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

Office Use Only Application Number:

Application for resource consent or fast-track resource consent

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

1. Pre-Lodgement Meeting

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

2. Type of Consent being applied for

(more than one circle can be ticked):

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

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

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

◯ **Yes** ✓ **No**

4. Consultation

Have you consulted with Iwi/Hapū? ◯ **Yes** ✓ **No**

If yes, which groups have you consulted with?	
Who else have you consulted with?	Consultation on-going with NZTA.

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

5. Applicant Details

Name/s: Te Whatu Ora Custodian Limited

Email: [redacted]

Phone number:

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

6. Address for Correspondence

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

Name/s: Kiri McKenna @ Matakote Architecture & Urbanism

Email: [redacted]

Phone number:

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

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

7. 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: Te Whatu Ora

Property Address/ Location: 7229 State Highway 12
Waimamaku,
Northland.
Postcode 0446

8. Application Site Details

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

Name/s:

Site Address/ Location: 7229 State Highway 12, Waimamaku

Postcode

Legal Description: Pt Sec 102 Blk IX Waima SD **Val Number:**

Certificate of title: NA516/943

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

Site visit requirements:

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

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

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

9. Description of the Proposal:

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

Proposed papakāinga development consisting of 10 units.

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

10. Would you like to request Public Notification?

◯ **Yes** ✓ **No**

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

(more than one circle can be ticked)

- ◯ **Building Consent** (enter ref # here (if known))
- ✓ **Regional Council Consent (ref # if known)** (ref # here (if known))
- ✓ **National Environmental Standard consent** (Consent # (if known))
- ◯ **Other (please specify)** (specify what here)

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

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

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

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

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

13. Assessment of Environmental Effects:

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

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

13. Draft Conditions:

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

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

14. Billing Details:

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

Name/s: (please write in full) Acacia Corfield

Email: [redacted]

Phone number:

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

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

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

Name: (please write in full) Acacia Corfield

Signature: [redacted]
(signature of bill payer
MANDATORY

Date 14.08.25

15. Important Information:

Note to applicant
You must include all information required by this form. The information must be specified in sufficient detail to satisfy the purpose for which it is required.
You may apply for 2 or more resource consents that are needed for the same activity on the same form.
You must pay the charge payable to the consent authority for the resource consent application under the Resource Management Act 1991.

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

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

Resource Consent Application

Te Roroa Development Charitable Trust

7229 State Highway 12

Waimamaku

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August 2025

KPN Consultants Ltd – PO Box 836 | Whangarei 0140 | Phone (022) 076 6471

Application and Property Details

Applicant:	Te Roroa Development Charitable Trust
Site Address:	7229 State Highway 12, Waimamaku
Agents Details:	KPN Consultants Limited PO Box 836 Whangarei 0140 Attention: Kim Nathan Phone: 022 076 6471 Email: kim@kpnc.co.nz
Submission Date:	
Legal Description and C/T:	Pt Sec 102 Blk IX Waoku SD (NA51B/943)
Site Area:	16.063ha
Operative Plans Applying:	Operative Far North District Plan
Zoning:	Rural Production
Controls / Overlays:	Notable Tree
Proposed Plans Applying:	Proposed District Plan
Zoning:	Rural Production
Controls/Overlays:	Treaty Settlement Area of Interest (Te Roroa), Notable Tree (65), River Flood Hazard Zone (10 and 100 year ARI Events)

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1.0 Introduction

The proposal is a land use consent for the development of a papakāinga consisting of ten (10) units, with associated access, parking and servicing; and including the earthworks and vegetation clearance associated with the proposed development on the application site. The construction of a culvert and bridge crossing is also required to span a wetland.

The application has been prepared in accordance with Section 88 and the Fourth Schedule of the Resource Management Act, 1991 (RMA). Section 88 of the RMA requires that resource consent applications be accompanied by an Assessment of Environmental Effects (AEE) in accordance with the Fourth Schedule.

The report also includes an analysis of the relevant provisions of the district, regional and national planning documents that are pertinent to the assessment and decision required under s104 of the RMA.

2.0 Site and Locality Description

2.1 Site Description

The 16.063ha application site is legally described as Pt Sec 102 Blk IX Waoku SD (NA51B/943).

Figure 1 – Aerial photograph of application site (Source: FNDC GIS)

The application site is irregular in shape, with three frontages onto State Highway 12 and bounded to the south and south-west by the Waimamaku River.

The land is generally flat in topography.

The property currently contains the existing farm homestead with some associated accessory buildings and an old cow shed; and no further built development. The application site gains access via an existing vehicle crossing off State Highway 12 and a driveway which extends through the site to the Waimamaku River.

The site is not connected to any reticulated services.

The majority of the site is maintained in pasture, however, there are pockets of native vegetation throughout, the majority of which surrounds the existing dwelling and along the banks of the river.

A number of watercourses, including permanent and intermittent streams, as well as natural inland wetland areas run through the site, the majority of which have been highly modified by previous land use.

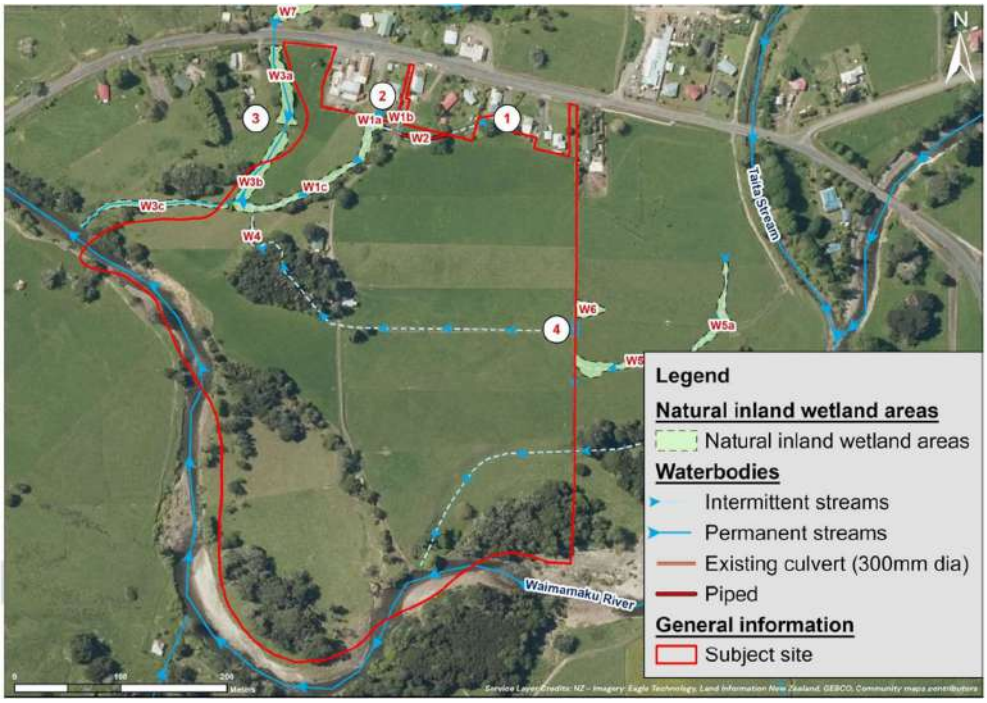

Figure 2 – Watercourse mapping (Source: Wetland and Watercourse Assessment report – Wild Ecology)

2.2 Locality Description

The application site is located approximately 7km east of Whakamaharatanga marae and approximately 10km east of the Waimamaku Beach.

The Waimamaku settlement includes a 4-Square convenience store, a GAS service station, a town hall and a medical clinic. The wider surrounding area is characterised by rural production land use activities.

3.0 Proposal / Background

3.1 Relevant Background

The site is held in one record of title (NA51B/943) which contains no legal restrictions which would affect any consent application for a papakāinga housing development. A copy of the record of title is included in **Appendix B.**

There are no legal restrictions listed on the title that would adversely impact this application.

Te Roroa are an Iwi of approximately 4,000 members, whose lands were settled with The Crown in 2008 (including the application site).

Te Roroa Development Charitable Trust was established in 2011 and comprises 5 Trustees, who are tasked by Whatu Ora with progressing the social, cultural and environmental.

Transitional housing services using transportable cabins are located at the Te Roroa campgrounds (in Waipoua), enabling Te Roroa to support the short-term housing needs and provide health & social service advocacy to whanau. This proposed papakāinga housing development will provide real opportunities for families to move into affordable long-term tenure (rental or lease), or home ownership supporting the aspirations of Te Roroa and of the people who live within the Rohe of Te Roroa.

3.2 The Proposal

The proposal is a land use consent for the development of a papakāinga consisting of ten (10) units, with associated access, parking and servicing; and including the earthworks and vegetation clearance associated with the construction of the development on the application site, the plans of which are included in **Appendix A**.

The proposed units include two sets of two 3-bedroom duplex dwellings each being 115m^2 in floor area; and six 5-bedroom standalone dwellings each having a floor area of 165m^2.

The proposed units would be single storey in design and constructed on timber piles. Each unit will be provided with its own fenced private area.

The proposed units have been designed to meet the Council's District Plan bulk and location requirements.

Access to the units will be via a proposed new vehicle crossing onto State Highway 12 at the western end of the application site, and a shared private. This would involve some localised road widening of the state highway. Consultation is ongoing with the New Zealand Transport Agency/Waka Kotahi in this regard.

The proposal involves the construction of a culvert and bridge crossing to span an existing natural inland wetland area.

As the accessway will serve a total of 11 dwellings, a formed width of 5.0 m is proposed to comply with the relevant standards. At the point where the accessway crosses the existing wetland, it will narrow to a 3.0 m one-way bridge, to minimise disturbance to the wetland environment.

The client has expressed a preference for the accessway to be constructed using a sealed surface, due to its heightened aesthetic characteristics. However, this may be subject to development budget constraints. In the event, sealed surfacing (e.g. chipseal or asphalt) is not financially feasible, a compacted gravel surface will be utilised as an alternative.

Each unit will have car parking space(s) available and an overflow area for guest parking is also provided within the site. Manoeuvring is possible on-site and a truck turning area will be provided towards the end of the access to ensure that there will be adequate space for vehicles, including fire service vehicles, to turnaround such that they would not be required to reverse manoeuvre off the site.

The existing vehicular access to the site, located between two buildings on the state highway is to be closed to vehicles using bollards (or similar) and will be utilised for pedestrian access only.

Vehicular access to the existing farm house will be realigned from the proposed new private accessway.

The proposed units will require on-site servicing, with wastewater (secondary) treatment and disposal being in accordance with the recommendations contained within the Land Development Report (**Appendix E**). A 15m setback from the intermittent stream will be provided with respect to the on-site land-based wastewater disposal area.

Water tanks will provide on-site water supply. Plus, two dedicated fire-fighting water tanks are proposed with the site.

Earthworks are proposed across the site to establish level building platforms, form the accessway, and manage secondary flows. Due to the site's gentle topography, significant retaining structures or steep batter slopes are not anticipated for the dwelling platforms. However, batter slopes and abutment retaining will be required to construct the bridge abutments where the accessway crosses the wetland.

A total approximate volume of earthworks (consisting of 1846m^3 cut and 2162m^3 fill) is proposed over a total approximate area of 17,140m^2. Some of the excavated material may be used onsite as fill.

A site-specific Erosion and Sediment Control Plan in accordance with best practice will be prepared and is anticipated as a condition of consent prior to works being undertaken, and may include and may include, but not be limited to the following:

- Stabilised Construction Entranceway,
- Silt Fences / Super Silt Fences,
- Clean / Dirty water diversion bunds,
- Decanting earth bunds,
- Progressive site stabilisation.

At works completion, all exposed surfaces will be stabilised and reinstated with landscape planting/grass/driveway surface. At this point any risk of erosion and run off is negated and erosion and sediment control measures can be removed from site.

A communal space will be provided within the centre of the units including a small communal Ruma Maori, a Kauta (cooking shed), areas for papa takaro (sports/play) and areas for planting Mare kai (food gardens), Raranga (weaving) and Rongoa Maori (herbal gardens).

Refer to the Design Statement (**Appendix I**) for a more detailed description of the overall design of the papakāinga development.

To the rear of the units, and between them and the existing farm house, the space will be filled with glasshouses, chickens, a kai storage shed, workshop and a cleaning area for hunting and fishing. This area will also be the location for the wastewater treatment plant.

Approximately 15m^2 of regenerating indigenous native species including mapou (*Myrsine australis*), nīkau palm (*Rhopalostylis sapida*), cabbage tree (*Cordyline australis*), karamu (*Coprosma robusta*), rewarewa (*Knightia excelsa*), and kohekohe (*Dysoxylum spectabile*) will be required to be removed to construct the accessway and bridge. However, in order to offset/mitigate this removal, it is proposed to undertaken an area of 45m^2 of native planting appropriate to the area near the wetland/watercourse as recommended in the Wetland and Watercourse Assessment report prepared by Wild Ecology dated (**Appendix H**). An appropriately worded consent condition in anticipated in this regard.

Additionally, landscape planting is proposed throughout the site, including along the rear of the existing residential properties located to the north of the proposed development

4.0 Reasons for the Application

4.1 Operative Far North District Plan (ODP)

The site is zoned within the Rural Production Zone under the ODP.

An assessment against the relevant ODP rules has identified the following breaches:

- Rule 8.6.5.2.2 Papakāinga Housing is provided for as a controlled activity, provided it complies with all the standards for permitted activities in this zone and in Part 3 - District Wide Provisions, except for the standards for residential intensity; and (b) each residential unit has at least 3,000m² surrounding the unit for its exclusive use; provided that the amount of land elsewhere on the site, in addition to the 3,000m² surrounding the unit, is not less than that required for the discretionary activity residential intensity standard (Rule 8.6.5.4.1 which is one unit per 2ha of land).

  The application site is approximately 16ha in area, and as 10 units are proposed this is 2 more than allowed density wise, therefore being assessed as a **Discretionary Activity** (refer Rule 8.6.5.4(c)).

- Under Rule 8.6.5.4.2 'Integrated Development', notwithstanding the rules in the Rural Production Zone relating to the management of the effects of activities, an application for integrated development of activities only on Maori freehold land and Maori customary land and Crown land reserved for Maori (as defined in Te Ture Whenua Act 1993) may be made where the proposed development does not comply with one or more of the rules.

  This rule applies to Maori customary land, Maori freehold land and Crown land reserved for Maori for activities including papakāinga housing and marae and associated buildings.

  Integrated development plans will be considered in the context of other whanau and hapu lands in the vicinity, including an acknowledgement of areas of open space, reserve, natural vegetation and other amenities already provided by the land-owning groups concerned.

  A management plan for integrated development under this rule is required.

  The proposal is assessed as a **Discretionary Activity** under this rule and a Management Plan is included in **Appendix G**.

- Consent is required under Rule 12.2.6.3.1 Indigenous Vegetation clearance in the Rural Production and Minerals Zones as 15m² of vegetation is proposed to be cleared to make way for the culvert, bridge and vehicular access, within 20m of a wetland, I therefore being assessed as a **Discretionary Activity**.
- Consent is required as a **Restricted Discretionary Activity** under Rule 12.3.6.2, as while the volume of works will be less than 5,000m³, the maximum average fill height at the right-side bridge abutment is approximately 1.65 m.
- Rule 15.1.6A.2.1 'Traffic Intensity' sets the Traffic Intensity threshold value for a site by Table 15.1.6A.1. The Traffic Intensity Factor for a proposed activity (subject to exemptions) shall be determined by reference to Appendix 3A in Part 4.

  It is estimated that the proposed development will generate between 31-200 one-way traffic movements and access is via a State Highway, therefore being assessed as a **Restricted Discretionary Activity**.

- Consent is required under Rule 15.1.6C.1.1 as a **Discretionary Activity**. The private accessway has been designed in accordance with Appendix 3B-1. However, the private access is for 11 household equivalents (including existing farm house), will have a formed width of 5.0m for the majority of its length, and the access will be onto the State Highway.

Therefore, being assessed as a **Discretionary Activity.**

A full assessment of the relevant Operative District Plan rules is included in **Appendix C**.

4.2 Proposed District Plan (PDP)

The proposed development/activity is subject to the PDP provisions.

The PDP was publicly notified on the 27th of July 2022. The submissions and further submission periods have now closed.

PDP hearings have been underway since May 2024.

As no decisions on the submissions have yet been made, little weight is attributed to the proposed provisions at this time.

The proposed zoning for the application site is Rural Production.

The site also identified as a Treaty Settlement Area of Interest.

There is a notable tree (65) identified on the application site.

The lower parts of the site are mapped within the 10-yr and 100-yr ARI River Flood Hazard Zone.

An assessment of the proposed development/activity against the PDP rules that have immediate legal effects are set out below:

RULE	**COMPLIANCE**
Hazardous Substances	
The following rules have immediate legal effect: Rule HS-R2 has immediate legal effect but only for a new significant hazardous facility located within a scheduled site and area of significance to Māori, significant natural area or a scheduled heritage resource. Rules HS-R5, HS-R6, HS-R9	Not applicable.
Heritage Area Overlays	
All rules have immediate legal effect (HA-R1 to HA-R14) All standards have immediate legal effect (HA-S1 to HA-S3)	Not applicable.
Historic Heritage	
All rules have immediate legal effect (HH-R1 to HH-R10). Schedule 2 has immediate legal effect.	Not applicable
Notable Trees	
All rules have immediate legal effect (NT-R1 to NT-R9)	The proposal will comply with these requirements; no pruning or removal is proposed. No works will be undertaken within the rootzone of the notable tree.
Sites and Areas of Significance to Maori	
All rules have immediate legal effect (SASM-R1 to SASM-R7) Schedule 3 has immediate legal effect.	Not applicable. The site does not contain any scheduled sites

	or areas of significance to Māori.
Ecosystems and Indigenous Biodiversity	
All rules have immediate legal effect (IB-R1 to IB-R5)	Not applicable. Not applicable. The site does not contain any known ecosystems or indigenous biodiversity to which these rules would apply.
Subdivision	
The following rules have immediate legal effect: SUB-R6, SUB-R13, SUB-R14, SUBR15, SUB-R17.	Not applicable.
Activities on the Surface of Water	
All rules have immediate legal effect (ASW-R1 to ASW-R4).	Not applicable
Earthworks	
The following rules have immediate legal effect: EW-R12, EW-R13 The following standards have immediate legal effect: EW-S3, EW-S5.	All earthworks in all zones are subject to Accidental Discovery Protocol standards EW-S3 and sediment control standards EW-S5. Any earthworks will be undertaken in accordance with these standards.
Signs	
The following rules have immediate legal effect: SIGN-R9, SIGN-R10 All standards have immediate legal effect but only for signs on or attached to a scheduled heritage resource or heritage area	Not applicable – no signage is proposed
Orongo Bay Zone	
Rule OBZ-R14 has partial immediate legal effect because RD1(5) relates to water	Not applicable

4.3 Overall Status of the Application

Overall, the status of the application is considered to be a Discretionary Activity.

5.0 Application Assessment

5.1 Statutory Considerations

5.1.1 Relevant Section of the RMA

When considering an application for a Restricted Discretionary activity the Council as consent authority must have regard to Part 2 of the RMA ("Purposes and Principles" – sections 5 to 8), and sections 104, 104B and 108 of the RMA.

Subject to Part 2 of the RMA, when considering an application for resource consent and any submissions received the Council must, in accordance with section 104(1) of the RMA have regard to the matters addressed in 5.2 – 5.7 below.

5.2 Section 104(1)(a) Actual and Potential Effects on the Environment

Section 104(1)(a) of the RMA requires that a council have regard to any actual and potential effects on the environment of allowing the activity.

5.2.1 Permitted Baseline / Existing Environment

Pursuant to section 104(2), when forming an opinion for the purposes of section 104(1)(a) a council may disregard an adverse effect of the activity on the environment if the plan or a NES permits an activity with that effect (i.e. a council may consider the "permitted baseline").

The permitted baseline refers to activities permitted on the subject site including activities that could be conducted on the site without resource consent. The existing environment includes activities that could be carried out under a granted but unexercised resource consent. Application of the permitted baseline test is discretionary and allows adverse effects arising from these activities to be disregarded and only adverse effects arising from the proposal over and above the permitted baseline are to be assessed. The existing environment is not discretionary; and it forms the backdrop for assessing the effects of the proposal on the environment; the only exception being if it was unlikely that an unimplemented consent would be implemented.

With respect to the application site, there is a permitted baseline in that a Papakāinga housing development with up to 8 units could be undertaken on the application site provided all other Far North and Northland Regional Council requirements were met.

5.2.2 Cultural Effects

The proposed development is to be undertaken within Maori land and will provide real opportunities for whanau to move into affordable long-term tenure (rental or lease), or home ownership supporting the aspirations of Te Roroa and of the people who live within the Rohe of Te Roroa.

The site is not known to contain any archaeological features, nor is it identified as a site of significance to Maori.

Accidental Discovery Protocols and appropriate sediment controls will be established and maintained during all works on site.

In light of the above, it is considered that any adverse cultural effects can be mitigated.

5.2.3 Character and Amenity

As discussed previously in this report, proposed development is to be undertaken on Maori land for the purpose of providing real opportunities for families to move into affordable long-term tenure (rental or lease), or home ownership supporting the aspirations of Te Roroa and of the people who live within the Rohe of Te Roroa.

As discussed previously in this report, due to the size of the application site, up to 8 (eight) papakāinga units could be constructed on the application site provided all other District and Regional Plan requirements were also met, the proposal provides for a total number of 10 (ten) units, which is an additional two above this permitted threshold.

Additionally, the proposed built development will comply with the relevant bulk and location provisions outlined in this District Plan, ensuring that the design, scale and appearance of which would be as anticipated, and in keeping with the character of existing built development in the surrounding environment.

The remainder of the application site will be retained for the continued undertaking of the existing rural production/grazing activities.

The application site has not been identified as having any natural, landscape or heritage values of note (other than containing a notable tree) and is located to the rear of existing built development consisting part of the commercial area of Waimamaku along State Highway 12, and generally not being visible from any public vantage point, other than a temporary glimpse on the approach into the Waimamaku township from the south for vehicles.

The proposed development has been designed and will be located appropriately within the site so that it will not obstruct any important or significant views, further the location of the units will be setback from and sit behind existing built development such that they will not appear visually dominant from the wider surrounding area.

The buildings will sit within the existing landform and not adversely affect the outlook or privacy of any surrounding properties. Any vegetation not required to be cleared will be retained and further landscaping is proposed, in order to provide a visual buffer of the development.

Overall, it is considered that any adverse effects on existing character and amenity values would be localised such that they would be less than minor with respect to the wider environment.

5.2.4 Traffic and Parking

As discussed previously in this report, access to the units will be via a proposed new vehicle crossing onto State Highway 12 at the western end of the application site, and a shared private. This would involve some localised road widening of the state highway. Consultation is ongoing with the New Zealand Transport Agency/Waka Kotahi in this regard.

Vehicular access to the existing farm house will be realigned from the proposed new private accessway.

The proposal involves the construction of a culvert and bridge crossing to span an existing natural inland wetland area.

As the accessway will serve a total of 11 dwellings, a formed width of 5.0 m is proposed to comply with the relevant standards. At the point where the accessway crosses the existing wetland, it will narrow to a 3.0 m one-way bridge, to minimise disturbance to the wetland environment.

The Traffic Effects Assessment (**Appendix D**) considers that '*especially for this access, which has no exit and leads only to the papakāinga, I conclude that the rate of harm on a 5.0 metre carriageway will be lower than that on a 6.0 metre carriageway and, in providing for two-way movements at low speed, is the optimum width*.'

The client has expressed a preference for the accessway to be constructed using a sealed surface, due to its heightened aesthetic characteristics. However, this may be subject to development budget constraints. In the event, sealed surfacing (e.g. chipseal or asphalt) is not financially feasible, a compacted gravel surface will be utilised as an alternative.

Each unit will have car parking space(s) available and an overflow area for guest parking is also provided within the site. Manoeuvring is possible on-site and a truck turning area will be provided towards the end of the access to ensure that there will be adequate space for vehicles, including fire service vehicles, to turnaround such that they would not be required to reverse manoeuvre off the site.

The existing vehicular access to the site, located between two buildings on the state highway is to be closed to vehicles using bollards (or similar) and will be utilised for pedestrian access only.

The Traffic Effects Assessment (**Appendix D**) estimates that the traffic generation of the proposed development at no more than 4 movements per day each unit. This is based on a detailed assessment of per-household traffic generation on Wekaweka Road for a previous similar project plus the proximity of the development to the Waimamaku township and the nature of papakāinga development, in which sustainability and self-sufficiency, including the minimisation of car trips.

On this basis, the ten new dwellings would generate no more than 40 additional vehicle movements per day. This part of the highway carries traffic in the mid-800s of vehicle movements on an average day.

The Traffic Effects Assessment also considers that with the exception of one sightline associated with the proposed crossing on SH12, the sight distances exceed Waka Kotahi's standards. The exception – the sight distance west of the crossing itself, at 143 metres is only 0.4 seconds below the full standard – safe intersection sight distance, at the full eastbound operating speed. That is also not a high-risk direction (especially with most exits from the site being left turns). The sight distances in the other direction, and in relation to all other access connection options, are well above all standards.

The Traffic Effects Assessment (**Appendix D**) concludes that this part of SH12 is more than wide enough for the traffic movements this proposal will generate and that the risks associated with the proposed crossing ("Diagram C" standard) will be well within acceptable limits.

Overall, it is concluded that the effects, of the small level of additional traffic this proposal will generate, will be well within the capacity limits of State Highway 12.

In light of the above, it is considered that the proposed development would result in no more than minor adverse effects on traffic safety and the efficiency of the road transport network.

5.2.5 Servicing

The proposed units will require on-site servicing.

A Land Development Report (**Appendix E**) has been prepared by Chester ('Land Development Report'), and submitted in support of this application.

The Land Development Report recommends the use of a secondary treatment system loading surface pressure compensating drip irrigation line and has identified an area within the site suitable for disposal. A detailed design can be provided at building consent stage.

The Land Development Report notes that stormwater runoff from the building roofs will be collected and stored in rainwater tanks for reuse as a potable water supply for the development. In overflow conditions, excess runoff will be directed to the proposed swale network, which conveys flows to the existing stream located to the north and west of the site.

Surface runoff from the private accessway and common parking area will similarly be intercepted by the swale network and directed to the same discharge points.

Water tanks will provide on-site water supply. Plus, two dedicated fire-fighting water tanks are proposed with the site.

As a result, the adverse effects from servicing resulting from the proposed development are considered to be less than minor.

5.2.6 Earthworks

The proposed earthworks will be carried out over a limited duration (approximately 2-3 months).

Hours of operation will be limited to 7am to 7pm Monday to Saturday with no work on Sundays or public holidays.

Plant machinery will consist of an excavator, bulldozer, grader, dump truck, roller and crane for the bridge installation. be the small digger only. No material will leave the site; therefore, little construction traffic will be generated.

The works are necessary to establish level building platforms, form the accessway, and manage secondary flows. Due to the site's gentle topography, significant retaining structures or steep batter slopes are not anticipated for the dwelling platforms. However, batter slopes and abutment retaining will be required to construct the bridge abutments where the accessway crosses the wetland.

Maximum cut and fill depths are anticipated to be approximately 1.62m cut and 2.8m fill across the site. The bulk of the cutting is associated with the formation of accessways and swales, while filling is primarily required to establish suitable building platforms and bridge abutments.

The potential visual effects of the area of works would be largely indiscernible from the wider environment owing to the relatively flat topography of the site and the temporary nature of the works, and with the majority of the earth worked area being covered by the proposed dwelling units and access.

Any uncovered area will be planted upon the completion of construction.

All excavations and earthworks will be carried out in accordance with best practice engineering methodologies, given the distances to boundaries and the scale of excavation/fill this is satisfactory to ensure there are not adverse stability effects.

The adverse effects of the earthworks will be managed through the provision of sediment and erosion control techniques and a site-specific Erosion and Sediment Control Plan is anticipated to be a requirement of consent (condition).

Any other potential effects such as noise, dust and vibration can be mitigated through the provision of standard conditions of consent, so that they will be less than minor.

5.2.7 Ecological Effects

As outlined previously in this report, in addition to the proposed earthworks, an area of 15m^2 of indigenous vegetation will be required to be removed to facilitate the construction of the accessway which has been redesigned following input from an ecologist to avoid any direct loss of natural inland wetlands.

The clearance requirements have been kept to a practicable minimum and are required to facilitate the construction of a culvert crossing and bridge structure, an no works will be undertaken within the mapped boundaries of the wetland.

The assessment contained within the Wetland and Watercourse Assessment report prepared by Wild Ecology (**Appendix H**). considers that there will be no loss of natural inland wetland extent as a result, and any potential adverse effects can be mitigated through the development of a site-specific Erosion and Sediment Control Plan ('ESCP') to minimise runoff and prevent sedimentation of the wetland(s). Concluding that through this combination of sensitive design and best-practice construction management, the accessway development will avoid the physical loss of both natural inland wetlands and intermittent streams, while maintaining the ecological integrity of these important natural features.

As discussed previously, in this report, the vegetation removal will be mitigated through the proposed revegetation of a 45m^2 appropriate to the area, an appropriately worded consent condition in anticipated in this regard. The offset planting near the wetlands/watercourse will help maintain ecological values and support long-term restoration.

Earthworks are to be managed in accordance with a site-specific ESCP which is based on best practice measures outlined under GD05 and other relevant specifications, it is considered the potential effect associated with sediment discharges as part of construction works are less than minor.

The proposed accessway construction is expected to generate additional stormwater runoff, which will be directed towards the natural inland wetland areas. While this will result in an increase in stormwater entering these wetlands, the additional runoff is not anticipated to significantly impact the existing water level range or the overall hydrological dynamics of the wetland system. The wetlands on-site are primarily fed by surface and rainwater, and their capacity to absorb and manage the increased flow is considered sufficient. Any potential effects on water levels are expected to remain within the natural fluctuations typical of these wetland systems.

Therefore, the impact of the proposed construction activities on the mapped wetlands is considered to be low, with no expected long-term disruption to their hydrological regime, ecological health, or natural processes. Carrying out earthworks during extended dry periods when the wetland areas are naturally dry, along with the implementation of appropriate erosion

and sediment control measures, will effectively mitigate any potential risks. This ensures that the wetlands continue to function within their natural seasonal variability, maintaining their ecological balance.

The proposed accessway will cross Watercourse 2, an intermittent stream that traverses Wetland W1c. To avoid direct impacts on this sensitive aquatic environment, a bridge structure is proposed in lieu of a culvert or ford crossing. The use of a bridge at this location significantly reduces ecological and hydrological disruption by spanning the watercourse entirely, thereby eliminating the need for in-stream works, excavation, or alteration of the natural channel and wetland margins.

By avoiding in-stream disturbance and adopting best-practice sediment control methods, the bridge installation is not expected to result in any significant adverse effects on aquatic fauna. The approach protects both the intermittent stream and the associated natural inland wetland, maintaining their ecological function and hydrological connectivity. Accordingly, the overall level of ecological effect is assessed as low, with any residual impacts being minor, temporary, and manageable through the proposed mitigation measures.

It is recommended that primary wastewater dispersal fields are planted with low-growing native species—such as sedges and shrubs—to enhance system performance, promote nutrient absorption, and assist in managing surface water flow.

Provided that all wastewater systems are installed and maintained according to manufacturer instructions and the recommendations in the associated technical reports, no significant adverse effects on freshwater habitats from the new effluent disposal fields are anticipated.

In light of the above, it is considered that the proposed works can be undertaken as per recommendations contained within the Wetland and Watercourse Assessment report prepared by Wild Ecology (**Appendix H**), such that any adverse ecological effects can be mitigated such that they will be no more than minor.

5.2.8 Stability

A Geotechnical Report has been prepared by Hawthorn Geddes and submitted in support of the application (**Appendix F**), which confirms that the land in respect of which consent is sought, nor any structure on the land, is not, and is not likely to be subject to material damage by subsidence, erosion or slippage from any source. Additionally, the Geotechnical Report concludes that sufficient provision has been made for stable physical access can be provided.

The Geotechnical Report makes recommendations with respect to earthworks and wastewater disposal.

Subject to compliance with the recommendations of the Geotechnical Report, it is considered that any adverse effects could be mitigated such that they would be no more than minor.

5.2.9 Flood Hazards

The lower portions of the application site, including along the Waimamaku River have been identified as flood hazards for 10-year, 50-year and 100-year events. However, the majority of the proposed development (including all of the proposed units) are located within the centre of the elevated portion of the site and are not subject to flood hazard, other that the proposed access.

The Land Development Report (**Appendix E**) notes that the proposed accessway within the flood plain will follow the existing ground profile and have a low-profile cross section to enable flood water to sheet flow across the road during significant rainfall event, thus ensuring less than minor effect to the flood levels within the neighbouring properties.

Further, noting that localised fill will be introduced within the flood plain to construct the proposed bridge abutments, however, given the extent of the flood plain and the width of the overall flood cross section, the effect of such fill in relation to the flood level is considered less than minor.

All earthworks will be required to be designed by a suitably qualified engineer taking into account the findings of the Land Development Report (**Appendix E**).

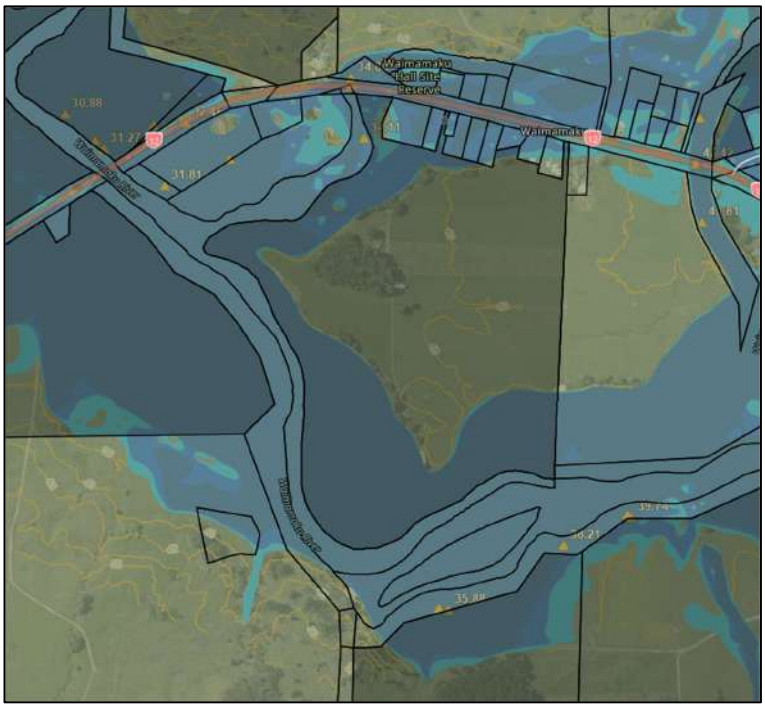

Figure 3 – Identified Flood Hazards the application site and surrounds (Source: NRC GIS)

The Land Development Report (Appendix E) recommends that:

- Signs must be erected at the eastern side of bridge advising users not to cross during flooding.
- An evacuation management plan must be developed and implemented that advises occupants of the flooding risk, noting that this section of State Highway 12 through Waimamaku township will also be flooded during a 1% AEP (100-year) flood event, therefore, to identify an emergency access route to the state highway can be difficult. However, if possible, an alternate emergency access route or other means of evacuation from the development area should also be investigated.

Provided the recommendations contained within the Land Development Report are followed, it is considered that any adverse effects from flood hazards can be mitigated such that they would be less than minor.

5.2.10 Reverse Sensitivity

The application site is a rurally zoned allotment located immediately adjacent to the Waimamkau township, as such the surrounding area is characterised by a variety of land uses.

As discussed previously in this report, the proposed units are to be located at the northern end of the site, and in close proximity to the existing built development (including residential dwellings) within the Waimamaku township, the remainder of the application site will be retained for the continued undertaking of the existing rural production(grazing) activities.

The location of the access road and proposed wastewater field areas which are required to be planted, will provide both physical separation and a visual buffer of the development area from the farm, minimising the potential for reverse sensitivity effects.

For these reasons, any reverse sensitivity effects are considered to be less than minor.

5.2.11 Cumulative Effects

On-going and subsequent development of land can potentially result in cumulative adverse effects as the volume and nature of development exceeds the carrying capacity of the environment to absorb these effects.

In this case, the proposed development would result 10 papakāinga units, however it is noted that there is a permitted baseline that due to the size of the application site, up to 8 (eight) papakāinga units could be constructed on the application site provided all other District and Regional Plan requirements were also met. As a result, it is considered that the proposed arrangement and size of the proposed units will not result in no more than minor adverse cumulative effects on the character and amenity values of the wider surrounding environment above what is anticipated by the District Plan.

The findings of the Traffic Effects Assessment (**Appendix D**) is that the traffic generation of the proposed development would be no more than 4 movements per day each unit. This is based on a detailed assessment of per-household traffic generation on Wekaweka Road for a previous similar project plus the proximity of the development to the Waimamaku township and the nature of papakāinga development, in which sustainability and self-sufficiency, including the minimisation of car trips. On this basis, the ten new dwellings would generate no more than 40 additional vehicle movements per day. This part of the highway carries traffic in the mid-800s of vehicle movements on an average day. As such, it is concluded that the effects, of the small level of additional traffic this proposal will generate, will be well within the capacity limits of State Highway 12.

Additionally, the Traffic Effects Assessment concludes that this part of SH12 is more than wide enough for the traffic movements this proposal will generate and that the risks associated with the proposed crossing ("Diagram C" standard) will be well within acceptable limits.

The proposed volume of earthworks will be less than the permitted level (5,000m^3), however the maximum average fill height at the right-side bridge abutment is approximately 1.65 m. With respect to the earthworks proposed as part of this application, the location and topography of the application site is such that the works will not be highly visible from the any public area, including the State Highway.

Any construction will be limited to that permitted under the Plan to mitigate any potential effects in terms of noise. Additionally, a Construction Management Plan will be required to outline measures to control dust, and will also include methods for manging construction traffic. However, it is noted that the majority of construction traffic will be internal within the site.

Earthworks are to be managed in accordance with a site-specific Erosion and Sediment Control Plan which is based on best practice measures outlined under GD05 and other relevant specifications, and at completion, stabilisation will occur to ensure any effects resulting from exposed earth will be temporary in nature until a stage when the site is fully stabilised and established. Therefore, it is considered the potential effect associated with sediment discharges as part of construction works are less than minor.

In addition to the proposed earthworks, an area of 15m^2 of indigenous vegetation will be required to be removed to facilitate the construction of the accessway which has been redesigned following input from an ecologist to avoid any direct loss of natural inland wetlands. The clearance requirements have been kept to a practicable minimum and are required to facilitate the construction of a culvert crossing and bridge structure, an no works will be undertaken within the mapped boundaries of the wetland. The vegetation removal will be mitigated through the proposed revegetation of a 45m^2 appropriate to the area, an appropriately worded consent condition in anticipated in this regard. The offset planting near the wetlands/watercourse will help maintain ecological values and support long-term restoration.

In light of the above, it is considered that if all of the proposed mitigation measures are in place any cumulative effects will be no more than minor.

5.2.12 Adverse Effects Conclusion

In summary, it is considered that subject to compliance with conditions, the adverse effects of the activity on the environment would be no more than minor.

5.3 Section 104(1)(b)(vi) Relevant Provisions of the District Plan - Objectives and Policies

Operative District Plan

The following objectives and policies of the Operative District Plan are considered relevant:

Chapter 2 – Tangata Whenua

Tangata Whenua - Objectives

2.7.1 Through the provisions of the Resource Management Act, to give effect to the rights guaranteed to Maori by Te Tiriti O Waitangi (Treaty of Waitangi).

2.7.2 To enable Maori to develop and manage their land in a manner which is consistent with sustainable management of the natural and physical resources of the District as a whole.

2.7.3 To recognise and provide for the protection of waahi tapu and other ancestral sites and the mauri (life force) of natural and physical resources.

Tangata Whenua - policies

2.8.1 That Council will provide opportunities for the involvement of tangata whenua in the sustainable management of the natural and physical resources of the District.

2.8.2 That tangata whenua be consulted over the use, development or protection of natural resources where these affect their taonga.

2.8.3 That the Council will have regard to relevant provisions of any whanau, hapu or iwi resource management plans, taiapure plans or mahinga mataitai plans.

2.8.4 That development on ancestral land will be provided for, consistent with the requirement for sustainable management of resources.

2.8.5 That waahi tapu and other taonga be identified and protected by provisions in the Plan.

Chapter 8 – Rural Environment

RPZ objectives

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

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

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

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

8.6.3.5 To protect and enhance the special amenity values of the frontage to Kerikeri Road between its intersection with SH10 and the urban edge of Kerikeri.

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

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

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

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

RPZ - policies

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

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

8.6.4.3 That land management practices that avoid, remedy or mitigate adverse effects on natural and physical resources be encouraged.

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

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

8.6.4.6 That the built form of development allowed on sites with frontage to Kerikeri Road between its intersection with SH10 and Cannon Drive be maintained as small in scale, set back from the road, relatively inconspicuous and in harmony with landscape plantings and shelter belts.

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

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

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

Chapter 12 – Natural and Physical Resources

Chapter 12 of the ODP is concerned with the sustainable management of natural and physical resources throughout the Far North District and which extend across zone boundaries. The application site is within the rural environment and is not within any significant landscape or coastal environment location. The location of the site adjacent to a river and bush areas that pose a fire risk to residential buildings are matters for policy consideration.

Chapter 12- Section 7 – Natural and Physical Resources – Lakes, Rivers, Wetlands and Coastline

Objectives

12.7.3.1 To avoid, remedy or mitigate the adverse effects of subdivision, use and development on riparian margins.

12.7.3.2 To protect the natural, cultural, heritage and landscape values and to promote the protection of the amenity and spiritual values associated with the margins of lakes, rivers and indigenous wetlands and the coastal environment, from the adverse effects of land use activities, through proactive restoration/rehabilitation/revegetation.

12.7.3.3 To secure public access (including access by Maori to places of special value such as waahi tapu, tauranga waka, mahinga kai, mahinga mataitai, mahinga waimoana and taonga raranga) to and along the coastal marine area, lakes and rivers, consistent with Chapter 14 - Financial Contributions, to the extent that this is compatible with:

(a) the maintenance of the life-supporting capacity of the waterbody, water quality, aquatic habitats, and

(b) the protection of natural character, amenity, cultural heritage, landscape and spiritual values; and

(c) the protection of public health and safety; and

(d) the maintenance and security of authorised activities (but acknowledging that loss of privacy or fear of trespass are not valid reasons for precluding access). In some circumstances public acquisition of riparian margins may be required and managed for purposes other than public access, for example to protect significant habitats, waahi tapu or historic sites, or for public recreation purposes.

12.7.3.4 To provide for the use of the surface of lakes and rivers to the extent that this is compatible with the maintenance of the life supporting capacity of the water body, water quality, aquatic habitats, and the protection of natural character, amenity, cultural heritage, landscape and spiritual values.

12.7.3.5 To avoid the adverse effects from inappropriate use and development of the margins of lakes, rivers, indigenous wetlands and the coastline.

12.7.3.6 To protect areas of indigenous riparian vegetation:

(a) physically, by fencing, planting and pest and weed control; and

(b) legally, as esplanade reserves/strips.

12.7.3.7 To create, enhance and restore riparian margins.

Policies

12.7.4.1 That the effects of activities which will be generated by new structures on or adjacent to the surface of lakes, rivers and coastal margins be taken into account when assessing applications.

12.7.4.2 That land use activities improve or enhance water quality, for example by separating land use activities from lakes, rivers, indigenous wetlands and the coastline, and retaining riparian vegetation as buffer strips.

12.7.4.3 That adverse effects of land use activities on the natural character and functioning of riparian margins and indigenous wetlands be avoided.

12.7.4.4 That adverse effects of activities on the surface of lakes and rivers in respect of noise, visual amenity of the water body, life supporting capacity of aquatic habitats, on-shore activities, the natural character of the water body or surrounding area, water quality and Maori cultural values, are avoided, remedied or mitigated.

12.7.4.5 That activities which have a functional relationship with waterbodies or the coastal marine area be provided for.

12.7.4.6 That public access to and along lakes, rivers and the coastline be provided as a consequence of development or as a result of Council (see Method 10.5.19) or public initiatives except where it is necessary to restrict access or to place limits on the type of access, so as to:

(a) protect areas of significant indigenous vegetation and/or significant habitats of indigenous fauna or

(b) protect cultural values, including Maori culture and traditions; or

(c) protect public health and safety; to the extent that is consistent with policies in Chapter 14.

12.7.4.7 That any adverse effects on the quality of public drinking water supplies from land use activities, be avoided, remedied or mitigated. (Refer to Commentary and Methods 12.7.5.6 and 12.7.5.7.)

12.7.4.8 That the Council acquire esplanade reserves, esplanade strips and access strips in accordance with Chapter 14 - Financial Contributions and Method 10.5.10 of the Plan.

12.7.4.9 That riparian areas in Council ownership be managed so as to protect and enhance the water quality of surface waters.

12.7.4.10 That historic buildings erected close to, or over, water bodies be protected and provision be made for new buildings where this form of development is in keeping with the historic pattern of settlement.

<u>Chapter 15 – Transportation</u>

Objectives

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

15.1.3.2 To provide sufficient parking spaces to meet seasonal demand in tourist destinations.

15.1.3.3 To ensure that appropriate provision is made for on-site car parking for all activities, while considering safe cycling and pedestrian access and use of the site.

15.1.3.4 To ensure that appropriate and efficient provision is made for loading and access for activities.

15.1.3.5 To promote safe and efficient movement and circulation of vehicular, cycle and pedestrian traffic, including for those with disabilities.

Policies

15.1.4.1 That the traffic effects of activities be evaluated in making decisions on resource consent applications.

15.1.4.2 That the need to protect features of the natural and built environment be recognised in the provision of parking spaces.

15.1.4.3 That parking spaces be provided at a location and scale which enables the efficient use of parking spaces and handling of traffic generation by the adjacent roading network.

15.1.4.4 That existing parking spaces are retained or replaced with equal or better capacity where appropriate, so as to ensure the orderly movement and control of traffic.

15.1.4.5 That appropriate loading spaces be provided for commercial and industrial activities to assist with the pick-up and delivery of goods.

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

15.1.4.7 That the needs and effects of cycle and pedestrian traffic be taken into account in assessing development proposals.

15.1.4.8 That alternative options be considered to meeting parking requirements where this is deemed appropriate by the Far North District Council.

Discussion

The residential activity sought is papakāinga housing. Tangata whenua objectives and policies seek to give effect to the rights given to Maori under the Treaty of Waitangi, this includes enabling Maori to develop and manage their land in a manner that is consistent with the sustainable management of natural and physical resources. Provision for papakāinga type housing where whanau members can live together on shared ownership Maori land gives effect to this intent and is provided for as a controlled activity in the Rural Production zone environment. Such developments remain subject to District-wide rules that manage potential adverse effects on the natural environment, natural hazards and heritage management, and on physical resources such as roads and other infrastructure. This development proposal is consistent with District Plan policies that give Maori the opportunity to develop and reside on their own land.

Where there are breaches to District-wide rules that manage effects on the natural environment, necessary design measures are included to ensure that any adverse effects are either avoided or mitigated. It is considered that the proposed papakāinga housing development is enabled by these objectives and policies. As per the recommendations contained within the Wetland and Watercourse Assessment report prepared by Wild Ecology (**Appendix H**), the proposal has been sensitively re-designed to have the least impact on natural inland wetlands and watercourses, and with the adoption of sensitive design, best-practice mitigation measures, and compliance with regulatory requirements, the ecological effects associated with the proposed accessway construction are expected to be low. Provided that all ecological and engineering recommendations are implemented, the works can proceed with confidence that the long-term ecological health and hydrological function of the site's natural watercourses and wetlands will be retained.

The Rural Environment covers the majority of the Far North District and includes areas of Maori land. It has a varied landform, extent of vegetation, waterways and land use activities. The objectives for the Rural Environment seek to promote the sustainable management of its natural and physical resources, which includes varied natural features, life-supporting soils, indigenous vegetation, and avoid land use conflict. The RPZ has a rural production focus, while recognising that a wide range of activities may exist in the zone where they are compatible with its productive purpose. Residential housing commonly occurs in the rural environment as it provides housing for those living on the land and using it productively. This development proposal is for a type of housing available to Maori wanting to live with other whanau members on Maori land. While slightly higher in scale and intensity to that which is anticipated in the RPZ, the proposed units will be clustered together in close proximity to the existing built development within the Waimamaku township (and State Highway 12), enabling the large balance area to continue to be utilised for rural production/grazing consistent with the productive intent of the zone.

The proposal involves the construction of a culvert and bridge crossing to span an existing natural inland wetland area; and aat the point where the accessway crosses the existing wetland, it will narrow to a 3.0 m one-way bridge, to minimise disturbance to the wetland environment. The use of a bridge at this location significantly reduces ecological and hydrological disruption by spanning the watercourse entirely, thereby eliminating the need for in-stream works, excavation, or alteration of the natural channel and wetland margins.

Each unit will have car parking space(s) available and an overflow area for guest parking is also provided within the site. Manoeuvring is possible on-site and a truck turning area will be provided towards the end of the access to ensure that there will be adequate space for vehicles, including fire service vehicles, to turnaround such that they would not be required to reverse manoeuvre off the site.

The existing vehicular access to the site which is located between two buildings on the state highway, is narrow and has restricted visibility due to parked cars either side, is proposed to be closed to vehicles using bollards (or similar) and will be utilised for pedestrian access only, linking through to the Waimamaku township.

The Traffic Effects Assessment (**Appendix D**) estimates that the traffic generation of the proposed development to be minimal in relation to this part of the State Highway. As such the demand for the proposed new vehicle crossing will be a small fraction of its capacity such that no traffic congestion would result, and further notes that State Highway 12 has ample capacity to cater for the small level of additional traffic the proposed development will generate.

Proposed District Plan

The following objectives and policies of the Proposed District Plan are considered relevant:

RPROZ-O1 The Rural Production zone is managed to ensure its availability for primary production activities and its long-term protection for current and future generations.

RPROZ-O2 The Rural Production zone is used for primary production activities, ancillary activities that support primary production and other compatible activities that have a functional need to be in a rural environment.

RPROZ-O3 Land use and subdivision in the Rural Production zone:

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

RPROZ-O4 The rural character and amenity associated with a rural working environment is maintained.

RPROZ-P1 Enable primary production activities, provided they internalise adverse effects onsite where practicable, while recognising that typical adverse effects associated with primary production should be anticipated and accepted within the Rural Production zone.

RPROZ-P2 Ensure the Rural Production zone provides for activities that require a rural location by:

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

RPROZ-P3 Manage the establishment, design and location of new sensitive activities and other non-productive activities in the Rural Production zone to avoid where possible, or otherwise mitigate, reverse sensitivity effects on primary production activities.

RPROZ-P4 Land use and subdivision activities are undertaken in a manner that maintains or enhances the rural character and amenity of the Rural Production zone, which includes:

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

RPROZ-P5 Avoid land use that:

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

RPROZ-P7 Manage land use and subdivision to address the effects of the activity requiring resource consent, including (but not limited to) consideration of the following matters where relevant to the application:

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

Discussion

The proposed rules for the Rural Production zone are enabling of Papakāinga housing provided number of residential units per site does not exceed 10, where there is a legal mechanism in place to ensure that the land will stay in communal ownership and continue to be used in accordance with ancestral cultural practices. Only 10 units are proposed and the land will continue to be owned by Te Roroa Development Charitable Trust (the applicant), should the consent be approved, this will ensure the land remains to be utilised as communal owned Papakāinga housing, however, if Council considers it necessary, a condition requiring such a legal mechanism be put in place could be included in the consent decision.

The proposed objectives and policies for the Rural Production zone are enabling of development provided that land is maintained for primary production activities as the predominant land use; and that the design and location of new sensitive activities are avoided unless reverse sensitivity effects can be mitigated. As discussed previously in this report, the proposed units are to be located on flat land at the northern end of the property, and in close proximity to the existing built development of the Waimamaku township, the remainder of the application site will be retained for the continued undertaking of the existing rural production(grazing) activities. The location of the access road and proposed wastewater field areas which are required to be planted, will provide both physical separation and a visual buffer of the development area minimising the potential for reverse sensitivity effects.

Further, the proposed development has been designed and will be located appropriately within the site so that it will not obstruct any important or significant views, with the buildings sitting within the existing landform and any vegetation not required to be cleared will be retained, plus further landscaping is proposed, in order to provide a visual buffer of the development from existing properties in close proximity.

The proposed development can be adequately serviced on-site, with detailed design required at the building consent stage.

As discussed previously throughout this report, the existing vehicular access to the site is no longer appropriate and will be closed to vehicles using bollards (or similar) and will be utilised for pedestrian access only, linking through to the Waimamaku township. The Traffic Effects Assessment) undertaken as part of this application estimates that the traffic generation of the proposed development to be minimal in relation to this part of the State Highway. As such the demand for the proposed new vehicle crossing will be a small fraction of its capacity such that no traffic congestion would result, and further notes that State Highway 12 has ample capacity to cater for the small level of additional traffic the proposed development will generate.

The application site is not known to contain any historic heritage and/or cultural values, or special landscape features. The proposed development has been sensitively designed following input from an ecologist to avoid any direct loss of natural inland wetlands. While a small area of vegetation removal will be required, this is intended to be mitigated through the proposed revegetation of a 45m^2 appropriate to the area near the wetlands/watercourse which will help maintain ecological values and support long-term restoration.

The application site is not known to contain any archaeological features, nor is it identified as a site of significance to Maori.

5.4 Section 104(1)(b)(v) Relevant Provisions of the Regional Policy Statement

The Operative Regional Policy Statement (“RPS”) for Northland contains high level policy guidance for development. The subject site does not contain any significant features as defined by the RPS and therefore consideration of the RPS provisions is limited to matters under the following objectives:

- Objective 3.11 Regional Form
- Objective 3.13 Natural Hazard Risk

Several underpinning policies are also relevant to this application, including:

Policy 5.1.1 - Planned and coordinated development

Subdivision, use and development should be located, designed and built in a planned and co-ordinated manner which:

(a) Is guided by the 'Regional Form and Development Guidelines' in Appendix 2;

(b) Is guided by the 'Regional Urban Design Guidelines' in Appendix 2 when it is urban in nature;

(c) Recognises and addresses potential cumulative effects of subdivision, use, and development, and is based on sufficient information to allow assessment of the potential long-term effects;

(d) Is integrated with the development, funding, implementation, and operation of transport, energy, water, waste, and other infrastructure;

(e) Should not result in incompatible land uses in close proximity and avoids the potential for reverse sensitivity;

(f) Ensures that plan changes and subdivision to / in a primary production zone, do not materially reduce the potential for soil-based primary production on land with highly versatile soils10, or if they do, the net public benefit exceeds the reduced potential for soil-based primary production activities; and

(g) Maintains or enhances the sense of place and character of the surrounding environment except where changes are anticipated by approved regional or district council growth strategies and / or district or regional plan provisions.

(h) Is or will be serviced by necessary infrastructure.

Note: in determining the appropriateness of subdivision, use and development (including development in the coastal environment – see next policy), all policies and methods in the Regional Policy Statement must be considered, particularly policies relating to natural character, features and landscapes, heritage, natural hazards, indigenous ecosystems and fresh and coastal water quality.

The RPS recognises that there are activities and land that should be protected from the negative impacts brought about through subdivision and or development as further development can result in incompatible land use, reverse sensitivity issues and sterilisation of productive land. The proposed development will not result in the fragmentation of productive land. The proposed development will not have adverse effects on the viability of adjoining rural landholdings and activities, including plantation forestry.

Further, it is considered that the proposal is appropriate and will be in keeping with the character of this locality and it is considered that the development would not result in adverse character and amenity effects.

Issues about water quality include the pollution of water bodies (including coastal waters) from contaminants in non-point discharges and stormwater runoff, including sediment from earthworks; and the effects on water quality of major land use changes and drainage. With appropriate conditions of consent, water quality issues can be addressed.

Policy 7.1.1 – General Risk Management Approach

Subdivision, use and development of land will be managed to minimise the risks from natural hazards by:

(a) Seeking to use the best available information, including formal risk management techniques in areas potentially affected by natural hazards;

(b) Minimising any increase in vulnerability due to residual risk;

(c) Aligning with emergency management approaches (especially risk reduction);

(d) Ensuring that natural hazard risk to vehicular access routes and building platforms for proposed new lots is considered when assessing subdivision proposals; and

(e) Exercising a degree of caution that reflects the level of uncertainty as to the likelihood or consequences of a natural hazard event.

Policy 7.1.2 – New subdivision and land use within 10-year and 100- year flood hazard areas

New subdivision, built development (including wastewater treatment and disposal systems), and land use change may be appropriate within 10-year and 100-year flood hazard areas provided all of the following are met:

(a) Hazardous substances will not be inundated during a 100-year flood event.

(b) Earthworks (other than earthworks associated with flood control works) do not divert flood flow onto neighbouring properties, and within 10-year flood hazard areas do not deplete flood plain storage capacity;

(c) A minimum freeboard above a 100-year flood event of at least 500mm is provided for residential buildings.

(d) Commercial and industrial buildings are constructed so as to not be subject to material damage in a 100-year flood event.

(e) New subdivision plans are able to identify that building platforms will not be subject to inundation and / or material damage (including erosion) in a 100-year flood event;

(f) Within 10-year flood hazard areas, land use or built development is of a type that will not be subject to material damage in a 100-year flood event; and

(g) Flood hazard risk to vehicular access routes for proposed new lots is assessed

As discussed previously in this report, the lower portions of the application site are susceptible to flood hazards, however the proposed works, and building sites with associated servicing are elevated and sit well outside the identified flood hazard areas.

However, the proposed accessway location is within the flood plain but has been designed to follow the existing ground profile and will have a low-profile cross section to enable flood water to sheet flow across the road during significant rainfall events.

Some localised fill will be introduced within the flood plain to construct the proposed bridge abutments, however, given the extent of the flood plain and the width of the overall flood cross section, it is considered that the effect of such fill in relation to the flood level would be less than minor.

All earthworks will be required to be designed by a suitably qualified engineer taking into account the findings of the Land Development Report (**Appendix E**) which also recommends that:

- Signs must be erected at the eastern side of bridge advising users not to cross during flooding.
- An evacuation management plan must be developed and implemented that advises occupants of the flooding risk, noting that this section of State Highway 12 through Waimamaku township will also be flooded during a 1% AEP (100-year) flood event, therefore, to identify an emergency access route to the state highway can be difficult. However, if possible, an alternate emergency access route or other means of evacuation from the development area should also be investigated.

Provided the recommendations contained within the Land Development Report are followed, it is considered that any adverse effects from flood hazards can be mitigated such that they would be less than minor.

No other Regional Policy Statements are relevant to this proposal.

The proposal requires consent under the Proposed Regional Plan for Northland for the daily volume of wastewater disposed (Rule C.6.1.3) and earthworks in relation to the proximity to the wetland, flood hazard area and the area of exposed earth at any one time (C.8.3.1).

A consent application has been concurrently submitted to Northland Regional Council.

5.5 Section 104(1)(b)(i) and (ii) Relevant provisions of National Environmental Standards and other regulations, Section 104(1)(b)(iii) Relevant provisions of National Policy Statements, Section 104(1)(b)(iv) Relevant provisions of the New Zealand Coastal Policy Statement (NZCPS)

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

The site is not identified as being a contaminated site within the Northland Regional Council's Register of contaminated sites, nor has it previously been used for activities listed on the HAIL Register produced by the Ministry for the Environment. Therefore, consent is not required under the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.

National Policy Statement for Highly Productive Land

Under s104(10(b) Council is required to have regard to the NPS-HPL. The application site is zoned Rural Production and has a LUC of 2, therefore, the NPS-HPL is applicable to the proposal, as the application site is considered to be 'Highly Productive Land'.

Pursuant to Section 3.9 of the NPS-HPL the Council must avoid the inappropriate use or development of highly productive land that is not land-based primary production, except where one of the exemptions listed under Section 3.9(2) applies.

In this instance, the proposal consists of a papakāinga development on specified Māori land (d) and therefore is provided for.

Additionally, measures will be undertaken to ensure that the proposed development:

(a) minimises or mitigates any actual loss or potential cumulative loss of the availability and productive capacity of highly productive land in their district; and

(b) avoids if possible, or otherwise mitigates, any actual or potential reverse sensitivity effects on land-based primary production activities from the use or development.

The proposed units will be consolidated within small portion of the application site in close proximity to existing built development and the state highway, avoiding the sprawl of built development throughout the site.

It is considered there will be no adverse effects on the viability of rural landholdings and activities in the wider surrounding environment, which already function well with existing residential development in close proximity. Further, the proposed wastewater disposal area with associated planting will provide a physical separation between the proposed units and the existing grazing land where rural activities are set to continue.

National Policy Statement for Indigenous Biodiversity

Although some vegetation clearance is required to provide for functional access to the development, this clearance has been minimised as far as practicable and will be offset at a 1:3 ratio to achieve no net loss—and ideally a net gain—of indigenous biodiversity, consistent with the biodiversity effects management hierarchy outlined in the NPS-IB (2023).

National Environmental Standard Freshwater

The proposal requires consent under the National Environmental Standard – Freshwater, for the following:

- Consent under Regulation 54(a) is required as the proposal will result in the disturbance and clearance of pastoral exotic vegetation and scattered terrestrial indigenous vegetation within a 10m setback of a wetland areas as part of access road construction and bridge installation.
- Consent under Regulation 54(b) is required as the proposal will result in the installation of a new bridge crossing wetland area W1c and watercourse 2, and establishment of accessway within a 10m setback of 'natural inland wetland' areas (W3a and W1c). It is noted that the new bridge will be located completely outside the wetland boundaries and will span the wetland, and therefore the existing wetland will not be affected.

A consent application has been concurrently submitted to Northland Regional Council.

National Policy Statement for Freshwater Management

The NES-F does not contain specific objectives and policies. Therefore, given the hierarchical nature of plan making in New Zealand, the NES-F must give effect to the National Policy Statement for Freshwater Management 2020 (NPS-FM).

Policy 6 of the NPS-FM considers the values of natural wetlands.

Policy 6: *There is no further loss of extent of natural inland wetlands, their values are protected, and their restoration is promoted.*

As per the recommendations contained within the Wetland and Watercourse Assessment report prepared by Wild Ecology (**Appendix H**), the proposal has been sensitively re-designed to have the least impact on natural inland wetlands and watercourses, and with the adoption of sensitive design, best-practice mitigation measures, and compliance with regulatory requirements, the ecological effects associated with the proposed accessway construction are expected to be low. Provided that all ecological and engineering recommendations are implemented, the works can proceed with confidence that the long-term ecological health and hydrological function of the site's natural watercourses and wetlands will be retained.

In consideration of the above and the conclusions reached in Section 5 of this report, the adverse effects of the proposed activities on freshwater resources are less than minor. Therefore, the proposal is not contrary to and sits comfortably within the policy direction of the NPS-FM.

5.6 Section 104(1)(c) Any other matters considered relevant and reasonably necessary to determine the application

There are no other matters that are considered necessary to determine the application.

6.0 Notification

Public Notification

Having undertaken the s95A public notification tests, the following conclusions are reached:

- Public notification is not mandatory as the applicant has not requested it, there are no outstanding or refused requests for further information, and the application does not involve any exchange of recreation reserve land under s15AA of the Reserves Act 1977.
- Public notification is not precluded due to certain circumstances.

- Public notification is not required as the proposed development will have less than minor adverse effects on the environment as assessed in Section 5.2 of this report.
- Under step 4, there are no special circumstances that warrant the application being publicly notified because there is nothing unique or unusual about the proposal or subject site that gives rise to special circumstances.

Limited Notification

Having undertaken the s95B limited notification tests, the following conclusions are reached:

- Limited notification is not mandatory.
- There is no rule of NES that specifically precludes limited notification of the activities, and the application is for an activity other than those specified in s95B(6)(b).
- Limited notification is not required as it is considered that the activity will not result in any adversely affected persons. As advised previously in this report consultation is ongoing with New Zealand Transport Agency/Waka Kotahi.
- There are no special circumstances that warrant the application being limited notified to any other persons.

It is therefore considered that this application can be processed without public or limited notification.

7.0 Consideration of Part 2 (Purpose and Principles) of the RMA

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

In considering the provisions of Section 5, the proposal would use and develop the physical resources of the site in a manner that would continue to enable the applicant to provide for the future social and economic wellbeing of Te Roroa whanau. At the same time the proposal sufficiently avoids, remedies or mitigates adverse effects on the roading network, sensitive receiving environments, amenity and character of the surrounding environment.

Section 6 of the Act sets out a number of matters of national importance which need to be recognised and provided for and includes among other things and in no order of priority, the protection of outstanding natural features and landscapes, the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna, and the protection of historic heritage.

Section 7 identifies a number of “other matters” to be given particular regard by a council in the consideration of any assessment for resource consent and includes the efficient use of natural and physical resources, and the maintenance of amenity values.

Pursuant to Section 7(b) particular regard shall be had to the efficient use and development of natural and physical resources. In this case, it is considered that the proposed development would not compromise the environment or generate any adverse effects, allowing for the efficient use of the physical resources of the site while avoiding adverse effects on the environment.

Pursuant to 7(c) particular regard shall be had to the maintenance and enhancement of amenity values. In this case, the proposal is consistent with, and would maintain the character and amenity values of the surrounding environment.

Pursuant to 7(g) particular regard shall be had to maintenance and enhancement of the environment. In this case, the proposed development has been designed such that the health of the surrounding environment will be maintained.

Section 8 requires a council to take into account the principles of the Treaty of Waitangi. The proposed development does not raise any Treaty of Waitangi issues.

The proposal is considered to be an efficient use of resources, providing further residential living opportunities. Overall, it is considered that the application meets the relevant provisions of Part 2 of the RMA, achieving the purpose of the RMA being sustainable management of natural and physical resources.

8.0 Lapsing of Consent

Section 125 of the RMA provides that if a resource consent is not given effect to within five years of the date of the commencement (or any other time as specified) it automatically lapses unless the consent authority has granted an extension. In this case, it is considered five years is an appropriate period.

9.0 Conclusion

The proposal is a land use consent for the development of a papakāinga consisting of ten (10) units, with associated access, parking and servicing; and including the earthworks and vegetation clearance associated with the proposed development on the application site. The construction of a culvert and bridge crossing is also required to span a wetland.

It is concluded that any actual or potential effects on the surrounding environment will be less than minor; and that the proposed development would be consistent with the relevant objectives and policies of the District Plan(s).

Overall, it is considered that the proposed development achieves the purpose and principles of the RMA and that the consent sought should be granted.

Prepared by:

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SENIOR PLANNER

Appendix A: Plans

Appendix B: Record of Title

Appendix C: Full Operative District Plan Assessment

RULE	COMPLIANCE
8.6.5.1.1 RESIDENTIAL INTENSITY	
Residential development shall be limited to one unit per 12ha of land. In all cases the land shall be developed in such a way that each unit shall have at least 3,000m² for its exclusive use surrounding the unit plus a minimum of 11.7ha elsewhere on the property. Except that this rule shall not limit the use of an existing site, or a site created pursuant to Rule 13.7.2.1 (Table 13.7.2.1) for a single residential unit for a single household, provided that all other standards for permitted activities are complied with. **Note:** There is a separate residential intensity rule applying to Papakāinga Housing (refer to Rule 8.6.5.2.2).	Does not comply – refer to the Papakāinga Housing rule below.
8.6.5.1.2 SUNLIGHT	
No part of any building shall project beyond a 45 degree recession plane as measured inwards from any point 2m vertically above ground level on any site boundary (refer to definition of Recession Plane in Chapter 3 - Definitions), except where a site boundary adjoins a legally established entrance strip, private way, access lot, or access way serving a rear site, the measurement shall be taken from the farthest boundary of the entrance strip, private way, access lot, or access way.	Complies – see plans.
8.6.5.1.3 STORMWATER MANAGEMENT	
The maximum proportion of the gross site area covered by buildings and other impermeable surfaces shall be 15%.	Complies, the total impervious area is 8,325.9m² (approximately 5.2%)
8.6.5.1.4 SETBACK FROM BOUNDARIES	
No building shall be erected within 10m of any site boundary; with the following exceptions; (a) no accessory building shall be erected within 3m of boundaries other than road boundaries, on sites less than 5000m2; (b) no crop protection structures shall be located within 3m of boundaries; (c) no building shall be erected within 12m of any road boundary with Kerikeri Road on properties with a road frontage with Kerikeri Road between its intersection with SH10 and Cannon Drive; (d) no building for residential purposes shall be erected closer than 100m from any zone boundary with the Minerals Zone; (e) no building shall be erected within the building line restriction area as marked in Appendix 6C, located immediately north of the Te Waimate Heritage Precinct. Any proposed building to be erected within this building line restriction area shall be	Complies – see plans.

deemed a discretionary activity and the Heritage New Zealand Pouhere Taonga will be considered an affected party to any such application made under this rule.	
8.6.5.1.5 TRANSPORTATION	
Refer to Chapter 15 – Transportation for Traffic, Parking and Access rules.	See Assessment of relevant Transport Chapter rules below.
8.6.5.1.6 KEEPING OF ANIMALS	
(a) Any building, compound or part of a site used for factory farming or a cattery, shall be located no closer than 50m from any site boundary, except for a boundary which adjoins a Residential, Coastal Residential or Russell Township Zone, where the distance shall be a minimum of 600m. (b) Any building, compound or part of a site used for a boarding kennel shall be located no closer than 300 metres from any site boundary except for a boundary which adjoins a Residential, Coastal Residential or Russell Township Zone, where the distance shall be a minimum of 600m.	Not applicable.
8.6.5.1.7 NOISE	
(a) All activities except Temporary Military Training Activities shall be so conducted as to ensure that noise from the site shall not exceed the following noise limits as measured at or within the boundary of any other site in this zone, or at any site in the Residential, Coastal Residential or Russell Township Zones, or at or within the notional boundary of any dwelling in any other rural or coastal zone: 0700 to 2200 hours 65 dBA L10 2200 to 0700 hours 45 dBA L10 and 70 dBA Lmax Noise Measurement and Assessment: Chapter 8.6 Page 4 Far North District Plan Printed on 03/05/2018 Chapter 8 - RURAL ENVIRONMENT Section 6 – Rural Production Zone Sound levels shall be measured in accordance with NZS 6801:1991 "Measurement of Sound" and assessed in accordance with NZS 6802:1991 "Assessment of Environmental Sound". The notional boundary is defined in NZS 6802:1991 "Assessment of Environmental Sound" as a line 20m from any part of any dwelling, or the legal boundary where this is closer to the dwelling. Construction Noise: Construction noise shall meet the limits recommended in, and shall be measured and assessed in accordance with, NZS 6803P:1984 "The Measurement and Assessment of Noise from Construction, Maintenance and Demolition Work". Noise limits for Temporary Military Training Activities are as follows: (b) **Time (Any Day)** / **Limits (dBA)** L_{10} / L_{95} / L_{max} 0630 to 0730: 60 / 45 / 70 0730 to 1800: 75 / 60 / 90 1800 to 2000: 70 / 55 / 85 2000 to 0630: 55 Impulse noise resulting from the use of explosives, explosives simulators or small arms shall not exceed 122 dBC. Temporary Military Training Activities shall be conducted so as to ensure the following noise limits are not exceeded at any point within the notional	The proposal is a residential activity such that compliance is assumed. The RPZ noise standards apply to activities undertaken on the site.

boundary of any dwelling, or residential institution, or educational facility within the district.	
8.6.5.1.8 BUILDING HEIGHT	
The maximum height of any building shall be 12m.	Complies - see plans.
8.6.5.1.9 HELICOPTER LANDING AREA	
A helicopter landing area shall be at least 200m from the nearest boundary of any of the Residential, Coastal Residential, Russell Township or Point Veronica Zones.	Not applicable.
8.6.5.1.10 BUILDING COVERAGE	
Any new building or alteration/addition to an existing building is a permitted activity if the total Building Coverage of a site does not exceed 12.5% of the gross site area.	Complies - see plans.
8.6.5.1.11 SCALE OF ACTIVITIES	
For activities other than those provided for in the exemptions below, the total number of people engaged at any one period of time in activities on a site, including employees and persons making use of any facilities, but excluding people who normally reside on the site or are members of the household shall not exceed i. ii. For activities ancillary to farming or plantation forestry activities, 8 persons per site or 2 person per 1 hectare of net site area, whichever is the greater For all other activities, 4 persons per site or 1 person per 1 hectare of net site area, whichever is the greater. Provided that: (a) this number may be exceeded for a period totalling not more than 60 days in any 12 month period where the increased number of persons is a direct result of activities ancillary to the primary activity on the site; or (b) this number may be exceeded where persons are engaged in constructing or establishing an activity (including environmental enhancement) on the site; or (c) this number may be exceeded where persons are visiting marae. In determining the total number of people engaged at any one period of time, the Council will consider the maximum capacity of the facility (for instance, the number of beds in visitors accommodation, the number of seats in a restaurant or theatre), the number of staff needed to cater for the maximum number of guests, and the number and nature of the vehicles that are to be accommodated on site to cater for those engaged in the activity. Exemptions: the foregoing limits shall not apply to farming and forestry or Temporary Military Training activities. All other activities shall comply with the requirements of s16 of the Act.	Not applicable.
8.6.5.1.12 TEMPORARY EVENTS	
Temporary events are a permitted activity in the zone, provided that: (a) the activity does not have a duration of more than two days; (b) the activity does not operate outside the hours of 6.30am to 10pm on each day; (c) the activity does not involve the assembly of more than 500 persons on each day; (d) the activity complies with excavation and/or filling rules as contained in Chapter 12.3 of Part 3 of the District Plan (and/or any necessary Earthworks Permit has been obtained);	Not applicable.

(e) prior to the event, a Traffic Management Plan (including parking) has been approved by the Council's Roading Engineer, or by NZTA representatives where access is off State Highway, or where traffic to and from the event will impact on State Highways in the vicinity. The approved plan is to be lodged with Council's Resource Consents Manager or other duly delegated officer at least 20 days prior to the event taking place, and be complied with for the duration of the event.	
8.6.5.2.2 PAPAKĀINGA HOUSING – Controlled Activity	
Papakāinga housing is a controlled activity in the Rural Production Zone provided that: (a) it complies with all the standards for permitted activities in this zone and in Part 3 - District Wide Provisions, except for the standards for residential intensity; and (b) each residential unit has at least 3,000m² surrounding the unit for its exclusive use; provided that the amount of land elsewhere on the site, in addition to the 3,000m² surrounding the unit, is not less than that required for the discretionary activity residential intensity standard (refer to Rule 8.6.5.4.1). In considering an application under this provision, the Council will restrict the exercise of its control to the following matters: (i) the number and location of dwellings; (ii) the location and standard of access; (iii) screening and planting.	**Does not comply.** Under the requirements of Rule 8.6.5.4.1 the residential intensity is one unit per 2ha of land; and in all cases the land shall be developed in such a way that each unit shall have at least 2,000m² for its exclusive use surrounding the unit plus a minimum of 1.8ha elsewhere on the property. The proposed development results in a residential intensity of one unit per 1.6063ha. **Discretionary Activity** (refer Rule 8.6.5.4(c)).
8.6.5.4.2 INTEGRATED DEVELOPMENT	
Notwithstanding the rules in this zone relating to the management of the effects of activities, an application for integrated development of activities only on Maori freehold land and Maori customary land and Crown land reserved for Maori (as defined in Te Ture Whenua Act 1993) may be made where the proposed development does not comply with one or more of the rules. This rule applies to Maori customary land, Maori freehold land and Crown land reserved for Maori for activities including papakāinga housing and marae and associated buildings. Integrated development plans will be considered in the context of other whanau and hapu lands in the vicinity, including an acknowledgement of areas of open space, reserve, natural vegetation and other amenities already provided by the land owning groups concerned. A management plan for integrated development under this rule is required.	**Complies – Discretionary Activity.**
12.2.6.1.2 INDIGENOUS VEGETATION CLEARANCE IN THE RURAL PRODUCTION AND MINERALS ZONES	
Clearance of indigenous vegetation in the Rural Production and Minerals Zones which is more than 10 years old is a permitted activity where: (a) it is not in a remnant forest, not within 20m of a lake (as scheduled in Appendix 1C), indigenous wetland or continually flowing river, and the clearance does not	**Does not comply.** A 15m² area od indigenous vegetation clearance is

exceed 2ha per site existing as at 1 February 2005 in any 10 year period while this rule is in force; or (b) if in a remnant forest, it is not within 20m of a lake (as scheduled in Appendix 1C), indigenous wetland or continually flowing river, and the clearance does not exceed 500m2 per site existing as at 1 February 2005 in any 10 year period while this rule is in force.	proposed within 20m of a wetland. **Discretionary Activity**.
12.3.6.1.1 EXCAVATION AND/OR FILLING, EXCLUDING MINING AND QUARRYING, IN THE RURAL PRODUCTION ZONE OR KAURI CLIFFS ZONE	
Excavation and/or filling, excluding mining and quarrying, on any site in the Rural Production Zone or Kauri Cliffs Zone is permitted, provided that: (a) it does not exceed 5,000m^3 in any 12-month period per site; and (b) it does not involve a continuous cut or filled face exceeding an average of 1.5m in height over the length of the face i.e. the maximum permitted average cut and fill height may be 3m.	Does not comply, the maximum average fill height at the right-hand side of the bridge abutment is approximately 1.65m. **Restricted Discretionary Activity**.
12.4.6.1.2 FIRE RISK TO RESIDENTIAL UNITS	
(a) Residential units shall be located at least 20m away from the drip line of any trees in a naturally occurring or deliberately planted area of scrub or shrubland, woodlot or forest; (b) Any trees in a deliberately planted woodlot or forest shall be planted at least 20m away from any urban environment zone, Russell Township or Coastal Residential Zone boundary, excluding the replanting of plantation forests existing at July 2003.	Complies - see plans.
12.5.6.1.1 NOTABLE TREES	
(a) The trimming and maintenance of a Notable Tree listed in Appendix 1D and shown on the Zone Maps, or the felling of a Notable Tree which has died, is a permitted activity, provided that the activity is carried out by, or under the supervision of, a member of the New Zealand Arboricultural Association who has advised the Council in advance of the work to be carried out; and/or (b) A Notable Tree listed in Appendix 1D and shown on the Zone Maps may be limbed or felled: (i) where this is required as emergency work to safeguard life or habitable buildings from immediate danger; or (ii) where this is required as emergency work to maintain or restore utilities, including networks for energy, telecommunications and transport; provided that such work is done to the minimum extent required to protect human life, habitable property or the network. Note: The felling or destruction of a Notable Tree as listed in Appendix 1D and shown on the Zone Maps, other than provided for in (a) or (b) above is a discretionary activity. (c) Excavation, filling and impermeable surfaces (including buildings) shall not occur within the area covered by the crown periphery (drip line) of any Notable Tree listed	Will comply, the notable tree will not be limbed or felled; and any excavation, filling or impermeable surfaces will not occur within the dripline of the notable tree.

in Appendix 1D and shown on the Zone Maps, but the planting and weeding of garden plants is permitted.	
12.7.6.1.1 SETBACK FROM LAKES, RIVERS AND THE COASTAL MARINE AREA	
For the purposes of this rule, lakes include the Manuwai and Waingaro Reservoirs. Any building and any impermeable surface must be set back from the boundary of any lake (where a lake bed has an area of 8ha or more), river (where the average width of the riverbed is 3m or more) or the boundary of the coastal marine area, except that this rule does not apply to man-made private water bodies other than the Manuwai and Waingaro Reservoirs. The setback shall be: (a) a minimum of 30m in the Rural Production, Waimate North, Rural Living, Minerals, Recreational Activities, Conservation, General Coastal, South Kerikeri Inlet and Coastal Living Zones; (b) a minimum of 26m in the Residential, Coastal Residential and Russell Township Zones; (c) a minimum of 20m in the Commercial and Industrial Zones. Provided that these setbacks do not apply: (i) to activities in a Maritime Exemption Area; or (ii) to river crossings, including but not limited to, fords, bridges, stock crossings and culvert crossings; or (iii) to activities related to the construction of river crossings; or (iv) to pumphouses utilised for the drawing of water from the lake, river or wetland, provided such pumphouse covers less than 25m2 in area; or (v) to buildings and impermeable surfaces associated with utility service structures, provided that they do not exceed 2m in height or 5m in area; or (vi) to activities associated with the maintenance, replacement and upgrading of existing linear network utilities; or (vii) where there is a legally formed and maintained road between the property and the coastal marine area, lake or river; or (viii) to activities associated with marine farming shore facilities on Lot 1 DP197240 (Orongo Bay), Lot 1 DP155347 (Waikare Inlet) and Lot 1 DP190467 (Waikare Inlet); or (ix) to Doug's Opua Boatyard's existing uses and/or resource consents applicable over Sec 1, 2, 3, & 4 SO68634 (esplanade reserve) CT 121C/187; NRC Plan Map 3231B; and pt Lot 1, Lot 2 & Sec 3 Town Block of Opua XXXII CT 21C/265; or (x) to activities, buildings and impermeable surfaces associated with the operation of a commercial boatyard on Part Allotment 6, Section 13, Town of Russell.	Complies
12.7.6.1.2 SETBACK FROM SMALLER LAKES, RIVERS AND WETLANDS	

Any building and any impermeable surface must be set back from the boundary of lakes (where the lake bed has an area of less than 8ha) smaller continually flowing rivers (where the average width of the river bed is less than 3m) and wetlands except that this rule does not apply to man-made private water bodies. The setback shall be: (a) 3 x the area (ha) of the lake (e.g. if the lake is 5ha in area, the setback shall be 15m); and/or (b) 10 x the average width of the river where it passes through or past the site; provided that in both cases the minimum setback shall be 10m and the maximum setback shall be no more than the minimum required by Rule 12.7.6.1.1 above; (c) 30m for any wetland of 1ha or more in area. Provided that these setbacks do not apply: (i) to river crossings, including but not limited to, fords, bridges, stock crossings and culvert crossings; or (ii) to activities related to the construction of river crossings; or (iii) to pumphouses utilised for the drawing of water from the lake, river or wetland, provided such pumphouse covers less than 25m2 in area; or (iv) to buildings and impermeable surfaces associated with utility service structures, provided that they do not exceed 2m in height or 5m in area; or (v) to activities associated with the maintenance, replacement and upgrading of existing linear network utilities; or (vi) where there is a legally formed and maintained road between the property and the coastal marine area, lake or river. These setbacks do not apply to river crossings or activities related to the construction of river crossings, or to access for the maintenance of existing utility service structures, linear network utilities or pump houses permitted by this rule.	Will comply, the proposed bridge is exempt from this rule under 12.7.6.1.2(c)(i) and (ii).
12.7.6.1.3 PRESERVATION OF INDIGENOUS WETLANDS	
Any land use activity within an indigenous wetland of 200m2 or more that does not change the natural range of water levels or the natural ecosystem or flora and fauna it supports is a permitted activity, provided that the harvesting of plantation forestry that existed prior to 28 August 2004 is permitted where it is provided for by a rule in a Regional Plan for Northland or by a resource consent granted by Northland Regional Council.	Complies, the proposed works will not take place within an indigenous wetland.
12.7.6.1.4 LAND USE ACTIVITIES INVOLVING DISCHARGES OF HUMAN SEWAGE EFFLUENT	
Land use activities which produce human sewage effluent (including grey water) are permitted provided that: (a) the effluent discharges to a lawfully established reticulated sewerage system; or (b) the effluent is treated and disposed of on-site such that each site has its own treatment and disposal system no part of which shall be located closer than 30m from the boundary of any river, lake, wetland or the boundary of the coastal marine area.	Complies, the proposed wastewater disposal area is setback 15m from an intermittent stream, which does not meet the definition of a river under the Operative District Plan.

<table>
<tr><th>15.1.6A.2.1 TRAFFIC INTENSITY</th><th></th></tr>
<tr><td>The Traffic Intensity threshold value for a site shall be determined for each zone by Table 15.1.6A.1 above. The Traffic Intensity Factor for a proposed activity (subject to the exemptions identified below) shall be determined by reference to Appendix 3A in Part 4.

This rule only applies when establishing a new activity or changing an activity on a site. However, when considering a new activity or changing an activity, the Traffic Intensity Factor for the existing uses (apart from those exempted above) on site need to be taken into account in order to address cumulative effects.</td><td>It is estimated that the proposed development will generate between 31-200 one-way traffic movements and access is via a State Highway, therefore being assessed as a Restricted Discretionary Activity.</td></tr>
<tr><th>15.1.6B.1.1 ON-SITE CAR PARKING SPACES</th><th></th></tr>
<tr><td>Where:

(i) an activity establishes; or

(ii) the nature of an activity changes; or

(iii) buildings are altered to increase the number of persons provided for on the site;

the minimum number of on-site car parking spaces to be provided for the users of an activity shall be determined by reference to Appendix 3C, unless an activity complies with the exemptions</td><td>Appendix 3C requires two car parking spaces per dwelling.

Complies, more than 20 parking formed spaces will be provided within the site.</td></tr>
<tr><th>15.1.6B.1.4 ACCESSIBLE CAR PARKING SPACES</th><th></th></tr>
<tr><td>Where onsite parking is provided or is to be provided for all buildings and activities in accordance with Rule 15.1.6B.1.1, except dwellings, car parking spaces for those with disabilities will be provided as follows:

(a) Accessible car parking spaces shall be provided at the following ratio:

<table><tr><th>Number of General Car Parking Spaces Provided</th><th>Number of Accessible Car Parking Spaces Required</th></tr><tr><td>20 or less car parking spaces provided</td><td>One accessible car parking space</td></tr><tr><td>21 – 50 car parking spaces provided</td><td>Two accessible car parking spaces</td></tr><tr><td>Every additional 50 car parking spaces where more than 50 spaces are provided</td><td>One additional accessible car parking space</td></tr></table>
(b) Accessible car parking spaces shall connect to an accessible route at the closest building entrance.

(c) Accessible car parking spaces shall have clear ground marking in accordance with the international symbol of access.

(d) All accessible car parking spaces must have a minimum width of 3.5m and a minimum depth of 5m.</td><td>Complies, the parking is for dwellings associated with a papakāinga development.</td></tr>
<tr><th>15.1.6B.1.5 CAR PARKING SPACE STANDARDS</th><th></th></tr>
<tr><td>(a) The required size of off-street car parking spaces, the manoeuvring space between, and the vehicle circulation routes providing access to them, shall be as set out in Appendix 3D.</td><td>Complies, the proposed parking and manoeuvring areas will be formed within all-weather surface and maintained to the satisfaction of Council.</td></tr>
</table>

<table>
<tr><td>(b) Stacked parking will be permitted for one of two spaces associated with a specific residential unit. In determining the extent of area required for manoeuvring space, the Council will be guided by the Tracking Curve diagrams as shown in Appendix 3E.

