Name*	Section BB Static.slmd



Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (m)	Failure Mode	Pile Shear Strength (kN)	Force Orientation
RW04		Pile/ Micro Pile	Active (Method A)	1	Shear	32	Parallel to surface
RW01		Pile/ Micro Pile	Active (Method A)	1	Shear	10	Parallel to surface

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface	Ru Value
Highly to Completely Weathered Rock		20	Mohr-Coulomb	20	35	None	0.1
Firm Tauranga Group		16	Mohr-Coulomb	3	28	None	0.3
Non engineered fill		16	Mohr-Coulomb	3	28	None	0.35
Stiff Residual Tupou Complex		17	Mohr-Coulomb	5	30	None	0.25
Colluvium		16	Mohr-Coulomb	0	28	None	0.3
Hardfill		20	Mohr-Coulomb	0	32	None	0.2

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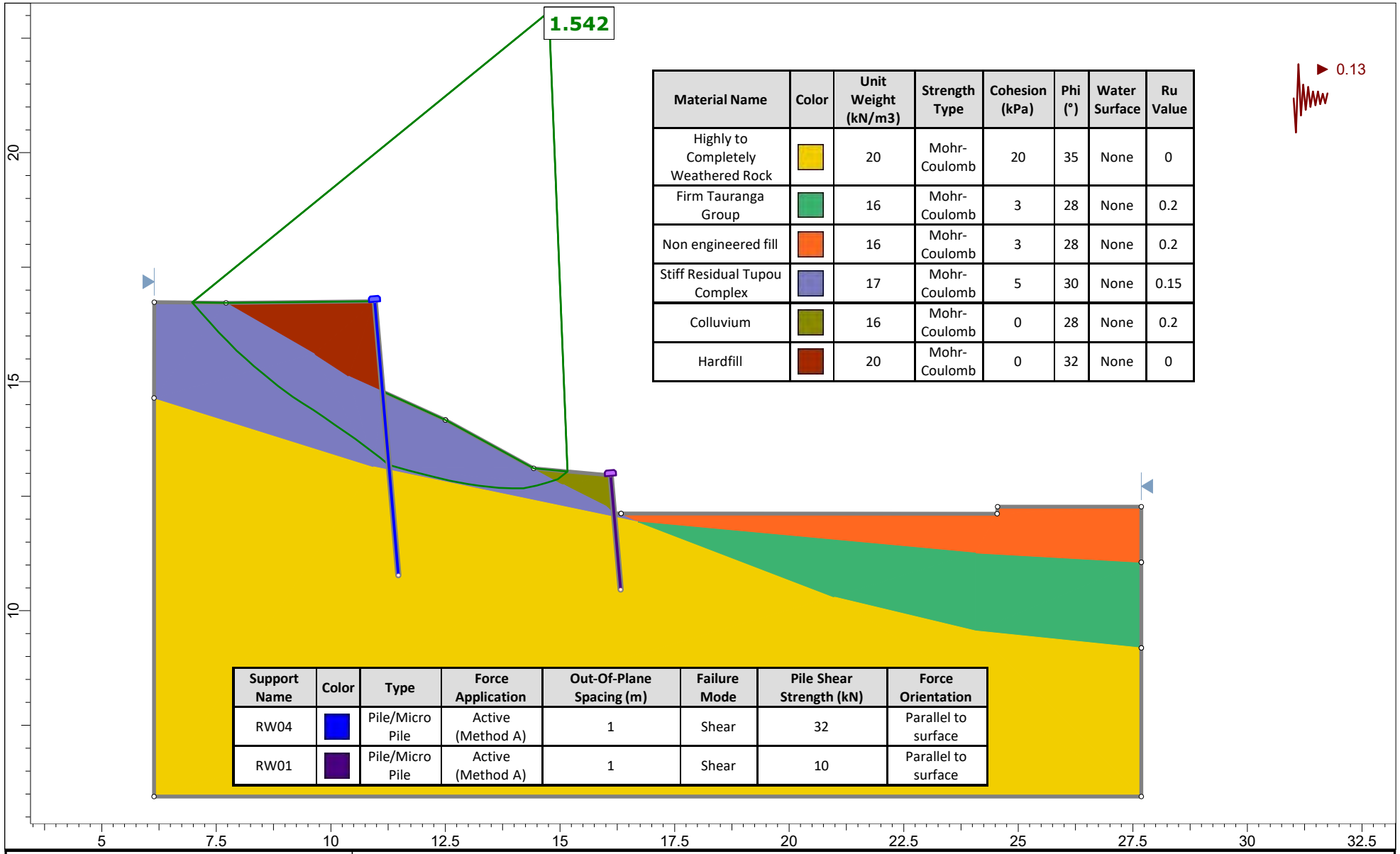
SLIDEINTERPRET 9.036

Project	RP 35 Old Church Road Slip		
Group	Section BB Saturated	*Scenario*	
Drawn By	J Corskie	*Company*	Haigh Workman
Date	19/06/2025, 10:40:29 am	*File Name*	Section BB Saturated.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface	Ru Value
Highly to Completely Weathered Rock		20	Mohr-Coulomb	20	35	None	0
Firm Tauranga Group		16	Mohr-Coulomb	3	28	None	0.2
Non engineered fill		16	Mohr-Coulomb	3	28	None	0.2
Stiff Residual Tupou Complex		17	Mohr-Coulomb	5	30	None	0.15
Colluvium		16	Mohr-Coulomb	0	28	None	0.2
Hardfill		20	Mohr-Coulomb	0	32	None	0

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (m)	Failure Mode	Pile Shear Strength (kN)	Force Orientation
RW04		Pile/Micro Pile	Active (Method A)	1	Shear	32	Parallel to surface
RW01		Pile/Micro Pile	Active (Method A)	1	Shear	10	Parallel to surface

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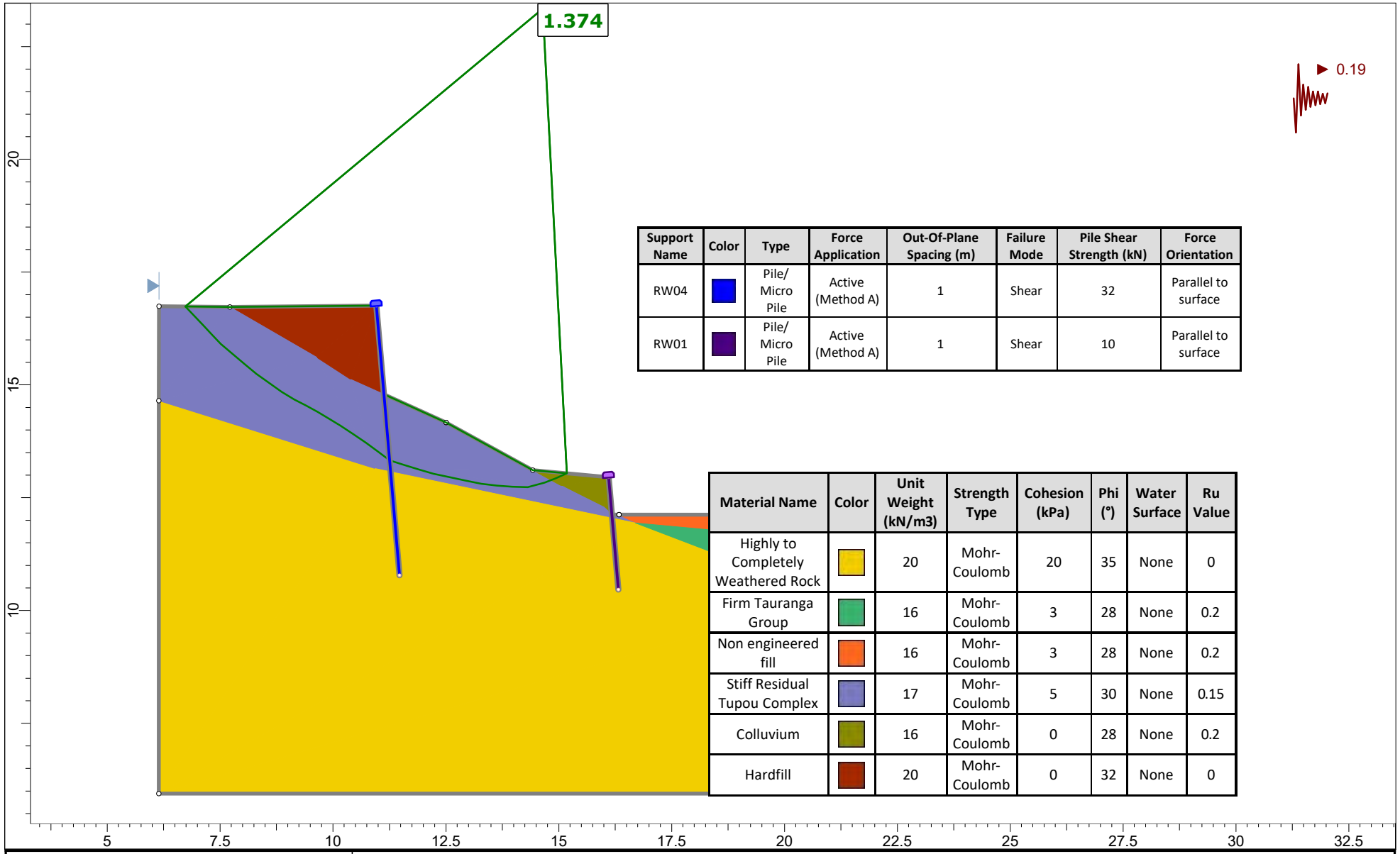
SLIDEINTERPRET 9.036

Project	RP 35 Old Church Road Slip		
Group	Section BB Seismic	*Scenario*	
Drawn By	J Corskie	*Company*	Haigh Workman
Date	19/06/2025, 10:40:29 am	*File Name*	Section BB Seismic.slmd



Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (m)	Failure Mode	Pile Shear Strength (kN)	Force Orientation
RW04		Pile/ Micro Pile	Active (Method A)	1	Shear	32	Parallel to surface
RW01		Pile/ Micro Pile	Active (Method A)	1	Shear	10	Parallel to surface

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface	Ru Value
Highly to Completely Weathered Rock		20	Mohr-Coulomb	20	35	None	0
Firm Tauranga Group		16	Mohr-Coulomb	3	28	None	0.2
Non engineered fill		16	Mohr-Coulomb	3	28	None	0.2
Stiff Residual Tupou Complex		17	Mohr-Coulomb	5	30	None	0.15
Colluvium		16	Mohr-Coulomb	0	28	None	0.2
Hardfill		20	Mohr-Coulomb	0	32	None	0

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SLIDEINTERPRET 9.036

Project	RP 35 Old Church Road Slip		
Group	Section BB Seismic DLS	*Scenario*	
Drawn By	J Corskie	*Company*	Haigh Workman
Date	19/06/2025, 10:40:29 am	*File Name*	Section BB Seismic DLS.slmd

Appendix E – Retaining Calculations

Project Name: 25 101

Old Church Road - FNDC

Doc No.:

Subject: Old Church Road - FNDC By: Jonathan Corskie Date:

Verified By: Date:

RW04 Input parameters for Wallap

Material Properties for Timber Pole

E =	8.70	GPa	(Young Modulus) [MGS8, NZS3603 Amendement 4, Table 2.3]	
	8.70E+06	kPa		
ρ =	450	kg/m^3	(Density)	
S =	1	m c/c	(Spacing between piles)	0.400 m ϕ
A =	0.126	m^2	(Sectional Area)	
I =	1.25664E-03	m^4	(Area Moment of Inertia) per pile	
EA =	**1.093E+06**	kN/m = [kN/m^2][m^2]/[m]		
EI =	**10932.74**	kNm^2/m = [kN/m^2][m^4]/[m]		
w =	**0.555**	kN/m/m = [kg/m^3][m/s^2][m^2]/[m]		
I	1.257E-03	m^4/m	per unit length of wall	
EI	1.0933E-02	kNm^2/m = [kN/m^2][m^4]/[m] per unit length of wall		

Seismic Loading Check

	(m)	(kNm/m) BM	(kN/m SF	c/c (m)
Max Height	2.4	63.4	43	1

Load factor = 1

DESIGN (kNm) BM	(kN) SF	fos	disp (mm)	pole size (mm)	Embedmer (m)	Total length (m)
63.4	43	2.61	57	400	3.6	6

pole design (maximum) (kNm) BM	(kN) SF
162	240
OK	OK

Vehicle Impact Loading Check

	(m)	(kNm/m) BM	(kN/m SF	c/c (m)
Max Height	2.4	150.1	101.8	1

Load factor = 1

DESIGN (kNm) BM	(kN) SF	fos	disp (mm)	pole size (mm)	Embedmer (m)	Total length (m)
150.1	101.8	1.72	101	400	3.6	6

pole design (maximum) (kNm) BM	(kN) SF
162	240
OK	OK

Saturated Loading Check

	(m)	(kNm/m) BM	(kN/m SF	c/c (m)
Max Height	2.4	52.7	36.1	1

Load factor = 1.5

DESIGN (kNm) BM	(kN) SF	fos	disp (mm)	pole size (mm)	Embedmer (m)	Total length (m)
79.05	54.15	2.01	49	0	3.6	6

pole design (maximum) (kNm) BM	(kN) SF
97	144
OK	OK

Static Loading Check

	(m)	(kNm/m) BM	(kN/m SF	c/c (m)
Max Height	2.4	55	36.6	1

Load factor = 1.5

DESIGN (kNm) BM	(kN) SF	fos	disp (mm)	pole size (mm)	Embedmer (m)	Total length (m)
82.5	54.9	2.1	49	0	3.6	6

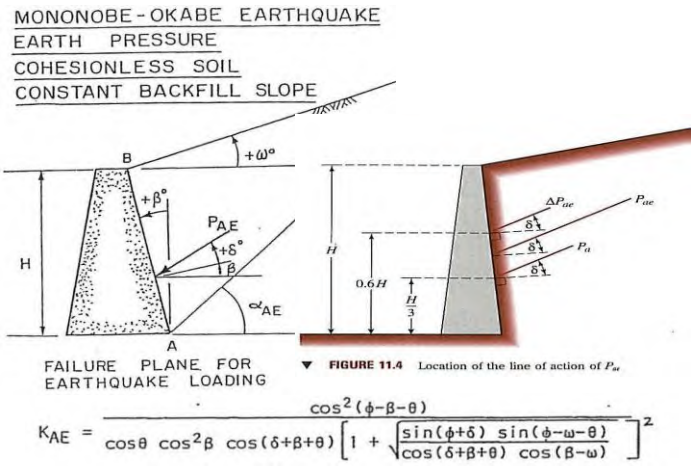
pole design (maximum) (kNm) BM	(kN) SF
97	144
OK	OK

EARTH PRESSURE UNDER EARTHQUAKE BY MONONOBE-OKABE METHOD

-- for Yielding or Flexible Walls (δ > 0.5% x Height of Wall)

Module 6 for loadings

$C_0 = k_h$	0.13	g	
$\theta = \tan^{-1}(k_h/(1-k_v))$	7.41	(Assume kv = 0)	
ω	14.00	º	
ϕ	30	º	
β	0	º	
δ	20	º	= 0.66667 ϕ
$\cos\theta$	0.991655617		
$\cos^2\beta$	1		
$\cos^2(\phi-\beta-\theta)$	0.852402697		
$\cos(\delta+\beta+\theta)$	0.88775986		
$\sin(\phi+\delta)$	0.766044443		
$\sin(\phi-\omega-\theta)$	0.149416059		
$\cos(\beta-\omega)$	0.970295726		
K_{AE}	**0.520027422**		



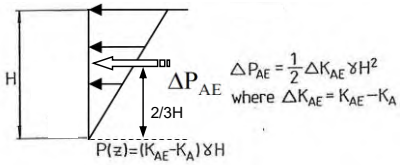
$$K_{AE} = \frac{\cos^2(\phi-\beta-\theta)}{\cos\theta\,\cos^2\beta\,\cos(\delta+\beta+\theta)\left[1+\sqrt{\frac{\sin(\phi+\delta)\,\sin(\phi-\omega-\theta)}{\cos(\delta+\beta+\theta)\,\cos(\beta-\omega)}}\right]^2}$$

$\cos^2(\phi-\beta)$	0.75	
$\cos^2\beta$	1	
$\cos(\delta+\beta)$	0.939692621	
$\sin(\phi+\delta)$	0.766044443	
$\sin(\phi-\omega)$	0.275637356	
$\cos(\omega-\beta)$	0.970295726	
K_A	**0.363773881**	

Coulomb equation for earth pressure:

$$K_A = \frac{\cos^2(\phi-\beta)}{\cos^2\beta\,\cos(\delta+\beta)\left[1+\sqrt{\frac{\sin(\phi+\delta)\,\sin(\phi-\omega)}{\cos(\delta+\beta)\,\cos(\omega-\beta)}}\right]^2}$$

γ	18	kN/m^3
H (Unbalanced Height)	3.00	m
ΔK_{AE}	0.16	
ΔP_{AE}	**12.66**	**kN/m**
Location of ΔP_{AE}	2.00	m from base



$\Delta P_{AE} = \frac{1}{2}\Delta K_{AE}\gamma H^2$ where $\Delta K_{AE} = K_{AE} - K_A$

Flexible Wall (from Mononobe–Okabe Theory)

Seed & Whitman (1970)

kh	0.08	
Ch(T0)	1.33	Site Class C
Z	0.06	Northland
Ru	1	1/500
Zru	0.0798	
Min Zru	0.13	

Units: kN,m

INPUT DATA

SOIL PROFILE

Stratum no.	Elevation of top of stratum	Soil types Left side	Right side
1	0.00	8 Engineered Fill	8 Engineered Fill
2	-2.40	3 Stiff Residual Tupou	3 Stiff Residual Tupou
3	-3.70	7 Tupou Weathered Rock	7 Tupou Weathered Rock

SOIL PROPERTIES

-- Soil type -- No.	Description (Datum elev.)	Bulk density kN/m3	Young's Modulus Eh,kN/m2 (dEh/dy)	At rest coeff. Ko (dKo/dy)	Consol state. NC/OC (Nu)	Active limit Ka (Kac)	Passive limit Kp (Kpc)	Cohesion kN/m2 (dc/dy)
1	Firm Tauranga Group	18.00	10000	0.530	NC (0.350)	0.327 (1.260)	4.127 (5.881)	3.000d
2	Tupou Rock Undrain	18.00	30000	0.426	NC (0.490)	1.000 (2.474)	1.000 (2.475)	1000u
3	Stiff Residual Tupou	18.00	20000	0.500	NC (0.350)	0.299 (1.209)	3.960 (5.127)	5.000d
4	Hard Clay (UD)	18.00	30000	0.440	NC (0.490)	1.000 (2.475)	1.000 (2.283)	500.0u
5	Very Stiff Clay (UD)	18.00	30000	0.470	NC (0.490)	1.000 (2.474)	1.000 (2.283)	200.0u
6	Hard Clay	20.00	30000	0.440	NC (0.350)	0.234 (1.135)	6.396 (7.999)	15.00d
7	Tupou Weathered Rock	20.00	30000	0.426	NC (0.490)	0.227 (1.104)	5.350 (6.213)	150.0d
8	Engineered Fill	20.00	50000	0.470	OC (0.350)	0.262 (0.000)	4.448 (0.000)	

Additional soil parameters associated with Ka and Kp

------- Soil type ------- No.	Description	--- parameters for Ka --- Soil friction angle	Wall adhesion coeff.	Back-fill angle	--- parameters for Kp --- Soil friction angle	Wall adhesion coeff.	Back-fill angle
1	Firm Tauranga Group	28.00	0.666	5.00	28.00	0.666	0.00
2	Tupou Rock Undrain	0.00	0.666	0.00	0.00	0.666	0.00
3	Stiff Residual Tupou	30.00	0.666	5.00	30.00	0.333	0.00
4	Hard Clay (UD)	0.00	0.667	0.00	0.00	0.333	0.00
5	Very Stiff Clay (UD)	0.00	0.666	0.00	0.00	0.333	0.00
6	Hard Clay	34.00	0.750	0.00	34.00	0.750	0.00
7	Tupou Weathered Rock	35.00	0.666	0.00	35.00	0.333	0.00
8	Engineered Fill	32.00	0.624	0.00	32.00	0.333	0.00

GROUND WATER CONDITIONS

Density of water = 9.810 kN/m3

	Left side	Right side
Initial water table elevation	-14.00	-14.00

Automatic water pressure balancing at toe of wall : No

Water press. profile no.	Left side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	Right side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2
1	1	-3.00	-3.00	0.0	1	-3.00	-3.00	0.0
2	1	-14.00	-14.00	0.0	1	-14.00	-14.00	0.0

WALL PROPERTIES

```
                        Type of structure = Soldier Pile Wall
                    Soldier Pile width =  0.40 m
                  Soldier Pile spacing =  1.00 m
             Passive mobilisation factor =  1.56
                Elevation of toe of wall = -6.00
           Maximum finite element length =  0.30 m
                Youngs modulus of wall E = 8.7000E+06 kN/m2
             Moment of inertia of wall I = 1.2566E-03 m4/m run
                                         = 1.2566E-03 m4 per pile
                                     E.I = 10933 kN.m2/m run
                   Yield Moment of wall = Not defined
```

HORIZONTAL and MOMENT LOADS/RESTRAINTS

Load no.	Elevation	Horizontal load kN/m run	Moment load kN.m/m run	Moment restraint kN.m/m/rad	Partial factor (Category)
1	-1.00	12.66	0	0	n/a
2	-1.00	-12.66	0	0	n/a
3	0.50	26.70	0	0	n/a
4	-3.25	23.33	0	0	n/a
5	-1.65	9.150	0	0	n/a
6	-2.57	3.050	0	0	n/a

SURCHARGE LOADS

Surcharge no.	Elev.	Distance from wall	Length parallel to wall	Width perpend. to wall	Surcharge(kN/m2) Near edge	Far edge	Surcharge Soil Cat.	Soil type	Part fact.	Short Q reduc. fact.
1	-3.00	-0.00(R)	20.00	6.00	9.60	-38.50	--	--	--	--
2	-3.00	-6.00(R)	20.00	12.00	-38.50	=	--	--	--	--
3	0.00	0.00(L)	20.00	5.00	10.50	=	--	--	--	--
4	0.00	1.00(L)	0.60	0.90	133.00	=	--	--	--	--
5	0.00	3.10(L)	0.60	0.90	133.00	=	--	--	--	--
6	0.00	5.00(L)	20.00	9.30	0.00	126.00	--	--	--	--
7	0.00	14.30(L)	20.00	5.70	126.00	135.00	--	--	--	--
8	0.00	0.00(L)	20.00	5.00	5.00	=	--	--	--	--

Note: L = Left side, R = Right side
A ramp surcharge is defined by two values:
N = at edge near to wall, F = at edge far from wall

CONSTRUCTION STAGES

Construction stage no.	Stage description
1	Excavate to elevation -3.00 on RIGHT side
2	Apply surcharge no.1 at elevation -3.00
3	Apply surcharge no.2 at elevation -3.00
4	Apply surcharge no.3 at elevation 0.00
5	Apply surcharge no.6 at elevation 0.00
6	Apply surcharge no.7 at elevation 0.00
7	Apply surcharge no.4 at elevation 0.00
8	Apply surcharge no.5 at elevation 0.00
9	Remove surcharge no.4 at elevation 0.00
10	Remove surcharge no.5 at elevation 0.00
11	Apply water pressure profile no.1
12	Apply water pressure profile no.2
13	Remove surcharge no.3 at elevation 0.00
14	Apply load no.1 at elevation -1.00
15	Apply load no.2 at elevation -1.00
16	Apply surcharge no.8 at elevation 0.00
17	Change EI of wall to 10933 kN.m2/m run Reset wall displacements to zero at this stage
18	Apply load no.3 at elevation 0.50

FACTORS OF SAFETY and ANALYSIS OPTIONS

Stability analysis:
Method of analysis - Strength Factor method
Factor on soil strength for calculating wall depth = 1.50

Parameters for undrained strata:
Minimum equivalent fluid density = 5.00 kN/m3
Maximum depth of water filled tension crack = 0.00 m

Bending moment and displacement calculation:
Method - Subgrade reaction model using Influence Coefficients
Open Tension Crack analysis? - No
Non-linear Modulus Parameter (L) = 0 m

Boundary conditions:
Length of wall (normal to plane of analysis) = 20.00 m

Width of excavation/fill on Left side of wall = 20.00 m
Width of excavation/fill on Right side of wall = 20.00 m

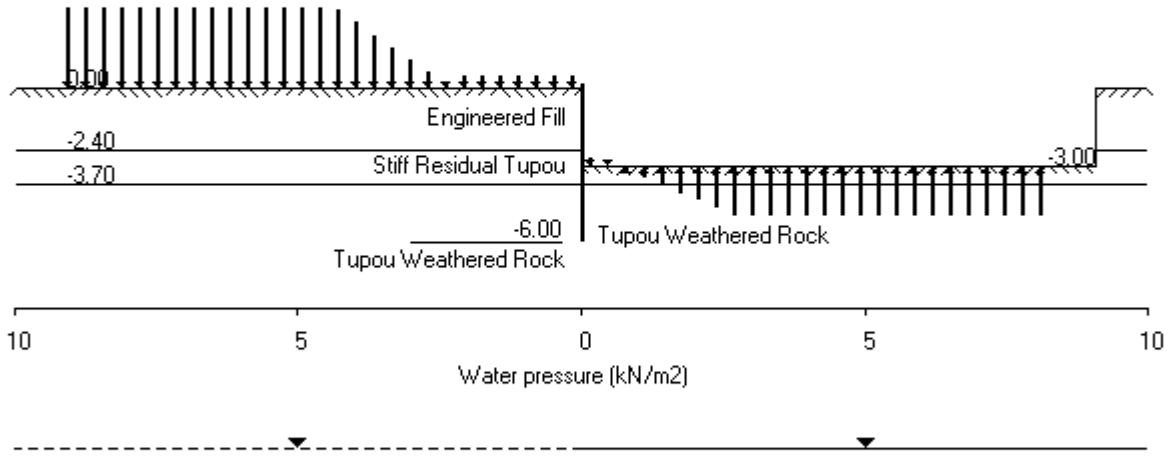
Distance to rigid boundary on Left side = 20.00 m
Distance to rigid boundary on Right side = 20.00 m