(c) All parking, loading, access drives and manoeuvring areas shall be formed and provided with an all-weather surface, drained, marked out and maintained to the satisfaction of the Council, and shall be kept free and available for the uses intended. Where a parking area provides four or more car parking spaces is adjacent to a road, a kerb or a barrier shall be provided to prevent direct access except at the designated vehicle access point.</td><td></td></tr>
<tr><td>15.1.6C.1.1 PRIVATE ACCESSWAY IN ALL ZONES</td><td></td></tr>
<tr><td>(a) The construction of private accessway, in addition to the specifics also covered within this rule, is to be undertaken in accordance with Appendix 3B-1 in Part 4 of this Plan.

(b) Minimum access widths and maximum centreline gradients, are set out in the Appendix 3B-1 table except that the grade shall be:

<table><tr><td>All urban zones; excluding the Commercial and Industrial Zones</td><td>No steeper than 1:8 adjacent to the road boundary for at least 5m.</td></tr><tr><td>Commercial and Industrial Zones</td><td>No steeper than 1:20 adjacent to the road boundary for a length of at least 6m.</td></tr></table>
(c) A private accessway may serve a maximum of 8 household equivalents.

(d) Where a subdivision serves 9 or more sites, access shall be by public road.

(e) Access shall not be permitted:

(i) onto a State Highway or a Limited Access Road;

(ii) onto an arterial or collector road within 90m of its intersection with an arterial road or a collector road;

(iii) onto an arterial or collector road within 30m of its intersection with a local road;

(iv) onto a local road within 30m of its intersection with an arterial or collector road;</td><td>Does not comply.

The accessway has been designed in accordance with Appendix 3B-1. However, the private access is for 11 household equivalents (including existing farm house), will have a formed width of 5.0m for the majority of its length, and the access will be onto the State Highway.

Therefore, being assessed as a Discretionary Activity.</td></tr>
<tr><td>15.1.6C.1.3 PASSING BAYS ON PRIVATE ACCESSWAYS IN ALL ZONES</td><td></td></tr>
<tr><td>(a) Where required, passing bays on private accessways are to be at least 15m long and provide a minimum usable access width of 5.5m.

(b) Passing bays are required:

(i) in rural and coastal zones at spacings not exceeding 100m;

(ii) on all blind corners in all zones at locations where the horizontal and vertical alignment of the private accessway restricts the visibility.</td><td>Complies, no passing bays are required as the private access provides for two-way movement.</td></tr>
<tr><td>15.1.6C.1.4 ACCESS OVER FOOTPATHS</td><td></td></tr>
<tr><td>The following restrictions shall apply to vehicle access over footpaths:</td><td>Complies</td></tr>
</table>

(a) no more than two crossings per site; and (b) the maximum width of a crossing shall be: All activities; except service stations: 6m Service stations or supermarkets: 9m	
15.1.6C.1.5 VEHICLE CROSSING STANDARDS IN RURAL AND COASTAL ZONES	
(a) Private access off roads in the rural and coastal zones the vehicle crossing is to be constructed in accordance with Council's "Engineering Standards and Guidelines" (June 2004 – Revised 2009). (b) Where the access is off a sealed road, the vehicle crossing plus splays shall be surfaced with permanent impermeable surfacing for at least the first 5m from the road carriageway or up to the road boundary, whichever is the lesser. (c) Where the vehicle crossing serves two or more properties the private accessway is to be 6m wide and is to extend for a minimum distance of 6m from the edge of the carriageway. Note 1: Refer to Appendix 3G for a visual representation of what a vehicle crossing is and how it works in relation to a private access.	Will comply with the NZTA requirements as access is onto a state highway.
15.1.6C.1.7 GENERAL ACCESS STANDARDS	
(a) Provision shall be made such that there is no need for vehicles to reverse off a site except where there are less than 4 parking spaces gaining access from a local road. (b) All bends and corners on the private accessway are to be constructed to allow for the passage of a Heavy Rigid Vehicle. (c) Any access where legal width exceeds formation requirements shall have surplus areas (where legal width is wider than the formation) grassed. (d) Runoff from impermeable surfaces shall, wherever practicable, be directed to grass swales and/or shall be managed in such a way as will reduce the volume and rate of stormwater runoff and contaminant loads.	Will comply.
15.1.6C.1.8 FRONTAGE TO EXISTING ROADS	
(c) Where a site has more than one road frontage or frontage to a service lane or right-of-way (ROW) in addition to a road frontage, access to the site shall be in a place that: (i) facilitates passing traffic, entering and exiting traffic, pedestrian traffic and the intended use of the site; (ii) is from the road or service lane or ROW that carries the lesser volume of traffic.	Complies.
15.1.6C.1.10 SERVICE LANES, CYCLE AND PEDESTRIAN ACCESSWAYS	
(a) Service lanes, cycle and pedestrian accessways shall be laid out and vested in accordance with the standards set out in the Council's "Engineering Standards and Guidelines" June (2004 – Revised 2009). (b) All access reserved for pedestrians only shall be a footpath, formed and concreted (or an alternative surface) to Councils satisfaction.	Will comply.

Appendix D: Traffic Effects Assessment

Appendix E: Land Development Report

Appendix F: Geotechnical Report

Appendix G: Management Plan

Appendix H: Wetland and Watercourse Assessment

Appendix I: Design Statement

Appendix J: NRC Application

Appendix K: Landscape Concept Plan

CIVIL ENGINEERING DRAWING SCHEDULE:

SHEET	TITLE	REVISION	REVISION DATE 12/06/2025								
001	DRAWING SCHEDULE	0									
002	NOTES AND ABBREVIATIONS	0									
100	EXISTING SITE PLAN	0									
101	PROPOSED SITE PLAN	0									
200	EARTHWORK PLAN	0									
210	EROSION AND SEDIMENT CONTROL PLAN	0									
400	STORMWATER LAYOUT PLAN - PRIVATE	0									
401	SWALE AND STORMWATER OUTLET DETAILS	0									
500	WASTEWATER LAYOUT PLAN - PRIVATE	0									
600	WATER SUPPLY LAYOUT PLAN	0									
800	COMMON ACCESS WAY PLAN	0									
801	COMMON ACCESS WAY LONG SECTION	0									
802	PROPOSED BRIDGE SCHEMATIC	0									
803	COMMON ACCESS WAY DETAILS	0									
804	ROAD WIDENING DETAILS (DIAGRAM D)	0									
805	ROAD WIDENING DETAILS (DIAGRAM C)	0									

SCHEDULE LEGEND	
ORIGINAL ISSUE	0
NOT REVISED	
REVISED	1
NOT INCLUDED IN SET	-
DELETED FROM SET	~~TITLE~~

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TE ROROA WHATU ORA / MANAWHENUA TRUST
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0	12/06/25	FOR CONSENT	SS

DRAFTER: S SIVA
DESIGNER: S SIVA
CHECKER: J CHEN
DATE: 12/06/2025

JOB: CIVIL DESIGN - WAIMAMAKU PAPAKAINGA
CLIENT: TE ROROA WHATU ORA / MANAWHENUA TRUST
ADDRESS: 7229 STATE HIGHWAY 12, WAIMAMAKU, NORTHLAND
DRAWING: DRAWING SCHEDULE

DRAWING: C001 REV: 0
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PROJECT: 15833
ISSUE: CONSENT

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GENERAL ABBREVIATIONS:

EX	EXISTING
PROP	PROPOSED
BNDY	BOUNDARY
RL	REDUCED LEVEL
FFL	FINISH FLOOR LEVEL
GFL	GARAGE FLOOR LEVEL
RW	RETAINING WALL
TOW	TOP OF WALL
BOW	BOTTOM OF WALL

UTILITY ABBREVIATIONS:

SW	STORMWATER
WW	WASTEWATER
PUB.	PUBLIC
PRIV.	PRIVATE
IC	INSPECTION CHAMBER (675mmØ AND LARGER)
IP	INSPECTION POINT (100/150mmØ)
CP	CATCH PIT
SP	SPLAY PIT
LL	LID LEVEL
INV	INVERT LEVEL
RCRRJ	REINFORCED CONCRETE RUBBER RING JOINT
CLn	CLASS n CONCRETE
PE	POLYETHYLENE
uPVC	UNPLASTICIZED POLYVINYL CHLORIDE
AC	ASBESTOS CONCRETE
VC	VITRIFIED CLAY
EW	EARTHENWARE
CONC	CONCRETE
CLS	CEMENT LINED STEEL
DI	DUCTILE IRON
WS	WATER SERVICE
SV	SLUICE VALVE
GV	GATE VALVE
FH	FIRE HYDRANT
EC	END CAP
FP	FLUSHING POINT
AB	ANCHOR BLOCK
E	ELECTRICAL POWER
G	NATURAL GAS
T	TELECOMMUNICATIONS
CS	COMBINED SERVICES

GEOMETRY ABBREVIATIONS:

L	LEFT
R	RIGHT
CL	CENTRE LINE
HP	HIGH POINT
LP	LOW POINT
CH	CHAINAGE
BOA	BEGIN OF ALIGNMENT
EOA	END OF ALIGNMENT
BP	BEGIN POINT
EP	END POINT
MID	MIDDLE POINT
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
PRC	POINT OF REVERSE CURVATURE
PT	POINT OF TANGENCY
IP	INTERSECTION POINT
BLS	BEGIN LONGSECTION
ELS	END LONGSECTION
VPC	VERTICAL POINT OF CURVATURE
VPT	VERTICAL POINT OF TANGENCY
BRK	GRADE BREAK
K	CURVE COEFFICIENT

GENERAL NOTES:

1. ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED AGAINST THE SITE DRAWINGS PRIOR TO COMMENCING WORK.
2. DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
3. ANY VARIATIONS OR DISCREPANCIES ARE TO BE REFERRED TO CHESTER CONSULTANTS LTD FOR RESOLUTION.
4. ALL SERVICES ARE TO BE LOCATED AND FLAGGED PRIOR TO COMMENCING WORK ON SITE.
5. WORKS TO BE IN ACCORDANCE WITH WSL STANDARDS, AUCKLAND COUNCIL STANDARDS, AND THE NEW ZEALAND BUILDING CODE.
6. THE CONTRACTOR IS TO OBTAIN ALL NECESSARY CONSENTS AND PERMITS FOR WORKS ON, IN, AND AROUND EXISTING SERVICES, ASSETS, AND THE ROAD AND ROAD RESERVE.
7. ELECTRONIC FILES PROVIDED AS SUPPLEMENTAL INFORMATION TO DRAWINGS AND REPORTS. IF DISCREPANCIES ARE FOUND BETWEEN ELECTRONIC FILES AND DRAWINGS, CONTRACTOR TO NOTIFY ENGINEER. DRAWINGS SHALL TAKE PRECEDENT OVER ELECTRONIC FILES UNLESS OTHERWISE NOTED OR DIRECTED BY ENGINEER.

TOPOGRAPHIC DATA NOTES:

1. TOPOGRAPHIC SURVEY DATA PROVIDED BY NIGEL ROSS SURVEYOR LIMITED.
2. TOPOGRAPHIC SURVEY DATA COLLECTED ON 14/02/2025.
3. SUPPLEMENTAL GROUND DATA SOURCED FROM LINZ DATA SERVICE AND DATED 2018-2020.
4. AERIAL IMAGERY SOURCED FROM LINZ DATA AND DATED 2015-2016.
5. DATA LOCATED ON MOUNT EDEN 2000 HORIZONTAL COORDINATE SYSTEM.
6. DATA SET TO NEW ZEALAND VERTICAL DATUM 2016.

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CLIENT: TE ROROA WHATU ORA / MANAWHENUA TRUST
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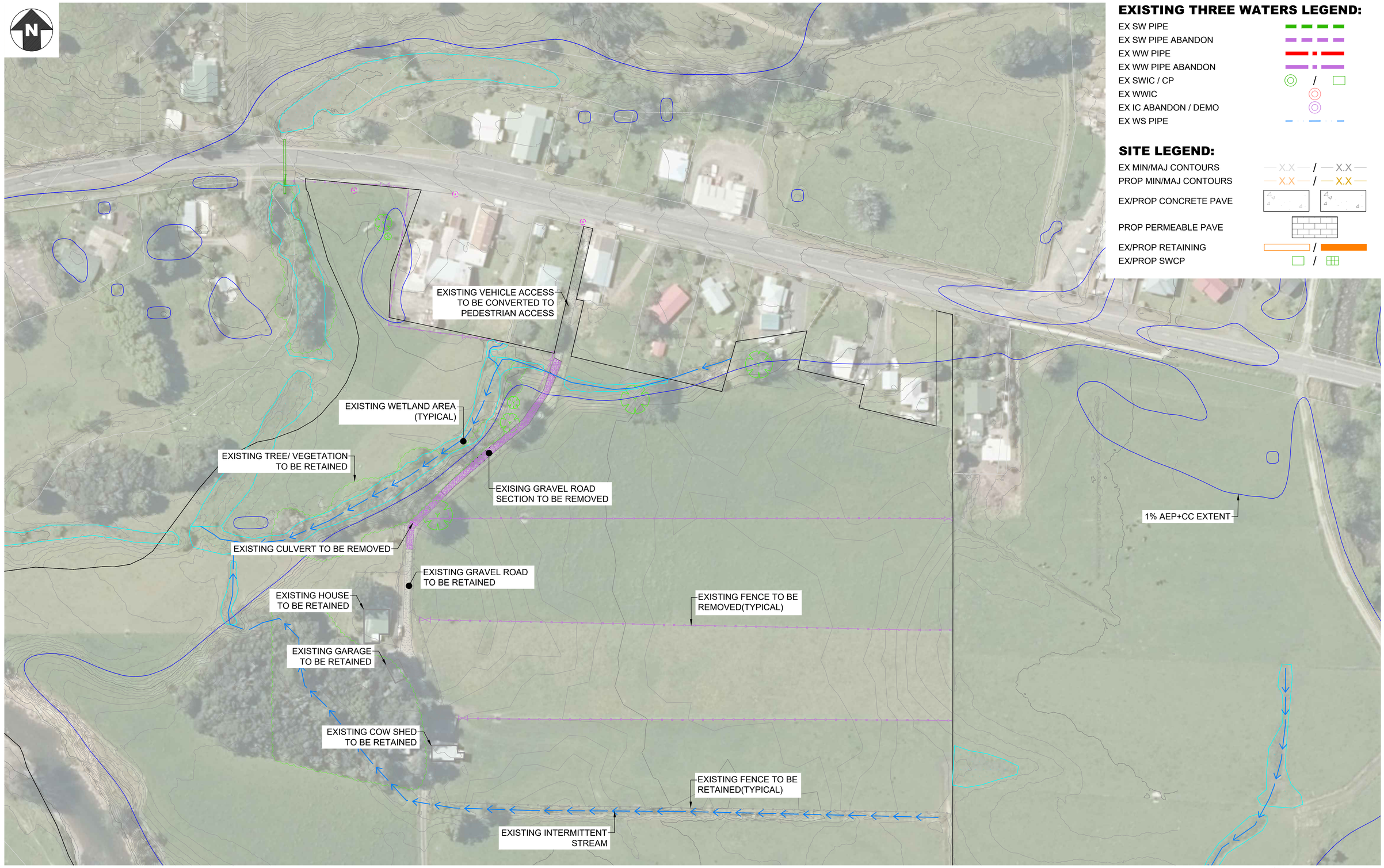

EXISTING THREE WATERS LEGEND:

- EX SW PIPE
- EX SW PIPE ABANDON
- EX WW PIPE
- EX WW PIPE ABANDON
- EX SWIC / CP
- EX WWIC
- EX IC ABANDON / DEMO
- EX WS PIPE

SITE LEGEND:

- EX MIN/MAJ CONTOURS X.X / X.X
- PROP MIN/MAJ CONTOURS X.X / X.X
- EX/PROP CONCRETE PAVE
- PROP PERMEABLE PAVE
- EX/PROP RETAINING /
- EX/PROP SWCP /

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DESIGNER: S SIVA
CHECKER: J CHEN
DATE: 12/06/2025

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CLIENT: TE ROROA WHATU ORA / MANAWHENUA TRUST
ADDRESS: 7229 STATE HIGHWAY 12, WAIMAMAKU, NORTHLAND
DRAWING: EXISTING SITE PLAN

DRAWING: C100 REV: 0
SCALE: 1:750 @ A1
PROJECT: 15833
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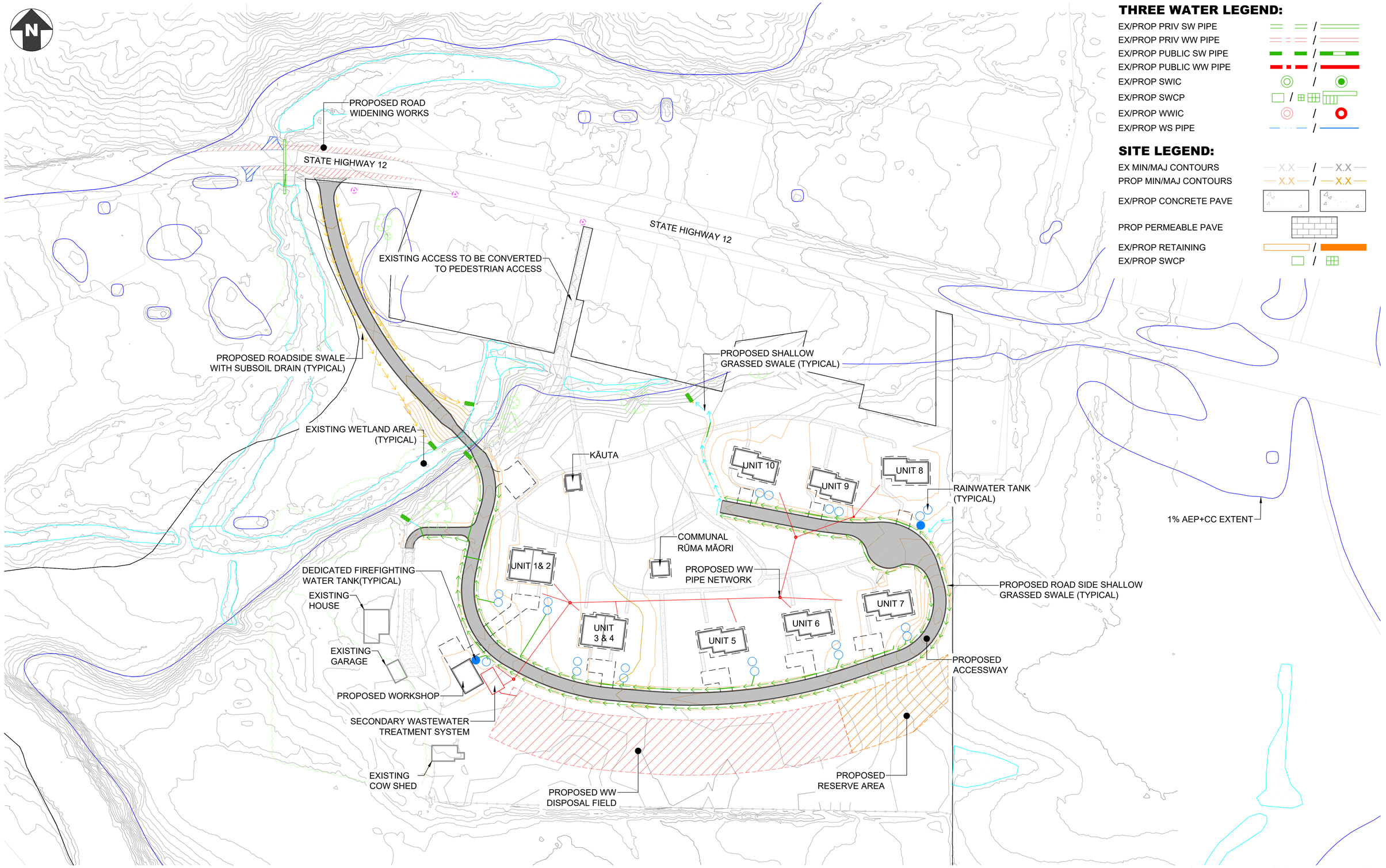

THREE WATER LEGEND:

- EX/PROP PRIV SW PIPE
- EX/PROP PRIV WW PIPE
- EX/PROP PUBLIC SW PIPE
- EX/PROP PUBLIC WW PIPE
- EX/PROP SWIC
- EX/PROP SWCP
- EX/PROP WWIC
- EX/PROP WS PIPE

SITE LEGEND:

- EX MIN/MAJ CONTOURS
- PROP MIN/MAJ CONTOURS
- EX/PROP CONCRETE PAVE
- PROP PERMEABLE PAVE
- EX/PROP RETAINING
- EX/PROP SWCP

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DRAWING: PROPOSED SITE PLAN

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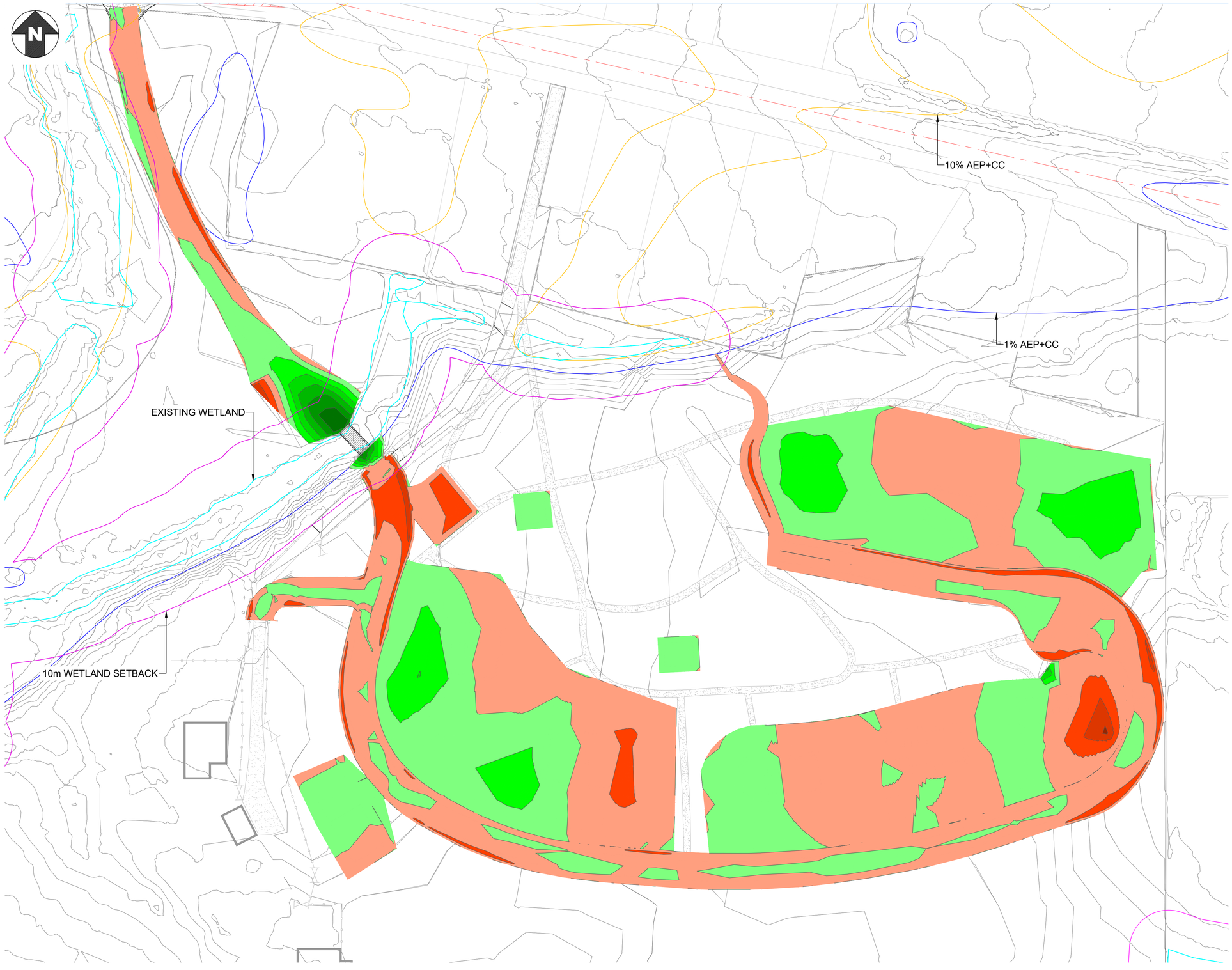

EARTHWORK NOTES:

1. CUT TO FILL VOLUMES ARE FROM EXISTING GROUND INCLUDING TOP SOIL TO FINAL GROUND INCLUDING TOPSOIL, PAVEMENT.
2. NO BULKING FACTORS HAVE BEEN USED IN THE VOLUME ESTIMATION.
3. TEMPORARY EARTHWORKS, SHORING, AND ENABLING WORKS TO BE DESIGNED BY OTHERS AND ARE THE RESPONSIBILITY OF THE CONTRACTOR.
4. WORKS ARE TO BE IN ACCORDANCE WITH AUCKLAND COUNCIL GUIDANCE DOCUMENT 2016/05 (GD05), EROSION AND SEDIMENT CONTROL GUIDE.
5. PLANS DETAIL THE GENERAL SEDIMENT AND EROSION CONTROL MEASURES. ACTUAL CONTROLS ARE TO BE THE RESPONSIBILITY OF THE CONTRACTOR AND ARE TO BE ADAPTED TO SUIT THE CURRENT STAGE OF WORKS.

CUT/FILL DEPTHS TABLE

LOWER RANGE (m)	UPPER RANGE (m)	COLOUR
-2.00	-1.50	
-1.50	-1.00	
-1.00	-0.50	
-0.50	0.00	
0.00	0.50	
0.50	1.00	
1.00	1.50	
1.50	2.00	
2.00	2.50	

Location	Area (m^2)	Cut (m^3)	Fill (m^3)	Net (m^3)
Total Earthwork within Site	17140	1846	2162	316 (Fill)
Within 10% AEP Floodplain	36	2	1	1 (Cut)
Within 1% AEP Floodplain	1243	125	493	368 (Fill)
Within 10m of Wetland	372	15	344	329 (Fill)

DRAWING NOTE: DRAWING SET TO BE DISTRIBUTED AND READ IN ITS ENTIRETY. REFER TO DRAWING C001 FOR DRAWING SCHEDULE. REFER TO DRAWING C002 FOR NOTES, LEGENDS, AND ABBREVIATIONS UNLESS OTHERWISE NOTED.

1:500 0 5 10 15 20 25 50

REV	DATE	AMENDMENTS	BY
0	12/06/25	FOR CONSENT	SS

DRAFTER: S SIVA
DESIGNER: S SIVA
CHECKER: J CHEN
DATE: 12/06/2025

JOB: CIVIL DESIGN - WAIMAMAKU PAPAKAINGA
CLIENT: TE ROROA WHATU ORA / MANAWHENUA TRUST
ADDRESS: 7229 STATE HIGHWAY 12, WAIMAMAKU, NORTHLAND
DRAWING: EARTHWORKS PLAN

DRAWING: C200 REV: 0
SCALE: 1:500 @ A1
PROJECT: 15833
ISSUE: CONSENT

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SECOND PROPOSED STABILISED CONSTRUCTION ENTRANCEWAY FROM STATE HIGHWAY 12 AS PER AUCKLAND COUNCIL GD05 FOR BRIDGE AND ACCESSWAY CONSTRUCTION.

PROPOSED RIP-RAP

PROPOSED SILT FENCE TO BE INSTALLED AS PER AUCKLAND COUNCIL GD05
MIN 600mm ABOVE GROUND
MIN 200mm BELOW GROUND
MAX 4m POST SPACING
(TYPICAL)

DECANTING EARTH BUND

TEMPORARY RIP-RAP

PROPOSED STABILISED CONSTRUCTION ENTRANCEWAY STATE HIGHWAY 12 AS PER AUCKLAND COUNCIL GD05. ACTUAL CONTROLS AND SEQUENCING OF INSTALLATION ARE TO BE THE RESPONSIBILITY OF THE CONTRACTOR.

PROPOSED RIP-RAP

EXISTING CULVERT

TEMPORARY CULVERT FOR CLEAN WATER DIVERSION

DECANTING EARTH BUND

DECANTING EARTH BUND

DIRTY WATER DIVERSION (TYPICAL)

EXISTING STORMWATER FLOW PATH FROM NEIGHBOUR SITE

EARTHWORK EXTENT (TYPICAL)

CLEAN WATER DIVERSION (TYPICAL)

CONSTRUCT ROAD SIDE SWALE AT THE BEGINNING OF THE CONSTRUCTION TO DIVERT DIRTY WATER

DIVERSION BUND (TYPICAL)

TEMPORARY CULVERT FOR CLEAN WATER DIVERSION

DECANTING EARTHBUND

EARTHWORK NOTES:

1. CUT TO FILL VOLUMES ARE FROM EXISTING GROUND INCLUDING TOP SOIL TO FINAL GROUND INCLUDING TOPSOIL, PAVEMENT.
2. NO BULKING FACTORS HAVE BEEN USED IN THE VOLUME ESTIMATION.
3. TEMPORARY EARTHWORKS, SHORING, AND ENABLING WORKS TO BE DESIGNED BY OTHERS AND ARE THE RESPONSIBILITY OF THE CONTRACTOR.
4. WORKS ARE TO BE IN ACCORDANCE WITH AUCKLAND COUNCIL GUIDANCE DOCUMENT 2016/05 (GD05), EROSION AND SEDIMENT CONTROL GUIDE.
5. PLANS DETAIL THE GENERAL SEDIMENT AND EROSION CONTROL MEASURES. ACTUAL CONTROLS ARE TO BE THE RESPONSIBILITY OF THE CONTRACTOR AND ARE TO BE ADAPTED TO SUIT THE CURRENT STAGE OF WORKS.

NOTE:

ACCESSWAY EARTHWORKS ARE TO BE COMPLETED TO FORM THE SUBBASE LEVEL, AND SWALES ARE TO BE CONSTRUCTED AT THE INITIAL STAGE OF CONSTRUCTION TO DIVERT AND CONVEY CLEAN WATER.

DRAWING NOTE: DRAWING SET TO BE DISTRIBUTED AND READ IN ITS ENTIRETY. REFER TO DRAWING C001 FOR DRAWING SCHEDULE. REFER TO DRAWING C002 FOR NOTES, LEGENDS, AND ABBREVIATIONS UNLESS OTHERWISE NOTED.

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DESIGNER: S SIVA
CHECKER: J CHEN
DATE: 12/06/2025

JOB: CIVIL DESIGN - WAIMAMAKU PAPAKAINGA
CLIENT: TE ROROA WHATU ORA / MANAWHENUA TRUST
ADDRESS: 7229 STATE HIGHWAY 12, WAIMAMAKU, NORTHLAND
DRAWING: EROSION AND SEDIMENT CONTROL PLAN

DRAWING: C210 REV: 0
SCALE: 1:500 @ A1
PROJECT: 15833
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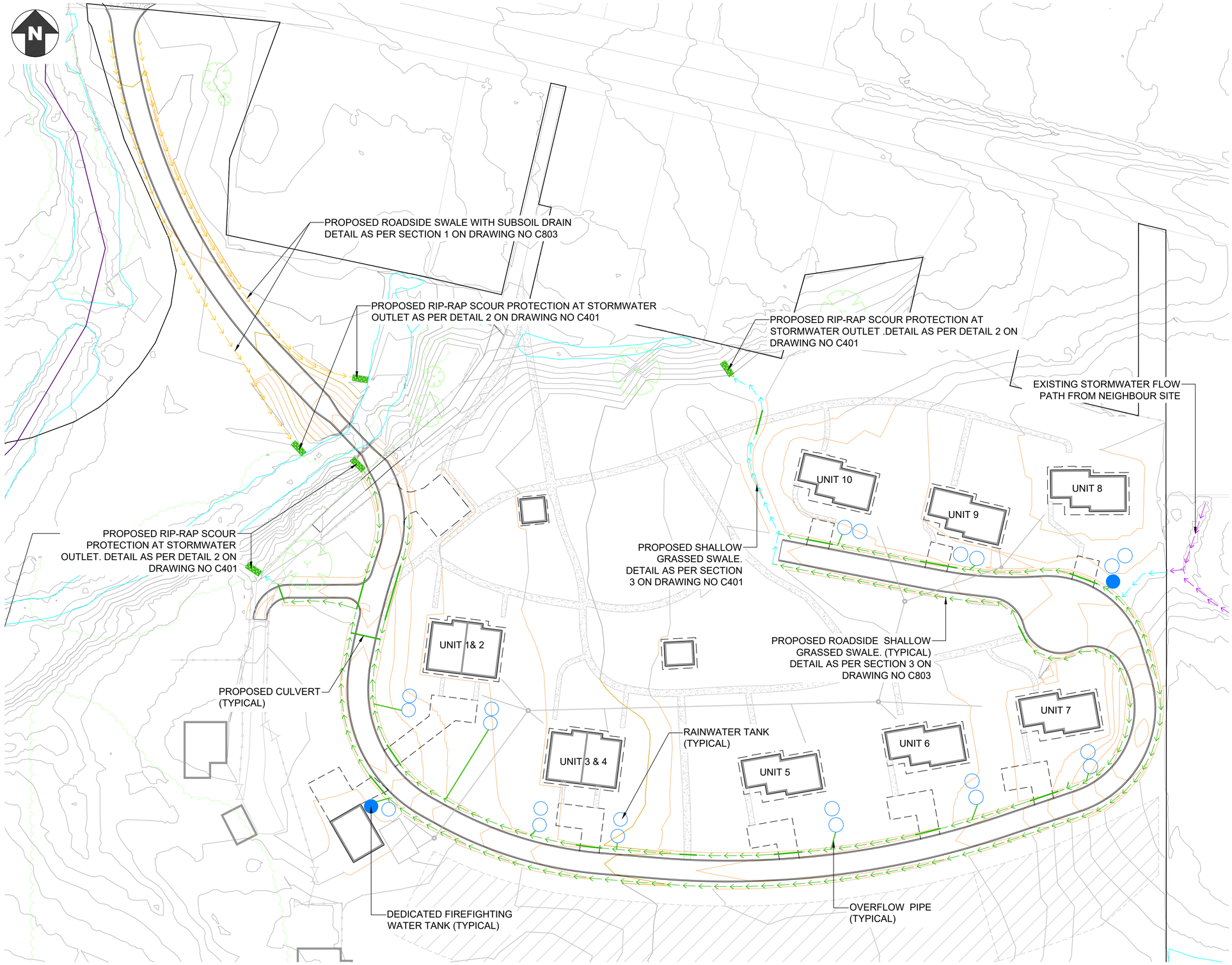

THREE WATER LEGEND:

- PROP ROAD SIDE SWALE
- PROP SHALLOW GRASS SWALE
- PROP SWALE WITH SUBSOIL PIPE
- EX/ PROP CULVERT
- PROP RIP-RAP
- PROP OVERFLOW PIPE

SITE LEGEND:

- EX MIN/MAJ CONTOURS
- PROP MIN/MAJ CONTOURS
- EX/PROP CONCRETE PAVE
- PROP PERMEABLE PAVE
- EX/PROP RETAINING
- EX/PROP SWCP

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DRAFTER: S SIVA
DESIGNER: S SIVA
CHECKER: J CHEN
DATE: 12/06/2025

JOB: CIVIL DESIGN - WAIMAMAKU PAPAKAINGA
CLIENT: TE ROROA WHATU ORA / MANAWHENUA TRUST
ADDRESS: 7229 STATE HIGHWAY 12, WAIMAMAKU, NORTHLAND
DRAWING: STORMWATER LAYOUT PLAN - PRIVATE

DRAWING: C400 REV: 0
SCALE: 1:500 @ A1
PROJECT: 15833
ISSUE: CONSENT

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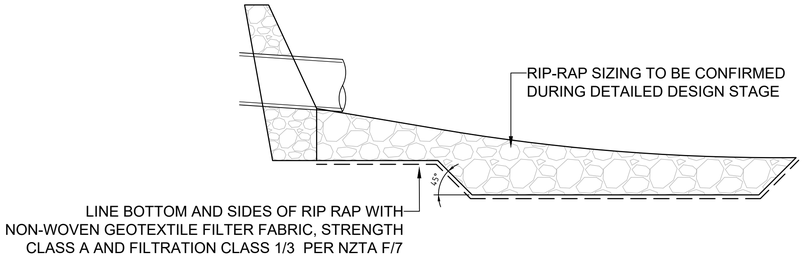
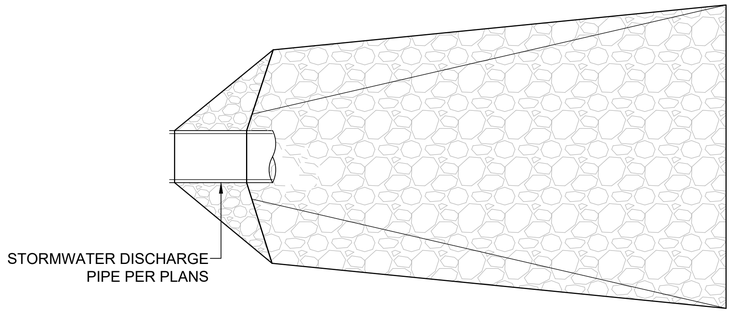
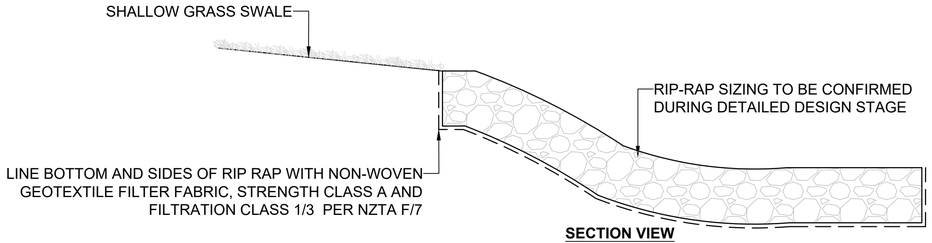


SECTION VIEW



PLAN VIEW

1 RIP-RAP DETAIL AT CULVERT OUTLET
SCALE: NTS



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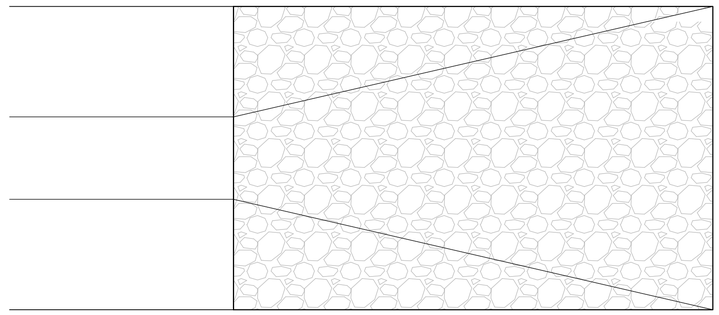
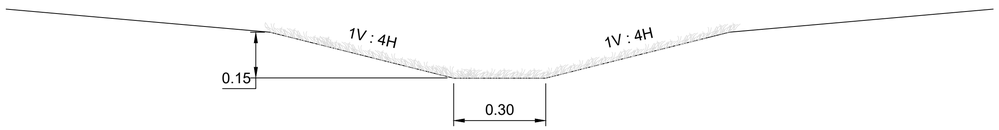


PLAN VIEW

2 RIP-RAP DETAIL AT SWALE OUTLET
SCALE: NTS



3 SHALLOW GRASSED SWALE DETAIL
SCALE: 1:10

NOTE:
RIP-RAP AND SWALE SIZE AND DETAILS TO BE CONFIRMED AT DETAILED DESIGN

DRAWING NOTE: DRAWING SET TO BE DISTRIBUTED AND READ IN ITS ENTIRETY. REFER TO DRAWING C001 FOR DRAWING SCHEDULE. REFER TO DRAWING C002 FOR NOTES, LEGENDS, AND ABBREVIATIONS UNLESS OTHERWISE NOTED.

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CHECKER:	J CHEN	ADDRESS:	7229 STATE HIGHWAY 12, WAIMAMAKU, NORTHLAND
DATE:	12/06/2025	DRAWING:	SWALE & STORMWATER OUTLET DETAILS

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SCALE:	NTS @ A1		
PROJECT:	15833		
ISSUE:	CONSENT		

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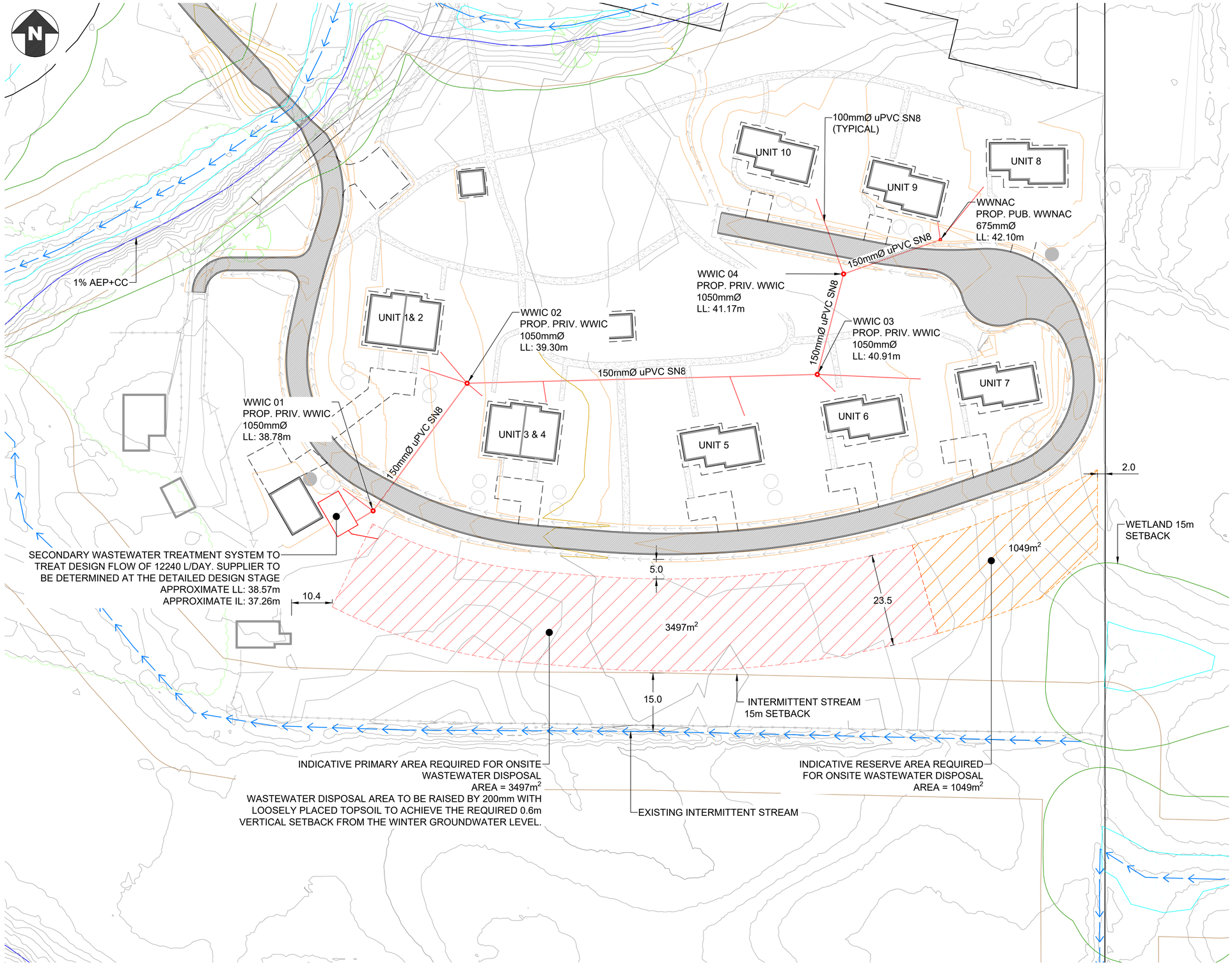

THREE WATER LEGEND:

- EX/PROP PRIV SW PIPE
- EX/PROP PRIV WW PIPE
- EX/PROP PUBLIC SW PIPE
- EX/PROP PUBLIC WW PIPE
- EX/PROP SWIC
- EX/PROP SWCP
- EX/PROP WWIC
- EX/PROP WS PIPE

SITE LEGEND:

- EX MIN/MAJ CONTOURS
- PROP MIN/MAJ CONTOURS
- EX/PROP CONCRETE PAVE
- PROP PERMEABLE PAVE
- EX/PROP RETAINING
- EX/PROP SWCP

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DESIGNER: S SIVA
CHECKER: J CHEN
DATE: 12/06/2025

JOB: CIVIL DESIGN - WAIMAMAKU PAPAKAINGA
CLIENT: TE ROROA WHATU ORA / MANAWHENUA TRUST
ADDRESS: 7229 STATE HIGHWAY 12, WAIMAMAKU, NORTHLAND
DRAWING: WASTEWATER LAYOUT PLAN - PRIVATE

DRAWING: C500 REV: 0
SCALE: 1:500 @ A1
PROJECT: 15833
ISSUE: CONSENT

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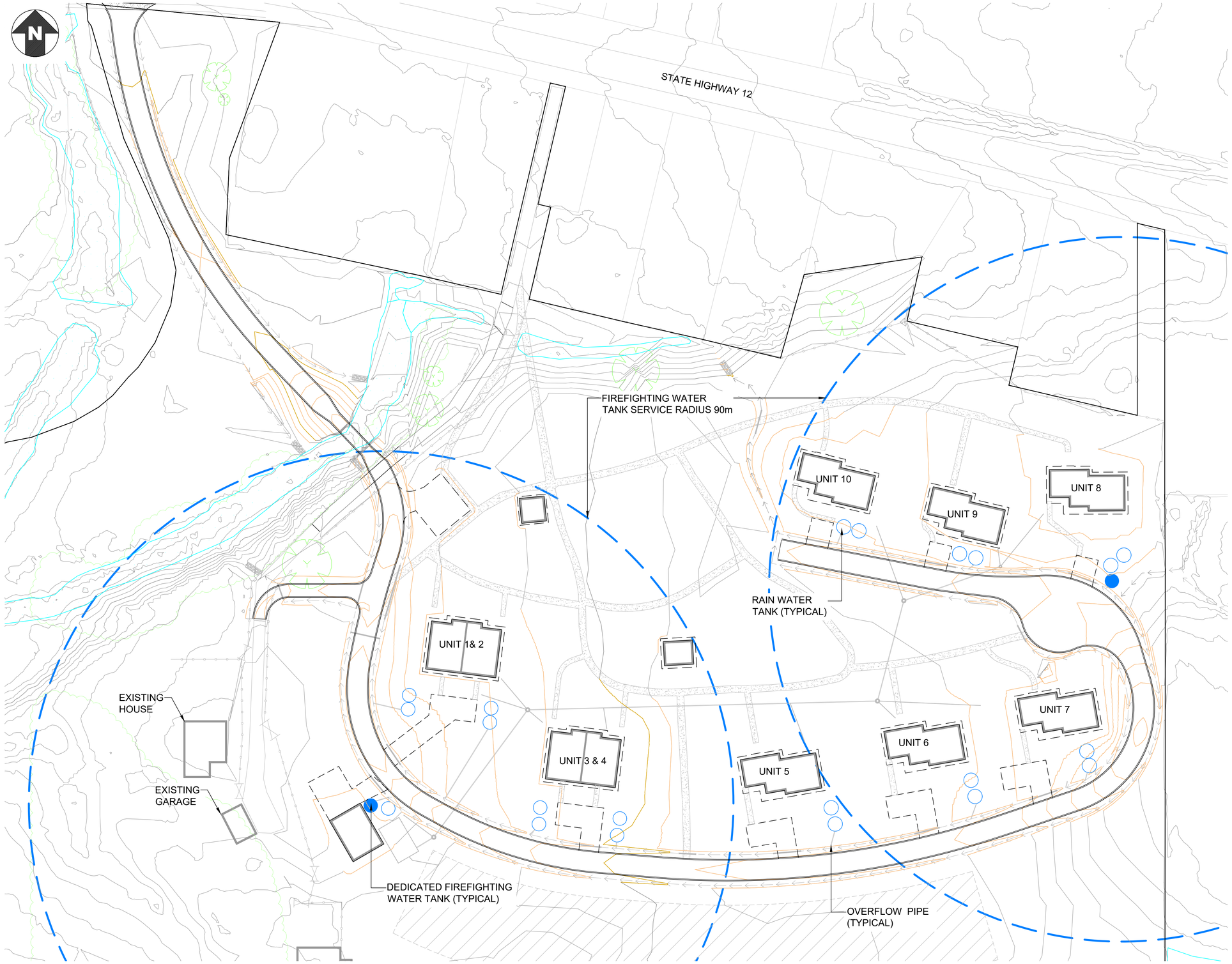

THREE WATER LEGEND:

- PROP WATER TANK
- PROP FIREFIGHTING WATER TANK
- FIREFIGHTING WATER TANK SERVICE RADIUS

SITE LEGEND:

- EX MIN/MAJ CONTOURS
- PROP MIN/MAJ CONTOURS
- EX/PROP CONCRETE PAVE
- PROP PERMEABLE PAVE
- EX/PROP RETAINING
- EX/PROP SWCP

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DRAFTER: S SIVA
DESIGNER: S SIVA
CHECKER: J CHEN
DATE: 12/06/2025

JOB: CIVIL DESIGN - WAIMAMAKU PAPAKAINGA
CLIENT: TE ROROA WHATU ORA / MANAWHENUA TRUST
ADDRESS: 7229 STATE HIGHWAY 12, WAIMAMAKU, NORTHLAND
DRAWING: WATER SUPPLY LAYOUT PLAN

DRAWING: C600 REV: 0
SCALE: 1:500 @ A1
PROJECT: 15833
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STATE HIGHWAY 12

CH 0

REFER DRAWING C802 FOR ROAD WIDENING DETAIL

STATE HIGHWAY 12

1 C803

CH 50

EXISTING ACCESSWAY TO BE CONVERTED TO PEDESTRIAN ACCESS

PROPOSED STONE MATTRESS OR RIP-RAP ROCKS SLOPE PROTECTION

CH 100

PROPOSED 3m WIDE ONE-LANE BRIDGE. FINAL BRIDGE DESIGN TO BE CONFIRMED DURING DETAILED DESIGN. PROVIDE ROAD MARKINGS IN ACCORDANCE WITH MANUAL OF TRAFFIC SIGNS AND MARKINGS (MOTSAM) SECTION 4.05 ONE-LANE BRIDGES.

2 C803

3.0

UNIT 10

UNIT 8

CH 549

UNIT 9

CH 500

CH 150

3 C803

R9.5

CH 450

EXISTING ACCESSWAY TO REMAIN

UNIT 1& 2

EXISTING HOUSE

CH 200

UNIT 7

UNIT 6

UNIT 3 & 4

UNIT 5

EXISTING GARAGE

5.0

CH 400

3 C803

CH 250

CH 300

CH 350

THREE WATER LEGEND:

- PROP ROAD SIDE SWALE
- PROP SHALLOW GRASS SWALE
- PROP SWALE WITH SUBSOIL PIPE
- EX/ PROP CULVERT
- PROP RIP-RAP
- PROP OVERFLOW PIPE

SITE LEGEND:

- EX MIN/MAJ CONTOURS X.X / X.X
- PROP MIN/MAJ CONTOURS X.X / X.X
- EX/PROP CONCRETE PAVE
- PROP PERMEABLE PAVE
- EX/PROP RETAINING /
- EX/PROP SWCP /

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DESIGNER: S SIVA
CHECKER: J CHEN
DATE: 12/06/2025

JOB: CIVIL DESIGN - WAIMAMAKU PAPAKAINGA
CLIENT: TE ROROA WHATU ORA / MANAWHENUA TRUST
ADDRESS: 7229 STATE HIGHWAY 12, WAIMAMAKU, NORTHLAND
DRAWING: COMMON ACCESS WAY PLAN

DRAWING: C800 REV: 0
SCALE: 1:500 @ A1
PROJECT: 15833
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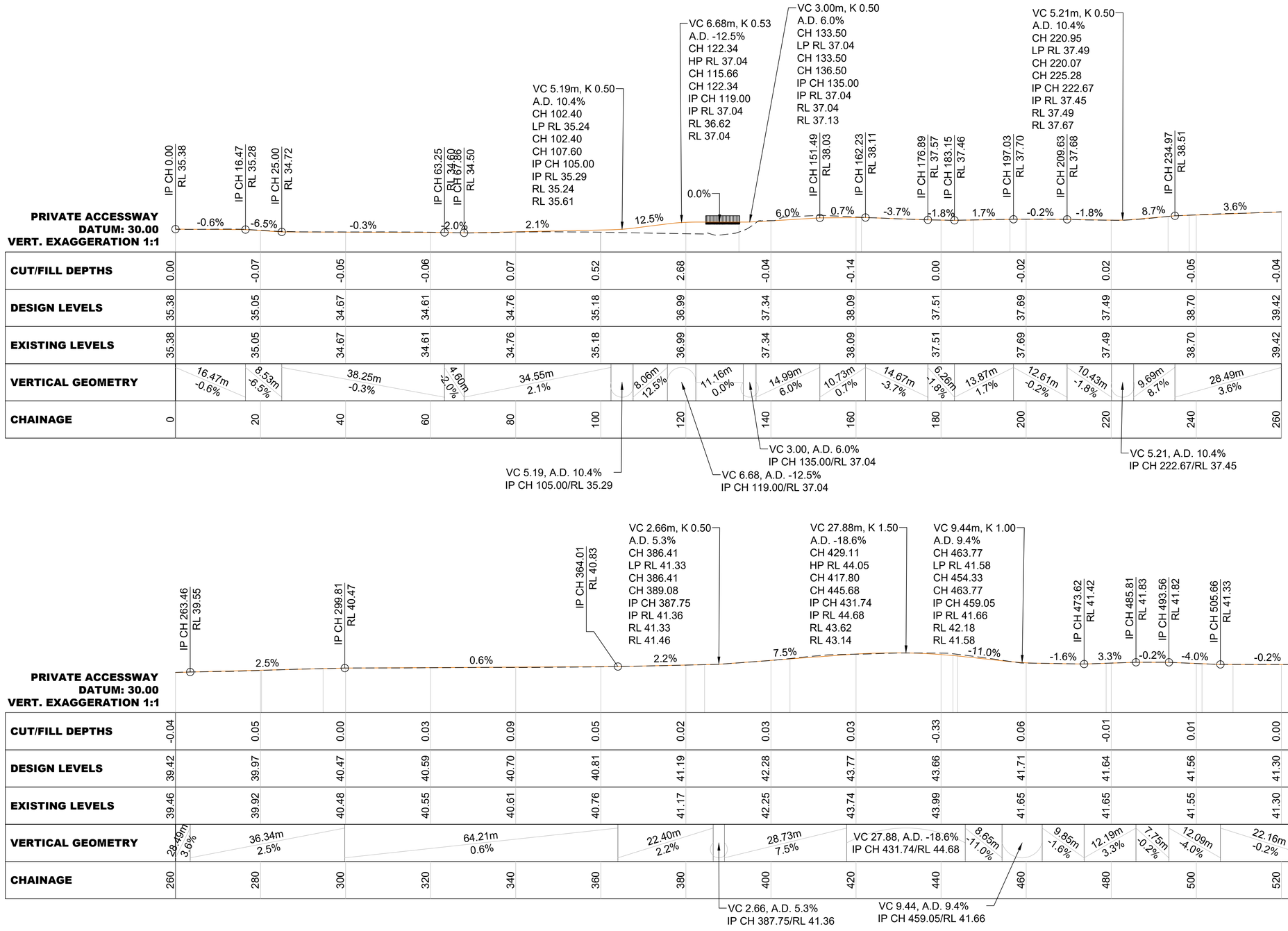

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DESIGNER: S SIVA
CHECKER: J CHEN
DATE: 12/06/2025

JOB: CIVIL DESIGN - WAIMAMAKU PAPAKAINGA
CLIENT: TE ROROA WHATU ORA / MANAWHENUA TRUST
ADDRESS: 7229 STATE HIGHWAY 12, WAIMAMAKU, NORTHLAND
DRAWING: COMMON ACCESSWAY LONG SECTION

DRAWING: C801 REV: 0
SCALE: 1:500 @ A1
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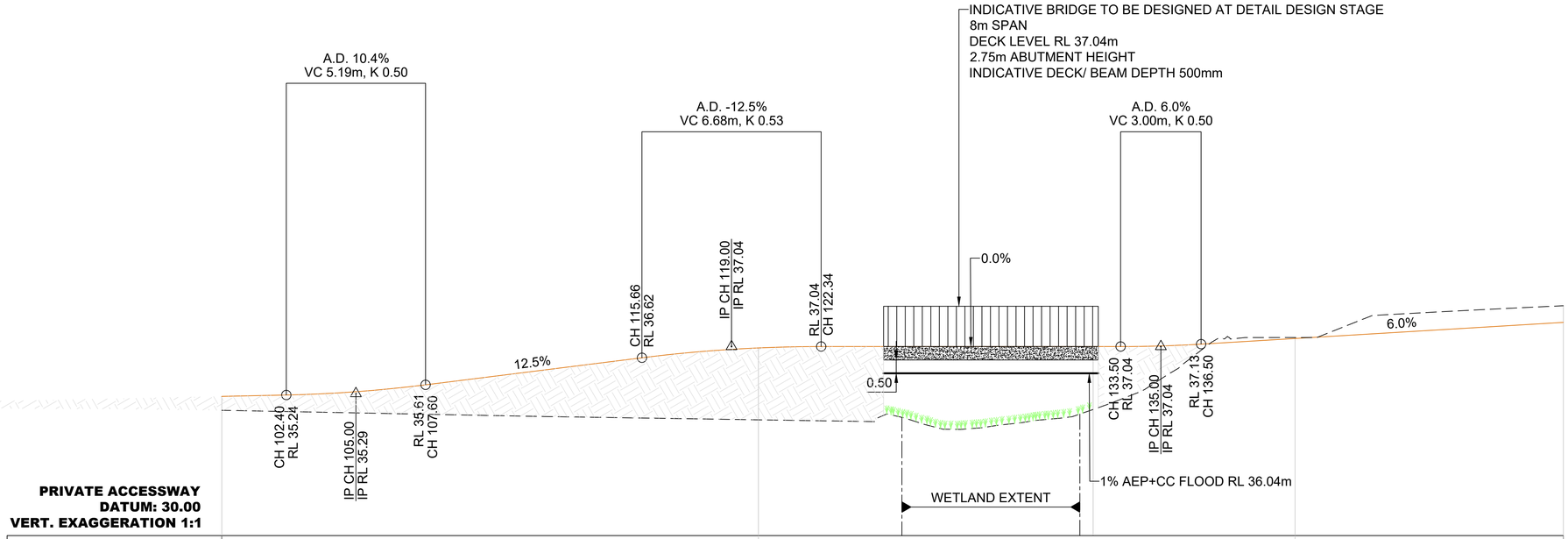
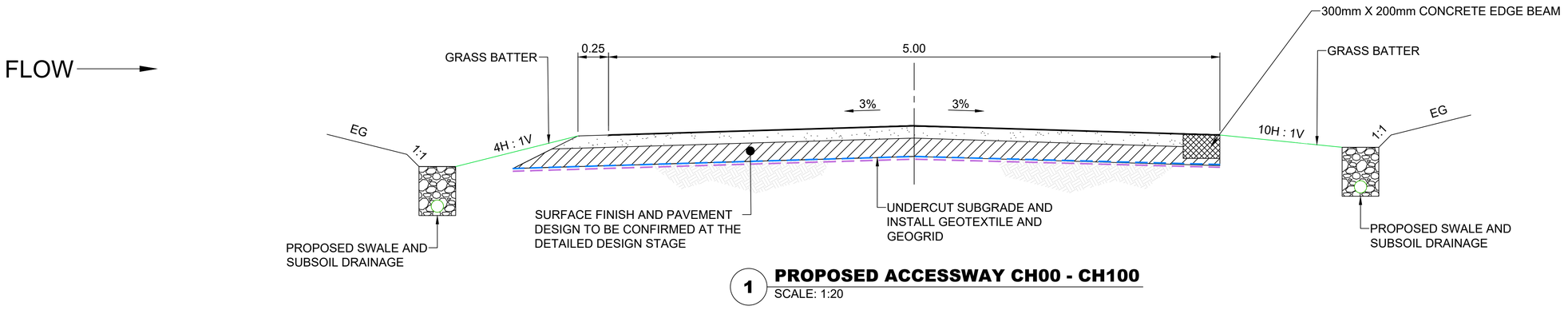
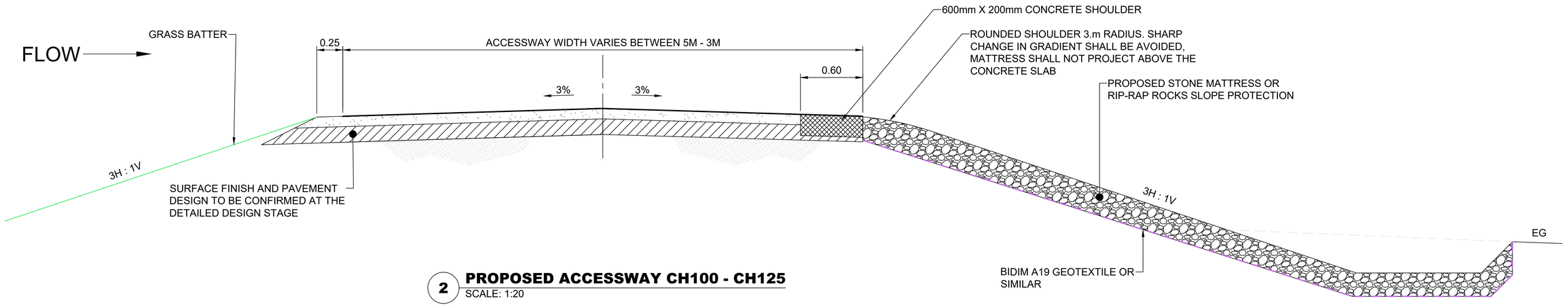

INDICATIVE BRIDGE TO BE DESIGNED AT DETAIL DESIGN STAGE
8m SPAN
DECK LEVEL RL 37.04m
2.75m ABUTMENT HEIGHT
INDICATIVE DECK/ BEAM DEPTH 500mm
A.D. 10.4%
VC 5.19m, K 0.50
A.D. -12.5%
VC 6.68m, K 0.53
A.D. 6.0%
VC 3.00m, K 0.50
0.0%
12.5%
6.0%
0.50
CH 102.40
RL 35.24
IP CH 105.00
IP RL 35.29
RL 35.51
CH 107.60
CH 115.66
RL 36.62
IP CH 119.00
IP RL 37.04
RL 37.04
CH 122.34
CH 133.50
RL 37.04
IP CH 135.00
IP RL 37.04
RL 37.13
CH 136.50
1% AEP+CC FLOOD RL 36.04m
WETLAND EXTENT
PRIVATE ACCESSWAY
DATUM: 30.00
VERT. EXAGGERATION 1:1

| | | |



1 PROPOSED ACCESSWAY CH00 - CH100
SCALE: 1:20



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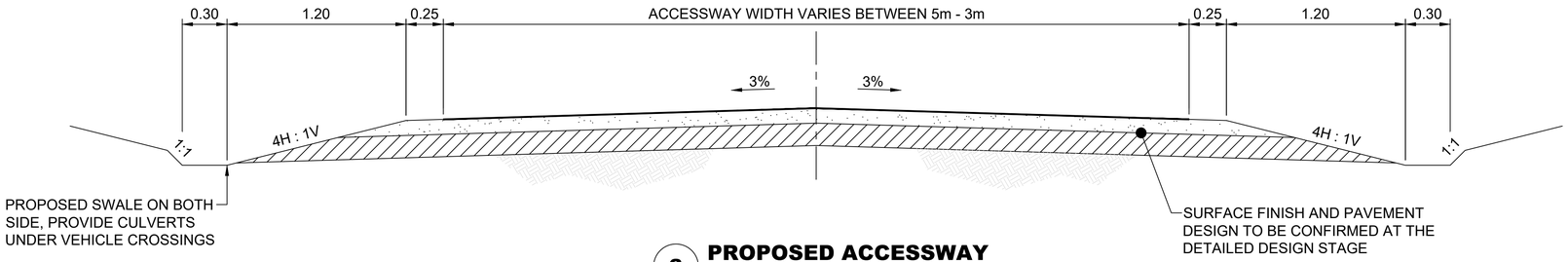

3 PROPOSED ACCESSWAY
SCALE: 1:20

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REV	DATE	AMENDMENTS	BY
0	12/06/25	FOR CONSENT	SS

DRAFTER: S SIVA
DESIGNER: S SIVA
CHECKER: J CHEN
DATE: 12/06/2025

JOB: CIVIL DESIGN - WAIMAMAKU PAPAKAINGA
CLIENT: TE ROROA WHATU ORA / MANAWHENUA TRUST
ADDRESS: 7229 STATE HIGHWAY 12, WAIMAMAKU, NORTHLAND
DRAWING: COMMON ACCESSWAY DETAILS

DRAWING: C803 REV: 0
SCALE: 1:20 @ A1
PROJECT: 15833
ISSUE: CONSENT

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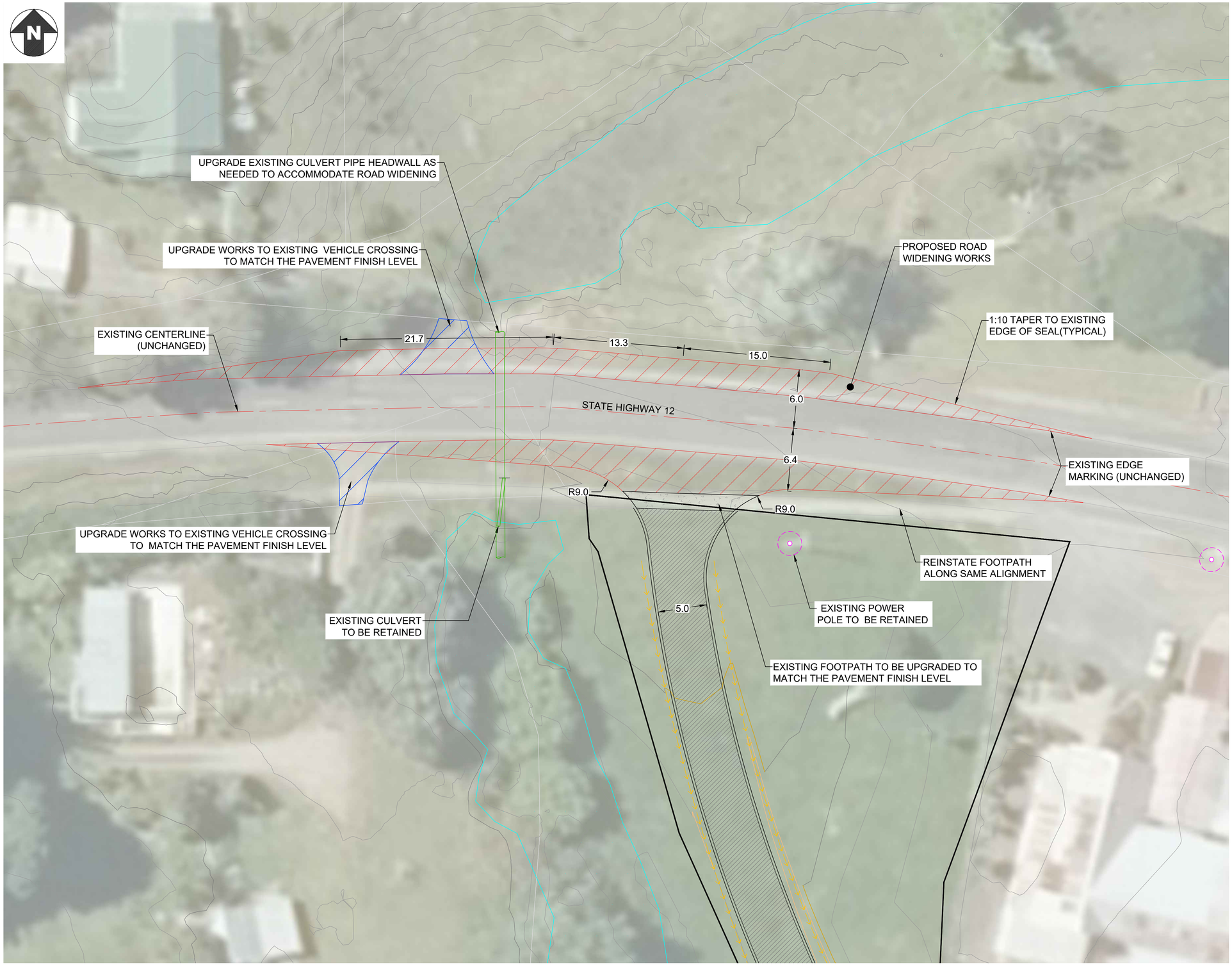

THREE WATER LEGEND:

- PROP ROAD SIDE SWALE
- PROP SHALLOW GRASS SWALE
- PROP SWALE WITH SUBSOIL PIPE
- EX/ PROP CULVERT
- PROP RIP-RAP
- PROP OVERFLOW PIPE

SITE LEGEND:

- EX MIN/MAJ CONTOURS
- PROP MIN/MAJ CONTOURS
- EX/PROP CONCRETE PAVE
- PROP PERMEABLE PAVE
- EX/PROP RETAINING
- EX/PROP SWCP

NOTES:

SHOWN DESIGN DRAWING INDICATIVE TO ILLUSTRATE EXTENT OF WORK REQUIRED. FINAL WORKS TO BE CONFIRMED AT THE DETAILED DESIGN STAGE SUBJECT TO ADDITIONAL SITE TOPOGRAPHIC SURVEY.

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REV	DATE	AMENDMENTS	BY
0	12/06/25	FOR CONSENT	SS

DRAFTER: S SIVA
DESIGNER: S SIVA
CHECKER: J CHEN
DATE: 12/06/2025

JOB: CIVIL DESIGN - WAIMAMAKU PAPAKAINGA
CLIENT: TE ROROA WHATU ORA / MANAWHENUA TRUST
ADDRESS: 7229 STATE HIGHWAY 12, WAIMAMAKU, NORTHLAND
DRAWING: ROAD WIDENING DETAIL (DIAGRAM D)

DRAWING: C804 REV: 0
SCALE: 1:200 @ A1
PROJECT: 15833
ISSUE: CONSENT

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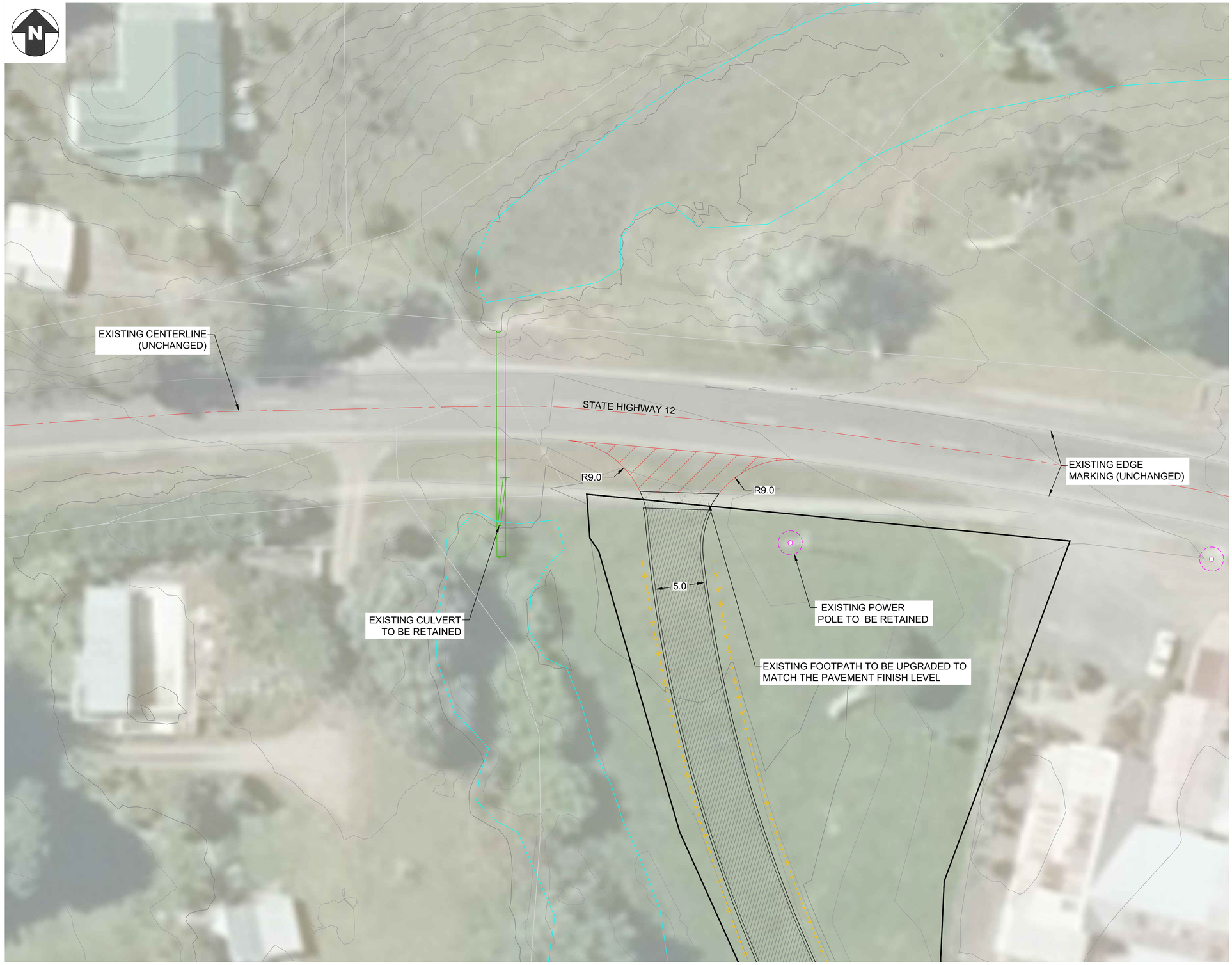

THREE WATER LEGEND:

- PROP ROAD SIDE SWALE
- PROP SHALLOW GRASS SWALE
- PROP SWALE WITH SUBSOIL PIPE
- EX/ PROP CULVERT
- PROP RIP-RAP
- PROP OVERFLOW PIPE

SITE LEGEND:

- EX MIN/MAJ CONTOURS
- PROP MIN/MAJ CONTOURS
- EX/PROP CONCRETE PAVE
- PROP PERMEABLE PAVE
- EX/PROP RETAINING
- EX/PROP SWCP

NOTES:

SHOWN DESIGN DRAWING INDICATIVE TO ILLUSTRATE EXTENT OF WORK REQUIRED. FINAL WORKS TO BE CONFIRMED AT THE DETAILED DESIGN STAGE SUBJECT TO ADDITIONAL SITE TOPOGRAPHIC SURVEY.

DRAWING NOTE: DRAWING SET TO BE DISTRIBUTED AND READ IN ITS ENTIRETY. REFER TO DRAWING C001 FOR DRAWING SCHEDULE. REFER TO DRAWING C002 FOR NOTES, LEGENDS, AND ABBREVIATIONS UNLESS OTHERWISE NOTED.