OUTPUT OPTIONS

Stage no.	Stage description	Output options: Displacement Bending mom. Shear force	Active, Passive pressures	Graph. output
1	Excav. to elev. -3.00 on RIGHT side	No	No	No
2	Apply surcharge no.1 at elev. -3.00	No	No	No
3	Apply surcharge no.2 at elev. -3.00	No	No	No
4	Apply surcharge no.3 at elev. 0.00	No	No	No
5	Apply surcharge no.6 at elev. 0.00	No	No	No
6	Apply surcharge no.7 at elev. 0.00	Yes	Yes	Yes
7	Apply surcharge no.4 at elev. 0.00	No	No	No
8	Apply surcharge no.5 at elev. 0.00	Yes	Yes	Yes
9	Remove surcharge no.4 at elev. 0.00	No	No	No
10	Remove surcharge no.5 at elev. 0.00	No	No	No
11	Apply water pressure profile no.1	Yes	Yes	Yes
12	Apply water pressure profile no.2	No	No	No
13	Remove surcharge no.3 at elev. 0.00	No	No	No
14	Apply load no.1 at elev. -1.00	Yes	Yes	Yes
15	Apply load no.2 at elev. -1.00	Yes	Yes	Yes
16	Apply surcharge no.8 at elev. 0.00	Yes	Yes	Yes
17	Change EI of wall to 10933kN.m2/m run	Yes	Yes	Yes
18	Apply load no.3 at elev. 0.50	Yes	Yes	Yes
*	Summary output	Yes	-	Yes

Units: kN,m

Stage No.6 Apply surcharge no.7 at elev. 0.00



Units: kN,m

Stage No. 6 Apply surcharge no.7 at elevation 0.00

STABILITY ANALYSIS of Soldier Pile Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	Ground level Act.	Ground level Pass.	Prop Elev.	FoS for toe elev. = -6.00 Factor of Safety	FoS for toe elev. = -6.00 Moment equilib. at elev.	Toe elev. for FoS = 1.500 Toe elev.	Wall Penetr-ation	Direction of failure
6	0.00	-3.00	Cant.	2.209	-5.27	-5.05	2.05	L to R

BENDING MOMENT and DISPLACEMENT ANALYSIS of Soldier Pile Wall

Analysis options

Soldier Pile width = 0.40m; spacing = 1.00m
Passive mobilisation factor = 1.560
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached

Length of wall perpendicular to section = 20.00m
Rigid boundaries: Left side 20.00m from wall
Right side 20.00m from wall

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN /m	Shear force kN /pile	Bending moment kN.m /m	Bending moment kN.m /pile	Prop forces kN/m
1	0.50	0.00	0.042	1.01E-02	0.0	0.0	0.0	0.0	
2	0.25	0.00	0.040	1.01E-02	0.0	0.0	-0.0	-0.0	
3	0.00	0.00	0.037	1.01E-02	0.0	0.0	0.0	0.0	
		2.75	0.037	1.01E-02	0.0	0.0	-0.0	-0.0	
4	-0.30	4.32	0.034	1.01E-02	1.1	1.1	0.1	0.1	
5	-0.60	5.89	0.031	1.01E-02	2.6	2.6	0.7	0.7	
6	-0.80	6.94	0.029	1.00E-02	3.9	3.9	1.3	1.3	
7	-1.00	7.99	0.027	1.00E-02	5.4	5.4	2.2	2.2	
8	-1.25	9.31	0.024	9.99E-03	7.5	7.5	3.8	3.8	
9	-1.50	10.63	0.022	9.88E-03	10.0	10.0	6.0	6.0	
10	-1.80	12.23	0.019	9.66E-03	13.5	13.5	9.5	9.5	
11	-2.10	13.83	0.016	9.34E-03	17.4	17.4	14.1	14.1	
12	-2.40	15.45	0.013	8.87E-03	21.8	21.8	20.0	20.0	
		11.64	0.013	8.87E-03	21.8	21.8	20.0	20.0	
13	-2.70	13.31	0.011	8.22E-03	25.5	25.5	27.1	27.1	
14	-3.00	15.01	0.008	7.37E-03	29.7	29.7	35.4	35.4	
		-30.35	0.008	7.37E-03	29.7	29.7	35.4	35.4	
15	-3.30	-38.51	0.006	6.29E-03	19.4	19.4	42.8	42.8	
16	-3.50	-42.34	0.005	5.48E-03	11.3	11.3	46.0	46.0	
17	-3.70	-34.09	0.004	4.62E-03	3.7	3.7	47.8	47.8	
		-91.84	0.004	4.62E-03	3.7	3.7	47.8	47.8	
18	-3.95	-59.03	0.003	3.55E-03	-15.2	-15.2	46.3	46.3	
19	-4.20	-30.57	0.002	2.55E-03	-26.4	-26.4	40.7	40.7	
20	-4.50	-5.99	0.002	1.56E-03	-31.9	-31.9	31.4	31.4	
21	-4.80	10.36	0.001	8.41E-04	-31.2	-31.2	21.7	21.7	
22	-5.10	20.97	0.001	3.67E-04	-26.5	-26.5	12.8	12.8	
23	-5.40	28.09	0.001	1.10E-04	-19.1	-19.1	5.9	5.9	
24	-5.70	32.71	0.001	9.87E-06	-10.0	-10.0	1.5	1.5	
25	-6.00	34.12	0.001	-1.03E-05	0.0	0.0	-0.0	-0.0	

(continued)

Stage No.6 Apply surcharge no.7 at elevation 0.00

LEFT side

Node no.	Y coord	Water press.	Effective stresses: Vertic-al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	10.50	2.75	46.70	2.75	2.75a	21428
4	-0.30	0.00	16.50	4.32	73.40	4.32	4.32a	12082
5	-0.60	0.00	22.51	5.89	100.13	5.89	5.89a	12082
6	-0.80	0.00	26.53	6.94	117.99	6.94	6.94a	12082
7	-1.00	0.00	30.55	7.99	135.89	7.99	7.99a	12082
8	-1.25	0.00	35.59	9.31	158.32	9.31	9.31a	12082
9	-1.50	0.00	40.66	10.63	180.84	10.63	10.63a	12082
10	-1.80	0.00	46.76	12.23	207.98	12.23	12.23a	12082
11	-2.10	0.00	52.89	13.83	235.26	13.83	13.83a	12082
12	-2.40	0.00	59.05	15.45	262.67	15.45	15.45a	12082
		0.00	59.05	11.64	259.51	11.64	11.64a	4833
13	-2.70	0.00	64.65	13.31	281.66	13.31	13.31a	4833
14	-3.00	0.00	70.27	15.00	303.94	15.01	15.01	4833
		0.00	70.27	15.00	189.66	15.01	15.01	4833
15	-3.30	0.00	75.93	16.69	203.63	17.05	17.05	4833
16	-3.50	0.00	79.71	17.82	212.98	19.53	19.53	4833
17	-3.70	0.00	83.50	18.96	222.35	23.42	23.42	4833
		0.00	83.50	0.00	860.29	2.96	2.96	8648
18	-3.95	0.00	88.76	0.00	877.84	12.21	12.21	8648
19	-4.20	0.00	94.03	0.00	895.43	22.70	22.70	8648
20	-4.50	0.00	100.37	0.00	916.59	32.15	32.15	8648
21	-4.80	0.00	106.72	0.00	937.80	38.92	38.92	8648
22	-5.10	0.00	113.08	0.00	959.04	43.82	43.82	8648
23	-5.40	0.00	119.45	0.00	980.31	47.59	47.59	8648
24	-5.70	0.00	125.83	0.00	1001.59	50.41	50.41	8648
25	-6.00	0.00	132.21	0.00	1022.88	51.72	51.72	8648

RIGHT side

Node no.	Y coord	Water press.	Effective stresses: Vertic-al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	-0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	-0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	-0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	-1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	-1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	-1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	-1.80	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	-2.10	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	-2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	-2.70	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	-3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	9.60	0.00	45.36	45.36	45.36p	4833
15	-3.30	0.00	13.47	0.00	55.56	55.56	55.56p	4833
16	-3.50	0.00	16.06	0.00	62.37	61.87	61.87	4833
17	-3.70	0.00	18.65	0.00	69.21	57.51	57.51	4833
		0.00	18.65	0.00	643.76	94.80	94.80	8648

(continued)

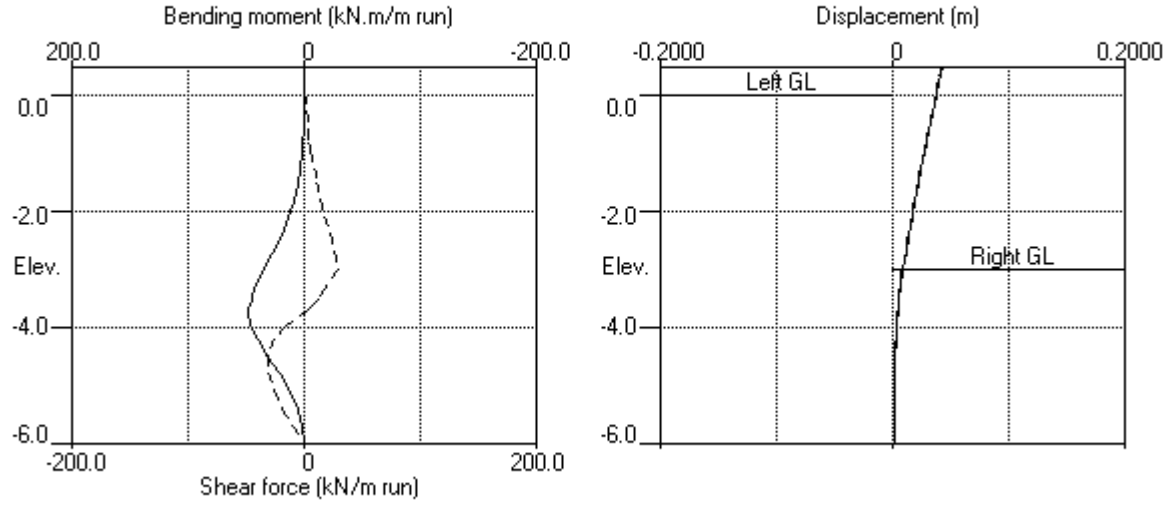
Stage No.6 Apply surcharge no.7 at elevation 0.00

		RIGHT side						
			Effective stresses				Total	Coeff. of
Node no.	Y coord	Water press.	Vertic -al	Active limit	Passive limit	Earth pressure	earth pressure	subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
18	-3.95	0.00	22.40	0.00	656.30	71.24	71.24	8648
19	-4.20	0.00	26.17	0.00	668.89	53.27	53.27	8648
20	-4.50	0.00	30.74	0.00	684.12	38.14	38.14	8648
21	-4.80	0.00	35.34	0.00	699.50	28.56	28.56	8648
22	-5.10	0.00	40.00	0.00	715.04	22.85	22.85	8648
23	-5.40	0.00	44.71	0.00	730.77	19.50	19.50	8648
24	-5.70	0.00	49.48	0.00	746.70	17.70	17.70	8648
25	-6.00	0.00	54.32	0.00	762.86	17.60	17.60	8648

Note: 13.31 a Soil pressure at active limit
55.56 p Soil pressure at passive limit

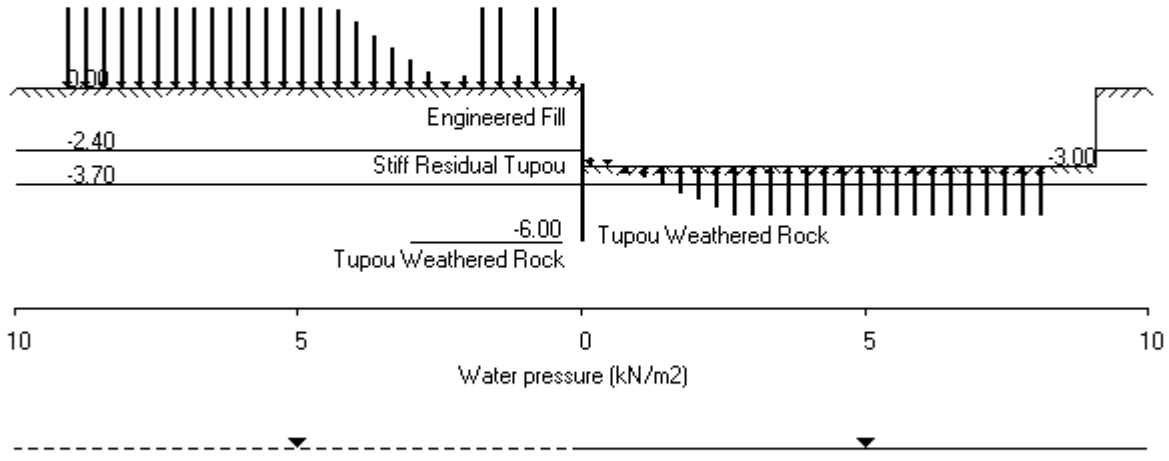
Units: kN,m

Stage No.6 Apply surcharge no.7 at elev. 0.00



Units: kN,m

Stage No.8 Apply surcharge no.5 at elev. 0.00



Units: kN,m

Stage No. 8 Apply surcharge no.5 at elevation 0.00

STABILITY ANALYSIS of Soldier Pile Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	Ground level Act.	Ground level Pass.	Prop Elev.	FoS for toe elev. = -6.00 Factor of Safety	FoS for toe elev. = -6.00 Moment equilib. at elev.	Toe elev. for FoS = 1.500 Toe elev.	Wall Penetr-ation	Direction of failure
8	0.00	-3.00	Cant.	2.095	-5.27	-5.13	2.13	L to R

BENDING MOMENT and DISPLACEMENT ANALYSIS of Soldier Pile Wall

Analysis options

Soldier Pile width = 0.40m; spacing = 1.00m
Passive mobilisation factor = 1.560
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached

Length of wall perpendicular to section = 20.00m
Rigid boundaries: Left side 20.00m from wall
Right side 20.00m from wall

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN /m	Shear force kN /pile	Bending moment kN.m /m	Bending moment kN.m /pile	Prop forces kN/m
1	0.50	0.00	0.049	1.17E-02	0.0	0.0	0.0	0.0	
2	0.25	0.00	0.046	1.17E-02	0.0	0.0	-0.0	-0.0	
3	0.00	0.00	0.043	1.17E-02	0.0	0.0	0.0	0.0	
		2.75	0.043	1.17E-02	0.0	0.0	-0.0	-0.0	
4	-0.30	4.42	0.040	1.17E-02	1.1	1.1	0.1	0.1	
5	-0.60	6.45	0.036	1.17E-02	2.7	2.7	0.7	0.7	
6	-0.80	7.88	0.034	1.16E-02	4.1	4.1	1.4	1.4	
7	-1.00	9.27	0.031	1.16E-02	5.9	5.9	2.4	2.4	
8	-1.25	10.88	0.029	1.15E-02	8.4	8.4	4.1	4.1	
9	-1.50	12.35	0.026	1.14E-02	11.3	11.3	6.6	6.6	
10	-1.80	13.99	0.022	1.12E-02	15.2	15.2	10.5	10.5	
11	-2.10	15.54	0.019	1.08E-02	19.7	19.7	15.8	15.8	
12	-2.40	17.07	0.016	1.03E-02	24.5	24.5	22.4	22.4	
		13.49	0.016	1.03E-02	24.5	24.5	22.4	22.4	
13	-2.70	15.04	0.013	9.61E-03	28.8	28.8	30.4	30.4	
14	-3.00	16.60	0.010	8.64E-03	33.6	33.6	39.7	39.7	
		-29.36	0.010	8.64E-03	33.6	33.6	39.7	39.7	
15	-3.30	-37.94	0.008	7.44E-03	23.5	23.5	48.4	48.4	
16	-3.50	-43.58	0.006	6.51E-03	15.3	15.3	52.4	52.4	
17	-3.70	-42.63	0.005	5.53E-03	6.7	6.7	55.0	55.0	
		-110.46	0.005	5.53E-03	6.7	6.7	55.0	55.0	
18	-3.95	-71.23	0.004	4.29E-03	-16.0	-16.0	53.7	53.7	
19	-4.20	-37.68	0.003	3.13E-03	-29.6	-29.6	47.5	47.5	
20	-4.50	-8.62	0.002	1.97E-03	-36.6	-36.6	37.0	37.0	
21	-4.80	10.76	0.002	1.11E-03	-36.2	-36.2	25.7	25.7	
22	-5.10	23.34	0.001	5.55E-04	-31.1	-31.1	15.3	15.3	
23	-5.40	32.63	0.001	2.46E-04	-22.7	-22.7	7.1	7.1	
24	-5.70	38.59	0.001	1.24E-04	-12.1	-12.1	1.8	1.8	
25	-6.00	41.75	0.001	9.95E-05	0.0	0.0	-0.0	-0.0	

(continued)

Stage No.8 Apply surcharge no.5 at elevation 0.00

LEFT side

Node no.	Y coord	Water press.	Effective stresses: Vertic-al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	10.50	2.75	46.70	2.75	2.75a	13206
4	-0.30	0.00	16.89	4.42	75.14	4.42	4.42a	13206
5	-0.60	0.00	24.64	6.45	109.61	6.45	6.45a	13206
6	-0.80	0.00	30.13	7.88	134.04	7.88	7.88a	13206
7	-1.00	0.00	35.45	9.27	157.68	9.27	9.27a	13206
8	-1.25	0.00	41.60	10.88	185.04	10.88	10.88a	13206
9	-1.50	0.00	47.22	12.35	210.04	12.35	12.35a	13206
10	-1.80	0.00	53.47	13.99	237.86	13.99	13.99a	13206
11	-2.10	0.00	59.42	15.54	264.32	15.54	15.54a	13206
12	-2.40	0.00	65.24	17.07	290.21	17.07	17.07a	13206
		0.00	65.24	13.49	284.02	13.49	13.49a	5283
13	-2.70	0.00	70.43	15.04	304.57	15.04	15.04a	5283
14	-3.00	0.00	75.64	16.60	325.21	16.60	16.60a	5283
		0.00	75.64	16.60	202.93	16.60	16.60a	5283
15	-3.30	0.00	80.90	18.18	215.91	18.18	18.18a	5283
16	-3.50	0.00	84.43	19.23	224.64	19.32	19.32	5283
17	-3.70	0.00	87.98	20.30	233.42	23.77	23.77	5283
		0.00	87.98	0.00	875.24	0.09	0.09	9440
18	-3.95	0.00	92.96	0.00	891.85	11.17	11.17	9440
19	-4.20	0.00	97.96	0.00	908.57	23.09	23.09	9440
20	-4.50	0.00	104.01	0.00	928.77	33.77	33.77	9440
21	-4.80	0.00	110.10	0.00	949.10	41.33	41.33	9440
22	-5.10	0.00	116.23	0.00	969.54	46.69	46.69	9440
23	-5.40	0.00	122.38	0.00	990.08	51.40	51.40	9440
24	-5.70	0.00	128.56	0.00	1010.70	54.63	54.63	9440
25	-6.00	0.00	134.75	0.00	1031.38	56.84	56.84	9440

RIGHT side

Node no.	Y coord	Water press.	Effective stresses: Vertic-al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	-0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	-0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	-0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	-1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	-1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	-1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	-1.80	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	-2.10	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	-2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	-2.70	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	-3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	9.60	0.00	45.96	45.96	45.96p	9728
15	-3.30	0.00	13.47	0.00	56.12	56.12	56.12p	9728
16	-3.50	0.00	16.06	0.00	62.91	62.91	62.91p	9728
17	-3.70	0.00	18.65	0.00	69.71	66.40	66.40	9728
		0.00	18.65	0.00	643.76	110.55	110.55	17265

(continued)

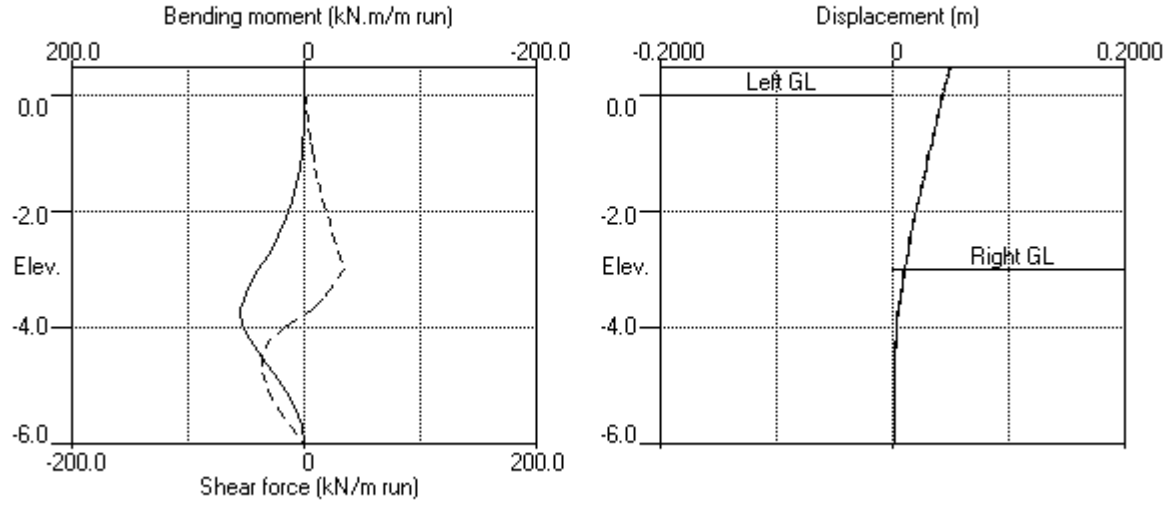
Stage No.8 Apply surcharge no.5 at elevation 0.00

		RIGHT side						
			Effective stresses				Total	Coeff. of
Node no.	Y coord	Water press.	Vertic -al	Active limit	Passive limit	Earth pressure	earth pressure	subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
18	-3.95	0.00	22.40	0.00	656.30	82.40	82.40	17265
19	-4.20	0.00	26.17	0.00	668.89	60.77	60.77	17265
20	-4.50	0.00	30.74	0.00	684.12	42.40	42.40	17265
21	-4.80	0.00	35.34	0.00	699.50	30.56	30.56	17265
22	-5.10	0.00	40.00	0.00	715.04	23.35	23.35	17265
23	-5.40	0.00	44.71	0.00	730.77	18.77	18.77	17265
24	-5.70	0.00	49.48	0.00	746.70	16.04	16.04	17265
25	-6.00	0.00	54.32	0.00	762.86	15.09	15.09	17265

Note: 18.18 a Soil pressure at active limit
62.91 p Soil pressure at passive limit

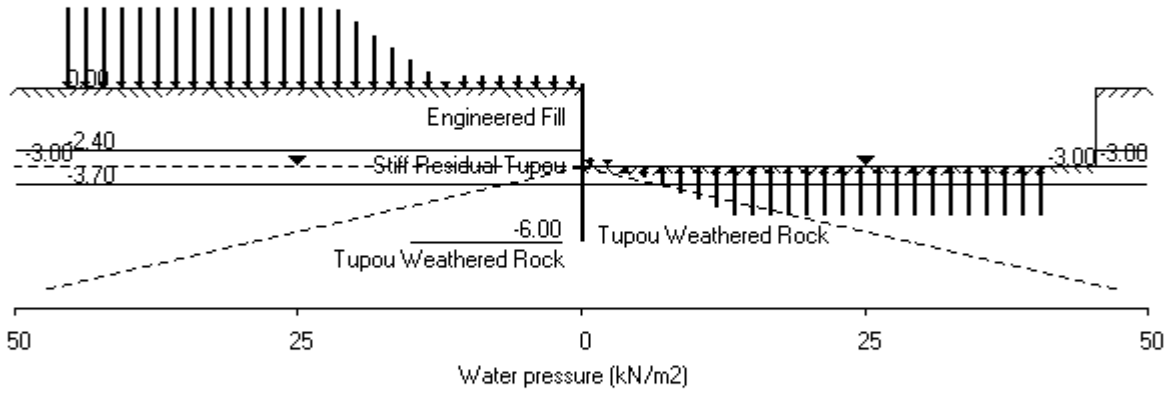
Units: kN,m

Stage No.8 Apply surcharge no.5 at elev. 0.00



Units: kN,m

Stage No.11 Apply water pressure profile no.1



Units: kN,m

Stage No. 11 Apply water pressure profile no.1

STABILITY ANALYSIS of Soldier Pile Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	Ground level Act.	Pass.	Prop Elev.	FoS for toe elev. = -6.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.500 Toe elev.	Wall Penetr-ation	Direction of failure
11	0.00	-3.00	Cant.	2.098	-5.26	-5.11	2.11	L to R

BENDING MOMENT and DISPLACEMENT ANALYSIS of Soldier Pile Wall

Analysis options

Soldier Pile width = 0.40m; spacing = 1.00m
Passive mobilisation factor = 1.560
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached

Length of wall perpendicular to section = 20.00m
Rigid boundaries: Left side 20.00m from wall
Right side 20.00m from wall

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN /m	Shear force kN /pile	Bending moment kN.m /m	Bending moment kN.m /pile	Prop forces kN/m
1	0.50	0.00	0.049	1.17E-02	0.0	0.0	0.0	0.0	
2	0.25	0.00	0.046	1.17E-02	0.0	0.0	-0.0	-0.0	
3	0.00	0.00	0.043	1.17E-02	0.0	0.0	0.0	0.0	
		5.94	0.043	1.17E-02	0.0	0.0	-0.0	-0.0	
4	-0.30	5.60	0.039	1.17E-02	1.7	1.7	0.3	0.3	
5	-0.60	6.60	0.036	1.17E-02	3.6	3.6	1.1	1.1	
6	-0.80	7.16	0.034	1.16E-02	4.9	4.9	1.9	1.9	
7	-1.00	7.99	0.031	1.16E-02	6.4	6.4	3.1	3.1	
8	-1.25	9.31	0.028	1.15E-02	8.6	8.6	4.9	4.9	
9	-1.50	10.63	0.025	1.13E-02	11.1	11.1	7.4	7.4	
10	-1.80	12.23	0.022	1.11E-02	14.5	14.5	11.2	11.2	
11	-2.10	13.83	0.019	1.07E-02	18.4	18.4	16.1	16.1	
12	-2.40	15.45	0.016	1.02E-02	22.8	22.8	22.3	22.3	
		11.64	0.016	1.02E-02	22.8	22.8	22.3	22.3	
13	-2.70	13.31	0.013	9.52E-03	26.6	26.6	29.7	29.7	
14	-3.00	15.00	0.010	8.59E-03	30.8	30.8	38.3	38.3	
		-30.36	0.010	8.59E-03	30.8	30.8	38.3	38.3	
15	-3.30	-32.15	0.008	7.43E-03	21.4	21.4	46.2	46.2	
16	-3.50	-33.35	0.006	6.55E-03	14.9	14.9	50.0	50.0	
17	-3.70	-33.94	0.005	5.61E-03	8.2	8.2	52.7	52.7	
		-104.68	0.005	5.61E-03	8.2	8.2	52.7	52.7	
18	-3.95	-73.73	0.004	4.42E-03	-14.1	-14.1	51.8	51.8	
19	-4.20	-40.79	0.003	3.30E-03	-28.4	-28.4	46.0	46.0	
20	-4.50	-10.07	0.002	2.18E-03	-36.1	-36.1	35.7	35.7	
21	-4.80	11.48	0.001	1.35E-03	-35.9	-35.9	24.5	24.5	
22	-5.10	27.69	0.001	8.23E-04	-30.0	-30.0	14.3	14.3	
23	-5.40	32.17	0.001	5.36E-04	-21.0	-21.0	6.5	6.5	
24	-5.70	35.26	0.001	4.23E-04	-10.9	-10.9	1.7	1.7	
25	-6.00	37.36	0.001	4.00E-04	0.0	0.0	-0.0	-0.0	

(continued)

Stage No.11 Apply water pressure profile no.1

LEFT side

Node no.	Y coord	Water press.	Effective stresses: Vertic-al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	10.50	2.75	46.70	5.94	5.94	213572
4	-0.30	0.00	16.50	4.32	73.40	5.60	5.60	11174
5	-0.60	0.00	22.51	5.89	100.13	6.60	6.60	11174
6	-0.80	0.00	26.53	6.94	117.99	7.16	7.16	11174
7	-1.00	0.00	30.55	7.99	135.89	7.99	7.99a	11174
8	-1.25	0.00	35.59	9.31	158.32	9.31	9.31a	11174
9	-1.50	0.00	40.66	10.63	180.84	10.63	10.63a	11174
10	-1.80	0.00	46.76	12.23	207.98	12.23	12.23a	11174
11	-2.10	0.00	52.89	13.83	235.26	13.83	13.83a	11174
12	-2.40	0.00	59.05	15.45	262.67	15.45	15.45a	11174
		0.00	59.05	11.64	259.51	11.64	11.64a	4470
13	-2.70	0.00	64.65	13.31	281.66	13.31	13.31a	4470
14	-3.00	0.00	70.27	15.00	303.94	15.00	15.00a	4470
		0.00	70.27	15.00	189.66	15.00	15.00a	4470
15	-3.30	2.94	72.98	15.81	196.36	15.81	18.75a	4470
16	-3.50	4.91	74.80	16.35	200.86	16.35	21.26a	4470
17	-3.70	6.87	76.64	16.90	205.38	17.52	24.39	4470
		6.87	76.64	0.00	837.36	0.00	6.87a	8009
18	-3.95	9.32	79.44	0.00	846.72	0.00	9.32a	8009
19	-4.20	11.77	82.26	0.00	856.13	8.35	20.12	8009
20	-4.50	14.71	85.65	0.00	867.47	16.97	31.69	8009
21	-4.80	17.66	89.06	0.00	878.85	22.72	40.37	24366
22	-5.10	20.60	92.48	0.00	890.27	27.69	48.29	24366
23	-5.40	23.54	95.91	0.00	901.71	32.17	55.72	24366
24	-5.70	26.49	99.34	0.00	913.17	35.26	61.75	24366
25	-6.00	29.43	102.78	0.00	924.63	37.36	66.79	24366

RIGHT side

Node no.	Y coord	Water press.	Effective stresses: Vertic-al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	-0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	-0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	-0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	-1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	-1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	-1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	-1.80	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	-2.10	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	-2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	-2.70	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	-3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	9.60	0.00	45.36	45.36	45.36p	8106
15	-3.30	2.94	10.53	0.00	47.96	47.96	50.90p	8106
16	-3.50	4.91	11.15	0.00	49.70	49.70	54.61p	8106
17	-3.70	6.87	11.78	0.00	51.46	51.46	58.33p	8106
		6.87	11.78	0.00	620.84	104.68	111.55	14409

(continued)

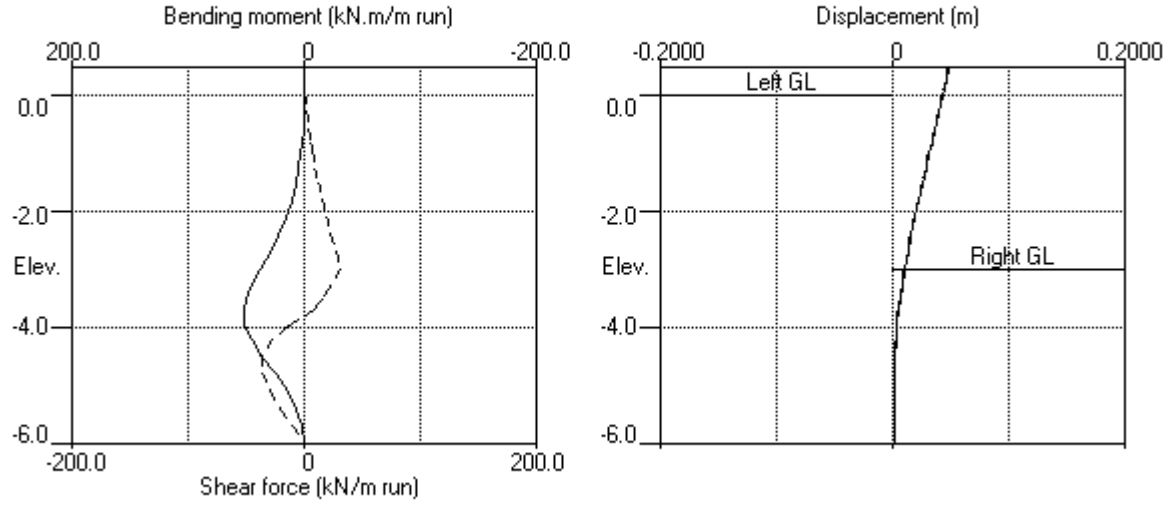
Stage No.11 Apply water pressure profile no.1

		RIGHT side						
			Effective stresses				Total	Coeff. of
Node no.	Y coord	Water press.	Vertic -al	Active limit	Passive limit	Earth pressure	earth pressure	subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
18	-3.95	9.32	13.08	0.00	625.18	73.73	83.05	14409
19	-4.20	11.77	14.40	0.00	629.59	49.14	60.91	14409
20	-4.50	14.71	16.02	0.00	635.00	27.05	41.76	14409
21	-4.80	17.66	17.68	0.00	640.54	11.23	28.89	24366
22	-5.10	20.60	19.39	0.00	646.26	0.00	20.60a	24366
23	-5.40	23.54	21.16	0.00	652.17	0.00	23.54a	24366
24	-5.70	26.49	22.99	0.00	658.28	0.00	26.49a	24366
25	-6.00	29.43	24.89	0.00	664.60	0.00	29.43a	24366

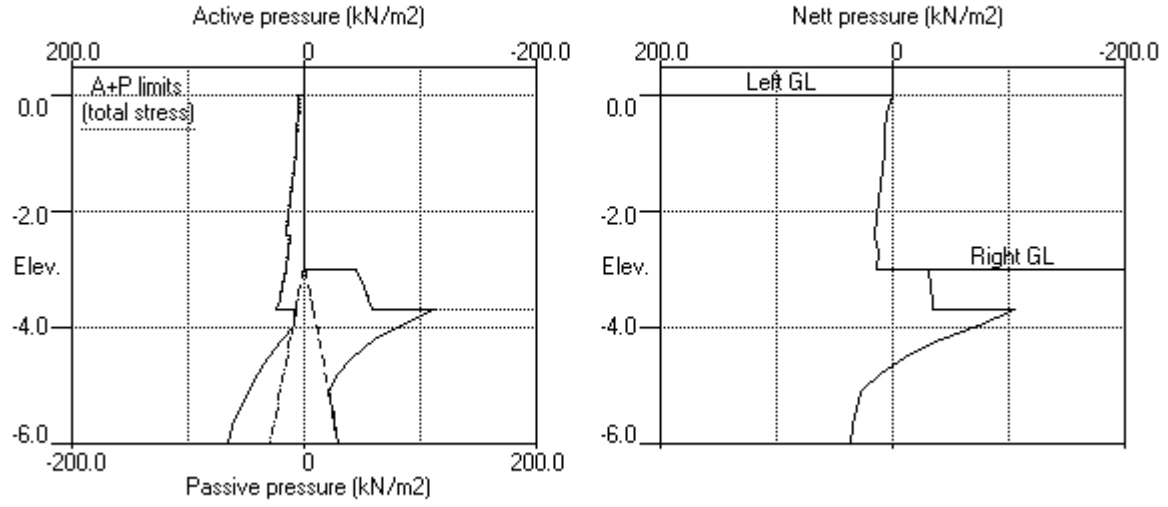
Note: 29.43 a Soil pressure at active limit
58.33 p Soil pressure at passive limit

Units: kN,m

Stage No.11 Apply water pressure profile no.1

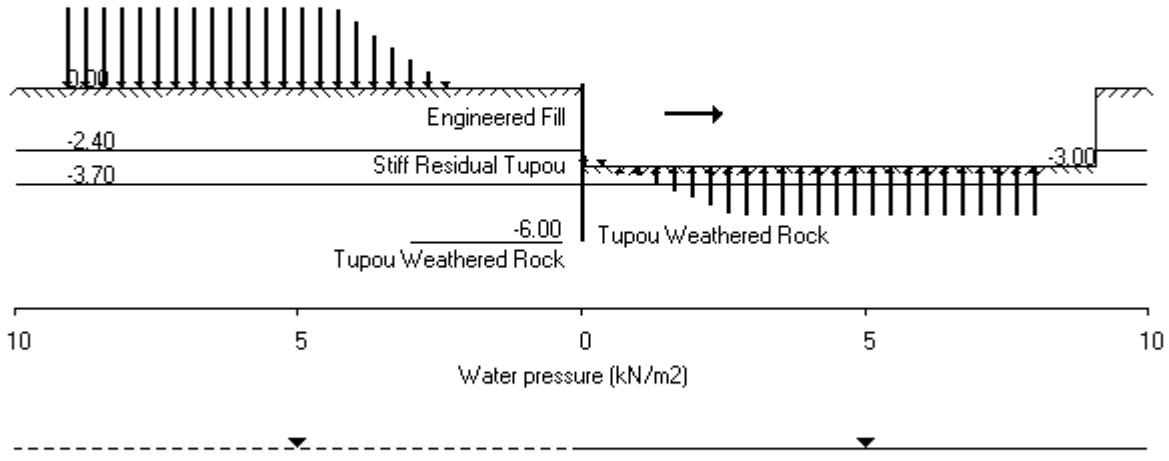


Stage No.11 Apply water pressure profile no.1



Units: kN,m

Stage No.14 Apply load no.1 at elev. -1.00



Units: kN,m

Stage No. 14 Apply load no.1 at elevation -1.00

STABILITY ANALYSIS of Soldier Pile Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	Ground level Act.	Pass.	Prop Elev.	FoS for toe elev. = -6.00 Factor of Safety	Moment equilib. at elev.	Toe Elev. for FoS = 1.500 Toe elev.	Wall Penetr-ation	Direction of failure
14	0.00	-3.00	Cant.	2.262	-5.25	-5.10	2.10	L to R

BENDING MOMENT and DISPLACEMENT ANALYSIS of Soldier Pile Wall

Analysis options

Soldier Pile width = 0.40m; spacing = 1.00m
Passive mobilisation factor = 1.560
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached

Length of wall perpendicular to section = 20.00m
Rigid boundaries: Left side 20.00m from wall
Right side 20.00m from wall

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN /m	Shear force kN /pile	Bending moment kN.m /m	Bending moment kN.m /pile	Prop forces kN/m
1	0.50	0.00	0.057	1.40E-02	0.0	0.0	0.0	0.0	
2	0.25	0.00	0.054	1.40E-02	0.0	0.0	-0.0	-0.0	
3	0.00	0.00	0.050	1.40E-02	0.0	0.0	0.0	0.0	
4	-0.30	1.57	0.046	1.40E-02	0.2	0.2	-0.1	-0.1	
5	-0.60	3.14	0.042	1.40E-02	0.9	0.9	0.1	0.1	
6	-0.80	4.20	0.039	1.40E-02	1.7	1.7	0.4	0.4	
7	-1.00	5.25	0.036	1.40E-02	2.6	2.6	0.8	0.8	12.7
		5.25	0.036	1.40E-02	15.3	15.3	0.8	0.8	
8	-1.25	6.58	0.033	1.39E-02	16.8	16.8	4.8	4.8	
9	-1.50	7.92	0.029	1.38E-02	18.6	18.6	9.2	9.2	
10	-1.80	9.53	0.025	1.35E-02	21.2	21.2	15.1	15.1	
11	-2.10	11.16	0.021	1.29E-02	24.3	24.3	22.0	22.0	
12	-2.40	12.81	0.017	1.22E-02	27.9	27.9	29.8	29.8	
		8.62	0.017	1.22E-02	27.9	27.9	29.8	29.8	
13	-2.70	10.33	0.014	1.13E-02	30.7	30.7	38.5	38.5	
14	-3.00	12.07	0.011	1.01E-02	34.1	34.1	48.3	48.3	
		-32.19	0.011	1.01E-02	34.1	34.1	48.3	48.3	
15	-3.30	-40.67	0.008	8.71E-03	23.2	23.2	56.9	56.9	
16	-3.50	-44.80	0.006	7.63E-03	14.6	14.6	60.9	60.9	
17	-3.70	-43.08	0.005	6.49E-03	5.8	5.8	63.4	63.4	
		-118.41	0.005	6.49E-03	5.8	5.8	63.4	63.4	
18	-3.95	-82.77	0.003	5.07E-03	-19.3	-19.3	61.5	61.5	
19	-4.20	-43.67	0.002	3.75E-03	-35.1	-35.1	54.1	54.1	
20	-4.50	-8.56	0.001	2.43E-03	-43.0	-43.0	41.7	41.7	
21	-4.80	15.05	0.001	1.47E-03	-42.0	-42.0	28.5	28.5	
22	-5.10	32.40	0.000	8.56E-04	-34.9	-34.9	16.6	16.6	
23	-5.40	37.48	0.000	5.24E-04	-24.4	-24.4	7.6	7.6	
24	-5.70	40.91	-0.000	3.93E-04	-12.6	-12.6	1.9	1.9	
25	-6.00	43.26	-0.000	3.67E-04	0.0	0.0	-0.0	-0.0	

(continued)

Stage No.14 Apply load no.1 at elevation -1.00

LEFT side

Node no.	Y coord	Water press.	Effective stresses: Vertic-al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	0.00	0.00	0.00	0.00	0.00	15951
4	-0.30	0.00	6.00	1.57	26.70	1.57	1.57a	15951
5	-0.60	0.00	12.02	3.14	53.46	3.14	3.14a	15951
6	-0.80	0.00	16.04	4.20	71.37	4.20	4.20a	15951
7	-1.00	0.00	20.09	5.25	89.34	5.25	5.25a	15951
8	-1.25	0.00	25.16	6.58	111.92	6.58	6.58a	15951
9	-1.50	0.00	30.27	7.92	134.65	7.92	7.92a	15951
10	-1.80	0.00	36.45	9.53	162.13	9.53	9.53a	15951
11	-2.10	0.00	42.68	11.16	189.85	11.16	11.16a	15951
12	-2.40	0.00	48.97	12.81	217.80	12.81	12.81a	15951
		0.00	48.97	8.62	219.55	8.62	8.62a	6380
13	-2.70	0.00	54.70	10.33	242.28	10.33	10.33a	6380
14	-3.00	0.00	60.49	12.07	265.19	12.07	12.07a	6380
		0.00	60.49	12.07	165.48	12.07	12.07a	6380
15	-3.30	0.00	66.32	13.81	179.89	13.81	13.81a	6380
16	-3.50	0.00	70.23	14.98	189.55	14.98	14.98a	6380
17	-3.70	0.00	74.16	16.16	199.26	16.16	16.16a	6380
		0.00	74.16	0.00	829.09	0.00	0.00a	11372
18	-3.95	0.00	79.59	0.00	847.21	1.14	1.14	11372
19	-4.20	0.00	85.03	0.00	865.40	13.70	13.70	11372
20	-4.50	0.00	91.59	0.00	887.30	26.81	26.81	13850
21	-4.80	0.00	98.17	0.00	909.26	36.55	36.55	13850
22	-5.10	0.00	104.76	0.00	931.26	45.05	45.05	13850
23	-5.40	0.00	111.36	0.00	953.29	52.80	52.80	13850
24	-5.70	0.00	117.96	0.00	975.34	59.03	59.03	13850
25	-6.00	0.00	124.57	0.00	997.39	64.21	64.21	13850

RIGHT side

Node no.	Y coord	Water press.	Effective stresses: Vertic-al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	-0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	-0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	-0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	-1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	-1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	-1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	-1.80	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	-2.10	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	-2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	-2.70	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	-3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	9.60	0.00	44.26	44.26	44.26p	16159
15	-3.30	0.00	13.47	0.00	54.48	54.48	54.48p	16159
16	-3.50	0.00	16.06	0.00	61.31	59.79	59.79	16159
17	-3.70	0.00	18.65	0.00	68.15	59.24	59.24	16159
		0.00	18.65	0.00	643.76	118.41	118.41	28577

(continued)

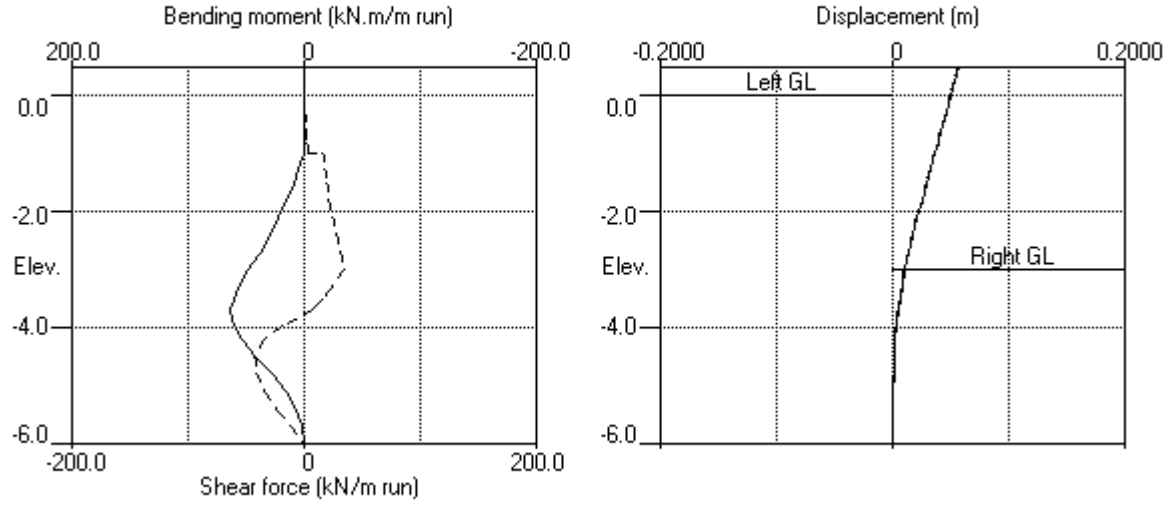
Stage No.14 Apply load no.1 at elevation -1.00

		RIGHT side						
			Effective stresses				Total	Coeff. of
Node no.	Y coord	Water press.	Vertic -al	Active limit	Passive limit	Earth pressure	earth pressure	subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
18	-3.95	0.00	22.40	0.00	656.30	83.91	83.91	28577
19	-4.20	0.00	26.17	0.00	668.89	57.36	57.36	28577
20	-4.50	0.00	30.74	0.00	684.12	35.37	35.37	13850
21	-4.80	0.00	35.34	0.00	699.50	21.49	21.49	13850
22	-5.10	0.00	40.00	0.00	715.04	12.66	12.66	13850
23	-5.40	0.00	44.71	0.00	730.77	15.32	15.32	13850
24	-5.70	0.00	49.48	0.00	746.70	18.12	18.12	13850
25	-6.00	0.00	54.32	0.00	762.86	20.95	20.95	13850

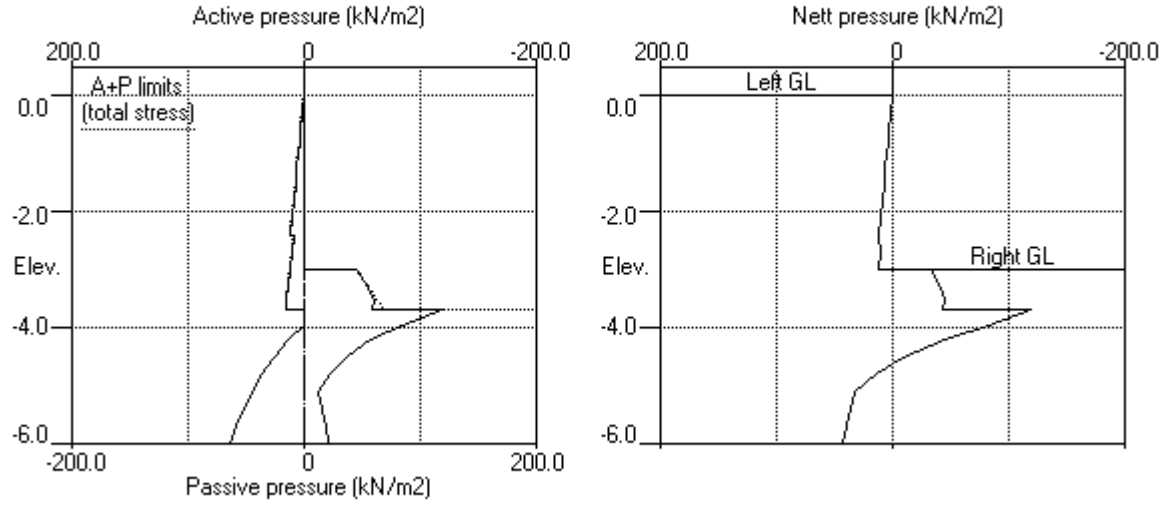
Note: 0.00 a Soil pressure at active limit
54.48 p Soil pressure at passive limit

Units: kN,m

Stage No.14 Apply load no.1 at elev. -1.00

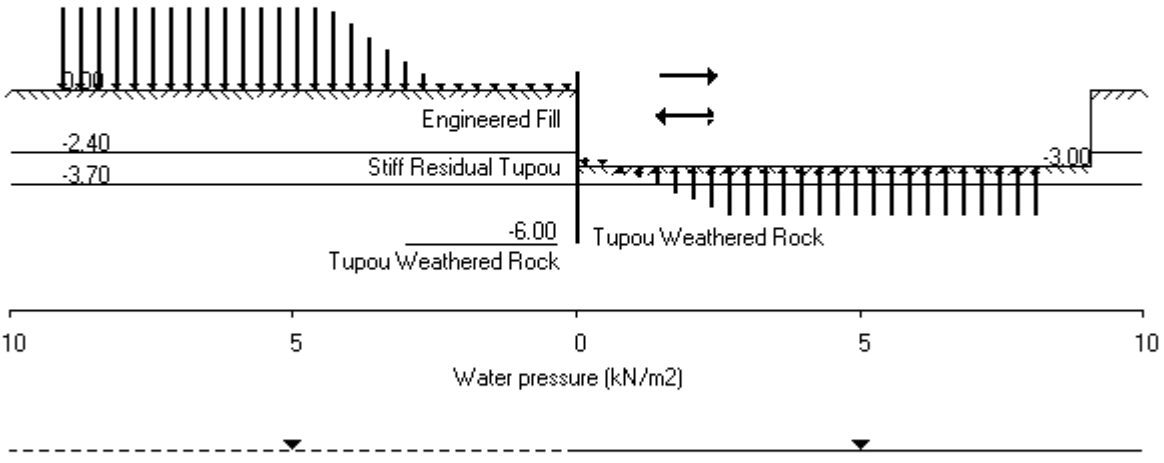


Stage No.14 Apply load no.1 at elev. -1.00



Units: kN,m

Stage No.18 Apply load no.3 at elev. 0.50



Units: kN,m

Stage No. 18 Apply load no.3 at elevation 0.50

STABILITY ANALYSIS of Soldier Pile Wall according to Strength Factor method

Factor of safety on soil strength

Stage No.	Ground level Act.	Ground level Pass.	Prop Elev.	**FoS for toe elev. = -6.00** Factor of Safety	**FoS for toe elev. = -6.00** Moment equilib. at elev.	**Toe elev. for FoS = 1.500** Toe elev.	**Toe elev. for FoS = 1.500** Wall Penetr-ation	Direction of failure
18	0.00	-3.00	Cant.	1.717	-5.20	-5.67	2.67	L to R