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REV	DATE	AMENDMENTS	BY
0	12/06/25	FOR CONSENT	SS

DRAFTER: S SIVA
DESIGNER: S SIVA
CHECKER: J CHEN
DATE: 12/06/2025

JOB: CIVIL DESIGN - WAIMAMAKU PAPAKAINGA
CLIENT: TE ROROA WHATU ORA / MANAWHENUA TRUST
ADDRESS: 7229 STATE HIGHWAY 12, WAIMAMAKU, NORTHLAND
DRAWING: ROAD WIDENING DETAIL (DIAGRAM C)

DRAWING: C805 REV: 0
SCALE: 1:200 @ A1
PROJECT: 15833
ISSUE: CONSENT

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DRAWING SET TO A1 DIMENSIONS AND CONTAINS ELEMENTS PLOTTED IN COLOUR

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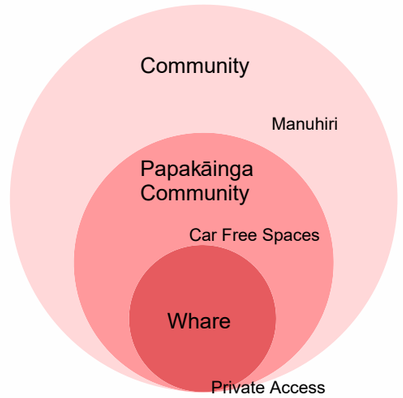
1 SITE STRATEGY PLAN

1 : 2500 @ A3

LEGEND

- Environmental Reserve
- Agriculture / Horticulture
- Papakāinga Kai Production
- Residential - Community
- Residential - Papakāinga Community
- Residential - Whare

PRIVACY GRADIENT



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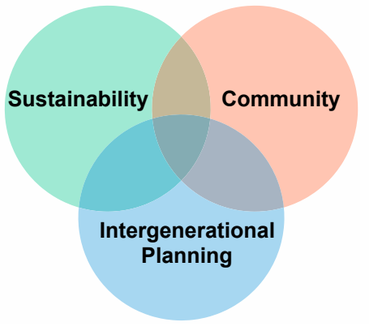

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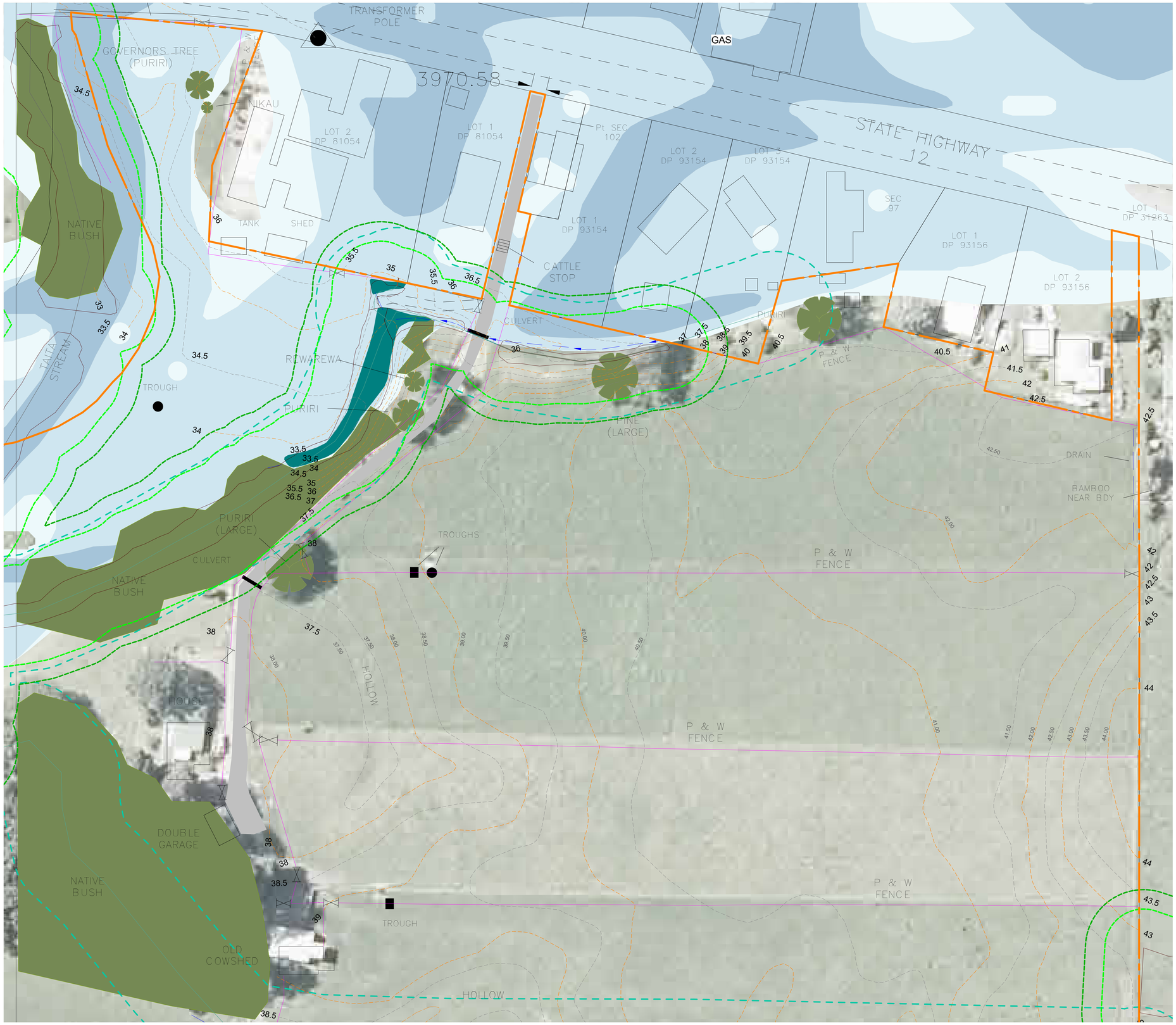

1 EXISTING SITE PLAN
1 : 500 @ A1

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SITE INFO

ADDRESS:	7229 STATE HIGHWAY 12, WAIMAMAKU, NORTHLAND
LEGAL DESCRIPTION:	Part Section 102 Block IX Waoku SD
ENVIROMENT AREA:	Rural Zone
OVERLAYS:	COASTAL LIVING
WIND ZONE:	High
CORROSION ZONE:	D
EARTHQUAKE ZONE:	1
CLIMATE ZONE:	1
RAINFALL RANGE:	
SITE AREA:	16.063 ha, 160,630m²

BUILDING COVERAGE

EXISTING MAIN DWELLING:	146.2m²
EXISTING STRUCTURES:	
Carport	52.8m²
Old Cowshed	88.1m²
TOTAL EXISTING FLOOR AREA	**287.1 m²**
PROPOSED DWELLING:	
4 x 3 bedroom	115m²
6 x 5 bedroom	167m²
TOTAL PROPOSED FLOOR AREA	**1295**m²
TOTAL BUILDINGS FLOOR AREA:	**1582.1m²**
IMPERMEABLE SURFACE:	
EXISTING:	718.2m²
PROPOSED:	7,607.7m²
TOTAL IMPERMEABLE	8,325.9m²
MAX BUILDING HEIGHT:	12m
MAX BUILDING COVERAGE	12.5%
PROPOSED BUILDING COVERAGE	0.80% COMPLIES
MAX IMPERMEABLE SURFACE	15%
MIN SETBACK FROM BOUNDARIES:	10m
MIN SETBACK FROM RIVERS:	30m

INFRASTRUCTURE:

WASTWATER TREATMENT
WATER SUPPLY
POWER SUPPLY

***papakāinga housing provisions require that each residential unit has at least 3,000m2 land area surrounding the unit for its exclusive use; provided that there is an additional 1.8ha of land elsewhere on the pplication site, in addition to the 3,000m2 surrounding the unit; i.e., a total land area of 2.1ha of land is required to be associated with each residential unit.*

LEGEND

- Property Boundary
- Contour lines at 0.5M Intervals
- Contour lines at 1.0M Intervals
- Flood Zone - 100 Year Extent
- Flood Zone - 50 Year Extent
- Flood Zone - 10 Year Extent
- Existing gate
- Existing fence
- Existing dwelling
- Existing Tree / Existing Native Bush
- Existing impervious
- 10m wetland setback
- 15m wetland setback
- 15m stream setback

NORTH | 19.06.2025 | SCALE @A1 | 1 : 500 | EXISTING SITE PLAN | **TE ROROA PAPAKĀINGA** | **A102**

SITE INFO

ADDRESS:	7229 STATE HIGHWAY 12, WAIMAMAKU, NORTHLAND
LEGAL DESCRIPTION:	Part Section 102 Block IX Waoku SD
ENVIROMENT AREA:	Rural Zone
OVERLAYS:	COASTAL LIVING
WIND ZONE:	High
CORROSION ZONE:	D
EARTHQUAKE ZONE:	1
CLIMATE ZONE:	1
RAINFALL RANGE:	
SITE AREA:	16.063 ha, 160,630m²

BUILDING COVERAGE

EXISTING MAIN DWELLING:	146.2m²
EXISTING STRUCTURES:	
Carport	52.8m²
Old Cowshed	88.1m²
TOTAL EXISTING FLOOR AREA	**287.1 m²**
PROPOSED DWELLING:	
4 x 3 bedroom	115m²
6 x 5 bedroom	167m²
TOTAL PROPOSED FLOOR AREA	**1295**m²
TOTAL BUILDINGS FLOOR AREA:	**1582.1m²**
IMPERMEABLE SURFACE:	
EXISTING:	718.2m²
PROPOSED:	7,607.7m²
TOTAL IMPERMEABLE	8,325.9m²
MAX BUILDING HEIGHT:	12m
MAX BUILDING COVERAGE	12.5%
PROPOSED BUILDING COVERAGE	0.80% COMPLIES
MAX IMPERMEABLE SURFACE	15%
MIN SETBACK FROM BOUNDARIES:	10m
MIN SETBACK FROM RIVERS:	30m

INFRASTRUCTURE:

WASTWATER TREATMENT
WATER SUPPLY
POWER SUPPLY

***papakāinga housing provisions require that each residential unit has at least 3,000m2 land area surrounding the unit for its exclusive use; provided that there is an additional 1.8ha of land elsewhere on the pplication site, in addition to the 3,000m2 surrounding the unit; i.e., a total land area of 2.1ha of land is required to be associated with each residential unit.*

LEGEND

- Property Boundary
- Contour lines at 0.5M Intervals
- Contour lines at 1.0M Intervals
- Existing gate
- Existing fence
- Proposed fence
- Proposed concrete pedestrian path: Main path - 1.8m wide Private path - 1.2m wide
- Private path - pavers or loose chips
- Existing dwelling
- Proposed dwelling
- Proposed deck / pergola
- Proposed auxillery / communal building
- Grass / open green area / private green area
- Hedging / screening plants
- Proposed māra kai
- Proposed solar panels
- Demolished path
- Rainwater collection tank
- Dedicated Firefighting Water Tank
- Existing impervious
- Proposed impervious
- Proposed dripfield location with planting
- Proposed Landscaping
- Proposed Raranga
- Proposed Rongoā
- Proposed Trees
- Existing Tree / Existing Native Bush
- Proposed native bush
- Clothes line
- Refuse Station
- Rubbish/recycling bin
- Compost

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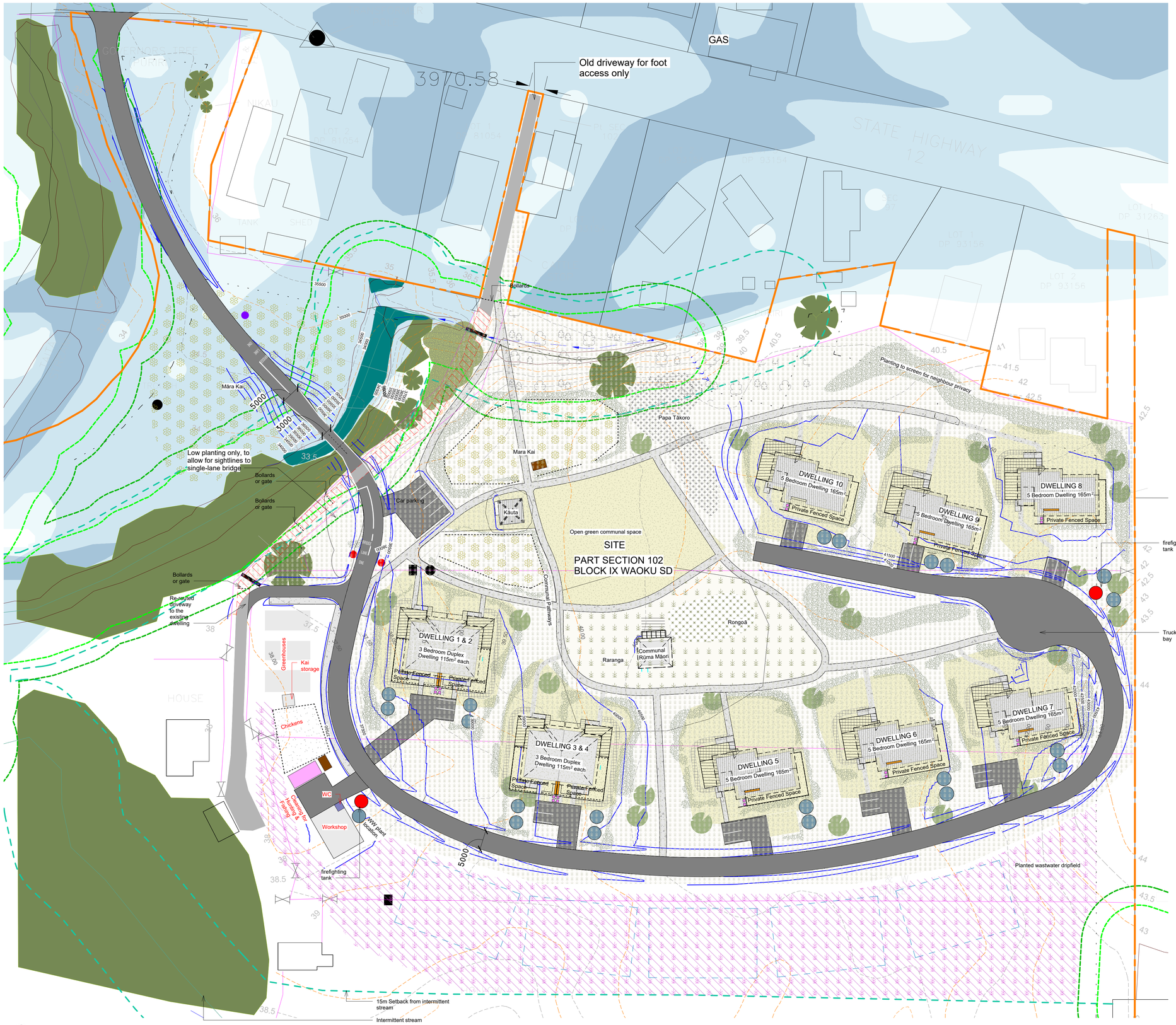
NORTH | 19.06.2025 | SCALE @A1 | 1 : 500 | PROPOSED SITE PLAN

TE ROROA PAPAKĀINGA

A103



1 PROPOSED SITE PLAN - PLANNING (OPTION 2)
1 : 500 @ A1

SITE INFO

ADDRESS:	7229 STATE HIGHWAY 12, WAIMAMAKU, NORTHLAND
LEGAL DESCRIPTION:	Part Section 102 Block IX Waoku SD
ENVIROMENT AREA:	Rural Zone
OVERLAYS:	COASTAL LIVING
WIND ZONE:	High
CORROSION ZONE:	D
EARTHQUAKE ZONE:	1
CLIMATE ZONE:	1
RAINFALL RANGE:	
SITE AREA:	16.063 ha, 160,630m²

BUILDING COVERAGE

EXISTING MAIN DWELLING:	146.2m²
EXISTING STRUCTURES:	
Carport	52.8m²
Old Cowshed	88.1m²
TOTAL EXISTING FLOOR AREA	**287.1 m²**
PROPOSED DWELLING:	
4 x 3 bedroom	115m²
6 x 5 bedroom	167m²
TOTAL PROPOSED FLOOR AREA	**1295m²**
TOTAL BUILDINGS FLOOR AREA:	**1582.1m²**

IMPERMEABLE SURFACE:

EXISTING:	718.2m²
PROPOSED:	7,607.7m²
TOTAL IMPERMEABLE	8,325.9m²
MAX BUILDING HEIGHT:	12m
MAX BUILDING COVERAGE	12.5%
PROPOSED BUILDING COVERAGE	0.80% COMPLIES
MAX IMPERMEABLE SURFACE	15%
MIN SETBACK FROM BOUNDARIES:	10m
MIN SETBACK FROM RIVERS:	30m

INFRASTRUCTURE:

WASTWATER TREATMENT
WATER SUPPLY
POWER SUPPLY

***papakāinga housing provisions require that each residential unit has at least 3,000m2 land area surrounding the unit for its exclusive use; provided that there is an additional 1.8ha of land elsewhere on the pplication site, in addition to the 3,000m2 surrounding the unit; i.e., a total land area of 2.1ha of land is required to be associated with each residential unit.*

LEGEND

- Property Boundary
- Existing contour lines at 0.5M Intervals
- Existing contour lines at 1.0M Intervals
- Proposed contour lines at 0.5M Intervals
- Flood Zone - 100 Year Extent
- Flood Zone - 50 Year Extent
- Flood Zone - 10 Year Extent
- Existing gate
- Existing fence
- Proposed fence
- Proposed concrete pedestrian path: Main path - 1.8m wide Private path - 1.2m wide
- Private path - pavers or loose chips
- Existing dwelling
- Proposed dwelling
- Proposed deck / pergola
- Proposed auxillery / communal building
- Grass / open green area / private green area
- Hedging / screening plants
- Proposed māra kai
- Proposed solar panels
- Demolished path
- Rainwater collection tank
- Dedicated Firefighting Water Tank
- Existing impervious
- Proposed impervious
- Proposed dripfield location with planting
- Proposed Landscaping
- Proposed Raranga
- Proposed Rongoā
- Proposed Trees
- Existing Tree / Existing Native Bush
- Proposed native bush
- Clothes line
- Refuse Station
- Rubbish/recycling bin
- Compost
- 10m Wetland Setback
- 15m wetland setback
- 15m stream setback
- Driveway sign - give way
- Driveway sign - right of way

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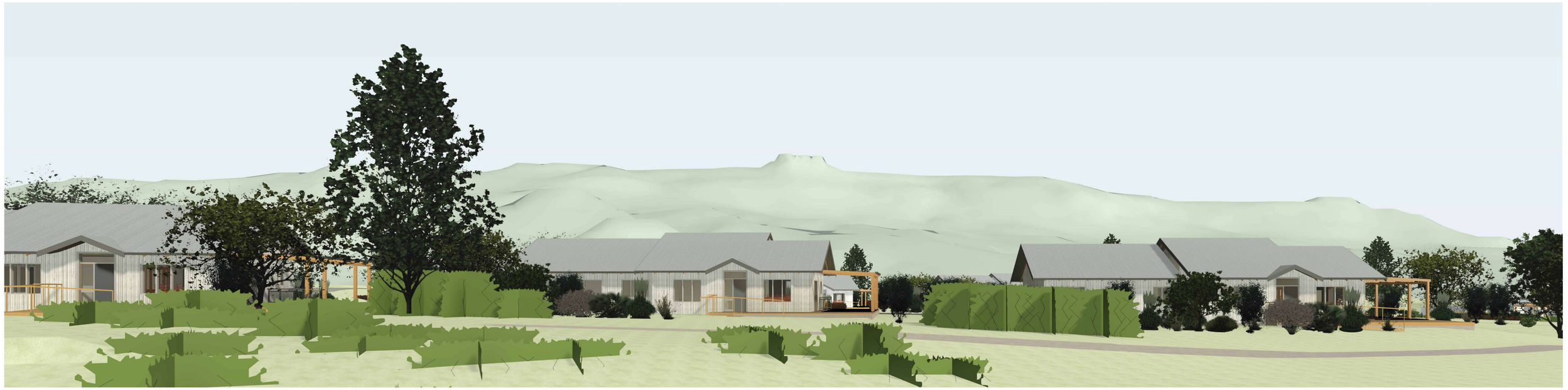
NORTH | 19.06.2025 | SCALE @A1 | 1 : 500 | PROPOSED SITE PLAN - PLANNING | **TE ROROA PAPAKĀINGA** | **A104**

1 PERSPECTIVE VIEW FROM CARPARK



2 PERSPECTIVE VIEW OF 5 BEDROOM DWELLINGS FROM NORTHERN NEIGHBOURING BUILDINGS

1 PERSPECTIVE VIEW OF COMMUNAL ROOM & 5 BEDROOM DWELLINGS

2 PERSPECTIVE VIEW OF 3 BEDROOM DUPLEX FROM DRIVEWAY

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DRAFT
WORK IN PROGRESS
FOR INFORMATION ONLY
29/07/2025 3:12:04 pm

SHEET LIST A3

Sheet No.	Sheet Name	Current Revision
A000a1	COVER PAGE A1	
A000a3	COVER PAGE A3	
A110	DUPLEX GROUND FLOOR PLAN	
A200	DUPLEX ELEVATION	
A201	DUPLEX ELEVATION	
A210	DUPLEX SECTION	
SK001	DUPLEX EXTERIOR PERSPECTIVES	

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TE KĀINGA ROA PAPAKĀINGA
DUPLEX TYPOLOGY

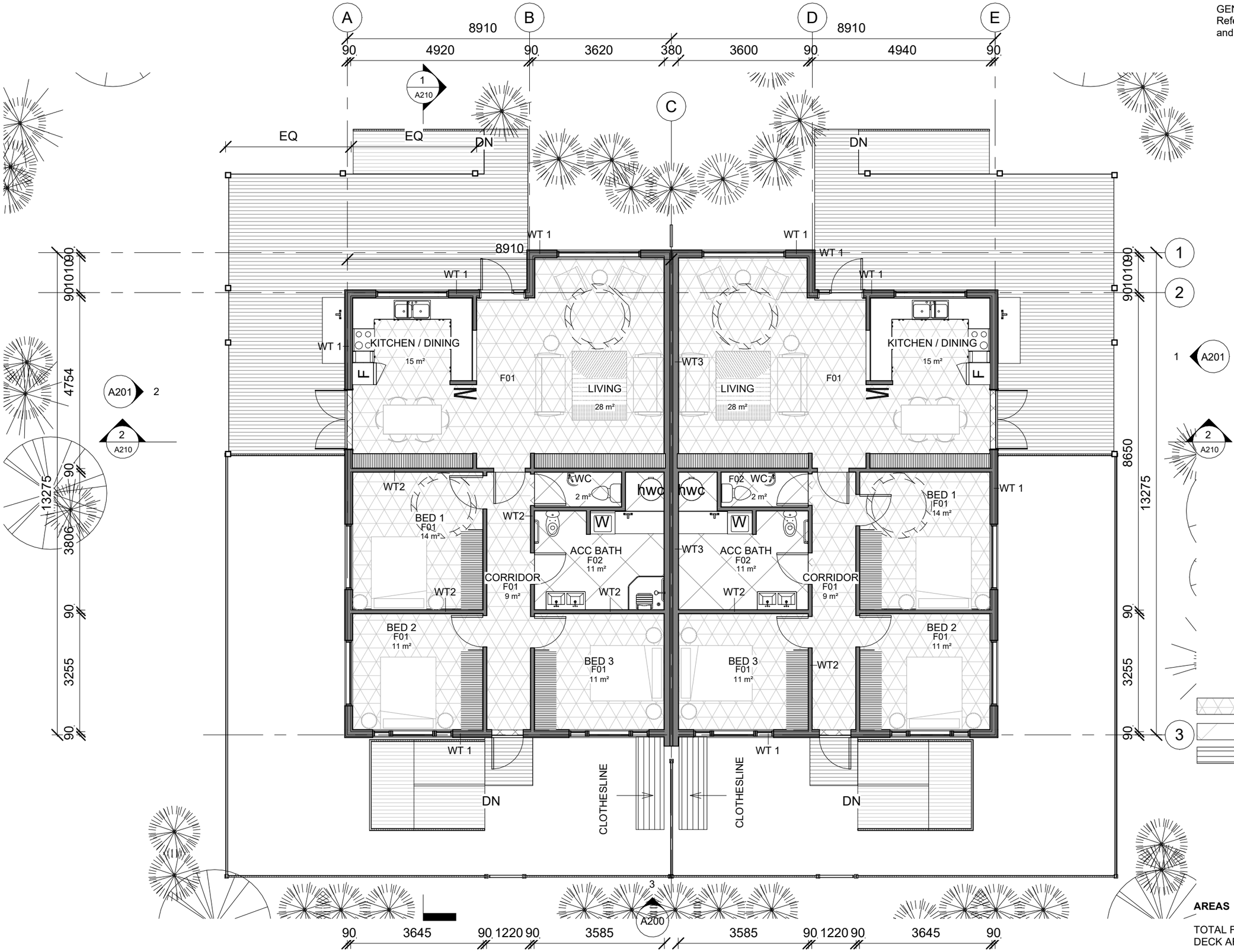
PRELIMINARY DESIGN

MA 0102

17.06.2025

REV

GENERAL NOTE:
Refer to Outline Specification for full list of products and materials.



WALL TYPE SCHEDULE

WT2	STRUCTURE 90mm timber framing, 2.7 stud LINING Allow for 10mm GIB. Level 4 Plaster and paint finish, timber trims. GIB Aqualine and to all wet areas w level 5 plaster and gloss paint finish.
WT3	GIB Intertenancy system: GBTLAB 60d with GIB Barrierline.
WT 1	STRUCTURE 90mm Timber framing, 2.7 stud. CLADDING Macrocarpa board and Batten (Standard heart clears) on 45mm Structural cavity batten, on proclima building wrap https://www.macdirect.co.nz Internal vapour barrier, 45mm insulated timber service cavity with GIB lining

FLOOR FINISHES LEGEND

F01	Marmoleum linoleum. Low VOC adheisive
F02	Tarkett Primo Safe Non Slip Vinyl Finish, on low VOC adhesive
F03	New Timber decking: LMA repurposed australian hardwood Spotted Gum or similar 140 x 19mm thick watershed decking. https://lmatimber.co.nz/ (reclaimed Australian hardwood)

AREAS

TOTAL FLOOR AREA:	112M²
DECK AREA:	40M²

REVISION

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PROJECT
TE KĀINGA ROA PAPAKĀINGA DUPLEX TYPOLOGY

CLIENT
TE ROROA DEVELOPMENT CHARITABLE TRUST

PRELIMINARY DESIGN

DRAWING TITLE
DUPLEX GROUND FLOOR PLAN

PROJECT NORTH

DATE	17.06.2025
DRAWN BY	MA
CHECKED BY	MA
SCALE @A3	1 : 100

PROJECT NO.
MA 0102

DRAWING NO.
A110

REV

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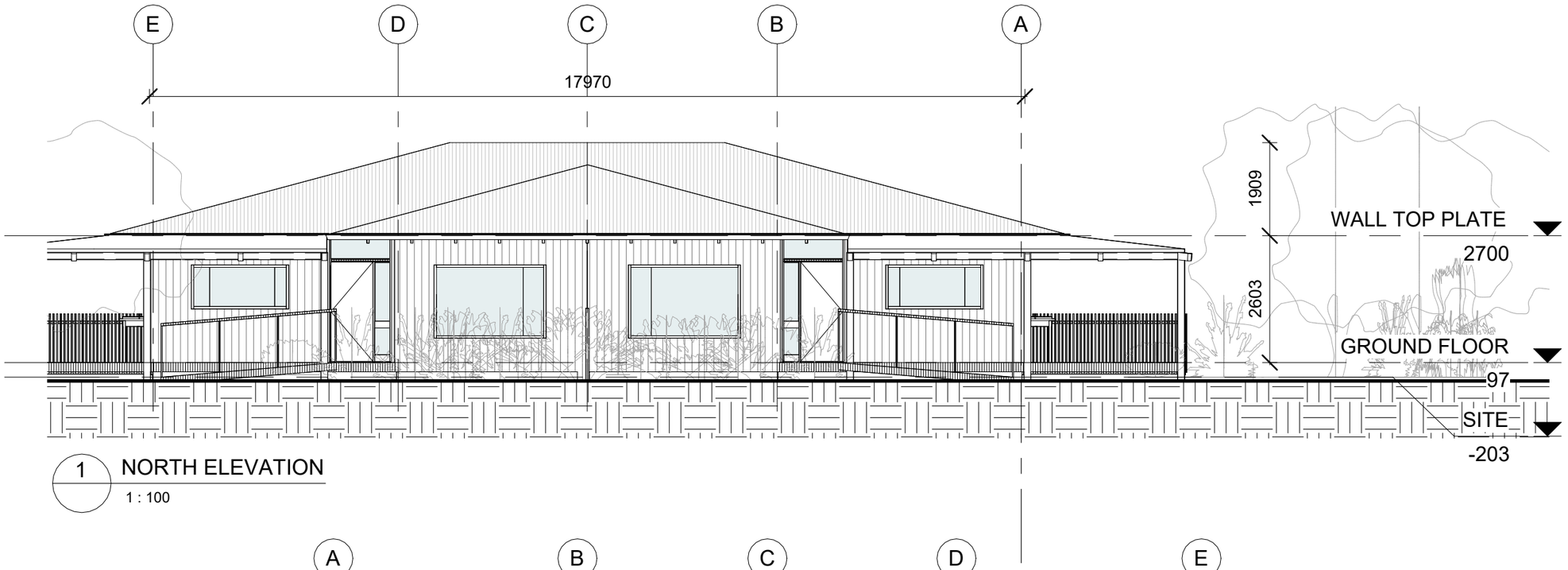
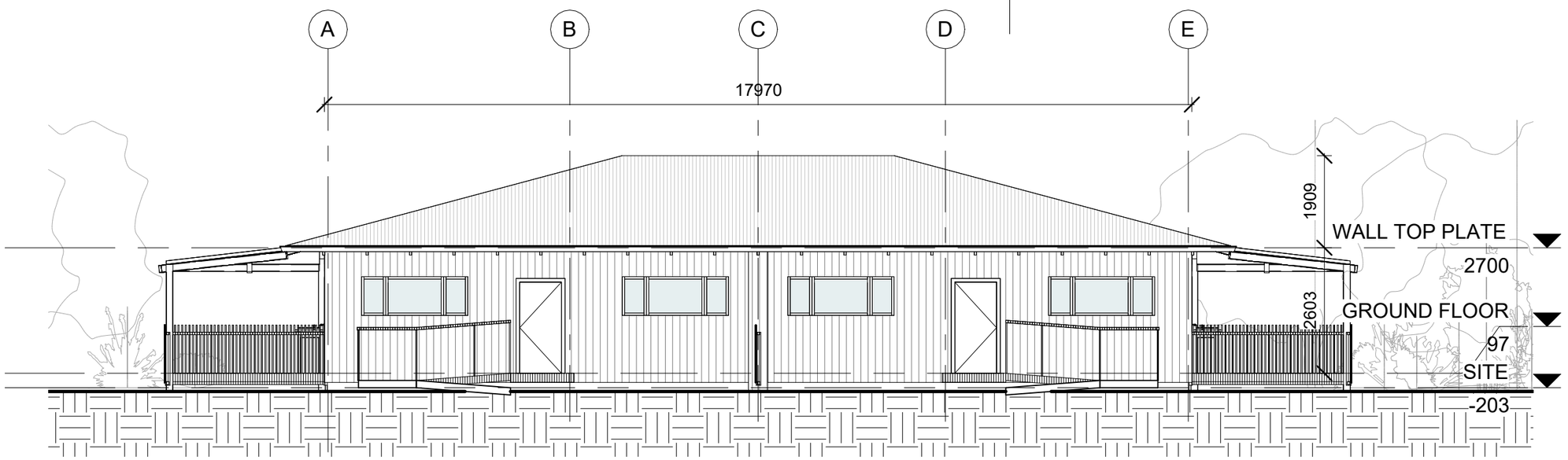


1 NORTH ELEVATION
1 : 100



3 SOUTH ELEVATION
1 : 100

LEGEND

WALLS
Macrocarpa board and Batten (premium heart clears) on 20mm cavity batten, on building wrap https://www.macdirect.co.nz/macrocarpaweatherboard/md121 on 140mm Timber framing, 2.7 stud.
Earthwool glasswool insulation (min R2.0), R value 4.1, 140mm thick. Allow for 10mm GIB. Level 4 Plaster and paint finish, with timber trims. Aqueline or similar to all wet areas.

FENCE
Timber fence

ROOF
Corrugated iron roofing on building wrap on Timber trusses, purlins and battens. Steel spouting.

EXTERIOR WINDOWS & DOORS
Double Glazed Thermally Broken Aluminium joinery APL residential series or similar

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PROJECT
TE KĀINGA ROA PAPAKĀINGA DUPLEX TYPOLOGY

CLIENT
TE ROROA DEVELOPMENT CHARITABLE TRUST

PRELIMINARY DESIGN

DRAWING TITLE
DUPLEX ELEVATION

PROJECT NORTH

DATE 17.06.2025
DRAWN BY Author
CHECKED BY Checker
SCALE @A3 1 : 100

PROJECT NO.
MA 0102

DRAWING NO.
A200

REV

GENERAL NOTE:
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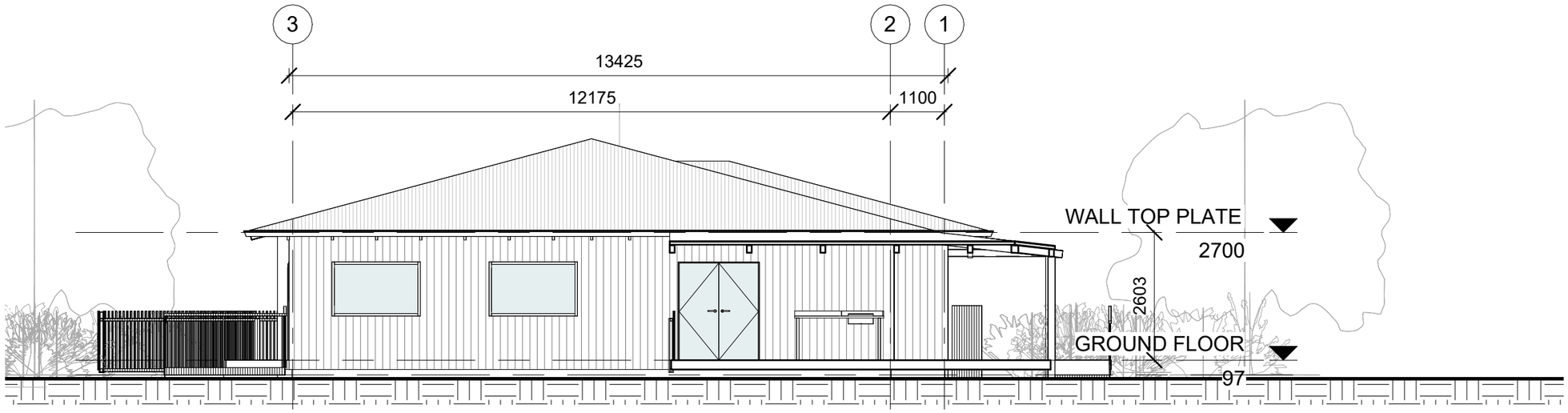
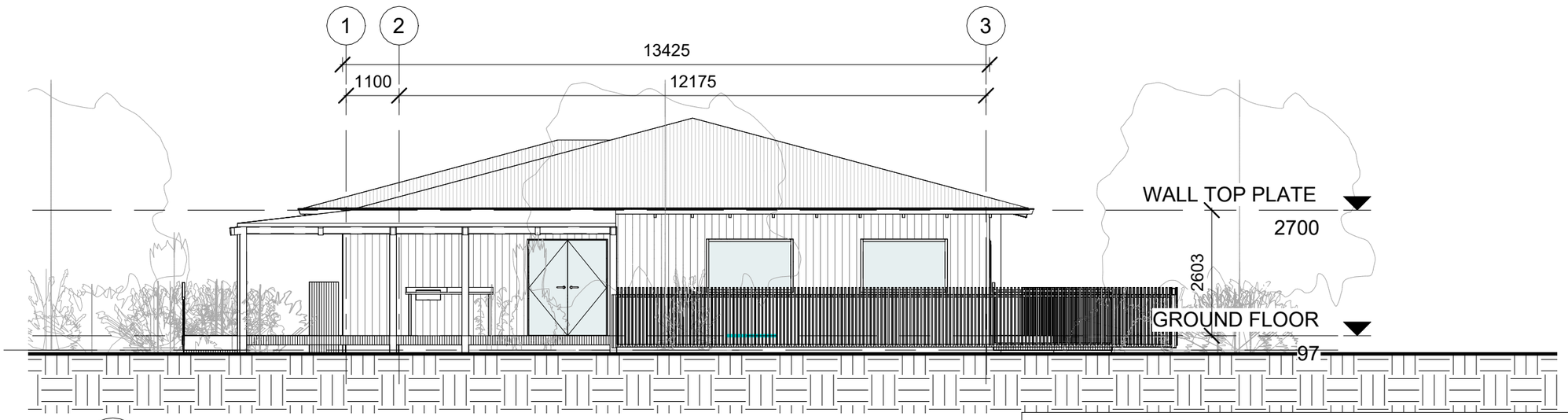


1 EAST ELEVATION
1 : 100



2 WEST ELEVATION
1 : 100

LEGEND

WALLS
Macrocarpa board and Batten (premium heart clears) on 20mm cavity batten, on building wrap https://www.macdirect.co.nz/macrocarpaweatherboard/md121 on 140mm Timber framing, 2.7 stud.
Earthwool glasswool insulation (min R2.0), R value 4.1, 140mm thick. Allow for 10mm GIB. Level 4 Plaster and paint finish, with timber trims. Aqueline or similar to all wet areas.

FENCE
Timber fence

ROOF
Corrugated iron roofing on building wrap on Timber trusses, purlins and battens. Steel spouting.

EXTERIOR WINDOWS & DOORS
Double Glazed Thermally Broken Aluminium joinery APL residential series or similar

REVISION

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PROJECT
TE KĀINGA ROA PAPAKĀINGA DUPLEX TYPOLOGY

CLIENT
TE ROROA DEVELOPMENT CHARITABLE TRUST

PRELIMINARY DESIGN

DRAWING TITLE
DUPLEX ELEVATION

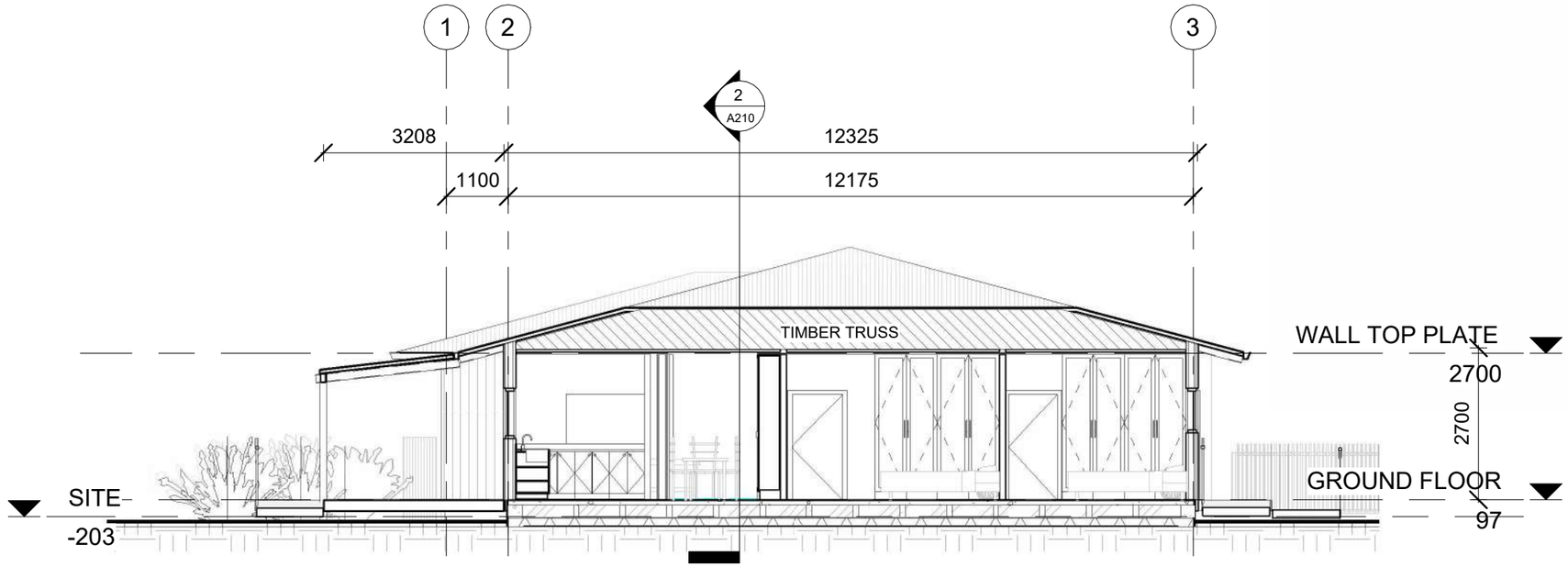
PROJECT NORTH

DATE 17.06.2025
DRAWN BY Author
CHECKED BY Checker
SCALE @A3 1 : 100

PROJECT NO. **MA 0102**

DRAWING NO. **A201**

REV



1 SECTION A
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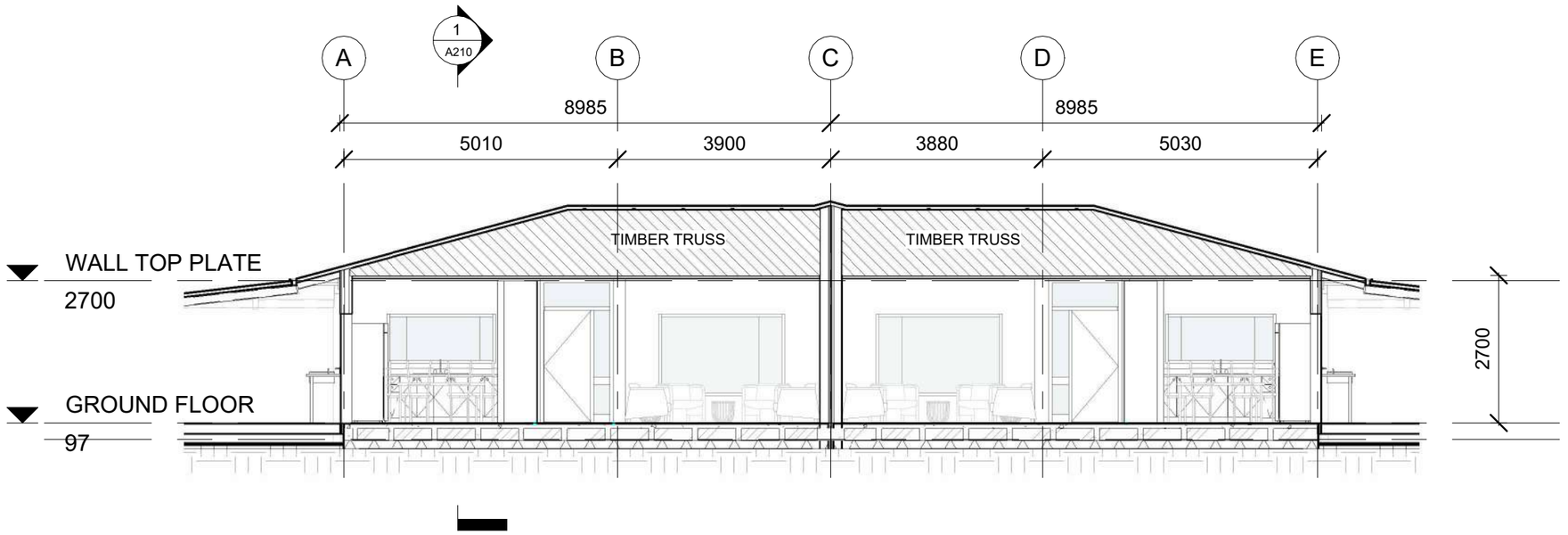

2 SECTION B
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PROJECT
TE KĀINGA ROA PAPAKĀINGA DUPLEX TYPOLOGY

CLIENT
TE ROROA DEVELOPMENT CHARITABLE TRUST

PRELIMINARY DESIGN

DRAWING TITLE
DUPLEX SECTION

PROJECT NORTH

DATE	17.06.2025
DRAWN BY	MA
CHECKED BY	MA
SCALE @A3	1 : 100

PROJECT NO.
MA 0102

DRAWING NO.
A210

REV

1 3D View 1

2 3D View 2

3 3D View 3

4 3D View 4

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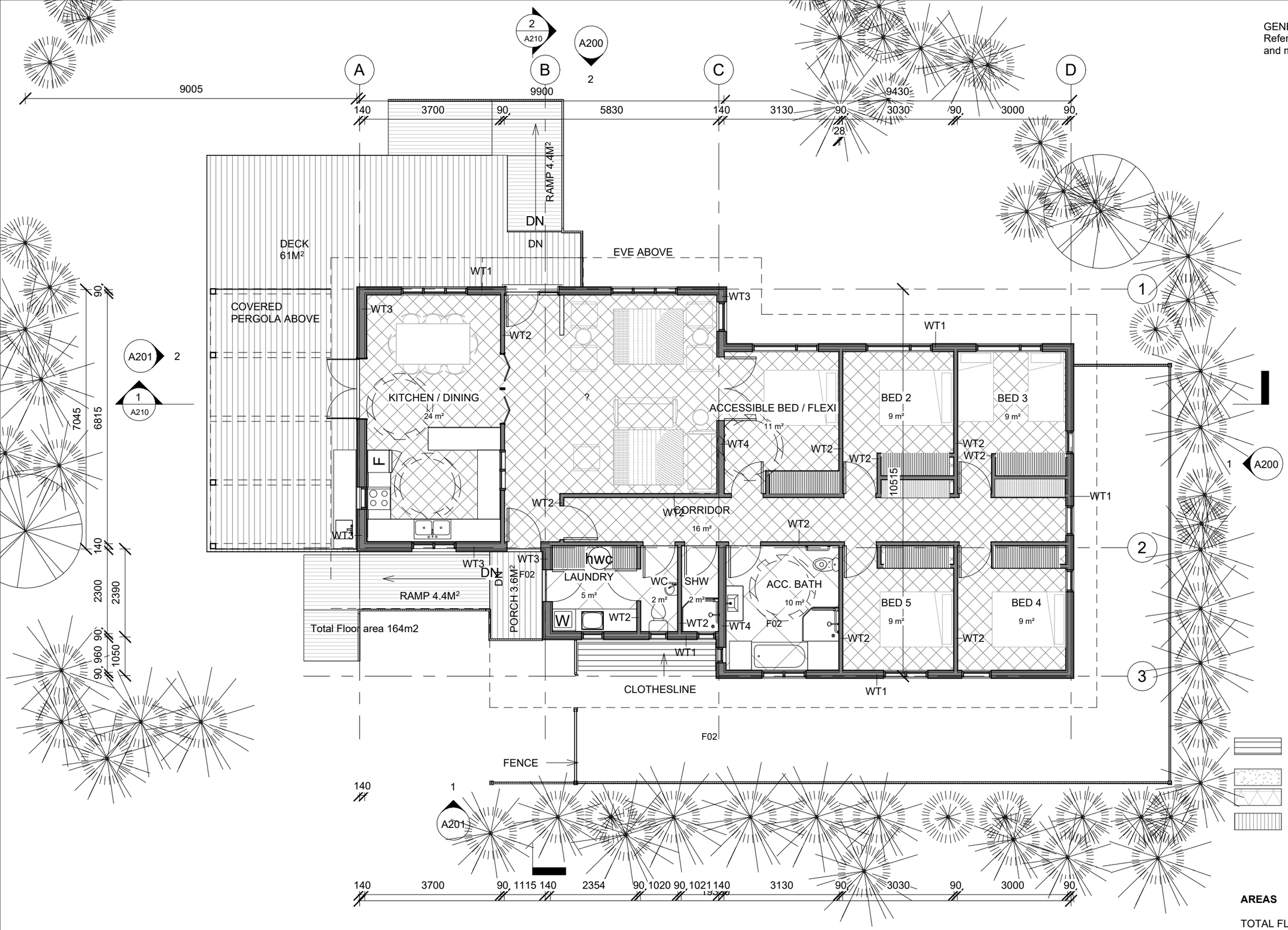
17.06.2025 | SCALE @A3 | DUPLEX EXTERIOR PERSPECTIVES | TE KĀINGA ROA PAPAKĀINGA DUPLEX TYPOLOGY | SK001

SHEET LIST A3

Sheet No.	Sheet Name	Current Revision
A000a1	COVER PAGE A1	
A000a3	COVER PAGE A3	
A110	GROUND FLOOR PLAN	
A112	ROOF PLAN	
A200	ELEVATION	
A201	ELEVATION	
A210	SECTION	
SK001	SKETCH ONE	

GENERAL NOTE:
Refer to Outline Specification for full list of products and materials.



WALL TYPE SCHEDULE

WT1	STRUCTURE 90mm Timber framing, 2.7 stud. CLADDING Macrocarpa board and Batten (Standard heart clears) on 45mm Structural cavity batten, on proclima building wrap https://www.macdirect.co.nz Internal vapour barrier, 45mm insulated timber service cavity with GIB lining
WT2	STRUCTURE 90mm timber framing, 2.7 stud LINING Allow for 10mm GIB. Level 4 Plaster and paint finish, timber trims. GIB Aqualine and to all wet areas w level 5 plaster and gloss paint finish.
WT3	STRUCTURE 140mm Timber framing, 2.7 stud. CLADDING Macrocarpa board and Batten (Standard heart clears) on 45mm Structural cavity batten, on proclima building wrap https://www.macdirect.co.nz Internal vapour barrier, 45mm insulated timber service cavity with GIB lining
WT4	STRUCTURE 140mm timber framing, 2.7 stud. 45mm cavity batten on one side only. LINING Allow for 10mm GIB. Level 4 Plaster and paint finish, timber trims. GIB Aqualine and to all wet areas w level 5 plaster and gloss paint finish.

FLOOR FINISHES LEGEND

F02	Tarkett Primo Safe Non Slip Vinyl Finish, on low VOC adhesive
F03	New Timber decking: LMA repurposed australian hardwood Spotted Gum or similar 140 x 19mm thick watershed decking. https://lmatimber.co.nz/ (reclaimed Australian hardwood)

AREAS

TOTAL FLOOR AREA:	163M²
DECK AREA:	61M²
PATIO:	3.6M²
TOTAL RAMP AREA:	8.8M²

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PROJECT
TE KĀINGA ROA PAPAKĀINGA
5 BED TYPOLOGY

CLIENT
TE ROROA DEVELOPMENT CHARITABLE TRUST

PRELIMINARY DESIGN

DRAWING TITLE
GROUND FLOOR PLAN

PROJECT NORTH

DATE	17.06.2025
DRAWN BY	MA
CHECKED BY	MA
SCALE @A3	1 : 100

PROJECT NO.
MA 0102

DRAWING NO.
A110

REV

GENERAL NOTE:
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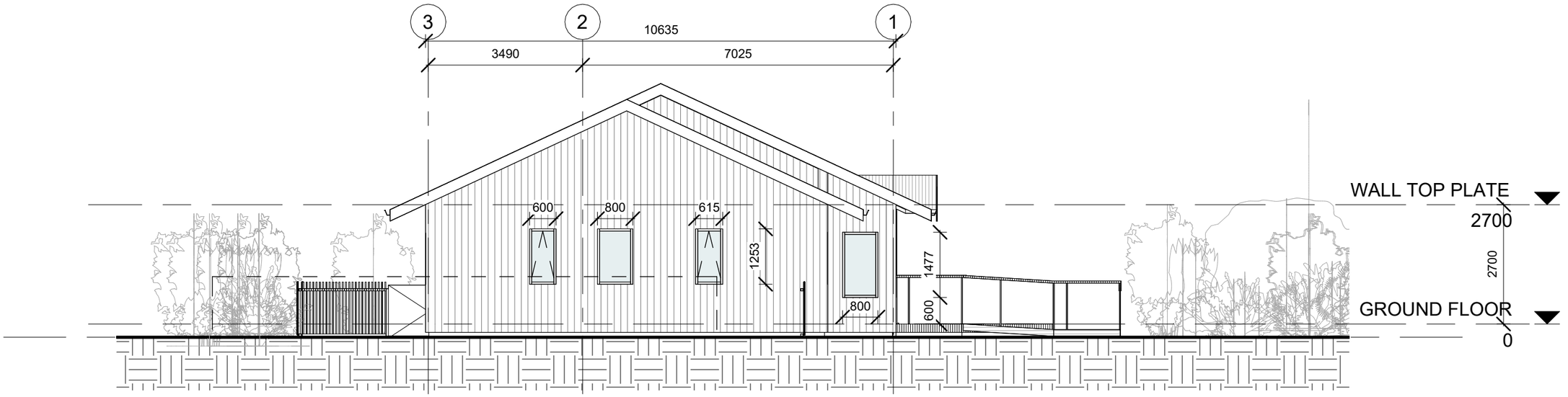

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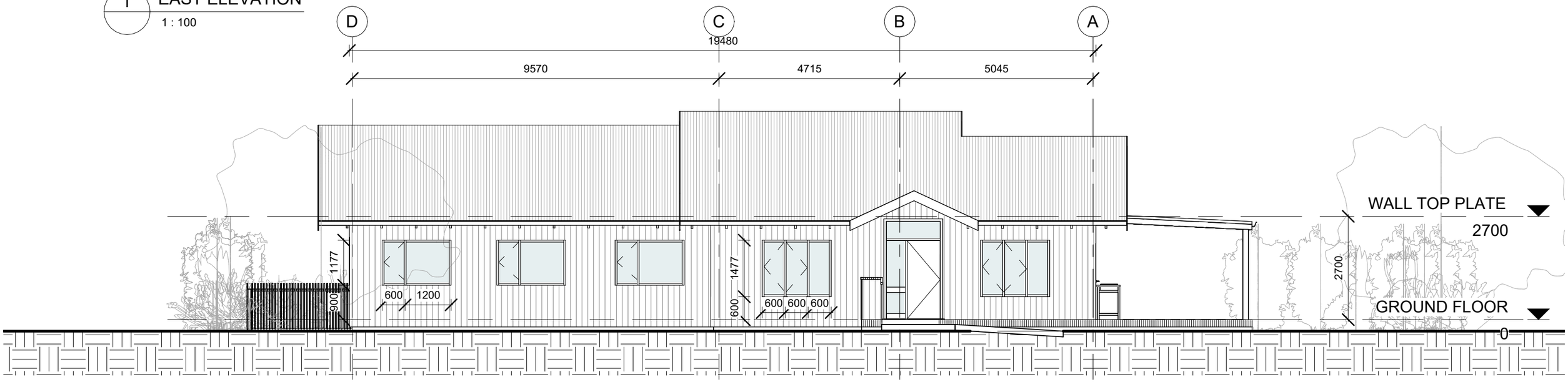
1 : 100



2 NORTH ELEVATION
1 : 100

LEGEND

WALLS
Macrocarpa bandsawn Vertical shiplap weatherboard (Premium heart Clears) 20mm cavity batten, on building wrap Macdirect.co.nz.
2.7m stud Ecopanel series 90 insulated wall panels with Knauf Earthwool insulation.
https://www.ecopanel.co.nz/insulated-wall-panels

FENCE
Timber fence

ROOF
Corrugated iron roofing on building wrap on Timber trusses, purlins and battens, or Ecopanel solution. Steel spouting

EXTERIOR WINDOWS & DOORS
Double glazed low e UpvC Joinery: Combination of Casement windows, Hing Tilt, Sliding and French Doors and Sliding Windows.

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PROJECT
TE KĀINGA ROA PAPAKĀINGA
5 BED TYPOLOGY

CLIENT
TE ROROA DEVELOPMENT CHARITABLE TRUST

PRELIMINARY DESIGN

DRAWING TITLE
ELEVATION

PROJECT NORTH

DATE 17.06.2025
DRAWN BY MA
CHECKED BY MA
SCALE @A3 1 : 100

PROJECT NO.
MA 0102

DRAWING NO.
A200

REV

GENERAL NOTE:
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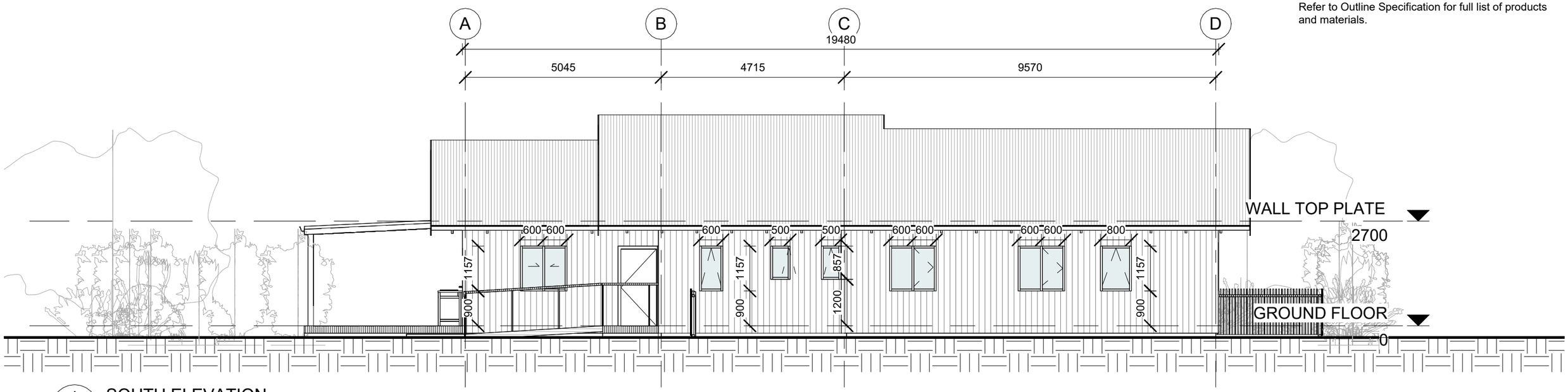
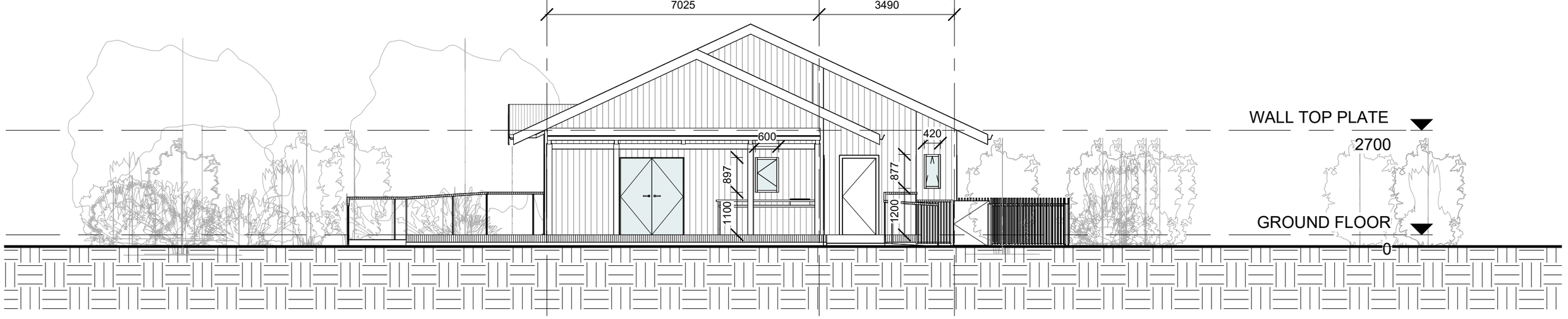


1 SOUTH ELEVATION
1 : 100



2 WEST ELEVATION
1 : 100

LEGEND

WALLS
Macrocarpa bandsawn Vertical shiplap weatherboard (Premium heart Clears) 20mm cavity batten, on building wrap Macdirect.co.nz.
2.7m stud Ecopanel series 90 insulated wall panels with Knauf Earthwool insulation.
https://www.ecopanel.co.nz/insulated-wall-panels

FENCE
Timber fence

ROOF
Corrugated iron roofing on building wrap on Timber trusses, purlins and battens, or Ecopanel solution. Steel spouting

EXTERIOR WINDOWS & DOORS
Double glazed low e UpvC Joinery: Combination of Casement windows, Hing Tilt, Sliding and French Doors and Sliding Windows.

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PROJECT
TE KĀINGA ROA PAPAKĀINGA
5 BED TYPOLOGY

CLIENT
TE ROROA DEVELOPMENT CHARITABLE TRUST

PRELIMINARY DESIGN

DRAWING TITLE
ELEVATION

PROJECT NORTH

DATE 17.06.2025
DRAWN BY Author
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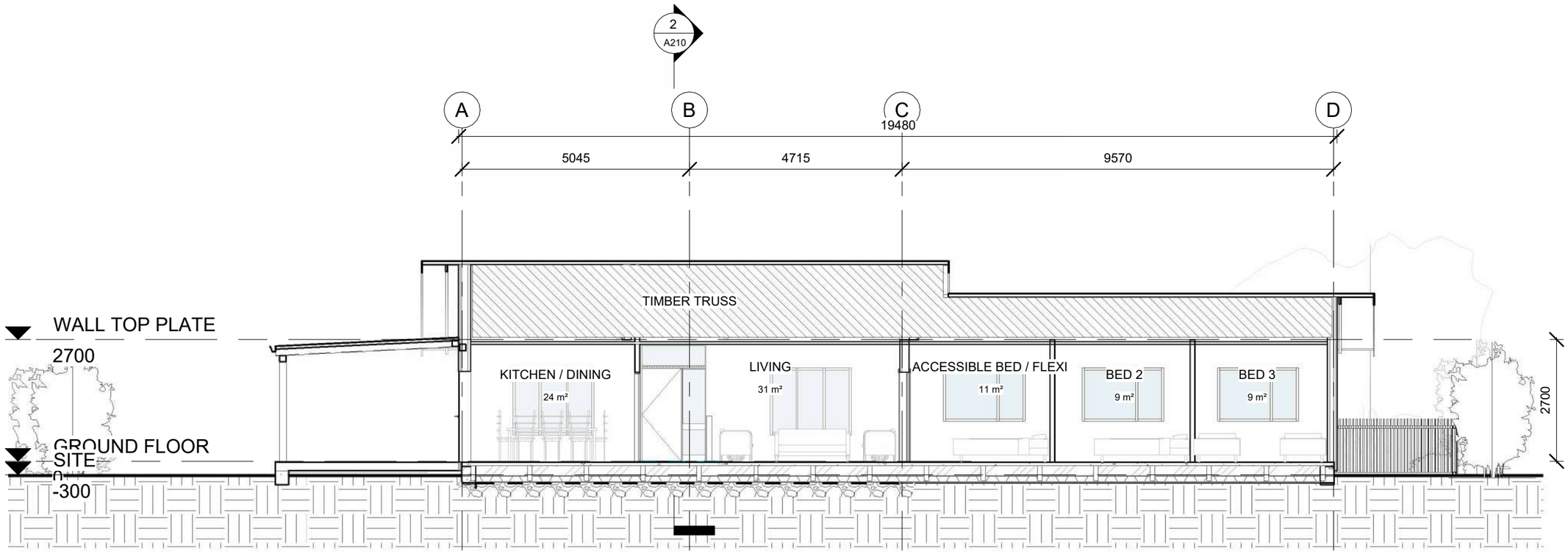
SCALE @A3 1 : 100

PROJECT NO. **MA 0102**
DRAWING NO. **A201**
REV



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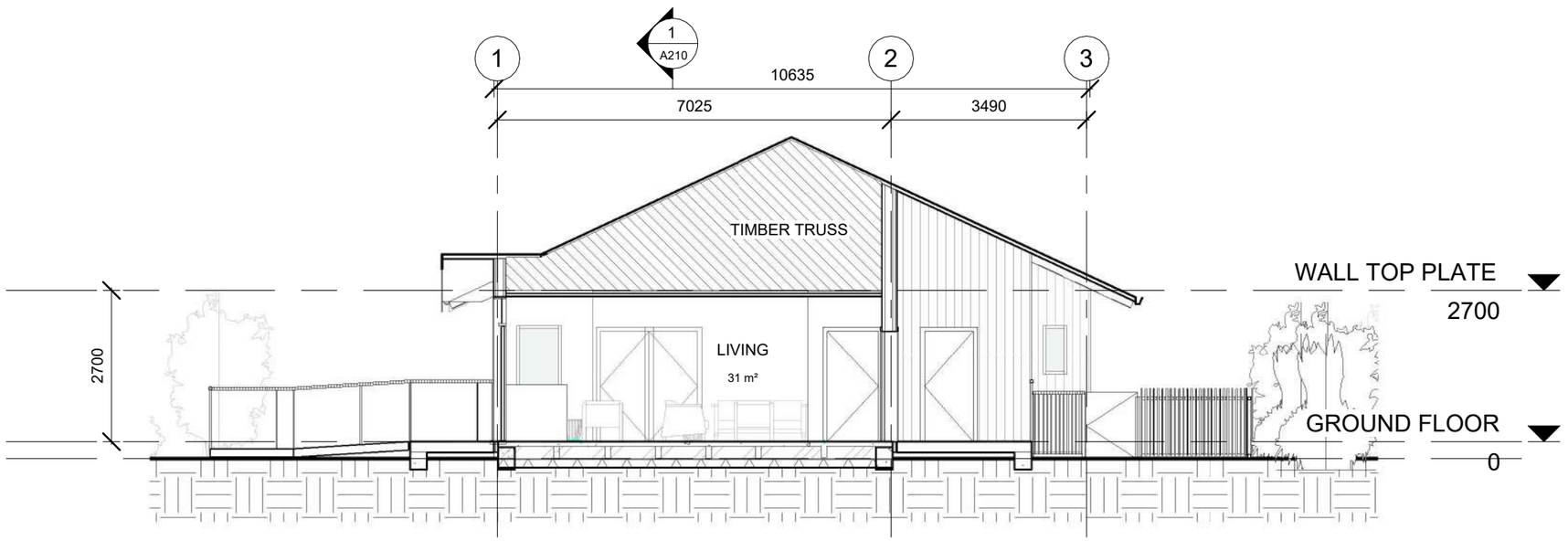

2 SECTION B

1 : 100

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PROJECT
TE KĀINGA ROA PAPAKĀINGA
5 BED TYPOLOGY

CLIENT
TE ROROA DEVELOPMENT CHARITABLE TRUST

PRELIMINARY DESIGN

DRAWING TITLE
SECTION

PROJECT NORTH

DATE 17.06.2025
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PROJECT NO. **MA 0102**

DRAWING NO. **A210**

REV

1 3D View 1

3 3D View 3

2 3D View 4

4 3D View 2

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17.06.2025 | SCALE @A3 | SKETCH ONE | TE KĀINGA ROA PAPAKĀINGA 5 BED TYPOLOGY | SK001

SHEET LIST A3		
Sheet No.	Sheet Name	Current Revision
A000a3	COVER PAGE A3	
A110	GROUND FLOOR PLAN	
A200	ELEVATION	
A201	ELEVATION	
A210	SECTION	
SK001	SKETCH ONE	

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TE KĀINGA ROA PAPAKĀINGA 3 BED TYPOLOGY

PRELIMINARY DESIGN

MA 0102

17.06.2025

REV

GENERAL NOTE:
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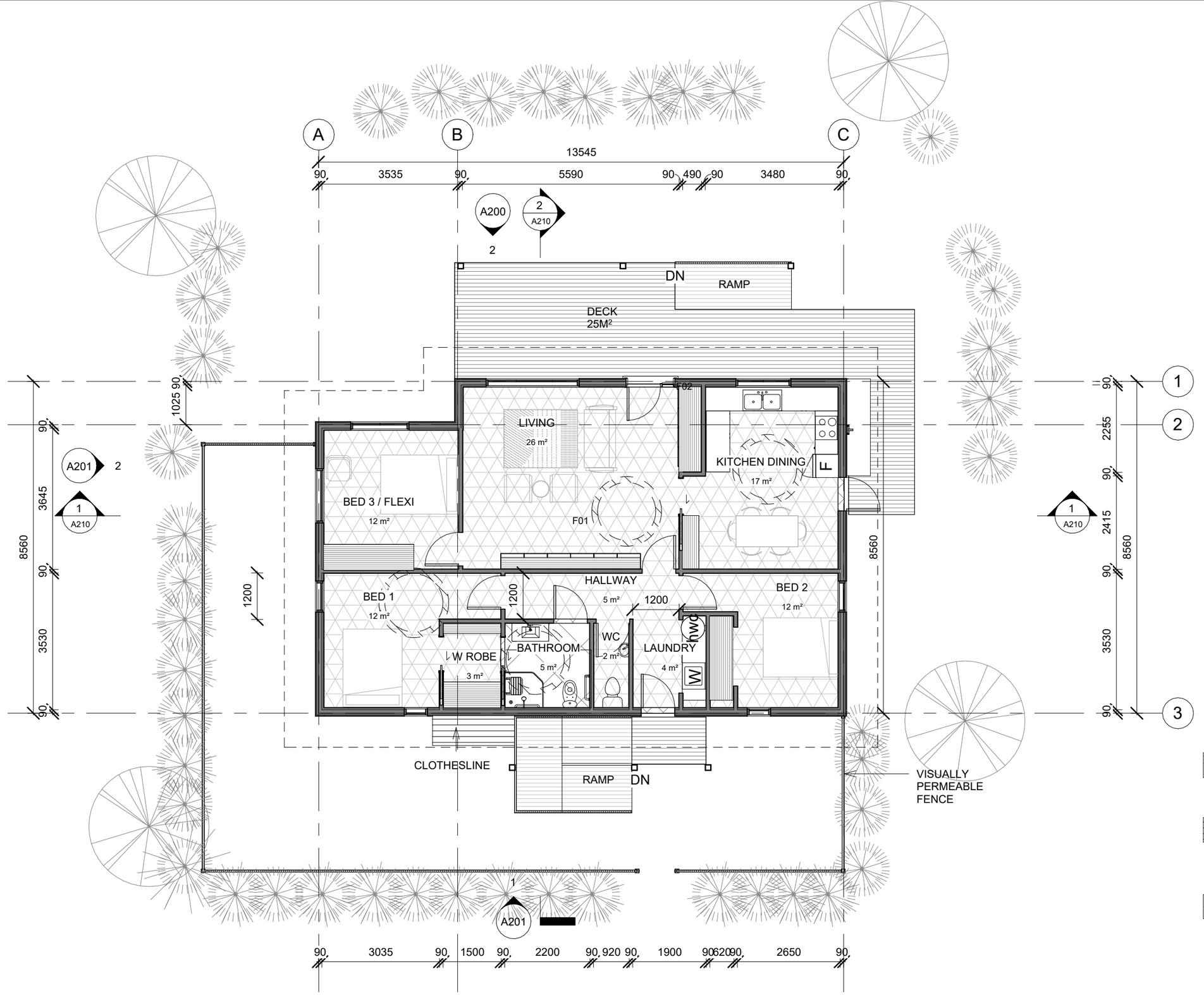

WALL TYPE SCHEDULE

WT2	STRUCTURE 90mm timber framing, 2.7 stud LINING Allow for 10mm GIB on both sides. Level 4 Plaster and paint finish, timber trims. GIB Aqualine and to all wet areas w level 5 plaster and gloss paint finish.
WT 1	STRUCTURE 90mm Timber framing, 2.7 stud. CLADDING Macrocarpa board and Batten (Standard heart clears) on 45mm Structural cavity batten, on proclima building wrap https://www.macdirect.co.nz Internal vapour barrier, 45mm insulated timber service cavity with GIB lining

FLOOR FINISHES LEGEND

F01	Tarkett linoleum on Timber Pole Raft foundation http://www.nzgc.co.nz/. or standard timber piles and joists, with 21mm ply deck over. Earthwool underfloor insulation.
F02	New Timber decking: LMA repurposed australian hardwood Spotted Gum or similar 140 x 19mm thick watershed decking. https://lmatimber.co.nz/ (reclaimed Australian hardwood)
F03	Tarkett Primo Safe Non Slip Vinyl Finish, on low VOC adhesive

AREAS

TOTAL FLOOR AREA: 107M²
DECK AREA: 30M²

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PROJECT
TE KĀINGA ROA PAPAKĀINGA
3 BED TYPOLOGY

CLIENT
TE RORoA DEVELOPMENT CHARITABLE TRUST

PRELIMINARY DESIGN

DRAWING TITLE
GROUND FLOOR PLAN

PROJECT NORTH

DATE	17.06.2025
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CHECKED BY	MA
SCALE @A3	1 : 100

PROJECT NO.
MA 0102

DRAWING NO.
A110

REV

GENERAL NOTE:
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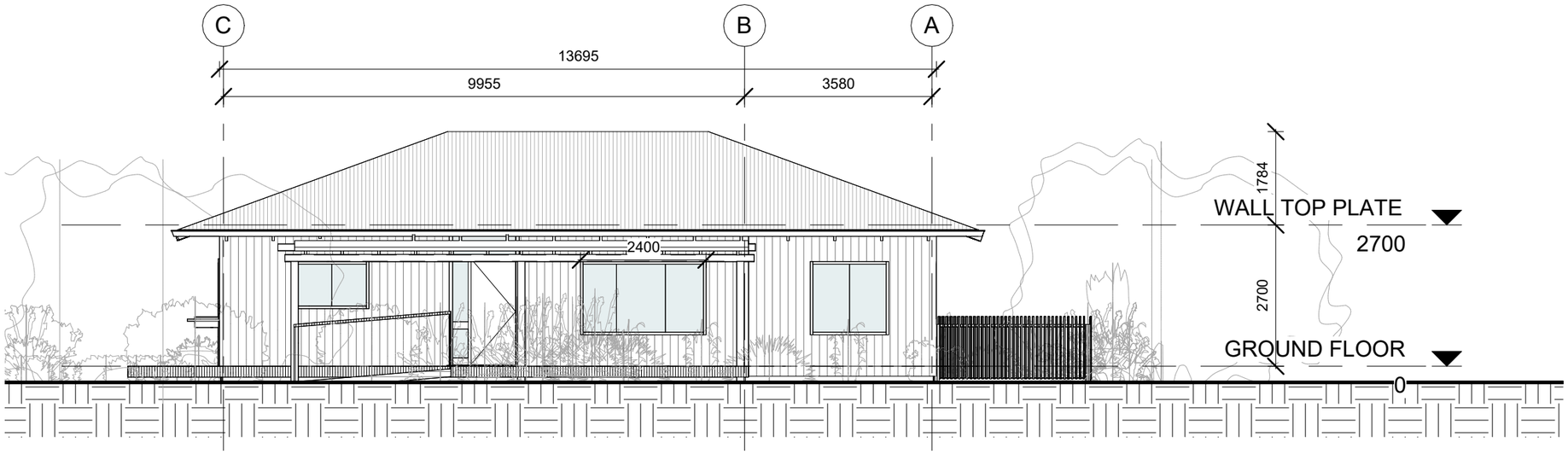
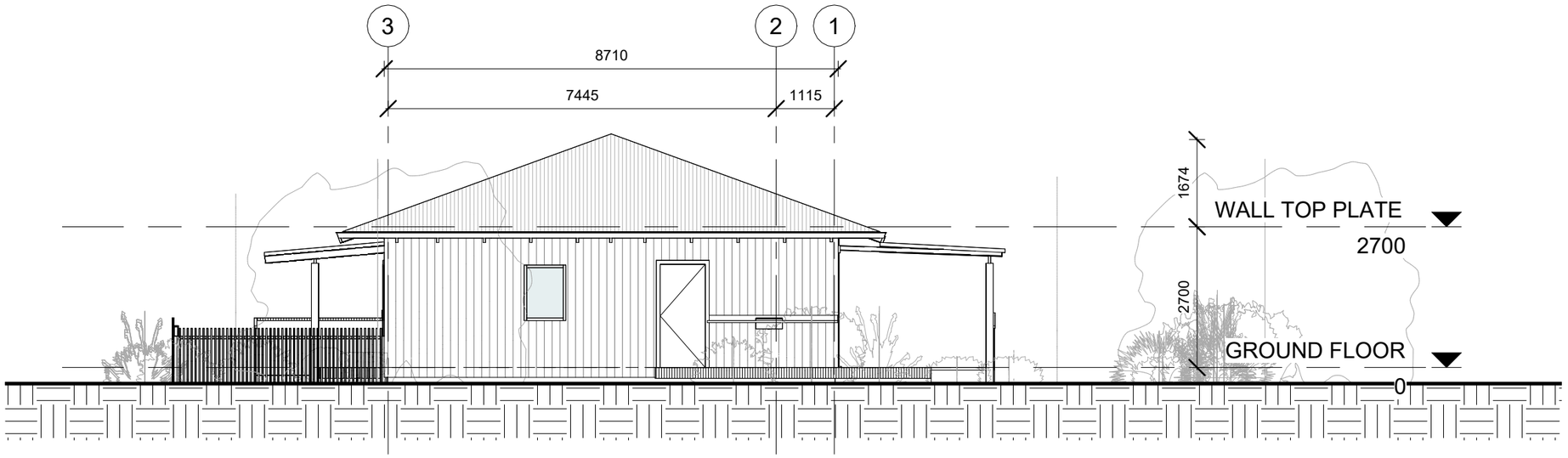


2 NORTH ELEVATION
1 : 100



1 EAST ELEVATION
1 : 100

LEGEND

WALLS
Macrocarpa board and Batten on 45mm cavity batten, on building wrap, on 900mm Timber framing, 2.7 stud. Earthwool glasswool insulation (min R2.0), R value 2.6, 90mm thick. Internal vapour lining, 45mm timber service cavity with 45mm insulation. Allow for 10mm GIB. Level 4 Plaster and paint finish, with timber trims. Aqueline or similar to all wet areas.

FENCE
Visually Permeable Fence - Timber or Wire Mesh

ROOF
Corrugated iron roofing on building wrap on Timber trusses, purlins and battens. Steel spouting.

EXTERIOR WINDOWS & DOORS
Double Glazed Thermally Broken Aluminium joinery APL residential series or similar

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PROJECT
TE KĀINGA ROA PAPAKĀINGA
3 BED TYPOLOGY

CLIENT
TE ROROA DEVELOPMENT CHARITABLE TRUST

PRELIMINARY DESIGN

DRAWING TITLE
ELEVATION

PROJECT NORTH

DATE 17.06.2025
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CHECKED BY MA
SCALE @A3 1 : 100

PROJECT NO.
MA 0102

DRAWING NO.
A200

REV

GENERAL NOTE:
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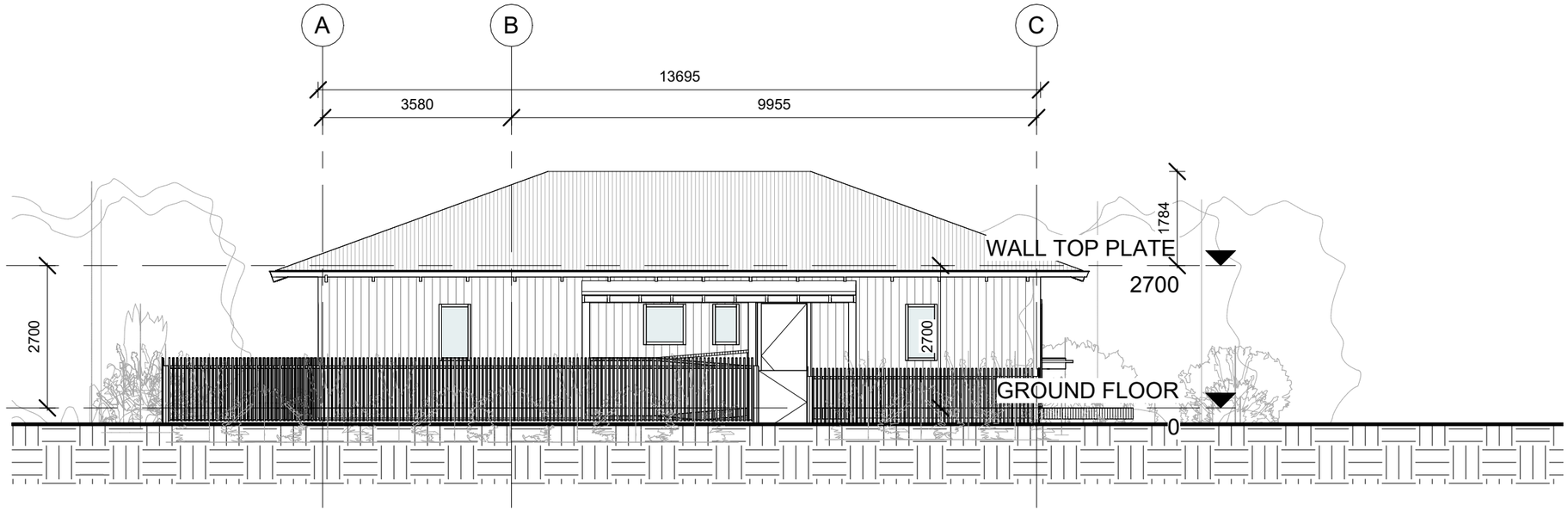
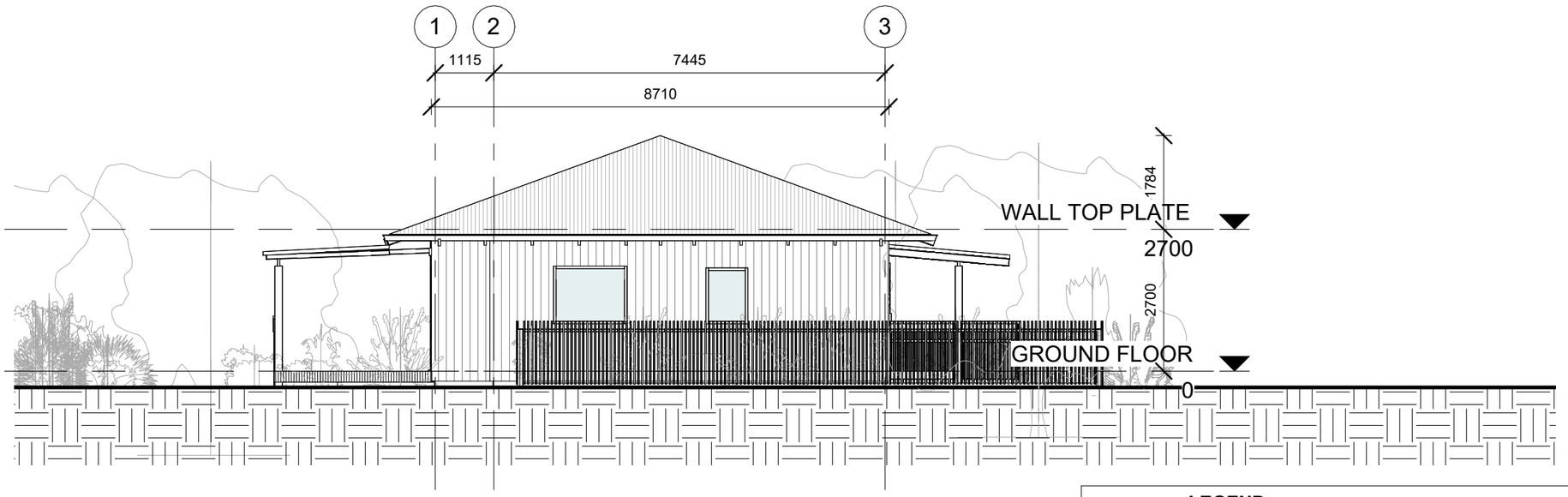


1 SOUTH ELEVATION
1 : 100



2 WEST ELEVATION
1 : 100

LEGEND

WALLS
Macrocarpa board and Batten on 45mm cavity batten, on building wrap, on 900mm Timber framing, 2.7 stud. Earthwool glasswool insulation (min R2.0), R value 2.6, 90mm thick. Internal vapour lining, 45mm timber service cavity with 45mm insulation. Allow for 10mm GIB. Level 4 Plaster and paint finish, with timber trims. Aqueline or similar to all wet areas.

FENCE
Visually Permeable Fence - Timber or Wire Mesh

ROOF
Corrugated iron roofing on building wrap on Timber trusses, purlins and battens. Steel spouting.

EXTERIOR WINDOWS & DOORS
Double Glazed Thermally Broken Aluminium joinery APL residential series or similar

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PROJECT
TE KĀINGA ROA PAPAKĀINGA
3 BED TYPOLOGY

CLIENT
TE ROROA DEVELOPMENT CHARITABLE TRUST

PRELIMINARY DESIGN

DRAWING TITLE
ELEVATION

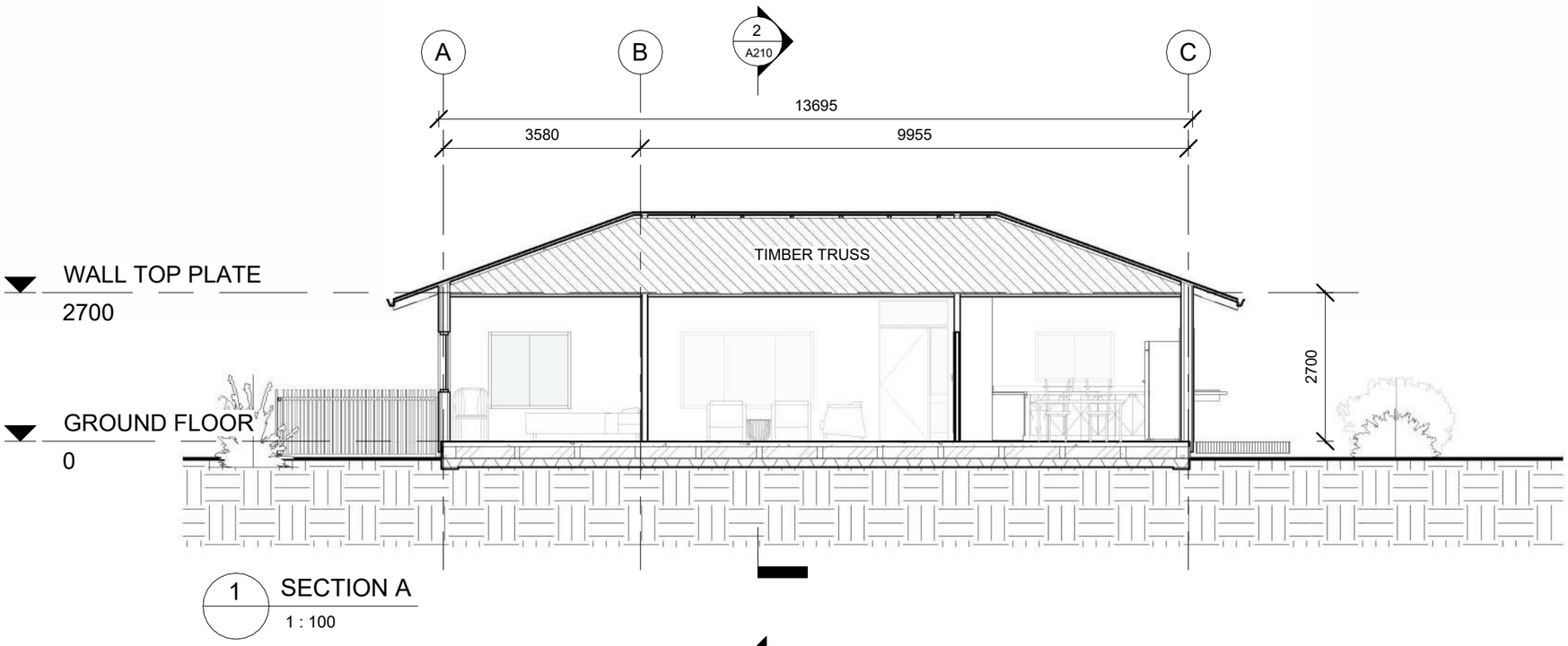
PROJECT NORTH

DATE 17.06.2025
DRAWN BY MA
CHECKED BY MA
SCALE @A3 1 : 100

PROJECT NO.
MA 0102

DRAWING NO.
A201

REV



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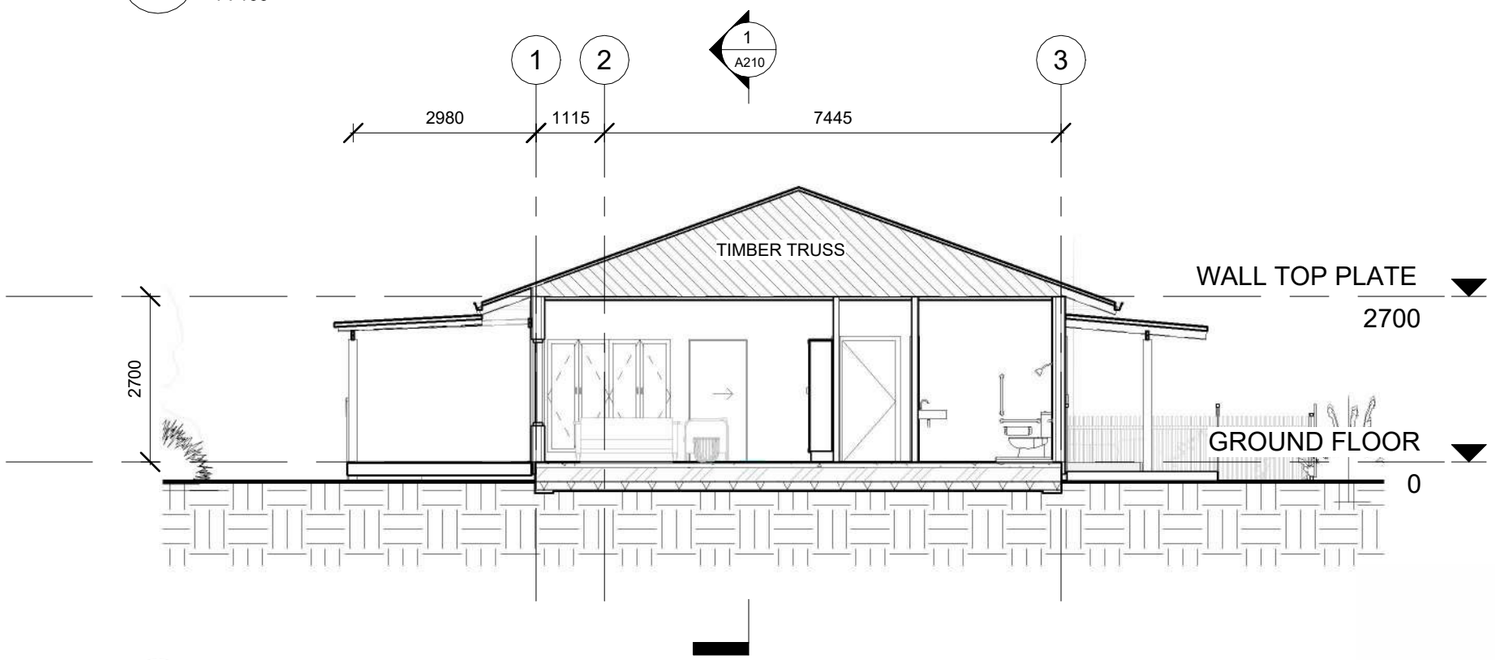

2 SECTION B

1 : 100

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PROJECT
TE KĀINGA ROA PAPAKĀINGA
3 BED TYPOLOGY

CLIENT
TE ROROA DEVELOPMENT CHARITABLE TRUST

PRELIMINARY DESIGN

DRAWING TITLE
SECTION

PROJECT NORTH

DATE 17.06.2025
DRAWN BY MA
CHECKED BY MA
SCALE @A3 1 : 100

PROJECT NO.
MA 0102

DRAWING NO.
A210

REV

1 3D View 1

2 3D View 2

3 3D View 3

4 3D View 4

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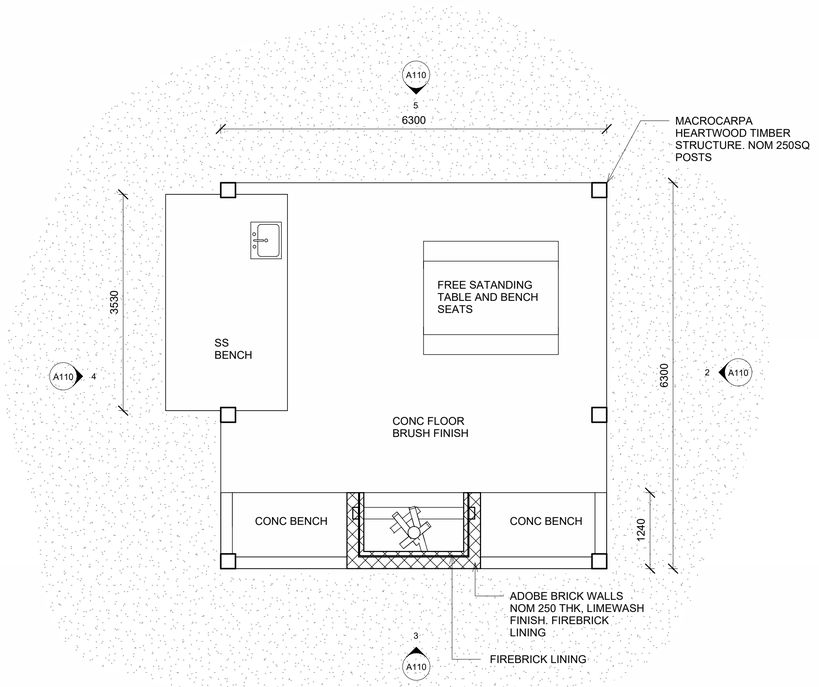
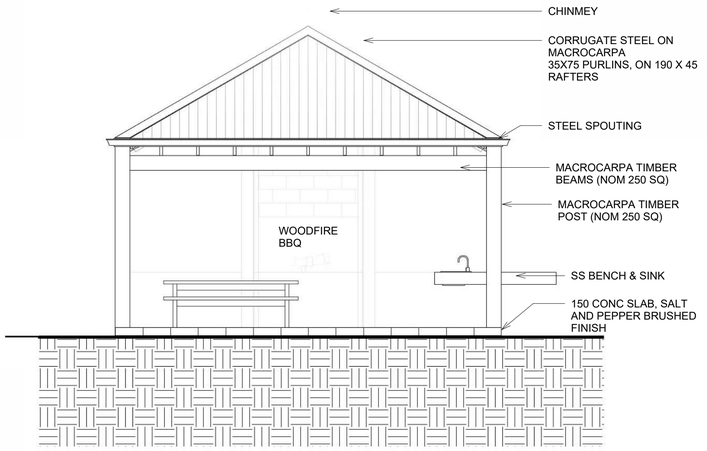
17.06.2025 | SCALE @A3 | SKETCH ONE | **TE KĀINGA ROA PAPAKĀINGA 3 BED TYPOLOGY** | **SK001**

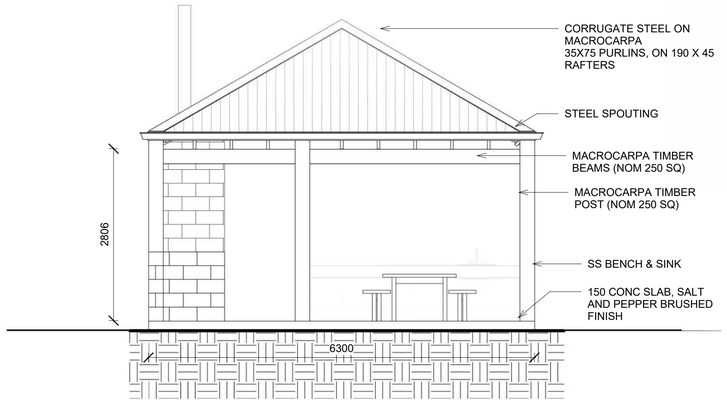
6 3D VIEW



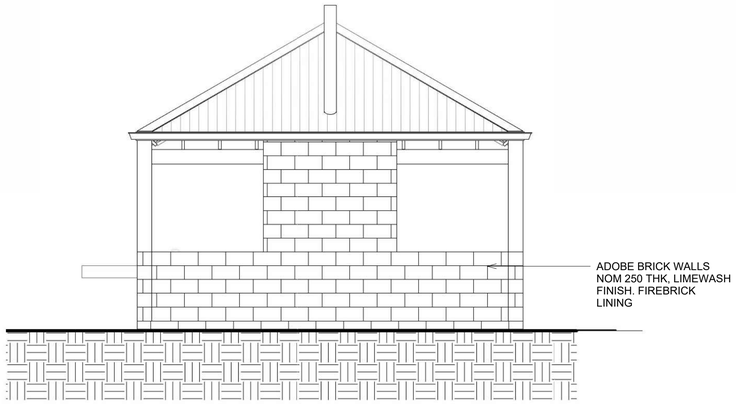
1 PROPOSED LEVEL 1
1 : 50



5 Elevation 4 - a
1 : 50



2 Elevation 1 - a
1 : 50



3 Elevation 2 - a
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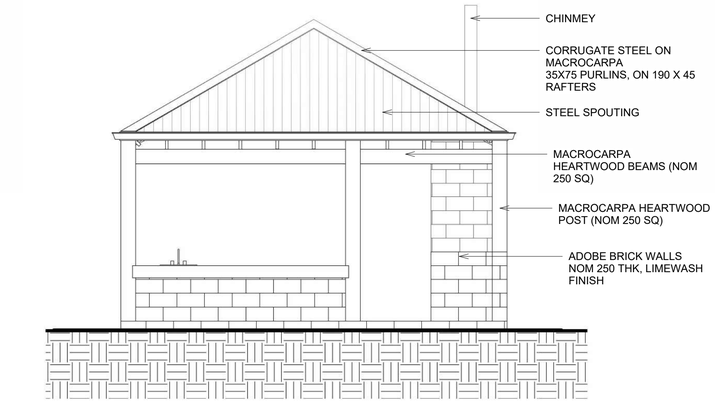

4 Elevation 3 - a
1 : 50

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CLIENT
TE ROROA TRUST

PROJECT
WAIMAMAKU PAPAKĀINGA_ KAUTA

DRAWING TITLE
GROUND FLOOR PLAN

PROJECT STATUS
CONCEPT

PROJECT NO.
MA 0102

DATE 17.07.2025
DRAWN BY MA
CHECKED BY MA
SCALE @A1 1 : 50

PROJECT NORTH

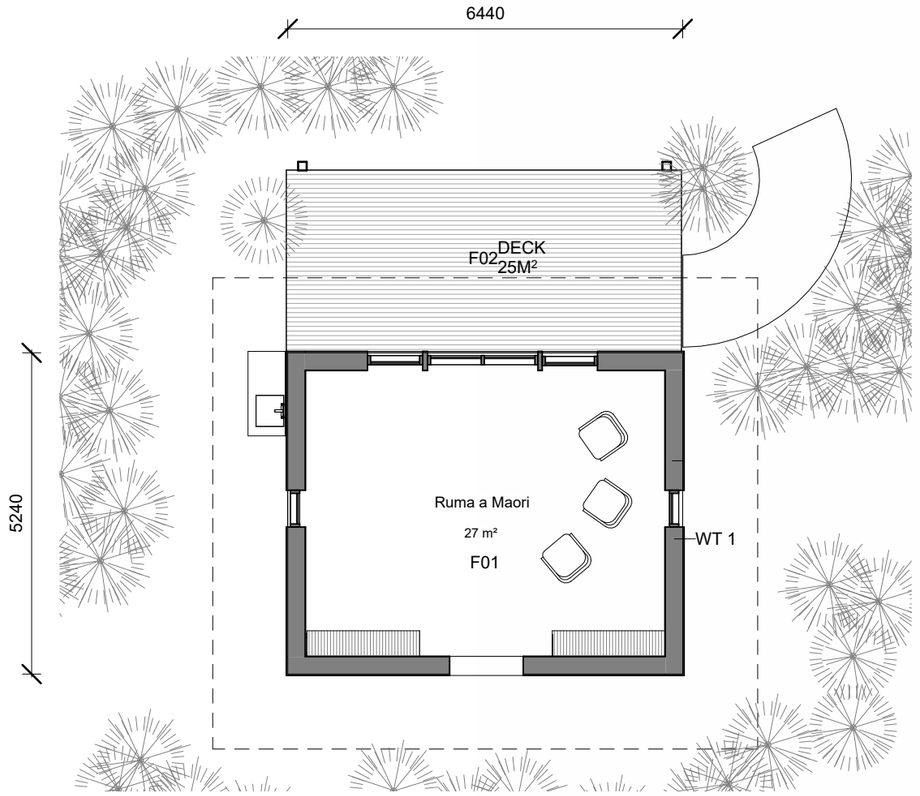
DRAWING NO. **A110**

REV

29/07/2025 3:28:51 pm

GENERAL NOTE:
Refer to Outline Specification for full list of products and materials.