BENDING MOMENT and DISPLACEMENT ANALYSIS of Soldier Pile Wall

Analysis options

Soldier Pile width = 0.40m; spacing = 1.00m
Passive mobilisation factor = 1.560
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached

Length of wall perpendicular to section = 20.00m
Rigid boundaries: Left side 20.00m from wall
Right side 20.00m from wall

*** Wall displacements reset to zero at stage 17

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN /m	Shear force kN /pile	Bending moment kN.m /m	Bending moment kN.m /pile	Prop forces kN/m
1	0.50	0.00	0.101	2.89E-02	26.7	26.7	0.0	0.0	26.7
2	0.25	0.00	0.094	2.88E-02	26.7	26.7	6.7	6.7	
3	0.00	0.00	0.087	2.86E-02	26.7	26.7	13.4	13.4	
		1.31	0.087	2.86E-02	26.7	26.7	13.3	13.3	
4	-0.30	2.88	0.078	2.81E-02	27.3	27.3	21.3	21.3	
5	-0.60	4.45	0.070	2.74E-02	28.4	28.4	29.7	29.7	
6	-0.80	5.50	0.064	2.68E-02	29.4	29.4	35.4	35.4	
7	-1.00	6.56	0.059	2.62E-02	30.6	30.6	41.4	41.4	
8	-1.25	7.88	0.053	2.53E-02	32.4	32.4	49.3	49.3	
9	-1.50	9.21	0.047	2.42E-02	34.6	34.6	57.7	57.7	
10	-1.80	10.82	0.039	2.28E-02	37.6	37.6	68.5	68.5	
11	-2.10	12.44	0.033	2.13E-02	41.1	41.1	80.3	80.3	
12	-2.40	14.06	0.027	1.96E-02	45.0	45.0	93.2	93.2	
		10.05	0.027	1.96E-02	45.0	45.0	93.2	93.2	
13	-2.70	11.75	0.021	1.77E-02	48.3	48.3	107.2	107.2	
14	-3.00	13.46	0.016	1.57E-02	52.1	52.1	122.3	122.3	
		-31.32	0.016	1.57E-02	52.1	52.1	122.3	122.3	
15	-3.30	-39.81	0.012	1.36E-02	41.4	41.4	136.3	136.3	
16	-3.50	-45.48	0.009	1.21E-02	32.9	32.9	144.0	144.0	
17	-3.70	-51.16	0.007	1.05E-02	23.2	23.2	150.1	150.1	
		-287.01	0.007	1.05E-02	23.2	23.2	150.1	150.1	
18	-3.95	-194.35	0.004	8.54E-03	-36.9	-36.9	147.2	147.2	
19	-4.20	-121.44	0.003	6.66E-03	-76.4	-76.4	131.8	131.8	
20	-4.50	-38.35	0.001	4.73E-03	-100.4	-100.4	103.7	103.7	
21	-4.80	29.03	-0.000	3.28E-03	-101.8	-101.8	72.0	72.0	
22	-5.10	70.25	-0.001	2.31E-03	-86.9	-86.9	43.1	43.1	
23	-5.40	89.59	-0.002	1.78E-03	-62.9	-62.9	20.1	20.1	
24	-5.70	105.29	-0.002	1.56E-03	-33.7	-33.7	5.3	5.3	
25	-6.00	119.28	-0.003	1.51E-03	0.0	0.0	-0.0	-0.0	

(continued)

Stage No.18 Apply load no.3 at elevation 0.50

LEFT side

Node no.	Y coord	Water press.	Effective stresses: Vertic-al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	5.00	1.31	22.24	1.31	1.31a	16245
4	-0.30	0.00	11.00	2.88	48.94	2.88	2.88a	16245
5	-0.60	0.00	17.02	4.45	75.69	4.45	4.45a	16245
6	-0.80	0.00	21.04	5.50	93.57	5.50	5.50a	16245
7	-1.00	0.00	25.07	6.56	111.51	6.56	6.56a	16245
8	-1.25	0.00	30.13	7.88	134.02	7.88	7.88a	16245
9	-1.50	0.00	35.22	9.21	156.65	9.21	9.21a	16245
10	-1.80	0.00	41.36	10.82	183.96	10.82	10.82a	16245
11	-2.10	0.00	47.54	12.44	211.47	12.44	12.44a	16245
12	-2.40	0.00	53.77	14.06	239.17	14.06	14.06a	16245
		0.00	53.77	10.05	238.58	10.05	10.05a	6498
13	-2.70	0.00	59.44	11.75	261.03	11.75	11.75a	6498
14	-3.00	0.00	65.15	13.46	283.64	13.46	13.46a	6498
		0.00	65.15	13.46	176.99	13.46	13.46a	6498
15	-3.30	0.00	70.89	15.18	191.19	15.18	15.18a	6498
16	-3.50	0.00	74.74	16.34	200.71	16.34	16.34a	6498
17	-3.70	0.00	78.61	17.49	210.26	17.49	17.49a	6498
		0.00	78.61	0.00	843.95	0.00	0.00a	11579
18	-3.95	0.00	83.95	0.00	861.79	0.00	0.00a	11579
19	-4.20	0.00	89.32	0.00	879.70	0.00	0.00a	11579
20	-4.50	0.00	95.77	0.00	901.25	19.55	19.55	11579
21	-4.80	0.00	102.24	0.00	922.85	45.89	45.89	19177
22	-5.10	0.00	108.72	0.00	944.49	70.25	70.25	19177
23	-5.40	0.00	115.21	0.00	966.16	89.59	89.59	19177
24	-5.70	0.00	121.71	0.00	987.84	105.29	105.29	19177
25	-6.00	0.00	128.20	0.00	1009.53	119.28	119.28	19177

RIGHT side

Node no.	Y coord	Water press.	Effective stresses: Vertic-al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	-0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.0
5	-0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.0
6	-0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.0
7	-1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
8	-1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.0
9	-1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
10	-1.80	0.00	0.00	0.00	0.00	0.00	0.00	0.0
11	-2.10	0.00	0.00	0.00	0.00	0.00	0.00	0.0
12	-2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.0
13	-2.70	0.00	0.00	0.00	0.00	0.00	0.00	0.0
14	-3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	9.60	0.00	44.78	44.78	44.78p	13792
15	-3.30	0.00	13.47	0.00	54.99	54.99	54.99p	13792
16	-3.50	0.00	16.06	0.00	61.82	61.82	61.82p	13792
17	-3.70	0.00	18.65	0.00	68.66	68.66	68.66p	13792
		0.00	18.65	0.00	643.76	287.01	287.01	24414

(continued)

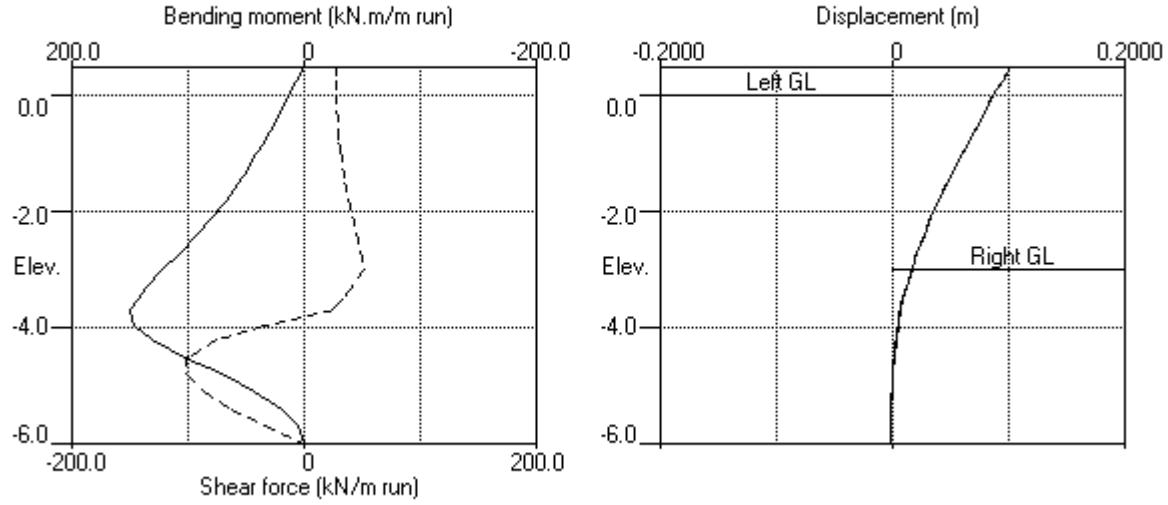
Stage No.18 Apply load no.3 at elevation 0.50

		RIGHT side						
			Effective stresses				Total	Coeff. of
Node no.	Y coord	Water press.	Vertic -al	Active limit	Passive limit	Earth pressure	earth pressure	subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
18	-3.95	0.00	22.40	0.00	656.30	194.35	194.35	24414
19	-4.20	0.00	26.17	0.00	668.89	121.44	121.44	24414
20	-4.50	0.00	30.74	0.00	684.12	57.90	57.90	24414
21	-4.80	0.00	35.34	0.00	699.50	16.86	16.86	19177
22	-5.10	0.00	40.00	0.00	715.04	0.00	0.00a	19177
23	-5.40	0.00	44.71	0.00	730.77	0.00	0.00a	19177
24	-5.70	0.00	49.48	0.00	746.70	0.00	0.00a	19177
25	-6.00	0.00	54.32	0.00	762.86	0.00	0.00a	19177

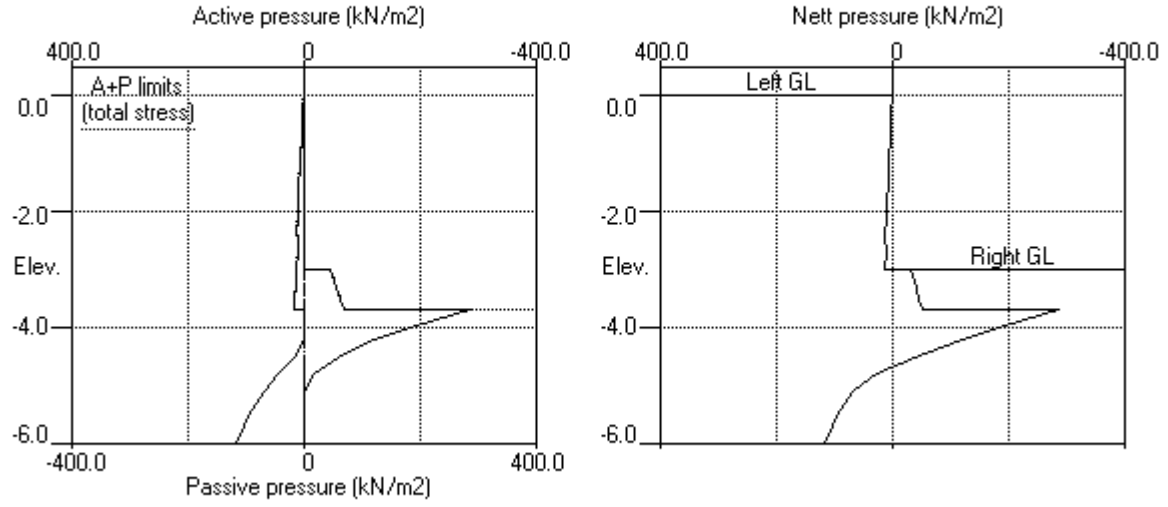
Note: 0.00 a Soil pressure at active limit
68.66 p Soil pressure at passive limit

Units: kN,m

Stage No.18 Apply load no.3 at elev. 0.50



Stage No.18 Apply load no.3 at elev. 0.50



Units: kN,m

Summary of results

STABILITY ANALYSIS of Soldier Pile Wall according to Strength Factor method
Factor of safety on soil strength

Stage No.	Ground level Act.	Ground level Pass.	Prop Elev.	FoS for toe elev. = -6.00 Factor of Safety	FoS for toe elev. = -6.00 Moment equilib. at elev.	Toe elev. for FoS = 1.500 Toe elev.	Wall Penetr-ation	Direction of failure
1	0.00	-3.00	Cant.	2.479	-5.27	-4.86	1.86	L to R
2	0.00	-3.00	Cant.	2.619	-5.26	-4.77	1.77	L to R
3	0.00	-3.00	Cant.	2.619	-5.26	-4.77	1.77	L to R
4	0.00	-3.00	Cant.	2.212	-5.26	-5.05	2.05	L to R
5	0.00	-3.00	Cant.	2.209	-5.27	-5.05	2.05	L to R
6	0.00	-3.00	Cant.	2.209	-5.27	-5.05	2.05	L to R
7	0.00	-3.00	Cant.	2.101	-5.27	-5.13	2.13	L to R
8	0.00	-3.00	Cant.	2.095	-5.27	-5.13	2.13	L to R
9	0.00	-3.00	Cant.	2.203	-5.27	-5.05	2.05	L to R
10	0.00	-3.00	Cant.	2.209	-5.27	-5.05	2.05	L to R
11	0.00	-3.00	Cant.	2.098	-5.26	-5.11	2.11	L to R
12	0.00	-3.00	Cant.	2.209	-5.27	-5.05	2.05	L to R
13	0.00	-3.00	Cant.	2.607	-5.28	-4.78	1.78	L to R
14	0.00	-3.00	Cant.	2.262	-5.25	-5.10	2.10	L to R
15	0.00	-3.00	Cant.	2.607	-5.28	-4.78	1.78	L to R
16	0.00	-3.00	Cant.	2.391	-5.27	-4.93	1.93	L to R
17	0.00	-3.00		No analysis at this stage				
18	0.00	-3.00	Cant.	1.717	-5.20	-5.67	2.67	L to R

Units: kN,m

Summary of results

BENDING MOMENT and DISPLACEMENT ANALYSIS of Soldier Pile Wall

Analysis options

Soldier Pile width = 0.40m; spacing = 1.00m
Passive mobilisation factor = 1.560
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached

Length of wall perpendicular to section = 20.00m
Rigid boundaries: Left side 20.00m from wall
Right side 20.00m from wall

Bending moment, shear force and displacement envelopes

Node no.	Y coord	Displacement max m	Displacement min m	Bending moment max kN.m/m	Bending moment min kN.m/m	Bending moment abs. max kN.m /pile	Shear force max kN/m	Shear force min kN/m	Shear force abs. max kN /pile
1	0.50	0.101	0.000	0	0	0	27	0	27
2	0.25	0.094	0.000	7	-0	7	27	0	27
3	0.00	0.087	0.000	13	-0	13	27	0	27
4	-0.30	0.078	0.000	21	-0	21	27	0	27
5	-0.60	0.070	0.000	30	0	30	28	0	28
6	-0.80	0.064	0.000	35	0	35	29	0	29
7	-1.00	0.059	0.000	41	0	41	31	0	31
8	-1.25	0.053	0.000	49	0	49	32	0	32
9	-1.50	0.047	0.000	58	0	58	35	0	35
10	-1.80	0.039	0.000	69	0	69	38	0	38
11	-2.10	0.033	0.000	80	0	80	41	0	41
12	-2.40	0.027	0.000	93	0	93	45	0	45
13	-2.70	0.021	0.000	107	0	107	48	0	48
14	-3.00	0.016	0.000	122	0	122	52	0	52
15	-3.30	0.012	0.000	136	0	136	41	0	41
16	-3.50	0.009	0.000	144	0	144	33	0	33
17	-3.70	0.007	0.000	150	0	150	23	0	23
18	-3.95	0.004	0.000	147	0	147	0	-37	37
19	-4.20	0.003	0.000	132	0	132	0	-76	76
20	-4.50	0.001	0.000	104	0	104	0	-100	100
21	-4.80	0.000	-0.000	72	0	72	0	-102	102
22	-5.10	0.000	-0.001	43	0	43	0	-87	87
23	-5.40	0.000	-0.002	20	0	20	0	-63	63
24	-5.70	0.000	-0.002	5	0	5	0	-34	34
25	-6.00	0.000	-0.003	0	-0	0	0	0	0

Summary of results (continued)

Maximum and minimum bending moment and shear force at each stage (per m run)

Stage	Bending moment				Shear force			
no.	maximum	elev.	minimum	elev.	maximum	elev.	minimum	elev.
	kN.m		kN.m		kN		kN	
1	33.5	-3.70	-0.0	0.25	21.0	-3.00	-22.5	-4.80
2	34.8	-3.70	-0.0	0.00	22.3	-3.00	-23.5	-4.80
3	34.8	-3.70	-0.0	0.00	22.4	-3.00	-23.5	-4.80
4	47.2	-3.70	-0.0	0.00	29.3	-3.00	-31.4	-4.50
5	47.8	-3.70	-0.0	0.00	29.7	-3.00	-31.8	-4.50
6	47.8	-3.70	-0.0	0.00	29.7	-3.00	-31.9	-4.50
7	54.6	-3.70	-0.0	0.00	33.3	-3.00	-36.2	-4.50
8	55.0	-3.70	-0.0	0.00	33.6	-3.00	-36.6	-4.50
9	55.0	-3.70	-0.0	0.00	32.5	-3.00	-36.5	-4.50
10	55.1	-3.70	-0.0	0.00	32.5	-3.00	-36.6	-4.50
11	52.7	-3.70	-0.0	0.00	30.8	-3.00	-36.1	-4.50
12	52.7	-3.70	-0.0	0.00	30.8	-3.00	-36.1	-4.50
13	52.6	-3.70	-0.0	0.00	30.0	-3.00	-36.0	-4.50
14	63.4	-3.70	-0.1	-0.30	34.1	-3.00	-43.0	-4.50
15	62.6	-3.70	-0.1	-0.30	34.2	-3.00	-42.5	-4.50
16	62.5	-3.70	-0.0	0.00	34.6	-3.00	-42.4	-4.50
17	No calculation at this stage							
18	150.1	-3.70	-0.0	-6.00	52.1	-3.00	-101.8	-4.80

Maximum and minimum bending moment and shear force at each stage (per pile)

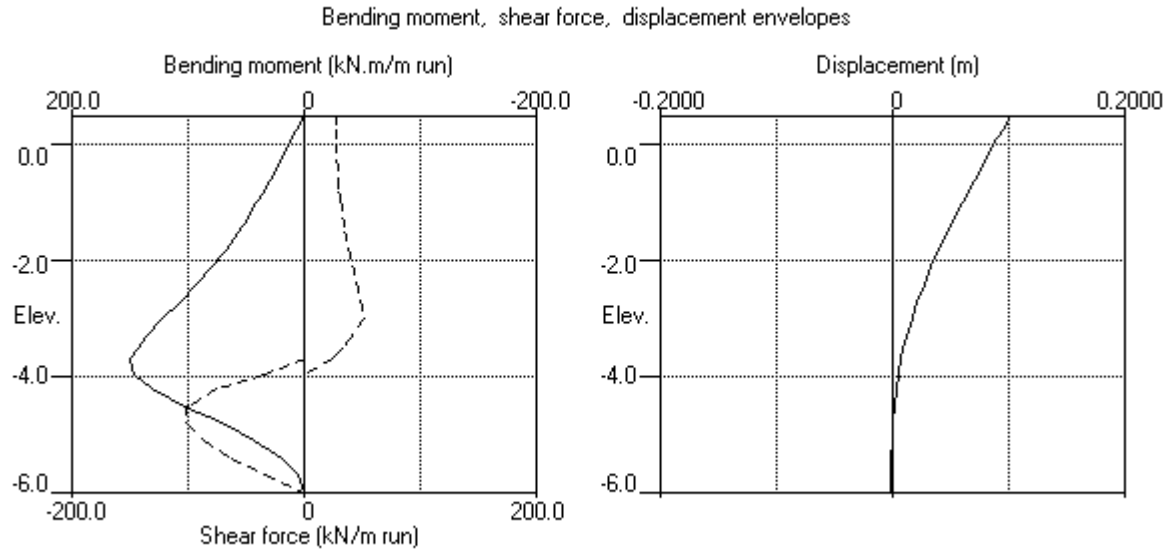
Stage	Bending moment				Shear force			
no.	maximum	elev.	minimum	elev.	maximum	elev.	minimum	elev.
	kN.m		kN.m		kN		kN	
1	33.5	-3.70	-0.0	0.25	21.0	-3.00	-22.5	-4.80
2	34.8	-3.70	-0.0	0.00	22.3	-3.00	-23.5	-4.80
3	34.8	-3.70	-0.0	0.00	22.4	-3.00	-23.5	-4.80
4	47.2	-3.70	-0.0	0.00	29.3	-3.00	-31.4	-4.50
5	47.8	-3.70	-0.0	0.00	29.7	-3.00	-31.8	-4.50
6	47.8	-3.70	-0.0	0.00	29.7	-3.00	-31.9	-4.50
7	54.6	-3.70	-0.0	0.00	33.3	-3.00	-36.2	-4.50
8	55.0	-3.70	-0.0	0.00	33.6	-3.00	-36.6	-4.50
9	55.0	-3.70	-0.0	0.00	32.5	-3.00	-36.5	-4.50
10	55.1	-3.70	-0.0	0.00	32.5	-3.00	-36.6	-4.50
11	52.7	-3.70	-0.0	0.00	30.8	-3.00	-36.1	-4.50
12	52.7	-3.70	-0.0	0.00	30.8	-3.00	-36.1	-4.50
13	52.6	-3.70	-0.0	0.00	30.0	-3.00	-36.0	-4.50
14	63.4	-3.70	-0.1	-0.30	34.1	-3.00	-43.0	-4.50
15	62.6	-3.70	-0.1	-0.30	34.2	-3.00	-42.5	-4.50
16	62.5	-3.70	-0.0	0.00	34.6	-3.00	-42.4	-4.50
17	No calculation at this stage							
18	150.1	-3.70	-0.0	-6.00	52.1	-3.00	-101.8	-4.80

Summary of results (continued)

Maximum and minimum displacement at each stage

Stage no.	Displacement maximum	elev.	minimum	elev.	Stage description
	m		m		
1	0.030	0.50	0.000	0.50	Excav. to elev. -3.00 on RIGHT side
2	0.030	0.50	0.000	0.50	Apply surcharge no.1 at elev. -3.00
3	0.030	0.50	0.000	0.50	Apply surcharge no.2 at elev. -3.00
4	0.041	0.50	0.000	0.50	Apply surcharge no.3 at elev. 0.00
5	0.042	0.50	0.000	0.50	Apply surcharge no.6 at elev. 0.00
6	0.042	0.50	0.000	0.50	Apply surcharge no.7 at elev. 0.00
7	0.048	0.50	0.000	0.50	Apply surcharge no.4 at elev. 0.00
8	0.049	0.50	0.000	0.50	Apply surcharge no.5 at elev. 0.00
9	0.049	0.50	0.000	0.50	Remove surcharge no.4 at elev. 0.00
10	0.049	0.50	0.000	0.50	Remove surcharge no.5 at elev. 0.00
11	0.049	0.50	0.000	0.50	Apply water pressure profile no.1
12	0.049	0.50	0.000	0.50	Apply water pressure profile no.2
13	0.048	0.50	0.000	0.50	Remove surcharge no.3 at elev. 0.00
14	0.057	0.50	-0.000	-6.00	Apply load no.1 at elev. -1.00
15	0.057	0.50	-0.000	-6.00	Apply load no.2 at elev. -1.00
16	0.057	0.50	0.000	0.50	Apply surcharge no.8 at elev. 0.00
17	Wall displacements reset to zero				Change EI of wall to 10933kN.m2/m run
18	0.101	0.50	-0.003	-6.00	Apply load no.3 at elev. 0.50

Units: kN,m


Bending moment, shear force, displacement envelopes
Bending moment (kN.m/m run)
200.0
0
-200.0
0.0
-2.0
Elev.
-4.0
-6.0
-200.0
0
200.0
Shear force (kN/m run)
Displacement (m)
-0.2000
0
0.2000
0.0
-2.0
Elev.
-4.0
-6.0

Project	Old Curch Road Slip
Client	FNDC
Job No	25 101
Date	1/07/2025
Calculated by:	J. Corskie
Reviewed by:	W. Thorburn
Comments	Lagging Design

Factored load on the plank at the base of the wall = **25.65** **kPa**

From Wallap

2.4	Height (m)
17.1	kPa
1.5	Load factor
2	Rails Required

Structural Design of Lagging to NZS 3603:1993

Timber Lagging: Structural actions

Lagging width b =	50	50	1.3	Height (m)
Lagging depth d =	150	150	10.8	kPa
For a maximum soil pressure of 25.65 kPa. The UDL on lagging "d" =	3.85	kN/m	1.5	Load factor
Lagging Span "L" =	1	m	1	Rails Required
Maximum factored moment M* = 1/8 dL^2	**0.481**	**kNm**		

Under Flexure, calculate the minimum lagging depth for moment capacity

Bending Stress, f_b =	11.7	MPa
Shear Stress, f_s =	2.4	MPa
No of parallel support elements, n =	2	
Strength Reduction Factor, ϕ =	0.8	
Duration Factor, k_1 =	0.6	
Parallel Support Factor , k_4 =	1.00	
Grid System Factor, k_5 =	1.00	
Section modulus of lagging, Z = bd^2/6 =	125000	mm^3
$\phi M_n = \phi k_1 k_4 k_5 f_b Z$ =	**0.702**	**kNm**
Percentage of lagging moment capacity utilised	69%	

Lagging OK for Moment Capacity!

Check for Shear Capacity

For 150 x 50 lagging. Shear surface area =	5000.0	mm^2
$\phi V_n = \phi k_1 k_4 k_5 f_s A_s$ =	**5.760**	**kN**
Compare with V* =	**2.405**	**kN**
Percentage of Shear capacity utilised	42%	

$$V^* = 0.625wL$$

Lagging OK for Shear Capacity!

Use 150 x 100 lagging, spanning continuously across a minimum of 2 pole spacings

Appendix F – Producer Statement Advisory Note

IMPORTANT ADVISORY NOTE

PRODUCER STATEMENT – CONSTRUCTION REVIEW (PS4)

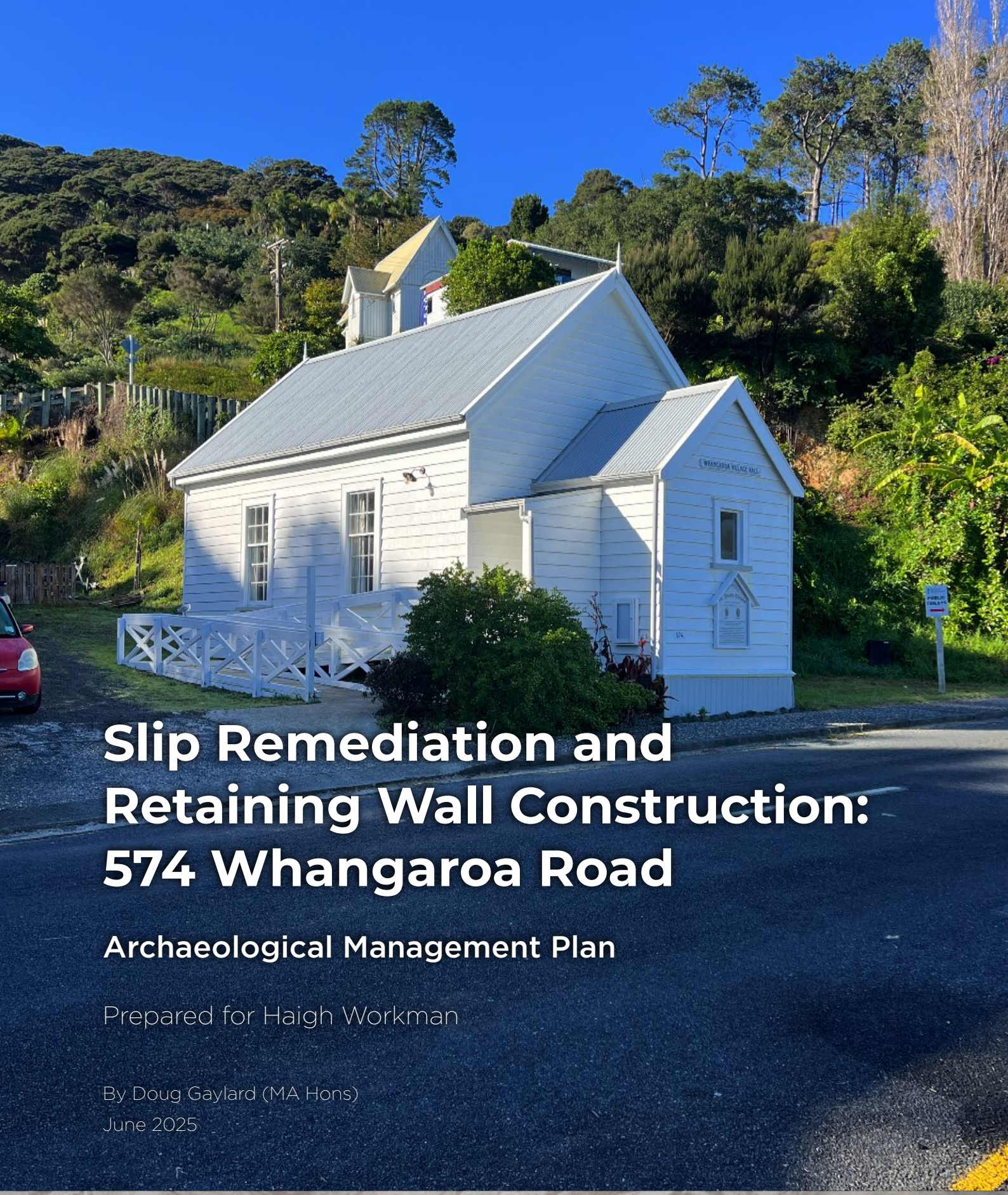
The Building Consent Authority (BCA) frequently requires Producer Statements–Construction Review (PS4) to be submitted to the BCA in order for a Code of Compliance Certificate (CCC) to be issued. A PS4 is usually required for each specialist area. The requirement for a consultant to issue a PS4 related to their area of work will appear as a condition in the Building Consent documents.

It is the consent holder's responsibility to notify Haigh Workman Limited for geotechnical construction monitoring and testing required for subsequent issue of a PS4. An initial inspection of stripped or excavated ground must take place before any fill or blinding concrete is placed. Retrospective site monitoring of completed or partially completed geotechnical work is not possible and a PS4 will not be issued without all the required observations.

In order to secure our construction monitoring services and avoid delays on site, Haigh Workman Limited require at least 24 hours' notice prior to the time the site visit is required. Construction monitoring is limited to items that have been recommended, designed and detailed by Haigh Workman Limited. We are unable to inspect non-consented or unauthorised work. Haigh Workman Limited do not carry out construction monitoring or issue PS4's for work that has been recommended, designed or detailed by other consultants without prior approval from Haigh Workman Limited. Haigh Workman Limited will not issue a PS4 where construction monitoring and/or testing have been carried out by any other consultant. The PS4 must be sought from the consultant who carried out those inspections.

The full Building Consent, with stamped plans with consent numbers (or a legible copy of the same) including all amendments, shall be made available to us during inspections. We will not commence construction monitoring until the documentation is available or provided to us prior to our site visit.

Unless stated otherwise in our terms of engagement, the fees associated with construction monitoring and the issue of PS4's are separate from any work carried out prior to commencement of construction. We are able to provide a fee estimate for this work if required. We cannot provide a fixed quote because the quantum of work required frequently depends on the construction program and the performance of others. These things are not known to us in advance of construction. Our normal terms of trade require payment of fees monthly during the inspection period and full settlement prior to release of any PS4.



Slip Remediation and Retaining Wall Construction: 574 Whangaroa Road

Archaeological Management Plan

Prepared for Haigh Workman

By Doug Gaylard (MA Hons)

June 2025

CONTEXT ARCHAEOLOGY

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Contents

Introduction

Purpose

Haigh Workman are proposing remediation of a slip within the existing corridor of Old Church Road, Whangaroa, the construction of a retaining wall, and excavations to mitigate the flow of water upon the Category 2 heritage listed building located within 574 Whangaroa Road (legal description: Lot 1 DP 190160).

The proposed remediation, excavations, and construction includes the following:

- Removal of approximately 50m^3 of existing slip material
- Construction of a retaining wall of 10m in length
- Approximately 10m^3 of filling behind the constructed retaining wall to remediate the existing slip and reinstate the roadway
- Excavations totalling approximately 35m^2 to establish adequate floor elevation of the adjacent heritage listed building, and mitigate the effects of water upon the structure
- Construction of concrete-lined curbs and channels to facilitate water flow

A detailed location, plans for the project, and areas to be subject to archaeological monitoring are detailed within Figures X-Figure X.

An archaeological assessment of the effects of the project was prepared:

> Gaylard, D. 2025. Slip Remediation and Retaining Wall Construction: 547 Whangaroa Road. Archaeological Assessment Prepared for Haigh Workman.

This assessment has determined that the proposed works will have moderate effects upon a marine shell midden (P04/812), and a 5-6cm thick layer of gravel which may be pre-1900 in origin (P04/813). There is also some some possibility of encountering previously unrecorded archaeological deposits or features associated with pre-European Māori settlement and/or 19th century Māori and European settlement – particularly within existing slip material and slopes adjacent to the slip. There is also some likelihood of encountering previously unrecorded archaeological features or deposits within the immediate surrounds of the Whangaroa Community Hall – formerly St Paul's Chapel – a Category 2 heritage listed building (Heritage New Zealand List number 2591). An application for a general authority under section 44(a) of the Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA) is being submitted before beginning any work. This will ensure that should any remains be uncovered during the proposed activities, the appropriate actions can be taken, and any delays will be minimised.

This archaeological management plan outlines the procedures to follow during the archaeological monitoring of earthworks, as well as the discovery of archaeological remains, including koiwi tangata (human remains) and taonga (Māori artefacts).

Project Archaeologist

A Heritage NZ-approved archaeologist, working under section 45 of the HNZPTA, will lead the project. Additional archaeological tasks may be performed by other qualified archaeologists under the guidance of the Project Archaeologist. The term "Archaeologist" encompasses both the Project Archaeologist and any qualified archaeologist operating under their supervision.

Māori Cultural Values

Archaeological sites of Māori origin carry significant cultural importance for tangata whenua, in addition to the archaeological values described in this plan.

This document includes the contact information for iwi representatives interested in the project area, as well as the protocols to be followed if any archaeological remains of Māori origin are uncovered. While meeting the authority's requirements, archaeologists will be guided by iwi representatives on matters of tikanga. Separate cultural protocols may have been established and are not detailed in this document.

Haigh Workman, or their designated representative, must ensure that the iwi representatives are notified at least 48 hours prior to the start of any works that require archaeological monitoring.

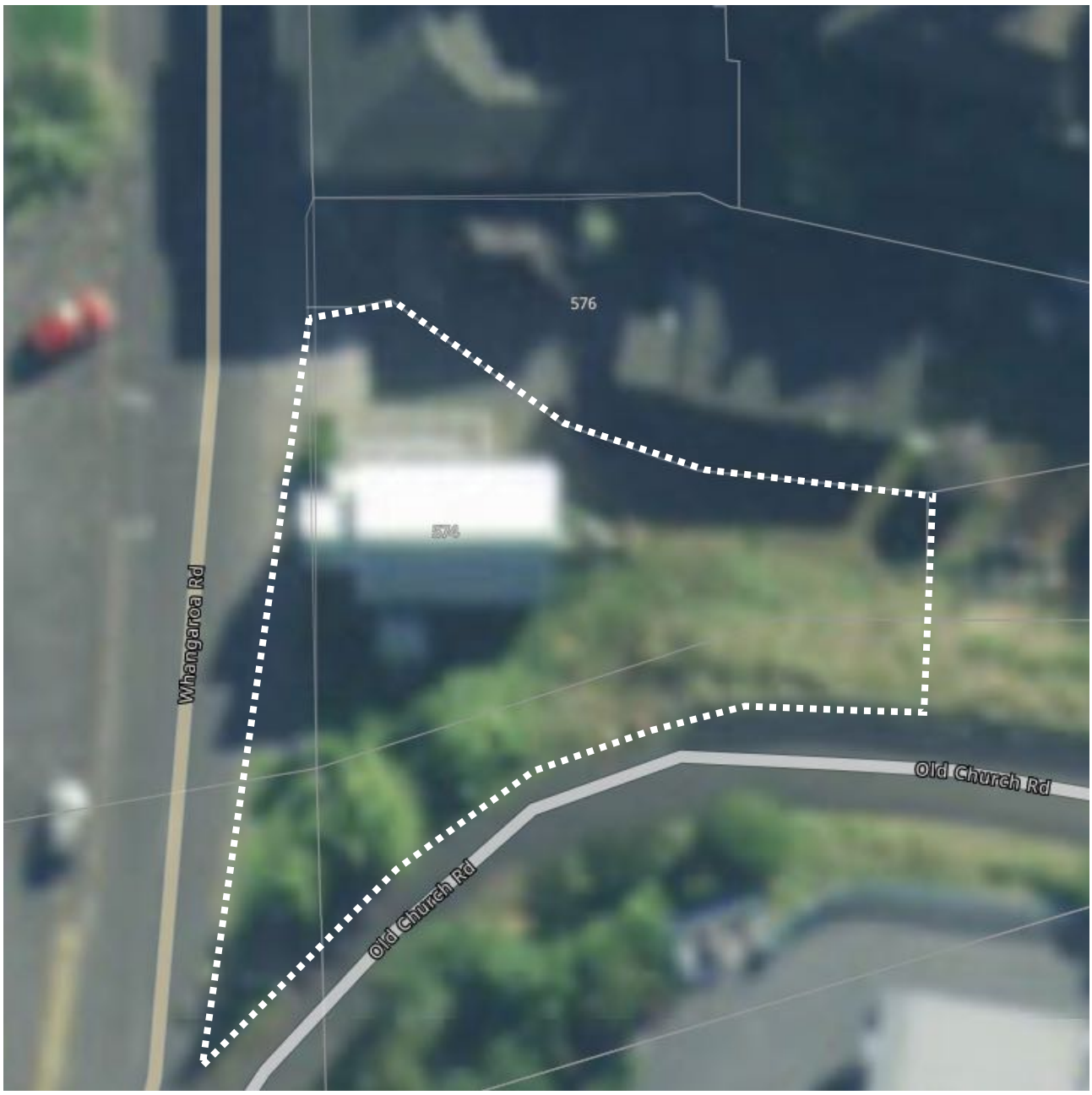

Figure 1. Aerial photography showing the project area (indicated by the white broken line)

Source: NRC Local Maps (2025)

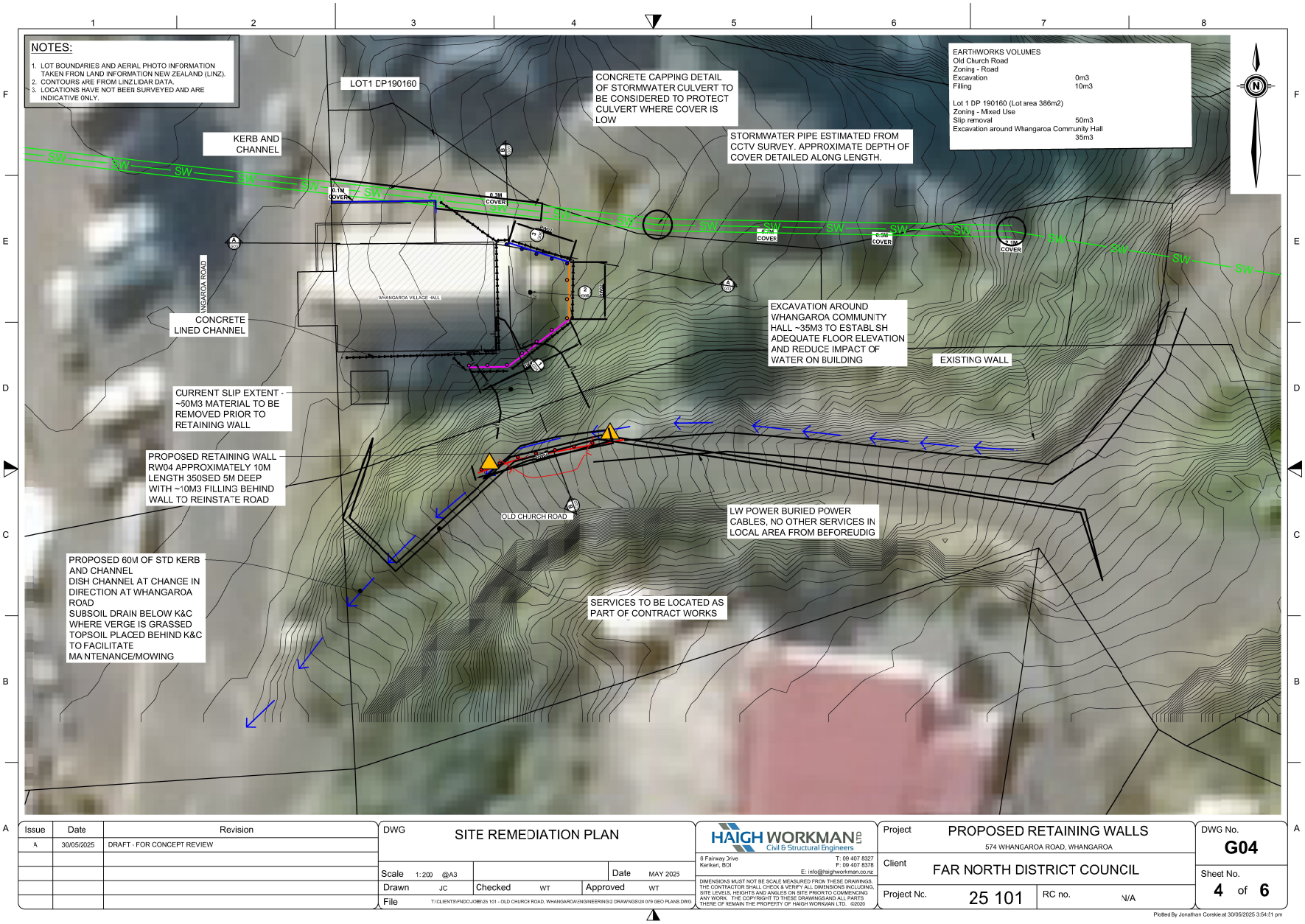

Figure 2. Proposed Remediation Plan.

Source: Haigh Workman (2025)

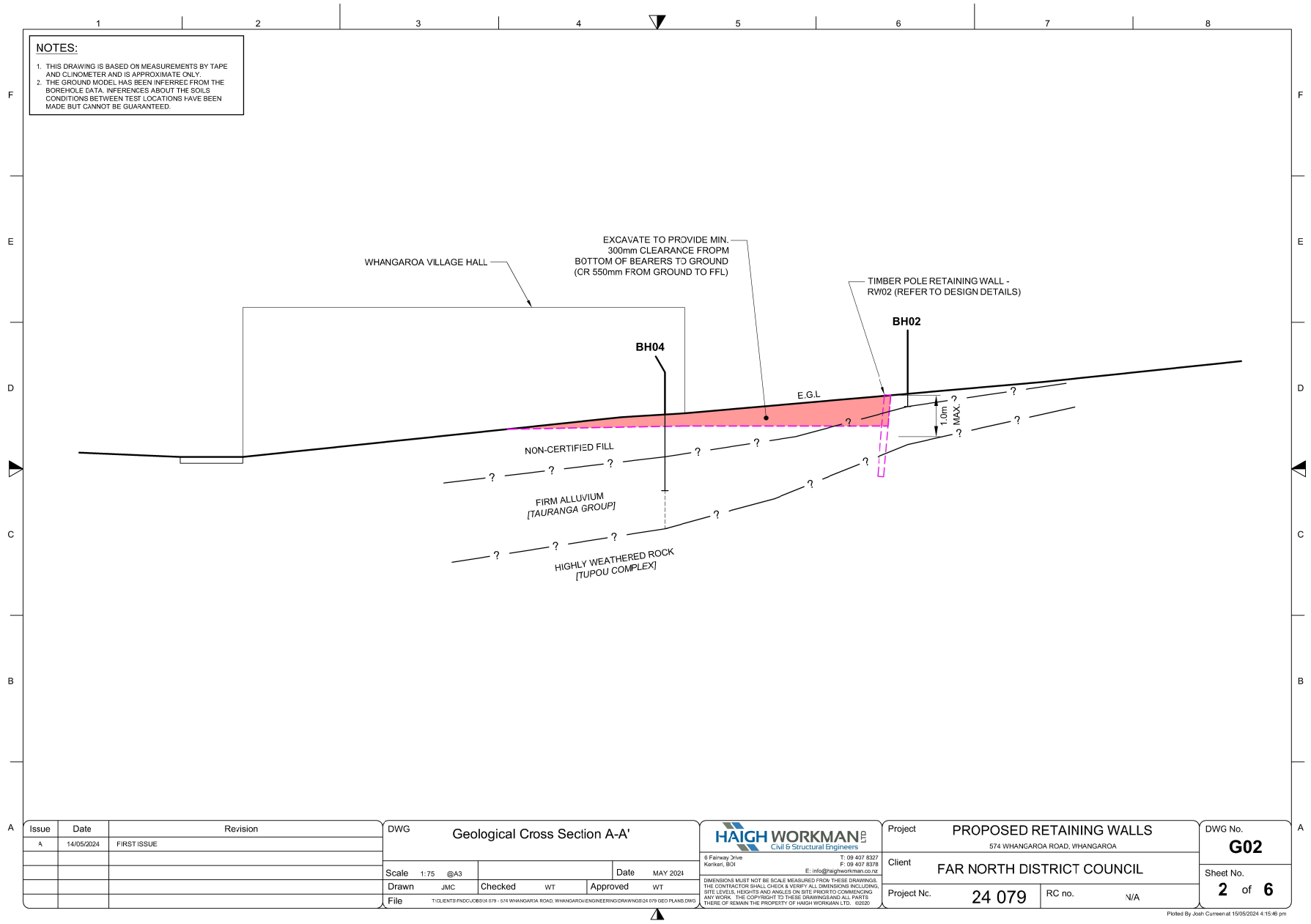

Figure 3. Proposed Retaining Walls.

Source: Haigh Workman (2025)

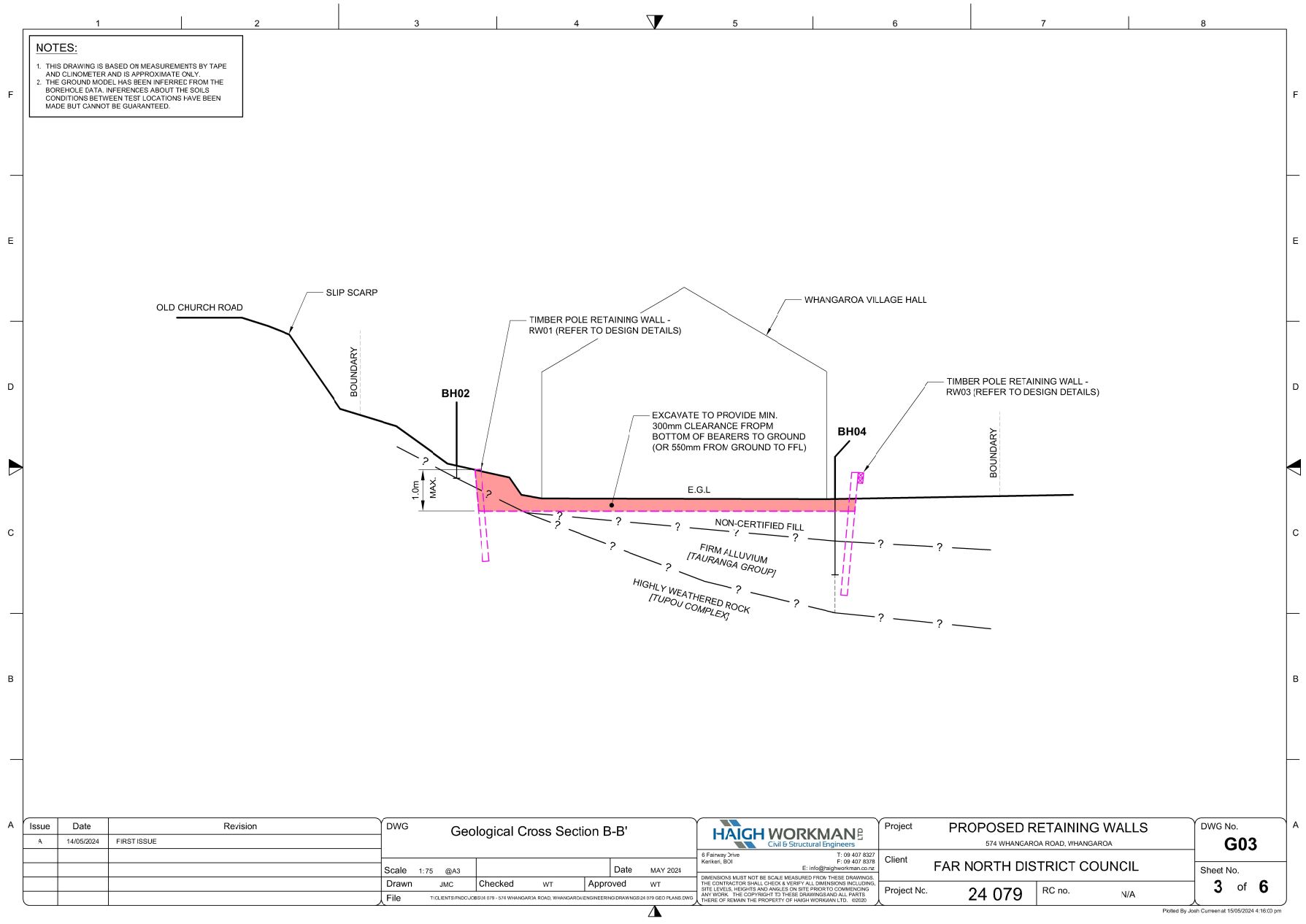

Figure 4. Proposed Retaining Walls.

Source: Haigh Workman (2025)

Figure 5. Aerial photography showing the project area (indicated by the white broken line) in relation to areas to be subject to archaeological monitoring

Source: NRC Local Maps (2025)

Site Management

Pre-Start Requirements

1. Before any earthworks begin, the Project Archaeologist will meet with the Contractor(s) on-site to discuss the archaeological requirements.

2. The Archaeologist will make sure that both the Contractor and Project Manager have received the Authority and Archaeological Management Plan. Furthermore, the Archaeologist will verify with Heritage NZ that these documents have been acknowledged and understood. This can be accomplished by providing signed copies from the relevant parties or by obtaining email confirmation, which should also be sent to Heritage NZ.

3. The Contractor must provide the Project Archaeologist with at least two weeks notice prior to the commencement of work.

Earthworks Phase

1. All preliminary excavations necessary for the project in the area depicted in Figure 5 will be overseen by a qualified archaeologist to assess the presence of pre-1900 archaeological remains.

2. Monitoring efforts will continue until natural deposits are reached (if excavations extend to that depth) or until it becomes clear that the area has been altered significantly, making archaeological findings unlikely.

3. If any *in situ* archaeological features or deposits are identified during the monitoring process, the archaeologist will promptly halt work in the nearby area by notifying the contractor.