2 3D View 1



1 CONCEPT - FLOOR PLAN
1 : 100

WALL TYPE SCHEDULE

WT 1	OPTION 1 EXTERIOR CLADDING: VERTICAL WEATHERBOARD, MACROCARPA, ON 20MM CASTELLATED CAVITY BATTEN SYSTEM, ON MIN 10mm THK LIME PLASTER. STRUCTURE:LEM (LIGHT EARTH METHOD) EARTH WALL OPTION 2 CLADDING: Ply board and Batten on 20mm cavity batten, on building wrap. STRUCTURE: 140mm Timber framing, 2.7 stud. Earthwool glasswool insulation (min R2.0), R value 4.1, 140mm thick. Allow for 10mm GIB. Level 4 Plaster and paint finish, with timber trims. Aqualine or similar to all wet areas.

FLOOR FINISHES LEGEND

F01	COMPACTED EARTH FLOOR FINISHED WITH LINSEAD OIL COATING, ON 300MM GROUND OYSTERSHELLS ON10MM SAND BLINDING OVER DPM ON COMPACTED HARDFILL
F02	New Timber decking: LMA repurposed australian hardwood Spotted Gum or similar 140 x 19mm thick watershed decking. https://lmatimber.co.nz/ (reclaimed Australian hardwood)

4 3D View 4

3 3D View 2

AREAS

TOTAL FLOOR AREA:	107M²
DECK AREA:	30M²

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PROJECT
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CLIENT
TE ROROA DEVELOPMENT CHARITABLE TRUST

CONCEPT

DRAWING TITLE
GROUND FLOOR PLAN

PROJECT NORTH

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PROJECT NO.
MA 0102

DRAWING NO.
A110

REV

GENERAL NOTE:
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LEGEND

WALLS
OPTION 1
EXTERIOR CLADDING: VERTICAL WEATHERBOARD, MACROCARPA, ON 20MM CASTELLATED CAVITY BATTEN SYSTEM, ON MIN 10mm THK LIME PLASTER.
OPTION 2
CLADDING: Ply board and Batten on 20mm cavity batten, on building wrap.

FENCE
Timber fence

ROOF
Corrugated iron roofing on building wrap on Timber trusses, purlins and battens. Steel spouting.

EXTERIOR WINDOWS & DOORS
Double Glazed Thermally Broken Aluminium joinery APL residential series or similar

REVISION

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CONCEPT

DRAWING TITLE
ELEVATION

PROJECT NORTH

DATE 17.07.2025
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PROJECT NO.
MA 0102

DRAWING NO.
A201

REV

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General of Land

Identifier **NA51B/943**

Part-Cancelled

Land Registration District **North Auckland**

Date Issued 05 October 1982

Prior References
NA21C/727

Estate	Fee Simple
Area	16.0630 hectares more or less
Legal Description	Part Section 102 Block IX Waoku Survey District

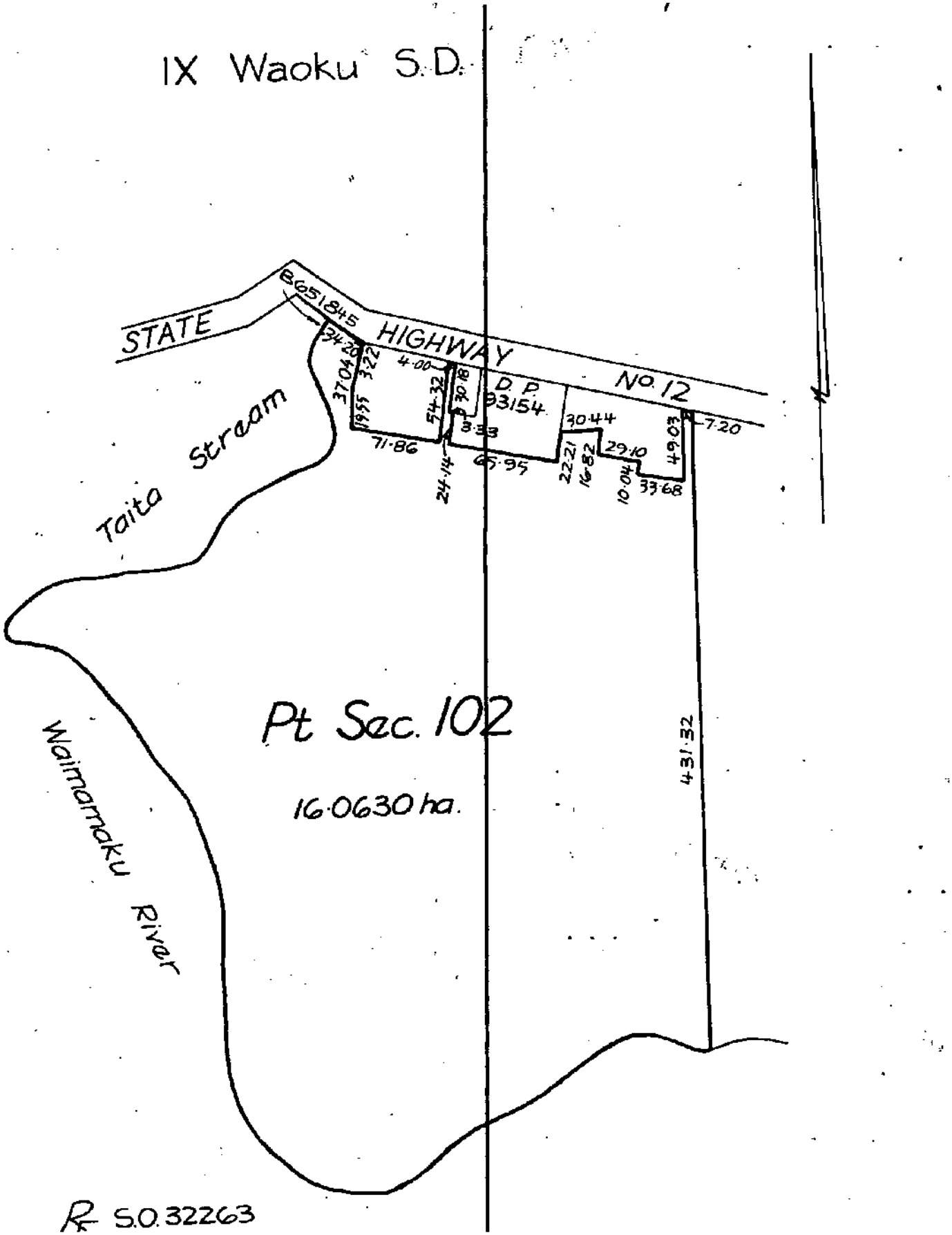
Registered Owners

Te Roroa Manawhenua Custodian Limited

Interests

Subject to Section 59 Land Act 1948

B651845.1 Gazette Notice (N.Z Gazette 5.3.1987 No.29 Page 1024) acquiring part (1055 m²) for road and vesting in Her Majesty the Queen - 10.4.1987 at 1.37 pm


IX Waoku S.D.
STATE HIGHWAY No. 12
E 651845
34·20
37·04
3·22
4·00
19·55
54·32
30·18
D.P. 93154
3·33
71·86
24·14
65·95
30·44
22·21
16·82
29·10
10·04
33·68
49·03
7·20
431·32
Taita Stream
Waimamaku River
Pt Sec. 102
16·0630 ha.
R S.O. 32263

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Principal: Dean Scanlen
BE(Hons)(Civil), CPEng, IntPE(NZ), CMEngNZ

23 June 2025

PROPOSED PAPAKĀINGA
WAIMAMAKU, HOKIANGA
PART SECTION 102 BLOCK IX WAOKU SD
TRAFFIC EFFECTS ASSESSMENT

By Dean Scanlen,
BE(Hons)(Civil), CPEng, IntPE(NZ), CMEngNZ

1. This is a traffic assessment for papakāinga housing consisting of ten new dwellings and associated access, visitor parking, onsite services, a communal building, workshop, gardens and associated facilities, all on this site.

2. The focus of this report is the vehicle access and the suitability of its connection to State highway 12. I also briefly consider foot access/pedestrian safety and parking.

Overall Conclusion

3. Overall, the proposed access and its connection to State highway 12, which is proposed to be NZTA Diagram C, will be suitable and fit-for-purpose.

4. Excellent foot access and ample parking is proposed (especially with the proposed foot access to SH12 in the centre of Waimamaku, where there is almost always a significant surplus of on-street parking, and additional visitor parking). No other traffic-related impacts proposal will be more than negligible.

5. Overall, the risks associated with the project will be well within acceptable limits and its effects will be less than minor.

The proposal, site and environment

6. The proposal includes ten new dwellings, four of which are in two duplex buildings and have three bedrooms and one parking space each, the remaining six being stand alone dwellings with five bedrooms and two parking spaces each. The existing dwelling will remain, so the proposal results in a total of eleven dwellings.

7. The proposal is described in a plan set by Matakohe Architecture + Urbanism entitled *Te Roroa Papakāinga* referenced A103 and dated 16 June 2025. The site plan is reproduced in Appendix A. Engineering plans have been produced by Chester entitled *Civil Design – Waimamaku Papakāinga; Te Roroa Whatu Ora/Manawhenua Trust; 7229 State Highway 12, Waimamaku, Northland; Proposed Site Plan* referenced Project 15833 and dated 12 June 2025.

8. The site has a total area of slightly more than 16 hectares and three frontages to the southern side of State highway 12. The proposed access leads to the westernmost frontage and will need a new access crossing. The existing dwelling and associated sheds will be re-routed to connect to the new shared access, with most of the northern end of its existing driveway used for foot access only. The third frontage is at the eastern extent of the site[1] but is not proposed for any access (at this location, there is neither an existing access to the site nor a crossing point on SH12).

9. The proposed shared access loops around the southern side of all dwellings and the parking spaces associated with each. An additional area is proposed for visitor parking, with capacity for at least four cars. The access is proposed to have a general carriageway width of 5.0 metres, a single-lane bridge plus a turning area near the far end. Apart from the approaches to the bridge, the access is proposed to be unsealed.

10. The bridge is proposed to protect an existing wetland. There is a potential visibility restriction in one direction, so signs and markings are proposed as used for single-lane bridges on public roads, with the give-way in the direction of the potential visibility restriction – for exiting vehicles.

11. An internal network of walking pathways links the dwellings to each other, the various activities on the site and to SH12 by way of the existing driveway. That leads to the southern side of SH12 alongside the Waimamaku Bar and Grill[2] and is proposed to be closed to vehicle traffic by bollards. All walking paths are proposed to be sealed.

12. The new vehicle access is proposed to connect to the southern side of SH12 at route position 74/3.78 kilometres in a standard at-grade intersection with flares but no local widening[3].

13. This part of SH12 is sealed with two lanes and widths varying from 7.0 metres (which is the width at the proposed access connection point) to 13 metres (through parts of the CBD where there are parking lanes on both sides). SH12 is not "limited access road" in this locality. The speed limit is 70 km/hr[4]

Traffic

14. I estimate the traffic generation of the proposed dwellings at no more than 4 movements per day each. This is based primarily on a detailed assessment of per-household traffic generation on Wekaweka Road for a previous project[5]. It also accounts for the proximity of the dwellings to the Waimamaku CBD and the nature of papakāinga, in which sustainability and self-sufficiency, including the minimisation of car trips[6], are key tenets.

15. On this basis, the ten new dwellings would generate no more than 40 additional vehicle movements per day. A high proportion - estimated at more than 80%, will travel to/from the west because Waimamaku itself is within easy walking distance, all schools and most workplaces are west of the site and the nearest large service town in the other direction (Dargaville) is close to an hour's drive from Waimamaku.

[1] At route position 74/4.05 km.
[2] At route position 74/3.90 km.
[3] "Diagram C" layout – Waka Kotahi *Planning Policy Manual* Appendix B.
[4] Which extends for 1.2 kilometres approximately between the bridges at each end of the settlement.
[5] Based on recent traffic counts and a count of dwellings on Wekaweka Road. Even the higher traffic count was an average of fewer than 3 movements per dwelling per day. So four movements per dwelling per day can be considered conservative despite most of the new dwellings having five bedrooms.
[6] Through ride sharing, trip chaining and/or the use of other modes of travel.

16. This part of the highway carries traffic in the mid 800s of vehicle movements on an average day[7].

Assessment

Access

17. The council's standard for roads that lead to eleven dwellings is a public road with 6.0 metre carriageway width[8]. However, in reality, the estimated traffic generation is equivalent to fewer than five equivalent standard households[9]. The council's standard for that is a 5.0 metre carriageway – the same as the width proposed. This width enables two-way travel at relatively low speeds which, in conjunction with the bridge, will ensure speeds remain desirably low.

18. Furthermore, I recently carried out research into the relationship between road width and harm[10]. This found that, for both urban and rural road midblocks[11] between 4.4 and 8 metres wide, the rate of harm increases with increasing width. As such, especially for this access, which has no exit and leads only to the papakāinga, I conclude that the rate of harm on a 5.0 metre carriageway will be lower than that on a 6.0 metre carriageway and, in providing for two-way movements at low speed, is the optimum width.

19. The sight distance on the approach to the bridge might be restricted somewhat by trees. Pruning of the lower branches, and provision of signage and marking, with the give-way in the direction of the potential visibility restriction (exits), will minimise the impact of this.

20. To further evaluate the traffic safety risks associated with the proposed bridge, a Far North district-wide search has been carried out of injury-causing head-on crashes on single lane bridges. This did find eight such incidents in the most recent five calendar years of which three resulted in more than minor injuries ("DSI crashes").

21. However, there are a number of factors that contributed to the historic crashes on those bridges that will not exist on the proposed papakāinga access. The two most important are that all of the bridges are on much busier roadways – with traffic counts ranging from more than 300 to more than 3,000 movements per day[12] and all are in much higher speed environments – sealed roads with 100 km/hr speed limits and at least one approach that enables high speeds.

22. Visibility restrictions were also present on the approaches to several of those bridges including one in which a fatal crash was unfortunately reported (Roma Road Ahipara). Also, the give-way is often in the wrong direction (as it is on the Roma Road, Ahipara bridge).

[7] Mobile Road.
[8] Operative *Far North district plan* sec. 15.1.6C.1.1: Private Access in All Zones. Part c of this only permits private shared access to eight household equivalents. Access leading to more eight household equivalents would be permitted only if a public road of the standard specified in Appendix 3B-2. Otherwise, as with this proposal, the access is a discretionary activity under 15.1.6C.2.
[9] For which Appendix 3A of the district plan specifies a "traffic intensity factor" of 10 movements per day hour "household equivalent".
[10] Which has been peer-reviewed and was presented to the Engineers NZ Transportation Group conference in 2024. The rate of harm is defined by the average cost per injury-causing crash on a section of road, based on the severity of the crashes and standardised by vehicle-kilometres travelled. The research was empirical and considered the actual historical crash history on a large proportion of roads in the north island.
[11] Which are the sections between intersections.
[12] The busiest being SH10 at the old Kaeo bridge. Data from Mobile Road.

23. There is also a significant number of single-lane bridges in the district with visibility restrictions on at least one approach including many in which the give-way is in the wrong direction. Examples are given in the appendix. No injury-causing crashes are reported at any of those bridges, nor many others in the district with similar visibility restrictions, in the most recent 5 calendar years.

24. With the network of internal pathways and the pedestrian link to the footpath on SH12, along the existing driveway, there is no need for a footpath on the access.

The Access Connection to SH12

25. With the exception of one sightline associated with the proposed crossing on SH12, the sight distances exceed Waka Kotahi's standards. The exception – the sight distance west of the crossing itself, at 143 metres is only 0.4 seconds below the full standard – safe intersection sight distance[13]. That is also not a high-risk direction (especially with most exits from the site being left turns that are not in conflict with eastbound vehicles). The sight distances in the other direction, and in relation to all other access connection options, are well above all standards.

26. Waka Kotahi guidelines specify at least "Diagram D" treatment for this situation, potentially even the larger "Diagram E"[14]. Both treatments involve local widening of the highway through the access location.

27. Based on previous detailed assessments I have carried out on even busier sections of highway elsewhere, all with speed limits of 100 km/hr[15], I conclude that this part of SH12 is more than wide enough for the traffic movements this proposal will generate and that the risks associated with the proposed crossing ("Diagram C" standard) will be well within acceptable limits.

28. It is particularly notable that the absence of local widening, especially in urban speed limits, is resulting in a remarkably low rate of harm. While a number (eight) of crashes that local widening, such as Diagram D, is intended to address[16] have been reported on urban roads[17] in the Far North district[18] in the most recent five calendar year period, not one resulted in more than minor injuries (and not one occurred in Waimamaku nor, indeed, anywhere on SH12). This is despite the very large number of existing urban intersections in the district that do not have local widening.

29. Also, the Road to Zero strategy targets crashes that result in either death or serious injury ("DSI crashes"). A significant investment in a measure – local widening, is simply not warranted when the rate of DSI crashes it is intended to address is undetectable.

---

[13] I measured the eastbound operating speed, at the limit of visibility to the west, at 71 km/hr. I calculated both the safe-stopping and (higher) safe-intersection sight distance standards from first principles, with a surface friction coefficient of 0.36 and gradient correction (there is a 2.0% uphill gradient on the eastbound approach to the crossing point). The available sight distance provides for 4.6 seconds of travel at the full operating speed before the driver beings braking.

[14] *Planning Policy Manual* Appendix B. Table App5B/4 – Accessway Types, specifies Diagram D for accesses that carry between 31 and 100 "equivalent car movements" (ecms) per day and lead to highways that, like this, carry fewer than 10,000 movements per day. That manual also specifies 10.4 vehicle movements per day from each dwelling in any location, or more than 110 movements for eleven dwellings (which, for the reasons given, is completely unrealistic in this locality). Table App5B/4 is silent on accesses that carry more than 100 ecms per day.

[15] Including the SH12/Wharekawa Road intersection at Oue, which is both faster and busier than this locality and access connection.

[16] Rear-end crashes involving vehicles turning off a priority route. Types GA and GD in *CAS.*

[17] Speed limits 70 km/hr or lower.

[18] Including State highways.

30. The site has two other frontages with SH12. One, at route position 74/3.9 kilometres, is the existing driveway that is intended to be converted for pedestrian access. It runs though a very narrow corridor – only 4.5 metres wide at its northern end, with a connection point that often has visibility restrictions due to parked cars. The easternmost frontage is a pan handle at route position 74/4.05 and is only 7.0 metres wide. That is slightly below the width specified by the district plan[19] for 5 to 8 dwellings and well below that for eleven dwellings (which is 16 metres). Both of those frontages are within only 25 metres of two existing vehicle access points on the same side of the highway.

31. The western site frontage/access connection has significantly wider corridor – with a minimum width of 14 metres 100 metres from the highway, mostly much wider, plus the greatest separation from existing crossings by far.

Other matters

32. There is excellent foot access through Waimamaku including a footpath along the southern side of the highway including the access connection. Additional crossings of the highway are likely by people on foot, but such will already be occurring and no crashes of any sort have been reported anywhere in Waimamaku since at least the start of 2020.

33. Two parking spaces are proposed at each building. With four visitor spaces, there will almost certainly be an adequate supply of parking. If exceptional circumstances result in the parking supply being exceeded, there is ample additional space on grassed areas and/or always surplus space on SH12, which has parking lanes on both sides and links to the site by way of the existing driveway formation.

34. The demand on the crossing will be only a tiny fraction of its capacity, so the proposal cannot result in any congestion. SH12 has ample capacity for the small level of additional traffic the development will generate.

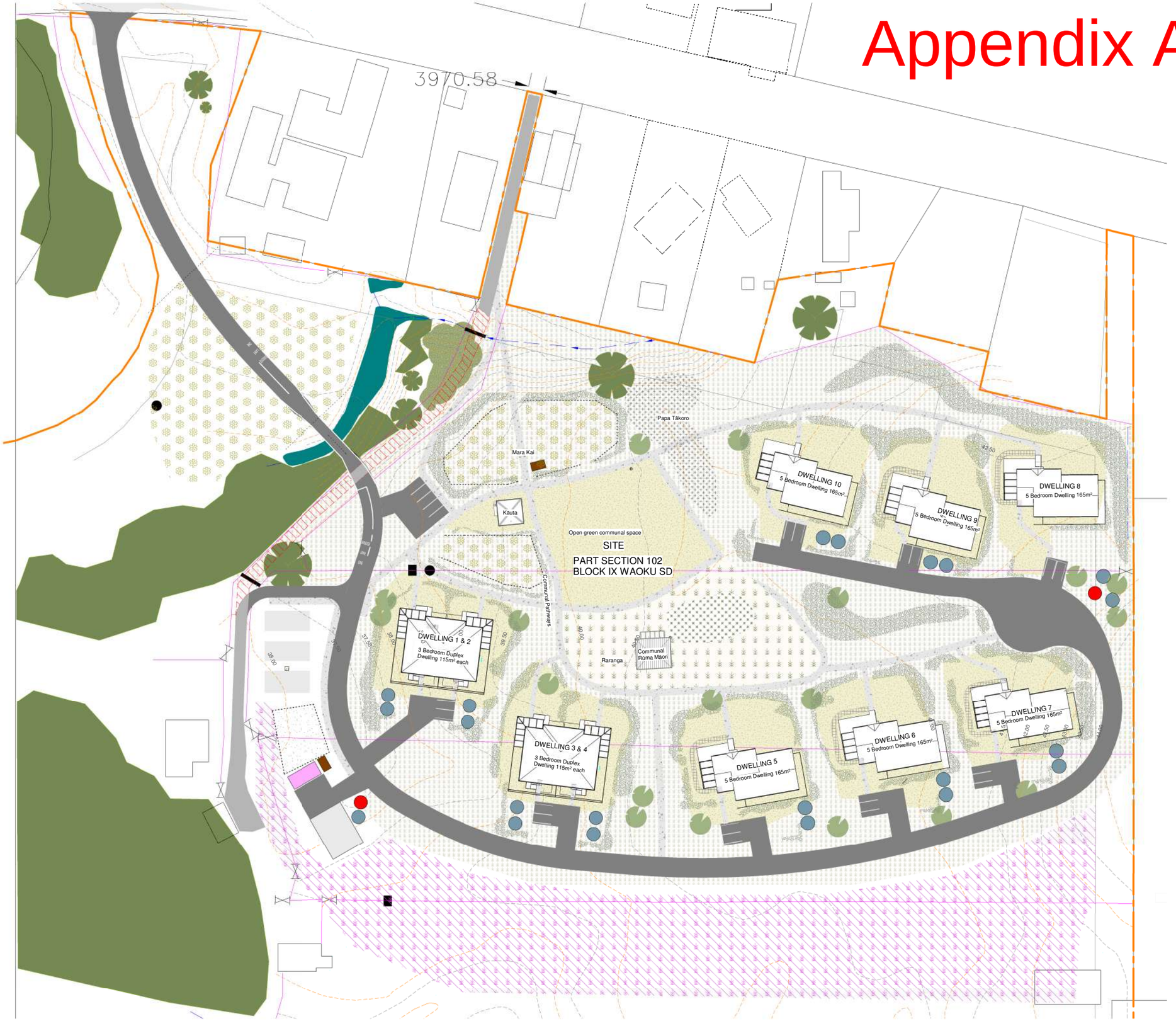
Prepared by Dean R Scanlen
BE(Hons)(Civil), CPEng, IntPE(NZ), CMEngNZ

Photo 1. A panorama of the proposed (western) site frontage from east (left) to west, centred near the recommended connection point. The sight distance towards the west is at least adequate as already explained, and that in the other direction is well above all standards. The footpath ends at the Waimamaku Playcentre a short distance west of this location.

[19] Appendix 3B-1.

Photo 2. The existing driveway and connection to SH12 viewed from the northern side of SH12. It is proposed that this be for foot access only.

Appendix A



SITE INFO

ADDRESS:	7229 STATE HIGHWAY 12, WAIMAMAKU, NORTHLAND
LEGAL DESCRIPTION:	Part Section 102 Block IX Waoku SD
ENVIROMENT AREA:	Rural Zone
OVERLAYS:	COASTAL LIVING
WIND ZONE:	High
CORROSION ZONE:	D
EARTHQUAKE ZONE:	1
CLIMATE ZONE:	1
RAINFALL RANGE:	
SITE AREA:	16.063 ha, 160,630m²

BUILDING COVERAGE

EXISTING MAIN DWELLING:	146.2m²
EXISTING STRUCTURES:	
Carport	52.8m²
Old Cowshed	88.1m²
TOTAL EXISTING FLOOR AREA	**287.1 m²**
PROPOSED DWELLING:	
4 x 3 bedroom	115m²
6 x 5 bedroom	167m²
TOTAL PROPOSED FLOOR AREA	**1295**m²
TOTAL BUILDINGS FLOOR AREA:	**1582.1m²**

IMPERMEABLE SURFACE:	
EXISTING:	718.2m²
PROPOSED:	7,607.7m²
TOTAL IMPERMEABLE	8,325.9m²
MAX BUILDING HEIGHT:	12m
MAX BUILDING COVERAGE	12.5%
PROPOSED BUILDING COVERAGE	0.80% COMPLIES
MAX IMPERMEABLE SURFACE	15%
MIN SETBACK FROM BOUNDARIES:	10m
MIN SETBACK FROM RIVERS:	30m

INFRASTRUCTURE:

WASTWATER TREATMENT
WATER SUPPLY
POWER SUPPLY

***papakāinga housing provisions require that each residential unit has at least 3,000m2 land area surrounding the unit for its exclusive use; provided that there is an additional 1.8ha of land elsewhere on the pplication site, in addition to the 3,000m2 surrounding the unit; i.e., a total land area of 2.1ha of land is required to be associated with each residential unit.*

LEGEND

- Property Boundary
- Contour lines at 0.5M Intervals
- Contour lines at 1.0M Intervals
- Existing gate
- Existing fence
- Proposed fence
- Proposed concrete pedestrian path: Main path - 1.8m wide Private path - 1.2m wide
- Private path - pavers or loose chips
- Existing dwelling
- Proposed dwelling
- Proposed deck / pergola
- Proposed auxillery / communal building
- Grass / open green area / private green area
- Hedging / screening plants
- Proposed māra kai
- Proposed solar panels
- Demolished path
- Rainwater collection tank
- Dedicated Firefighting Water Tank
- Existing impervious
- Proposed impervious
- Proposed dripfield location with planting
- Proposed Landscaping
- Proposed Raranga
- Proposed Rongoā
- Proposed Trees
- Existing Tree / Existing Native Bush
- Proposed native bush
- Clothes line
- Refuse Station
- Rubbish/recycling bin
- Compost
- 10m Wetland Setback
- 15m wetland setback
- 15m stream setback

Matakohe Architecture + Urbanism

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NORTH | 16.06.2025 | SCALE @A1 | 1 : 500 | PROPOSED SITE PLAN | **TE ROROA PAPAKĀINGA** | **A103**

Appendix B. Examples of existing single-lane bridges in the Far North district with visibility restrictions in at least one direction.

This is far from an exhaustive list. The bridge numbers are those in RAMM.

Broadwood Rd Bridge H14

Broadwood Rd Bridge H34

Diggers Valley Rd Bridge D07

Diggers Valley Rd Bridge D21

Diggers Valley Rd Bridge D22

Duncan Rd (Kaingaroa) Bridge C16

Fern Flat Rd Bridge E47

Fern Flat Rd Bridge E46

Fern Flat Rd Bridge E52

Fisher-Riley Rd Bridge E64

Golf View Rd Kerikeri S19

Hihi Rd Hihi F06 eastbound

Hihi Rd Hihi F06 westbound

Land Development Report

7229 State Highway 12, Waimamaku, Northland
Proposed Papakāinga

Prepared For:
Te Roroa Whatu Ora/Manawhenua Trust

Job No.: 15833
Rev: 0
Date: 10 July 2025

CHESTER

Revision History

Revision No	Description/comments	Prepared By	Date
0	First Issue	S Siva	10/07/2025

Document Control

Action	Name	Signed	Date
Prepared by	S Siva Civil Engineer		04/07/2025
Reviewed by	N. Jull Senior Civil Engineer		08/07//2025
Approved by	Steven Rankin CPEng (1012095)		08/07/2025

Distribution

Business/company	Attention	Role
Te Roroa Whatu Ora/Manawhenua Trust	Roger Herangi	Operations Manager
Matakohe Architecture and Urbanism	Kiri McKenna	Architect

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1 Introduction

Chester Consultants Ltd has been engaged by Te Roroa Whatu Ora/Manawhenua Trust to provide a Land Development Report with respect to the proposed development at 7229 State Highway 12, Waimamaku, Northland.

This report has been prepared solely for the benefit of this specific project, and Far North District Council (FNDC). Chester Consultants Ltd accepts no liability for inaccuracies in third party information used as part of this report. The reliance by other parties on the information or opinions contained in the report shall, without our prior review and agreement in writing, be at such parties' sole risk.

This report is based on development data provided by the client, Matakohe Architecture & Urbanism and data obtained from Far North District Council and Northland Regional Council maps current to the site at the time of this document's production. Should alterations be made which impact upon the development not otherwise authorised by this report then the design / comments / recommendations contained within this report may no longer be valid.

In the event of the above, the property owner should immediately notify Chester Consultants Ltd to enable the impact to be assessed and, if required, the design and or recommendations shall be amended accordingly and as necessary.

2 Existing Site Description

The development site is located at 7229 State Highway 12, Waimamaku, Northland and is legally described as Pt Sec 102 Blk IX Waoku SD. The total site area is 16.1 ha. The site is zoned as 'Rural Production' under both the Operative and Proposed Far North District Plans.

The site contains an existing house, garage, old cowshed, and fencing, all of which are proposed to remain. There is scattered vegetation throughout the site. The site is not currently serviced for 3-waters. There is an overhead power line running near the northern boundary, along State Highway 12. The site is accessed off State Highway 12.

The majority of the development site comprises a gently sloping grassed area located toward the western portion of the property. A steeper slope is present along the northern boundary, where the site adjoins neighbouring land, and along the northern to western edge of the site, where the existing stream is situated and follows a general north–west alignment.

Figure 1: Existing site aerial image (FNDC GIS Maps 07/05/2025)

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3 Proposal

It is proposed to construct ten new dwellings with a workshop, associated access and servicing. For further information, refer to the site plan prepared by Matakohe Architecture and Urbanism in Figure 2 below,

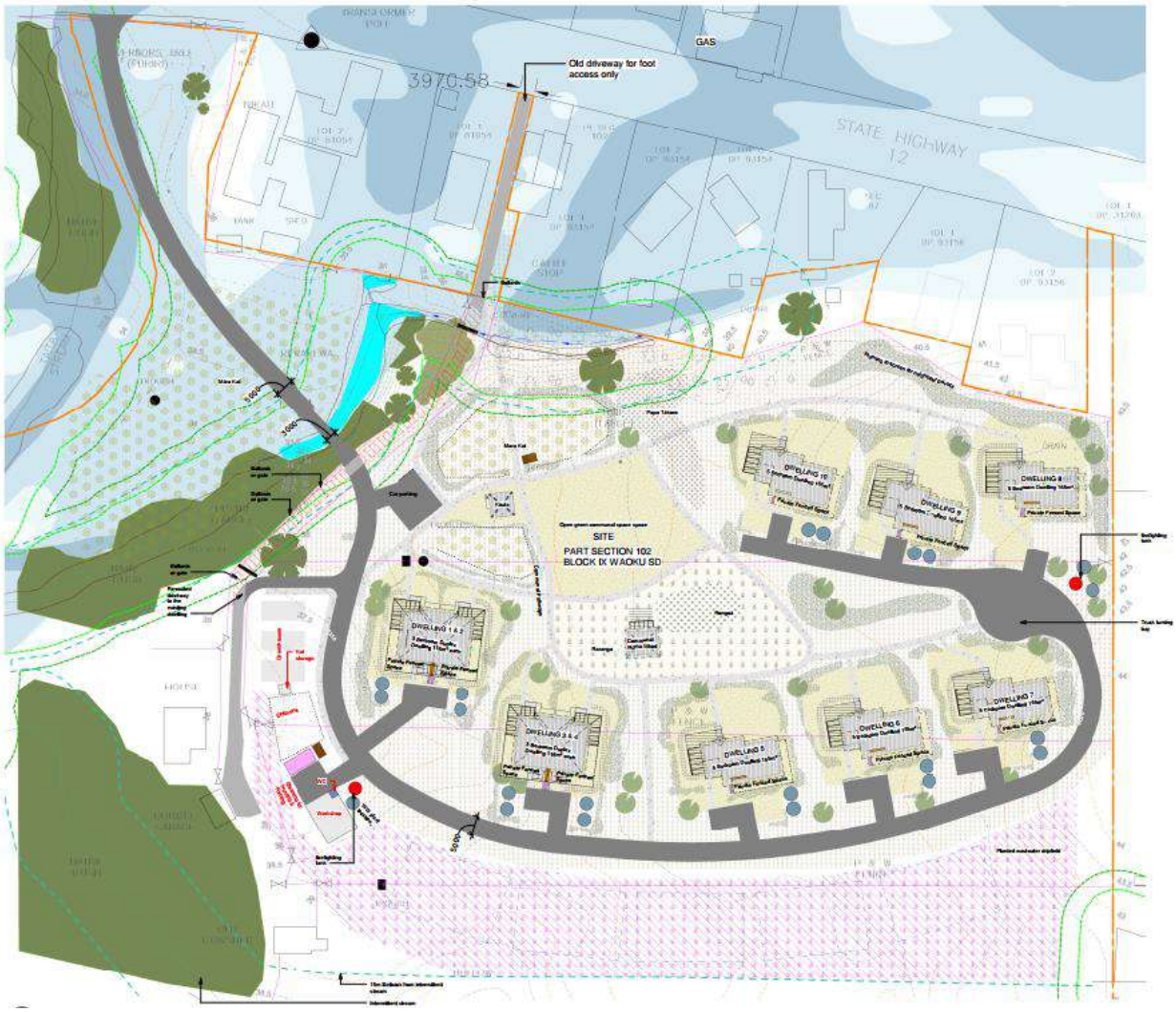

Figure 2: Proposed Site Plan (Matakohe Architecture & Urbanism)

This report is intended to accommodate a Resource Consent application and will report on the following:

- Earthworks, Erosion & Sediment Control,
- Access,
- Water Supply,
- Wastewater,
- Stormwater,
- Flood Risk Assessment

This report is intended to be read in conjunction with the accompanying Chester drawings.

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4 Earthworks, Erosion & Sediment Control

4.1 Earthworks

Earthworks are proposed across the site to establish level building platforms, form the accessway, and manage secondary flows. Due to the site's gentle topography, significant retaining structures or steep batter slopes are not anticipated for the dwelling platforms. However, batter slopes and abutment retaining will be required to construct the bridge abutments where the accessway crosses the wetland.

4.1.1 Earthworks Area and Volume

Table 1 below summarises the bulk earthwork volumes required in terms of existing ground versus proposed ground as shown on the civil drawings. Earthworks proposed within the 10%, 1% AEP floodplains and 10m of Wetland are included in the table

Table 1: Cut – Fill Volumes

Location	Area (m^2)	Cut (m^3)	Fill (m^3)	Net (m^3)
Total Earthwork within Site	17140	1846	2162	316 (Fill)
Within 10% AEP Floodplain	36	2	1	1 (Cut)
Within 1% AEP Floodplain	1243	125	493	368 (Fill)
Within 10m of Wetland	372	15	344	329 (Fill)

Some of the excavated material may be reused onsite as fill, provided testing is undertaken and it meets the necessary requirements as recommended in the Geotechnical Report prepared by Hawthorn Geddes dated 16 June 2025.

4.1.2 Cut/Fill Depths

Maximum cut and fill depths are anticipated to be approximately 1.62m cut and 2.8m fill across the site. The bulk of the cutting is associated with the formation of accessways and swales, while filling is primarily required to establish suitable building platforms and bridge abutments.

4.1.3 Construction Methodology

In general work operations across the site will involve:

- Vegetation clearance (with specialist ecological oversight).
- Installation of erosion and sediment controls.
- Progressive stripping of organic layers and unsuitable material, stockpiled clear of earthworks or removed from the site.
- Bulk earthworks and retaining.
- Drainage and services.
- Roading.
- Progressive Stabilization and Landscaping.
- Decommissioning of erosion and sediment controls.
- On-going mulching and establishment of vegetation.

The final construction methodology to complete works will be determined with input from the contractor at pre-commencement stage.

4.2 Proposed Regional Plan for Northland

Table 2 sets out our assessment against section C.8.3.1 Earthworks – permitted activity of the Proposed Regional Plan for Northland, February 2024

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Table 2:Proposed Regional Plan for Northland - Permitted Activity Assessment

Rule C.8.3.1	Assessment/Comment
1. *Within 10m of a natural wetland, the bed of a continually or intermittently flowing river or lake* a. *200m² of exposed earth at any time, and* b. *50m³ of moved or placed earth in any 12-month period.*	Earthworks of 372 m² and 344m³ of fill are proposed, exceeding the 200 m² and 50 m³ thresholds.
2. *Within 10m of an īnanga spawning site* a. *200 m² of exposed earth at any time, and* b. *50m³ of moved or placed earth in any 12-month period*	We understand the development site is not near any īnanga spawning site
3. *Catchment of an Outstanding Lake - 2,500m² of exposed earth at any time*	The development site is not within the catchment of an outstanding lake
4. *Erosion-prone Land - 2,500m² of exposed earth at any time*	The development site is not within any land hazard overlays
5. *High-risk flood hazard area - 50m³ of moved or placed earth in any 12-month period.*	2m³ of cut and 1m³ of fill is proposed, which is less than 50m³
6. *Coastal riparian and foredune management area - Excluding for coastal dune restoration, 200m² of exposed earth at any time*	The development site is not within coastal riparian and foredune management area
7. *Flood hazard area - 100 m³ of moved or placed earth in any 12-month period.*	125m³ of cut and 493m³ of fill is proposed, which is more than 100m³
8. *Other areas - 5,000m² of exposed earth at any time.*	17,140m² of area of earthwork is proposed, which is more than 5000m²

4.3 Erosion and sediment control

Best practice erosion and sediment control will be implemented to mitigate the effect of the earthworks to the surrounding environment. The sediment control devices will be constructed in general accordance with Auckland Council's Guidance Document 005 (GD05) and may include, but not be limited to the following:

- Stabilised Construction Entranceway,
- Silt Fences / Super Silt Fences,
- Clean / Dirty water diversion bunds,
- Decanting earth bunds,
- Progressive site stabilisation.

The Contractor will be ultimately responsible for specific design, installation, maintenance, and removal of various protection measures in accordance with GD05 as necessary to align with actual construction operations and staging.

Refer to drawing 210 of the accompanying civil design drawings for more information and an indicative erosion and sediment control plan.

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5 Access

5.1 Traffic

A Traffic Report has been prepared that describes the existing and proposed traffic movements of the development site. Please refer to the Traffic Report prepared by Engineering Outcomes Ltd.

5.2 Vehicle Crossing

5.2.1 Existing Crossing

The project site shares a legal boundary with the State Highway 12 reserve and thus has a legal means of access to and from the property. It is proposed that this existing crossing be repurposed for pedestrian access only as part of the development.

5.2.2 Proposed Crossing

It is proposed to construct a new vehicle crossing to provide access to both the existing dwelling and the proposed development from State Highway 12, at the western end of the property. The legal boundary of the site extends into the State Highway 12 road reserve, necessitating formal consultation with Waka Kotahi NZ Transport Agency (NZTA) as part of the resource consent process. This consultation, including assessment and approval of the connection type, is expected to be led by the traffic engineer.

Two potential access options have been considered in accordance with NZTA's Accessway Standards – Diagrams C and D, each featuring a 5.0 m width at the boundary. Both access configurations have been incorporated into our plans to demonstrate that either option can be feasibly implemented at the proposed connection point.

In our opinion, Accessway Standard Diagram C is the most appropriate and sufficient solution for the site's intended use.

Refer to the Civil Design 800 plans prepared by Chester for more information.

5.3 Private Accessway

A new shared accessway is proposed to provide access to both the existing dwelling and the proposed development. The accessway is designed generally in accordance with Section 15.1.6C – Access and Appendix 3B-1: Standards for Private Access of the Far North District Plan, as illustrated in Figure 6 below. As the accessway will serve a total of 11 dwellings, a formed width of 5.0 m is proposed to comply with the relevant standards. At the point where the accessway crosses the existing wetland, it will narrow to a 3.0 m one-way bridge, to minimise disturbance to the wetland environment

The client has expressed a preference for the accessway to be constructed using a sealed surface, due to its heightened aesthetic characteristics. However, this may be subject to development budget constraints. In the event, sealed surfacing (e.g. chipseal or asphalt) is not financially feasible, a compacted gravel surface will be utilised as an alternative.

In our professional opinion, a gravel surface remains appropriate for the proposed development, given the rural context of the site. In either case, shallow swales will be installed adjacent to the accessway to effectively manage stormwater runoff and maintain site drainage. The final surface treatment—whether asphaltic concrete or gravel—will be confirmed during the detailed design phase.

Refer to the Civil Design 800 plans prepared by Chester for more information.

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APPENDIX 3B-1: STANDARDS FOR PRIVATE ACCESS

(Reference: ***Part 3 District Wide Provisions, Section 15.1 Traffic, Parking and Access*** and ***Zone Maps***)

Zone	No. of H.E.s	Legal Width	Carriageway Width	Maximum Gradient		Kerb	Foot-path	Storm-water Drain[1]
				Unsealed	Sealed			
Rural Production Rural Living	1	-	3.0	1:5	1:4	-	-	Yes
Waimate North Horticultural Processing Carrington Estate	2	5	3.0	1:5	1:4	-	-	Yes
General Coastal Coastal Living	3 – 4	7.5	3.0 with passing bays	1:5	1:4	-	-	Yes
South Kerikeri Inlet Recreational Activities	5 – 8	7.5	5.0	1:5	1:4	-	-	Yes

[1] All private access must have stormwater drainage measures such that adverse effects are not created on adjoining properties or the public road, in accordance with Council's "*Engineering Standards and Guidelines*" *(June 2004 – Revised 2009)*

Note 1: H.E. = Household Equivalent represented by 10 vehicle movements

Note 2: Refer to ***Rules 15.1.6B.1.1(c) and (d)***.

Note 3: Access for more than 8 Household Equivalents shall be by public road and constructed to a standard identified in ***Appendix 3B-2***.

Note 4: Access carriageways in urban zones that serve two or more users shall be sealed or concreted, refer ***Rule 15.1.6B.1.2(c)***.

Figure 3: FNDC Appendix 3B-1: Standards for Private Access

6 Water Supply

6.1 Existing Water Supply Network

There is no public reticulated water supply available to the site.

6.2 Proposed Potable Water Supply

It is proposed to install on-site water tanks to service the proposed development in terms of potable water supply, which is typical in the surrounding rural area. At the time of the building consent application for the proposed new dwellings, the rainwater tanks will be designed and installed in accordance with the New Zealand Building Code G12 Section 5. The following Figure 7 extracted from the Auckland Region Countryside Living Toolbox is a recommendation for potable water supply volumes. For practical storage reasons based on the available water capture from the small roof areas and the number of bedrooms per dwelling, we are recommending 50m^3 of storage for the 3-bedroom dwellings and 60m^3 of storage for 5-bedroom dwellings.

Table C12
Minimum Tank Size for RDC Homes Having Tanks as Sole Water Source

Usable Roof Area (m^2)	Bedrooms				
	1	2	3	4	5
100	20	50			
120	15	35	75		
140	10	30	60		
160		20	50		
180			45	75	
200			35	65	
220			30	55	90
240			30	50	80
260				45	70
280				40	65
300				35	60

Colours indicate units of 25 cubic metres (5,000 gallons):

1 x 25 m^3 | 2 x 25 m^3 | 3 x 25 m^3 | 4 x 25 m^3

Figure 4: Recommended Tank Size based on Roof Area and Bedrooms from The Countryside Living Toolbox Table C12

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6.3 Fire Fighting Water Supply

The site's water supply classification for firefighting is FW2 as per the Engineering Standards and SNZ PAS 4509:2008. The requirement for FW2 for the non-reticulated water supply is Storage of 45 cubic metres to provide firefighting water supply for 30 minutes not more than 90 metres, as shown below in Table 3.

Table 3: SNZPAS4509:2008 Firefighting Water Supply Recommendations

Fire Water Classification	Reticulated water supply			Non-reticulated water supply	
	Required water flow within a distance of 135 m	Additional water flow within a distance of 270 m	Maximum number of hydrants to provide flow	Minimum water storage (within 90m)	
				Time (firefighting) (min)	Volume (m³)
FW1	450 L/min	-	1	15	7
FW2	**750 L/min**	**750 L/min**	**2**	**30**	**45**
FW3	1500 L/min	1500 L/min	3	60	180
FW4	3000 L/min	3000 L/min	4	90	540
FW5	4500 L/min	4500 L/min	6	120	1080
FW6	6000 L/min	6000 L/min	8	180	2160
FW7	*As per Appendix H of SNZPAS4509:2008*				

To achieve firefighting water supplies a best practical approach has been adopted. Across the site two 25,000-liter dedicated firefighting water supply tanks are proposed. They have been positioned near the access road hardstand and in a position such that each house is within 90m of one of the tanks. An approval has been granted by Fire and Emergency New Zealand (FENZ) supporting this proposal. Please refer Appendix B for further detail. The dedicated firefighting water tanks will be connected to the adjacent dwelling's potable water tanks. Overflow from the potable tanks will be directed into the firefighting tanks, which will also be supplemented by rainwater collection.

Refer to drawing 600 of the accompanying civil design drawings for further details.

7 Wastewater

7.1 Existing Reticulation

The development site is not connected to the existing public wastewater network.

7.2 Proposed Wastewater Reticulation

The development site does not have a connection to the existing public network. As such, on-site wastewater treatment and disposal is proposed.

7.2.1 Site Assessment

Geotechnical investigations at the development site were undertaken by Hawthorn Geddes. The site was found to consist of alluvial soils classified as Whakapara mottled clay loam (WFm). At the borehole location (BH12), situated within the proposed wastewater disposal field, topsoil was encountered to a depth of 100 mm, underlain by approximately 600 mm of silty clay. Beneath this, at a depth of 700 mm, the soil was identified as clay with minor silt content. Based on these findings, the soil at the proposed disposal field location is classified as clay loam, which corresponds to Category 4 under AS/NZS 1547:2012. The soil category used for design purposes has been selected in accordance with Table 5.1 of AS/NZS 1547:2012, as summarised below.

Please refer to the Geotechnical Investigation Report prepared on the 16 June 2025 by Hawthorn Geddes for further details.

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Table 4: Selected Soil Category as per ASNZS 1547:2012

Selected Soil Category	Soil Description
Category 4	Clay loams

7.2.2 Groundwater

Based on the geotechnical investigation by Hawthorn Geddes, elevated groundwater levels are anticipated to occur no shallower than 0.5 m below ground level. To maintain the required vertical separation from the winter groundwater table and to avoid surface runoff from the upslope catchment, a 200 mm layer of fill is proposed over the wastewater disposal and reserve areas.

7.2.3 Design Flow Volume

The following section presents the design occupancy and design flow volume from the proposed development site.

Table 5: Design Occupation (Interpreted from ASNZS 1547:2012)

Typology	No. of Bedrooms	No. of Dwellings	Population Equivalent	Design Occupancy
A	3 Bedroom	4	5	20
B	5 Bedroom	6	8	48
			Total	68

Table 6: Design flow volume for proposed development site

Design Flow Detail	
Design Occupancy	68 (Table 9-2 above)
Design Flow Allowance per Person	180 L/person/day (ASNZS 1547:2012, Table H3, Water Tank Supply)
Design Flow Volume	**12240 L/day** from the proposed development site

Refer to drawing 500 of the accompanying civil design drawings for further details.

7.3 Wastewater System

7.3.1 Treatment System

The treatment system required for this design is proposed to be secondary wastewater treatment, treating a design flow of 12,240 L/day, as outlined in Table 6 above. The supplier will be determined at the detailed design stage.

7.3.2 Land Disposal System

Pressure Compensating Drip Irrigation (PCDI) is proposed as the disposal system for this development. Details of the PCDI system as follows,

Table 7: Land Disposal System Details

Land Disposal Detail	
Disposal Method:	PCDI
Distribution Pipe Spacing:	At 1m centres
Selected Loading Rate:	3.5 mm/day (Category 4 soils, ASNZS 1547:2012, Table M1)
Disposal Field Area:	12240/3.5 = **3497m²**
Reserve Area:	**1049m²**
Servicing Requirement:	As per the manufacturer's specifications

Refer to Chester Drawing 510 for the proposed location of the treatment and disposal system.

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7.4 Planning Assessment

7.4.1 Far North District Council Operative Plan

We believe that the proposal is a permitted activity under Far North District Council Operative Plan. Table 8 below sets out the relevant rule under Section 7, Chapter 12:

Table 8: FNDC Operative Plan - Permitted Activity Assessment

Rule 12.7.6.1.4	Assessment/Comment
Land use activities which produce human sewage effluent (including grey water) are permitted provided that: *a. the effluent discharges to a lawfully established reticulated sewerage system; or* b. *the effluent is treated and disposed of on-site such that each site has its own treatment and disposal system no part of which shall be located closer than 30m from the boundary of any river, lake, wetland or the boundary of the coastal marine area.*	The development is proposed to be treated and disposed of by a system which has no part closer than 30 m from the bank of any river, lake, wetland, or the boundary of the coastal marine area.

7.4.2 Proposed Regional Plan for Northland

Table 9 sets out our assessment against section C.6.1.3 Other on-site treated domestic wastewater discharge – permitted activity of the Proposed Regional Plan for Northland, February 2024.

Table 9: Proposed Regional Plan for Northland - Permitted Activity Assessment

Rule C.6.1.3	Assessment/Comment
1. *The on-site system is designed and constructed in accordance with the Australian/New Zealand Standard. On-site Domestic Wastewater Management (AS/NZS 1547:2012), and*	The on-site wastewater system has been designed in accordance with AS/NZS 1547:2012.
2. *The volume of wastewater discharged does not exceed two cubic metres per day, and*	The maximum daily design flow volume is 12.24 cubic metres per day which is more than 2 cubic metres and therefore **not compliant.**
3. *The discharge is not via a spray irrigation system or deep soakage system, and*	The discharge is **not** via a spray irrigation system or deep soakage system.
4. *The slope of the disposal area is not greater than 25 degrees, and*	The disposal area is located on the slopes not greater than 25 degrees
5. *For wastewater that has received secondary or tertiary treatment, it is discharged via:* *a. a trench or bed system in soil categories 3 to 5 that is designed in accordance with Appendix L of Australian/New Zealand Standard On-Site Domestic Wastewater Management (AS/NZS 1547:2012); or* *b. an irrigation line system that is dose loaded and covered by a minimum of 50 millimetres of topsoil, mulch, or bark, and*	The wastewater will receive **secondary treatment and is disposed of into category 4 equivalent soils via PCDI system**.

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6. *For the discharge of wastewater onto the surface of slopes greater than 10 degrees:* *a. the wastewater, excluding greywater, has received at least secondary treatment, and* *b. the irrigation lines are firmly attached to the disposal area, and* *c. where there is an up-slope catchment that generates stormwater runoff, a diversion system is installed and maintained to divert surface water runoff from the up-slope catchment away from the disposal area, and* *d. a minimum 10 metre buffer area down-slope of the lowest irrigation line is included as part of the disposal area, and* *e. the disposal area is located within existing established vegetation that has at least 80 percent canopy cover, or* *f. the irrigation lines are covered by a minimum of 100 millimetres of topsoil, mulch, or bark, and*	The proposed disposal system discharges onto a slope shallower than 10 degrees, so this does not apply.
7. *The disposal area and reserve disposal area are situated outside the relevant exclusion areas and setbacks in Table 9: Exclusion areas and setback distances for on-site domestic wastewater systems, and*	The proposal complies with all exclusion areas and setback distances set out in Table 9.
8. *For septic tank treatment systems, a filter that retains solids greater than 3.5 millimetres in size is fitted on the outlet, and*	The proposed system will have a filter that meets this requirement.
9. *The following reserve disposal areas are available at all times:* *a. 100 percent of the existing effluent disposal area where the wastewater has received primary treatment or is only comprised of greywater, or* *b. 30 percent of the existing effluent disposal area where the wastewater has received secondary treatment or tertiary treatment, and*	The wastewater receives secondary treatment system and a 30% reserve area is proposed.
10. *The on-site system is maintained so that it operates effectively at all times and maintenance is undertaken in accordance with the manufacturer's specifications, and*	A maintenance agreement between the applicant and supplier (or other suitably qualified contractor) is to be entered in to.
11. *The discharge does not contaminate any groundwater water supply or surface water, and*	Noted.
12. *There is no surface runoff or ponding of wastewater, and*	Noted.
13. *There is no offensive or objectionable odour beyond the property boundary.*	Noted.

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8 Stormwater

8.1 Existing Reticulation Network

There is no public stormwater network available to the site.

8.2 Proposed Network

The site is located within the Rural Production Zone, as defined under both the Operative and Proposed Far North District Council (FNDC) District Plans. In accordance with the relevant planning frameworks, impervious surfaces are a permitted activity within this zone, provided they do not exceed 15% of the total site area.

The impervious area of the proposed development is less than 5% of the total site area, which remains well within the permitted threshold for stormwater management. Therefore, no further mitigation is required under the FNDC Operative Plan.

Stormwater runoff from the building roofs will be collected and stored in rainwater tanks for reuse as a potable water supply for the development. In overflow conditions, excess runoff will be directed to the proposed swale network, which conveys flows to the existing stream located to the north and west of the site.

Surface runoff from the private accessway and common parking area will similarly be intercepted by the swale network and directed to the same discharge points. This integrated stormwater management strategy ensures that both roof and surface runoff are effectively managed, supporting the site's drainage objectives and minimising environmental impact.

Refer to the Civil Design 400 plans prepared by Chester for more information.

8.3 Stormwater Management

The following sections discuss the proposed Best Practical Option (BPO) stormwater management approach for the development in accordance with the key stormwater management criteria outlined in Table 4-1 of the FNDC Engineering Standards 2023. Our proposal considers the site-specific catchment and downstream receiving environment characteristics.

8.3.1 Stormwater Quality Treatment

The proposed impervious areas consist of building roofs, low-volume accessways, and a common parking area—all considered low-contaminant-yielding surfaces due to their intended use and limited traffic exposure. Roof and accessway runoff will be collected and conveyed via a swale network, which will provide passive stormwater quality treatment through filtration and sedimentation.

Given the low contamination risk associated with the site's impervious areas and the use of vegetated swales for both conveyance and treatment, no additional stormwater quality treatment is deemed necessary for the site. The proposed passive treatment measures are considered sufficient to address stormwater quality concerns.

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8.3.2 Volume (Stream Protection)

Retention and reuse of roof runoff is proposed for all dwellings via onsite rainwater tanks, thereby reducing the volume of stormwater discharged to the receiving environment. In addition, runoff from the accessways will be conveyed through vegetated swales, which promote infiltration and attenuation of flows. Together, these measures contribute to stream protection by reducing peak discharge volumes of the high frequency storms, extending runoff durations, and minimising hydrological impacts on downstream receiving environments. Given the above, no further volume reduction measures are proposed nor deemed necessary.

8.3.3 Flow Attenuation (50% and 20% AEP event)

The site is not discharging into an existing reticulated stormwater network, and as discussed earlier, roof runoff will be stored in rainwater tanks for full water reuse, reducing stormwater volume and peak flow during the 50% and 20% AEP events. Accessway runoff will flow through swales to promote infiltration and slow water flow, minimising peak discharge and protecting downstream environments.

8.3.4 Flood Control (1% AEP event)

Flooding Hazards have been identified downstream of the site however those are associated with the wider and significant Waimamaku River catchment. The site is situated in the lower third of the catchment area and given its position within this part of the catchment, runoff from the site will be discharged into the Waimamaku River before it reaches peak flow during the 1% AEP event. Efforts to try providing Flood Control Attenuation at the development will be ineffective, and in fact may overall worsen the downstream peak flow. Reason being is the flood attenuation device restricts the peak flow rate and in turn increases the time required to discharge the flow. In this case might cause slight increase to the site discharge when the Waimamaku River flow peak arrives. For the reasons above, no further Flood Control are proposed nor deemed necessary.

8.4 Proposed Regional Plan for Northland

Table 10 sets out our assessment against section C.6.4.2 Other stormwater discharges – permitted activity of the Proposed Regional Plan for Northland, February 2024

Table 10: Proposed Regional Plan for Northland - Permitted Activity Assessment

Rule C.6.4.2	Assessment/Comment
1. *The discharge or diversion is not from:* *a. a public stormwater network, or* *b. a high-risk industrial or trade premises, and*	The discharge is <u>not</u> from a public stormwater network or high-risk industrial or trade premises.
2. *The diversion and discharge does not cause or increase flooding of land on another property in a storm event of up to and including a 10 percent annual exceedance probability, or flooding of buildings on another property in a storm event of up to and including a one percent annual exceedance probability, and*	For the reasons in the above sections, in our opinion the discharge will not cause or increase flooding on another property.
3. *where the diversion or discharge is from a hazardous substance storage or handling area:* *a. the stormwater collection system is designed and operated to prevent hazardous substances stored or used on the site from entering the stormwater system, or* *b. there is a secondary containment system in place to intercept any spillage of hazardous substances and either discharges that spillage*	The discharge is <u>not</u> from a hazardous substance storage or handling area.

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to a trade waste system or stores it for removal and treatment, or *c. if the stormwater contains oil contaminants, the stormwater is passed through a stormwater treatment system designed in accordance with the Environmental Guidelines for Water Discharges from Petroleum Industry Sites in New Zealand (Ministry for the Environment, 1998) prior to discharge, and*	
4. *Where the diversion or discharge is from an industrial or trade premises:* *a. the stormwater collection system is designed and operated to prevent any contaminants stored or used on the site, other than those already controlled by condition 3) above, from entering stormwater unless the stormwater is discharged through a stormwater treatment system, and* *b. any process water or liquid waste stream on the site is bunded, or otherwise contained, within an area of sufficient capacity to provide secondary containment equivalent to 100 percent of the quantity of any process water or liquid waste that has the potential to spill into a stormwater collection system, in order to prevent trade waste entering the stormwater collection system, an*	The discharge is <u>not</u> from an industrial or trade premises.
5. *The diversion or discharge is not into potentially contaminated land, or onto potentially contaminated land that is not covered by an impervious area, and*	The discharge is <u>not</u> into potentially contaminated land, or onto potentially contaminated land that is not covered by an impervious area.
6. *The diversion and discharge does not cause permanent scouring or erosion of the bed of a water body at the point of discharge, and*	Erosion and scour protection is proposed at the point of discharge.
7. *The discharge does not contain more than 15 milligrams per litre of total petroleum hydrocarbons, and*	The proposed impermeable areas are all low contaminant yielding and are very unlikely to pick up petroleum hydrocarbon contaminants of more than 5 milligrams per litre.
8. *The discharge does not cause any of the following effects in the receiving waters beyond the zone of reasonable mixing:* *a. the production of conspicuous oil or grease films, scums or foams, of floatable or suspended materials, or* *b. a conspicuous change in the colour or visual clarity, or* *c. an emission of objectionable odour, or* *d. the rendering of freshwater unsuitable for consumption by farm animals, or* *e. the rendering of freshwater taken from a mapped priority drinking water abstraction*	None of these effects are anticipated on the receiving waters.

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point (refer I Maps | Ngā mahere matawhenua) unsuitable for human consumption after existing treatment.

9 Flood Assessment

From the NRC Natural Hazard Regionwide Models flood mapping for 10-year, 50-year and 100-year events shown below in Figure 5, we understand the low-lying parts of the site is subject to Waimamaku River flood, however majority of the proposed development is located within the centre elevated part of the site and is not subject to flood hazard except the accessway.

Our interpretation of the NRC flood mapping indicates that the accessway is only shown to be inundated during the 1% AEP design storm event. The inundation results from the combined effects of two contributing flow conditions: overtopping of Taita Stream along the man-made diversion section upstream of Waimamaku Township, causing the stream to follow its historic flow path and overtopping of the unnamed stream that runs roughly parallel to the northern side of State Highway 12, which crosses the highway via a culvert west of the site boundary. This is considered a low frequency event and based on NRC surveyed flood levels and anecdotal evidence provided by the client, no such inundation has been observed within the past decade.

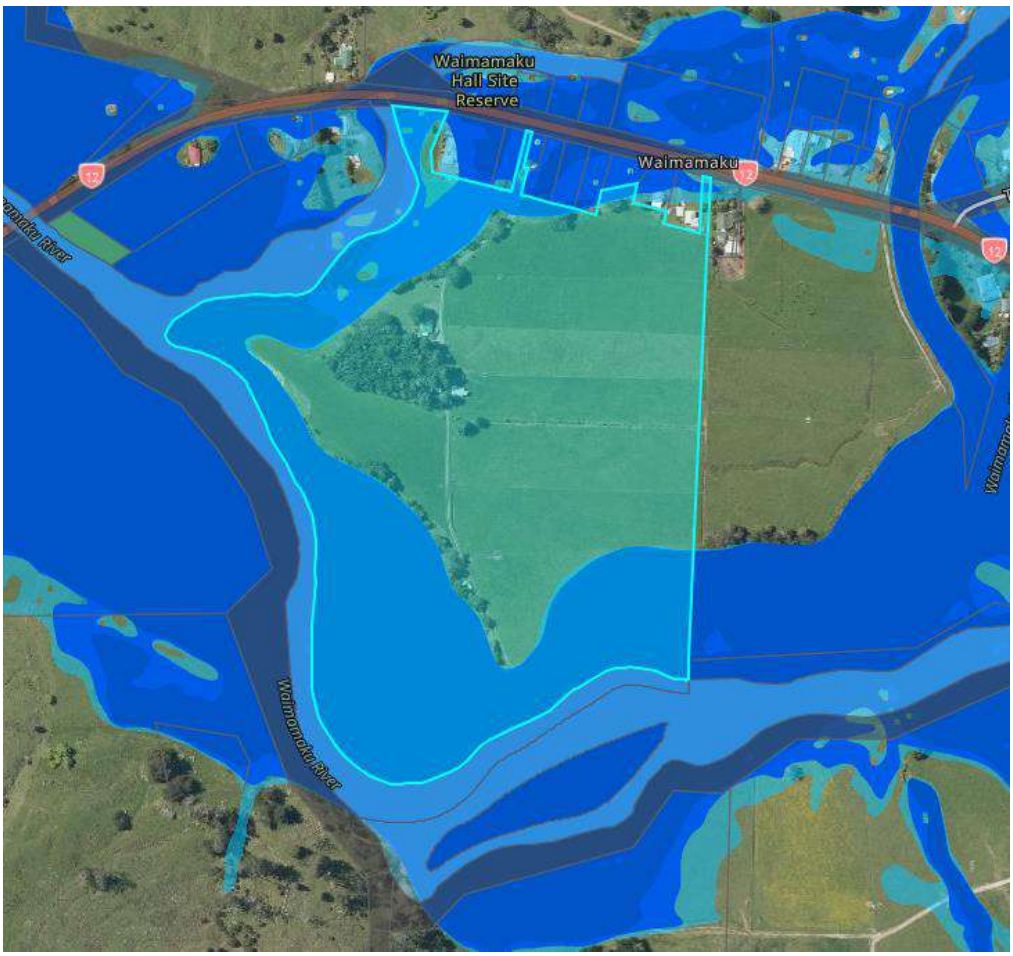

Figure 5: NRC Natural Hazard Regionwide Models Flood map (NRC Hazards Map 08/05/2025)

It is proposed to construct a new accessway across the low-lying area to service the proposed development, the proposed accessway within the flood plain will follow the existing ground profile and have a low-profile cross section to enable flood water to sheet flow across the road during significant rainfall event, thus ensuring less than minor effect to the flood levels within the neighbouring properties.

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We note that localised fill will be introduced within the flood plain to construct the proposed bridge abutments, however, given the extent of the flood plain and the width of the overall flood cross section, the effect of such fill in relation to the flood level is considered less than minor.

9.1 Flood Risk

As part of the flood risk assessment, flood level and peak velocity raster data from the region-wide hydraulic model (Model M03) have been obtained from the Northland Regional Council (NRC). These datasets have been used to assess flood depths and peak velocities along the portion of the accessway subject to inundation, as illustrated below.

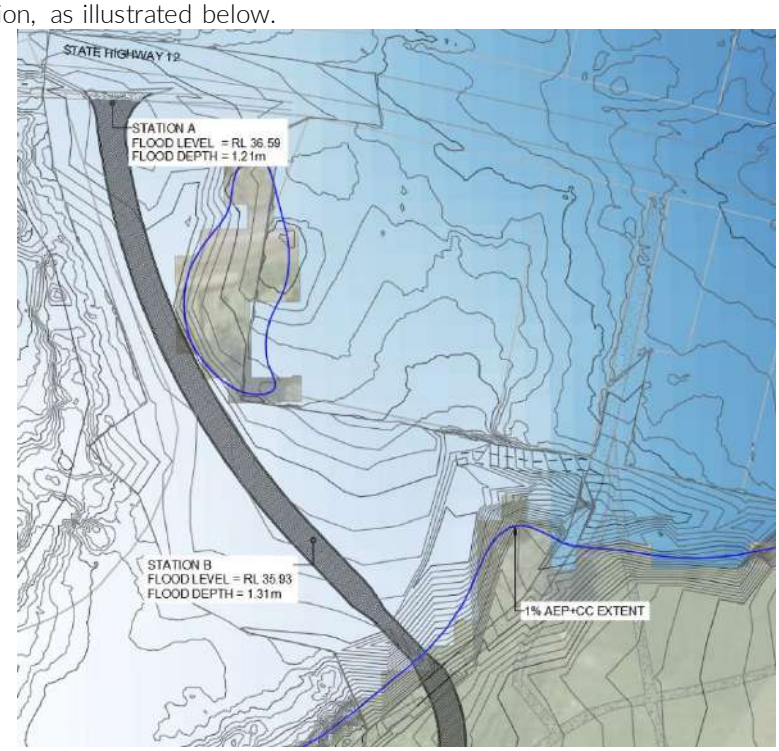

Figure 6: 1% AEP Flood Level from NRC Regional wide Hydraulic Model

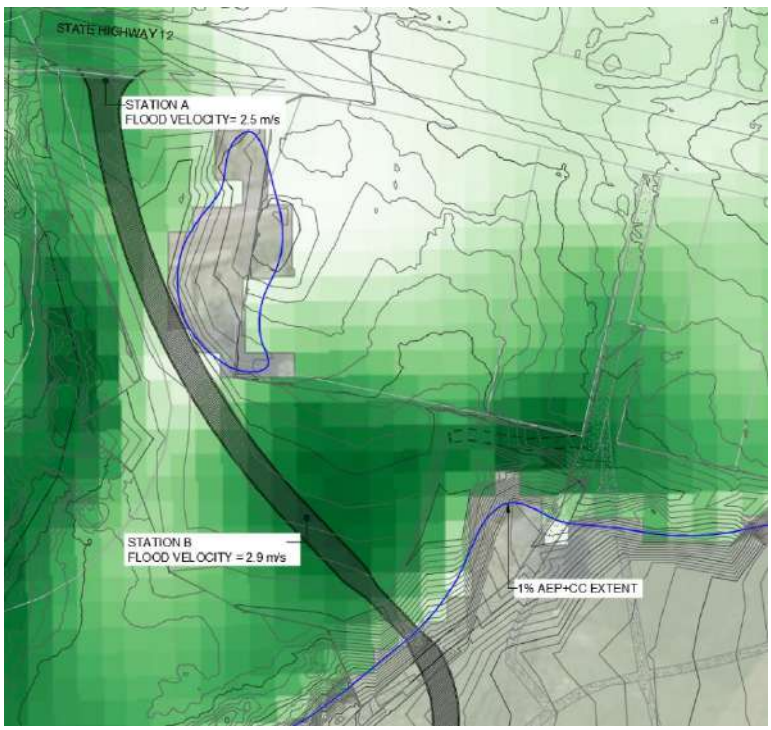

Figure 7: 1% AEP Flood Velocity from NRC Regional wide Hydraulic Model

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Table 11 below shows the flood depth and the flood velocity at different points along the accessway.

Table 11: Flood depth and Velocity

Station	Flood RL (m)	Proposed Road RL (m)	Flood Depth (m)	Flood Velocity (m/s)
A	36.59	35.38	1.21	2.5
B	35.93	34.62	1.31	2.9

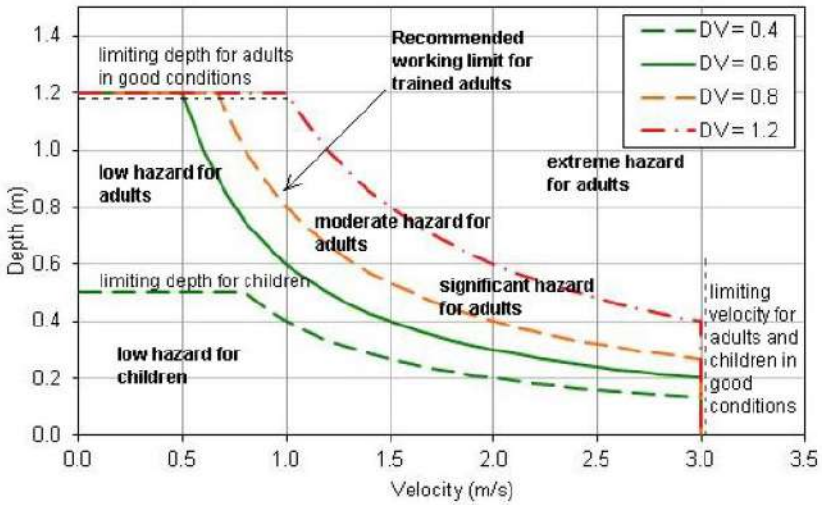

Figure 6.7.4. Safety Criteria for People in Variable Flow Conditions Cox et al. (2010)

Figure 8: Figure 6.7.4. from Australian Rainfall and Runoff: A guide to flood estimation (ARR); 2019

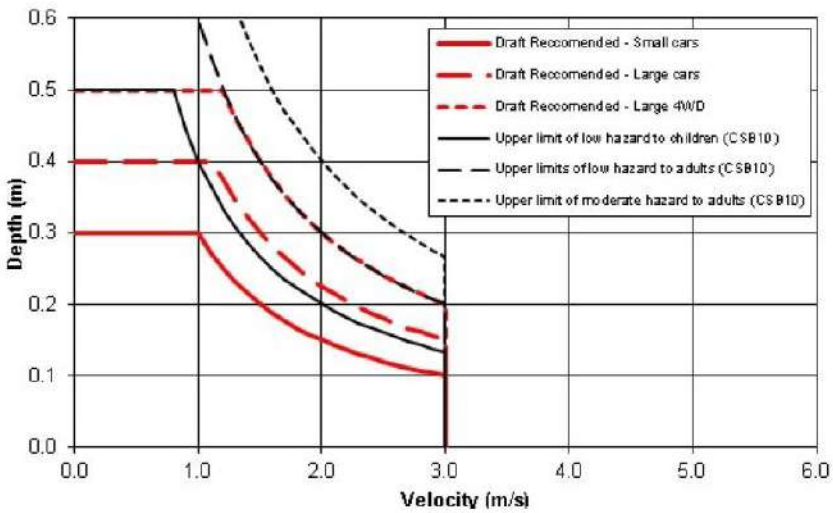

Figure 6.7.6. Interim Safety Criteria for Vehicles in Variable Flow Conditions (Shand et al., 2011)

Figure 9: Figure 6.7.6 from Australian Rainfall and Runoff: A guide to flood estimation (ARR); 2019

Based on the flood data and the applicable safety criteria from Australian Rainfall and Runoff, it is noted that the 1% AEP flood levels across the proposed accessway between the development area and State Highway 12 pose a significant hazard. This indicates that the accessway is unlikely to be safely passable by pedestrians or standard vehicles during peak flood events. During such times, access should be restricted until floodwaters have receded. Consequently, egress and emergency management considerations are necessary and are discussed further in Section below.

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9.2 Development Controls

9.2.1 Finished Floor Level (FFL)

All of the proposed dwellings are located outside of the flood plain and have adequate separation distances. Secondary flow from the site is managed by the roadside drainage and proposed earthworks have ensured no localised ponding. Given the above, no specific minimum FFL controls are proposed.

9.2.2 Earthworks

Earthworks within the development area must be designed by a suitably qualified engineer with respect the data presented within this report.

9.2.3 Egress

- Signs must be erected at the eastern side of bridge advising users not to cross during flooding.
- An Evacuation Management Plan must be prepared and implemented to inform occupants of the flood hazard risk and provide clear procedures during flood events. The plan should identify an alternative access route from the development area to State Highway 12, (i.e across the neighbouring paddock). It is noted, however, that State Highway 12 within the Waimamaku township may itself be subject to inundation during a 1% AEP flood event. In such cases, where evacuation is not safe or practical, the recommended course of action is to remain on site at higher ground until floodwaters recede and access routes become passable.

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10 Summary

In our opinion the site is suitable for the proposed development, subject to Far North District Council approval with regards to the matters addressed in this report and summarised below. The development can be undertaken in general accordance with the engineering standards with no specific area of non-compliance that in our opinion would have an actual or potential adverse effect on the environment or negatively affect any persons.

10.1 Earthworks, Erosion & Sediment Control

Bulk earthworks are proposed to enable the development. Best practice erosion and sediment control measures in accordance with GD05 are proposed to manage the potential effect on the environment.

10.2 Access

Provision for access to and within the site has been made by way of a new vehicle crossing and common accessway.

10.3 Water Supply

The site is located outside the reticulated water supply network. To service the proposed development, on-site rainwater tanks will be installed to provide potable water. In addition, dedicated on-site water storage tanks are proposed to meet firefighting water supply requirements.

10.4 Wastewater

The existing property does not have access to the public wastewater service. It is proposed to service the development via an on-site wastewater treatment and land disposal system in accordance with ASNZS1547:2012. The design flow volume is greater than $2m^3$/day, therefore a regional discharge consent is required. Otherwise, the proposed activity meets all the relevant performance criteria set out in Proposed Regional Plan for Northland.

10.5 Stormwater

Stormwater network is proposed for the development, and provision is made to provide stormwater service for each unit. Best practice stormwater management is proposed in accordance with the relevant standards.

10.6 Flooding Risk

The proposed dwellings are clear of the 1% AEP design flood extent and the proposed works will not worsen flooding on neighbouring properties.

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11 Limitations

- This assessment contains the professional opinion of Chester Consultants as to the matters set out herein, in light of the information available to it during the preparation, using its professional judgement and acting in accordance with the standard of care and skill normally exercised by professional engineers providing similar services in similar circumstances. No other express or implied warranty is made as to the professional advice contained in this report.
- We have prepared this report in accordance with the brief as provided and our terms of engagement. The information contained in this report has been prepared by Chester Consultants at the request of Te Roroa Whatu Ora/Manawhenua Trust and is exclusively for its client use and reliance. It is not possible to make a proper assessment of this assessment without a clear understanding of the terms of engagement under which it has been prepared, including the scope of the instructions and directions given to and the assumptions made by Chester Consultants Ltd. The assessment will not address issues which would need to be considered for another party if that party's particular circumstances, requirements and experience were known and, further, may make assumptions about matters of which a third party is not aware. No responsibility or liability to any third party is accepted for any loss or damage whatsoever arising out of the use of or reliance on this assessment by any third party.
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12 Appendices

Appendix A – Civil Design Drawings (Bound Separately)

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Appendix B – FENZ Consultation and Approval

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Non-Reticulated Firefighting Water Supplies, Vehicular Access & Vegetation Risk Reduction Application for New and Existing Residential Dwellings and Sub-Divisions

Applicant Information

Applicants Information	
Name:	Sivatharsan Sivashanmugapillai
Address:	28 The Warehouse Way, Northcote, Auckland 0627
Contact Details:	021345632
Return Email Address:	siva@chester.co.nz

Property Details

Property Details	
Address of Property:	7229 State Highway 12, Waimamaku, Northland
Lot Number/s:	Pt Sec 102 Blk IX Waoku SD
Dwelling Size: (Area = Length & Width)	Multiple dwellings comprise a mix of 3-bedroom and 5-bedroom units.
Number of levels: (Single / Multiple)	Single

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Firefighting Water Supplies and Vegetation Risk Reduction Waiver

"Fire and Emergency New Zealand strongly recommends the installation of automatic fire detection system devices such as smoke alarms for early warning of a fire and fire suppression systems such as sprinklers in buildings (irrespective of the water supply) to provide maximum protection to life and property".

Waiver Explanation Intent

Fire and Emergency New Zealand [FENZ] use the New Zealand Fire Service [NZFS] Code of Practice for firefighting water supplies (SNZ PAS 5409:2008) (The Code) as a tool to establish the quantity of water required for firefighting purposes in relation to a specific hazard (Dwelling, Building) based on its fire hazard classification regardless if they are located within urban fire districts with a reticulated water supply or a non-reticulated water supply in rural areas. The code has been adopted by the Territorial Authorities and Water Supply Authorities. The code can be used by developers and property owners to assess the adequacy of the firefighting water supply for new or existing buildings.

The Community Risk Manager under the delegated authority of the Fire Region Manager and District Manager is responsible for approving applications in relation to firefighting water supplies. The Community Risk Manager may accept a variation or reduction in the amount of water required for firefighting for example; a single level dwelling measuring 200^{m2} requires 45,000L of firefighter water under the code, however the Community Risk Manager in Northland will except a reduction to 10,000L.

This application form is used for the assessment of proposed water supplies for firefighting in non-reticulated areas only and is referenced from (Appendix B – Alternative Firefighting Water Sources) of the code. This application also provides fire risk reduction guidance in relation to vegetation and the 20-metre dripline rule under the Territorial Authority's District Plan. Fire and Emergency New Zealand are not a consenting authority and the final determination rests with the Territorial Authority.

For more information in relation to the code of practice for Firefighting Water supplies, Emergency Vehicle Access requirements, Home Fire Safety advice and Vegetation Risk Reduction Strategies visit www.fireandemergency.nz

1. Fire Appliance Access to alternative firefighting water sources - Expected Parking Place & Turning circle

Fire and Emergency have specific requirements for fire appliance access to buildings and the firefighting water supply. This area is termed the hard stand. The roading gradient should not exceed 16%. The roading surface should be sealed, able to take the weight of a 14 to 20-tonne truck and trafficable at all times. The minimum roading width should not be less than 4 m and the property entrance no less 3.5 metres wide. The height clearance along access ways must exceed 4 metres with no obstructions for example; trees, hanging cables, and overhanging eaves.

1 (a) Fire Appliance Access / Right of Way	
Is there at least 4 metres clearance overhead free from obstructions?	☒YES ☐NO
Is the access at least 4 metres wide?	☒YES ☐NO
Is the surface designed to support a 20-tonne truck?	☒YES ☐NO
Are the gradients less than 16%	☒YES ☐NO
Fire Appliance parking distance from the proposed water supply is 5 metres	

Internal FENZ Risk Reduction comments only:

Click or tap here to enter text.

If access to the proposed firefighting water supply is not achievable using a fire appliance, firefighters will need to use portable fire pumps. Firefighters will require at least a one-metre wide clear path / walkway to carry equipment to the water supply, and a working area of two metres by two metres for firefighting equipment to be set up and operated.

1 (b) Restricted access to firefighting water supply, portable pumps required
Has suitable access been provided? ☒YES ☐ NO
Comments: Water tank placed next to the road with suitable access

Internal FENZ Risk Reduction comments only:

Click or tap here to enter text.

2. Firefighting Water Supplies (FFWS)

What are you proposing to use as your firefighting water supply?

2 (a) Water Supply Single Dwelling	
Tank	☐ Concrete Tank ☐ Plastic Tank ☐ Above Ground (Fire Service coupling is required - 100mm screw thread suction coupling) ☐ Part Buried (max exposed 1.500 mm above ground) ☐ Fully Buried (access through filler spout) Volume of dedicated firefighting water Click or tap here to enter text.litres

Internal FENZ Risk Reduction comments only:

Click or tap here to enter text.

2 (b) Water Supply Multi-Title Subdivision Lots / Communal Supply	
Tank Farm	☐ Concrete Tank ☒ Plastic Tank ☒ Above Ground (Fire Service coupling is required - 100mm screw thread suction coupling) ☒ Part Buried (max exposed 1.500mm above ground) ☐ Fully Buried (access through filler spout) Number of tanks provided 1 Number of Tank Farms provided 2 Water volume at each Tank Farm 25000 Litres Volume of dedicated firefighting water 50000 litres

Internal FENZ Risk Reduction comments only:

Click or tap here to enter text.

2 (c) Alternative Water Supply	
Pond:	Volume of water: Click or tap here to enter text.
Pool:	Volume of water: Click or tap here to enter text.
Other:	Specify: Click or tap here to enter text.
	Volume of water: Click or tap here to enter text.

Internal FENZ Risk Reduction comments only:

Click or tap here to enter text.

3. Water Supply Location

The code requires the available water supply to be at least 6 metres from a building for firefighter safety, with a maximum distance of 90 metres from any building. This is the same for a single dwelling or a Multi-Lot residential subdivision. Is the proposed water supply within these requirements?

3 (a) Water Supply Location	
Minimum Distance:	*Is your water supply at least 6 metres from the building?* ☒YES ☐ NO
Maximum Distance	*Is your water supply no more than 90 metres from the building?* ☒YES ☐ NO

Internal FENZ Risk Reduction comments only:

Click or tap here to enter text.

3 (b) Visibility
How will the water supply be readily identifiable to responding firefighters? E.g.: tank is visible to arriving firefighters or, there are signs / markers posts visible from the parking place directing them to the tank etc.
Comments: Signpost will be installed to identify the water tank location

Internal FENZ Risk Reduction comments only:

Click or tap here to enter text.

3 (c) Security
How will the FFWS be reasonably protected from tampering? E.g.: light chain and padlock or, cable tie on the valve etc.
Explain how this will be achieved: padlock will be installed

Internal FENZ Risk Reduction comments only:

Click or tap here to enter text.

4. Adequacy of Supply

The volume of storage that is reserved for firefighting purposes must not be used for normal operational requirements. Additional storage must be provided to balance diurnal peak demand, seasonal peak demand and normal system failures, for instance power outages. The intent is that there should always be sufficient volumes of water available for firefighting, except during Civil Défense emergencies or by prior arrangement with the Fire Region Manager.

4 (a) Adequacy of Water supply
Note: *The owner must maintain the firefighting water supply all year round. How will the usable capacity proposed be reliably maintained? E.g. automatically keep the tank topped up, drip feed, rain water, ballcock system, or manual refilling after use etc.*
Comments: Rainwater will be used to top up the dedicated firefighting water tank

Internal FENZ Risk Reduction comments only:

Click or tap here to enter text.

5. Alternative Method using Appendix's H & J

If Table 1 + 2 from the Code of Practice is not being used for the calculation of the Firefighting Water Supply, a competent person using appendix H and J from the Code of Practice can propose an alternative method to determine firefighting water supply adequacy.

Appendix H describes a method for determining the maximum fire size in a structure. Appendix J describes a method for assessing the adequacy of the firefighting water supply to the premises.

5 (a) Alternative Method Appendix H & J	
If an alternative method of determining the FFWS has been proposed, who proposed it? Name: Click or tap here to enter text.	
Contact Details: Click or tap here to enter text.	
Proposed volume of storage?	Litres: Click or tap here to enter text.
Comments: Click or tap here to enter text. ** Please provide a copy of the calculations for consideration.*	

Internal FENZ Risk Reduction comments only: Click or tap here to enter text.

6. Diagram

Please provide a diagram identifying the location of the dwelling/s, the proposed firefighting water supply and the attendance point of the fire appliance to support your application.

Internal FENZ Risk Reduction comments only:

Click or tap here to enter text.