4. Any *in situ* archaeological deposits or features that cannot be avoided will be investigated, documented, and sampled by the archaeologist, following established archaeological practices and the guidelines of Heritage NZ. Comprehensive notes will be taken on each feature and deposit, photographs will be captured, and all subsurface features will be recorded on the site plan. Stratigraphic drawings and photographs of the features and deposits will also be prepared. Any artefacts discovered will be preserved for analysis, with their locations indicated on the site plan.

5. Additional archaeologists may be brought to the site as necessary to assist in monitoring, recording, and sampling efforts.

6. The contractor will ensure that there is adequate time and opportunity for the documentation and sampling of any archaeological features or deposits that are encountered. The archaeologist(s) will aim to record the archaeological features or deposits as swiftly as possible to allow earthworks to resume without unnecessary delays.

7. In the event that suspected archaeological deposits or features are identified while the archaeologist is temporarily absent, the contractor must stop work within a 10-meter radius and adhere to the procedures outlined below.

8. The project archaeologist will inform Heritage NZ if any significant archaeological features or deposits that were not anticipated are uncovered. This will trigger the stand-down procedure detailed below.

9. Any significant archaeological features that are exposed will be preserved in situ whenever feasible, after thorough investigation and documentation.

Procedures if Archaeological Sites are Exposed when the Archaeologist is not Present

If the Archaeologist is temporarily not present and potential archaeological features or deposits are discovered (as explained to the Contractor in the pre-start meeting), the following steps should be taken:

1. The Contractor must immediately halt all earthworks in the surrounding area (within 10 meters) while contacting the Archaeologist to determine if the finds are part of an archaeological site as defined by the Heritage New Zealand Pouhere Taonga Act (HNZPTA).

2. If the Archaeologist verifies that it is an archaeological site, they will outline the boundaries of the site, which will be excluded from any further earthworks.

3. The Archaeologist will conduct an investigation and record the archaeological site following accepted archaeological practices and the authority's guidelines.

4. The Archaeologist will inform Heritage New Zealand if any significant archaeological features or deposits that were not expected are encountered.

5. If the site relates to Māori occupation, the relevant Iwi representatives will be notified by the Archaeologist (if not present) before any investigation takes place.

6. Established protocols will be followed if human remains (koiwi tangata) or taonga (Māori artefacts) are found.

Protocols Relating to Koiwi Tangata (Human Remains)

If bone material is suspected to be human, the following procedures will be implemented:

1. All earthworks or investigations must immediately halt in the surrounding area while an archaeologist determines whether the bone is human.

2. If there is uncertainty regarding the bone's origin, work should remain paused until the University's reference collection or a specialist can provide a clear identification.

3. If the bone is confirmed to be human (koiwi tangata), the archaeologist will promptly notify Iwi representatives (if they are not already present), Heritage NZ, and the NZ Police.

4. The site will be secured in a manner that minimises further harm to the koiwi.

5. Discussions will take place with all Iwi representatives as specified by the authority, as well as the Heritage NZ regional archaeologist and the authority holder, to determine the most suitable course of action. No further actions will occur until all parties have responded, and the koiwi will not be removed until instructed by Heritage NZ.

6. Iwi representatives will advise on appropriate tikanga and will be given the opportunity to conduct any relevant cultural ceremonies.

7. If the Iwi representatives consent and request it, the bones may be examined by a qualified bio-anthropological specialist prior to reburial, following the *Heritage NZ Guidelines for Koiwi Tangata Human Remains (2014)*.

8. Work at the site may recommence once the bones have been reinterred or removed and authorisation has been received from Heritage NZ.

Protocols Relating to Taonga (Māori Artefacts)

Māori artefacts, such as carvings, stone adzes, and greenstone objects, are regarded as taonga (treasures). According to the Protected Objects Act 1975, these items are classified as taonga tuturu. While taonga can sometimes be found in isolated contexts, they are generally discovered at archaeological sites. When taonga are found, the following protocols will be followed:

1. The area containing the taonga will be secured to protect them from further damage, in accordance with the conditions set by the relevant Authority.

2. The Archaeologist will inform Heritage NZ and the Iwi representatives to determine the appropriate actions from both cultural and archaeological perspectives.

3. These actions will take place within the specified stand-down period. Work may resume either at the end of this period or when advised by Heritage NZ or the Archaeologist.

4. The Archaeologist will notify the Ministry for Culture and Heritage of the discovery within 28 days, as required under the Protected Objects Act 1975. This notification can be done through the Auckland War Memorial Museum.

5. The Ministry for Culture and Heritage, in consultation with the tangata whenua, will decide on the custodianship of the taonga. This custodian may be a

museum or the iwi whose claim to the artefact has been validated by the Māori Land Court.

6. If the taonga requires conservation treatment (stabilisation), this can be carried out by the Department of Anthropology at the University of Auckland. The costs will be covered by the Ministry, and the taonga will then be returned to the chosen custodian or museum.

Post-Earthworks Phase

1. All artefacts recovered and samples collected will be examined and documented by qualified specialists.
2. Any Māori artefacts will be reported to the Ministry for Culture and Heritage in accordance with the Protected Objects Act 1975.
3. The Project Archaeologist will deliver a report to Heritage New Zealand within 20 days of finishing the archaeological work. This report may be final if no significant archaeological remains are found.
4. If substantial remains that require in-depth analysis are discovered, the Project Archaeologist will compile a detailed monitoring report within 12 months after the archaeological work concludes. This report will be shared with Heritage New Zealand and other parties specified in the Authority.

Archaeologist and Other Contacts

Doug Gaylard will lead the project in his role as the Section 45 archaeologist. He will either carry out the fieldwork himself or supervise it directly.

If needed, other qualified archaeologists or specialists may be added to the team, especially those with expertise in specific types of artefacts or remains.

Contact Details

Project Archaeologist	Doug Gaylard	021 258 4699 info@contextarchaeology.co.nz
Heritage NZ Regional Archaeologist	James Robinson	09 407 0473 021 724 90864 jrobinson@heritage.org.nz
Iwi Representatives	Eljon Fitzgerald Te Rūnanga o Whaingaroa	021 022 06851 eljon.fitzgerald@gmail.com

Stand Down Periods

Depending on the discoveries made during the earthworks, it may be necessary to implement stand-down periods to facilitate archaeological investigations or consultations with the appropriate stakeholders.

During a stand-down, earthworks will only be paused in the immediate area of the feature or artefact found, while work can continue in other locations. Maximum stand-down durations will be established, although work may resume sooner if the required actions have been completed.

Flexibility in these timeframes is essential to ensure that all archaeological tasks are accomplished as needed to comply with the authority's conditions.

Trigger	Stand Down Period	Requirements	Release
Archaeological feature, deposit or artefacts.	Up to 1-2 day[s] within each area where remains are found (maximum 2 days), but work may continue in areas where no remains are identified.	Sufficient time must be allowed for the Archaeologist to investigate and record the remains.	Work resumes when the Archaeologist advises the Contractor that work is completed.
Significant archaeological feature, deposit or artefacts.	Up to 3 days for a response from Heritage NZ, and up to 3 days for any detailed investigation required.	The likely requirement is a mitigation investigation and/or recording by standard archaeological techniques, but this will be advised by Heritage NZ.	Work resumes when the Archaeologist advises the Contractor that work is completed.
Human bone found.	As agreed between the project manager, Heritage NZ and Iwi.	Heritage NZ and NZ Police to be satisfied that koiwi identification is correct. Iwi representative(s) to organise reinterment or removal of bones from site and appropriate cultural ceremonies.	Work resumes following reinterment or removal of bones from site and when authorisation from Heritage NZ has been received..
Taonga, or archaeological remains of Māori origin found that were not anticipated.	Up to 3 days.	Heritage NZ and Iwi representative(s) to be consulted on appropriate action. Archaeological recording as required.	Work resumes when the Archaeologist or Heritage NZ advises the Contractor that work is completed.

Applicant and Contractor Responsibilities

Authority Holder's Responsibilities

Haigh Workman, or their appointed representative, are responsible for the following:

1. Notifying Heritage NZ of the start and completion dates for any necessary archaeological work.
2. Ensuring that ample time is allocated for any required archaeological investigations.
3. Providing adequate site security to safeguard archaeological materials from illegal excavation or removal.
4. Keeping a copy of the archaeological authority on site and making sure that all contractors and subcontractors are informed of its contents.
5. Maintaining a copy of this Archaeological Management Plan on site and ensuring that its contents are communicated to all contractors and subcontractors.
6. Ensuring that the conditions and protocols described in the authority and this document are adhered to by all contractors and subcontractors.
7. Creating a safe working environment for archaeologists to perform their tasks.

Contractor's Responsibilities

The Contractor has the following responsibilities:

1. Prior to starting work, meet with the Project Archaeologist on-site for a briefing regarding archaeological requirements.
2. Notify the Project Archaeologist at least two weeks in advance of the commencement of project earthworks, ensuring that an Archaeologist is present at the start of earthworks in the monitored areas specified in Figure 1.
3. Adhere to established protocols in the event that any archaeological sites, koiwi, or taonga (as outlined on pages 7-8) are uncovered.
4. Provide the Archaeologists with adequate time to explore and document any archaeological remains before work resumes in the immediate area.
5. Ensure a safe working environment for the archaeologists.

Dispute Resolution

Disputes often occur due to inadequate communication between developers, subcontractors, Iwi representatives, and project archaeologists. Many of these disputes can be prevented if the tender documents or work management documentation clearly define the archaeological issues and assigned responsibilities.

Typical disputes may include subcontractors believing that archaeologists are causing significant delays, or archaeologists feeling rushed and unable to meet their obligations set by the authority. In the case of a dispute related to the authority's investigation, the following steps should be taken for resolution:

1. **For disputes concerning archaeological issues:**
   A meeting should be organised as soon as possible, involving the authority holder (or their designated representative), the contractor or subcontractor, and the archaeologists to try and resolve the matter.

2. **For disputes concerning cultural issues:**
   A meeting should also be arranged promptly, including the authority holder (or designated representative), the contractor or subcontractor, Iwi representatives, and the archaeologists.

3. **If the dispute remains unresolved:**
   A further meeting with all involved parties, along with representatives from Heritage New Zealand, will be scheduled within one working day to facilitate resolution. Heritage New Zealand holds the ultimate responsibility for addressing issues pertaining to the conditions of the authorities they issue.

Taonga tūturu (Māori artefacts) obtained during archaeological work are frequently placed in local or national museums following analysis, with the consent of Iwi. In certain instances, Iwi may wish to retain ownership of these artefacts, which can result in disputes between different Iwi with interests in the area. Any disagreements regarding the long-term ownership and custody of taonga tūturu should be managed through the legal channels specified in the Protected Objects Act 1975. This Act mandates that all taonga tūturu be reported to the Ministry for Culture and Heritage within 28 days after completion of archaeological fieldwork. According to sections 11 and 12 of the Act, the Ministry is required to inform all interested parties about the taonga, and if there are conflicting ownership claims that cannot be resolved, the issue may need to be taken to the Māori Land Court for resolution.

Slip Remediation and Retaining Wall Construction: 574 Whangaroa Road

Archaeological Assessment

Prepared for Haigh Workman

By Doug Gaylard (MA Hons)

June 2025

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Contents

Introduction

Haigh Workman is proposing the remediation of a slip within the existing road corridor of Old Church Road, Whangaroa, as well as minor excavations designed to mitigate water flow within the adjacent property located at 574 Whangaroa Road (legal description: Lot 1 DP 190160).

The proposed remediation plan includes:

- Removal of approximately 50m^3 of existing slip material
- Construction of a retaining wall of 10m in length
- Approximately 10m^3 of filling behind the constructed retaining wall to remediate the existing slip and reinstate the roadway
- Excavations totalling approximately 35m^2 to establish adequate floor elevation of the adjacent heritage listed building, and mitigate the effects of water upon the structure
- Construction of concrete-lined curbs and channels to facilitate water flow

Figures 3, 4, and 5, detail nature and extent of the proposed remediation and mitigation plans.

An archaeological and heritage impact assessment was commissioned by Haigh Workman to establish whether removal of existing slip material, construction of the retaining wall, slip remediation and excavations around the structure located at 574 Whangaroa Road will impact archaeological or heritage values. Recommendations have been made in accordance with the statutory requirements of the Resource Management Act 1991 (RMA) and the Heritage New Zealand Pouhere Taonga Act 2014.

Methodology

As part of this assessment the New Zealand Archaeological Association's (NZAA) site record database (ArchSite), District Plan schedules and the Heritage New Zealand Pouhere Taonga (Heritage NZ) New Zealand Heritage List/Rārangi Kōrero were searched to determine whether any archaeological sites had been recorded on or near the proposed areas of works. Relevant literature and archaeological reports were also consulted (see Bibliography). Early survey plans and aerial photographs from the area were checked for information relating to past activities or modifications.

An inspection of the area was undertaken on 23 May 2025. This inspection focussed on the footprint of the slip remediation works, and the structure located within 574 Whangaroa Road.

Figure 1. General Location of slip remediation works and associated excavations (indicated by white dot).

Source: NRC Local Maps (2025)

Figure 2. Detailed location of slip remediation works and associated excavations (indicated by the white broken line).

Source: NRC Local maps (2025)

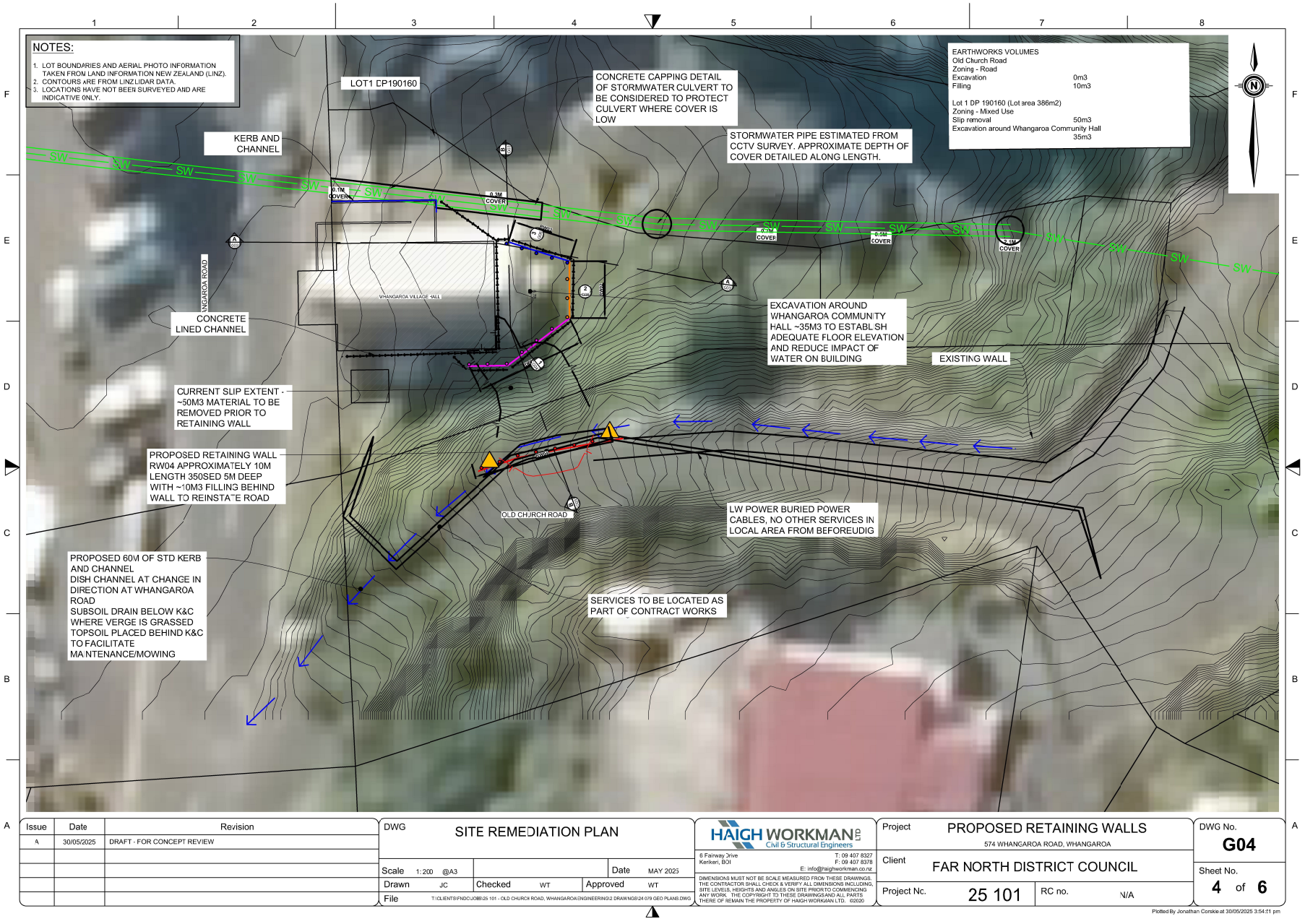

Figure 3. Proposed Remediation Plan.

Source: Haigh Workman (2025)

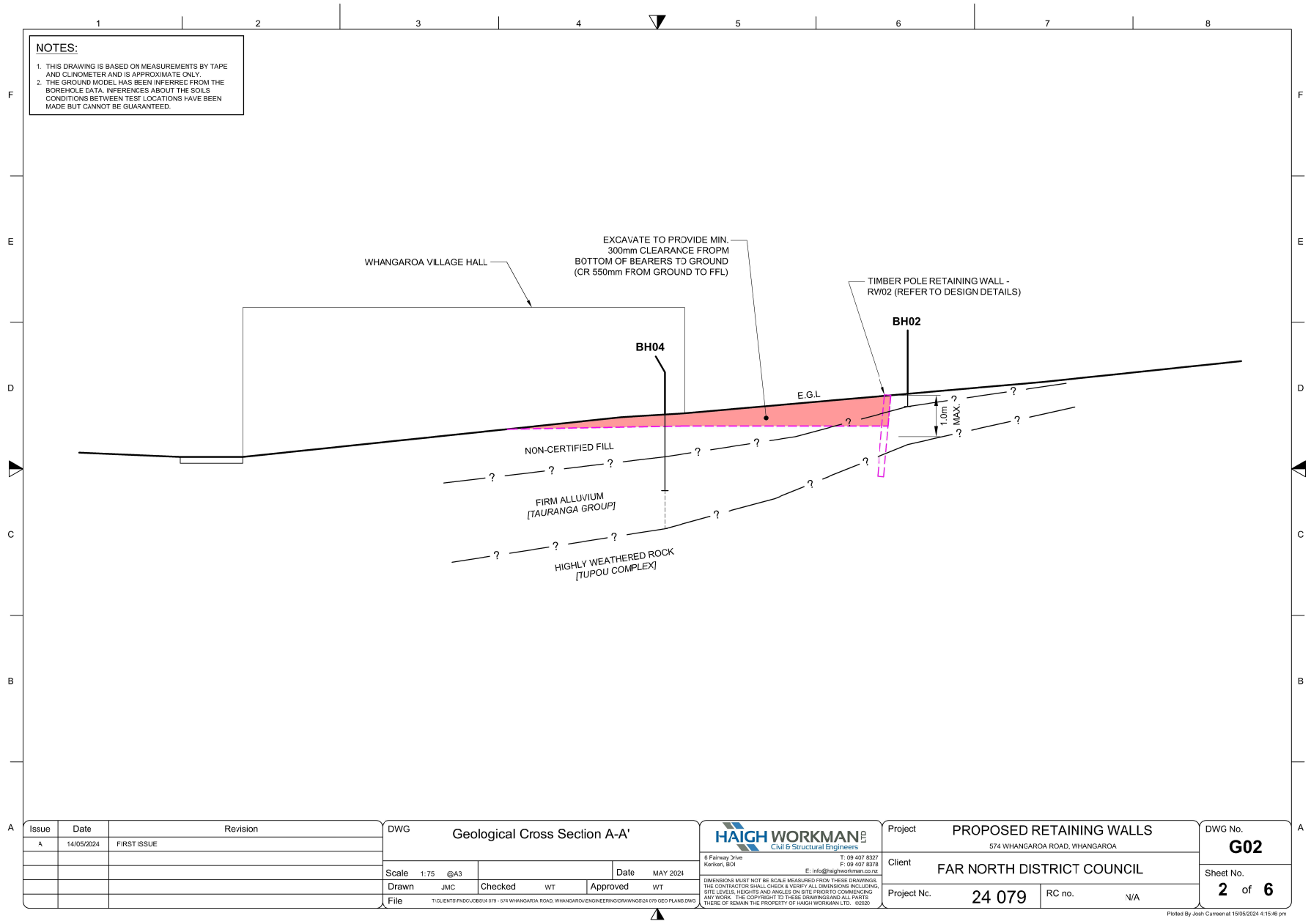

Figure 4. Proposed Retaining Walls.

Source: Haigh Workman (2025)

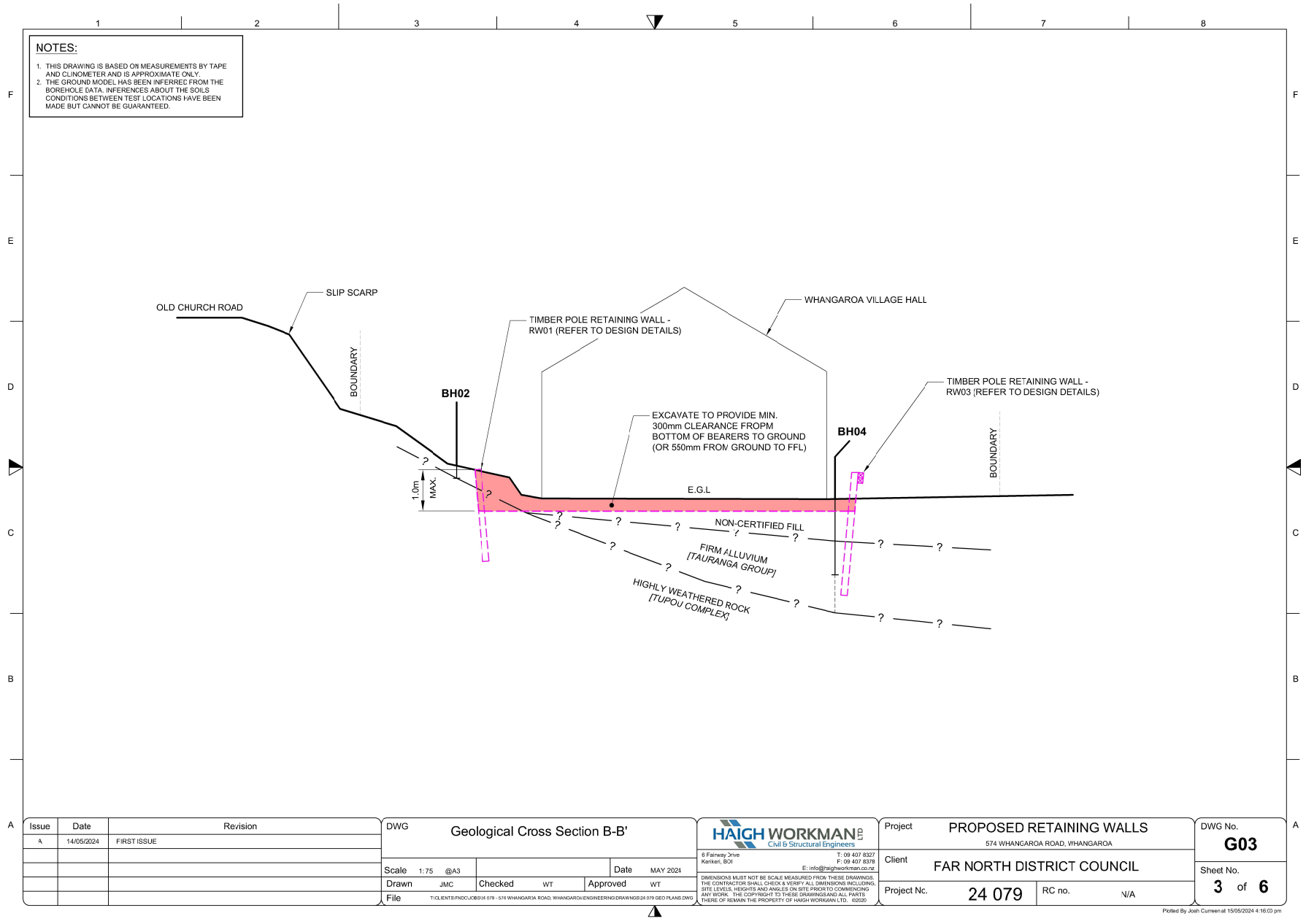

Figure 5. Proposed Retaining Walls.

Source: Haigh Workman (2025)

Historical Background

Whangaroa Harbour is located on the northeastern shore of New Zealand's Northland Peninsula, approximately 40 kilometres north of Kerikeri. This harbour is a drowned river valley and is known for its steep volcanic cliffs, sheltered inlets, and native forests. Before the arrival of Europeans, the forests surrounding the harbour were filled with kauri, tōtara, rimu, and kahikatea. These forest were home to a number of bird species, including kererū, tūī, and kākā, while the waters were home to numerous species of fish, shellfish, and marine mammals. This natural abundance provided ample sustenance for early Māori populations, who inhabited the Whangaroa for 600 to 800 years before the arrival of European settlers (Williams 1940?, Sale 1986, Robinson 1991, Orange 2015).

Ngāti Kahu, an iwi of Muriwhenua heritage, were the first to settle in the area and trace their ancestry back to the waka *Māmari*, one of the original Polynesian canoes that brought early explorers to Aotearoa. Archaeological sites such as wāhi tapu, and terraced gardens and pā sites, including Ohakiri/Saint Paul's Rock, which overlooks the harbour, underscore the strategic and cultural importance of the area.

In December 1809, Whangaroa became notorious due to the *Boyd* Incident, an event that significantly affected early Pākehā-Māori relations. The *Boyd*, a British brig, arrived from Sydney carrying cargo and passengers, including Te Ara, the son of a local Māori chief. Upon arrival in Whangaroa, Te Ara informed his people about his mistreatment on board the *Boyd* and inciting utu, or retribution, upon the passengers and crew. Approximately 66 individuals on board were killed.

The incident shocked colonial society and garnered widespread attention, but it was often sensationalised and misrepresented, lacking the cultural context and provocations that led to the attack.

In retaliation, European whalers and traders destroyed local pā and villages, further deteriorating relations between Māori and European settlers within the Whangaroa area for many years.

Shortly after the *Boyd* incident, Christian missionaries arrived in Whangaroa, perceiving it as a region in need of salvation and as a base to extend their influence. In 1823, the Wesleyan Mission established a station at Kaeo, at the head of the harbour. The mission faced several challenges, including warfare and internal conflict, and was ultimately abandoned following an attack in 1827 by Hōne Heke and Ngāti Pou forces during the musket wars.

Later missionaries such as James Shepherd, who settled in the Whangaroa area in 1838, continued early efforts to establish a missionary presence. While Shepherd was not an ordained minister, he was an accomplished carpenter and horticulturalist, in addition to being fluent in te reo (Sale 1986, NZ National Library 2024). Shepherd was also a key figure in drafting some of New Zealand's first written Māori publications. In 1840 Shepherd constructed St Paul's Chapel – which occupies 574 Whangaroa Road – which was intended as a non-denominational church. Shepherd also constructed St Paul's Church, located some 70m to the southeast. As a result of the completion of St Paul's Church the chapel was deconsecrated in 1887, becoming the Whangaroa County Office, and later the Whangaroa Village Hall.

Figure 6. Whangaroa town centre with St Paul's Chapel and bell tower (date unknown).

Source: Sale (1986) from Whangaroa Museum and Archives Society

Figure 7. Whangaroa town centre with former St Paul's Chapel. Sale (1986) notes the chapel is now the Whangaroa County Offices at the time this image was taken (date unknown).

Source: Sale (1986) from Whangaroa Museum and Archives Society

Despite early obstacles, the missionaries' presence left lasting impacts, including literacy, Western agricultural practices, Christianity, and the introduction of European goods, which gradually transformed local society.

By the mid-19th century, Whangaroa had established itself as a centre for the kauri timber industry. Large kauri trees were felled using axes and pit saws, transported to the water by bullocks, and floated down rivers to the harbour, where they were loaded onto ships bound for Auckland and international markets. The timber trade thrived for many years but was highly destructive, and extensive logging led to erosion-prone hillsides and permanently altered the ecosystem.

Whangaroa also gained fame for kauri gum-digging, particularly in the late 1800s and early 1900s. Gum was extracted from swamps and old forest floors for use in varnishes and linoleum. Many gum diggers were Croatian immigrants who introduced their own cultural influences to the region. While the gum-digging industry provided jobs and income, it was arduous and often dangerous work, leading to its gradually decline by the 1930s (Orange 2015).

As the kauri and gum industry declined, Whangaroa entered a quieter phase, with farming - particularly sheep and cattle grazing - becoming the primary focus of the local economy. The surrounding area also saw the development of orchards and forestry.

The 20th century saw the Whangaroa area transition from an economic hub to a recreational destination. The Whangaroa area is now the location of many holiday homes and a centre for marine leisure activities such as yachting, diving, and big game fishing.

Archaeological Background

Previous Archaeological Work

As Maingay (1986) notes, intensive archaeological survey of the Whangaroa Harbour was initially overlooked in favour of the sea coast and outlying islands such as Stevenson Island and the Cavalli Islands group. It was not until the late 1980s and mid-1990s that the paucity of archaeological information was addressed, with comprehensive surveys of the Whangaroa Harbour (Johnson 1988, Johnson 1990, Robinson 1996).

More recent archaeological work within the area of Whangaroa Village has been focussed on the foreshore area and the adjacent coastal hill slopes. This work has largely been prompted by residential subdivision (Bruce 2004), land reclamation (Nevin 2001), or upgrades to existing infrastructure (Callaghan 2012).

What is clear, is that coastal areas within the Whangaroa area were well populated and defended, and that geological resources provided early populations with rich agricultural soils and mineral resources for the creation of stone tools (Maingay 1986, Stratton and Cassels 1978). The area was also important for early European populations, evidenced by the remains of early industrial activity such as saw mills and wharves.

Information from Early Maps, Plans and Aerial Photography

Examination of early survey plans was undertaken, with survey plan SO 20011 from July of 1916 providing the most information. The plan shows W.C.C (likely Whangaroa County Council) being the landowner at this time, while a right of way is visible to the south (Figure 8). It is unclear as to whether this right of way was formally gazetted prior to the formation of Old Church Road.

An examination of aerial photography held within the RetroLens database shows considerable changes within the area around 574 Whangaroa Road. The earliest available aerial photography shows that in 1950 the present corridor of Old Church Road has not yet been formed, and primary access to St Paul's Church being located further to the south along Whangaroa Road (Figure 9). A small, barely visible, ancillary path does seem to extend from the location of St Paul's Chapel – which at this time would likely have been the Whangaroa Country Office – to St Paul's Church. Likewise, a number of buildings shown in early photographs of Whangaroa Village including the chapel bell tower and school house have been removed (see: Figure 6 and Figure 7).

By 1977, the corridor of Old Church Road has now been formed and additional structures now occupy the surrounding slopes, while land reclamation efforts have been undertaken along the foreshore (Figure 10). By 1981, the Whangaroa Village area appears largely as it does today, with a number of residential, commercial and recreational developments clearly visible (Figure 11).

Figure 8. Detail of survey plan SO 20011 with project area indicated by the white broken line.

Figure 9. Detail of 1950 aerial photography showing the project area (indicated by the white circle).

Source: RetroLens (2025) Survey Number 350, Run 1362, Photo 53

Figure 10. Detail of 1977 aerial photography showing the project area (indicated by the white circle).

Source: RetroLens (2025) Survey Number 5006, Run G, Photo 5

Figure 11. Detail of 1981 aerial photography showing the project area (indicated by the white circle).

Source: RetroLens (2025) Survey Number 5932, Run E, Photo 24

Archaeological Field Survey

A pedestrian archaeological survey within the project area was undertaken on 23 May 2025. Overall, the project area encompasses two main landscape topographies. The first is a steep slope extending from the northern extent of Old Church Road corridor, in which the existing slip is located. The second is the property of 574 Whangaroa itself, which is represented by a large, flat, mostly gravelled area. The existing community hall (formerly St Paul's Chapel) which is a heritage listed building , occupies a location to the extreme west of the property, adjacent to the road corridor of Whangaroa Road. The hall is a Category 2 historic building (Heritage New Zealand List number 2591). A small ancillary structure – of 20th or 21st century origin – occupies a location to the immediate south of the community hall.

The survey involved visual inspection of the general area and examination of the footprints of the proposed slip remediation, retaining wall, and proposed excavations within 574 Whangaroa Road (Figure 13-Figure 23).

Subsurface probing within the boundary of 547 Whangaroa Road revealed highly compacted gravelled ground surfaces, which were not conducive to test pitting, and no test pits were excavated.

Examination of the existing slip revealed the presence of one possible archaeological site, and one confirmed archaeological site.

The confirmed archaeological site is a layer of marine shell midden – approximately 10cm thick and 80cm in length, comprised largely of tuatua, with isolated instances of oyster (Figure 21). The shell is within a matrix of dark brown silt and no other inclusions (eg. charcoal or heat modified rock) were noted. The deposit was visible within the exposed slip scarp, and located approximately 1m below the existing road surface of Old Church Road. Subsurface probing was unable to establish the extent of this deposit and it is likely to extend beneath the footprint of Old Church Road.

The possible archaeological site is represented by a distinct layer of gravel, approximately 70cm below the existing existing road surface of Old Church Road and within the exposed slip scarp (Figure 22). The location of this layer broadly correlates to the ancillary path visible within aerial photography from 1950 (Figure 9), and also to the stairway visible within an early photographs of the Whangaroa Village centre (Figure 6), which provides access to St Paul's Church.Subsurface probing was unable to establish the extent of this deposit and it is likely to extend beneath the footprint of Old Church Road.

A single brown glass bottle was also observed within the slip material (Figure 23). While the age of the bottle was not able to be established, its presence suggests the possibility of further instances of historical material (eg. ceramics and glass) being present within the hill slope or within the slip material.

The location of all confirmed and suspected archaeological sites have been entered into the New Zealand Archaeological Association ArchSite database (refer to Appendix 1).

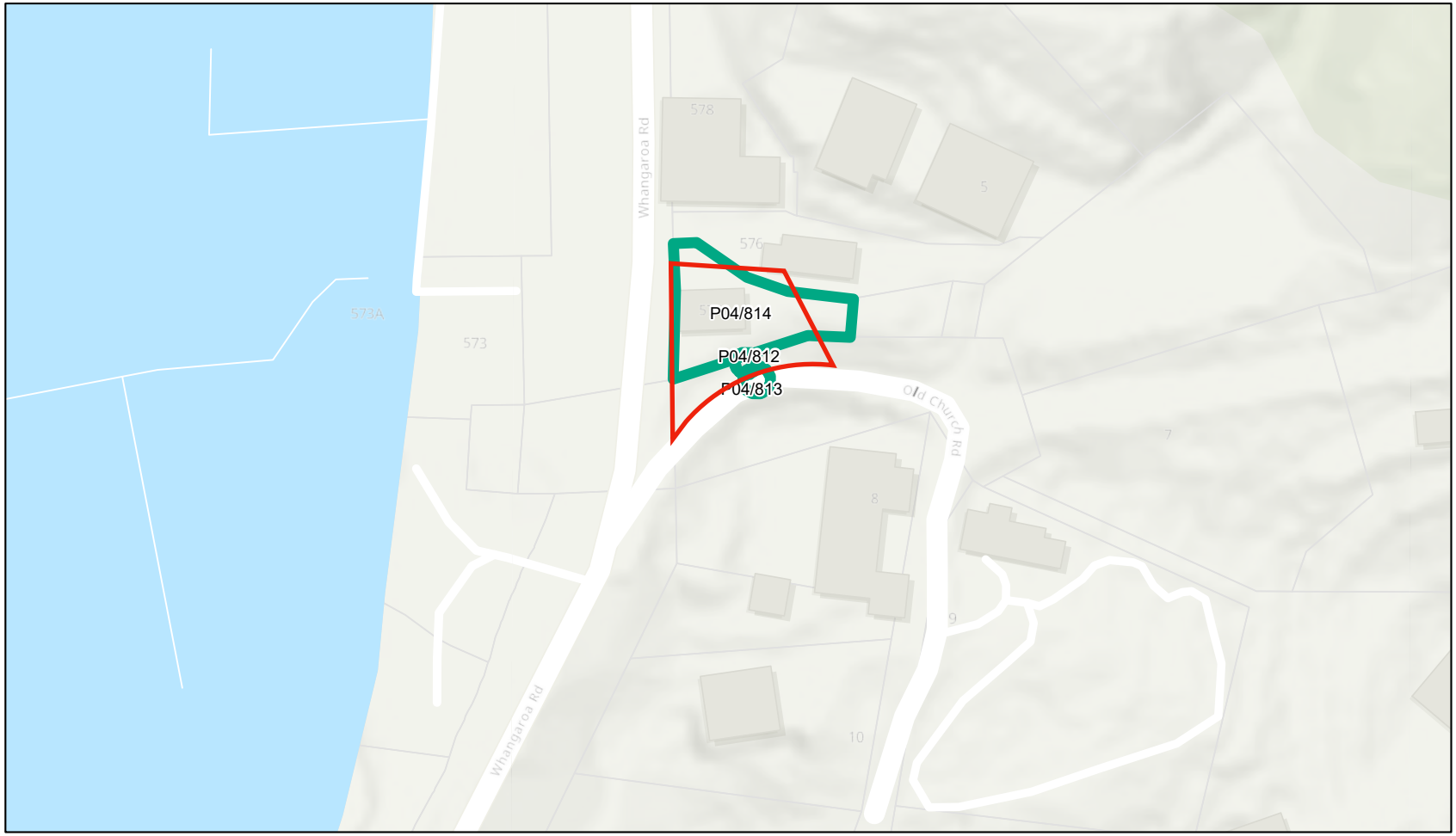

Figure 12. Recorded archaeological sites in relation to the proposed works (indicated by the red outline)

Source: ArchSite 2025

Figure 13. View southeast towards the Whangaroa Community Hall (formerly St Paul's Chapel) from Whangaroa Road.

Figure 14. View east over the northern extent of 547 Whangaroa Road.

Figure 15. View east along the southern extent of 547 Whangaroa Road. Note slip material in centre of image.

Figure 16. View east between the Whangaroa Community Hall and the modern ancillary structure. Note slip material in centre of image.

Figure 17. View west from the rear of the Whangaroa Community Hall. Note slip material in image foreground.

Figure 18. View west from the rear of the Whangaroa Community Hall.

Figure 19. View of slip extending from old Church Road.

Figure 20. View of slip extending from Old Church Road showing location of archaeological deposits.

Figure 21. Exposed midden deposit.

Figure 22. Exposed gravel layer

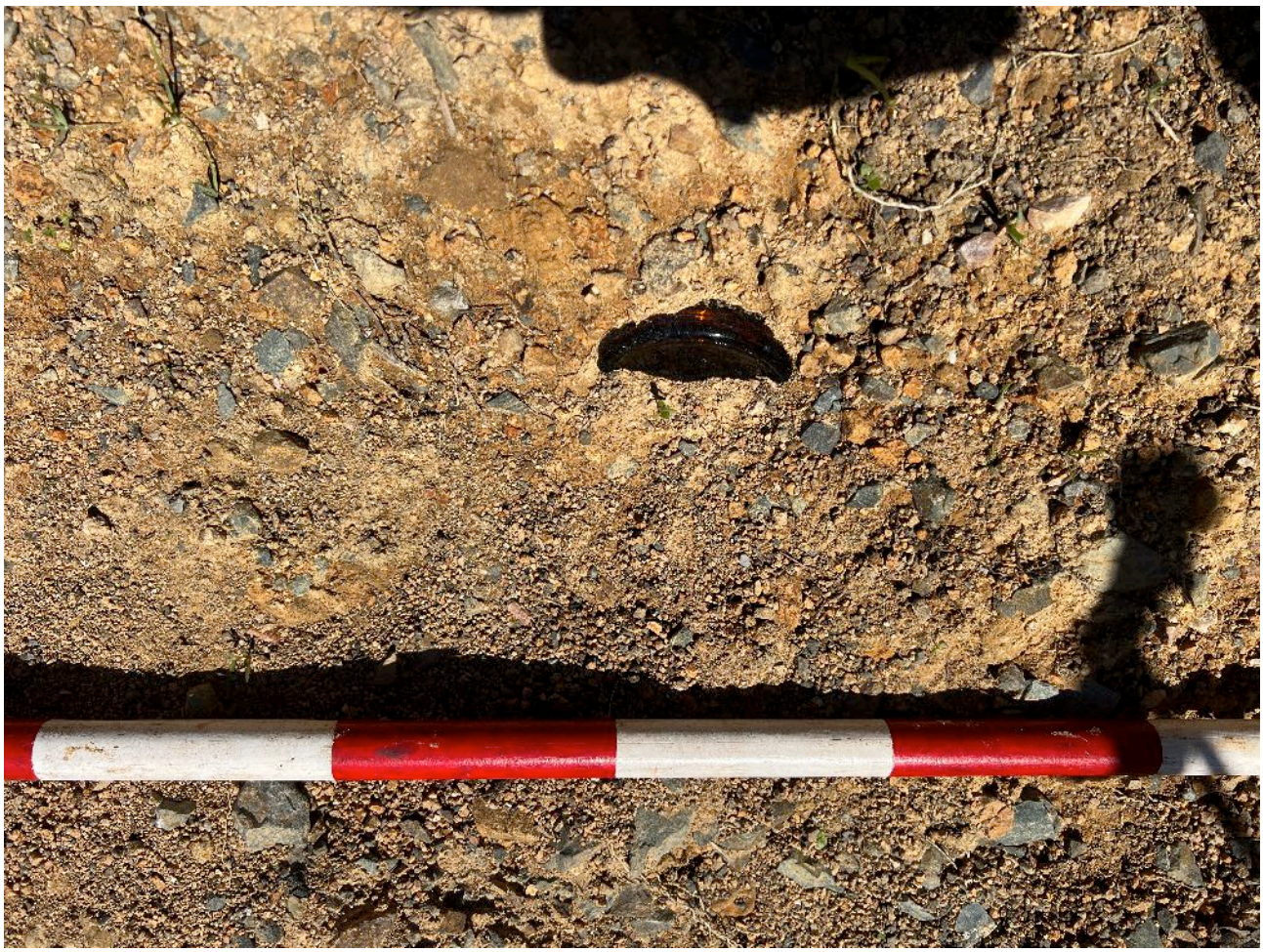

Figure 23. Brown glass bottle (unknown time period).

Summary and Discussion

Summary of Results

Pedestrian archaeological survey identified two confirmed archaeological sites and one potential archaeological site. Results of the survey also suggested the possibility of encountering further unidentified archaeological deposits.

The two confirmed archaeological sites are represented by the Category 2 heritage listed building (the Whangaroa Community Hall, formerly St Paul's Chapel), and a deposit of marine shell midden approximately 10 x 80cm in size. The possible archaeological site – a thin layer of gravel exposed within the slip scarp – may represent remains of pre-1900 access to St Paul's Church, located some 70m to the southeast. Both the shell midden and the gravel layer are likely to be present underneath the existing footprint of Old Church Road.

While a definitive time period for the brown glass bottle was unable to be established, its presence suggests some possibility of additional archaeological deposits, artefacts, or features. These may be located either within the slip material or intact slopes extending from Old Church Road.

Māori Cultural Values

This assessment considers the impact on archaeological values only and does not assess the impact on Māori cultural values. Only the tangata whenua should carry out such assessments. Māori cultural concerns may include a wider range of values than those associated with archaeological sites. The strong historical connection of the general area with the tangata whenua is apparent from the documented sites, traditional histories, and known Māori place names.

Constraints and Limitations

This report does not reflect the perspectives of tangata whenua concerning the importance of the place to mana whenua. The cultural significance of the place to tangata whenua and the potential presence of w hi tapu can only be evaluated by mana whenua.

Traditional archaeological survey methods, which rely on visual inspection and limited subsurface testing, are not always capable of identifying all sub-surface archaeological features. Furthermore, they cannot identify wahi tapu and other sites of traditional importance to Māori, especially if these sites lack physical remains.

Archaeological Values and Significance

Heritage New Zealand has established specific guidelines for assessing archaeological sites. These guidelines include criteria such as condition, rarity, contextual value, information potential, amenity value, and cultural associations (Heritage NZ 2019: 9-10). Both sets of criteria have been applied to evaluate the value and significance of the archaeological sites within the project area (refer to Table 1, Table 2, and Table 3).

The archaeological value of sites primarily relates to their information potential, which refers to how effectively they can provide evidence concerning local, regional, and national history through archaeological investigation techniques. The extent, complexity, and condition of the sites are crucial factors affecting their ability to yield information. For instance, pa sites are generally more complex and have a higher information potential than smaller middens, unless the middens are of an early date.

Moreover, archaeological value encompasses contextual value within the heritage landscape. These sites may also possess additional historic heritage values, including historical, architectural, technological, cultural, aesthetic, scientific, social, spiritual, and traditional values.

Table 1. Assessment of the historic heritage significance of site P04/814 (historic chapel)

Criterion	Comment	Significance Evaluation
a) historical: The place reflects important or representative aspects of national, regional or local history, or is associated with an important event, person, group of people or idea or early period of settlement within New Zealand, the region or locality	The chapel, constructed by missionary James Shepherd, represents an early example of missionary activity within the Whangaroa area.	High
b) social: The place has a strong or special association with, or is held in high esteem by, a community or cultural group for its symbolic, spiritual, commemorative, traditional or other cultural value	The Whangaroa Community Hall (formerly St Paul's Chapel) represents considerable association with the local community.	High
c) Mana Whenua: The place has a strong or special association with, or is held in high esteem by, Mana Whenua for its symbolic, spiritual, commemorative, traditional or other cultural value	To be determined by mana whenua	Not assessed
d) knowledge: The place has potential to provide knowledge through scientific or scholarly study or to contribute to an understanding of the cultural or natural history of New Zealand, the region, or locality	Much of the missionary history of the Whangaroa area, and the history of the chapel itself, is known,	Moderate

e) technology: The place demonstrates technical accomplishment, innovation or achievement in its structure, construction, components or use of materials	The chapel represents an early example of missionary construction.	Moderate
f) physical attributes: The place is a notable or representative example of a type, design or style, method of construction, craftsmanship or use of materials or the work of a notable architect, designer, engineer or builder;	The chapel was constructed by missionary James Shepherd, a key figure within early missionary activity within the Whangaroa area.	High
g) aesthetic: The place is notable or distinctive for its aesthetic, visual, or landmark qualities	While the chapel is not aesthetically distinctive, it does provide visual and landmark qualities.	High
h) context: The place contributes to or is associated with a wider historical or cultural context, streetscape, townscape, landscape or setting	The chapel contributes to the wider historical context of missionary activity within the Whangaroa area in addiction to providing context to the early Whangaroa Village streetscape.	High

Table 2. Assessment of the archaeological values of site P04/812 (shell midden) based on Heritage NZ criteria (Heritage NZ 2019: 9-10)

Value	**Assessment**
Condition	The deposit appears to have good integrity as it is well preserved beneath Old Church Road. The deposit is also in good condition, displaying only moderate fragmentation.
Rarity	The deposit is not of high rarity, as shell midden deposits are one of the more common archaeological site types within New Zealand.
Contextual value	The deposit has potential to contextualise early marine subsistence within the Whangaroa area.
Information potential	The deposit has moderate potential to provide information about pre-European subsistence within the Whangaroa area.
Amenity value	The deposit has little amenity value as it below an existing roadway which is due to be reinstated.
Cultural associations	Unknown, the cultural significance of the deposit is for tangata whenua to determine.
Other	The deposit may provide radiocarbon data to contextualise it within the wider history of the Whangaroa area.

Table 3. Assessment of the archaeological values of site P04/813 (gravel layer/possible historic path) based on Heritage NZ criteria (Heritage NZ 2019: 9-10)-1

Value	**Assessment**
Condition	The deposit appears to have good integrity as it is well preserved beneath Old Church Road.
Rarity	The deposit is of moderate rarity.
Contextual value	The deposit has high contextual value, providing insight into early missionary activity within the Whangaroa area.
Information potential	The deposit has moderate potential for providing information about early construction materials and techniques.
Amenity value	The deposit has little amenity value as it below an existing roadway which is due to be reinstated.
Cultural associations	The deposit has high cultural associations with early missionary activity within the Whangaroa area.
Other	The deposit has moderate potential to provide information on early construction methods and technologies.

Effects of the Proposal

The proposal will have impact upon all archaeological sites recorded during pedestrian survey, and these are detailed in the following assessment of effects.

Slip Material from Old Church Rd

During the initial removal of 50m^3 of existing slip material on the southern side of the community hall, there is some possibility of encountering previously unrecorded archaeological deposits or artefacts. These may have been present beneath the carriageway of Old Church Road – or within its adjacent slope – prior to its failure from water inundation. The nature of these deposits is somewhat unclear, but most likely to be disturbed remains of both the marine shell midden (P04/812) and the gravel layer that may be a footpath from Old Church Road to the community hall when it was functioning as a chapel (P04/813). The presence of the brown glass bottle (refer to Figure 20 and Figure 23) also suggests the possibility of further artefacts or deposits being present in secondary deposition within the slip material or *in situ* on the adjacent slope, and these may be pre-1900 in origin. Removal of slip material and formation of the new slope will damage or destroy any unknown subsurface deposits. An archaeologist should be present to sample and record any previously unrecorded archaeological deposits or features that are likely to be exposed or impacted by this phase of the project.

Retaining Wall to Stabilise the Slip Scarp

Stabilisation of the existing slip scarp prior to carriageway reinstatement will have effects on both the marine shell midden (P04/812) and the gravel layer (P04/813). The marine shell midden is, at minimum, expected to be horizontally truncated by stabilisation works. The exact extent of horizontal truncation is currently unknown, however subsurface probing during pedestrian survey was unable to definitively establish the extent of this deposit, and there is a high likelihood that all *in situ* remains of P04/812 will be destroyed during stabilisation works. The gravel layer, P04/813, will also be horizontally truncated by stabilisation works and there is also a high likelihood that *in situ* remains of this deposit will be destroyed as part of stabilisation works. Any *in situ* remains of these deposits that exist following stabilisation works will be buried by 10m^3 of fill material following construction of the proposed retaining wall. In sum, all works associated with stabilisation of the existing slip scarp will damage or destroy P04/812 and P04/813. An archaeologist should be present to sample and record these deposits during this phase of the project.

Community Hall building, formerly St Pauls Chapel

There is no anticipated effect upon the community hall itself (P04/814, formerly St Paul's chapel). However, previous landslips have built up the ground surface around the building causing problems with water damage and lack of sub floor ventilation. Therefore excavation of this multiple slip material is required to a depth of 300mm to create a new ground surface, retaining walls, and drainage infrastructure to mitigate the effects of water upon the community hall (refer to plans within Figures 3-5) have a high likelihood to expose pre-1900 deposits, features, or artefacts associated with the structure. The nature of any archaeology exposed during this phase of the project is unknown, but may include remains of the pre-1900 ground surface in the form of paths, foundations, footings, or artefacts associated with the use of the structure prior

to 1900. Should the required removal of 300mm be lower than the pre 1900 surface then any archaeological remains exposed during this phase of the project will be destroyed. Considering that the pre 1900 ground surface would have provided reasonable drainage and ventilation for the early history of the building, the monitoring archaeologist will advocate with the contractors to only excavate down to the pre 1900 ground surfaces. If found these surfaces are to be retained where possible. Similarly the installation of two small retaining walls and kerb and channel drains may cause damage depending on how deep the new ground surface will be, will damage any archaeology present.