7. Vegetation Risk Reduction - Fire + Fuel = Why Homes Burn

Properties that are residential, industrial or agricultural, are on the urban–rural interface if they are next to vegetation, whether it is forest, scrubland, or in a rural setting. Properties in these areas are at greater risk of wildfire due to the increased presence of nearby vegetation.

In order to mitigate the risk of fire spread from surrounding vegetation to the proposed building and vice-versa, Fire Emergency New Zealand recommends the following;

I. *Fire safe construction*

Spouting and gutters – Clear regularly and consider screening with metal mesh. Embers can easily ignite dry material that collects in gutters.

Roof – Use fire resistant material such as steel or tile. Avoid butanol and rubber compounds.

Cladding – Stucco, metal sidings, brick, concrete, and fibre cement cladding are more fire resistant than wood or vinyl cladding.

II. *Establish Safety Zones around your home.*

Safety Zone 1 is your most import line of defence and requires the most consideration. Safety Zone 1 extends to 10 metres from your home, you should;

a) *Mow lawn and plant low-growing fire-resistant plants; and*
b) *Thin and prune trees and shrubs; and*
c) *Avoid tall trees close to the house; and*
d) *Use gravel or decorative crushed rock instead of bark or wood chip mulch; and*
e) *Remove flammable debris like twigs, pine needles and dead leaves from the roof and around and under the house and decks; and*
f) *Remove dead plant material along the fence lines and keep the grass short; and*
g) *Remove over hanging branches near powerlines in both Zone 1 and 2.*

III. *Safety Zone 2 extends from 10 – 30 metres of your home.*

a) *Remove scrub and dead or dying plants and trees; and*
b) *Thin excess trees; and*
c) *Evenly space remaining trees so the crowns are separated by 3-6 metres; and*
d) *Avoid planting clusters of highly flammable trees and shrubs*
e) *Prune tree branches to a height of 2 metres from the ground.*

IV. *Choose Fire Resistant Plants*

Fire resistant plants aren't fire proof, but they do not readily ignite. Most deciduous trees and shrubs are fire resistant. Some of these include: poplar, maple, ash, birch and willow. Install domestic sprinklers on the exterior of the sides of the building that are less 20 metres from the vegetation. Examples of highly flammable plants are: pine, cypress, cedar, fir, larch, redwood, spruce, kanuka, manuka.

For more information please go to https://www.fireandemergency.nz/at-home/the-threat-of-rural-fire/

If your building or dwelling is next to vegetation, whether it is forest, scrubland, or in a rural setting, please detail below what Risk Reduction measures you will take to mitigate the risk of fire development and spread involving vegetation?

7 (a) Vegetation Risk Reduction Strategy
Fire-resistant plants proposed at the 10-meter zone from the building edge in areas where buildings are located within 20 meters of vegetation or bush. .

Internal FENZ Risk Reduction comments only:

Click or tap here to enter text.

8. Applicant

Checklist	
☒	Site plan (scale drawing) – including; where to park a fire appliance, water supply, any other relevant information.
☐	Any other supporting documentation (diagrams, consent).

I submit this proposal for assessment.

Name: Sivatharsan Sivashanmugapillai Dated: 3/04/2025

Contact No.: 021345632

Email: siva@chester.co.nz

Signature: Click or tap here to enter text.

9. Approval

In reviewing the information that you have provided in relation to your application being approximately a Click or tap here to enter text. *square metre,* Choose an item. *dwelling/sub division, and non-sprinkler protected.*

The Community Risk Manager of Fire and Emergency New Zealand under delegated authority from the Fire Region Manager, Te Hiku, and the District Manager has assessed the proposal in relation to firefighting water supplies and the vegetation risk strategy. The Community Risk Manager Choose an item. *agree with the proposed alternate method of Fire Fighting Water Supplies. Furthermore, the Community Risk Manager agrees with the Vegetation Risk Reduction strategies proposed by the applicant.*

Name: Click or tap here to enter text.

Signature: Click or tap here to enter text.

P.P on behalf of the Community Risk Manag

Fire and Emergency New Zealand
Te Tai Tokerau / Northland District

APPROVED
By GoffinJ at 9:29 am, May 13, 2025

Jason Goffin- Advisor Risk Reduction

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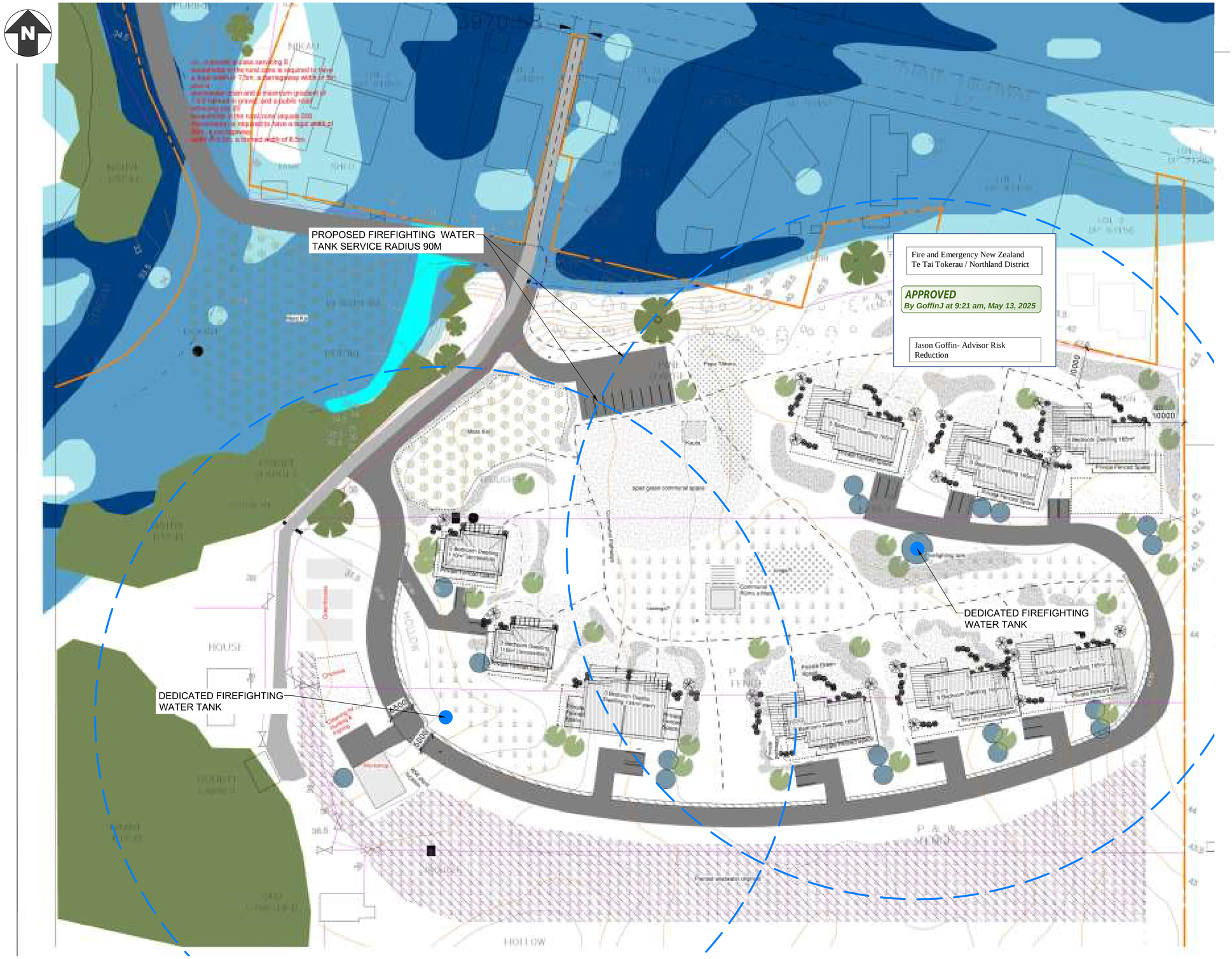

PROPOSED FIREFIGHTING WATER TANK SERVICE RADIUS 90M
DEDICATED FIREFIGHTING WATER TANK
DEDICATED FIREFIGHTING WATER TANK
Fire and Emergency New Zealand
Te Tai Tokerau / Northland District
APPROVED
By GoffinJ at 9:21 am, May 13, 2025
Jason Goffin- Advisor Risk Reduction
HOUSE
HOLLOW
Kauta
Mess Hall
Commercial Kitchen & Dining
Commercial Rooms a Meeting
Principal Pohutukawa
Principal Whitewood (Ngaio)
Principal Kahikatea
Principal Totara
Principal Rimu
Principal Kauri
Principal Puriri
Principal Pohutukawa
Principal Kowhai
Principal Ngaio
Principal Whitewood

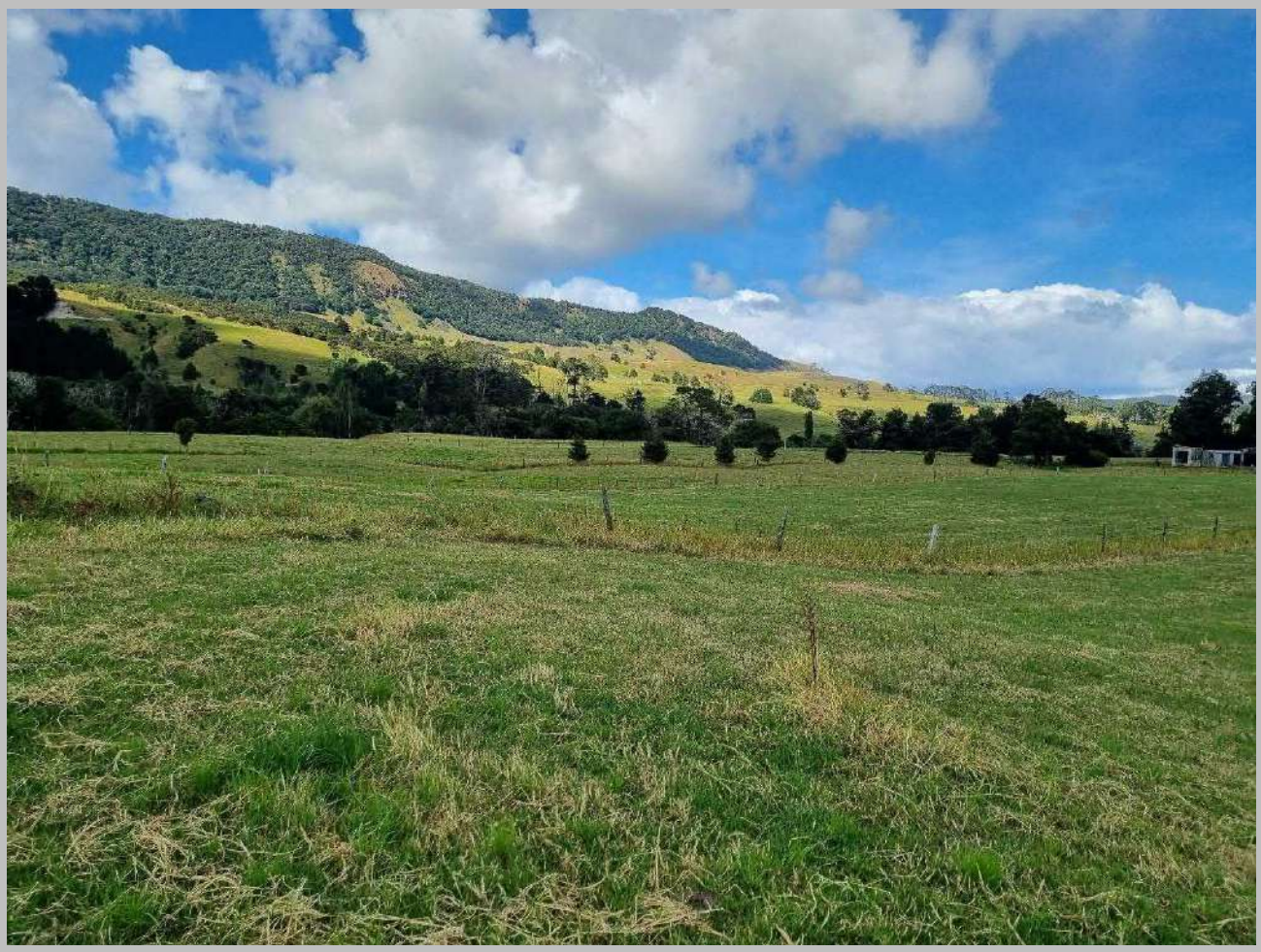
Hawthorn Geddes
engineers & architects ltd

GEOTECHNICAL REPORT FOR RESOURCE CONSENT – Revision 1

PREPARED FOR TE ROROA WHATU ORA / MANAWHENUA TRUST

AT 7729 STATE HIGHWAY 12, WAIMAMAKU

PT SECTION 102 BLK IX WAOKU SD



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21A The Grange
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hawthorngeddes.co.nz

GEOTECHNICAL REPORT FOR PROPOSED PAPAKĀINGA DEVELOPMENT

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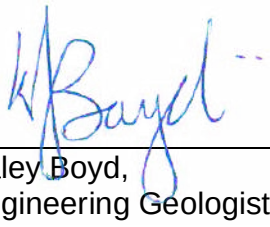
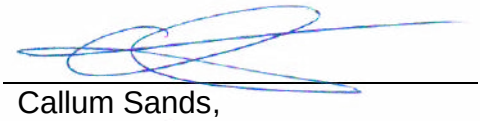
Report Prepared by:		Report Approved by:	
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1	Client: Attention: Via email: CC Via email	Te Roroa Whatu Ora / Manawhenua Trust Ruby Lee Barns Martin rlbarnesmartin@teroroa.iwi.nz Kiri McKenna kiri@matakohe.co.nz	EMAIL	16.06.2025

1. Purpose

The purpose of this report is to present the results of the geotechnical assessment completed at Pt Section 102 Blk IX Waoku SD, 7729 State Highway 12, Waimamaku. This report provides advice for the proposed development on liquefaction damage potential, slope stability, settlement potential, earthworks, on-site wastewater disposal field, and founding soil conditions.

This report is suitable to support a resource consent application to Far North District Council (FNDC).

2. Executive Summary

This report presents the results of a geotechnical investigation and assessment completed for the proposed papakāinga development as described in Section 3 below.

This Executive Summary provides a brief overview of our geotechnical evaluation for the project and is not intended to replace more detailed information contained elsewhere in this report. A summary of important geotechnical considerations, our conclusions, and recommendations for the proposed development are as follows:

- **Report Purpose:** to comment on the geotechnical suitability of the land for the papakāinga development which is proposed to comprise ten new residential dwellings.

- **Geological Unit:** published geology of the property is that of OIS4 to OIS1 (Late Pleistocene to Holocene) estuary, river, and swamp deposits.

- **General Site Topography:** typically undulating with the Waimamakau River traversing south to west around the property's boundary. Multiple natural and manmade streams are present over the property.

- **Subsoil Investigation:** two hand augers were undertaken on the 15th of January 2025, additionally eleven hand augered boreholes, five Dynamic Penetrometer tests, and eight Cone Penetrometer tests were undertaken on the 6th of May 2025.

- **Groundwater:** groundwater was encountered from 0.8m below ground level (bgl) during the subsoil investigation. Elevated groundwater levels are expected to be no shallower than 0.5m bgl based on encountered wet soils and the site topography.

- **Liquefaction Vulnerability:** the proposed building sites have been assessed as having a very low liquefaction vulnerability during a 500-year seismic event. The site is considered susceptible to a Level 1 (Mild) liquefaction damage event during a 1,000-year seismic event in accordance with and is described in MBIE / NZGS Earthquake Geotechnical Engineering Practise Module 3, Nov 2021.

- **Static Load Settlement:** the proposed building sites are considered subject to minor settlement under a typical NZS-3604 type residential foundation and/or load such as fill, not greater than 10kPa. Total settlements which include primary and secondary, are expected to be negligible.

- **Site Subsoil Class:** Seismic Subsoil Class C, per AS/NZS 1170.5:2004, Amd 2016, Section 3.1.3.1.

- **Earthworks:** excavations and/or fill are expected to be no greater than 2.5m deep for the formation of flat building sites, driveways, and/or the shared accessway. Retaining or battering is required to support both excavations and fill where greater than 0.5m high anywhere over the proposed papakāinga development.

- **Foundation Options:** shallow foundations are considered appropriate for future residential development over the proposed papakāinga footprint following appropriate earthworks. NZS3604-type foundations are not considered suitable and specific engineered design is required for a concrete slab or pile foundations due to expansive soils.

- **Wastewater Disposal Field:** the subsoil classification for the wastewater disposal field area in accordance with AS/NZS 1547:2012 is Soil Category 4. An appropriate design irrigation rate is some 3.5mm/day for a drip irrigation field.

3. Proposal

It is proposed to construct ten new residential dwellings as part of a papakāinga development within the northeastern area of Pt Section 102 Blk IX Waoku SD (Figure A). Eight building platforms are proposed which includes two duplexes, which equates to ten new dwellings proposed.

Figure A: Snip of the DRAFT "Proposed Site Plan - Planning" provided by Matakohe Architecture + Urbanism dated 06.06.2025.

The property is not connected to a council reticulated wastewater network; therefore, on-site wastewater disposal will be required to serve the development. Appropriate site allowance (area) shall be assessed and allocated.

During the site walkover completed in January 2025 and again in May 2025, it was noted that wastewater from neighbouring properties was accumulating beneath the proposed location of Dwelling #8. It appears to have been accumulating for multiple years, if not decades given the growth and establishment of hydrophilic plants such as reeds in this area.

Access to the proposed lots will be via a new shared accessway which shall extend southeast off State Highway 12. This accessway includes a bridge which extends over a river terrace and wetland area. Private driveways to each of the individual dwellings are proposed to extend off the new accessway as shown in Figure A above.

4. Site Description

The property is irregular in shape, approximately 16.1Ha in area located within the Rural Production Zone under the current Far North District ePlan. The property is located within Waimamaku township and bordered by the Waimamakau River to the west and south of the property. The proposed papakāinga development is located some 60m south of State Highway 12 (SH12) and at its nearest point, only some 150m northeast of the Waimamakau River. A dairy shed is located on the property, to the southwest of the proposed papakāinga development. The land is currently used for agriculture practices.

Site topography typically comprises gentle to moderate slopes that are undulating, with localised areas of steeply graded slopes that trend towards the Waimamakau River or towards intermittent / permanent streambeds which have formed in historic streambeds. The proposed development is situated over an upper river terrace where the break wraps around from the south – west – north of the development.

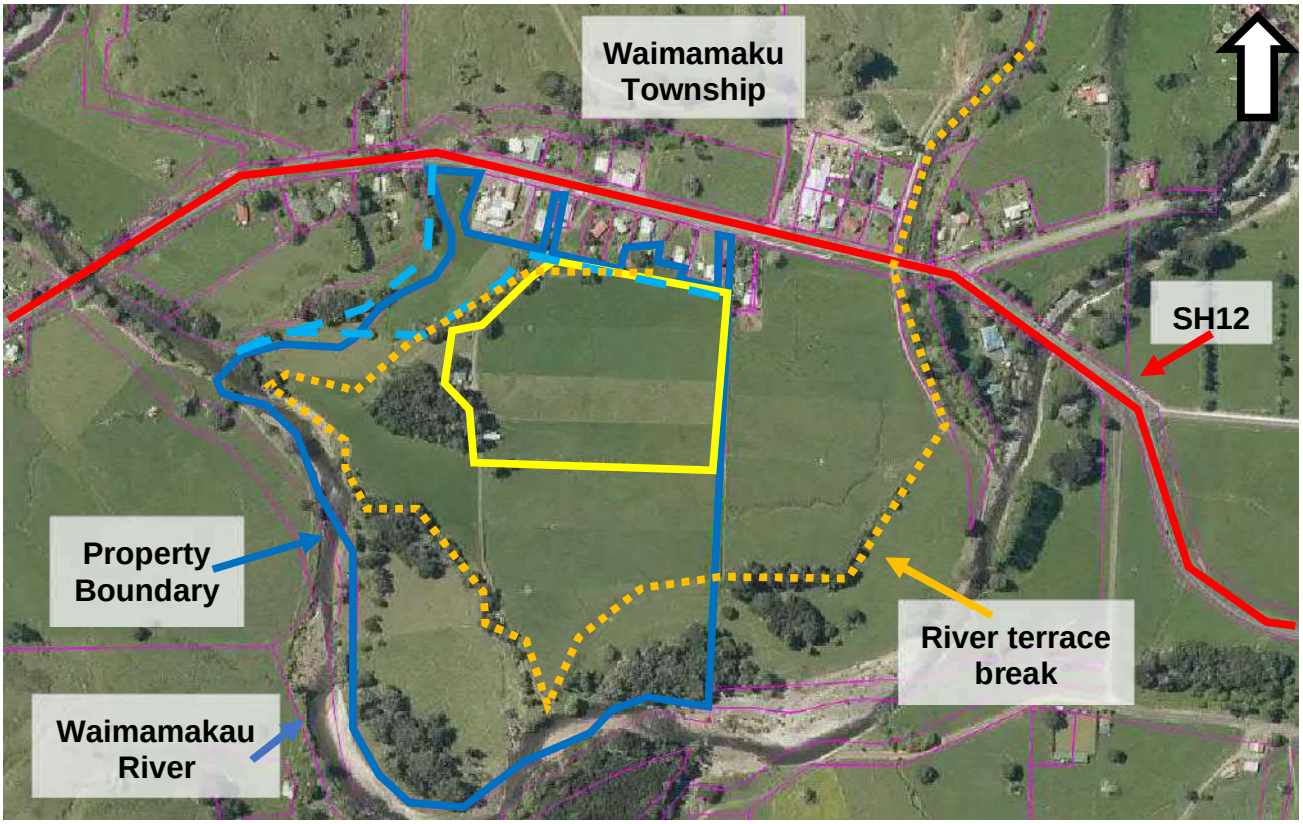


Figure B: Aerial image of the proposed development (the perimeter of which is illustrated with yellow) in relation to its wider surrounds (source: LINZ Data). The dashed light blue lines represent the approximate location of the streambeds.

5. Geological Setting

The published geology by GNS Science indicates that the property is underlain by OIS4 to OIS1 (Late Pleistocene to Holocene) estuary, river, and swamp deposits (Figure C). These deposits are described as comprising poorly to un-consolidated sand, peat, mud, and shell deposits (estuarine, lacustrine, swamp, alluvial, and colluvial).

Surrounding the OIS4 to OIS1 deposits is the Whangai Formation in Northland Allochthon comprising fissile, dark grey to white weathering siliceous mudstone, blue-grey calcareous mudstone, and minor micritic limestone and chert.

Southwest of the proposed papakāinga development, Undifferentiated Pleistocene – Holocene landslide deposits comprise poorly to un-consolidated landslide and rockfall deposits.

North of the proposed papakāinga development, the geology of the Waitiiti Formation is present comprising massive to poorly bedded mudstone and muddy sandstone.

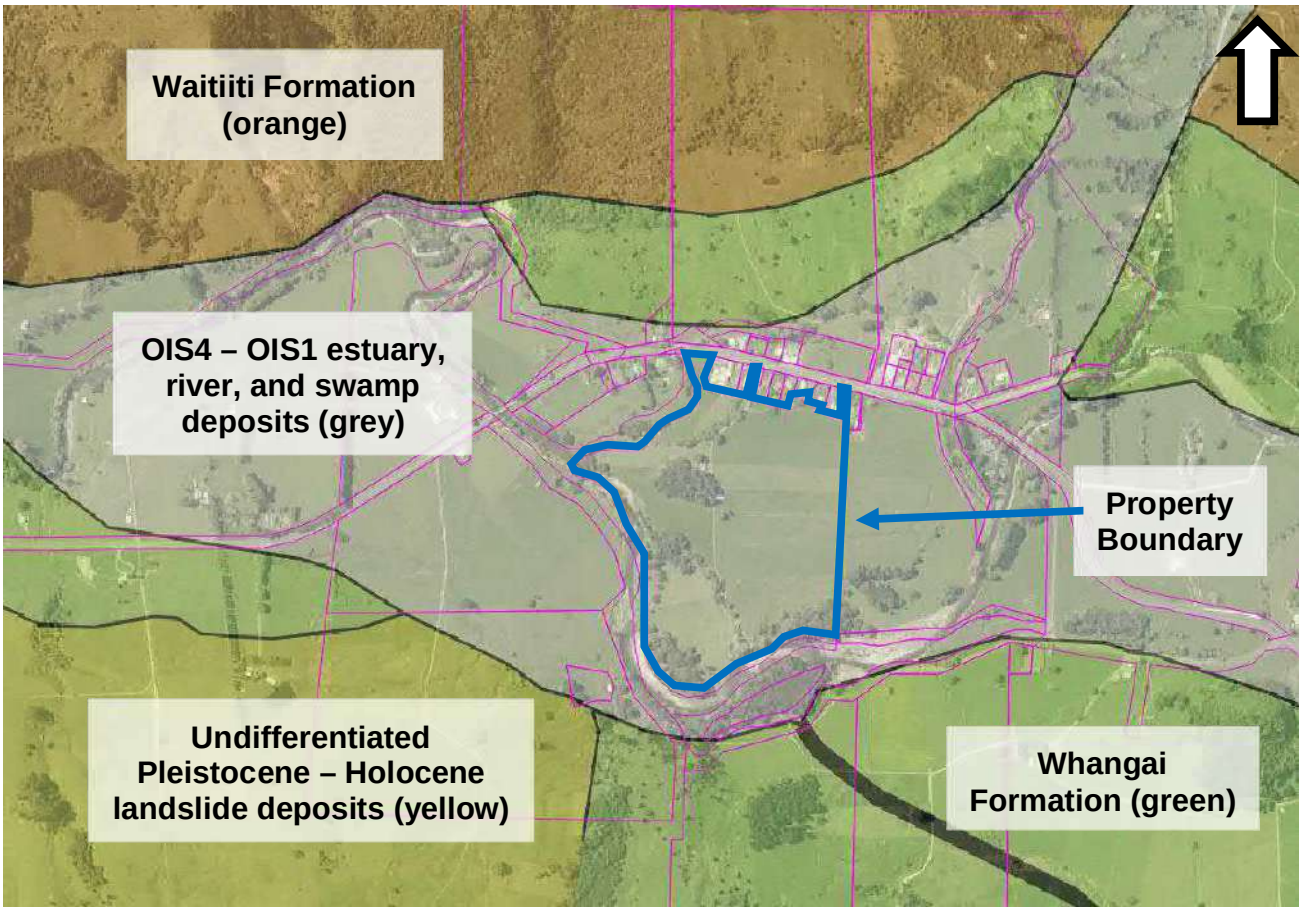


Figure C: Aerial view of the property in relation to its wider surrounds with the 250k geology units overlain (source: LINZ Data and GNS Science).

6. Geotechnical Investigation

A site-specific subsoil investigation was undertaken on the 15th of January and the 6th of May 2025 to determine the quality of the subsoil present beneath the proposed building sites, accessway, and on-site wastewater field. The investigation comprised the following:

- Two hand augered boreholes (HA1 – HA2) drilled on the 15th of January 2025 by Hawthorn Geddes engineers and architects (HGEA),
- Eleven hand augered boreholes (HA3 – HA13) drilled on the 6th of May 2025 by HGEA, and
- Eight cone penetrometer tests (CPT1 to CPT8) performed by Underground Investigations and interpreted by HGEA.

6.1. Subsoil Investigation

Hand augered boreholes were drilled to depths between 0.9m and 2.3m below ground level (bgl) where refusal over dense to very dense alluvial gravel deposits was encountered. A Dynamic Cone Penetrometer Test (DCPT) was performed with a Scala Penetrometer from the base of HA3, HA5, HA7, HA9, and HA13. Results of the DCPT tests were attained to refusal (≥20 blows/100mm) at a maximum depth of 2.6m bgl. Refusal is inferred to be contact with the dense to very dense alluvial gravel deposits. The undrained shear strengths of cohesive soils were measured using a handheld shear vane at nominal 0.3m intervals within all boreholes. The shear strength readings were completed in accordance with NZGS Guideline for Handheld Shear Vane Test. The peak shear vane results ranged between 38kPa and unable to penetrate (UTP).

Groundwater transmissions were encountered within all hand augered boreholes except for HA2, HA5, HA6, HA7, and HA12. Groundwater transmissions were encountered as shallow as 0.8m bgl with an absence of groundwater at depths greater than 2.0m bgl, the range is considered to likely be the result of undulating land. The encountered groundwater transmissions are considered representative of normal groundwater conditions, averaging 1.2m bgl (some 41.0m NZVD) across the proposed papakāinga. Elevated groundwater transmissions are expected to be no shallower than 0.5m bgl in low-lying areas.

Soils encountered within the hand augered boreholes were consistent with the published geology by GNS Science of OIS4 to OIS1 estuary, river, and swamp deposits.

No peat or soft alluvial soils were encountered within the hand augered boreholes.

Logs of the hand augered boreholes and a site plan indicating the hand augered borehole locations, are attached to this report.

Each hand augered borehole is summarised on Table 1 below:

Table 1: Summary of Subsoil Conditions

Hand Augered Borehole	Hand Auger Termination Depth	Scala Penetrometer Termination Depth	Topsoil Depth	Groundwater Depth	Shear Vane Soil Strengths	Scala Penetrometer Raw Data in Natural Ground	Generalised Description
All depths measured in (m) below current ground level					min - max		
					kPa	Blows/ 100mm	
HA1	1.7	NM	NE	1.6	87 – 172	NM	**Alluvial Deposits:** dark brown, stiff to very stiff silts and clays with none to trace gravels that range from fine to medium, angular to rounded, and completely to moderately weathered. The soils are typically highly plastic, becoming less plastic with depth. These soils are overlying gravels, with further details on sizing, grading, angularity, and weathering undetermined. **Whangai Formation Mudstone Completely Weathered Soil:** bluish grey, highly plastic, very stiff, silty clay with minor subangular gravels. Only encountered from 1.6m bgl in HA13 which was situated some 100m northwest of the nearest hand auger (HA6) and some 5.0m lower than the elevation of the proposed papakāinga.
HA2	1.3	NM	NE	NE	81 – 221+	NM	
HA3	1.1	1.7	0.1	0.8	95 – 122	3 – 23	
HA4	1.9	NM	0.2	1.0	95 – UTP	NM	
HA5	2.0	2.3	0.2	NE	68 – UTP	6 – 21	
HA6	0.9	NM	0.3	NE	174 – UTP	NM	
HA7	1.6	1.7	0.1	NE	84 – 163	20	
HA8	2.1	NM	0.1	1.8	38 – 167	NM	
HA9	1.8	2.6	0.1	1.5	95 – UTP	1 – 20	
HA10	1.8	NM	0.1	1.2	95 – UTP	NM	
HA11	2.0	NM	0.1	0.8	67 – 115	NM	
HA12	1.0	NM	0.1	NE	132 – 161	NM	
HA13	2.3	2.4	0.1	1.1	58 – 131	0 – 20	

Table 1 Notes: NM = not measured NE = not encountered

6.2. Cone Penetrometer Testing Investigation

Eight Cone Penetrometer Tests (CPTs) were completed by Underground Investigation Ltd on the 6th of May 2025. The CPTs were undertaken over the proposed development and pushed to a maximum depth of 3.3m bgl. The soil descriptors contained herein are based on soil strength parameters estimated using the computer programme CPeT-IT and the soil behaviour type classification proposed by Robertson (1986, 2010, and 2016).

CPT1 – CPT8 were unable to be pushed beyond depths ranging between 1.3m and 3.3m bgl due to refusal over dense to very dense gravels which typically returned a final tip resistance of 20MPa or greater and an average relative density of 90% to 100%. The cone was unable to penetrate further, and testing was therefore terminated at those depths.

Test pits were not considered suitable for determining the full depth of the underlying gravels within the proposed papakāinga development area. However, a very steep river terrace break located northwest of the site—approximately 4.0 m high— was minorly eroded and exhibited well graded river gravels and cobbles throughout its exposed profile. Based on this observation, the gravel layer is estimated to be approximately 5.0 m thick and is overlain by cohesive alluvial soils.

All eight CPTs shared a similar soil profile with inferred soils representative of alluvial deposits typical of OIS4 – OIS1 estuary, river, and swamp deposits. This subsoil profile typically comprised a capping layer of stiff silty clay or clayey silt, with minor variations in depth to the underlying dense to very dense gravel deposits. In four CPTs (CPT2, 3, 5, and 7) a silty sand was inferred overlying the dense gravel layer where refusal was encountered. CPT5 inferred some 0.4m of stiff sandy silt between the medium dense silty sand and the underlying very dense gravel layer.

Groundwater was measured following the removal of the CPT cone, this resulted in the depth to groundwater transmissions representing normal groundwater conditions when exposed to atmospheric pressure. Groundwater transmissions were measured at depths between 0.0m and 2.4m, the variation is representative of the undulating ground encountered over the proposed development area.

No peat or other soft soils were inferred within the CPT profiles.

Based on the analysis of the CPT data, an idealised soil profiled has been determined for each CPT to evaluate the geotechnical parameters of the inferred soils.

The soil profile was inferred from CPT measured tip resistance, friction angle, and porewater pressure. The inferred geotechnical parameters have been estimated and are summarised in Table 2 below.

CPT logs and site plan indicating CPT locations are attached to this report.

Table 2: Summary of CPT Testing and Estimated Soil Parameters

Measured Soil Parameters			Estimated Soil Parameters			
General Description	**General depth layer was encountered (m)**	**Tip resistance – qc (MPa)**	**Undrained shear strength (kPa)**	**Relative density – Rd (%)**	**Effective friction angle - ϕ' (°)**	**Soil unit weight - ɣ (kN/m^3)**
Alluvial Silts and Clays Firm to stiff	0.0 – 1.7	1.0	75	-	20	18
Silty Sand Medium Dense to Dense	1.7 – 2.6	5	-	55	24	17
Sandy Silt Stiff	2.4 – 2.8	1.3	60	-	22	17
Gravel Dense to Very Dense	2.6+	22	-	93	28	20

Table 2 Notes:

- (-) is not a relevant soil parameter for the inferred soil.

6.3. Geological Model

A geological profile though the centre of the proposed development is presented below in Figure D. The illustrated image shows the encountered subsoil depths from hand augered boreholes and inferred CPT data. The profile also identifies encountered normal groundwater transmissions. The locality of this section is identified in the site plan in Appendix A of this report.

The property is underlain by OIS4 to OIS1 estuary, river, and swamp deposits of clays, silts, and sands overlying dense to very dense gravels. The findings from the subsoil investigation are consistent with the mapped geology of the area by GNS Science.

Geologic Cross Section Key			
	Alluvial Silts and Clays		Alluvial Gravel
	Completely Weathered Whangai Formation Mudstone		Highly to Moderately Weathered Whangai Formation Mudstone

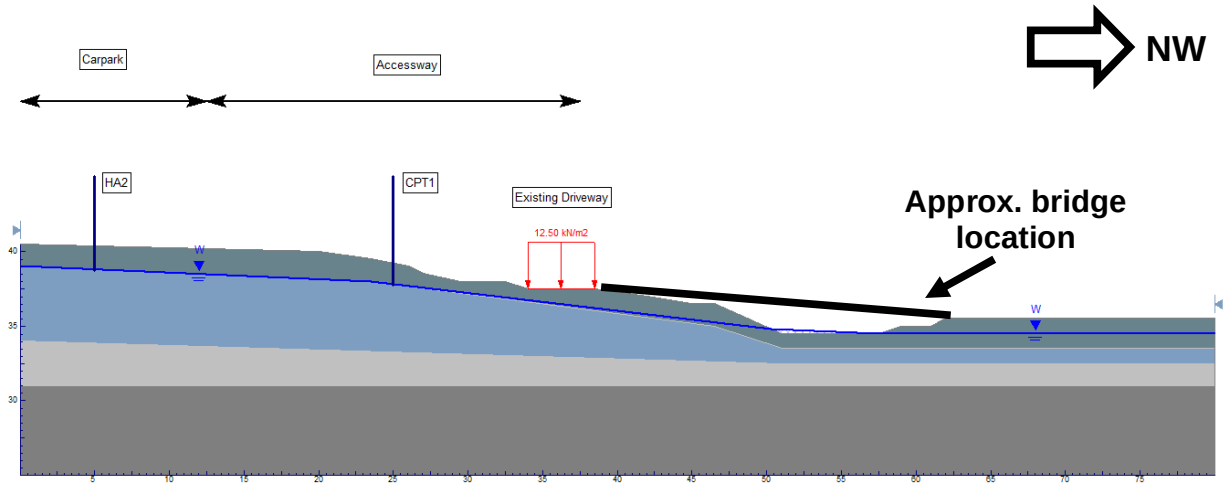


Figure D: Snip of geological cross-section completed in RocScience Slide2, it transects through the proposed accessway and carpark of the papakāinga. The dark blue line represents the normal groundwater transmissions some 1.0m bgl.

7. Seismic Subsoil Classification

The results of the investigation indicate the site is Seismic Subsoil Class C; in accordance with AS/NZS 1170.5:2004. This was assessed based on the geological properties measured during our investigation in correlation with AS/NZS 1170.5:2004; (method (c) of the hierarchy for site classification methods, AS/NZS 1170.5:2004, Amd 2014, Section 3.1.3.1).

8. Stability Assessment

8.1. Visual Stability Assessment

A visual stability assessment was undertaken by an engineering geologist and reviewed by a geotechnical Chartered Professional Engineer from HGEA. This comprised a site walkover, a review of historical aerial photographs (source: Google Earth and Retro Lens), and a review of available LiDAR data.

The proposed papakāinga development area is over typically gently undulating slopes at an average of 4° (Figure E). The proposed development area is generally gently undulating or planar with localised steep slopes that border the streambeds to the north and the northwest. The property comprises an upper and lower river terrace which are separated by a break which ranges in gradient from moderate to very steep.

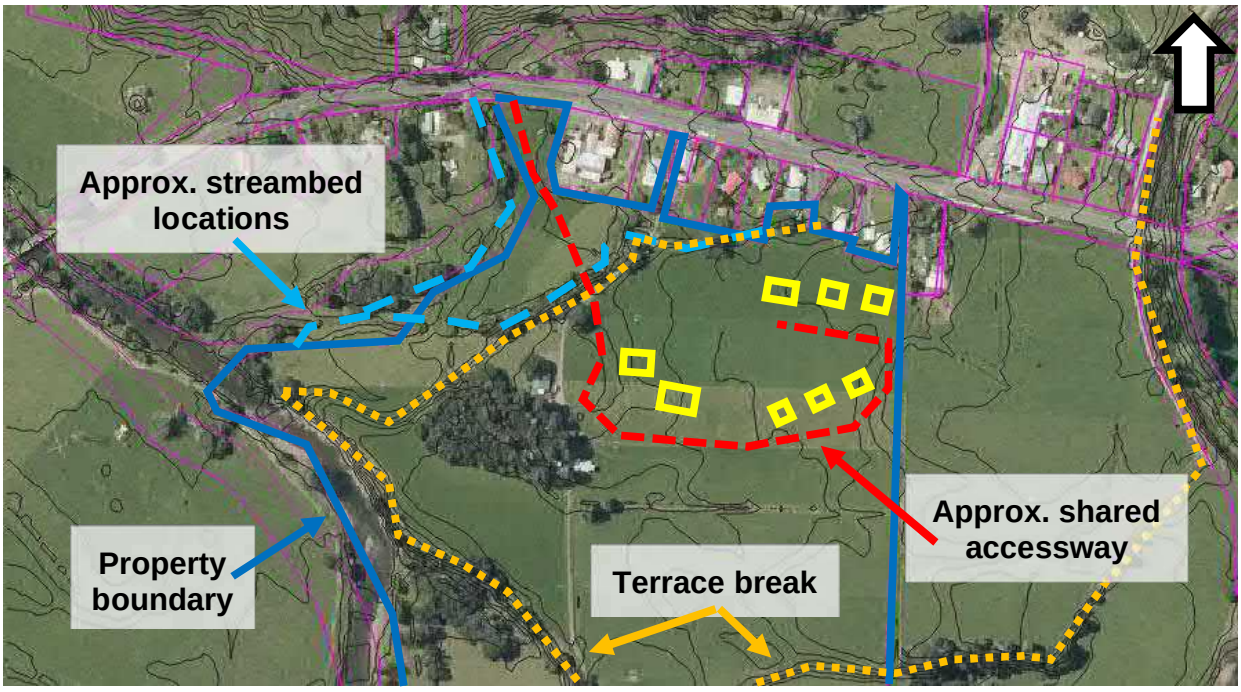


Figure E: Aerial image of the proposed papakāinga development extent and its immediate surrounds with contours overlain at 1.0m intervals (source: LINZ Data). The yellow squares represent proposed residential dwellings.

Localised steep slopes are present along the terrace break, specifically the extent along the southern to eastern banks of the closest stream to the proposed papakāinga development (Figure E above). Localised steep slopes no greater than 6.0m high from the incision of the streambed and are typically less than 3.0m high. The stream banks are slightly incised with minor evidence of active erosion occurring (Figure F).

Figure F: Image of the slopes above an intermittent stream north of the papakāinga (taken 15th of January).

Terracettes are evidence of shallow movement such as soil creep / slippage in the upper 1.0m of subsoils due to oversaturation, slope oversteepening, and/or shrink / swell processes. These slippages were observed over the property on slopes of 20° and greater, typically along the river terrace breaks. It is observed in Figure F above, the pine tree and fence posts are leaning, likely the result of shallow / surface slippage on oversteepened slopes.

The hillshade model shown in Figure G below illustrates the surface topography using a digital elevation model (DEM) available from LINZ, to more readily identify any surface movements occurring. The proposed papakāinga development is located on the upper, gently undulating river terrace. This upper terrace transitions to a lower terrace via slopes ranging from 18° to 40°, with a maximum elevation change of approximately 6.0 m. Minor evidence of slipping and erosion is occurring along the terrace break beneath the existing driveway and proposed bridge abutment as identified on the image below.

Minor ongoing slippage as a result of surface water runoff erosion is occurring within very steep slopes situated below the existing accessway. The elevation change is some 4.0m and the terrace break is becoming oversteepened as a result of minor ongoing stream incision at the base of the break.

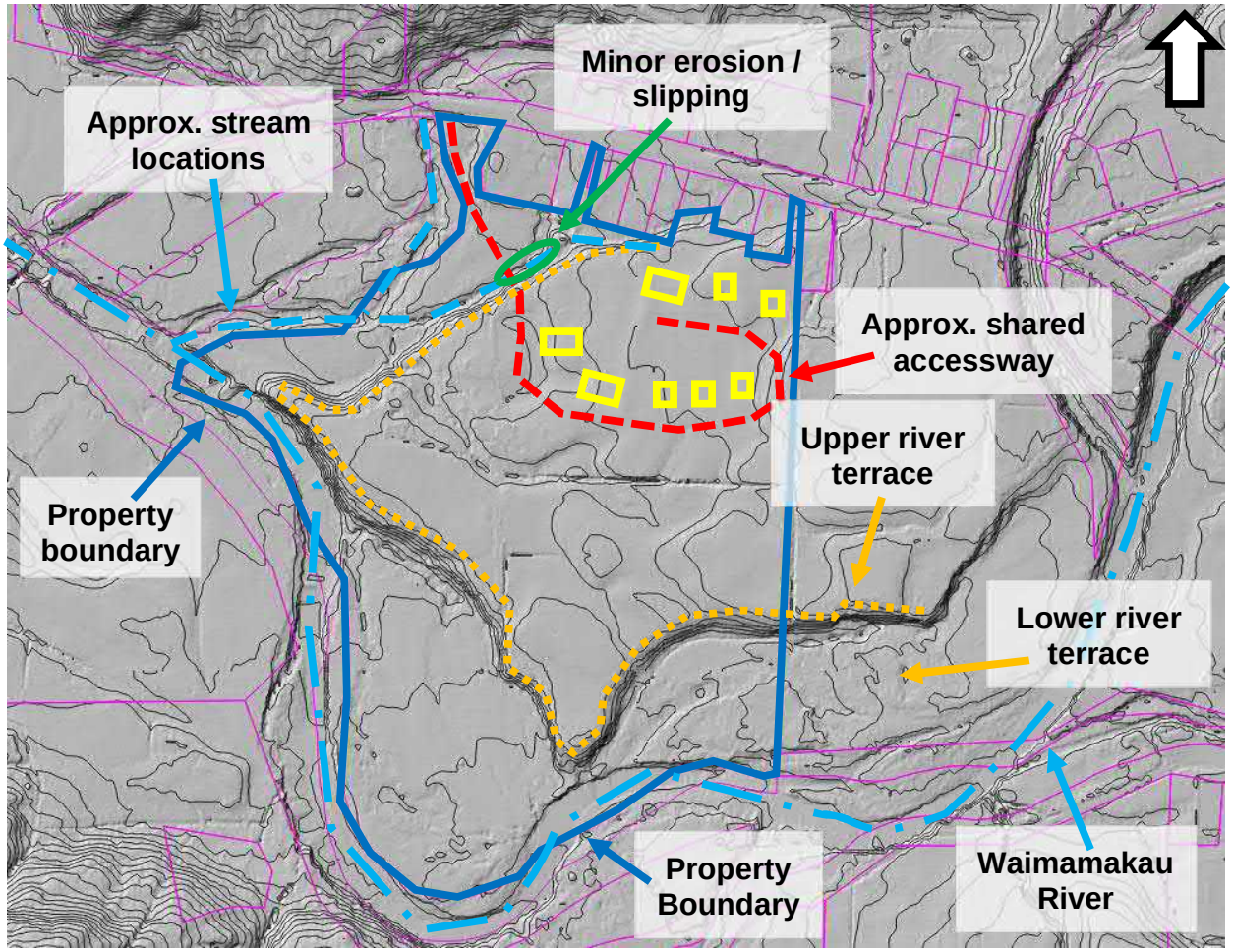


Figure G: Hillshade image of the property with contours overlain at 1.0m intervals (source: LINZ Data). The yellow squares represent the approximate locations of the proposed building sites.

8.2. Numerical Stability Analysis

A numerical slope stability analysis has been undertaken to determine the Factor of Safety (FoS) against sliding for the proposed building sites as part of the proposed papakāinga development using RocScience Slide2. The cross-section used for the analysis has been adopted from available LiDAR data, the locality of the cross-section is illustrated in Figure H below.

Global stability is defined as the large-scale instability of the site where the critical failure plane intercepts the proposed building sites. Local stability relates to smaller slippage of localised steep slopes and earthworks (cut/fill) batters.

The numerical analysis presented in this report was completed using RocScience Slide2 and the Morgenstern-Price slope model, to assess the global and local stability of the proposed development through the critical nominated building sites.

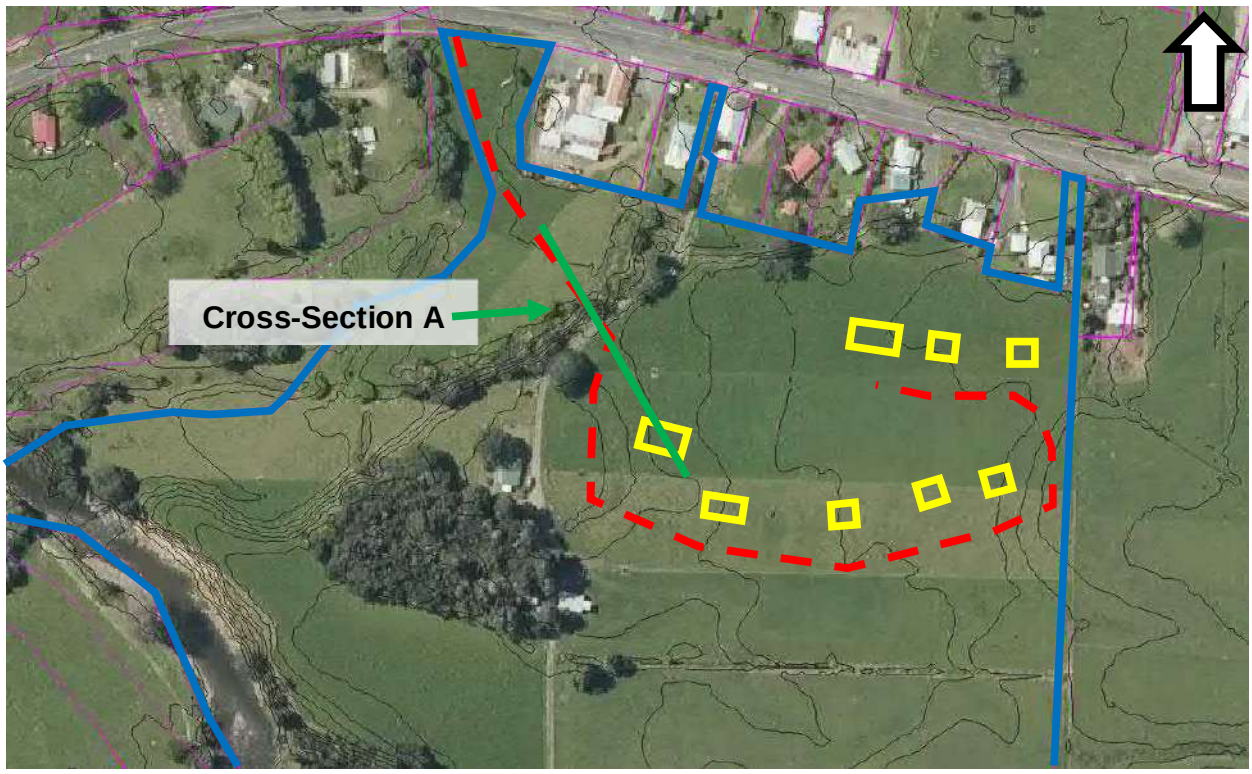


Figure H: Aerial image of the proposed development area with the property boundary identified in dark blue, the proposed building sites are identified as yellow squares (source: LINZ Data).

An analysis has been undertaken for the critical cross-section through the nominated building sites. To ensure the parameters and methods used are critical representations, a sensitivity analysis was conducted.

The analysis criteria adopted herein is based on the standard engineering practice. This requires a minimum FoS against sliding of 1.5 to be achieved for normal groundwater conditions, 1.3 for extreme groundwater conditions (undrained) and 1.0 for a DCLS level seismic event.

Three load cases / slope conditions have been assessed; these are:

1. Normal groundwater conditions (NGWT),

2. Elevated groundwater conditions (EGWT), and

3. Seismic with normal groundwater conditions (DCLS).

The Mohr-Coulomb (MC) engineering soil parameters of the subsoil conditions were derived from prior experience and CPT strength parameters with OIS4 to OIS1 estuary, river, and swamp deposits. No recent or relevant slope movement is evident in observed LiDAR data nor within the GNS published geology, therefore a back analysis was unable to be undertaken.

Soil lithology and depth for the forward analysis has been inferred based on site topography and profiles encountered in the hand augers, DCPTs, and CPTs inferring (post earthworks) slope conditions. The calibrated MC soil parameters used for this analysis are considered conservative and are summarised in Table 3 below:

Table 3: Calibrated Mohr-Coulomb Soil Parameters

Soil Description	Soil Unit Weight (γ)	Effective Cohesion (c')	Effective Friction Angle (ϕ')
	kN/m^3	kPa	Degrees
Silty Clay / Clayey Silt	18	1.5	20
Silty Sand / Sandy Silt	17	0	24
Gravel	19	0	28
CW Waipapa Group bedrock	19	3	26
HW – MW Waipapa Group bedrock	20	7	32

Table 3 Notes:

CW = Completely Weathered

HW = Highly Weathered

MW = Moderately Weathered

Two distinct failure methods have been evaluated to determine the sensitivity of our analysis with respect to the selected soil strength parameters. At the property, no slope failure mechanisms were observed however, the most common failure for the encountered soil types is translational (block-slide) failure. A sensitivity analysis of the entry and exit boundaries of the soils were conducted for a rotational and translational failure. This approach was undertaken to yield the most plausible outcomes under varying slope, soil, and groundwater conditions. The results from the analysis was assessed and it determined that rotational failure was the more critical failure mechanism therefore has been modelled despite not being typically consistent with common failures in gravelly alluvial deposits.

For an IL2 structure, a DCLS level seismic event may be adopted for slope stability assessments to model a minimum seismicity event in areas with a perceived low seismic potential as is recommended within the NZ Bridge Manual (SP/M/022) and has been adopted as engineering best practice.

Peak ground acceleration (PGA) and magnitude for this analysis have been adopted from Table A1, Appendix A of the MBIE/NZGS Earthquake Geotechnical Engineering Practice Module 1, 2021. Input parameters for the liquefaction assessment are summarised in Table 4 below:

Table 4: Liquefaction Assessment Input Parameters

Importance Level	Limit State	Probability of Exceedance (per annum)	PGA	Earthquake Magnitude
2	DCLS	Undefined (>1,000)	0.19	6.5

Initial slope modelling was undertaken to ascertain the most appropriate balance of earthworks, drainage, and slope mitigation required for the proposed development; referred to herein as the ‘proposed’ slope conditions. The proposed building sites have been modelled with surcharge loads of 10kPa to represent typical NZS 3604-type residential buildings.

A floor area of 12m x 12m has been adopted in the modelling for the building sites. Minor excavations and fill have been modelled to form a flat building platform, with batters modelled where appropriate. For the existing driveway and proposed shared accessway, a 12.5kPa surcharge load has been modelled to represent heavy-weight vehicular movement. Minor excavations have been modelled however no fill has been modelled.

Groundwater has been modelled at 0.5m bgl for elevated conditions and at 1.0m bgl for normal conditions based on encountered groundwater transmissions.

Results of our numerical slope stability analysis identify the lowest FoS in relation to the nominated critical building site/s and shared accessway are presented in Table 5 below:

Table 5: Assessed FoS of Critical Conditions

Cross-Section	Condition	Existing FoS	Proposed FoS
Cross-Section A **Dwelling and Shared Access**	Normal Groundwater Transmissions	1.12	>1.50
	Elevated Groundwater Transmissions	0.97	>1.50
	Seismic - DCLS	0.74*	0.87*

Table 5 Notes:

- The FoS presented above have been rounded to the nearest two decimal places.
- (*) where the DCLS level seismic event has returned a FoS result lower than 1.0, a Newmark Rigid Body assessment has been undertaken.

Results of our numerical stability analyses indicate that the FoS against rotational failure for slopes near and/or beneath the proposed critical building sites are greater than standard engineering practice requirements. The shared accessway is appropriate for the proposed development subject to adequate drainage, battering of fill and excavations, and retaining where necessary.

Cross-Section A modelled the proposed conditions of the very steep slopes beneath the proposed bridge abutment. To isolate the bridge abutment from instability issues and erosional processes, an inground retaining wall has been modelled to achieve an appropriate FoS in accordance with NZ Bridge Manual for seismic conditions and standard engineering practice for groundwater conditions.

Results of the sensitivity analyses indicate that site conditions are highly sensitive to changes in loads, groundwater elevation, seismicity, and appropriate retaining / setbacks.

Where the seismic FoS is lower than 1.0, a Newmark Rigid Body assessment has been performed to determine the co-seismic site displacements during a DCLS level seismic event. This analysis was conducted using Slide2 and the regression models proposed by Jibson (2007) and Jobson et al. (2013).

A Newmark Rigid Body assessment was completed to predict the likelihood of seismic induced slope movement via a DCLS level seismic event with the associated critical seismic coefficient measured against a FoS of 1.0. The DCLS magnitude displacement was assessed based on a seismic record greater than the MBIE defined DCLS level seismic events and of a greater magnitude. The seismic data model used within the assessment is that of Kobe, Japan 1995 (KAK – 000) with a magnitude of 6.9 and a PGA of 0.251. These seismic records exceed the DCLS criteria and therefore the assessment is considered conservative.

The Newmark displacement assessment found that the wider property where the building sites are proposed to be found, are not likely to undergo displacements greater than 1cm.

The maximum Newmark displacement modelled for the location of the bridge abutment and approach was found to be up to some 7.0m from the base of the streambed. Subject to the installation of the inground retaining wall, the shared accessway is assessed to undergo a maximum displacement of less than 10mm, with the effects considered to be negligible and unlikely to significantly impact use of the bridge or accessway, should this event occur.

The FoS for the proposed building sites, bridge abutment, and shared accessway, as described above, are compliant with current engineering best practice and the NZ Bridge Manual.

9. Liquefaction Assessment

The liquefaction analysis presented here was completed using the computer programme CLiq, version 3.5.3.15 over the full depth of the CPTs.

Liquefaction is a phenomenon where saturated low plasticity soils lose strength due to high pore pressure development during earthquake shaking. This generally occurs in loose to medium dense, cohesionless soils such as sand and other river deposited non-plastic silts, most common in low-lying and coastal areas with associated high groundwater transmissions. Liquefaction of near-surface soils typically results in surface cracking, dislocation, ground deformation, and lateral spreading.

Eight CPTs were undertaken in correspondence with a ‘Level D’ site-specific assessment of liquefaction risk, as per the Planning and Engineering Guidance released by EQC, MBIE, and MfE in 2017 (PEG 2017). The assessment was completed to provide a significant reduction in the uncertainty level of liquefaction related risks.

9.1. Assessment Criteria

The latest MBIE Guidelines are prepared for, and actioned under, the Building Act 2004, however, are commonly used as guidance during liquefaction assessment under the Resource Management Act 1991 (RMA). It is best practice to adhere to the advice contained within the Building Act 2004 when undertaking assessments to address Section 106(1) of the RMA, these guidelines have been used to facilitate the liquefaction assessment contained herein.

The future building sites are likely to have an Importance Level 2 (IL2) residential building constructed. Following the guidance set out in the MBIE Module 4 and NZS 1170.5:2004, IL2 buildings are required to be designed to resist seismic activity aligned with a 25-year return period seismic event, known as the Serviceability Limit State (SLS) design load. The deformation for this design case shall be limited such that the building’s structural system does not experience deformation that prevents the continual use of the structure, also it should not require significant repair. The magnitude of this deformation is typically accepted

as that described in the New Zealand Building Code B1 Structures, Appendix B B1/VM1, Clause B1.0.2 (differential settlement no greater than 25mm over 6.0m, or 1:240).

An Ultimate Limit State (ULS) seismic event is defined in Module 4 with an annual probability of exceedance 1/500 (500-year return period), whereby the structure must remain sound enough to allow evacuation and preservation of life (though irreparable damage to the structure may occur). A permissible differential settlement tolerance of 1:80 is considered appropriate for a lightweight residential building found over shallow foundations.

9.2. Analysis Assumptions

Peak ground acceleration (PGA) and magnitudes for SLS and ULS level events have been adopted from Table A1, Appendix A of the MBIE / NZGS Earthquake Geotechnical Engineering Practise Module 1, Nov 2021. The NZ Bridge Manual suggests that all structures should be assessed in terms of the Damage Control Limit State (DCLS) when modelling areas perceived as having a low seismic potential. A DCLS seismic event is modelled within MBIE / NZGS Module 1 and is similar to an event with a return period of 1/1,000-years. During a DCLS level seismic event, the structure may undergo significant / irreparable damage but should preserve life and allow for evacuation.

A comparison of the DCLS liquefaction potential index (LPI) and liquefaction severity number (LSN) was undertaken for five empirical liquefaction triggering correlations (Figure I). This comparison was conducted to determine the most appropriate empirical method to use when completing our liquefaction assessment.

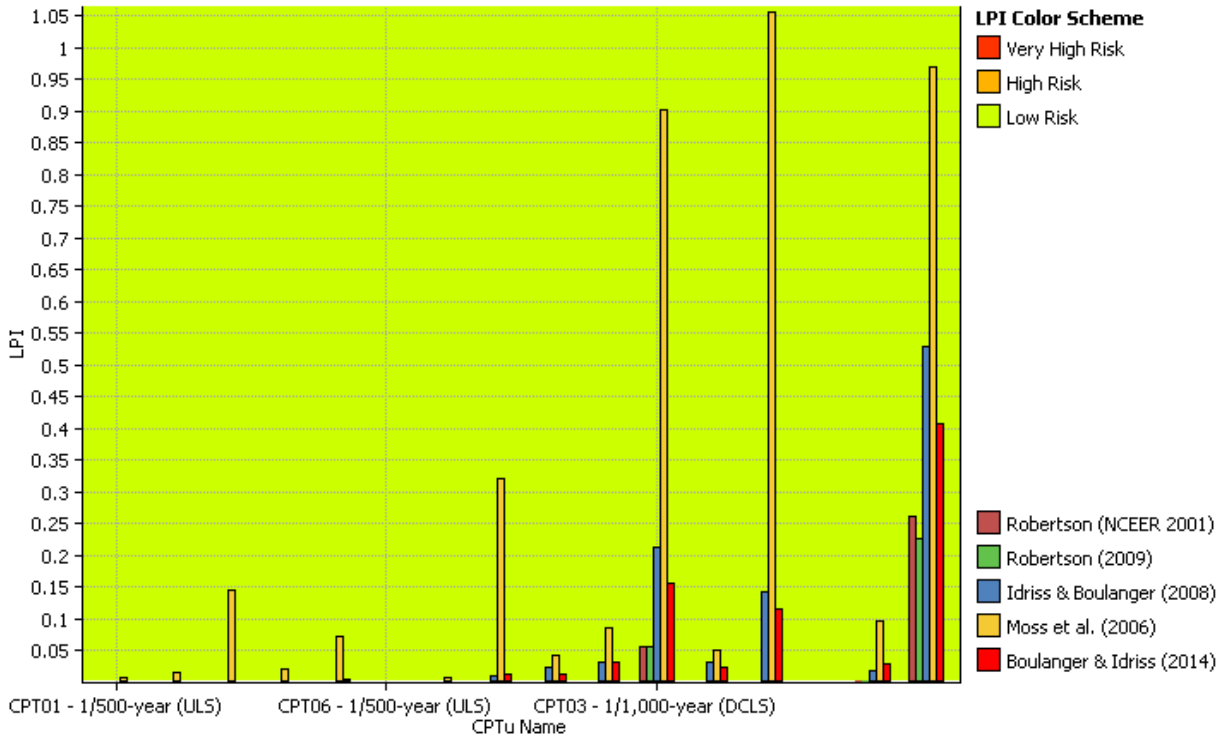


Figure I: Graph of all five empirical methods used to calculate the DCLS LPI, the most representative results were typically provided by Boulanger & Idriss (2014).

Based on the outputs of all five empirical liquefaction triggering correlations, the Moss et al. (2006) relationship is considered to be the most conservative for the site and has been adopted for the assessment contained herein due to the low liquefaction risk.

In accordance with the recommendations set out in MBIE / NZGS Earthquake Geotechnical Engineering Practise Module 4, Section 3.5, a triggering analysis has been undertaken to understand the site behaviour under various peak ground acceleration scenarios.

Input parameters for the liquefaction assessment are summarised in Table 6 below:

Table 6: Seismic Input Parameters for the Liquefaction Assessment Based on Waimamaku

Importance Level	Limit State	Probability of Exceedance (per annum)	PGA	Earthquake Magnitude
2	SLS	1/25	0.03	5.8
	Not Defined	1/50	0.05	5.8
	Not Defined	1/100	0.07	5.8

	Not Defined	1/250	0.10	5.8
	ULS	1/500	0.13	5.8
	DCLS	1/2,500	0.19	6.5

Table 6 Notes:

- Not Defined = No limit state per NZS 1170.5:2004 and/or MBIE / NZGS Module 4.

The liquefaction analysis presented below has been undertaken adopting the following:

- The Moss et al. (2006) empirical correlation / method,
- Depth to normal groundwater transmissions at 1.0m bgl,
- A soil behaviour index (Ic) cut-off of 2.6, assuming soils with an Ic greater than 2.6 are clay-like and not liquefiable, and
- DCLS, per MBIE Guidelines and the NZ Bridge Manual (SP/M/022).

Under current codes, design engineering must only consider the SLS and ULS seismic events, however, it is important to understand the behaviour of the site during the intermediary seismic events (annual exceedance probabilities) and a DCLS level seismic event.

Based on the above, the liquefaction analysis contained herein, is considered conservative in nature, and representative of the worst-case scenario for the site.

9.3. Surface Manifestation

Liquefaction induced damage observed at the ground surface is a function of the severity of liquefaction and thickness / density of the non-liquefiable crust.

Analysis of the potential liquefaction surface manifestation has been undertaken using the computer programme CLiq and the Ishihara (1985) empirical correlation. Based on the results of the CPT testing, the non-liquefiable crust over the site is typically some 1.7m thick.

The below graph (Figure J) shows the site-specific CPTs plotted over Ishihara's (1985) crust thickness chart. This plot shows that the subject property is unlikely to undergo surface manifestation, up to a DCLS level seismic event for the 1.7m thick crust.

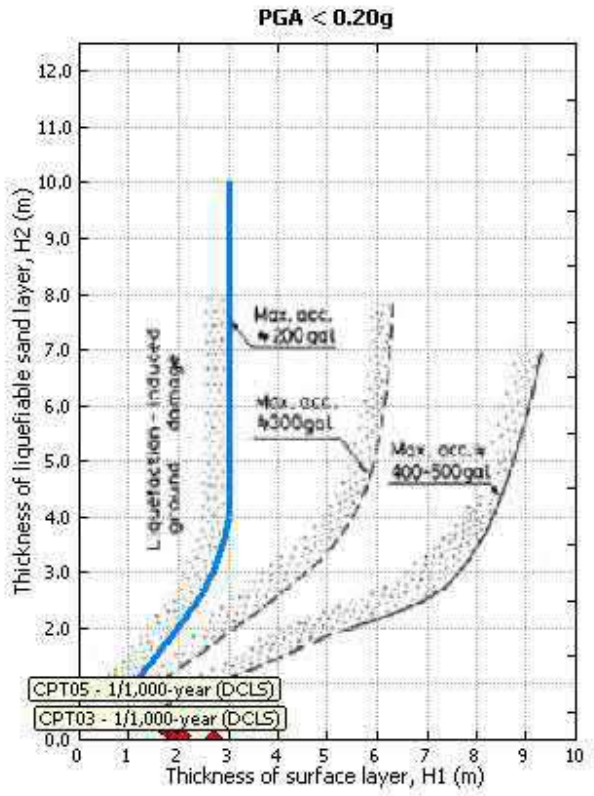


Figure J: Plot of the CPTs against Ishihara's (1985) chart for assessment of effects of crust thickness on liquefaction induced ground damage. The plot shows the seismic events that could induce surface manifestation.

9.4. Seismic Induced Vertical Settlement Analysis

Liquefaction-induced vertical settlement has been assessed under a DCLS and SLS seismic event over the full CPT depths.

Results of the analysis indicate that soils over the site are highly unlikely to liquefy during a SLS level event and may undergo minor liquefaction during a DCLS level event. The results of this analysis are detailed in Table 7 below.

The performance levels are presented below based on those described in MBIE / NZGS Earthquake Geotechnical Engineering Practise Module 3, Nov 2021, as follows:

"Level 0 'Insignificant' liquefaction effects are described as "No significant excess pore water pressures (no liquefaction)". This classification indicates the FoS has been calculated to be >1.4, with a liquefaction potential index (LPI) of 0, and a liquefaction severity number (LSN) of less than 10.

Level 1 'Mild' liquefaction effects are described as "limited excess pore water pressures; negligible deformation of the ground and small settlements." A 'Mild' classification means the FoS has been found to be ~1.0, a LPI of less than 5, and a LSN between 5 to 15.

Level 2 'Moderate' liquefaction effects are described as "Liquefaction occurs in layers of limited thickness (small proportion of the deposit, some 10% or less) and lateral extent; ground deformation results in relatively small differential settlements." This classification indicates the FoS has been found to be ~1.0, a LPI of less than 5, and a LSN between 10-25.

Level 3 'High' liquefaction effects are described as "Liquefaction occurs in a significant portion of the deposit (say 30% to 50%) resulting in transient lateral displacement, moderate-to-large differential movements, and settlement of the ground in the order of 100mm to 200mm." A 'High' classification indicates the FoS has been calculated to be less than 1.0, LPI ranges between 5 to 15, and the LSN ranges between 15 to 35.

Level 4 'Severe' liquefaction effects are described as "Complete liquefaction develops in most of the deposit resulting in large lateral displacements of the ground, excessive differential settlements and total settlement of over 200mm." This classification indicates the FoS is much less than 1.0, the LPI is greater than 15, and the LSN is greater than 30.

Level 5 'Very Severe' liquefaction effects are described as "Liquefaction resulting in lateral spreading (flow), large permanent lateral ground displacements and/or significant ground distortion (lateral strains/stretch, vertical offsets, and angular distortion." A 'Very Severe' classification does not provide characteristics but is considered to be much greater than that of Level 4 'Severe'."

Table 7: Summary of Liquefaction Under DCLS Analysis - Full CPT Depths

CPT	Overall Vertical Settlement (mm)	FoS	LPI	LSN	Probability (%)	Performance Level
1	<1	0.5	<1	<1	4	L0
2	2	0.5	<1	<1	4	L0
3	8	0.5	1	4	5	L0
4	<1	0.5	<1	<1	4	L0
5	9	0.5	1	5	5	L1
6	0	>2.0	0	0	4	L0
7	2	0.5	<1	<1	4	L0
8	6	0.5	1	2	5	L0

For a DCLS level seismic event, the site performance level of the CPTs have been calculated on average to have a very low probability of liquefaction occurrence, with an LPI and LSN commensurate of a L0 “Insignificant” performance level over the full CPT depth. CPT5 returned a low probability of liquefaction, with liquefaction outputs representative of a L1 “Mild” performance level. For conservatism, the L1 “Mild” performance level has been applied to the wider development.

Results of our DCLS liquefaction assessment over the full CPT depth indicate that the site may experience an overall vertical settlement in the order of 10mm with the probability of occurrence some 5%. Liquefaction-induced settlement is expected to occur within the medium dense silty sands which were inferred at depths from approximately 2.0m bgl, beneath the groundwater table.

A copy of the CLiq outputs is attached to this report within Appendix F.

9.5. Lateral Spreading

Lateral spreading normally occurs along an open slope face such as a riverbank or steep coastal slope, where loose, saturated sandy soils are commonly encountered at shallow depths. The effect of lateral spreading generally decreases with increased distance from the slope face.

The subject papakāinga development area is essentially flat, with no significant gradient changes, slope faces, or deep drains within the subject area. North and west of the proposed papakāinga there is a stream which may have the potential to undergo lateral spreading. The change in elevation from the shared accessway and the base of the streambed is some 5.0m and has been modelled from available LINZ data and educated assumptions.

A lateral spreading assessment has been undertaken using RocScience Slide2 to determine the FoS and likely extent of the lateral spreading in relation to the stream bank. The assessment found that the shared accessway is likely to undergo minor displacements following the installation of an in-ground retaining wall. The largest displacement was assessed at <10mm under the shared accessway extending from the base of the streambed. No displacement was assessed to extend into the modelled building site. This assessment has been further explained in Section 8.2. of this report.

The FoS for the proposed building site, as described above, are compliant with engineering best practice. A copy of the lateral spreading outputs is attached to this report in Appendix D.

10. Static Settlement

Results of our geotechnical investigation indicate that the site is typically underlain by a variety of alluvial deposits with varying strength parameters. The upper firm to stiff silty clay / clayey silt layer encountered to some 0.9m to 2.9m bgl is considered to be at potential risk of settlement, however, the medium to dense silty sands and dense to very dense gravels below this layer are not considered prone to settlement.

A preliminary settlement analysis of the potential primary and secondary creep settlements over a 600-month period has been undertaken to ascertain the potential levels of settlement under a future commercial development. This analysis has been completed using the computer programme CPeT-IT version 3.9.5.6.

Consolidation settlement is the process of excess porewater pressure dissipation, whereby when a load is applied to a soil structure, the load is initially taken up by the porewater pressure and gradually transferred to the soil structure. This process results in the consolidation of the soil structure over time, referred to as ‘primary consolidation settlement’.

Creep settlement occurs over an extensive period and is the re-adjustment of soil particles under constant load, generally commencing once all excess pore water pressure dissipates (at the end of consolidation settlement), referred to as ‘secondary settlement’.

The general guidance on differential settlement for Serviceability Limit State (SLS) design load combinations, as described in the NZ Building Code B1 Structures, Appendix B B1/VM1, Clause B1.0.2, advises a design tolerance for differential settlement beneath a building platform to be no greater than 25mm over a horizontal distance of 6.0m (1:240) is generally suitable. This tolerance is typical of a single-storey lightweight residential building, and the assessment contained herein has been undertaken for a structure that is tolerable of differential settlements in the order of 1:240 across the building footprint for a SLS design.

The analysis undertaken is for the assessment of potential settlement (consolidation and secondary settlement) for individual building sites with a total footprint of some 120m^2. The analysis has been undertaken over the full depth of the soil profile as measured by the CPTs.

Results of our analysis primary consolidation settlement for the future residential building sites with an imposed load of 10kPa will be negligible.

Due to the negligible effect of a 10kPa imposed on the soils, a sensitivity assessment was undertaken and found that for a 50kPa load, the maximum total settlement expected over the property is no greater than some 15mm.

It should be noted that the above settlement predictions are not precise calculations and are mildly sensitive to changes in applied fill and building loads. The accuracy of the predicted total settlement magnitudes should be considered in the order of ±50%.

Results of our preliminary analysis using CPeT-IT conclude the site is unlikely to be subject to considerable settlement and therefore, further assessment (i.e., Plaxis) is not necessary.

Results of our settlement analysis are attached within Appendix E.

11. On-site Effluent Field Soil Assessment

An assessment of the near surface soils was undertaken during our site investigation. Soils on the property have been assessed for on-site effluent disposal in terms of the Proposed Regional Plan (PRP) for Northland 2024 and AS/NZS 1547:2012.

All dwellings are proposed to dispose of effluent into a shared on-site wastewater disposal field. The soils over the sites are identified as Clay Loams, or Category 4 in terms of Table 5.2. of AS/NZS 1547:2012. We recommend secondary treated effluent be discharged via pressure compensated dripper irrigation (PCDI) lines with a design rate of 3.5mm which is considered appropriate for this soil type.

There are limited areas for a discharge and reserve field, with appropriate separation distances from boundaries, slopes greater than 18°, setback a minimum 10m from slopes greater than 18°, and areas of water ponding. The wastewater disposal field is proposed to be situated over slopes that have a potential for a moderate volume of surface water runoff; therefore, where practicable an impermeable bund or swale should be installed around the upper slopes of the wastewater disposal field/s to divert surface water runoff.

Where the wastewater disposal field is to be constructed within depressions of the undulating ground, the effluent disposal field shall be raised a minimum 0.6m, to elevate above surface water ponding during heavy rainfall events and elevated groundwater transmissions.

Should solar panels be placed over the wastewater disposal field in the future, a reduction in the daily irrigation rate is required to decrease excessive discharge and remove any consideration for evapotranspiration. A more appropriate rate for these soils with no consideration for evapotranspiration is 2.5mm/day.

12. Recommendations and Conclusions

12.1. Liquefaction

Results of our subsoil investigation found the property underlain by OIS4 to OIS1 estuary, river, and swamp deposits. Silty sand and sandy silt were inferred under some areas of the property between depths of 1.9m and 2.8m bgl and are situated below the permanent groundwater table (1.0m bgl). The overlying cohesive silty clay / clayey silt present in the upper 2.0m and the underlying dense to very dense gravels are assessed as being highly unlikely to liquefy during a DCLS level seismic event or smaller.

Normal groundwater transmissions were encountered over the papakāinga development at depths between 0.8m bgl and 1.8m bgl. Elevated groundwater transmissions are expected to be no shallower than 0.5m bgl as inferred during the subsoil investigation.

A 'Level D' liquefaction assessment was completed to reduce the uncertainty of liquefaction related risks. Ground damage induced by an earthquake or similar shaking has a >85% likelihood of not occurring at this site. This site is considered to have a *very low* liquefaction vulnerability in areas that underwent a subsoil investigation and is unlikely to occur in all other areas as established from PEG 2017.

The probability of liquefaction occurring for an ULS and a DCLS level seismic event was assessed and classified in accordance with Table 5.1 MBIE Module 3. For an ULS level seismic event and below, the probability of liquefaction occurring is less than 5% and has been classified as a Level 0 (Insignificant) liquefaction event. For a DCLS level seismic event, the probability of liquefaction occurring is assessed to be no greater than 6%, with the maximum classification determined as a Level 1 (Mild) liquefaction event. The DCLS level seismic event has been based on the entire CPT depth, as the CPT rig was unable to penetrate to depths beneath the gravel layer. The upper 2.0m have been assessed as sufficiently thick enough to prevent surface manifestation of any liquefaction that may occur at depths greater than 2.0m bgl within the thin lenses of liquefiable soils.

The results of the CLiq analysis indicate minor variations in soil compositions and layering over the property. Differential settlement over the building sites is not expected to occur for seismic events up to a ULS level event and is likely to be negligible for a DCLS level seismic event.

Results of our lateral spreading analysis indicate that the stream banks situated north to west of the papakāinga and shared accessway will have no effect on the building sites for seismic events up to a DCLS event. During / post a DCLS event, our analysis indicates a FoS of 0.81, with a lateral displacement not more than 75mm possible under the shared accessway.

The proposed development is highly unlikely to experience significant infrastructure failure that could cause catastrophic damage to the building or loss of life following a DCLS level seismic event. The likelihood of an earthquake occurring to create such a catastrophic failure is very low for Waimamaku.

Following the foundation recommendations provided in Section 12.2 and 12.3 below, we consider the proposed building appropriate and able to withstand catastrophic failure during a DCLS level seismic event.

Once the final form, layout, and foundation configuration of the development are confirmed, a reassessment shall be undertaken at Building Consent stage to ensure geotechnical performance remains consistent with the IL2 expectations of MBIE Module 4 (2021) and NZ Building Code Clause B1/VM1.

12.2. Stability

The proposed development area over the property is gently undulating with no evidence of deep-seated slope instability, across or near the property. Shallow slippage and erosion were observed under the existing driveway where the terrace break has become oversteepened as a result of erosion of the stream banks.

Minor erosion was observed within the stream banks. Slippage in the form of terracettes were observed over the river terrace break where gradients exceed 20°.

In the northern area of the property there is an intermittent stream which transitions to permanent in the northwest; this has been assessed in terms of likely slope stability for normal and elevated groundwater transmissions and a DCLS seismic event. This assessment used Slide2 and found that the lateral spreading and instability risks under the proposed conditions are expected to be appropriate for an IL2 building and a bridge with the FoS above the ULS requirement and above standard engineering practice recommendations subject to the recommendations and conclusions below.

No building site shall be situated within 10m of the upslope terrace break without a detailed stability assessment undertaken at the specific design stage.

The FoS of the shared accessway, elevated groundwater transmissions and seismic DCLS conditions indicate significant failure is possible within the design life of the accessway if mitigation is not undertaken. The bridge abutment and approach are the defining feature which must meet a minimum FoS for a DCLS level event of 1.0 under the NZ Bridge Manual. Standard engineering practice considers the FoS for normal and elevated groundwater transmissions appropriate for the bridge abutment where greater than 1.5 and 1.3 respectively.

To mitigate against the identified risk, an inground pile retaining wall has been modelled to isolate the bridge abutment from future instability and erosion. The inground retaining wall has been modelled with a maximum setback of 2.5m from the bridge abutment and stabilises the land upslope of it to allow for the abutment to have shallow foundations. The inground retaining wall must have a minimum embedment depth of 5.0m to isolate from deeper global instability. The inground retaining wall must be designed to have a minimum shear capacity at the mid-point of the timber pole retaining wall that is 80kN/m^3 or the equivalent of three evenly distributed loads over this effective retained height.

Rocks should be placed along the stream's banks at the toe of the slopes following deforestation and devegetation to form access for the bridge construction. These rocks will act as rip rap and decrease the rate of erosion at the slope's toe and reduce the impact of surface water runoff during increased rainfall events.

Surface water runoff is to be controlled over the proposed development, specifically over and/or near the terrace break slopes. All installed surface water drainage shall discharge at the base of the slopes over a 1m *x* 1m rock apron to decrease the effect of soil erosion, minimising the effect of instability over the property. The accessway shall have formalised drainage that minimises the runoff over terrace break slopes.

12.3. Static Settlement

Results of our subsoil investigation and settlement analysis indicate that the site is underlain by cohesive silts and clays in the upper 2.0m of the subsoil column that are expected to undergo negligible to minor settlement under loads up to 10kPa. These cohesive soils are typically underlain by dense to very dense gravels that are not susceptible to load settlement. Differential static load settlement over the building platform is not expected to exceed the typical design tolerance as outlined in Section 11 of this report.

The underlying sandy silts, silty sands, and/or gravels are not expected to undergo static settlement, either primary or secondary.

A sensitivity analysis using CPeT-IT was completed for loads up to 50kPa and found that settlements were likely to be no greater than 100mm (total settlement), indicating the site soils are slightly sensitive to load changes and have a moderate load settlement potential.

12.4. Earthworks

All areas to be filled and/or found over must be stripped of topsoil and vegetation prior to filling. Clean topsoil may be used for the formation of lawns, gardens, and the wastewater disposal beds as detailed in Section 12.8 of this report. All batters completed over the property shall be covered in coconut matting and planted to prevent weathering and/or erosion of exposed soils.

A suitable batter angle for all excavations is no greater than 18° (1V:3H) however, if a suitable gradient is unable to be formed, retaining will be required. Where the excavations are less than 0.5m high, 33° (1V:1.5H) is considered appropriate.

Fill exceeding 0.5m shall be battered at no more than 18° (1V:3H) however, if this gradient is unable to be formed, then retaining shall be required. Fill that exceeds 1.0m thick for the formation of a driveway, the shared accessway, or a building site shall be placed over benches formed into the natural ground with each bench a minimum 0.5m deep.

Based on the results of our subsoil investigation and our experience with similar soils, we considered clean, stiff to very stiff cohesive site excavated soils appropriate for use as 'site-

won' engineered fill. All excess site-won material shall be placed over slopes less than 18° at nominal thicknesses no greater than 0.5m at any location.

Driveways to each building site may require fill placed to meet the proposed shared accessway elevations. This fill will be up to 1.5m deep to form an appropriate driveway gradient, the fill shall be retained or battered appropriately. Battering of driveway fill shall be battered at 18° or retained where unable to achieve appropriate battering. If retaining walls are required, they shall consider a 12.5kPa load during their design to account for heavy vehicle movements.

All retaining walls greater than 1.0m high shall be specifically designed by a geo-professional.

All earthworks over the site shall be undertaken in general accordance with NZS 4431:2022 and shall be subject to the above engineering specification and supervision.

12.4.1. Bridge

All fill placed for the bridge approaches MUST be adequately retained and any soft soils beneath the proposed fill area shall be removed prior to filling. Static settlement of the fill is not considered to be a risk under fill locations that have been stripped of all topsoil, organics, and/or soft soils.

All excavations undertaken for the bridge approach that are greater than 0.5m deep and supporting the bridge approach and/or abutment shall be retained or battered at 18°.

Specific geotechnical engineering design of the bridge approach and abutment shall be undertaken in accordance with the NZ Bridge Manual (SP/M/022) by a geo-professional.

12.4.1.2. Temporary Earthworks for Bridge Construction

Due to the depth of the proposed excavations and/or the location of filling for the bridge approach, all cut and fill heights greater than 2.0m shall likely require temporary battering and/or retaining walls to decrease the risk associated with working at the toe of these excavations. These excavations should be battered at no more than 45°, temporarily retained, or constructed top down to provide a safe work environment.

Parameters for temporary retaining works shall be provided during the Building Consent process for either the retaining walls or the building platform. Note that design parameters provided for temporary works are NOT considered suitable for long-term retaining.

It is highly recommended that works are carried out during prolonged dry periods, if this is not possible, the excavation faces greater than 2.0m high should be covered with polythene wrap to decrease exposure to weathering which would increase the rate of instability.

12.4.2. Accessway Earthworks

A hand auger and two DCPTs were completed over the approximate location that the accessway is proposed to extend over between the existing driveway and the entry / exit point onto SH12, with CPTs over the remainder of the accessway. Both investigations informed the following recommendations for the formation of the proposed accessway and the appropriate California Bearing Ratio (CBR) for the roading subgrade.

These CBR numbers provide guidance for preliminary earthwork plans however site specific testing during construction is recommended for design verification.

The upper 0.8m of the soil is likely prone to minor settlement therefore, additional fill may need to be installed to account for this and maintain the final design elevation. The upper 0.8m of the subsoil column has a CBR of <1%.

If the upper 0.8m of the subsoil column is to be replaced with engineered fill (site-won or imported) the underlying soils have a CBR of 5%. As groundwater was encountered from 1.1m bgl and expected to rise to some 0.5m bgl, no ground excavations are to be completed during high rainfall periods and should not exceed 1.0m bgl without specific engineering design / consideration. Minor dewatering may be required following these excavations to allow for filling without additional / uncontrolled moisture content effecting the fill.

12.5. Fill Specification

Testing of cohesive fill shall be performed at 500mm fill depth intervals with a minimum of two tests per 1,000m^2 of placed fill. All cohesive filling over the site will be subject to engineer monitoring and Nuclear Densometer (NDM) testing, to the following engineering specification:

- Strip all topsoil from beneath the area to be filled, extending a minimum 2.0m from the edge of the proposed filling perimeter.

- Average undrained shear strengths as measured with a handheld shear vane shall average 170kPa, with no single value less than 150kPa, and

- Air voids measured by the NDM testing and following water content correction testing, the results shall average no greater than 8%, with no single value greater than 10%.

Alternatively, the site may be brought to the design level by placing compacted engineered non-cohesive fill, sand, scoria, or gravel (GAP40 or similar). This fill shall adhere to the following specification:

The site may be brought to the design level by placing compacted engineered non-cohesive fill, scoria, or gravel (GAP40 or similar). The same shall apply to all undercutting. This fill shall adhere to the following specification:

- Strip all unsuitable topsoil from beneath the fill area, extending a minimum 2.0m from the edge of the proposed filling perimeter,

- Gravel fill shall be placed at nominal uncompacted thicknesses of no greater than 150mm and be compacted to achieve a Clegg Impact Value (CIV) of not less than 25,

- Scoria shall be placed in nominal 150mm thicknesses and compacted to return a DCPT result of not less than 5 blows per 100mm nor any result greater than 10 blows per 100mm,

- Scoria shall also achieve a CIV average of 16, with no value less than 12, and no value greater than 20, and

- Testing of compacted fill shall be undertaken at nominal 500mm lifts.

Appropriate compaction equipment and methodology shall be adopted to achieve the desired level of compaction for any material used. All areas to be filled must be stripped of topsoil and unsuitable materials and benched as required, prior to filling.

12.6. Building Site Suitability

Results of our subsoil investigation indicate that the proposed papakāinga development is underlain by OIS4 to OIS1 estuary, river, and swamp deposits comprising clays through gravels. Undrained shear strengths within cohesive soils typically measured greater than 70kPa, and dense to very dense non-cohesive soils.

Due to the presence of wastewater discharge accumulating in soils near the proposed location for Dwelling #8, the subsoil investigation undertaken during Building Consent shall need to address the presence of organics if relevant. If organics are encountered within 3.0m of the proposed building platform, the depth to which they are encountered throughout the subsoil column shall need to be excavated and backfilled with clean soils / imported fill to mitigate future settlement risks. Organic soils are not considered suitable for use as site-won fill anywhere over the property and shall be disposed of appropriately.

At the specific design of any future development, the geo-professional engaged by the subsequent landowner shall undertake an appropriate assessment of the ground conditions to ascertain the classification of soil expansivity of cohesive soils. This may be undertaken in accordance with Clause 7.5.13.1 “Identification of Expansive Soils” outlined in the NZ Building Code B1/AS1 (Amd 19)

Subject to the above, the site is considered suitable for residential development found over either timber pile foundations or over a shallow concrete pad, such as a waffle raft or a conventional concrete slab. Shallow foundations will require specific engineering design at Building Consent due to the presence of expansive soils.

12.7. Resource Management Act (RMA) – Section 106(1)

Based on our findings and subject to our recommendations on subsidence, erosion, or slippage, for each of the proposed lots and nominated building sites, the risk of future instability affecting the property is low, and in terms of Section 106(1) of the RMA:

a) the land in respect of which a consent is sought, or any structure on the land, is not, and is not likely to be, subject to material damage by subsidence, erosion, or slippage from any source,

b) repealed; and

c) that sufficient provision has been made for stable physical access to each allotment to be created by the subdivision.

12.8. On-site Effluent Disposal

Soils on the property have been assessed for on-site effluent disposal in terms of AS/NZS 1547:2012 and are identified as Clay Loams or Category 4.

The wastewater disposal field shall be positioned such that they are over slopes not typically exceeding 18°. Care should be taken during the building consent stage for all future development to ensure the combined wastewater disposal field is appropriately designed for site conditions, including the use of bunds / swales to divert any surface runoff around the field, and positioning the field such that it is isolated from any potential building sites. Where the wastewater disposal field is proposed to be situated within depressions of the undulating land, it shall be placed over mounds / beds that are some 0.6m above existing ground level.

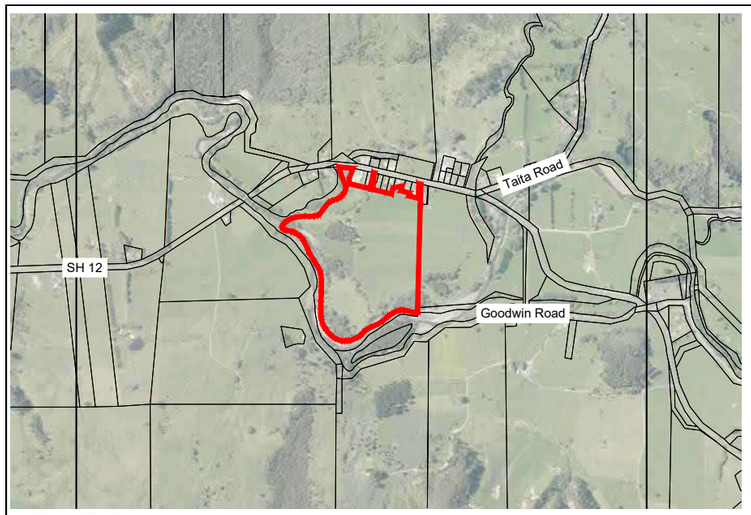
13. Limitation

Recommendations and opinions in this report are based on data from the investigation described herein. The nature and continuity of subsoil conditions away from the boreholes is inferred and it is possible that actual conditions could vary from those assumed. Should subsoil conditions vary from those described in this report, it is essential that Hawthorn Geddes engineers and architects ltd be contacted to confirm the applicability of the recommendations.

This report has been prepared solely for the benefit of our client Te Roroa and the Far North District Council in relation to the resource consent application for which this report has been prepared.

The comments in it are limited to the purpose stated in this report. No liability is accepted by Hawthorn Geddes engineers & architects ltd in respect of its use by any other person, and any other person who relies upon any matter contained in this report does so entirely at their own risk.

Appendix A. Figures



LOCALITY PLAN
N.T.S

NOTE:
SITE INFORMATION AND BOUNDARY INFORMATION PROVIDED BY LINZ.
AERIAL PHOTO PROVIDED BY LINZ MAPS AND MAY SHOW DISTORTION.
ALL INFORMATION MUST BE CONFIRMED ON SITE.

THIS DRAWING WAS PRODUCED IN COLOUR. DO NOT USE FOR CONSTRUCTION PURPOSES IF THIS NOTE IS IN BLACK & WHITE

N

SH 12

DCPT 1

HA 13

Lot 2 DP 533312

Lot 1 DP 533312

Lot 2 DP 81054

Lot 1 DP 81054

Lot 1 DP 93154

Lot 2 DP 93154

Lot 3 DP 93154

Section 97 Block IX Waoku SD

Lot 1 DP 93516

Lot 2 DP 93516

Lot 1 DP 31263

Part Section 76 Block IX Waoku SD

CPT 1
HA 2
CPT 2
HA 5
HA 4
CPT 3
HA 3
HA 6
CPT 5
CPT 4
HA 7
HA 1
CPT 6
HA 8
HA 9
HA 10
CPT 8
CPT 7
HA 11
HA 12

Part Section 14 Block IX Waoku SD

Part Section 102 Block IX Waoku SD

Part Section 1 Block XIII Waoku SD

Part Section 2 Blk XIII Waoku SD

LEGEND

- HA — Hand Auger locations
- CPT — Cone Penetrometer Test locations
- DCPT — Dynamic Cone Penetrometer Test location
- Slope ≥18°

THIS FIGURE IS TO BE READ ONLY IN CONJUNCTION WITH ASSOCIATED REPORT

USE WRITTEN DIMENSIONS. DO NOT SCALE FROM DRAWING.

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CLIENT: TE ROROA WHATU ORA / MANAWHENUA TRUST
PROJECT: GEOTECHNICAL INVESTIGATION
7729 SH12, WAIMAMAKU
DRAWING: SITE PLAN

SCALE @ A3: 1:2500
PROJECT No.: 13317
FIGURE No.: 01
REV.: -

21/05/2025 10:38:15 AM K:\13317 Te Roroa Whatu Ora; Manawhenua Trust - Prelim Geotech - 7729 SH12, Waimamaku, Kaikohe\13317 250521 Geotech.dwg

Appendix B. Hand Augered Borehole Logs + DCPT Log

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LOG OF HAND AUGER

HA01

CLIENT Te Roroa Whatu Ora / Manawhenua Trust
PROJECT Te Roroa Whatu Ora / Manawhenua Trust - Papakainga Geotech
PROJECT NUMBER 13317
PROJECT LOCATION 7229 SH12, Waimamaku
START DATE 15/01/25 **COMPLETED DATE** 06/05/25 **COORDINATES** 1643292.53E, 6065028.54N **LEVEL** 0.00
DRILLING CONTRACTOR
DRILLING METHOD 50mm Hand Auger
LOGGED BY KB
HOLE LOCATION

DEPTH (m)	SCALA (Blows / 100mm)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER	DEPTH (m)
0		SV = 172 / 47 kPa (GEO287)		Clayey SILT, with trace rootlets and gravel; dark brown. Very stiff; high plasticity; dry; gravel, fine to medium, angular to subround, completely weathered to slightly weathered; Alluvial Deposits.		
		SV = 172 / 54 kPa (GEO287)		0.6m: Dark brown with orange mottling.		
				0.8m: Dark brown and grey mottled orange. Stiff; moist; Low plasticity.		
1		SV = 87 / 22 kPa (GEO287)		1.1m: With minor sand. Wet; sand, fine.		
		SV = 111 / 24 kPa (GEO287)		1.5m: Silty GRAVEL, with some clay, with minor sand; brown. Dense; non-plastic; wet; gravel, fine to medium, angular to round, completely weathered to slightly weathered; sand, fine to medium.	15/01/2025	
				1.6m: Saturated.		
				1.700 EOH: 1.70m		
2				1.7m: EOH: Unable to Penetrate.		

PHOTO / SKETCH

WATER OBSERVATIONS

Date / Time	Water Level (m)	Type	Remarks
15/01/2025 12:00:00 p.m.	1.600	Static Water Level	

REMARKS

SYMBOLS

- Standing Water Level
- Water Out flow
- Water In flow

Produced with Core-GS

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LOG OF HAND AUGER

HA02

CLIENT Te Roroa Whatu Ora / Manawhenua Trust
PROJECT Te Roroa Whatu Ora / Manawhenua Trust - Papakainga Geotech
PROJECT NUMBER 13317
PROJECT LOCATION 7229 SH12, Waimamaku
START DATE 15/01/25 **COMPLETED DATE** 06/05/25 **COORDINATES** 1643173.75E, 6065097.83N **LEVEL** 0.00
DRILLING CONTRACTOR
DRILLING METHOD 50mm Hand Auger
LOGGED BY KB
HOLE LOCATION

DEPTH (m)	SCALA (Blows / 100mm)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER	DEPTH (m)
		SV = 215 / 36 kPa (GEO287)		Clayey SILT, with trace rootlets and gravel; dark brown. Very stiff; high plasticity; dry; gravel, fine to medium, angular to round, completely weathered to slightly weathered; Alluvial Deposits.	Groundwater Not Encountered	
		SV = 221+ kPa (GEO287)		0.6m: Hard.		
1		SV = 221+ kPa (GEO287)		0.9m: Minor orange mottling. Moist.		
		SV = 81 / 35 kPa (GEO287)		1.2m: Silty GRAVEL, with some clay, with minor sand; dark brown. Stiff; non-plastic; moist; gravel, fine to medium, angular to round, completely weathered to slightly weathered; sand, fine to medium.		
2				1.300 EOH: 1.30m		
				1.3m: EOH: Unable to Penetrate (gravels).		

PHOTO / SKETCH

WATER OBSERVATIONS

Date / Time	Water Level (m)	Type	Remarks

REMARKS

SYMBOLS

- Standing Water Level
- Water Out flow
- Water In flow

Produced with Core-GS

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LOG OF HAND AUGER

HA03

CLIENT Te Roroa Whatu Ora / Manawhenua Trust
PROJECT Te Roroa Whatu Ora / Manawhenua Trust - Papakainga Geotech
PROJECT NUMBER 13317
PROJECT LOCATION 7229 SH12, Waimamaku
START DATE 06/05/25 **COMPLETED DATE** 06/05/25 **COORDINATES** 1643310.29E, 6065078.30N **LEVEL** 0.00
DRILLING CONTRACTOR
DRILLING METHOD 50mm Hand Auger
LOGGED BY US
HOLE LOCATION

DEPTH (m)	SCALA (Blows / 100mm)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER	DEPTH (m)
				0.100 TOPSOIL; dark brown.		
		SV = 95 / 14 kPa (Geo 3928)		Silty CLAY, with trace gravel; brown mottled orange and grey. Stiff; high plasticity; moist; gravel, fine, angular to subround; Alluvial Deposits.		
		SV = 109 / 27 kPa (Geo 3928)		0.6m: Very stiff.		
				0.8m: With trace rootlets. Wet.	06/05/2025	
1		SV = 122 / 122 kPa (Geo 3928)				
	3			1.100 EOH: 1.10m		
	4			1.1m: EOH: Unable to Penetrate.		
	12					
	12					
	10					
	23					
2						

PHOTO / SKETCH

WATER OBSERVATIONS

Date / Time	Water Level (m)	Type	Remarks
6/05/2025 12:00:00 p.m.	0.800	Static Water Level	

REMARKS

SYMBOLS

- Standing Water Level
- Water Out flow
- Water In flow

Produced with Core-GS

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LOG OF HAND AUGER

HA04

CLIENT Te Roroa Whatu Ora / Manawhenua Trust
PROJECT Te Roroa Whatu Ora / Manawhenua Trust - Papakainga Geotech
PROJECT NUMBER 13317
PROJECT LOCATION 7229 SH12, Waimamaku
START DATE 06/05/25 **COMPLETED DATE** 06/05/25 **COORDINATES** 1643289.27E, 6065082.13N **LEVEL** 0.00
DRILLING CONTRACTOR
DRILLING METHOD 50mm Hand Auger
LOGGED BY US
HOLE LOCATION

DEPTH (m)	SCALA (Blows / 100mm)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER	DEPTH (m)
				TOPSOIL; dark brown.		
				0.200		
		SV = 109 / 27 kPa (Geo 3928)		Silty CLAY, with trace gravel; brown mottled orange. Very stiff; high plasticity; moist; gravel, fine, angular to subround; Alluvial Deposits.		
		SV = 95 / 14 kPa (Geo 3928)		0.6m: Stiff; wet.		
		SV = 95 / 14 kPa (Geo 3928)				
1				1.0m: CLAY, with some silt. Very stiff; low plasticity; saturated.	06/05/2025	
		SV = 115 / 27 kPa (Geo 3928)				
		SV = 109 / 14 kPa (Geo 3928)				
		SV = UTP (Geo 3928)		1.900 EOH: 1.90m		
2				1.9m: EOH: Unable to Penetrate.		

PHOTO / SKETCH

WATER OBSERVATIONS

Date / Time	Water Level (m)	Type	Remarks
6/05/2025 12:00:00 p.m.	1.000	Inflow	

REMARKS

SYMBOLS

- Standing Water Level
- Water Out flow
- Water In flow

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LOG OF HAND AUGER

HA05

CLIENT Te Roroa Whatu Ora / Manawhenua Trust
PROJECT Te Roroa Whatu Ora / Manawhenua Trust - Papakainga Geotech
PROJECT NUMBER 13317
PROJECT LOCATION 7229 SH12, Waimamaku
START DATE 06/05/25 **COMPLETED DATE** 06/05/25 **COORDINATES** 1643268.11E, 6065086.56N **LEVEL** 0.00
DRILLING CONTRACTOR
DRILLING METHOD 50mm Hand Auger
LOGGED BY US
HOLE LOCATION

DEPTH (m)	SCALA (Blows / 100mm)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER	DEPTH (m)
				TOPSOIL; dark brown.	Groundwater Not Encountered	
				0.200		
		SV = 136 / 41 kPa (Geo 3928)		Silty CLAY, with trace rootlets; brown. Very stiff; high plasticity; moist; Alluvial Deposits.		
		SV = 95 / 27 kPa (Geo 3928)		0.6m: Stiff.		
		SV = 81 / 14 kPa (Geo 3928)		0.9m: CLAY, with some silt. Low plasticity.		
1		SV = 75 / 14 kPa (Geo 3928)				
		SV = 68 / 14 kPa (Geo 3928)				
		SV = UTP (Geo 3928)				
				2.000 EOH: 2.00m		
2	6 12 21			2.0m: EOH: Unable to Penetrate.		

PHOTO / SKETCH

WATER OBSERVATIONS

Date / Time	Water Level (m)	Type	Remarks

REMARKS

SYMBOLS

- Standing Water Level
- Water Out flow
- Water In flow

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LOG OF HAND AUGER

HA06

CLIENT Te Roroa Whatu Ora / Manawhenua Trust
PROJECT Te Roroa Whatu Ora / Manawhenua Trust - Papakainga Geotech
PROJECT NUMBER 13317
PROJECT LOCATION 7229 SH12, Waimamaku
START DATE 06/05/25 **COMPLETED DATE** 06/05/25 **COORDINATES** 1643139.58E, 6065061.66N **LEVEL** 0.00
DRILLING CONTRACTOR
DRILLING METHOD 50mm Hand Auger
LOGGED BY WK
HOLE LOCATION

DEPTH (m)	SCALA (Blows / 100mm)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER	DEPTH (m)
				TOPSOIL; dark brown. Dry.	Groundwater Not Encountered	
				0.300		
		SV = 174 / 42 kPa (GEO287)		Silty CLAY, with trace rootlets; dark brown, orange mottling. Very stiff; high plasticity; moist; Alluvial Deposits.		
		SV = 176 / 38 kPa (GEO287)				
				0.900 EOH: 0.90m		
1		SV = UTP (GEO287)		0.9m: EOH: Unable to Penetrate.		
2						

PHOTO / SKETCH

WATER OBSERVATIONS

Date / Time	Water Level (m)	Type	Remarks

REMARKS

SYMBOLS

- Standing Water Level
- Water Out flow
- Water In flow

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LOG OF HAND AUGER

HA07

CLIENT Te Roroa Whatu Ora / Manawhenua Trust
PROJECT Te Roroa Whatu Ora / Manawhenua Trust - Papakainga Geotech
PROJECT NUMBER 13317
PROJECT LOCATION 7229 SH12, Waimamaku
START DATE 06/05/25 **COMPLETED DATE** 06/05/25 **COORDINATES** 1643155.52E, 6065035.07N **LEVEL** 0.00
DRILLING CONTRACTOR
DRILLING METHOD 50mm Hand Auger
LOGGED BY WK
HOLE LOCATION

DEPTH (m)	SCALA (Blows / 100mm)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER	DEPTH (m)
				0.100 TOPSOIL; dark brown . Dry.	Groundwater Not Encountered	
		SV = 163 / 42 kPa (GEO287)		Silty CLAY, with trace rootlets; dark brown, orange mottling. Very stiff; high plasticity; moist; Alluvial Deposits.		
		SV = 118 / 32 kPa (GEO287)		0.7m: CLAY, with some silt. Low plasticity.		
1		SV = 102 / 17 kPa (GEO287)				
		SV = 103 / 45 kPa (GEO287)		1.1m: With trace gravel. Gravel, fine, angular.		
				1.4m: With trace organics.		
		SV = 84 / 29 kPa (GEO287)		1.5m: Pinkish white inclusions.		
	20			1.600 EOH: 1.60m		
2				1.6m: EOH: Unable to Penetrate.		

PHOTO / SKETCH

WATER OBSERVATIONS

Date / Time	Water Level (m)	Type	Remarks

REMARKS

SYMBOLS

- Standing Water Level
- Water Out flow
- Water In flow

Produced with Core-GS

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LOG OF HAND AUGER

HA08

CLIENT Te Roroa Whatu Ora / Manawhenua Trust
PROJECT Te Roroa Whatu Ora / Manawhenua Trust - Papakainga Geotech
PROJECT NUMBER 13317
PROJECT LOCATION 7229 SH12, Waimamaku
START DATE 06/05/25 **COMPLETED DATE** 06/05/25 **COORDINATES** 1643171.59E, 6065019.11N **LEVEL** 0.00
DRILLING CONTRACTOR
DRILLING METHOD 50mm Hand Auger
LOGGED BY WK
HOLE LOCATION

DEPTH (m)	SCALA (Blows / 100mm)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER	DEPTH (m)
0		SV = 163 / 63 kPa (GEO287)	TS	0.100 TOPSOIL; dark brown. Dry.		
				CLAY, with some silt, with minor rootlets; dark brown. Stiff; high plasticity; moist; Alluvial Deposits.		
		SV = 167 / 41 kPa (GEO287)		0.7m: CLAY, with minor silt. Low plasticity.		
1		SV = 89 / 23 kPa (GEO287)				
		SV = 38 / 6 kPa (GEO287)		1.2m: Wet.		
				1.4m - 2.0m: Poor Recovery.		
		SV = 102 / 13 kPa (GEO287)		1.8m: Saturated.	06/05/2025	
2				2.100 EOH: 2.10m		
				2.1m: EOH: Unable to penetrate.		

PHOTO / SKETCH

WATER OBSERVATIONS

Date / Time	Water Level (m)	Type	Remarks
6/05/2025 11:00:00 a.m.	1.800	Static Water Level	

REMARKS

SYMBOLS

- Standing Water Level
- Water Out flow
- Water In flow

Produced with Core-GS

Hawthorn Geddes engineers & architects ltd

LOG OF HAND AUGER

HA09

CLIENT	Te Roroa Whatu Ora / Manawhenua Trust	**PROJECT**	Te Roroa Whatu Ora / Manawhenua Trust - Papakainga Geotech
PROJECT NUMBER	13317	**PROJECT LOCATION**	7229 SH12, Waimamaku
START DATE	06/05/25	**COMPLETED DATE**	06/05/25
COORDINATES	1643239.99E, 6065015.28N	**LEVEL**	0.00
DRILLING CONTRACTOR			
DRILLING METHOD	50mm Hand Auger		
LOGGED BY	US		
HOLE LOCATION			

DEPTH (m)	SCALA (Blows / 100mm)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
				0.100 TOPSOIL; dark brown.
		SV = 122 / 41 kPa (Geo 3928)		Silty CLAY, with trace rootlets and gravel; brown mottled orange. Very stiff; high plasticity; moist; gravel, fine, angular to round, completely weathered to moderately weathered; Alluvial Deposits.
		SV = 109 / 47 kPa (Geo 3928)		
		SV = 149 / 47 kPa (Geo 3928)		
1				1.0m: CLAY, with minor silt. Low plasticity.
		SV = 109 / 109 kPa (Geo 3928)		
		SV = 95 / 95 kPa (Geo 3928)		
				1.800 EOH: 1.80m
	1	SV = UTP (Geo 3928)		1.8m: EOH: Unable to Penetrate.
	1			
2	2			
	2			
	2			
	2			
	7			
	20			

WATER: 06/05/2025

DEPTH (m)

PHOTO / SKETCH

WATER OBSERVATIONS

Date / Time	Water Level (m)	Type	Remarks
6/05/2025 12:00:00 p.m.	1.500	Static Water Level	

REMARKS

SYMBOLS

- Standing Water Level
- Water Out flow
- Water In flow

Produced with Core-GS

Hawthorn Geddes engineers & architects ltd

LOG OF HAND AUGER

HA10

CLIENT Te Roroa Whatu Ora / Manawhenua Trust
PROJECT Te Roroa Whatu Ora / Manawhenua Trust - Papakainga Geotech
PROJECT NUMBER 13317
PROJECT LOCATION 7229 SH12, Waimamaku
START DATE 06/05/25 **COMPLETED DATE** 06/05/25 **COORDINATES** 1643269.20E, 6065018.72N **LEVEL** 0.00
DRILLING CONTRACTOR
DRILLING METHOD 50mm Hand Auger
LOGGED BY US
HOLE LOCATION

DEPTH (m)	SCALA (Blows / 100mm)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER	DEPTH (m)
				0.100 TOPSOIL; dark brown.		
		SV = 109 / 41 kPa (Geo 3928)		Silty CLAY, with trace gravel; brown. Very stiff; high plasticity; moist; gravel, fine, angular to subround, completely weathered to moderately weathered; Alluvial Deposits.		
		SV = 109 / 27 kPa (Geo 3928)				
		SV = 95 / 41 kPa (Geo 3928)		0.9m: Wet.		
1				1.0m: CLAY, with minor silt, with trace rootlets. Low plasticity.		
		SV = 122 / 27 kPa (Geo 3928)		1.2m: Saturated.	06/05/2025	
		SV = 109 / 27 kPa (Geo 3928)				
		SV = UTP (Geo 3928)		1.800 EOH: 1.80m 1.8m: EOH: Unable to Penetrate.		
2						

PHOTO / SKETCH

WATER OBSERVATIONS

Date / Time	Water Level (m)	Type	Remarks
6/05/2025 12:00:00 p.m.	1.200	Static Water Level	

REMARKS

SYMBOLS

- Standing Water Level
- Water Out flow
- Water In flow

Produced with Core-GS

Hawthorn Geddes engineers & architects ltd

LOG OF HAND AUGER

HA11

CLIENT	Te Roroa Whatu Ora / Manawhenua Trust	**PROJECT**	Te Roroa Whatu Ora / Manawhenua Trust - Papakainga Geotech
PROJECT NUMBER	13317	**PROJECT LOCATION**	7229 SH12, Waimamaku
START DATE	06/05/25	**COMPLETED DATE**	06/05/25
COORDINATES	1643111.89E, 6065002.20N	**LEVEL**	0.00
DRILLING CONTRACTOR			
DRILLING METHOD	50mm Hand Auger		
LOGGED BY	WK		
HOLE LOCATION			

DEPTH (m)	SCALA (Blows / 100mm)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER	DEPTH (m)
				0.100 TOPSOIL; dark brown. Moist.		
		SV = 115 / 55 kPa (GEO287)		CLAY, with minor silt, with trace rootlets; dark brown. Stiff; high plasticity; moist; Alluvial Deposits.		
				0.5m: Wet.		
		SV = 71 / 16 kPa (GEO287)			06/05/2025	
1				0.8m: With trace gravel. Saturated; gravel, fine, angular to subangular, completely weathered to moderately weathered.		
		SV = 74 / 25 kPa (GEO287)				
		SV = 67 / 15 kPa (GEO287)		2.000 EOH: 2.00m		
2				2.0m: EOH: Unable to Penetrate.		

PHOTO / SKETCH

WATER OBSERVATIONS

Date / Time	Water Level (m)	Type	Remarks
6/05/2025 12:44:00 p.m.	0.800	Static Water Level	

REMARKS

SYMBOLS

- Standing Water Level
- Water Out flow
- Water In flow

Produced with Core-GS

Hawthorn Geddes engineers & architects ltd

LOG OF HAND AUGER

HA12

CLIENT Te Roroa Whatu Ora / Manawhenua Trust
PROJECT Te Roroa Whatu Ora / Manawhenua Trust - Papakainga Geotech
PROJECT NUMBER 13317
PROJECT LOCATION 7229 SH12, Waimamaku
START DATE 06/05/25 **COMPLETED DATE** 06/05/25 **COORDINATES** 1643195.27E, 6064975.81N **LEVEL** 0.00
DRILLING CONTRACTOR
DRILLING METHOD 0mm Hand Auger
LOGGED BY WK
HOLE LOCATION

DEPTH (m)	SCALA (Blows / 100mm)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER	DEPTH (m)
				0.100 TOPSOIL; dark brown.	Groundwater Not Encountered	
		SV = 132 / 31 kPa (GEO287)		Silty CLAY, with trace rootlets; dark brown. Very stiff; high plasticity; dry; Alluvial Deposits.		
		SV = 142 / 55 kPa (GEO287)		0.7m: CLAY, with minor silt. Low plasticity.		
1		SV = 161 / 54 kPa (GEO287)		1.000 EOH: 1.00m 1.0m: Target depth achieved.		
2						

PHOTO / SKETCH

WATER OBSERVATIONS

Date / Time	Water Level (m)	Type	Remarks

REMARKS

SYMBOLS

- Standing Water Level
- Water Out flow
- Water In flow

Produced with Core-GS

Hawthorn Geddes engineers & architects ltd

LOG OF HAND AUGER

HA13

CLIENT Te Roroa Whatu Ora / Manawhenua Trust
PROJECT Te Roroa Whatu Ora / Manawhenua Trust - Papakainga Geotech
PROJECT NUMBER 13317
PROJECT LOCATION 7229 SH12, Waimamaku
START DATE 06/05/25 **COMPLETED DATE** 06/05/25 **COORDINATES** 1643078.94E, 6065151.35N **LEVEL** 0.00
DRILLING CONTRACTOR
DRILLING METHOD 50mm Hand Auger
LOGGED BY WK
HOLE LOCATION

DEPTH (m)	SCALA (Blows / 100mm)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER	DEPTH (m)
	1			0.100 TOPSOIL; dark brown.		
	2			CLAY, with minor silt, with trace rootlets and gravel; dark brown. Stiff; high plasticity; moist; gravel, fine, angular to subangular, completely weathered to moderately weathered; Alluvial Deposits.		
	1					
	1					
	0					
	1					
	1	SV = 58 / 29 kPa (GEO287)				
	1					
	3			0.8m: Wet.		
1	1				06/05/2025	
	3			1.1m: Saturated.		
	4					
	2					
	3	SV = 131 / 12 kPa (GEO287)		1.3m: Very stiff.		
	6					
	12			1.600		
	13	SV = 74 / 39 kPa (GEO287)		Silty CLAY, with minor gravel; bluish grey. Very stiff; high plasticity; saturated; gravel, fine to medium, angular to subround, completely weathered to slightly weathered, Mudstone; Completely Weathered Whangai Formation Mudstone.		
	11					
	12					
	10					
2	18					
	13					
	10			2.300 EOH: 2.30m		
	20			2.3m: EOH: Unable to Penetrate.		

PHOTO / SKETCH

WATER OBSERVATIONS

Date / Time	Water Level (m)	Type	Remarks
6/05/2025 3:00:00 p.m.	1.100	Static Water Level	

REMARKS

SYMBOLS

- Standing Water Level
- Water Out flow
- Water In flow

Produced with Core-GS

SCALA PENETROMETER TEST RESULTS

Hawthorn Geddes engineers & architects ltd

Project No: 13317
Project Name: Te Roroa Whatu Ora
Tested by: WK
Date: 18.02.25

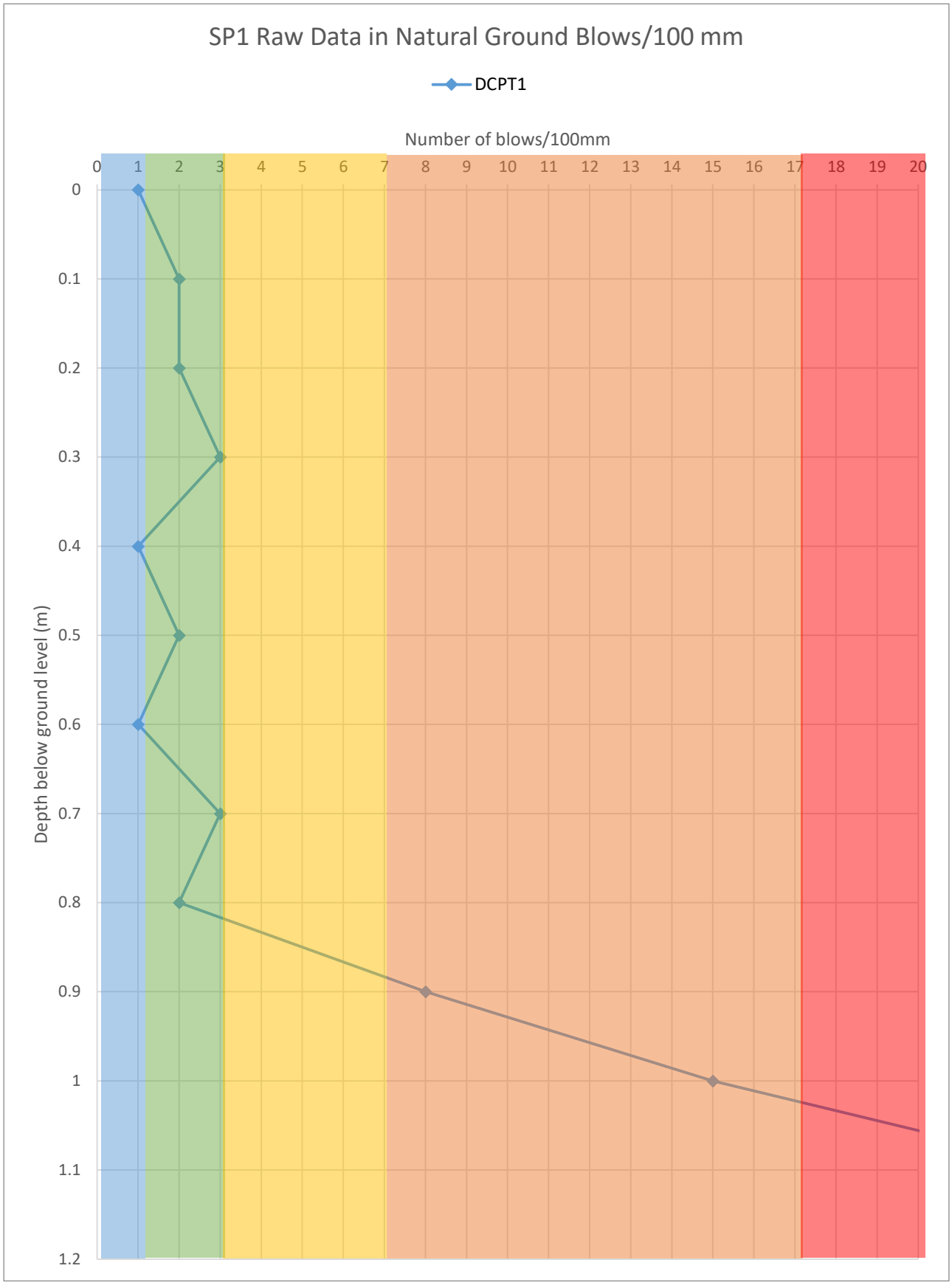
Depth	Test		
	DCPT1		
0	1		
0.1	2		
0.2	2		
0.3	3		
0.4	1		
0.5	2		
0.6	1		
0.7	3		
0.8	2		
0.9	8		
1.0	15		
1.1	24		
1.2			
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2.0			

SCALA PENETROMETER TEST RESULTS

Hawthorn Geddes engineers & architects ltd

Project No: 13317
Project Name: Te Roroa Whatu Ora
Tested by: WK
Date: 18.02.25

Legend:
Very Loose =
Loose =
Medium Dense =
Dense =
Very Dense =

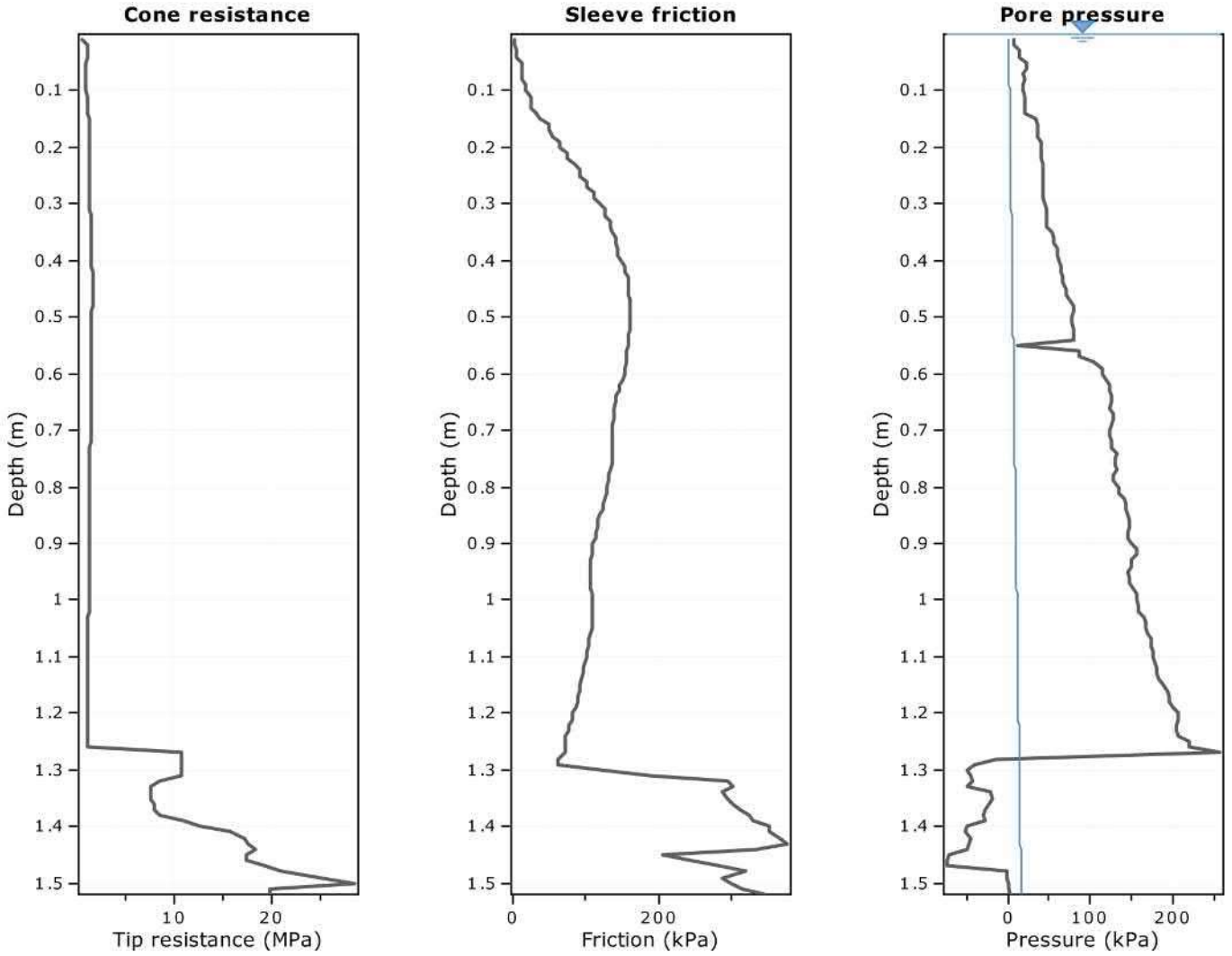


Appendix C. CPT Logs

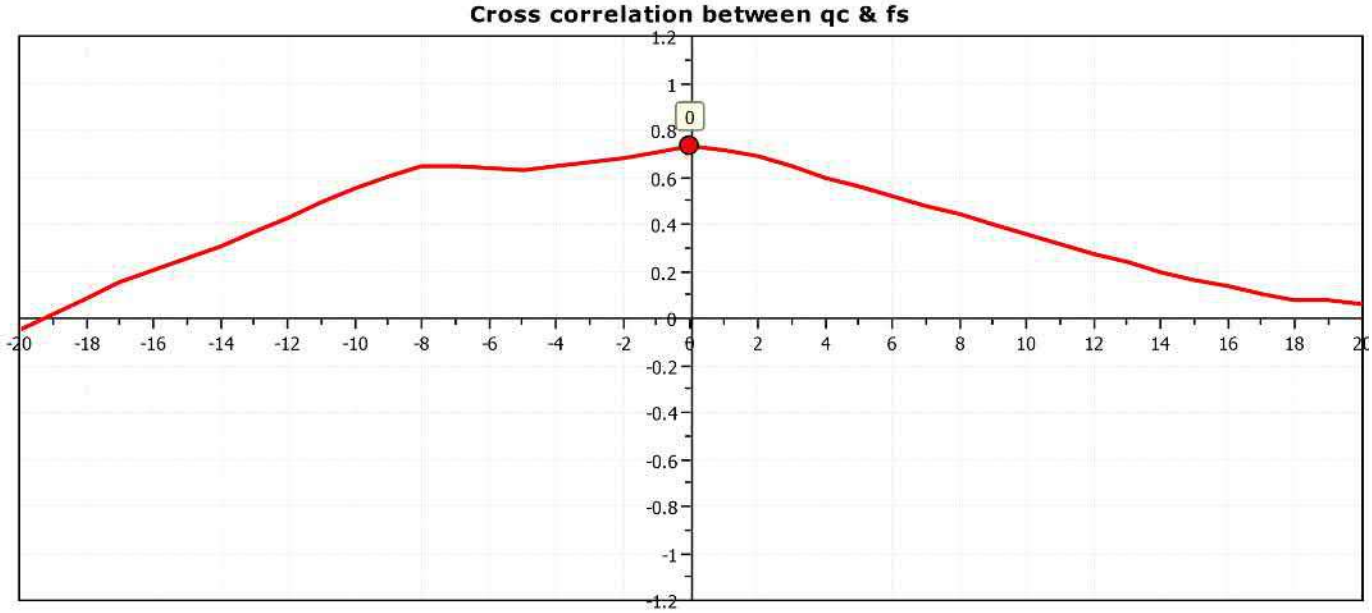
Underground Investigation Ltd
Cone Penetration Testing
craig@undergroundinvestigation.co.nz
+64211473249

CPT: CPT01
Total depth: 1.52 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



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).



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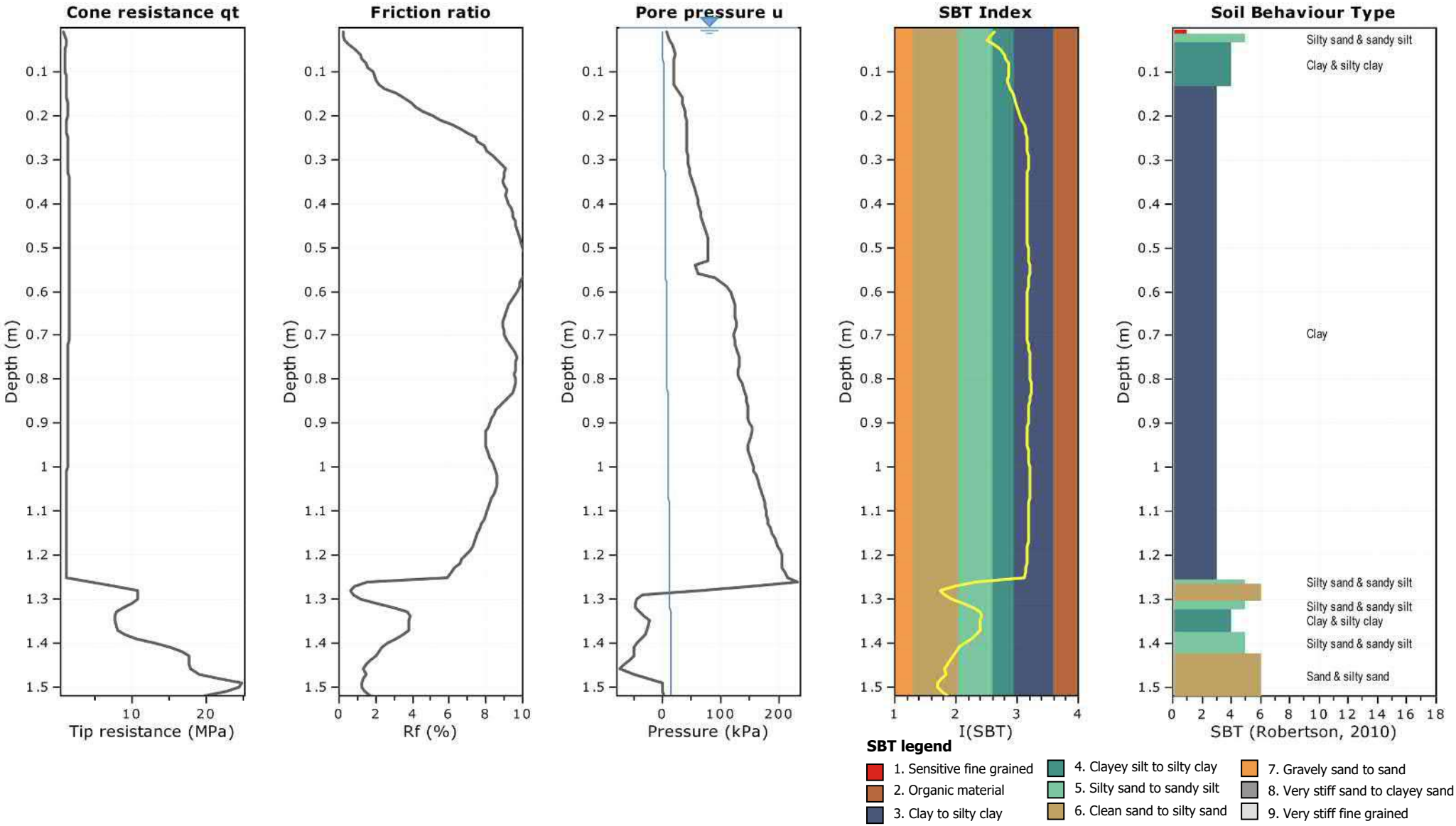
+64211473249

CPT: CPT01
Total depth: 1.52 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



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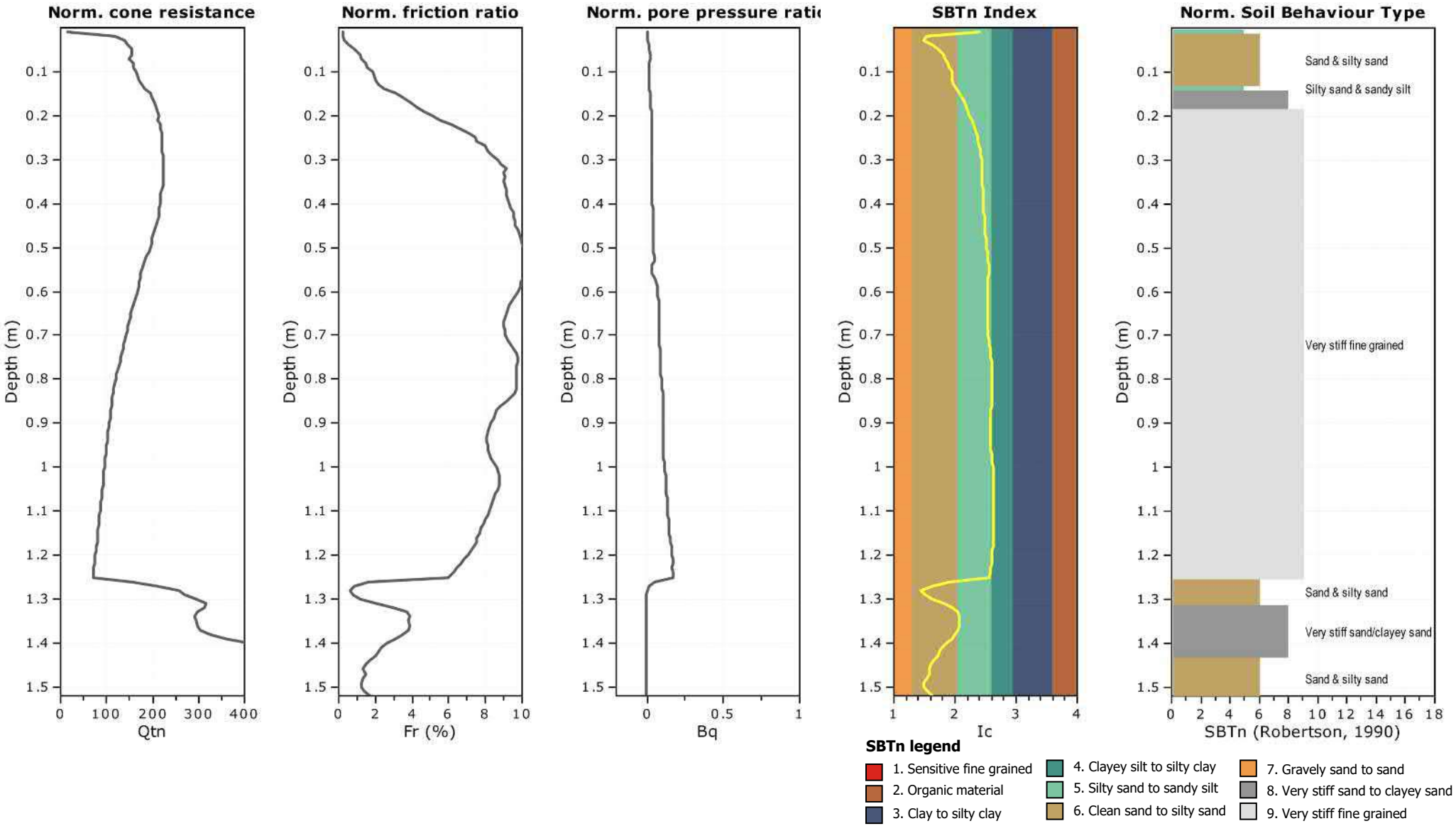
CPT: CPT01
Total depth: 1.52 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



Underground Investigation Ltd
Cone Penetration Testing
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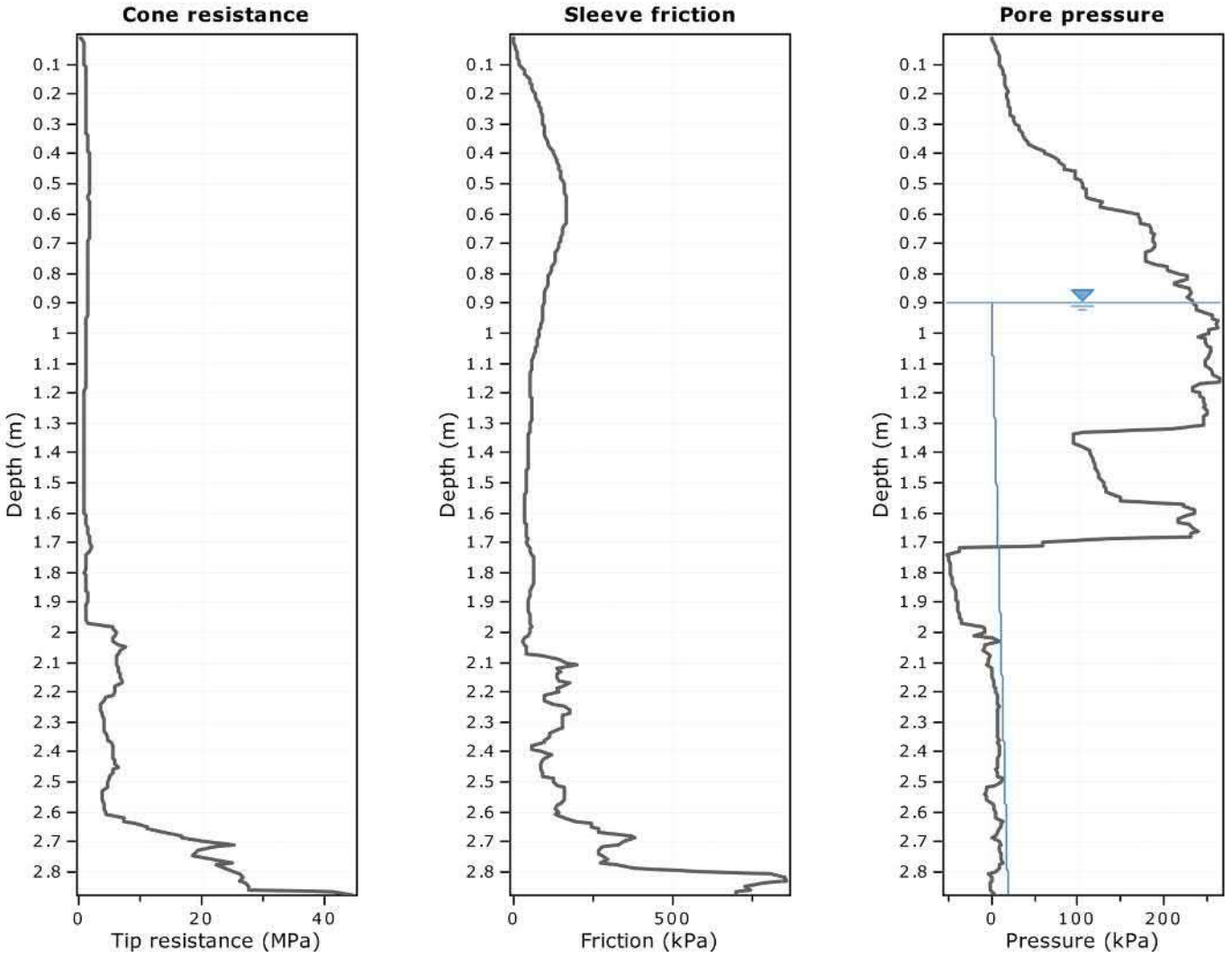
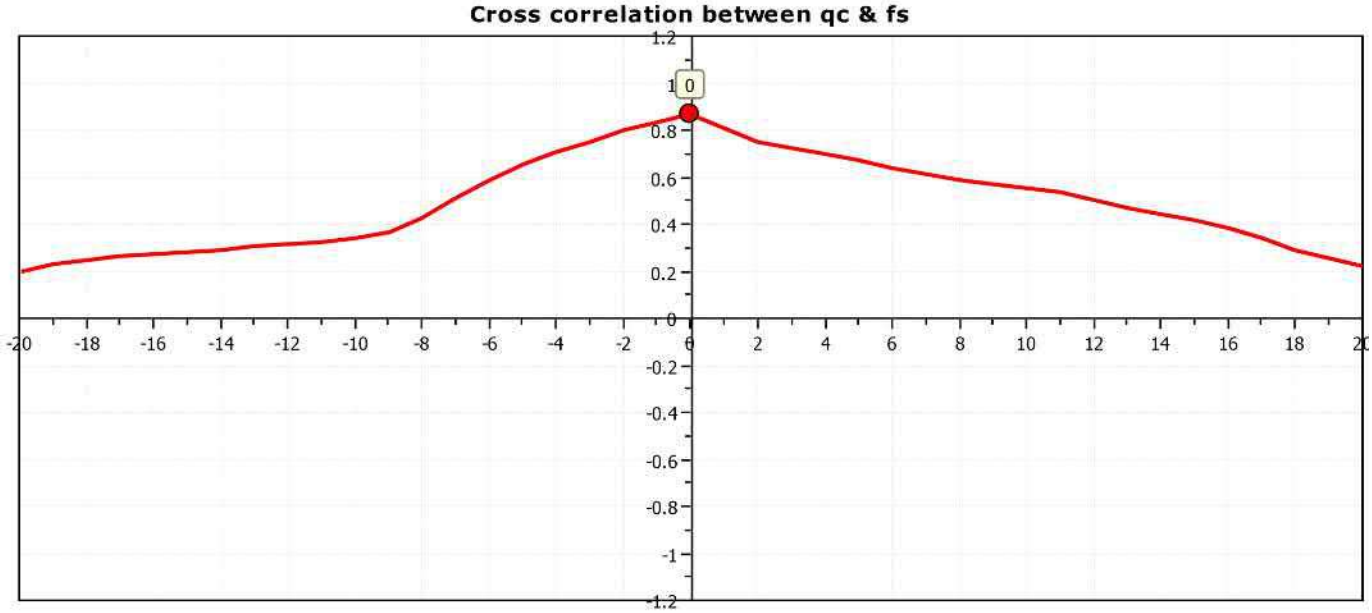
+64211473249

CPT: CPT02
Total depth: 2.88 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 0.90 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



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).



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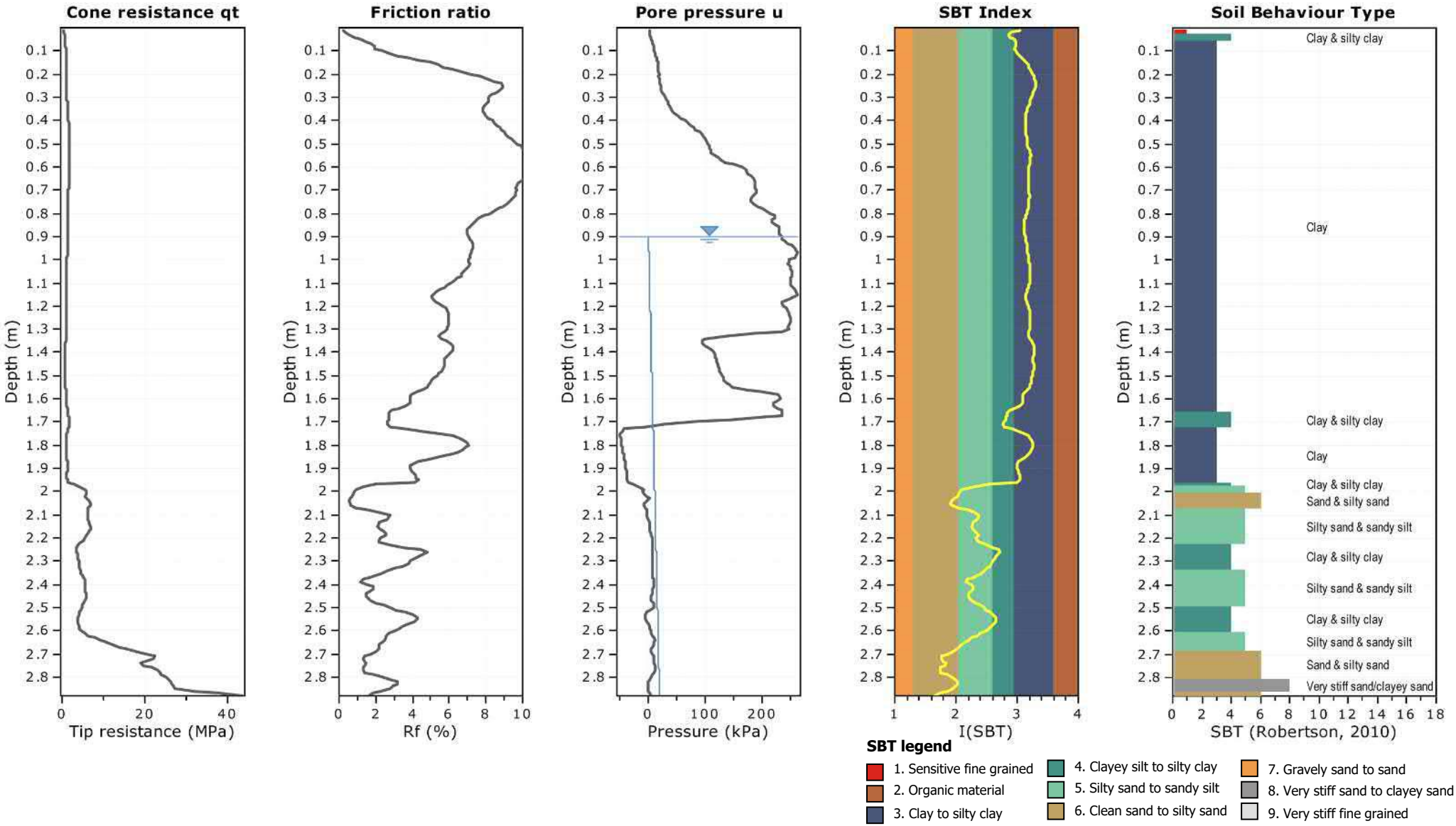
CPT: CPT02
Total depth: 2.88 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 0.90 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



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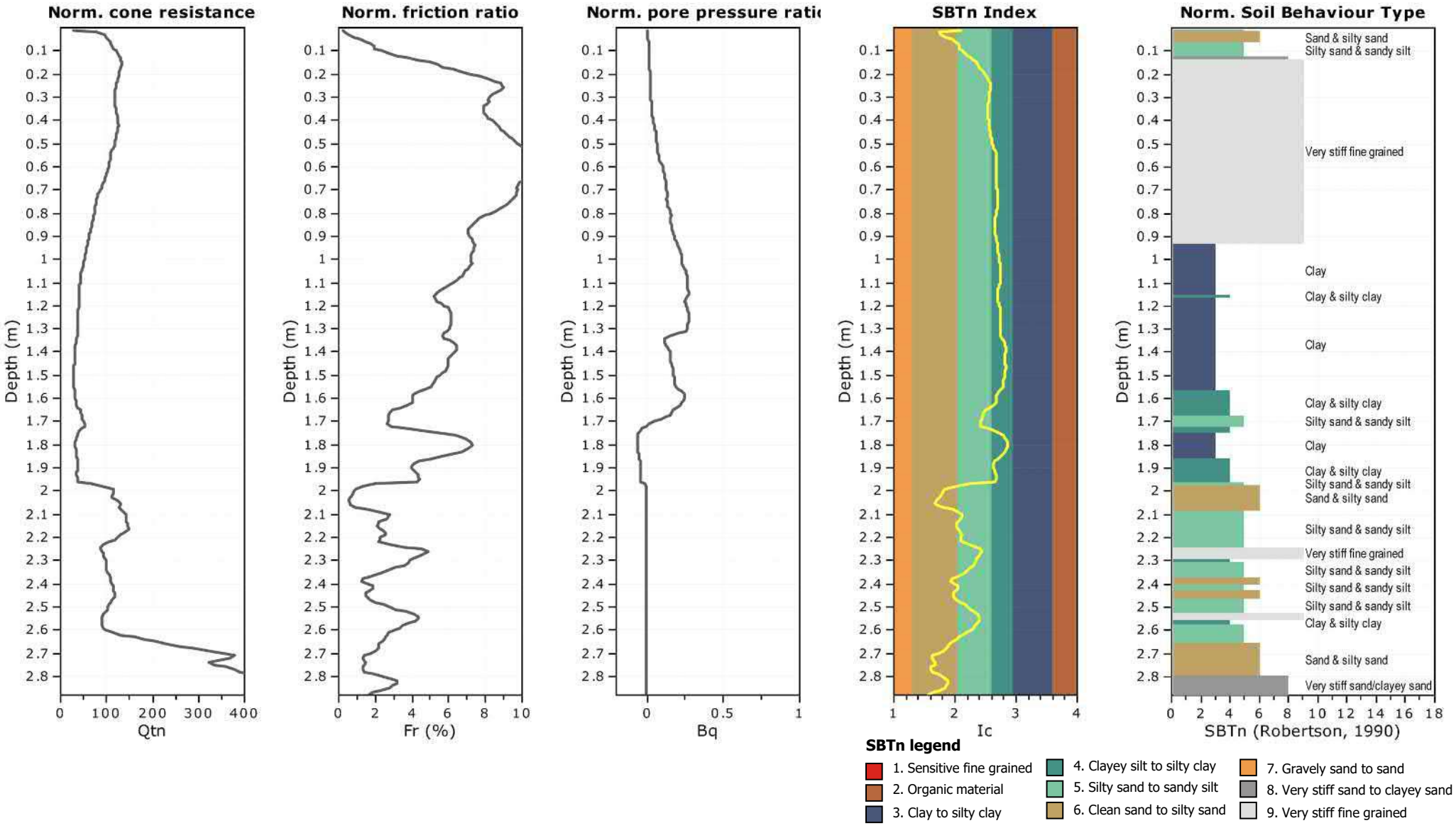
CPT: CPT02
Total depth: 2.88 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 0.90 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

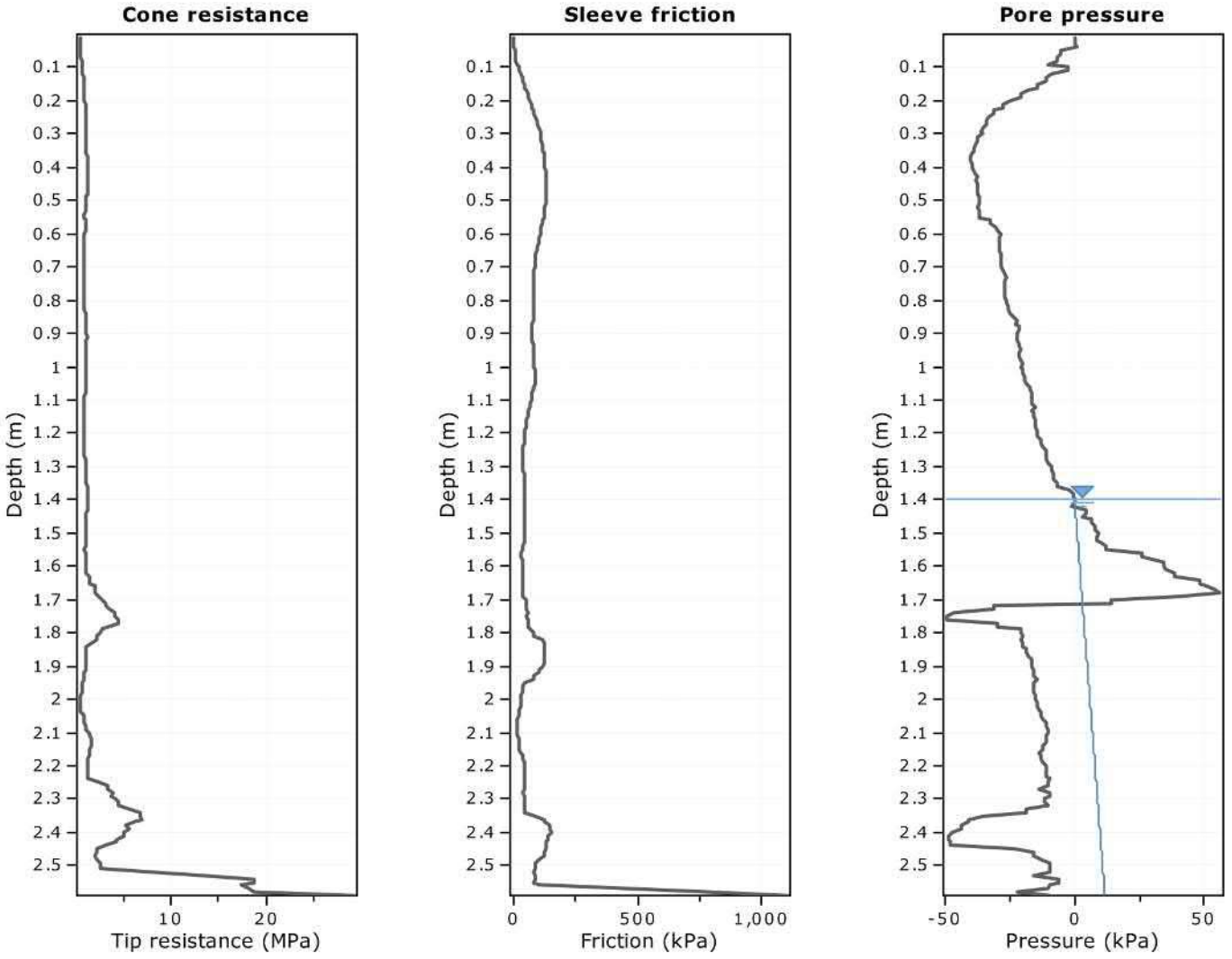
Project:
Location:



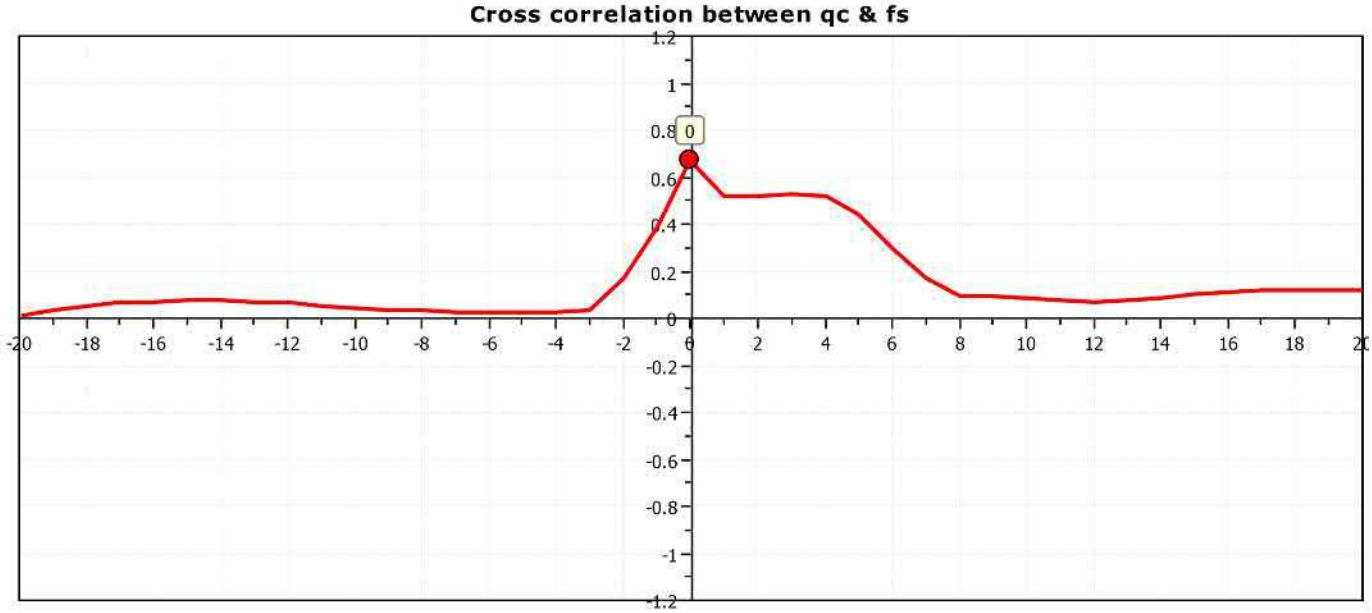
Underground Investigation Ltd
Cone Penetration Testing
craig@undergroundinvestigation.co.nz
+64211473249

CPT: CPT03
Total depth: 2.59 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 1.40 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



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).



Underground Investigation Ltd
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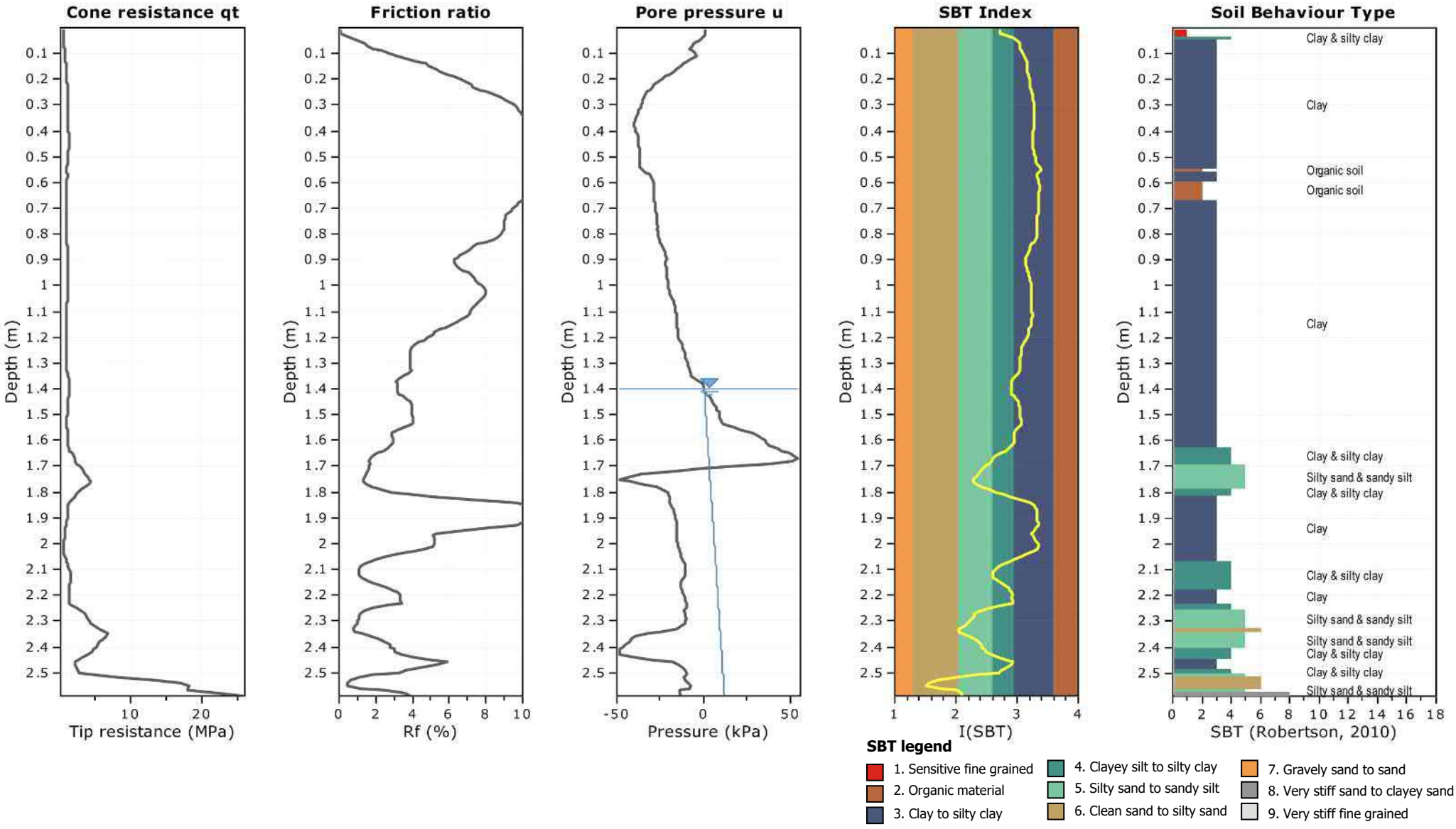
CPT: CPT03
Total depth: 2.59 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 1.40 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



Underground Investigation Ltd
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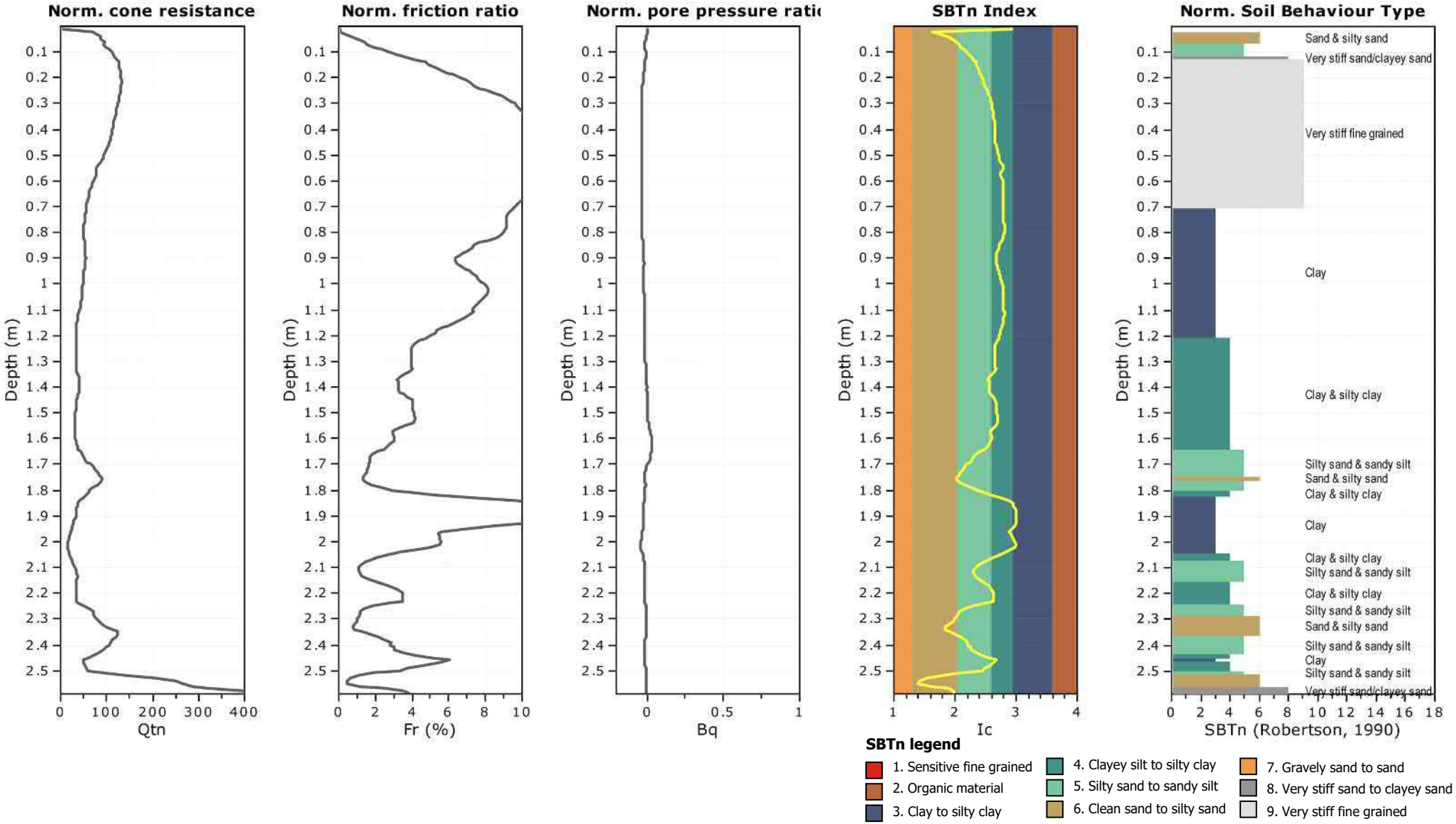
CPT: CPT03
Total depth: 2.59 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 1.40 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



Underground Investigation Ltd
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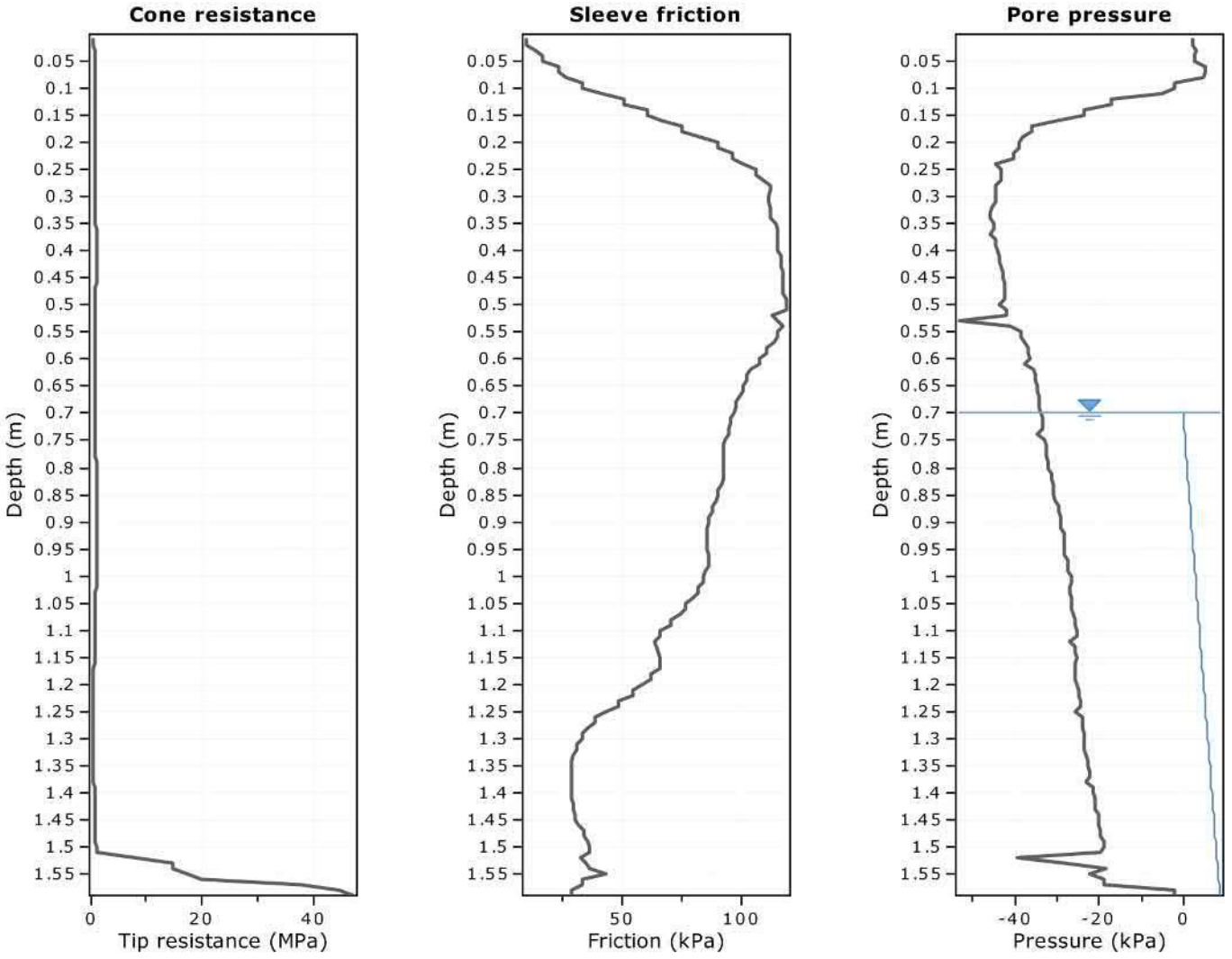
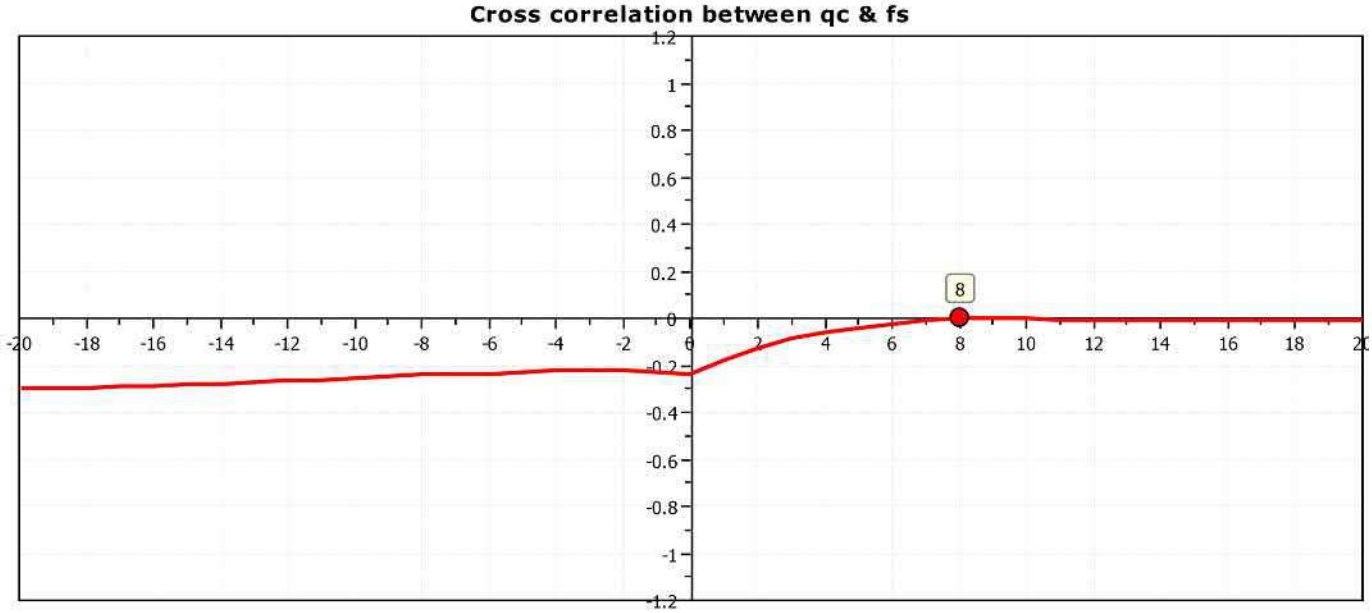
+64211473249

CPT: CPT04
Total depth: 1.59 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 0.70 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



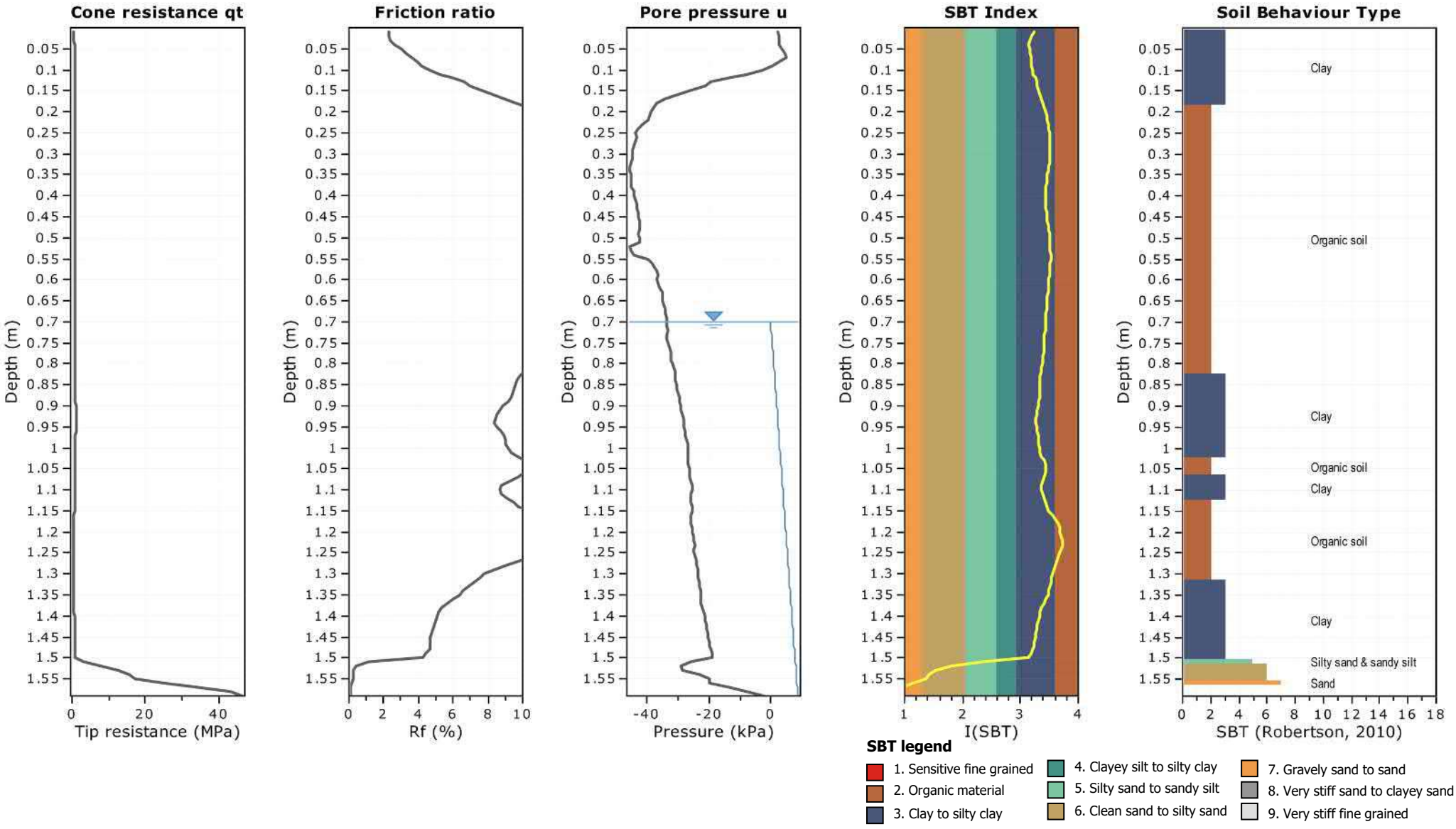
The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



Underground Investigation Ltd
Cone Penetration Testing
craig@undergroundinvestigation.co.nz
+64211473249

CPT: CPT04
Total depth: 1.59 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 0.70 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