In summary, an archaeologist should be present to monitor excavations during this phase of the project and sample and recorded any artefacts or features exposed during earthworks. In areas where archaeological sites have been documented nearby, there is a possibility of encountering unrecorded subsurface remains during development. These remains may include burnt and fire-cracked stones, charcoal, refuse heaps containing shells and bones, as well as 19th-century glass and crockery. Additionally, the remains may consist of features such as ditches, banks, pits, old building foundations, artefacts of Māori and early European origin, or human burials.

On balance, while the proposed works will have significant impacts upon both recorded and unrecorded archaeology in the immediate area, the works will have the benefit of ongoing protection for the Whangaroa Community Hall from the effects of water flow from severe weather events.

Legislation and Policy

There are two main pieces of legislation in New Zealand that govern work affecting archaeological and other significant historic heritage sites: the Resource Management Act 1991 (RMA) and the Heritage New Zealand Pouhere Taonga Act (2014).

1. Resource Management Act 1991 (RMA)

This act provides a framework for managing the use of natural and physical resources, including historic heritage. It requires local authorities to consider the effects of land use and development on heritage sites, and to provide protection for historic heritage as part of the sustainable management of resources. The RMA empowers local councils to develop district and regional plans that include rules and provisions to protect heritage sites.

2. Heritage New Zealand Pouhere Taonga Act 2014

This act is specifically focused on heritage protection and management. It establishes Heritage New Zealand Pouhere Taonga (formerly known as the New Zealand Historic Places Trust) as the main organisation responsible for identifying, protecting, and conserving New Zealand's historic places. The Act requires that any work on archaeological sites – defined as any site associated with human activity before 1900 – must have an archaeological authority from Heritage New Zealand Pouhere Taonga, regardless of whether the site is recorded or not.

Together, these two pieces of legislation play a significant role in safeguarding New Zealand's archaeological and historic heritage sites.

Resource Management Act 1991 (RMA)

Section 6 of the RMA recognises as matters of national importance: "the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, wāhi tapu, and other taonga" (S6(e)); and "the protection of historic heritage from inappropriate subdivision, use, and development" (S6(f)).

All individuals carrying out responsibilities and exercising authority under the Resource Management Act (RMA) must acknowledge and address these significant national matters when overseeing the utilisation, development, and safeguarding of natural and physical resources, as outlined in Section 6. There is an obligation to prevent, rectify, or alleviate any negative environmental impacts resulting from an activity (Section 17), including those affecting historic heritage.

Historic heritage is defined (S2) as 'those natural and physical resources that contribute to an understanding and appreciation of New Zealand's history and cultures, deriving from any of the following qualities: (i) archaeological; (ii) architectural; (iii) cultural; (iv) historic; (v) scientific; (vi) technological'. Historic heritage includes: '(i) historic sites, structures, places, and areas; (ii) archaeological sites; (iii) sites of significance to Māori,

including wahi tapu; (iv) surroundings associated with the natural and physical resources'.

Regional, district, and local plans include sections that aid in the identification, protection, and management of archaeological and other heritage sites. These plans are developed in accordance with the provisions of the Resource Management Act (RMA).

This assessment has concluded that the proposed activity will affect both P04/813 (a marine shell midden) and P04/812 (a gravel layer/possible historic path). Additionally, the proposed activity is likely to affect the immediate surrounds of P04/814 (historic chapel). This site is listed or on the Far North District Council Proposed District Plan (Schedule Number 223).

Furthermore, there is a possibility that the activity could impact unidentified subsurface archaeological remains that may be uncovered during development. Any potential effects on these archaeological deposits or features can be effectively managed through proper archaeological investigation and recording, enabling us to recover information related to the area's history. If resource consent is granted, it is recommended that a condition be included to require accidental discovery protocols. Additionally, it is advisable to add a note regarding the provisions of the Heritage New Zealand Pouhere Taonga Act (HNZPTA), as an Authority under this Act will be necessary for any modification or investigation of archaeological remains.

Heritage New Zealand Pouhere Taonga Act 2014 Requirements

The Heritage New Zealand Pouhere Taonga Act (HNZPTA) protects all archaeological sites, whether they have been officially recorded or not. These sites cannot be damaged or destroyed without prior authorisation from Heritage NZ, as outlined in Section 42 of the Act, in addition to any requirements set forth in the Resource Management Act (RMA).

HNZPTA Section 6 defines an archaeological site as follows:

'**archaeological site** means, subject to section 42(3), –

> (a) any place in New Zealand, including any building or structure (or part of a building or structure) that –
>
> (i) was associated with human activity that occurred before 1900 or is the site of the wreck of any vessel where the wreck occurred before 1900; and
>
> (ii) provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand; and
>
> (b) includes a site for which a declaration is made under section 43(1)'

Under Section 43(1) a place post-dating 1900 (including the site of a wreck that occurred after 1900) that could provide 'significant evidence relating to the historical

and cultural heritage of New Zealand' can be declared by Heritage NZ to be an archaeological site.

Authorities to modify archaeological sites can be applied for either in respect to archaeological sites within a specified area of land (Section 44(a)), or to modify a specific archaeological site where the effects will be no more than minor (Section 44(b)), or for the purpose of conducting a scientific investigation (Section 44(c)). Applications that relate to sites of Māori interest require consultation with (and in the case of scientific investigations the consent of) the appropriate iwi or hapū and are subject to the recommendations of the Māori Heritage Council of Heritage NZ. In addition, an application may be made to carry out an exploratory investigation of any site or locality under Section 56, to confirm the presence, extent and nature of a site or suspected site.

As the proposed development, will affect site P04/813 (a marine shell midden), P04/812 (a gravel layer/possible historic path), and the immediate surrounds of P04/814 (a historic chapel), an Authority must be obtained from Heritage NZ before any work can be carried out that may affect the sites. The conditions of the Authority are likely to include the archaeological recording/investigation of any remains affected.

Under Section 65 of the Act, Heritage NZ has the power to list significant historic places and areas, wahi tupuna, wahi tapu and wahi tapu areas on the New Zealand Heritage List. The purpose of listing is to inform members of the public and landowners about the values of significant places and to assist in their protection under the RMA. Heritage NZ would be considered an affected party in relation to any consent application affecting an item on the List. While proposed earthworks to mitigate the effects of water upon the historic chapel are unlikely to affect the Category 2 historic building (Heritage New Zealand List number 2591), excavations may affect its immediate surrounds and expose associated archaeological deposits, features, or artefacts.

Conclusions

Two confirmed archaeological sites were encountered during the course of field survey, P04/813 and P04/814. These are represented by a deposit of moderately fragmented shell midden exposed in the slip scarp beneath Old Church Road, and the Whangaroa Community Hall – a Category 2 heritage listed building (Heritage New Zealand List number 2591) – respectively.

A further potential archaeological site (P04/812), was noted in the form of a distinct gravel layer within the slip scarp. This deposit may represent a pre-1900 path used to access St Paul's Church from the Whangaroa Road/St Paul's Chapel area, or a base course designed to support a now demolished flight of stairs likely used to access St Paul's Church (refer to Figure 6).

Further to the three sites outlined above, a single brown glass bottle of unknown date suggests the potential of further unrecorded archaeological deposits, features, or artefacts within the project footprint.

Considered together, it is recommended that an archaeological authority be sought prior to commencement of earthworks for this project. Additionally, the early phases of the project should be monitored by an archaeologist to enable robust sampling and recording of all archaeological remains. Archaeological monitoring should be undertaken during aspects of the project where any ground surfaces or existing slip material will be disturbed.

In sum, the activities where archaeological monitoring is recommended include: removal of existing slip material (should any artefacts be contained within), cutting/preparation of the existing slip scarp and lowering of ground surfaces around the Whangaroa Community Hall.

Additionally, should any suspected archaeological deposits or features be encountered during other phases of the project, works should cease in the immediate vicinity and Heritage New Zealand, the project archaeologist, and tangata whenua should be notified.

Recommendations

- As sites, P04/812, P04/813 and the immediate surrounds of P04/814 will be affected by the proposed works, and there is potential to affect additional unidentified subsurface archaeological remains, an Authority to modify archaeological sites within the project area must be applied for under Section 44(a) of the HNZPTA prior to the start of earthworks. **This is a legal requirement.**

- An archaeologist should be present to monitor earthworks in the vicinity of site P04/812, P04/813 and P04/814, and to investigate, record and sample any archaeological remains exposed, particularly during the project phases detailed below:

    - Removal of existing slip material
    - Cutting/Preparation of the existing slip scarp
    - Lowering of ground surfaces around the Whangaroa Community Hall

- Since archaeological survey cannot always detect sites of traditional significance to Māori, such as wahi tapu, and as the affected sites relate to Māori settlement, the tangata whenua should be consulted regarding the cultural effects of the proposal. This will be required as part of the Authority application and is likely to be required for resource consent purposes.

- In the event of human remains being uncovered, work should be stopped immediately in the area, and tangata whenua, Heritage NZ, NZ Police, and the Council should be contacted to make appropriate arrangements.

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Appendix 1: Site Record Forms

NEW ZEALAND ARCHEOLOGICAL ASSOCIATION INCORPORATED

Site Record Form

ARCHSITE archaeological site recording scheme

NZAA Site Number:	P04/812	**Site Coordinates (NZTM)**	
Imperial Site Number:		**Easting:**	
Site Type:	Midden/Oven	**Northing:**	
Site Name(s):		**Source:**	Handheld GPS

Finding Aids to the Location of the Site:

Exposed by slip and located 1m below existing surface of Old Church Road.

Brief Description:

Shell midden exposed by slip

Condition of Site when last visited:

Fair

Printed by: CLOU_DougGaylard_ArchSite

Date Report Created: 03/06/2025

Site Periods:

Indigenous pre-1769

Ethnicity:

Maori

Site Features:

Midden

Associated Sites:

Description:

Updated 29/05/2025 (Field Visit), submitted by: CLOU_DougGaylard_ArchSite, visited 23/05/2025 by Doug Gaylard

Exposed by slip and located 1m below existing surface of Old Church Road. The deposit is comprised of moderately fragmented tuatua and rare oyster shell in a compact dark brown matrix. The exposed extent is approximately 10cm in thickness with a width of 80cm. No associated charcoal was noted. Subsurface probing was not able to establish the extent of this deposit. It is possible it extends underneath the existing corridor of Old Church Road.

Condition Notes:

Updated 29/05/2025 (Field Visit), submitted by: CLOU_DougGaylard_ArchSite, visited 23/05/2025 by Doug Gaylard

Appears in good to fair condition.

Date Report Created: 03/06/2025

NEW ZEALAND ARCHEOLOGICAL ASSOCIATION INCORPORATED

Site Record Form

ARCHSITE archaeological site recording scheme

NZAA Site Number:	P04/813	**Site Coordinates (NZTM)**	
Imperial Site Number:		**Easting:**	
Site Type:	Transport/	**Northing:**	
Site Name(s):		**Source:**	Handheld GPS

Finding Aids to the Location of the Site:

Located 1m below existing corridor of Old Church Road

Brief Description:

Gravel layer - historic road surface

Condition of Site when last visited:

Good

Printed by: CLOU_DougGaylard_ArchSite

Date Report Created: 03/06/2025

NEW ZEALAND ARCHEOLOGICAL ASSOCIATION INCORPORATED

Site Periods:

Colonial 1840-1900, Modern 1900-

Ethnicity:

Non Maori

Site Features:

Road

Associated Sites:

Description:

Updated 29/05/2025 (Field Visit), submitted by: CLOU_DougGaylard_ArchSite, visited 23/05/2025 by Doug Gaylard

Visible in exposed slip scarp. Layer of gravel approximately 5cm in thickness. I was not able to conclusively establish if this is pre-1900 in origin. The layer may be an early/mid 20th century road surface. Historical records show there was a path to St Paul's Church in this location, and the layer may be associated with the path. The site will soon be covered when the existing slip is remediated.

Condition Notes:

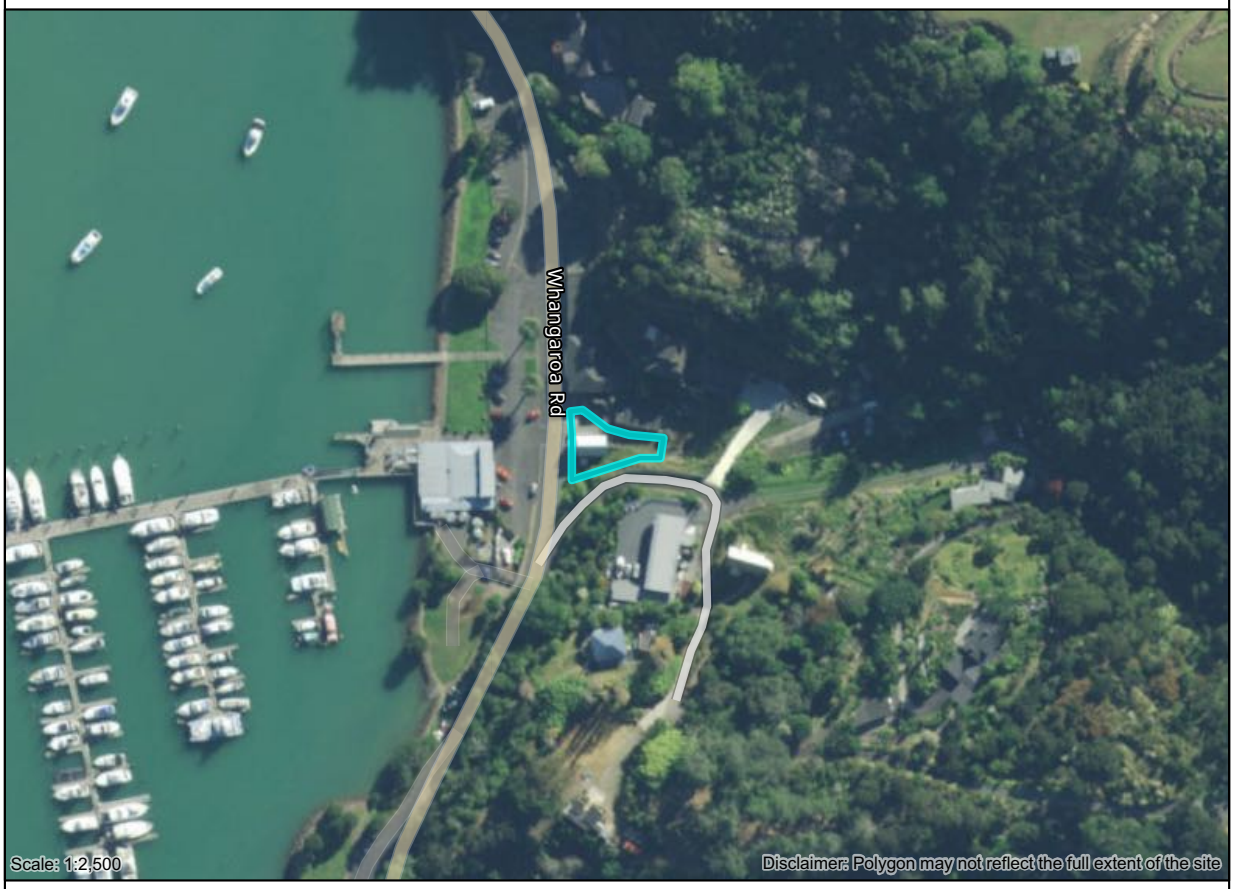
Date Report Created: 03/06/2025

NEW ZEALAND ARCHEOLOGICAL ASSOCIATION INCORPORATED

Site Record Form

ARCHSITE archaeological site recording scheme

NZAA Site Number:	P04/814	**Site Coordinates (NZTM)**	
Imperial Site Number:		**Easting:**	
Site Type:	Religious	**Northing:**	
Site Name(s):	Whangaroa Village	**Source:**	On Screen



Finding Aids to the Location of the Site:

Located at 547 Whangaroa Road

Brief Description:

Chapel constructed 1840

Condition of Site when last visited:

Good

Printed by: CLOU_DougGaylard_ArchSite

Date Report Created: 03/06/2025

NEW ZEALAND ARCHEOLOGICAL ASSOCIATION INCORPORATED

Site Periods:

Colonial 1840-1900

Ethnicity:

Non Maori

Site Features:

Church/ chapel

Associated Sites:

Description:

Updated 03/06/2025 (Field Visit), submitted by: CLOU_DougGaylard_ArchSite, visited 23/05/2025 by Doug Gaylard

Located at 547 Whangaroa Road, this building was formerly St Paul's Chapel, a non-denominational church used prior to the construction of St Paul's Church (completed in 1883) - located some 70m to the southeast. The chapel was constructed by the missionary James Shepherd in 1840. The building itself is constructed of wood and has a footprint of approximately 16 x 10m. The chapel has undergone some modification over time, with the original entrance being removed sometime after the chapel's deconsecration in 1887. Following deconsecration, the chapel became the Whangaroa County Office, then later the Whangaroa Community Hall. A bell tower was located to the southwest of the church, but this has since been removed and a small modern building occupies the bell tower footprint.

Updated 29/05/2025 (Field Visit), submitted by: CLOU_DougGaylard_ArchSite, visited 23/05/2025 by Doug Gaylard

Historic Chapel constructed by James Shepherd.

Condition Notes:

Updated 29/05/2025 (Field Visit), submitted by: CLOU_DougGaylard_ArchSite, visited 23/05/2025 by Doug Gaylard

Church is in good condition and is currently in use as the Whangaroa Village Hall.

Date Report Created: 03/06/2025

Heritage New Zealand Pouhere Taonga

Archaeological Authority 2025-637
Heritage New Zealand Pouhere Taonga Act 2014

Heritage New Zealand Pouhere Taonga has granted an archaeological authority subject to conditions. Read your conditions carefully. Complying with the conditions of your archaeological authority is a legal requirement.

DETERMINATION DATE	23 July 2025
EXPIRY DATE	23 July 2030
AUTHORITY HOLDER	Haigh Workman
ARCHAEOLOGICAL SITES	P04/814, P04/812, P04/813
LOCATION	Old Church Road Road Reserve, and 574 Whangaroa Road, Whangaroa

This authority may not be exercised during the appeal period of 15 working days, or until any appeal that has been lodged is resolved.

This decision does not ascribe mana whenua status.

DETERMINATION

Heritage New Zealand Pouhere Taonga grants an authority pursuant to section 48 of the Heritage New Zealand Pouhere Taonga Act 2014 in respect of the archaeological site(s) described above, within the area specified as Lot 1 DP 190160, Old Church Road Road Reserve to Haigh Workman for the proposal to undertake earthworks to stabilise the Old Church Road with a retaining wall, and earthworks to mitigate water flow around the adjacent Chapel at Old Church Road Road Reserve, and 574 Whangaroa Road, Whangaroa, subject to the following conditions:

CONDITIONS OF AUTHORITY

1. Prior to the start of any on-site archaeological work, the authority holder must ensure that Heritage New Zealand Pouhere Taonga is advised of the date when work will begin.

2. The authority holder must ensure that Heritage New Zealand Pouhere Taonga is advised of the completion of the on-site archaeological work, within two working days of completion.

3. This authority may not be exercised until landowner consent is received by Heritage New Zealand Pouhere Taonga for all land affected by this authority.

4. Te Rūnanga o Whaingaroa shall be informed two working days before the start of the archaeological work.

5. The authority holder must ensure that all contractors working on the project are briefed on site by the s45 approved person (who may appoint a person to carry out the briefing on their behalf) prior to any works commencing. The briefing must include the possibility of encountering archaeological evidence, how to identify possible archaeological sites, the archaeological work required by the conditions of this authority, and contractors' responsibilities with regard to discovering archaeological evidence (including stopping works and parties to notify).

6. The authority must be exercised in accordance with the management plan attached to the authority application. Any changes to the plan require the prior written agreement of Heritage New Zealand Pouhere Taonga.

7. Any earthworks that may affect any archaeological sites must be monitored by the s45 approved person who may appoint a person to carry out the monitoring on their behalf.

8. Any archaeological evidence encountered during the exercise of this authority must be investigated, recorded and analysed in accordance with current archaeological practice.

9. In addition to any tikanga agreed, the following shall apply for Te Rūnanga o Whaingaroa:

a) Enable access in order to undertake tikanga consistent with any requirements of site safety.
b) Notify if any kōiwi (human remains) are encountered. All work should cease within 5 metres of the discovery. Heritage New Zealand Pouhere Taonga and New Zealand Police must also be advised immediately in accordance with Guidelines for Kōiwi Tangata/Human Remains (AGS8 2010) and no further work in the area may take place until future actions have been agreed by all parties.
c) Notify if any possible taonga are identified to enable appropriate tikanga to be undertaken, so long as all statutory requirements under the Heritage New Zealand Pouhere Taonga Act 2014 and the Protected Objects Act 1975 are met.
d) Provide a copy of any reports completed as a result of the archaeological work associated with this authority and give an opportunity to discuss them with the s45 approved person if required.

10. Te Rūnanga o Whaingaroa shall be informed two working days after the finish of the archaeological work.

11. Within 20 working days of the completion of the on-site archaeological work associated with this authority, NZAA Site Records must be updated in ArchSite based on current archaeological practice.

12. Within 20 working days of the completion of the on-site archaeological work associated with this authority, the authority holder shall ensure that an interim report completed to the satisfaction of Heritage New Zealand Pouhere Taonga and following the Archaeological Report Guideline (AGS12 2023) is submitted to Heritage New Zealand Pouhere Taonga for inclusion in the Heritage New Zealand Pouhere Taonga Archaeological Reports Digital Library.

13. Within 6 months of the completion of the on-site archaeological work, the authority holder shall ensure that a final report, completed to the satisfaction of Heritage New Zealand Pouhere Taonga and following the Archaeological Report Guideline (AGS12 2023), is submitted to Heritage New Zealand Pouhere Taonga for inclusion in the Heritage New Zealand Pouhere Taonga Archaeological Reports

Digital Library.

Digital copies of the final report must also be sent to: the NZAA Central Filekeeper, Kaeo Museum and Te Rūnanga o Whaingaroa.

Signed for and on behalf of Heritage New Zealand Pouhere Taonga,

Claire Craig

Deputy Chief Executive Policy, Strategy and Operations Manahautu Tuarua: Rautaki

Heritage New Zealand Pouhere Taonga

Click here to read our Advice Notes

In considering this application, Heritage New Zealand Pouhere Taonga notes that Haigh Workman Ltd wish to undertake earthworks to install a 10-metre retaining wall that will stabilise a land slip on the edge of the Old Church Road in Whangaroa. These works will impact archaeological sites P04/812 (a midden exposed within the slip) and P04/813 (a historic track). The slip has also impacted the Whangaroa Community Hall at 574 Whangaroa Road, and you also wish to undertake earthworks around the Community Hall to mitigate water flow. These mitigation works include lowering the ground surface that has built up over the years with slip material, constructing two small retaining walls, and installing curbing and channelling.

The Whangaroa Community Hall is the former St Paul's Chapel (site P14/814), constructed by the missionary James Shepherd in 1840. Your works may encounter archaeological material relating to the construction or use of the Chapel. The heritage significance of St Paul's Chapel is recognised by its inclusion on the New Zealand Heritage List / Rārangi Kōrero as a Category 2 Historic Place (List No. 2571). Heritage New Zealand Pouhere Taonga appreciates the effort you have made to provide for the long-term protection of the Chapel by carrying out these stabilisation and water control works, which will ensure its resilience to future flood events.

The sites and the area are of significance to Te Rūnanga o Whaingaroa and we appreciate the consultation you have undertaken.

If you have any queries, please contact us through the AAP in the first instance. Otherwise, you can contact:

James Robinson

Senior Archaeologist Tuakana Poutairangahia

Phone (09) 407 0473

Email ArchaeologistNA@heritage.org.nz

Te Kaunihera o Te Hiku o te Ika
Far North District Council

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CREATING GREAT PLACES
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Private Bag 752, Kaikohe 0440, New Zealand
ask.us@fndc.govt.nz
0800 920 029
fndc.govt.nz

14 November 2025

Far North District Council Roading Team
Private Bag 752
Kaikohe
0440

Dear Far North District Council Roading Team,

Re:2260232-RMAOUW - Request to waive the requirement for an Outline Plan for the RW04 slip-remediation works located within Designation FN on Old Church Road, Whangaroa at approximately RP31.

I am pleased to advise that your application to waive the requirement to submit an outline plan of works is duly granted pursuant to s.176A (2)(c) of the Resource Management Act 1991.

The property in respect of which the application is made is situated at 9999 Old Church Road, Whangaroa 0478 and is legally described as .

The site is designated *as a road as per Appendix 5 of the operative district plan:*

Desig #	Site Notation/Purpose	Admin Auth	Site Location	Legal Description	Map #	Underlying Zone
	All of Council's roading network (for which Council is responsible for maintaining)	FNDC	Entire District		ALL	Refer to def. of Road (Ch3)

The outline plan waiver is to repair a slip on Old Church Road, Whangaroa at RP31, as detailed in the information submitted with the application.

In exercising Council's delegated authority, consideration has been given to the purpose of the Far North District Council Roading network designation, and the intent and scale of the proposed works. It is concluded that the RW04 slip-remediation works are within the purpose of the designation.

If you have any queries regarding this information, please do not hesitate to contact the undersigned on 09 401 5200 or 0800 920 029.

Yours sincerely,

Trish Routley

Delegated Authority
Patricia (Trish) Routley
(**Title): Manager Resource Consents**

Te Kaunihera o Te Hiku o te Ika
Far North District Council

HE ARA TĀMATA
CREATING GREAT PLACES
Supporting our people

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Advice note:

This outline plan waiver applies only to the RW04 works located within the boundaries of Designation FN. Any works occurring outside the designated road reserve are not covered by this waiver and must be authorised under the applicable RMA pathways, including (where relevant) section 330 or a separate resource consent