Underground Investigation Ltd
Cone Penetration Testing
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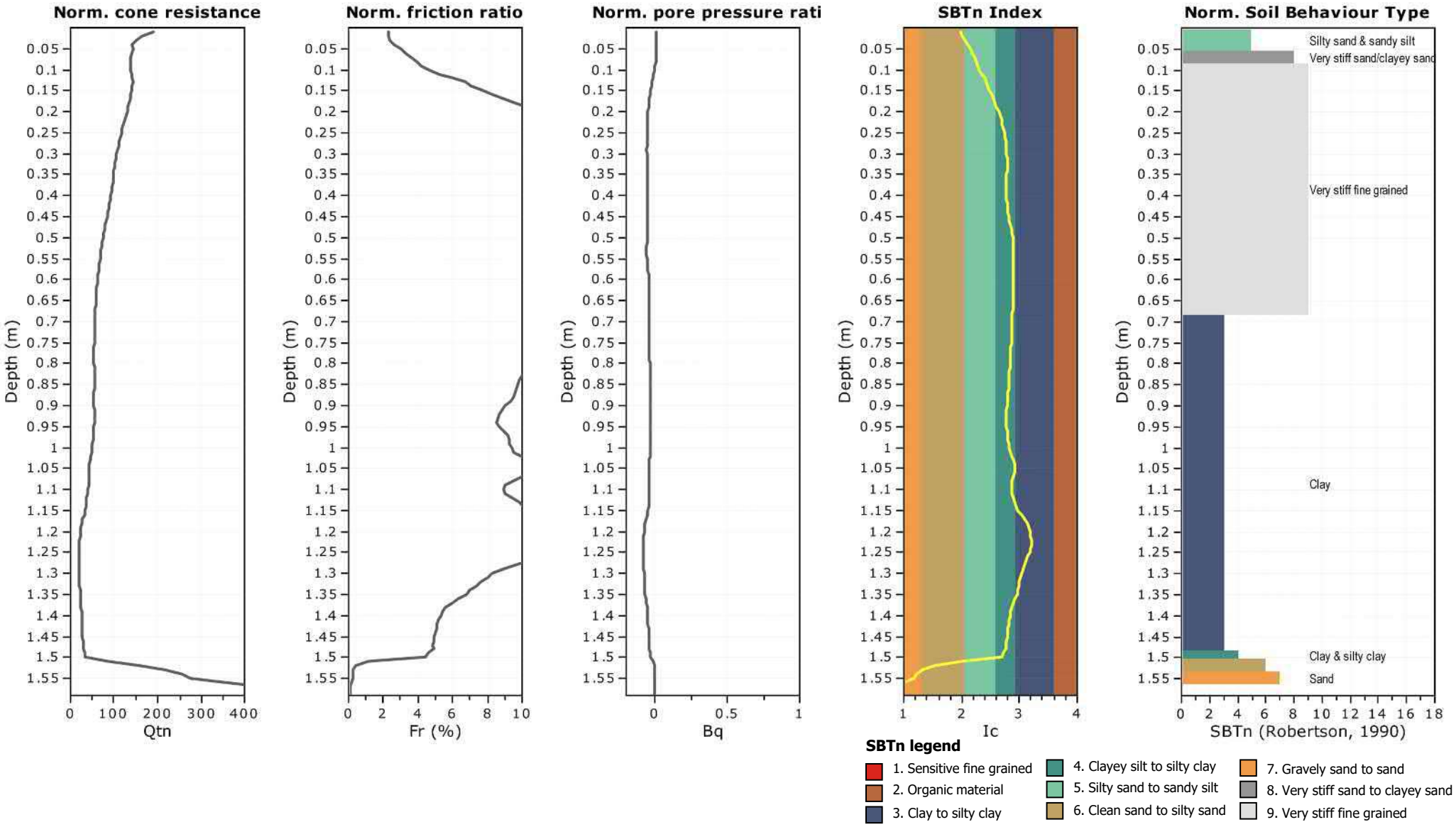
CPT: CPT04
Total depth: 1.59 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 0.70 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



Underground Investigation Ltd
Cone Penetration Testing
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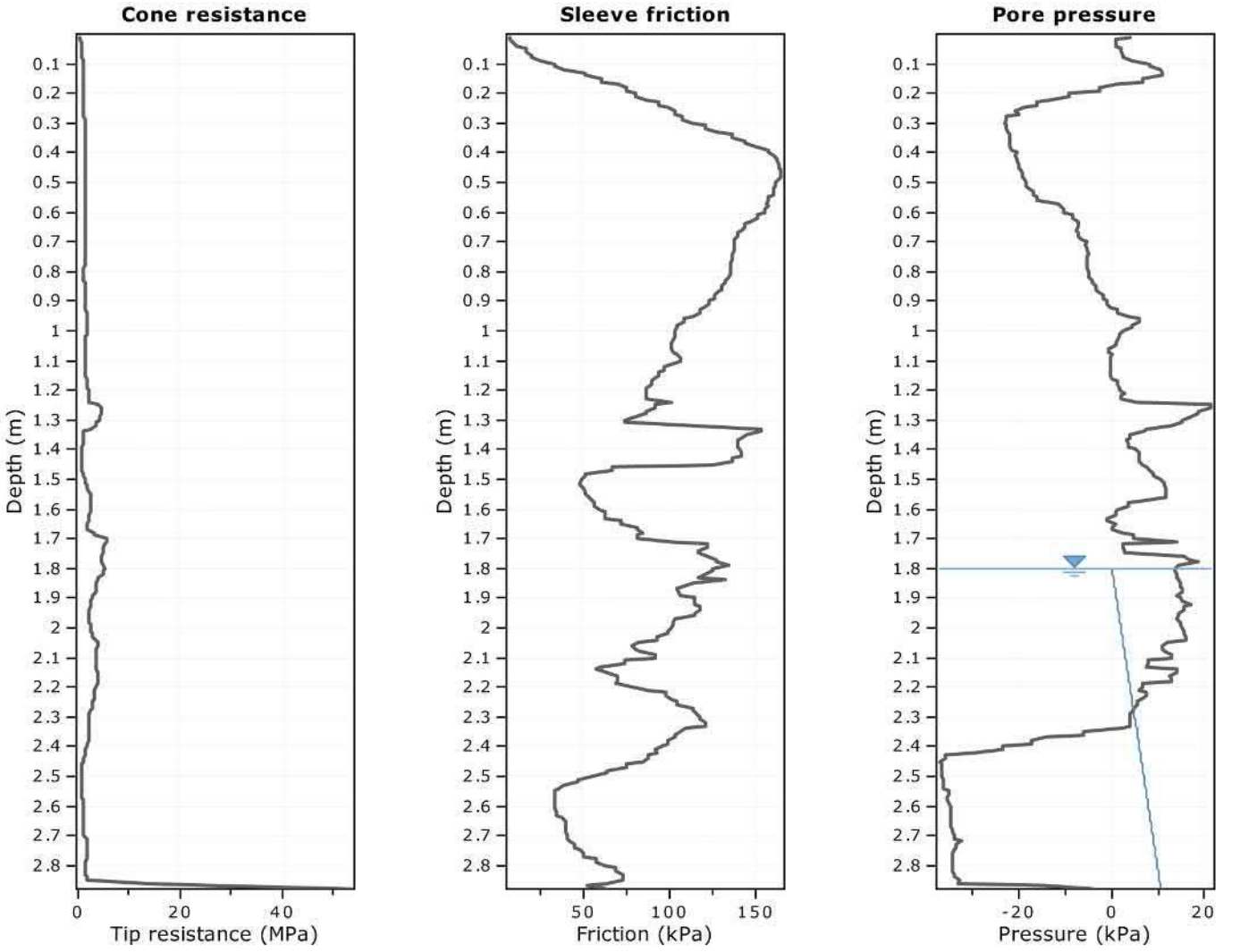
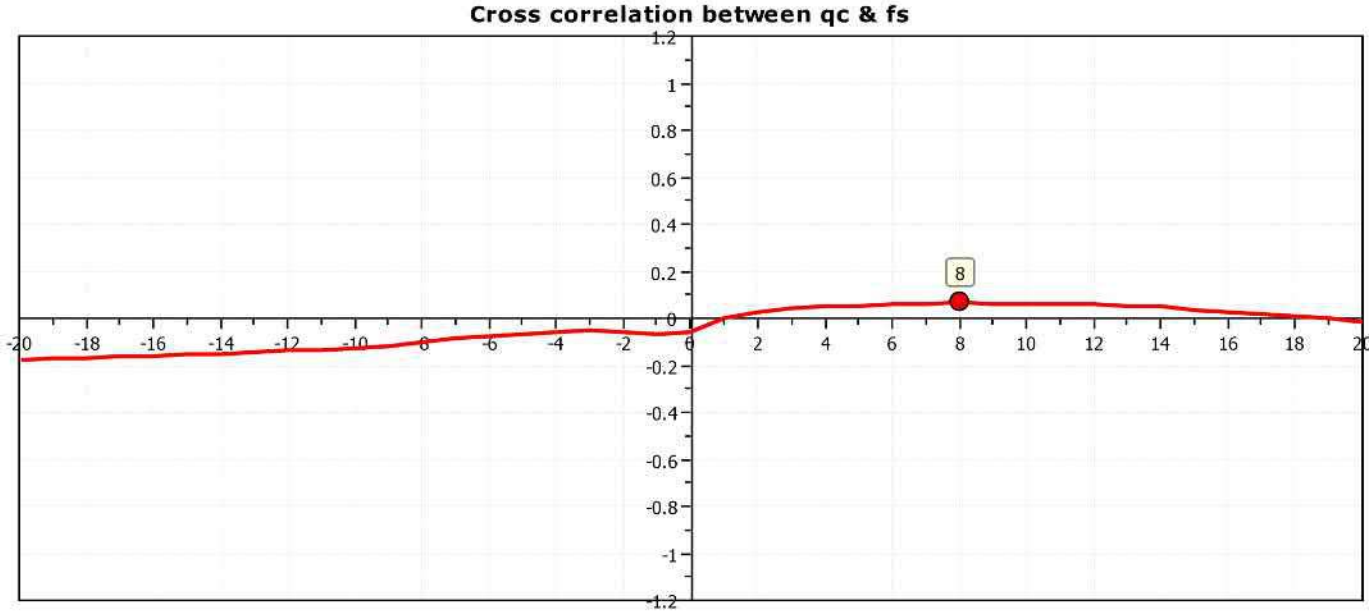
+64211473249

CPT: CPT05
Total depth: 2.88 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 1.80 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



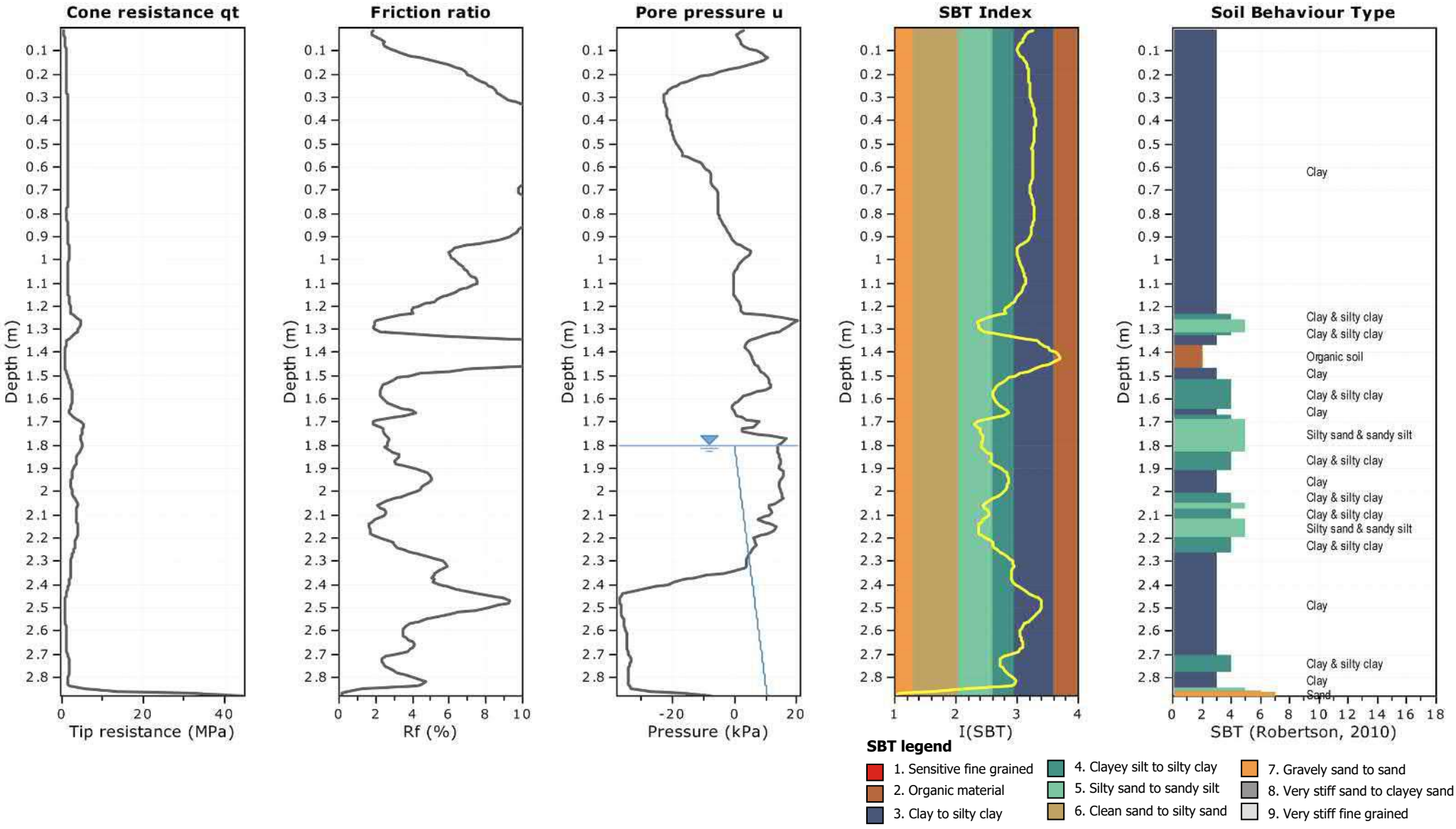
The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



Underground Investigation Ltd
Cone Penetration Testing
craig@undergroundinvestigation.co.nz
+64211473249

CPT: CPT05
Total depth: 2.88 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 1.80 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

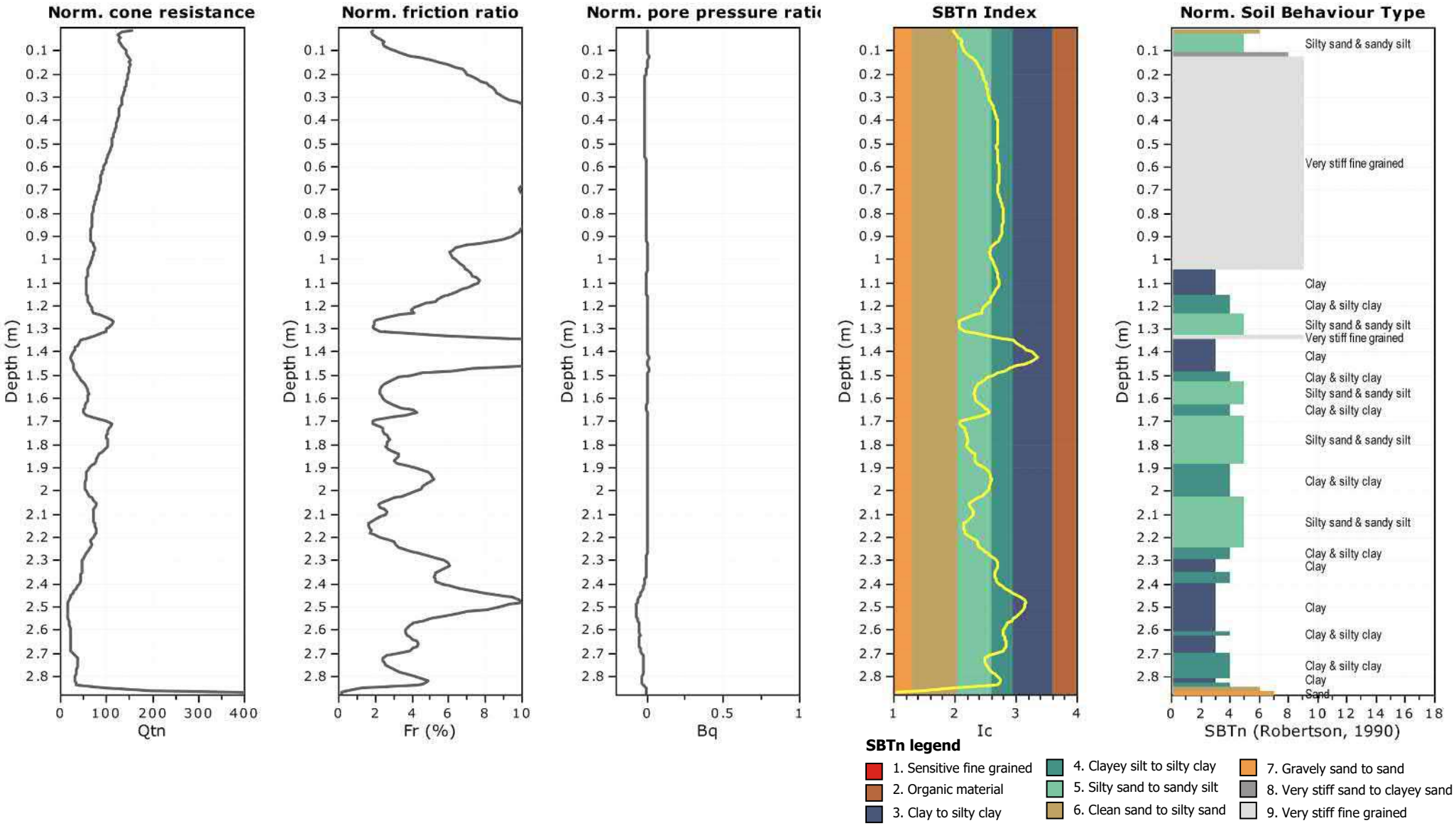
Project:
Location:



Underground Investigation Ltd
Cone Penetration Testing
craig@undergroundinvestigation.co.nz
+64211473249

CPT: CPT05
Total depth: 2.88 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 1.80 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

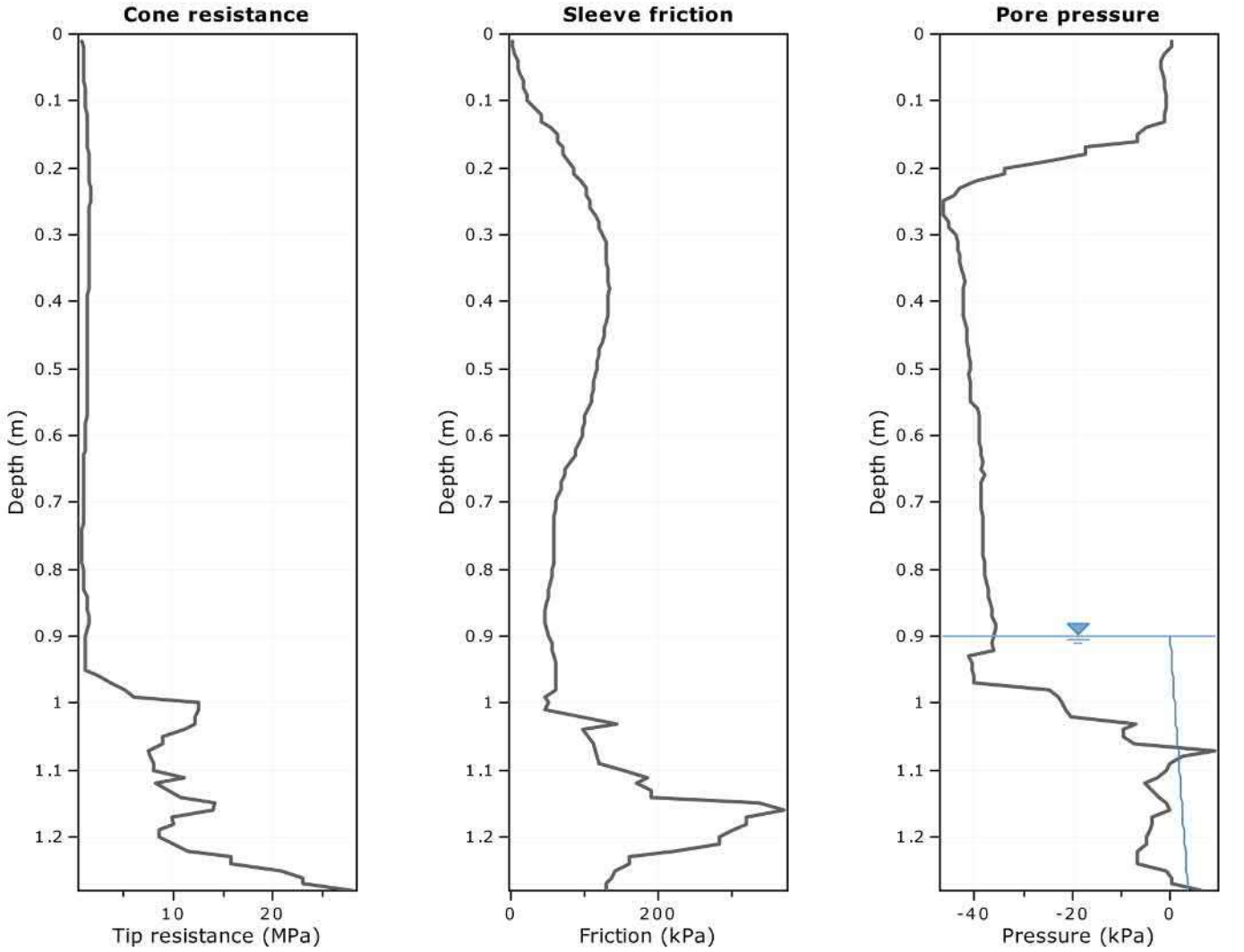
Project:
Location:



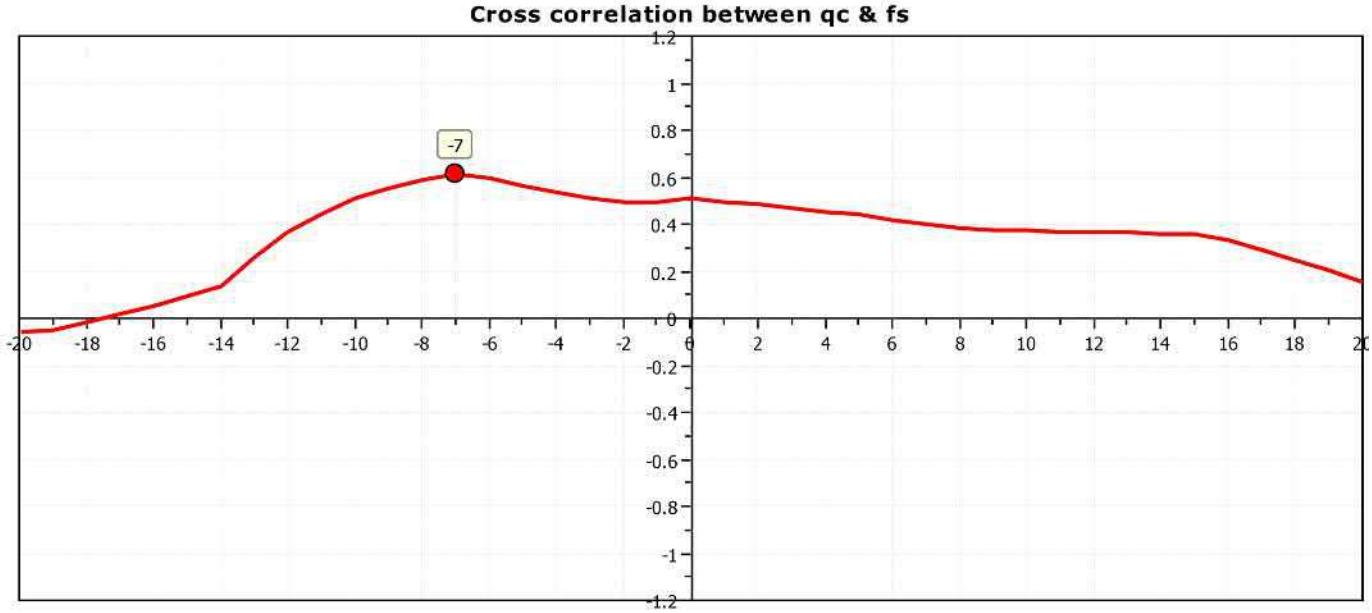
Underground Investigation Ltd
Cone Penetration Testing
craig@undergroundinvestigation.co.nz
+64211473249

CPT: CPT06
Total depth: 1.28 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 0.90 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



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).



Underground Investigation Ltd
Cone Penetration Testing
craig@undergroundinvestigation.co.nz
+64211473249

CPT: CPT06
Total depth: 1.28 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 0.90 m
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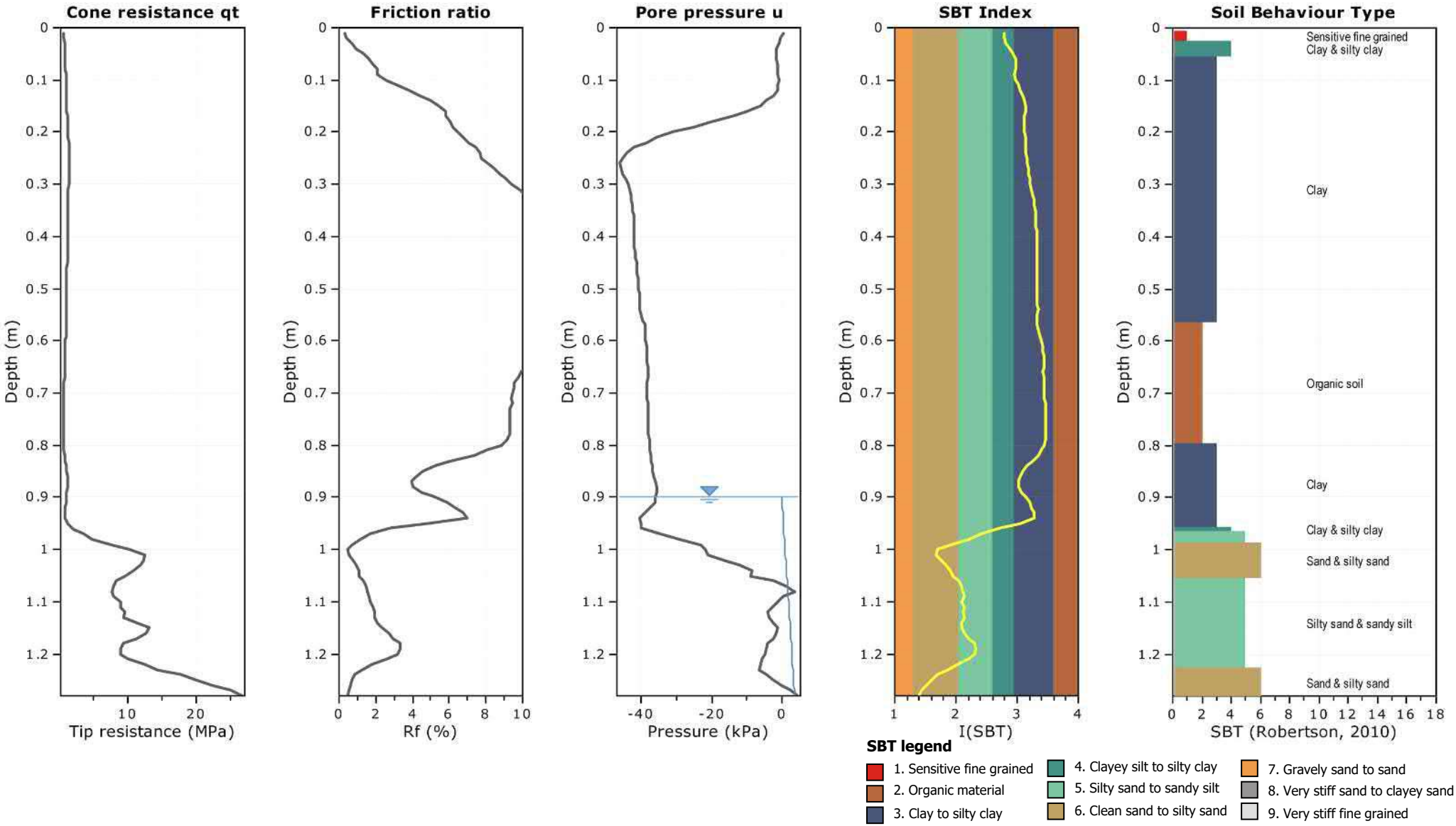
Cone Type:
Cone Operator:

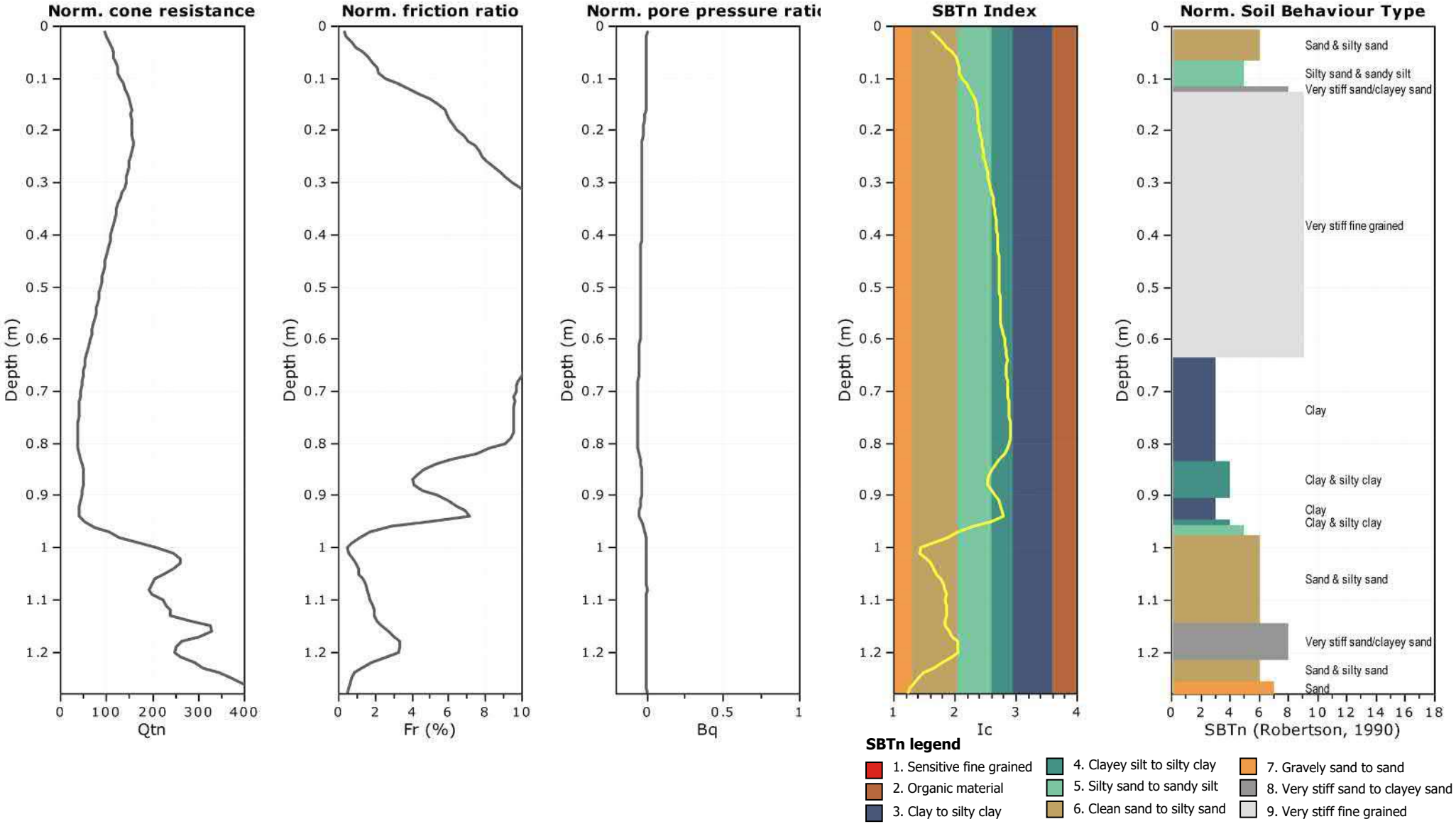
Project:
Location:



Underground Investigation Ltd
Cone Penetration Testing
craig@undergroundinvestigation.co.nz
+64211473249

CPT: CPT06
Total depth: 1.28 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 0.90 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



Underground Investigation Ltd
Cone Penetration Testing
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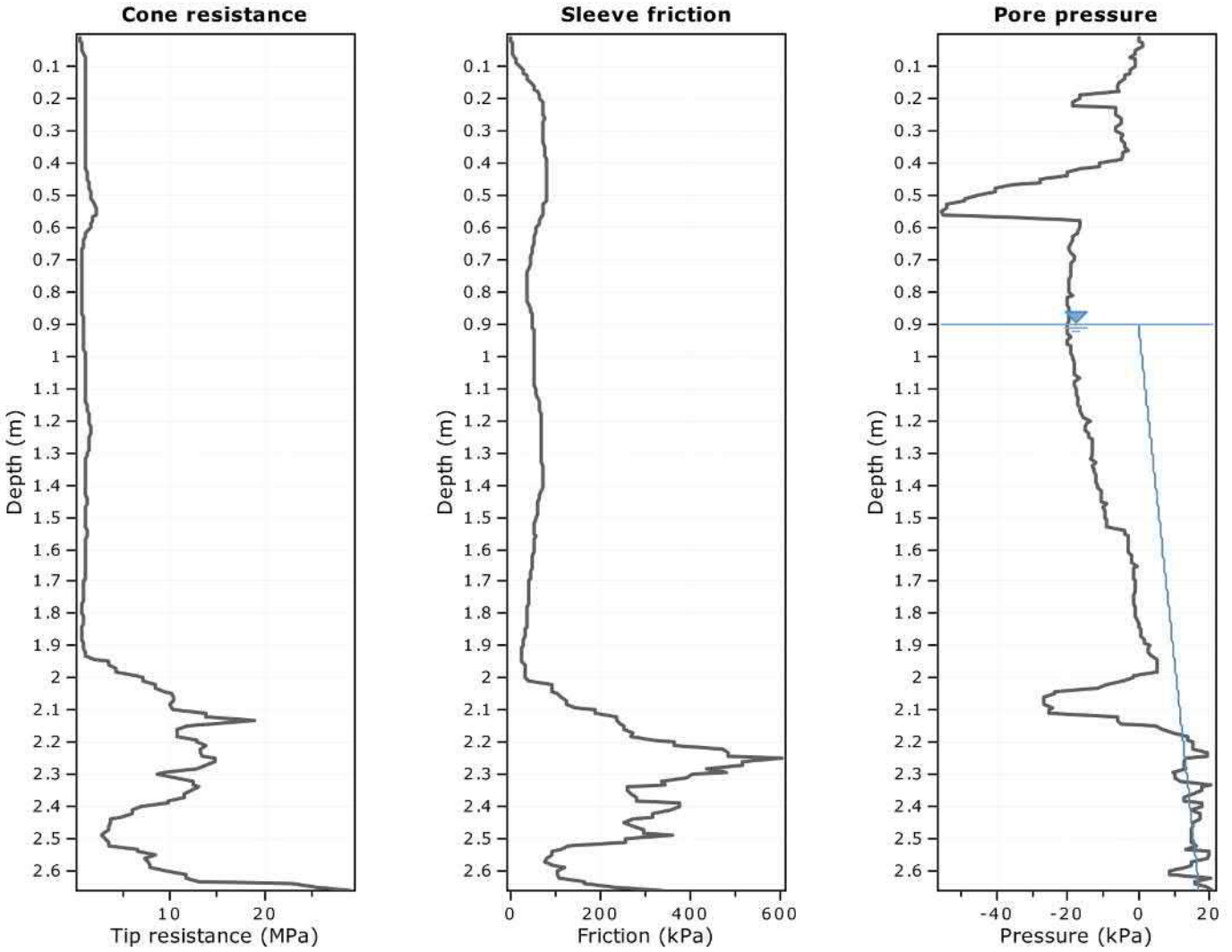
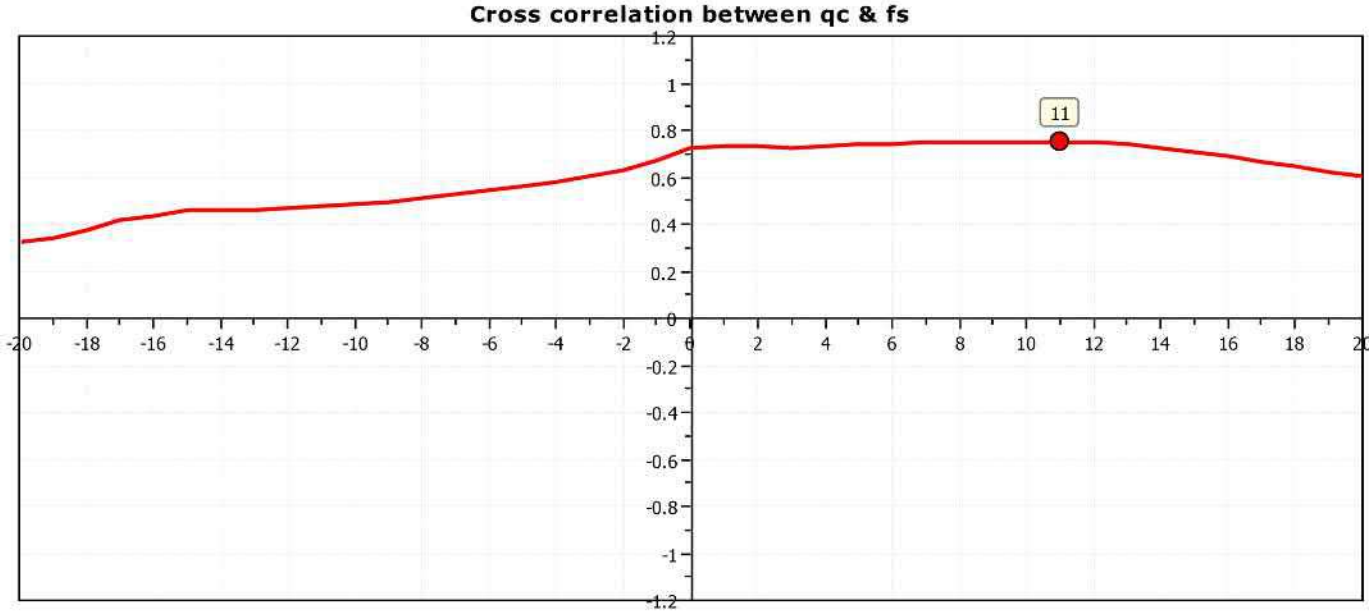
+64211473249

CPT: CPT07
Total depth: 2.66 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 0.90 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



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).



Underground Investigation Ltd
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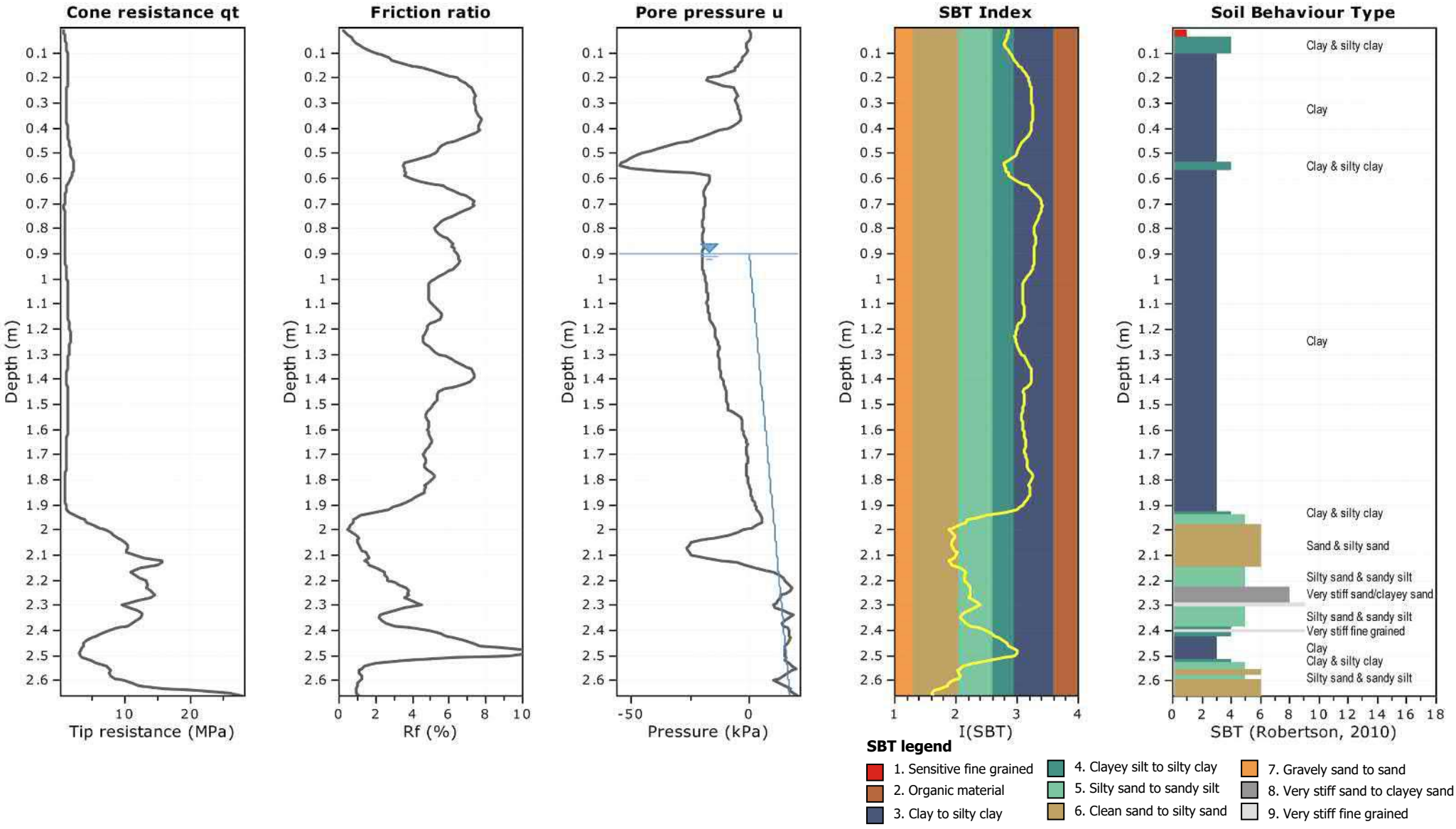
CPT: CPT07
Total depth: 2.66 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 0.90 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



Underground Investigation Ltd
Cone Penetration Testing
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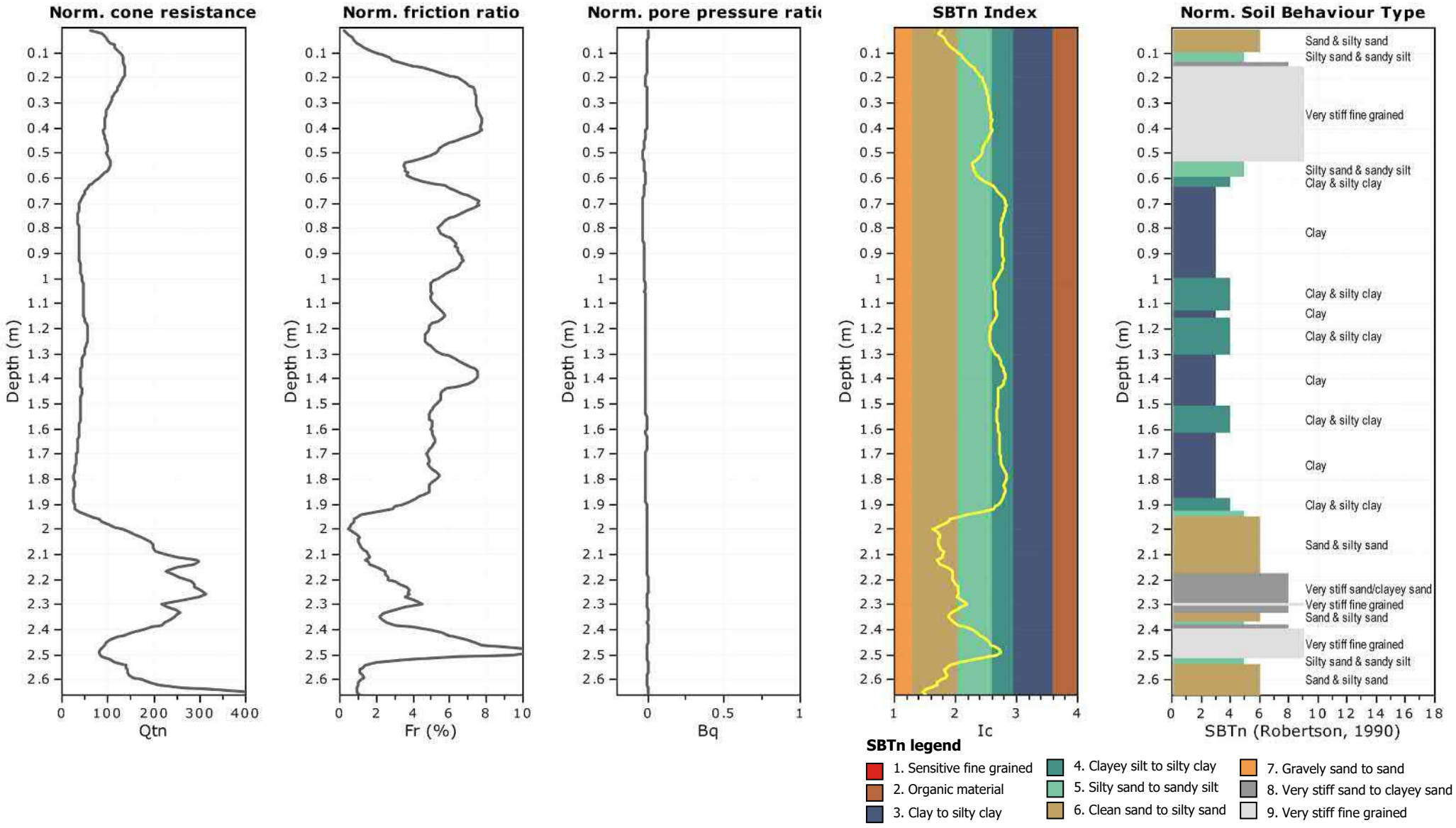
+64211473249

CPT: CPT07
Total depth: 2.66 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 0.90 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



Underground Investigation Ltd
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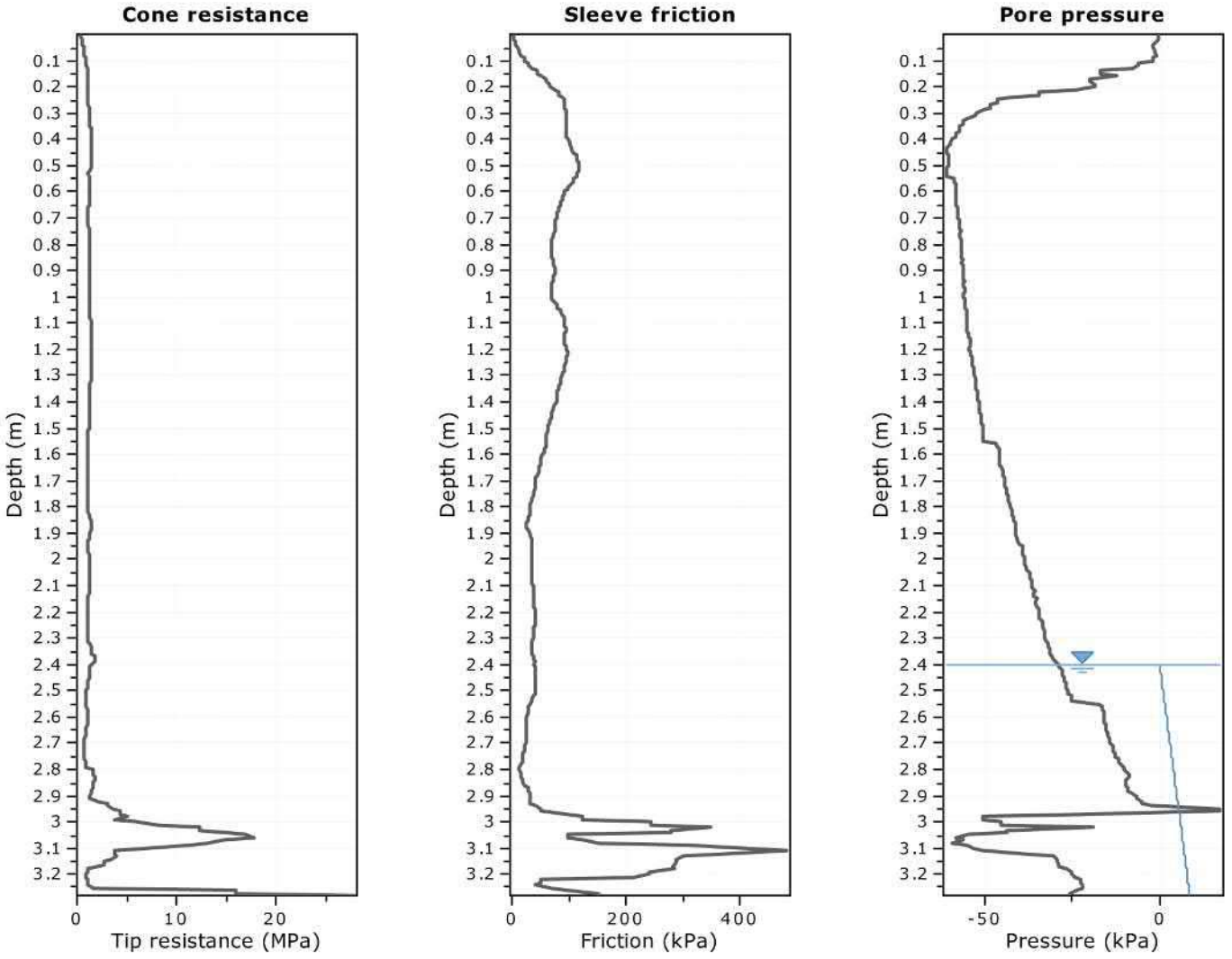
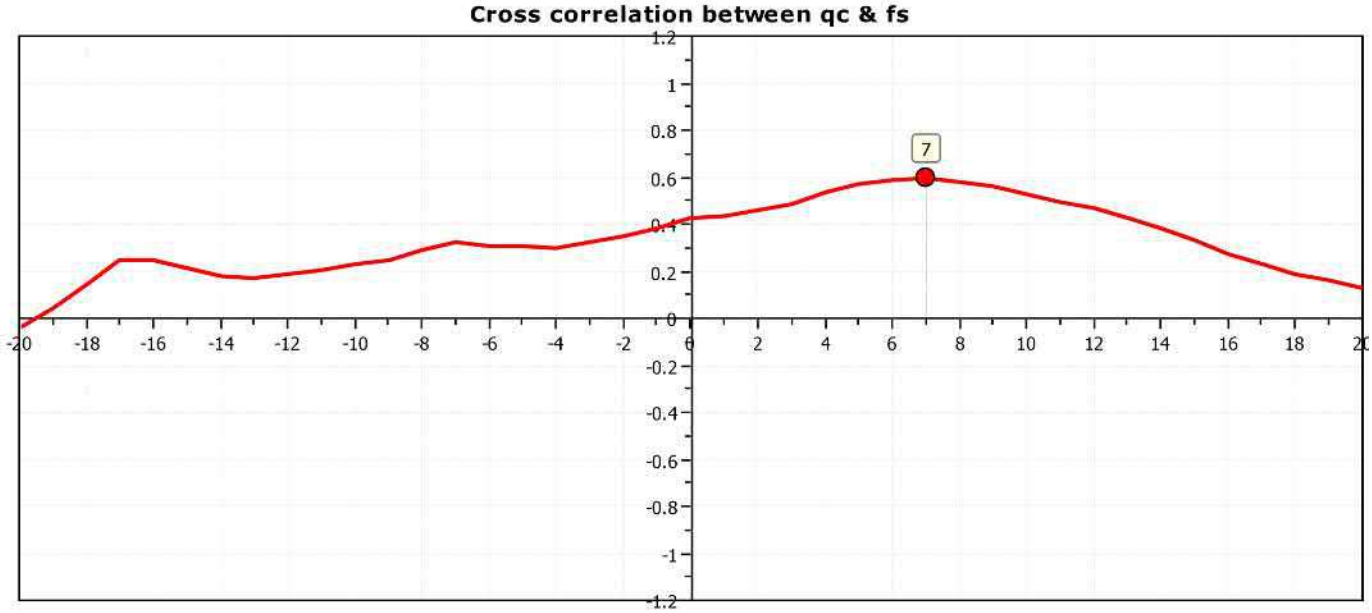
+64211473249

CPT: CPT08
Total depth: 3.28 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 2.40 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



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).



Underground Investigation Ltd
Cone Penetration Testing
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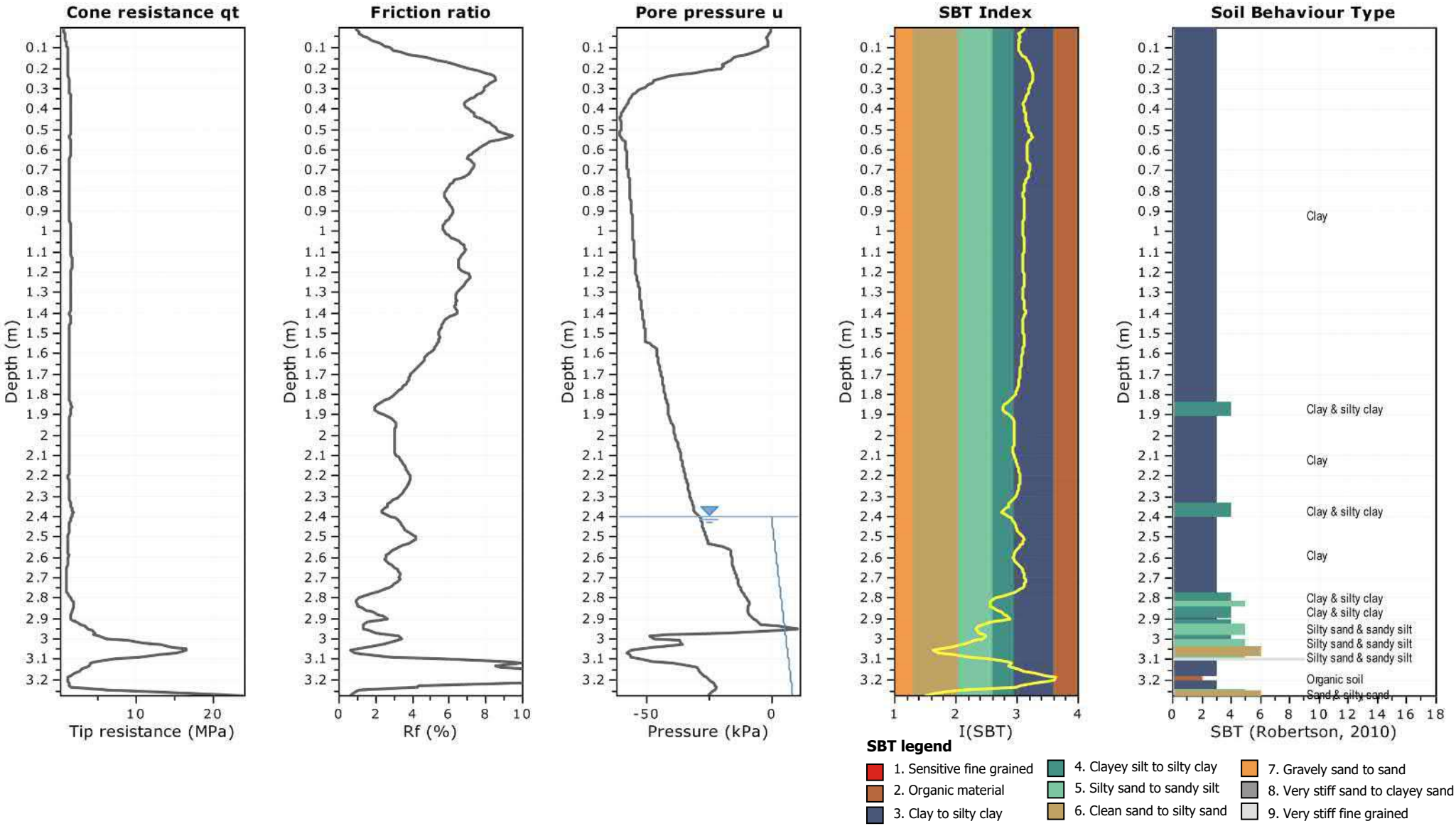
+64211473249

CPT: CPT08
Total depth: 3.28 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 2.40 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

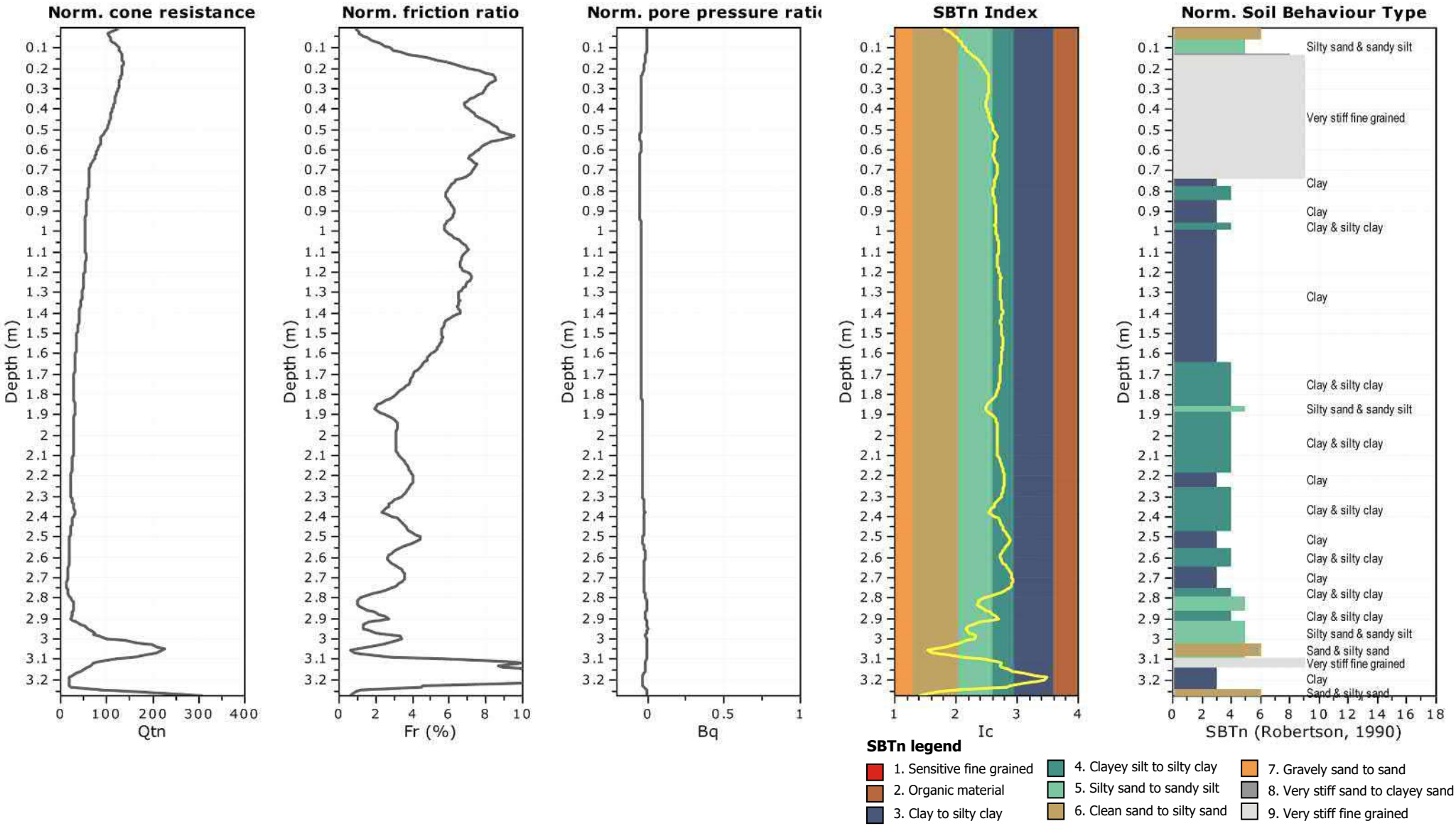
Project:
Location:



Underground Investigation Ltd
Cone Penetration Testing
craig@undergroundinvestigation.co.nz
+64211473249

CPT: CPT08
Total depth: 3.28 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 2.40 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:



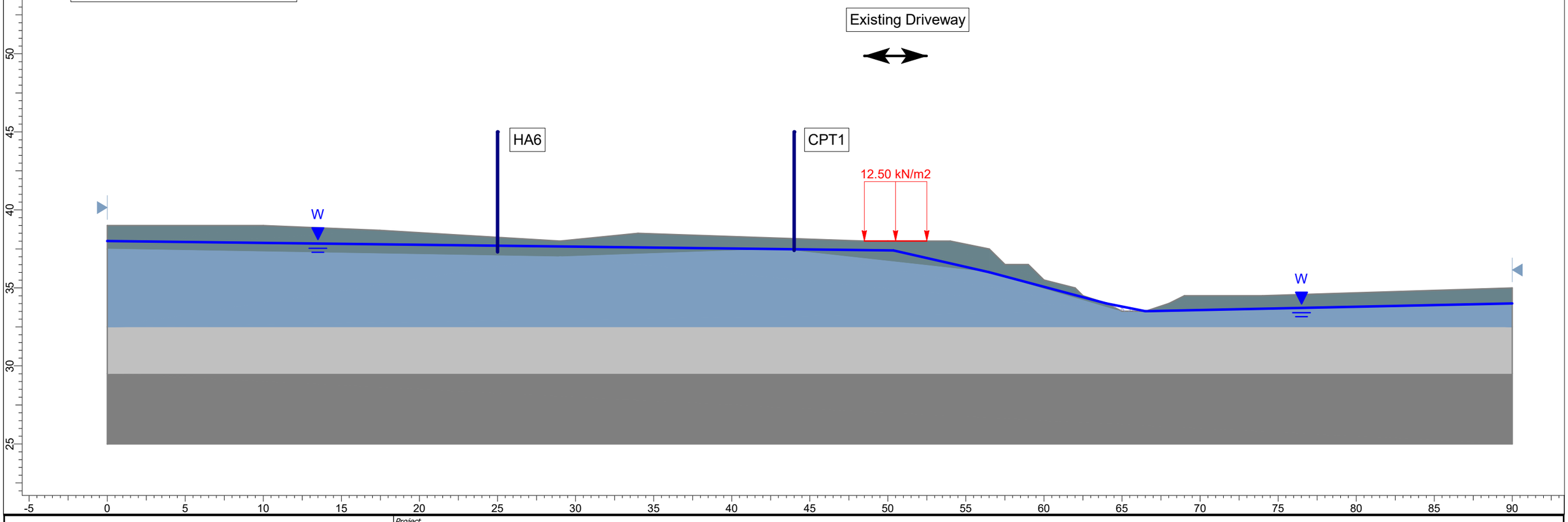
Appendix D. Slope Stability and Lateral Displacement Outputs (Slide2)

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface
Alluvial Silty Clay / Clayey Silt		18	Mohr-Coulomb	1.5	22	Water Table
Alluvial Gravel		19	Mohr-Coulomb	0	28	Water Table
Completely Weathered Waipapa Group Bedrock		19	Mohr-Coulomb	3	26	Water Table
Highly to Moderately Weathered Waipapa Group Bedrock		20	Mohr-Coulomb	7	32	Water Table

Method: GLE / Morgenstern-Price

FoS Range is 0.5 to 1.5

Scale at A3 is 1:250



Hawthorn Geddes engineers & architects ltd

SLIDEINTERPRET 9.038

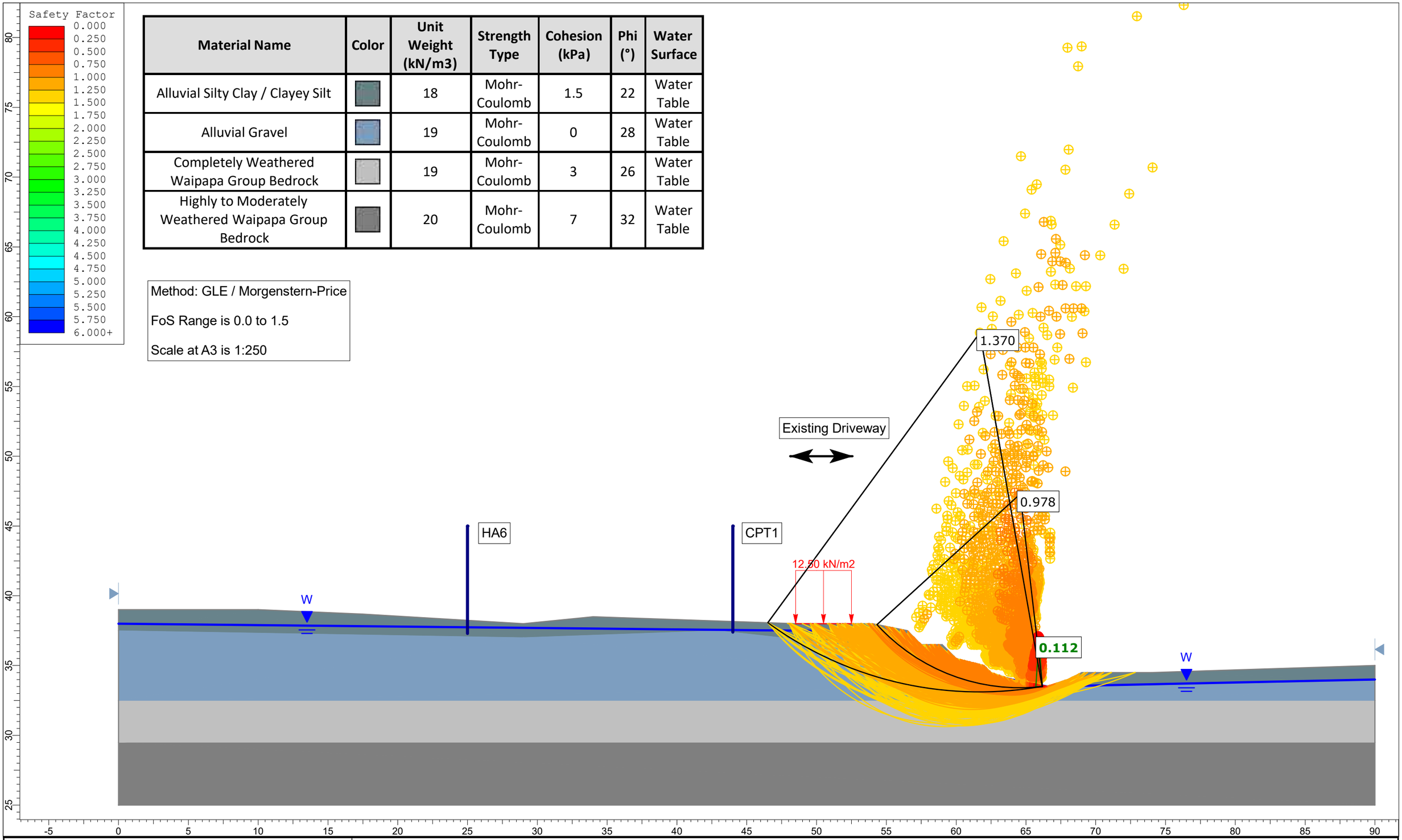
Project	Te Roroa Whatu Ora / Manawhneua Trust - Papakainga Development		
Group	Cross-Section A - Existing Conditions	*Scenario*	Master Scenario
Drawn By	KB	*Company*	HGEA
Date	7/05/2025	*File Name*	geo 250507 slide assessment 13317.slmd

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface
Alluvial Silty Clay / Clayey Silt		18	Mohr-Coulomb	1.5	22	Water Table
Alluvial Gravel		19	Mohr-Coulomb	0	28	Water Table
Completely Weathered Waipapa Group Bedrock		19	Mohr-Coulomb	3	26	Water Table
Highly to Moderately Weathered Waipapa Group Bedrock		20	Mohr-Coulomb	7	32	Water Table

Method: GLE / Morgenstern-Price

FoS Range is 0.0 to 1.5

Scale at A3 is 1:250



Hawthorn Geddes engineers & architects ltd	Project	Te Roroa Whatu Ora / Manawhneua Trust - Papakainga Development	
	Group	Cross-Section A - Existing Conditions	Scenario: NGWT
	Drawn By	KB	Company: HGEA
	Date	7/05/2025	File Name: geo 250507 slide assessment 13317.slmd

SLIDEINTERPRET 9.038

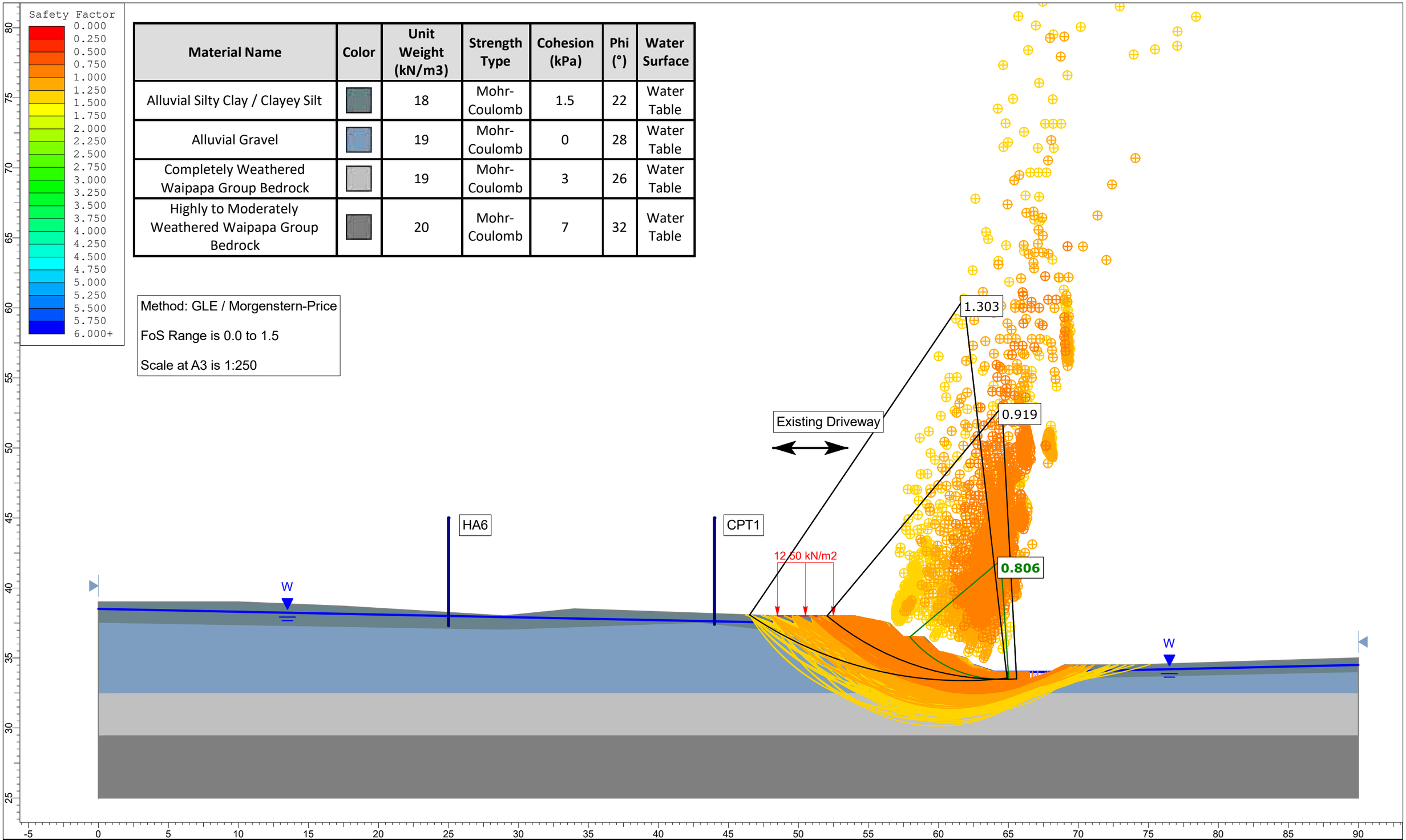
Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface
Alluvial Silty Clay / Clayey Silt		18	Mohr-Coulomb	1.5	22	Water Table
Alluvial Gravel		19	Mohr-Coulomb	0	28	Water Table
Completely Weathered Waipapa Group Bedrock		19	Mohr-Coulomb	3	26	Water Table
Highly to Moderately Weathered Waipapa Group Bedrock		20	Mohr-Coulomb	7	32	Water Table

Method: GLE / Morgenstern-Price

FoS Range is 0.0 to 1.5

Scale at A3 is 1:250



Hawthorn Geddes engineers & architects ltd	Project	Te Roroa Whatu Ora / Manawhneua Trust - Papakainga Development	
	Group	Cross-Section A - Existing Conditions	Scenario: EGWT
	Drawn By	KB	Company: HGEA
	Date	7/05/2025	File Name: geo 250507 slide assessment 13317.slmd

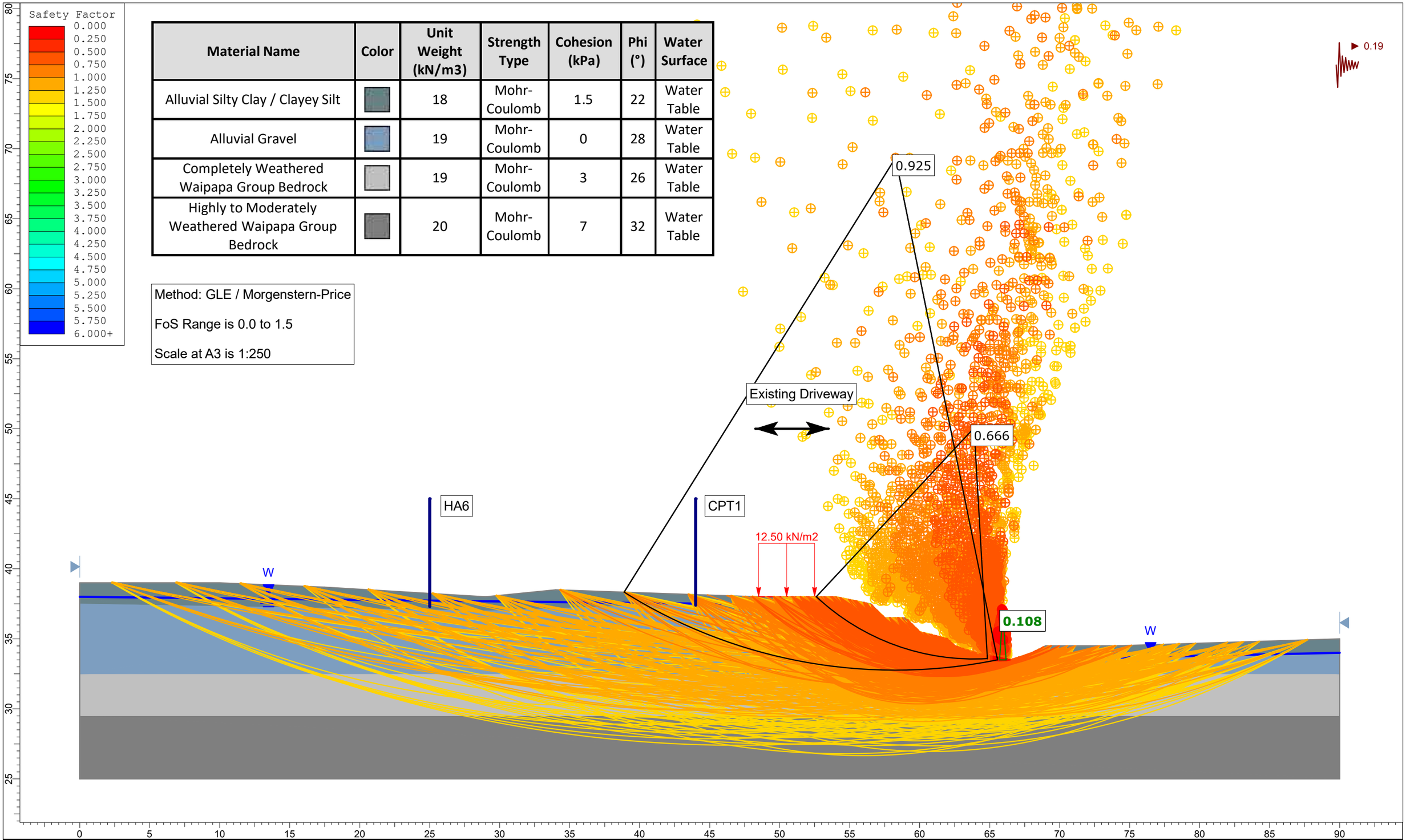
SLIDEINTERPRET 9.038

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface
Alluvial Silty Clay / Clayey Silt		18	Mohr-Coulomb	1.5	22	Water Table
Alluvial Gravel		19	Mohr-Coulomb	0	28	Water Table
Completely Weathered Waipapa Group Bedrock		19	Mohr-Coulomb	3	26	Water Table
Highly to Moderately Weathered Waipapa Group Bedrock		20	Mohr-Coulomb	7	32	Water Table

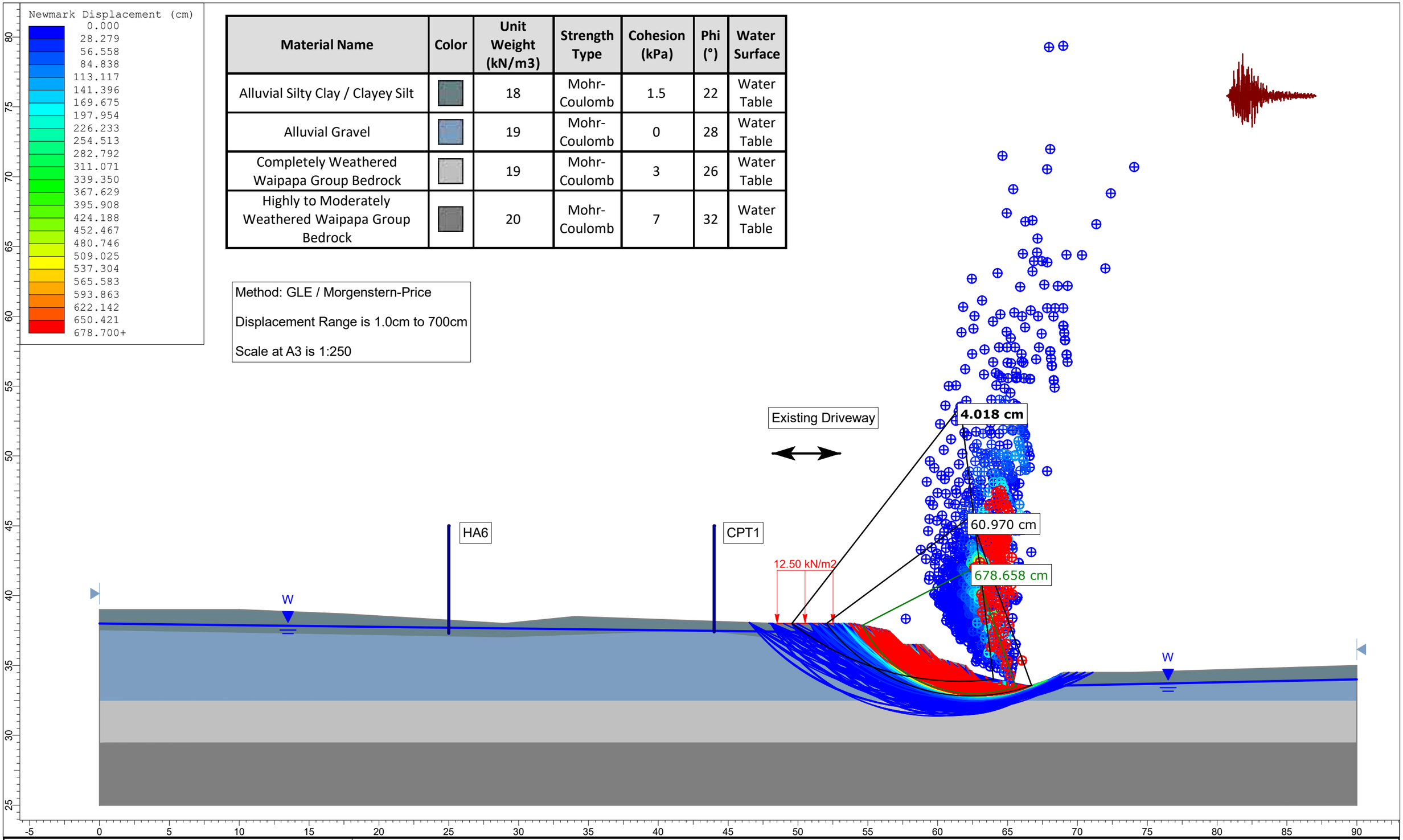
Method: GLE / Morgenstern-Price

FoS Range is 0.0 to 1.5

Scale at A3 is 1:250



Hawthorn Geddes engineers & architects ltd	Project	Te Roroa Whatu Ora / Manawhneua Trust - Papakainga Development	
	Group	Cross-Section A - Existing Conditions	Scenario: Seismic - DCLS
	Drawn By	KB	Company: HGEA
SLIDEINTERPRET 9.038	Date	7/05/2025	File Name: geo 250507 slide assessment 13317.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface
Alluvial Silty Clay / Clayey Silt		18	Mohr-Coulomb	1.5	22	Water Table
Alluvial Gravel		19	Mohr-Coulomb	0	28	Water Table
Completely Weathered Waipapa Group Bedrock		19	Mohr-Coulomb	3	26	Water Table
Highly to Moderately Weathered Waipapa Group Bedrock		20	Mohr-Coulomb	7	32	Water Table

Method: GLE / Morgenstern-Price

Displacement Range is 1.0cm to 700cm

Scale at A3 is 1:250

Hawthorn Geddes engineers & architects ltd

SLIDEINTERPRET 9.038

Project	Te Roroa Whatu Ora / Manawhneua Trust - Papakainga Development		
Group	Cross-Section A - Existing Conditions	Scenario	Newmark Displacement - KAK000
Drawn By	KB	Company	HGEA
Date	7/05/2025	File Name	geo 250507 slide assessment 13317.slmd

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface
Alluvial Silty Clay / Clayey Silt		18	Mohr-Coulomb	1.5	22	Water Table
Alluvial Gravel		19	Mohr-Coulomb	0	28	Water Table
Completely Weathered Waipapa Group Bedrock		19	Mohr-Coulomb	3	26	Water Table
Highly to Moderately Weathered Waipapa Group Bedrock		20	Mohr-Coulomb	7	32	Water Table
Engineered Fill		18	Mohr-Coulomb	1	35	Water Table

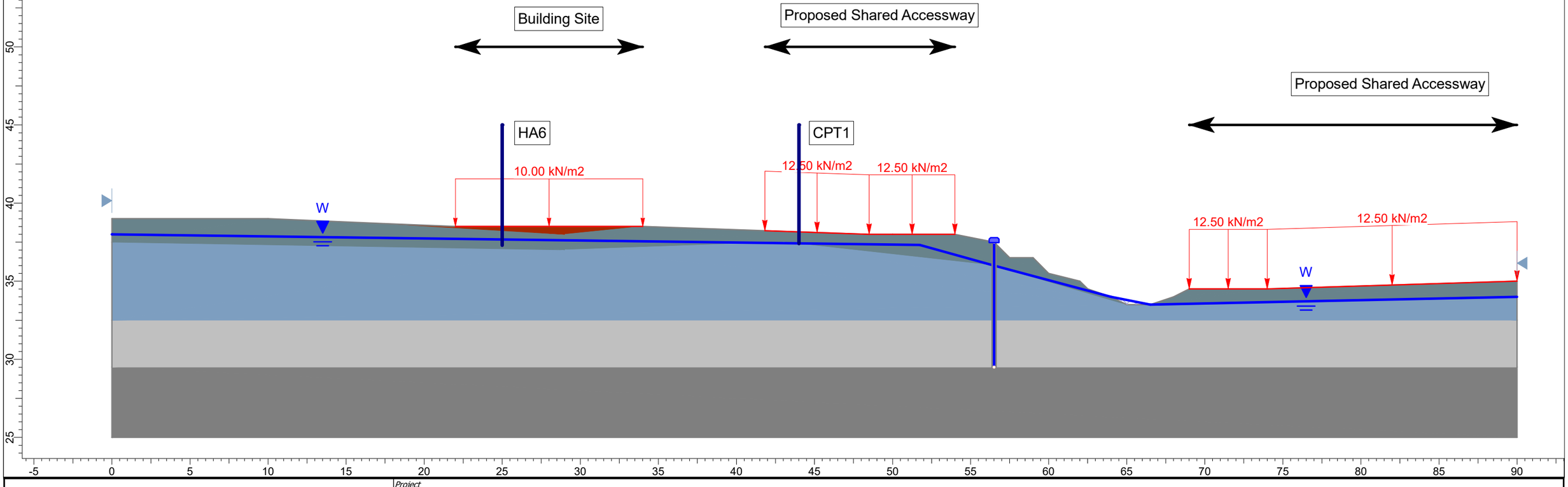
Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (m)	Failure Mode	Pile Shear Strength (kN)	Force Orientation
Inground Retaining Wall		Pile/ Micro Pile	Active (Method A)	1.2	Shear	80	Parallel to surface

Method: GLE / Morgenstern-Price

FoS Range is 0.0 to 1.5

Scale at A3 is 1:250

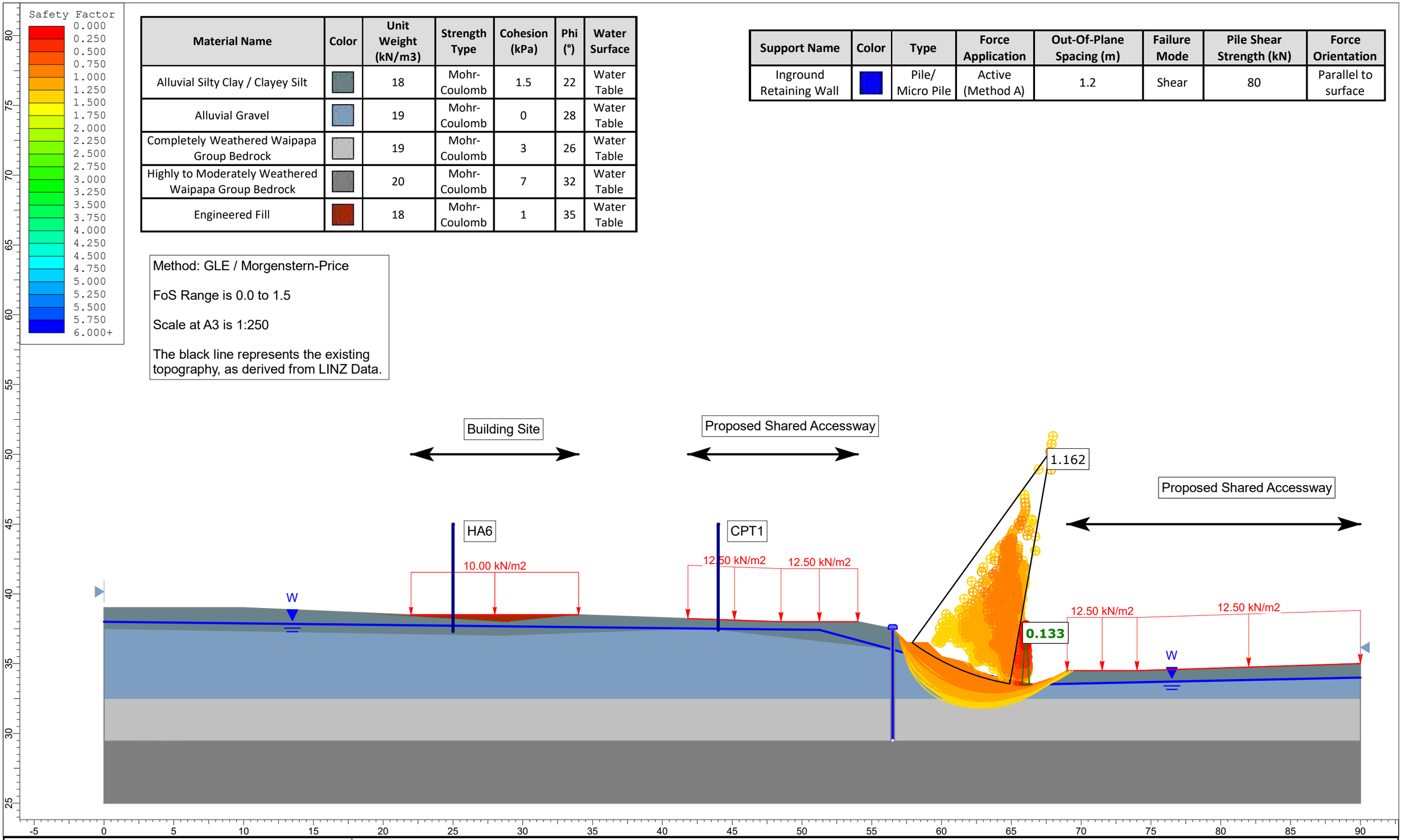
The black line represents the existing topography, as derived from LINZ Data.



Hawthorn Geddes engineers & architects ltd

SLIDEINTERPRET 9.038

Project	Te Roroa Whatu Ora / Manawhneua Trust - Papakainga Development		
Group	Cross-Section A - Proposed Conditions	Scenario	Master Scenario
Drawn By	KB	Company	HGEA
Date	7/05/2025	File Name	geo 250507 slide assessment 13317.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface
Alluvial Silty Clay / Clayey Silt		18	Mohr-Coulomb	1.5	22	Water Table
Alluvial Gravel		19	Mohr-Coulomb	0	28	Water Table
Completely Weathered Waipapa Group Bedrock		19	Mohr-Coulomb	3	26	Water Table
Highly to Moderately Weathered Waipapa Group Bedrock		20	Mohr-Coulomb	7	32	Water Table
Engineered Fill		18	Mohr-Coulomb	1	35	Water Table

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (m)	Failure Mode	Pile Shear Strength (kN)	Force Orientation
Inground Retaining Wall		Pile/ Micro Pile	Active (Method A)	1.2	Shear	80	Parallel to surface

Method: GLE / Morgenstern-Price

FoS Range is 0.0 to 1.5

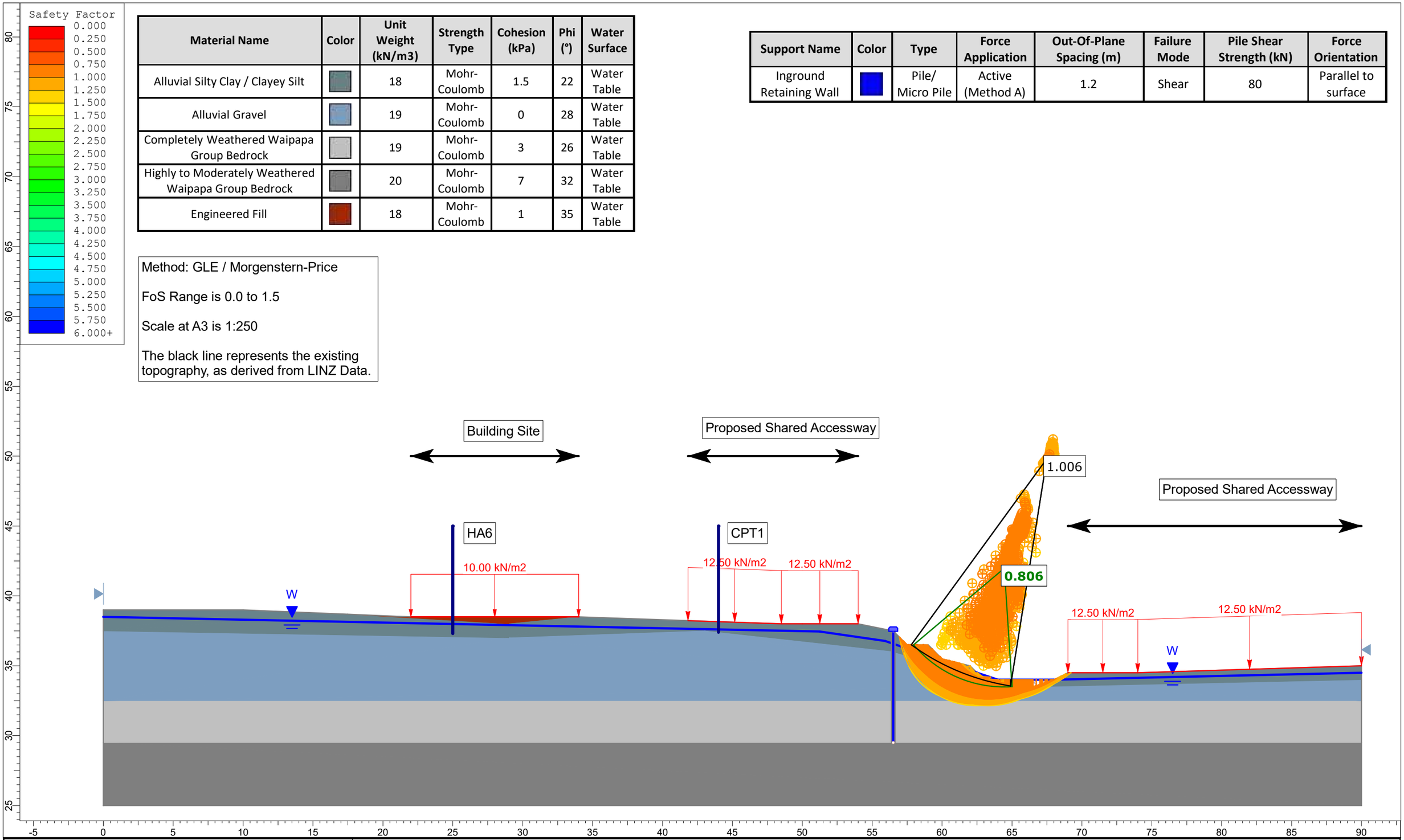
Scale at A3 is 1:250

The black line represents the existing topography, as derived from LINZ Data.

Hawthorn Geddes engineers & architects ltd

SLIDEINTERPRET 9.038

Project	Te Roroa Whatu Ora / Manawhneua Trust - Papakainga Development		
Group	Cross-Section A - Proposed Conditions	Scenario	NGWT
Drawn By	KB	Company	HGEA
Date	7/05/2025	File Name	geo 250507 slide assessment 13317.slmd



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface
Alluvial Silty Clay / Clayey Silt		18	Mohr-Coulomb	1.5	22	Water Table
Alluvial Gravel		19	Mohr-Coulomb	0	28	Water Table
Completely Weathered Waipapa Group Bedrock		19	Mohr-Coulomb	3	26	Water Table
Highly to Moderately Weathered Waipapa Group Bedrock		20	Mohr-Coulomb	7	32	Water Table
Engineered Fill		18	Mohr-Coulomb	1	35	Water Table

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (m)	Failure Mode	Pile Shear Strength (kN)	Force Orientation
Inground Retaining Wall		Pile/ Micro Pile	Active (Method A)	1.2	Shear	80	Parallel to surface

Method: GLE / Morgenstern-Price

FoS Range is 0.0 to 1.5

Scale at A3 is 1:250

The black line represents the existing topography, as derived from LINZ Data.

Hawthorn Geddes engineers & architects ltd

SLIDEINTERPRET 9.038

Project	Te Roroa Whatu Ora / Manawhneua Trust - Papakainga Development		
Group	Cross-Section A - Proposed Conditions	Scenario	EGWT
Drawn By	KB	Company	HGEA
Date	7/05/2025	File Name	geo 250507 slide assessment 13317.slmd

Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface
Alluvial Silty Clay / Clayey Silt		18	Mohr-Coulomb	1.5	22	Water Table
Alluvial Gravel		19	Mohr-Coulomb	0	28	Water Table
Completely Weathered Waipapa Group Bedrock		19	Mohr-Coulomb	3	26	Water Table
Highly to Moderately Weathered Waipapa Group Bedrock		20	Mohr-Coulomb	7	32	Water Table
Engineered Fill		18	Mohr-Coulomb	1	35	Water Table

Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (m)	Failure Mode	Pile Shear Strength (kN)	Force Orientation
Inground Retaining Wall		Pile/ Micro Pile	Active (Method A)	1.2	Shear	80	Parallel to surface

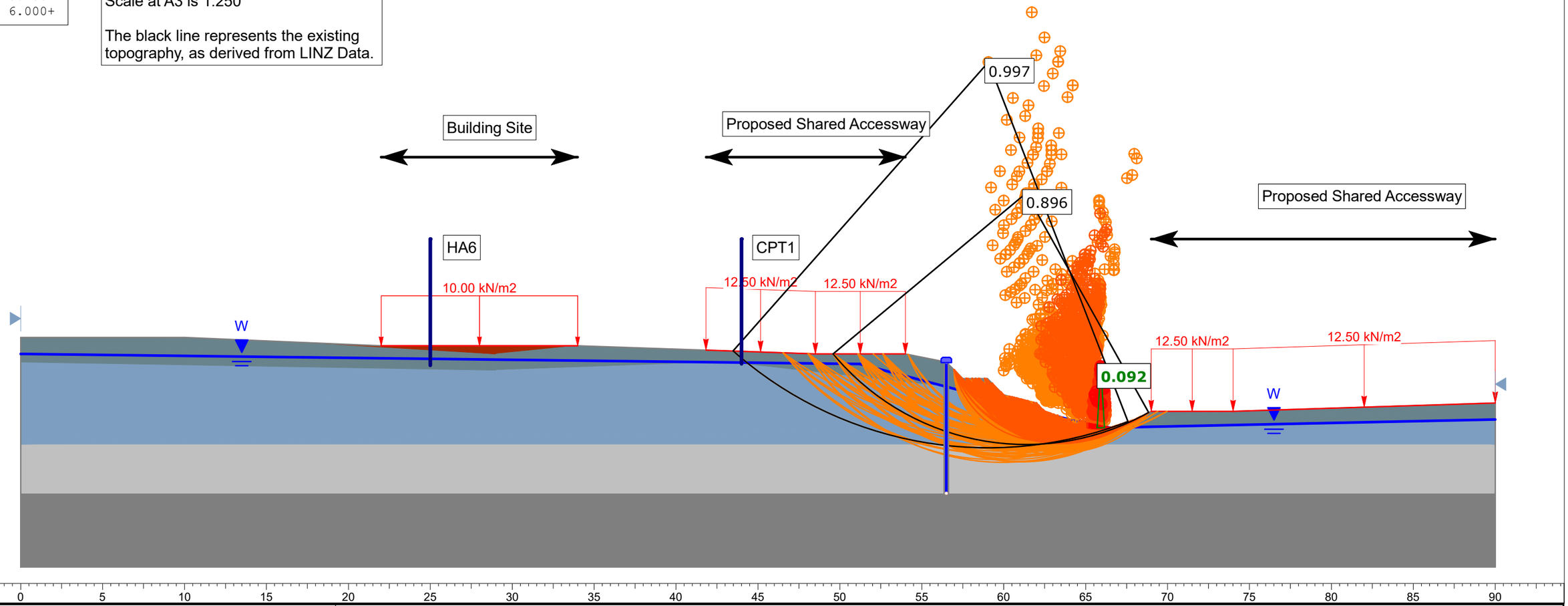
▶ 0.19

Method: GLE / Morgenstern-Price

FoS Range is 0.0 to 1.5

Scale at A3 is 1:250

The black line represents the existing topography, as derived from LINZ Data.



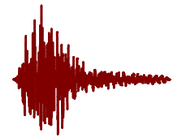
Hawthorn Geddes engineers & architects ltd

SLIDEINTERPRET 9.038

Project	Te Roroa Whatu Ora / Manawhneua Trust - Papakainga Development		
Group	Cross-Section A - Proposed Conditions	Scenario	Seismic - DCLS
Drawn By	KB	Company	HGEA
Date	7/05/2025	File Name	geo 250507 slide assessment 13317.slmd

Newmark Displacement (cm)
0.000
28.279
56.558
84.838
113.117
141.396
169.675
197.954
226.233
254.513
282.792
311.071
339.350
367.629
395.908
424.188
452.467
480.746
509.025
537.304
565.583
593.863
622.142
650.421
678.700+

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Water Surface
Alluvial Silty Clay / Clayey Silt		18	Mohr-Coulomb	1.5	22	Water Table
Alluvial Gravel		19	Mohr-Coulomb	0	28	Water Table
Completely Weathered Waipapa Group Bedrock		19	Mohr-Coulomb	3	26	Water Table
Highly to Moderately Weathered Waipapa Group Bedrock		20	Mohr-Coulomb	7	32	Water Table
Engineered Fill		18	Mohr-Coulomb	1	35	Water Table



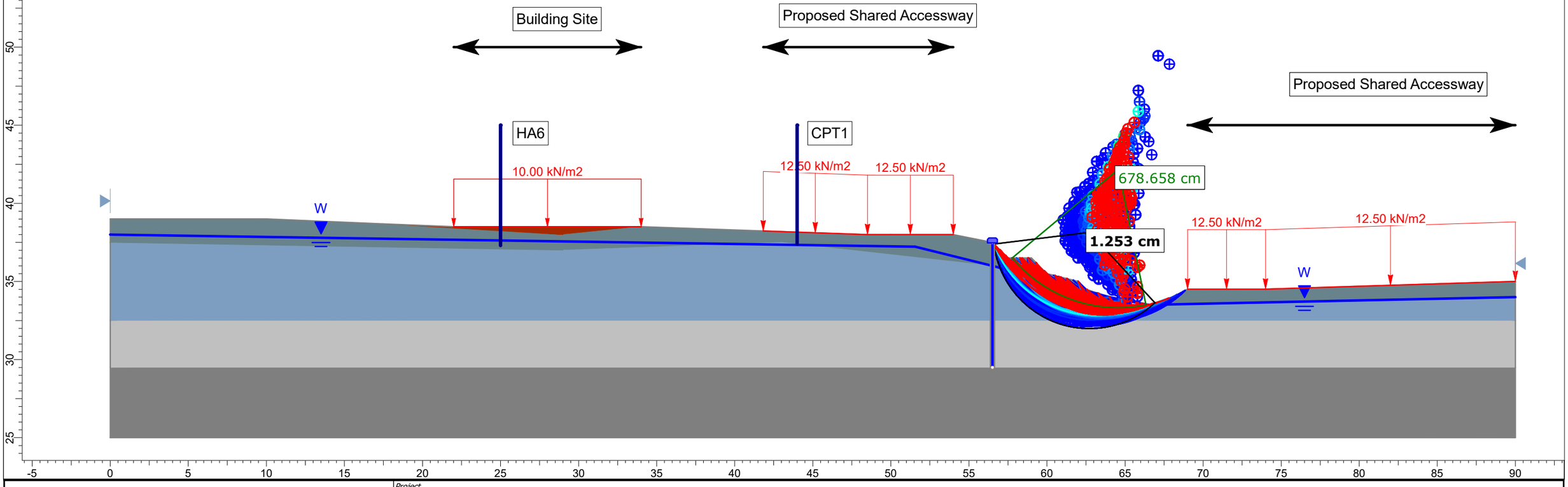
Support Name	Color	Type	Force Application	Out-Of-Plane Spacing (m)	Failure Mode	Pile Shear Strength (kN)	Force Orientation
Inground Retaining Wall		Pile/ Micro Pile	Active (Method A)	1.2	Shear	80	Parallel to surface

Method: GLE / Morgenstern-Price

Displacement Range is 1.0cm to 700cm

Scale at A3 is 1:250

The black line represents the existing topography, as derived from LINZ Data.



Hawthorn Geddes engineers & architects ltd	Project	Te Roroa Whatu Ora / Manawhneua Trust - Papakainga Development	
	Group	Cross-Section A - Proposed Conditions	Scenario: Newmark Displacement - KAK000
	Drawn By	KB	Company: HGEA
SLIDEINTERPRET 9.038	Date	7/05/2025	File Name: geo 250507 slide assessment 13317.slmd

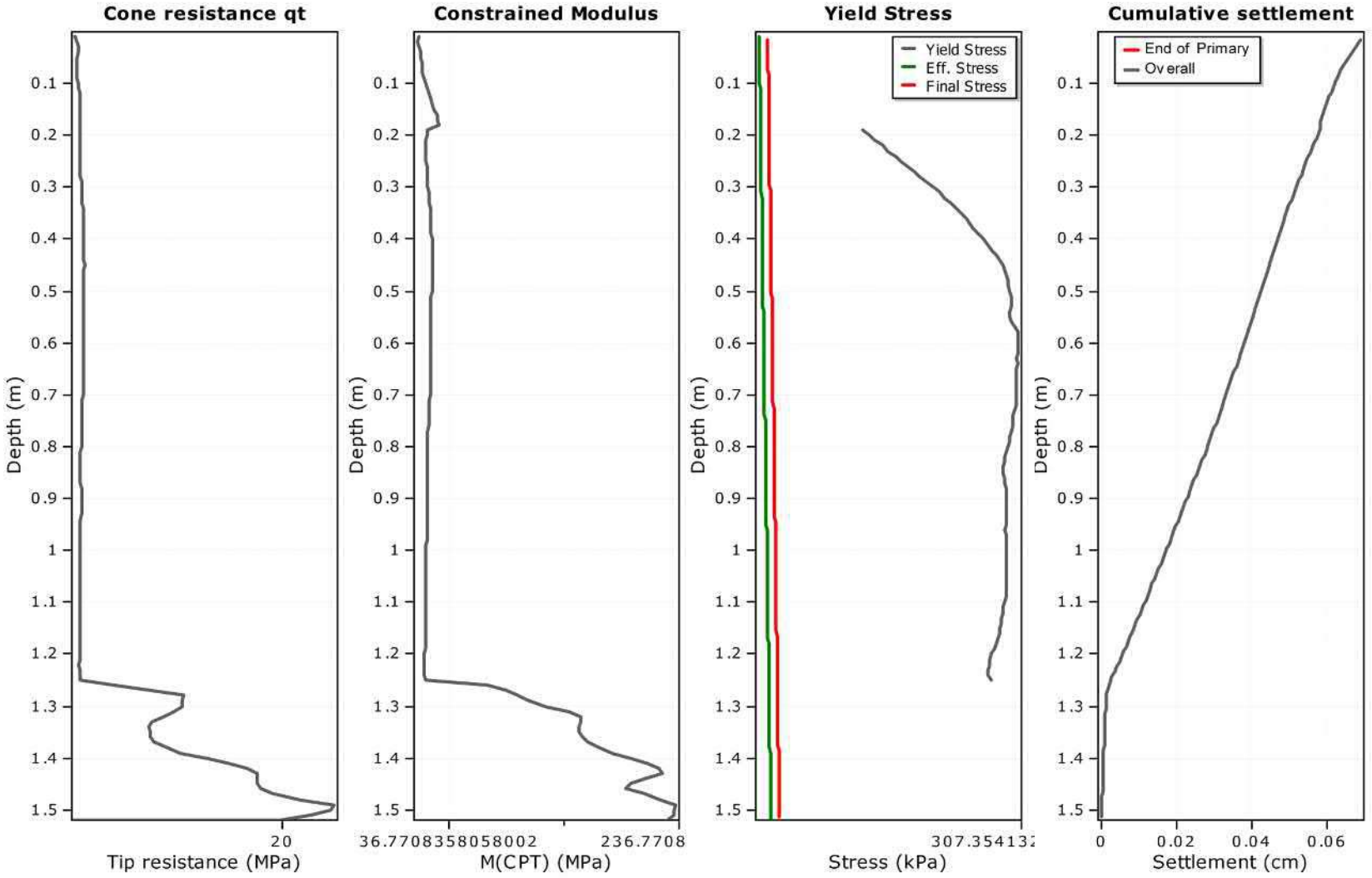
Appendix E. Settlement Analysis Outputs (CPeT-IT)

Underground Investigation Ltd
Cone Penetration Testing
craig@undergroundinvestigation.co.nz
+64211473249

CPT: CPT01
Total depth: 1.52 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 1.0
Footing pressure: 10.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

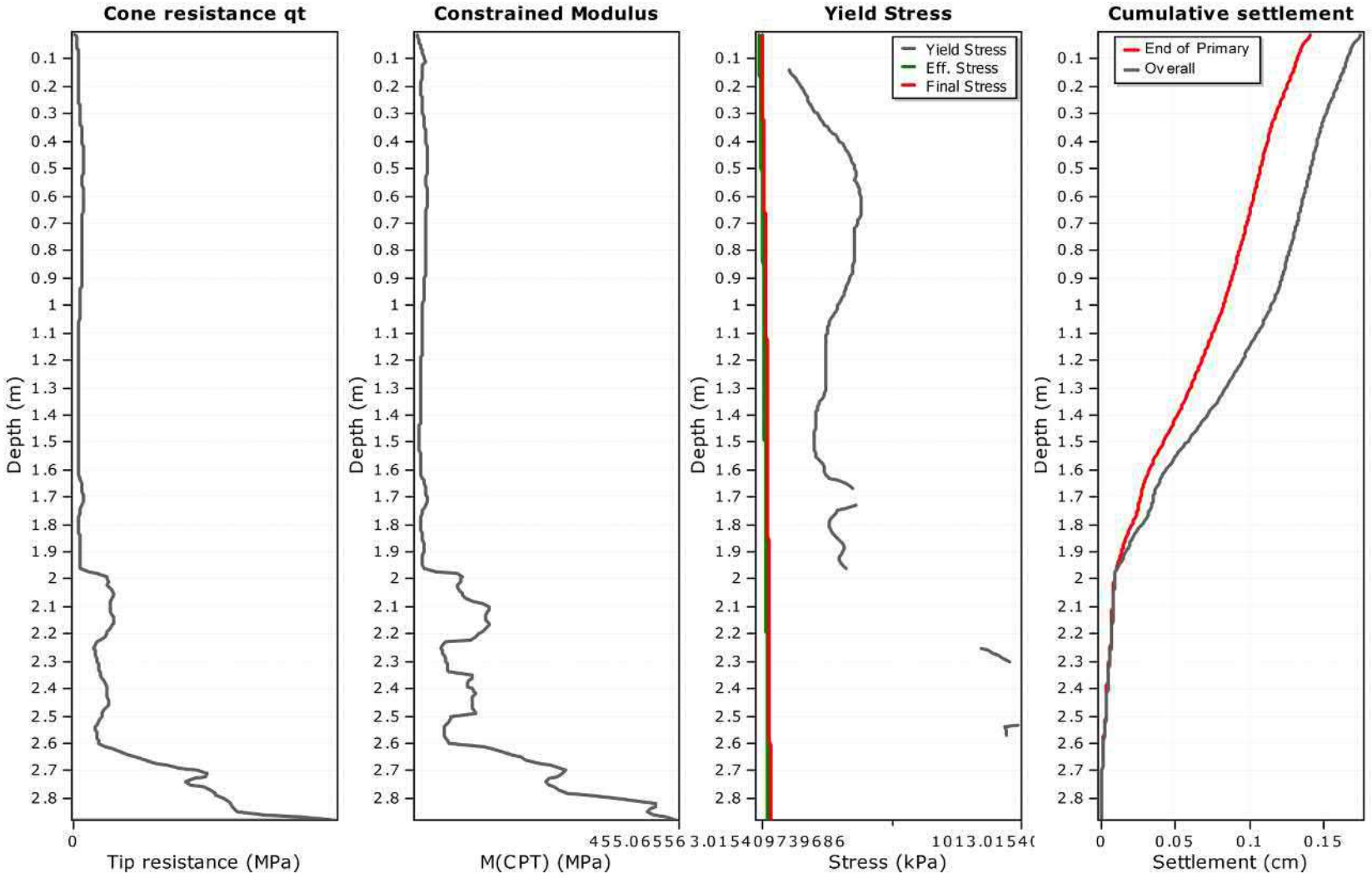
where t_p is the duration of primary consolidation

Underground Investigation Ltd
Cone Penetration Testing
craig@undergroundinvestigation.co.nz
+64211473249

CPT: CPT02
Total depth: 2.88 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 0.90 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 1.0
Footing pressure: 10.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

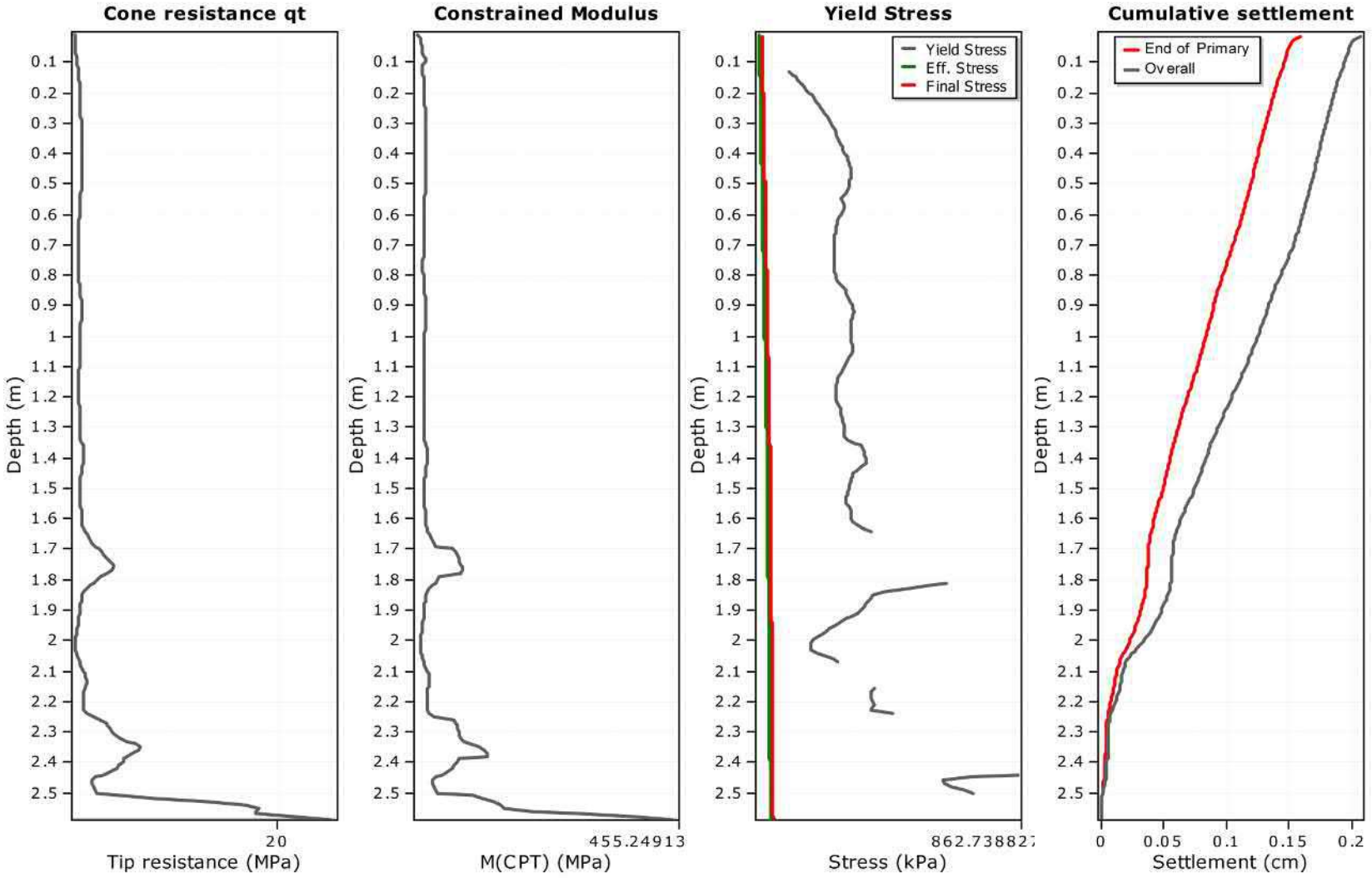
where t_p is the duration of primary consolidation

Underground Investigation Ltd
Cone Penetration Testing
craig@undergroundinvestigation.co.nz
+64211473249

CPT: CPT03
Total depth: 2.59 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 1.40 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 1.0
Footing pressure: 10.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

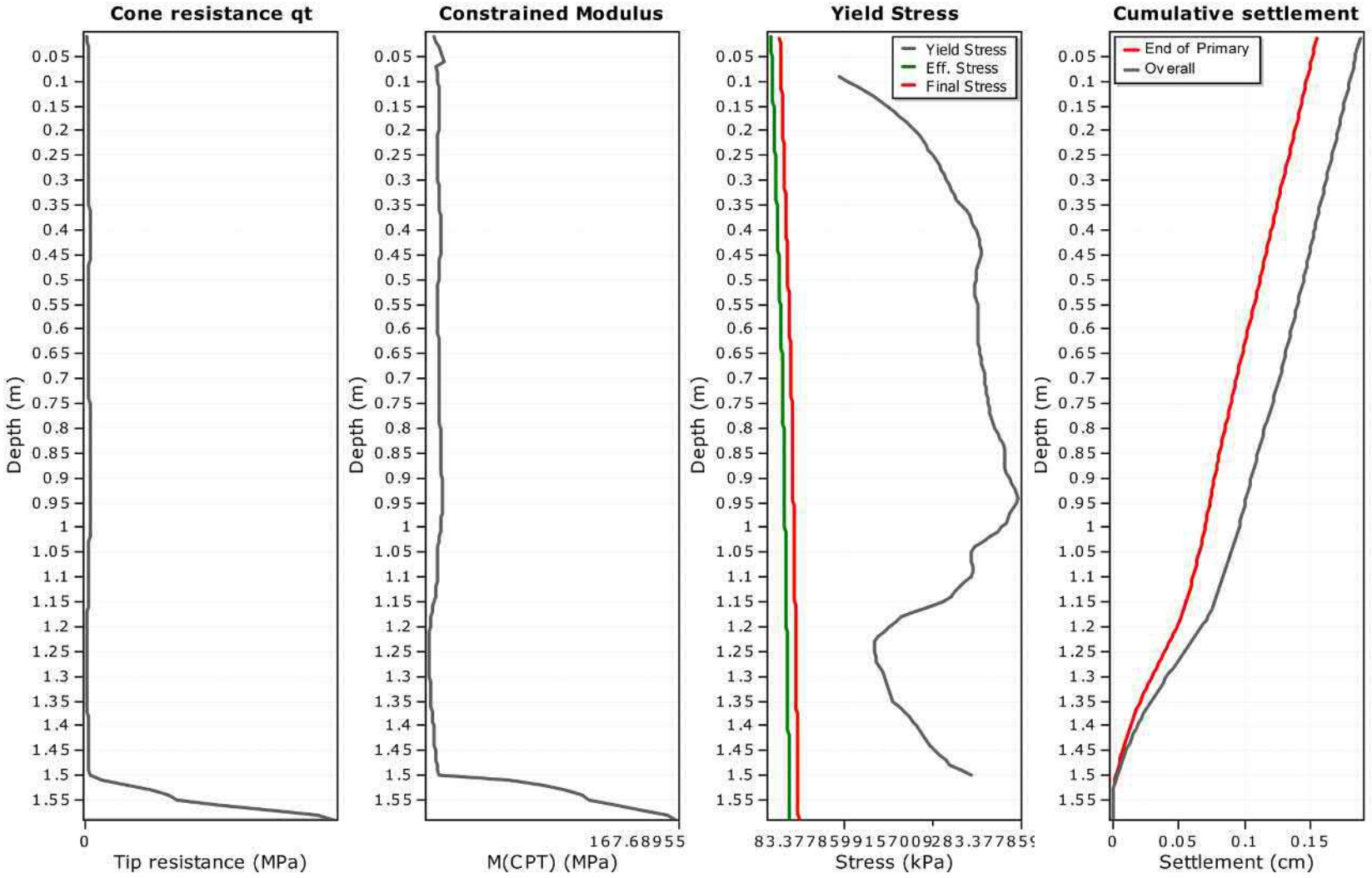
where t_p is the duration of primary consolidation

Underground Investigation Ltd
Cone Penetration Testing
craig@undergroundinvestigation.co.nz
+64211473249

CPT: CPT04
Total depth: 1.59 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 0.70 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 1.0
Footing pressure: 10.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

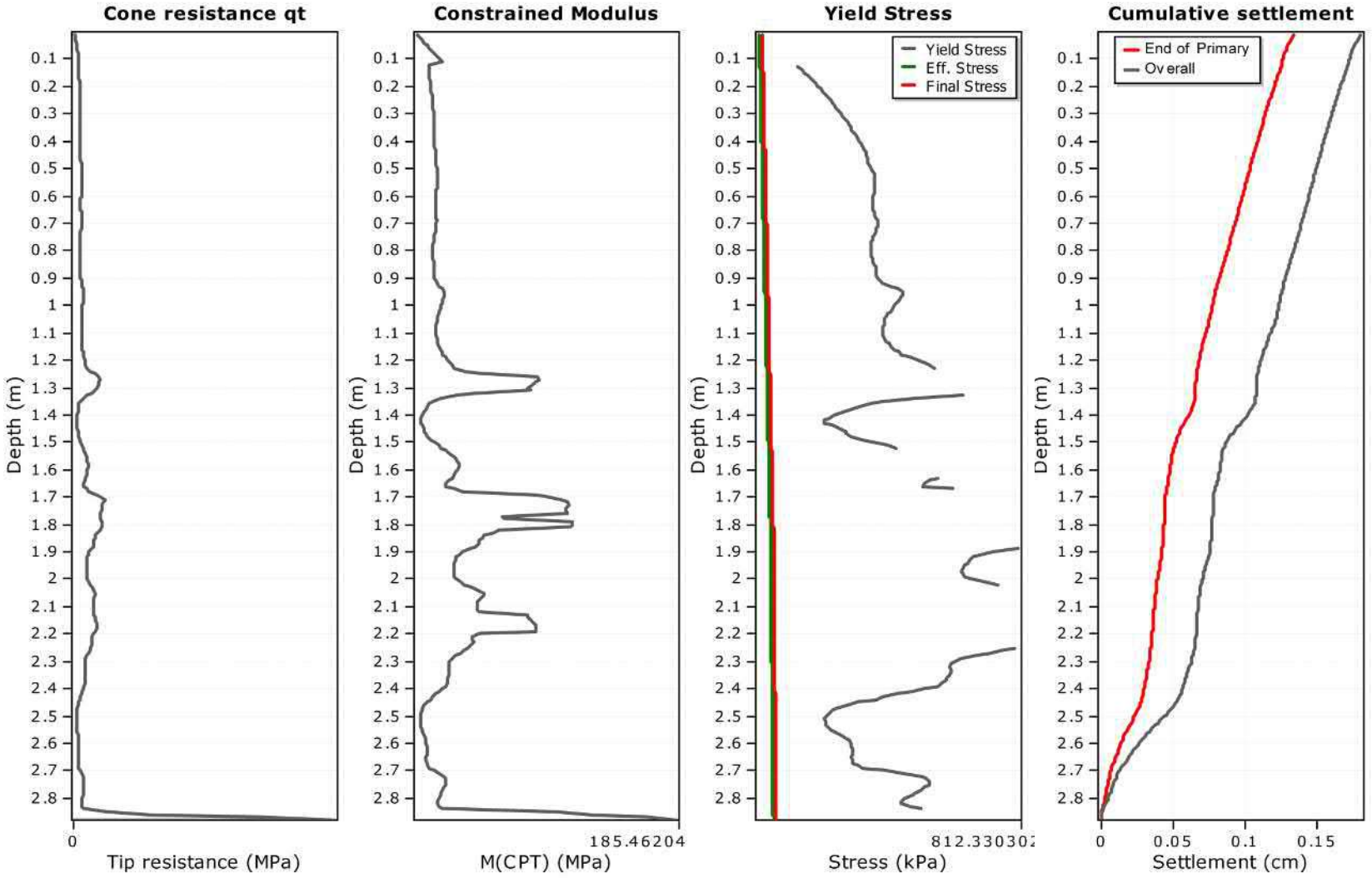
where t_p is the duration of primary consolidation

Underground Investigation Ltd
Cone Penetration Testing
craig@undergroundinvestigation.co.nz
+64211473249

CPT: CPT05
Total depth: 2.88 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 1.80 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 1.0
Footing pressure: 10.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

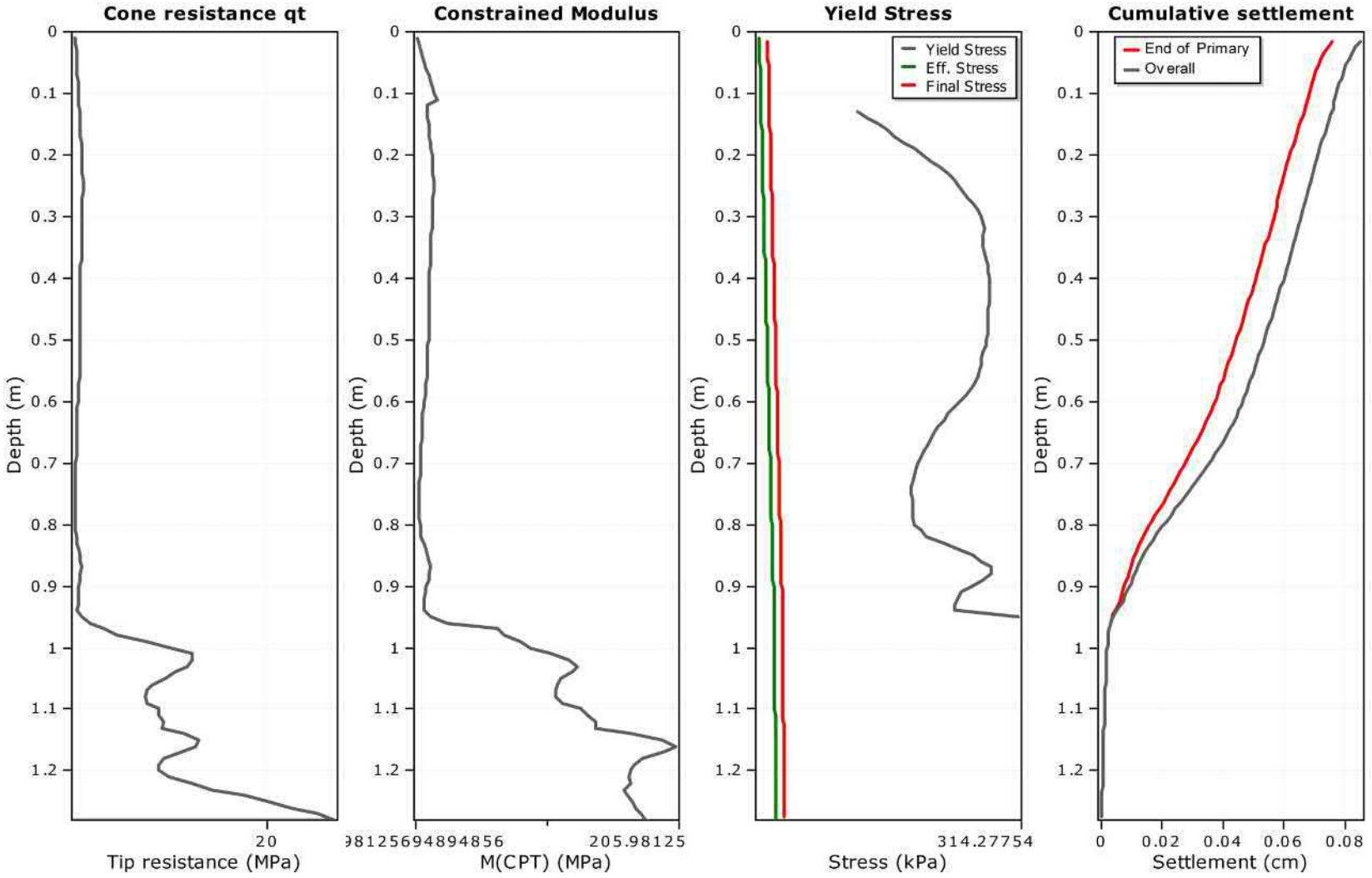
where t_p is the duration of primary consolidation

Underground Investigation Ltd
Cone Penetration Testing
craig@undergroundinvestigation.co.nz
+64211473249

CPT: CPT06
Total depth: 1.28 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 0.90 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 1.0
Footing pressure: 10.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

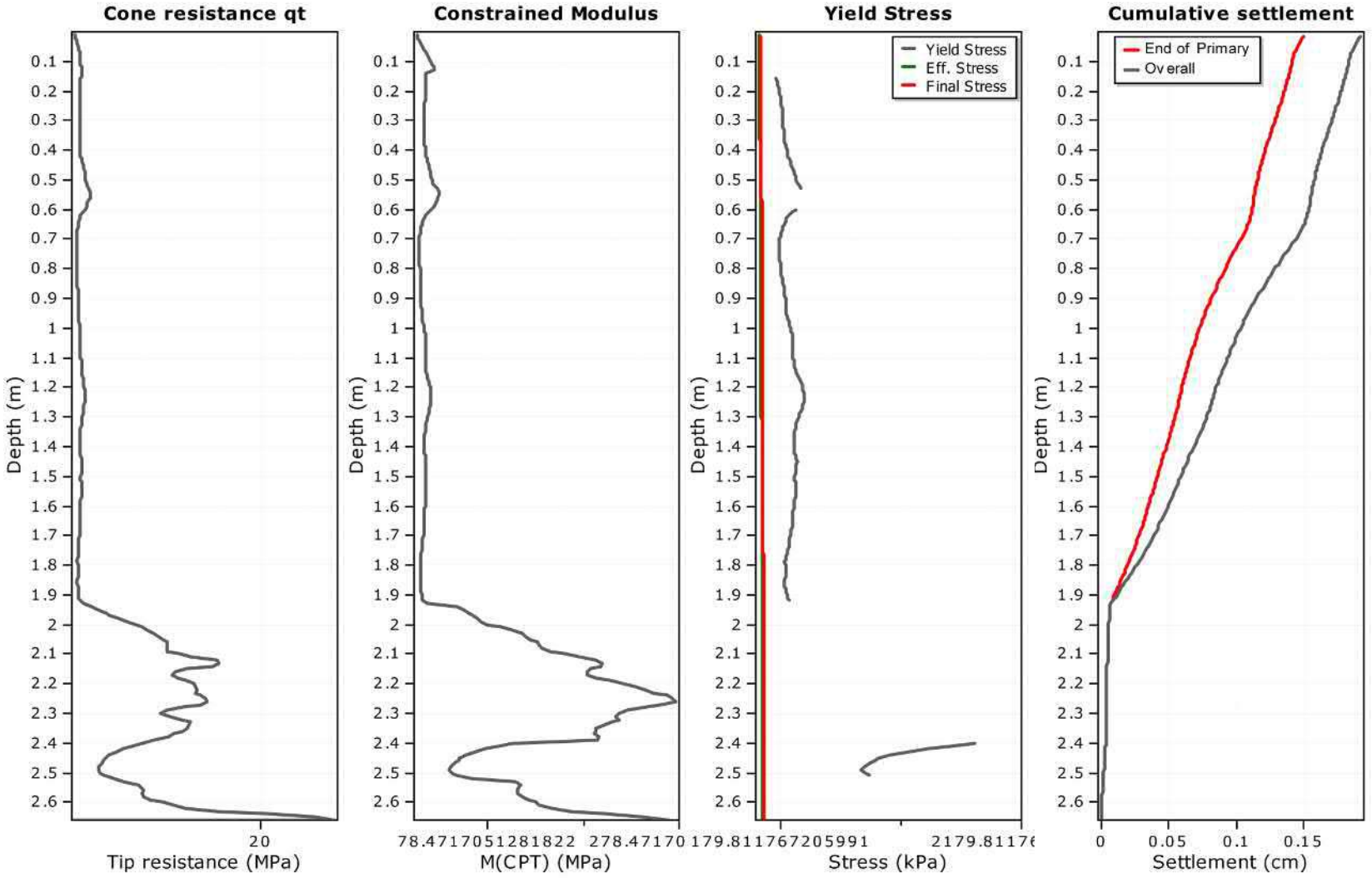
where t_p is the duration of primary consolidation

Underground Investigation Ltd
Cone Penetration Testing
craig@undergroundinvestigation.co.nz
+64211473249

CPT: CPT07
Total depth: 2.66 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 0.90 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 1.0
Footing pressure: 10.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

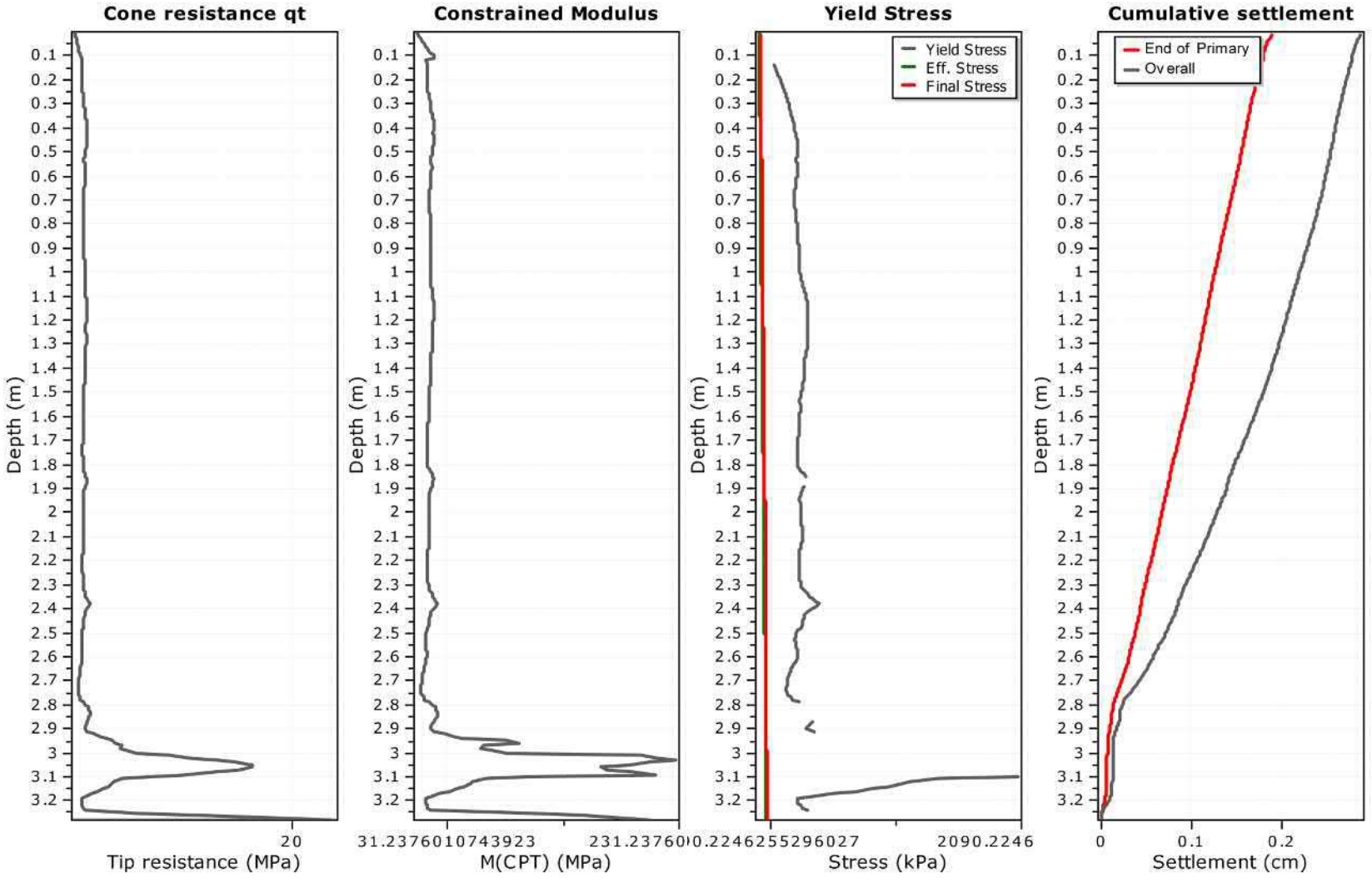
where t_p is the duration of primary consolidation

Underground Investigation Ltd
Cone Penetration Testing
craig@undergroundinvestigation.co.nz
+64211473249

CPT: CPT08
Total depth: 3.28 m, Date: 6/05/2025
Surface Elevation: 0.00 m, Est. GWL: 2.40 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 1.0
Footing pressure: 10.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta\sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

where t_p is the duration of primary consolidation

Appendix F. Liquefaction Outputs (CLiq)

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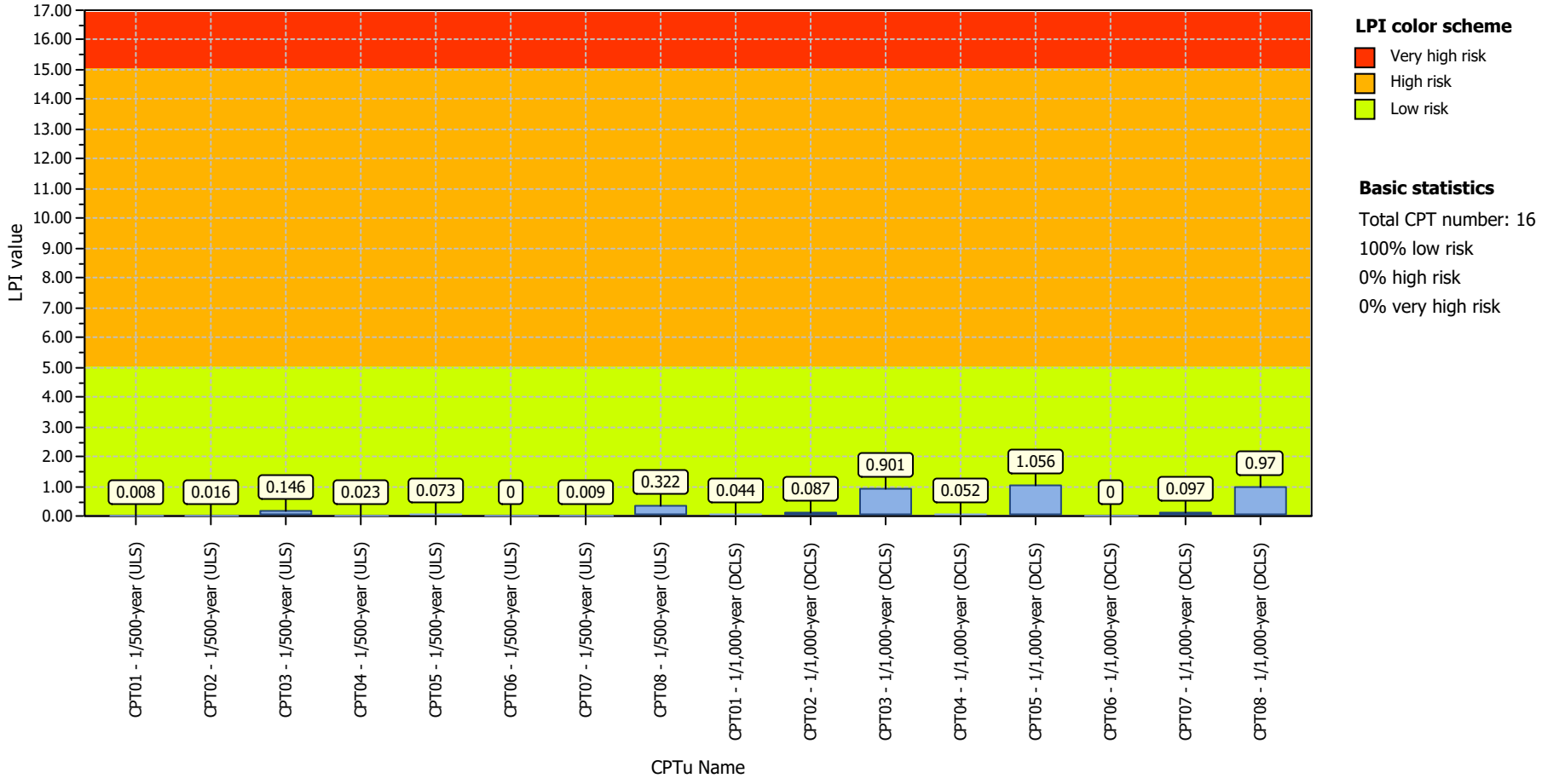
Project title :

Location :

Overall Liquefaction Potential Index report



LPI color scheme

- Very high risk
- High risk
- Low risk

Basic statistics

Total CPT number: 16
100% low risk
0% high risk
0% very high risk

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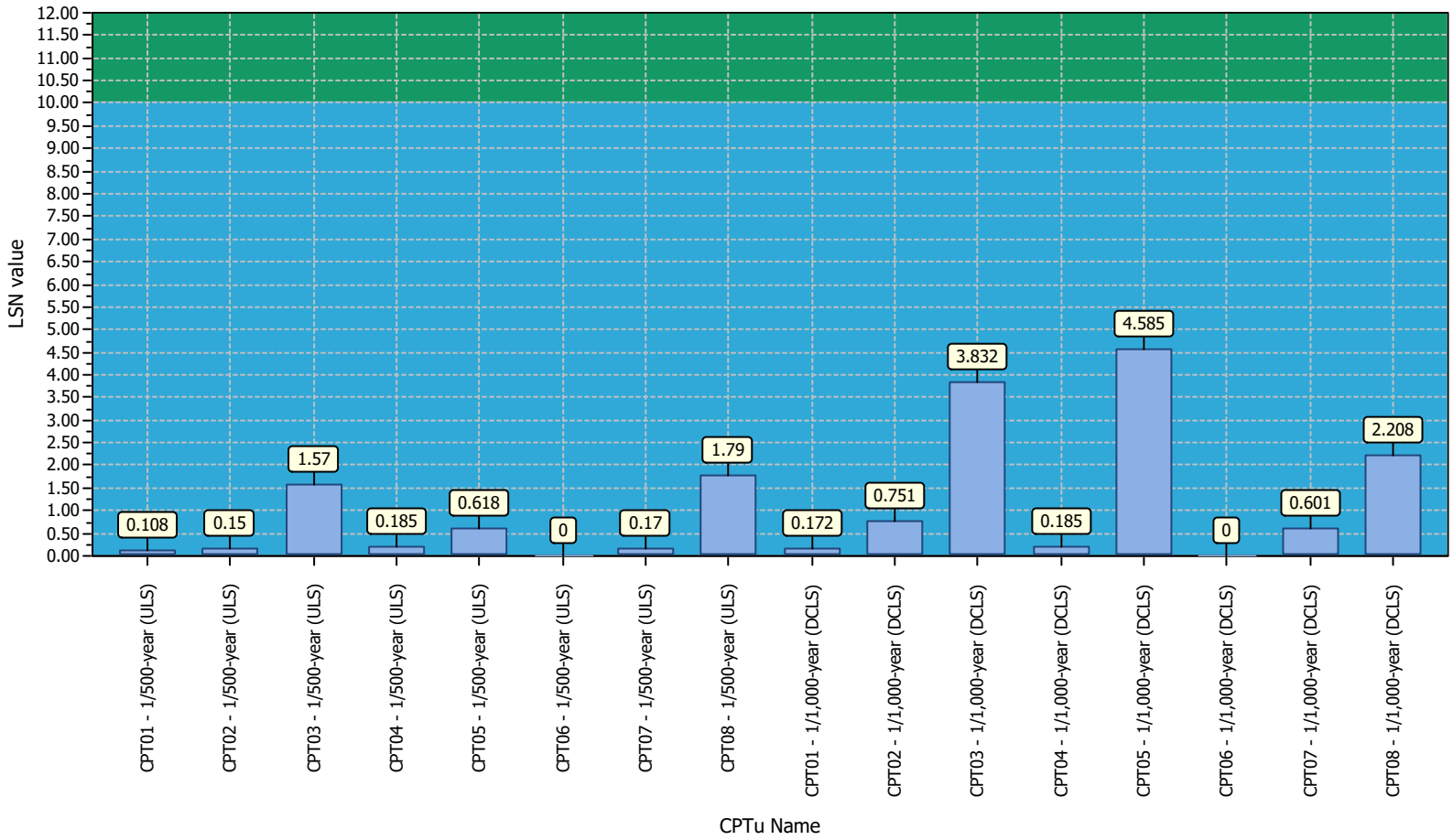
Project title :

Location :

Overall Liquefaction Severity Number report



LSN color scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

Basic statistics

Total CPT number: 16

100% little liquefaction

0% minor liquefaction

0% moderate liquefaction

0% moderate to major liquefaction

0% major liquefaction

0% severe liquefaction

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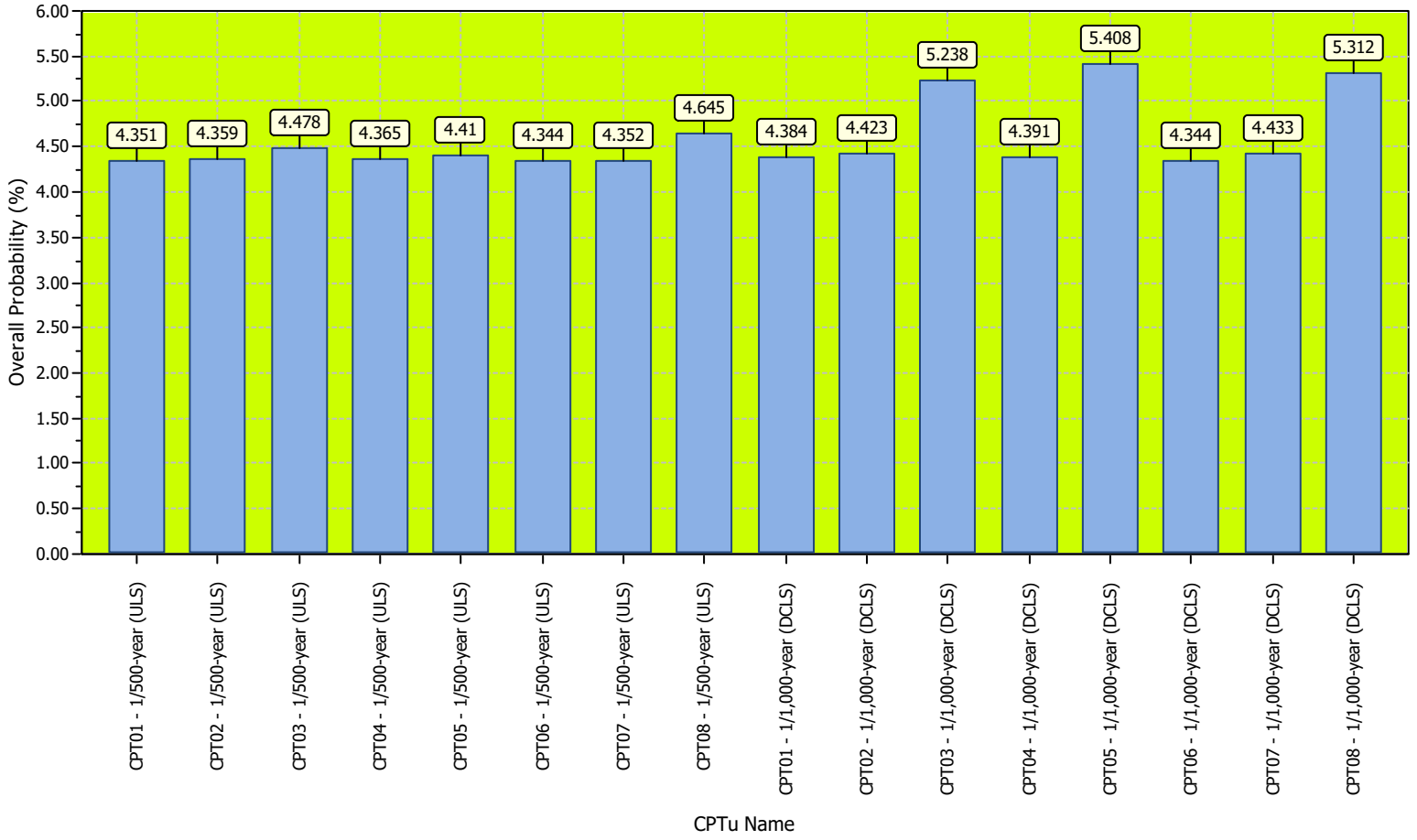
Project title :

Location :

Overall Probability for Liquefaction report



Probability color scheme

- Very High Probability
- High Probability
- Low Probability

Basic statistics

Total CPT number: 48
100% low probability
0% high probability
0% very high probability

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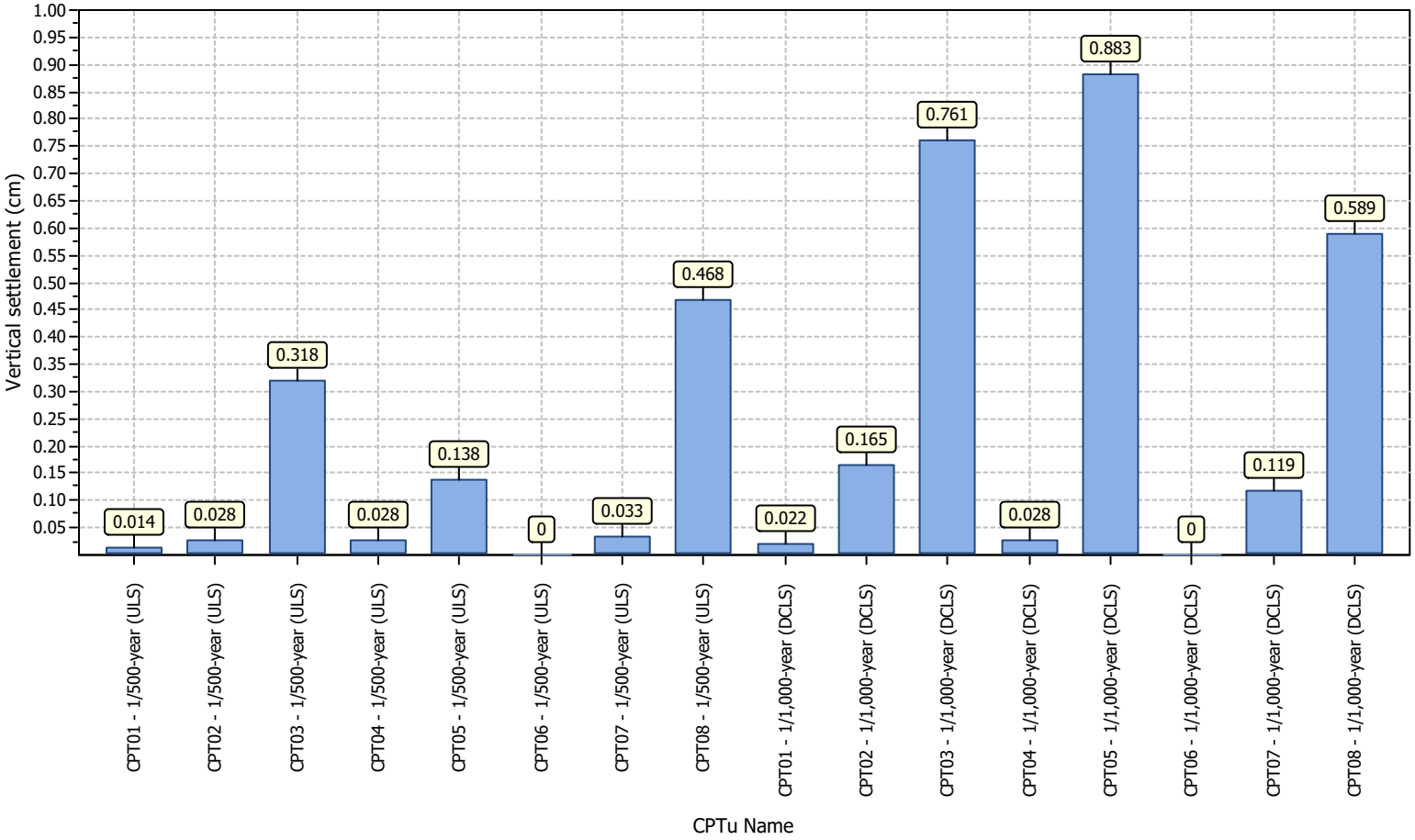
+64211473249

Project title :

Location :

Overall vertical settlements report



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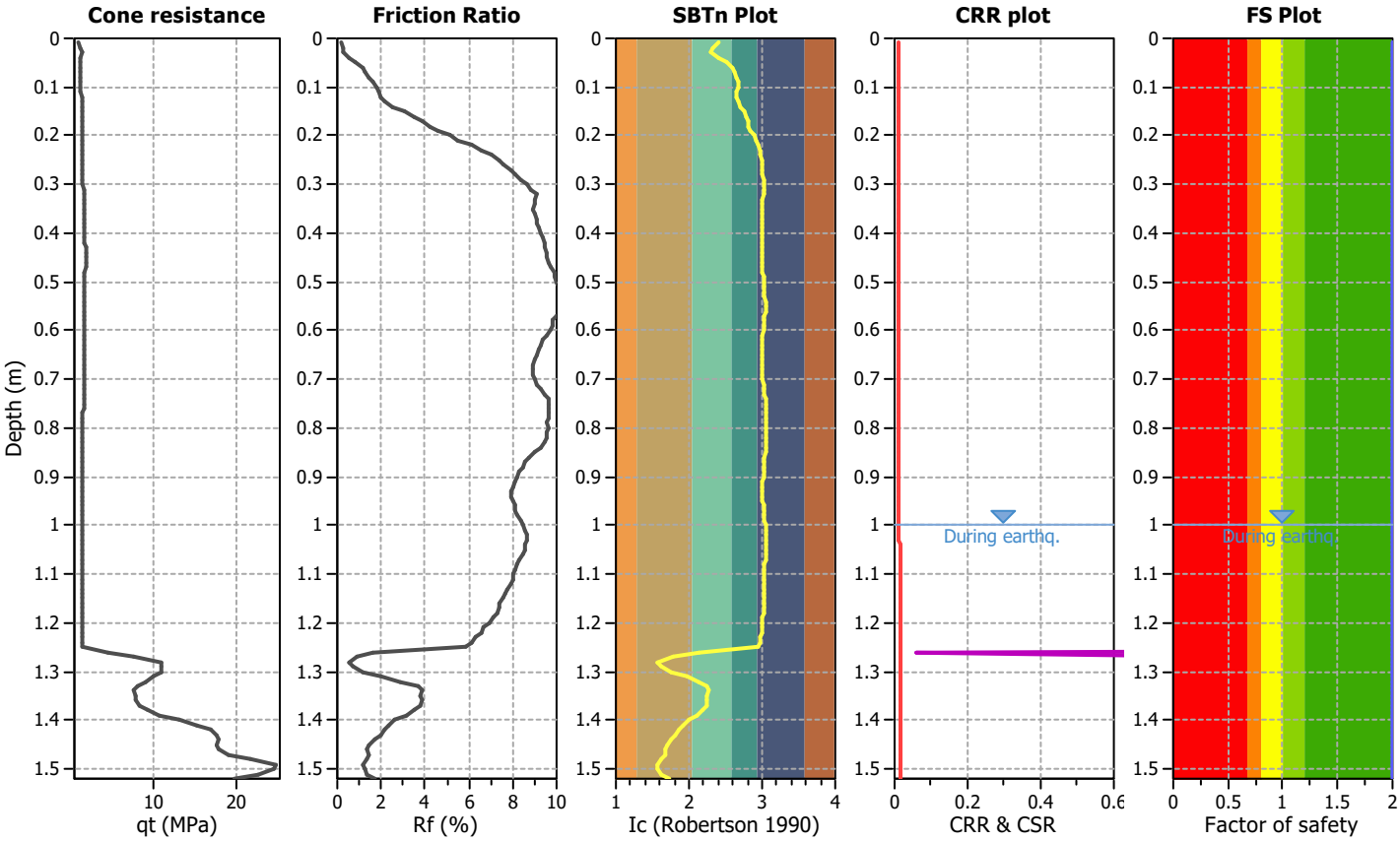
LIQUEFACTION ANALYSIS REPORT

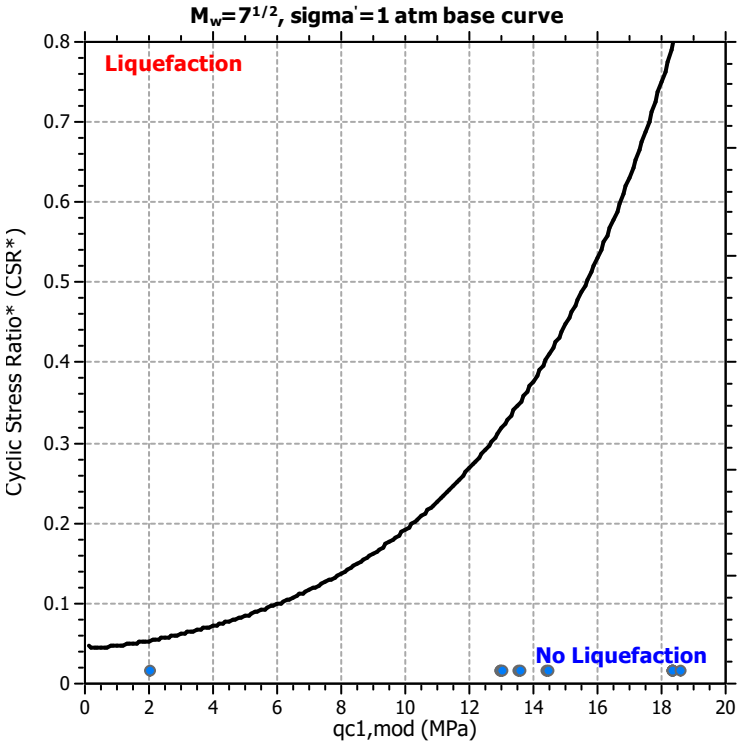
Project title : **Location :**

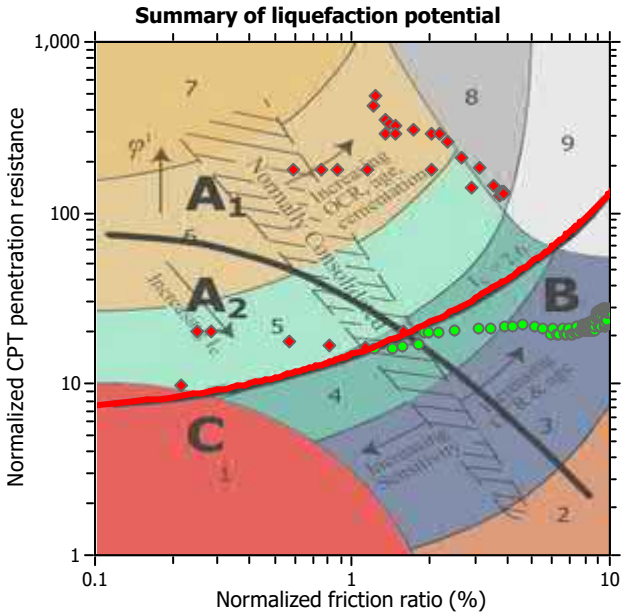
CPT file : CPT01 - 1/25-year (SLS)

Input parameters and analysis data

Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.80	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.03	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

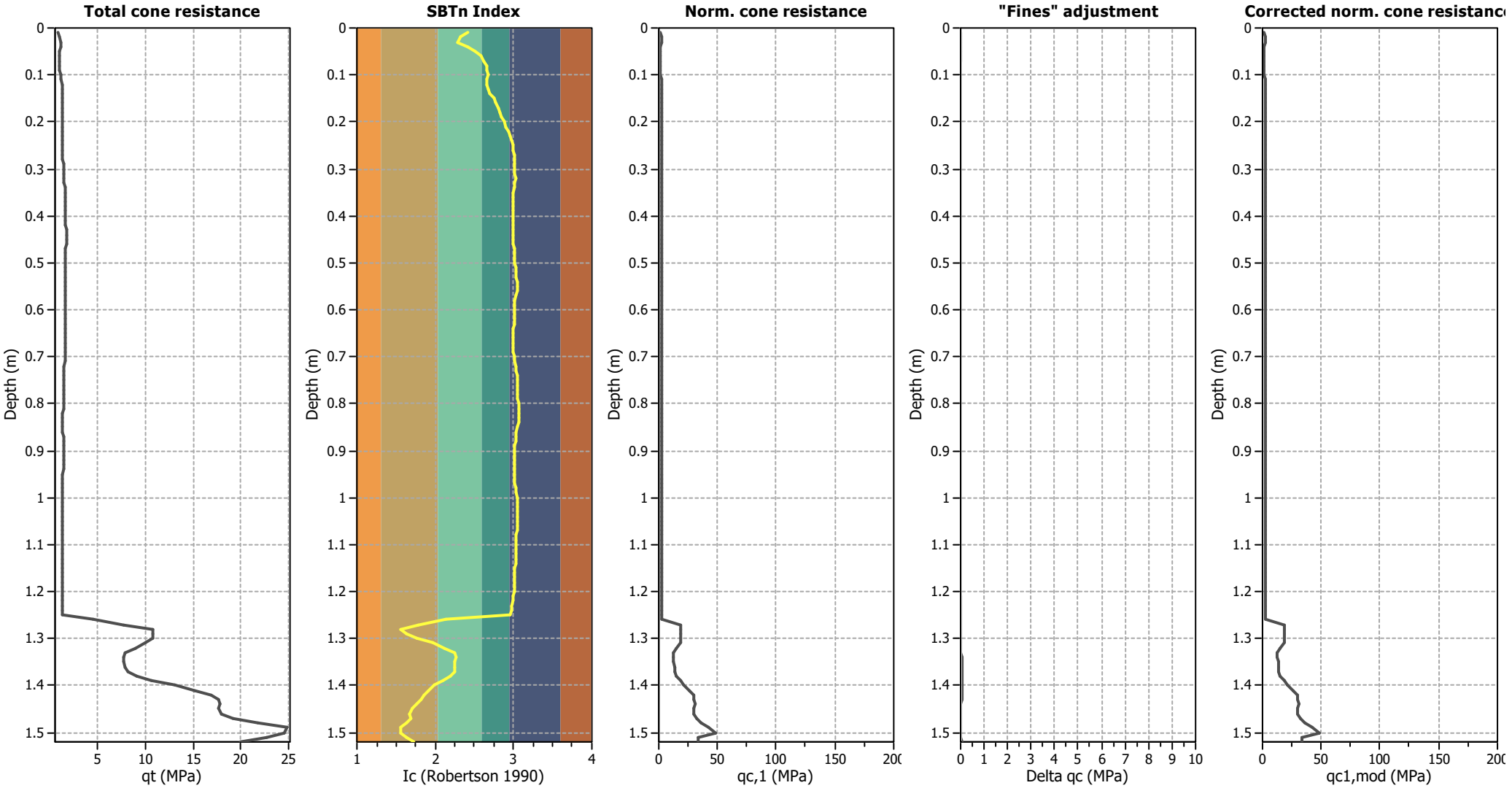






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_o applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.03	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.00 m	Fill height:	N/A	Limit depth:	N/A

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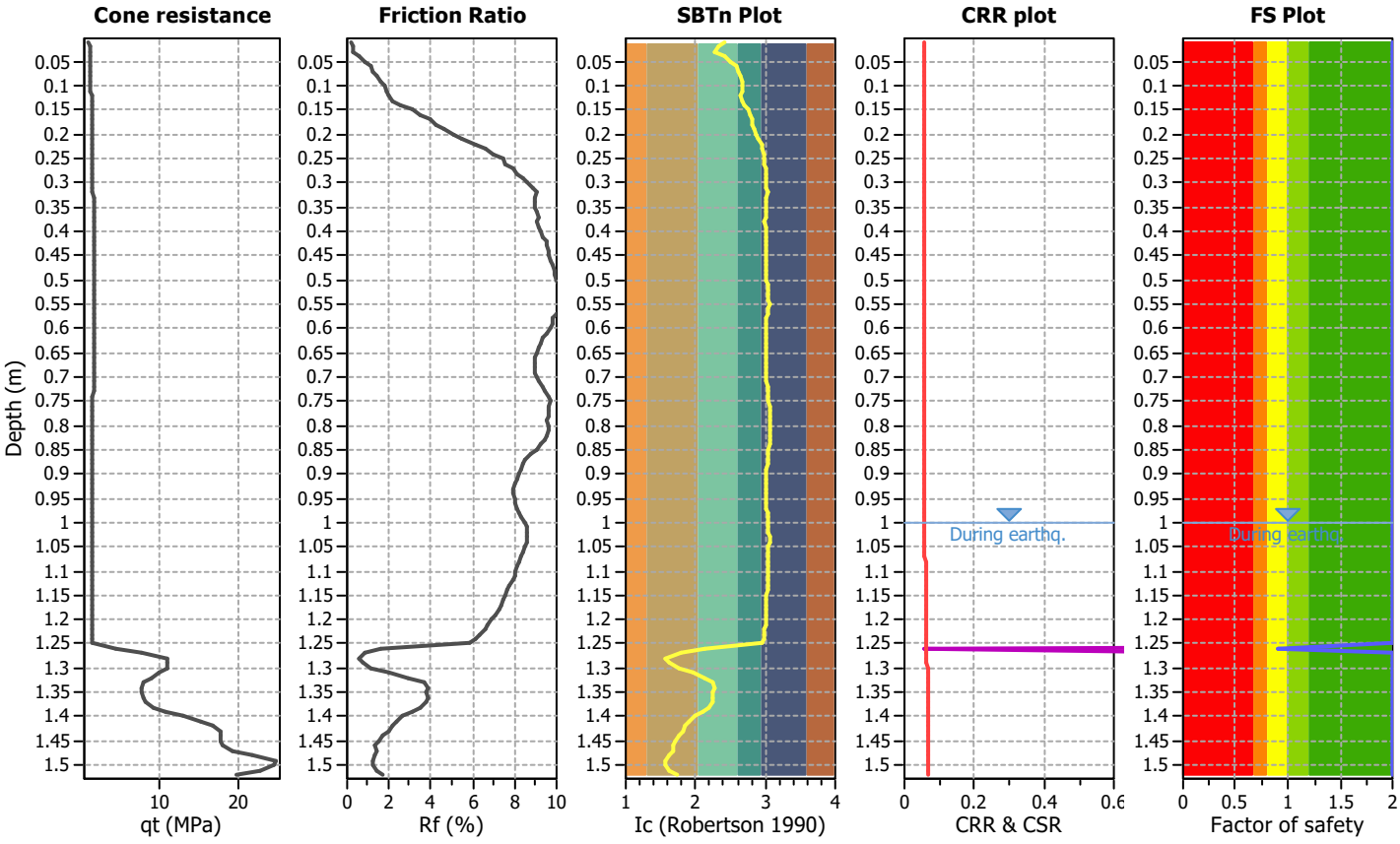
LIQUEFACTION ANALYSIS REPORT

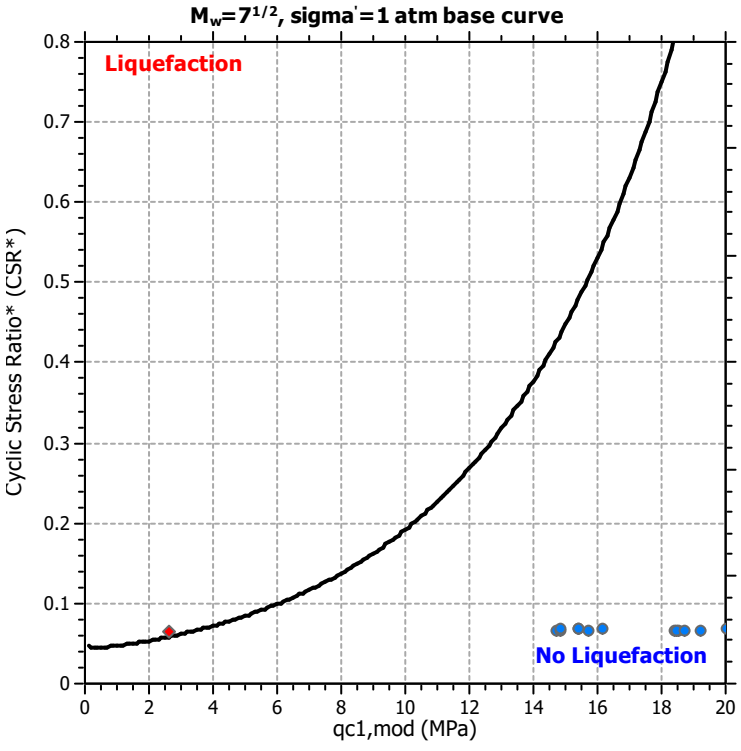
Project title : **Location :**

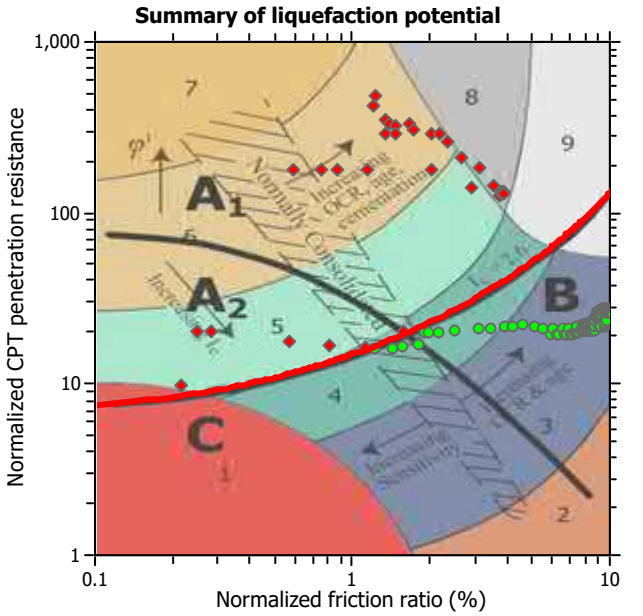
CPT file : CPT01 - 1/500-year (ULS)

Input parameters and analysis data

Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.80	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

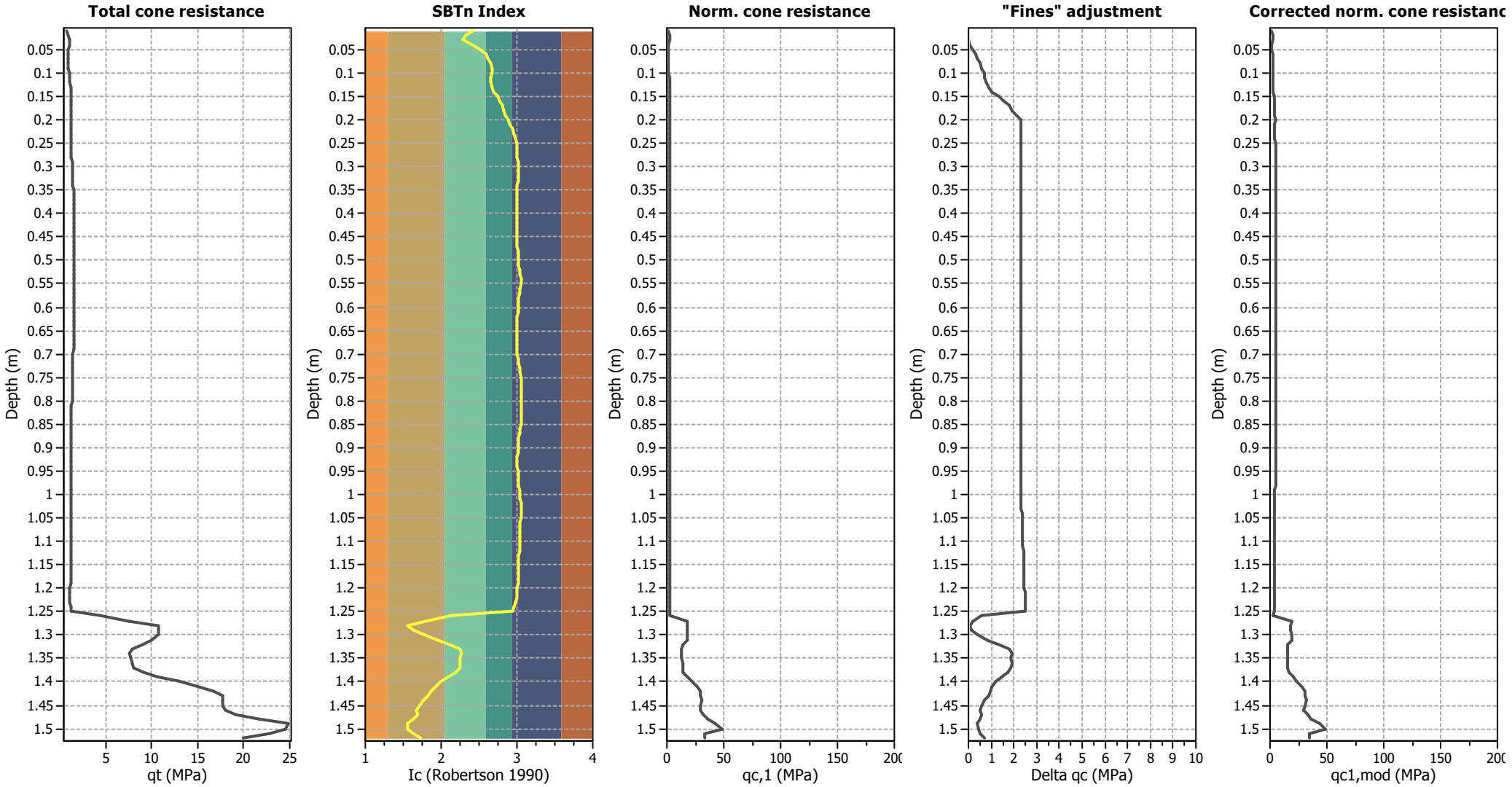






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

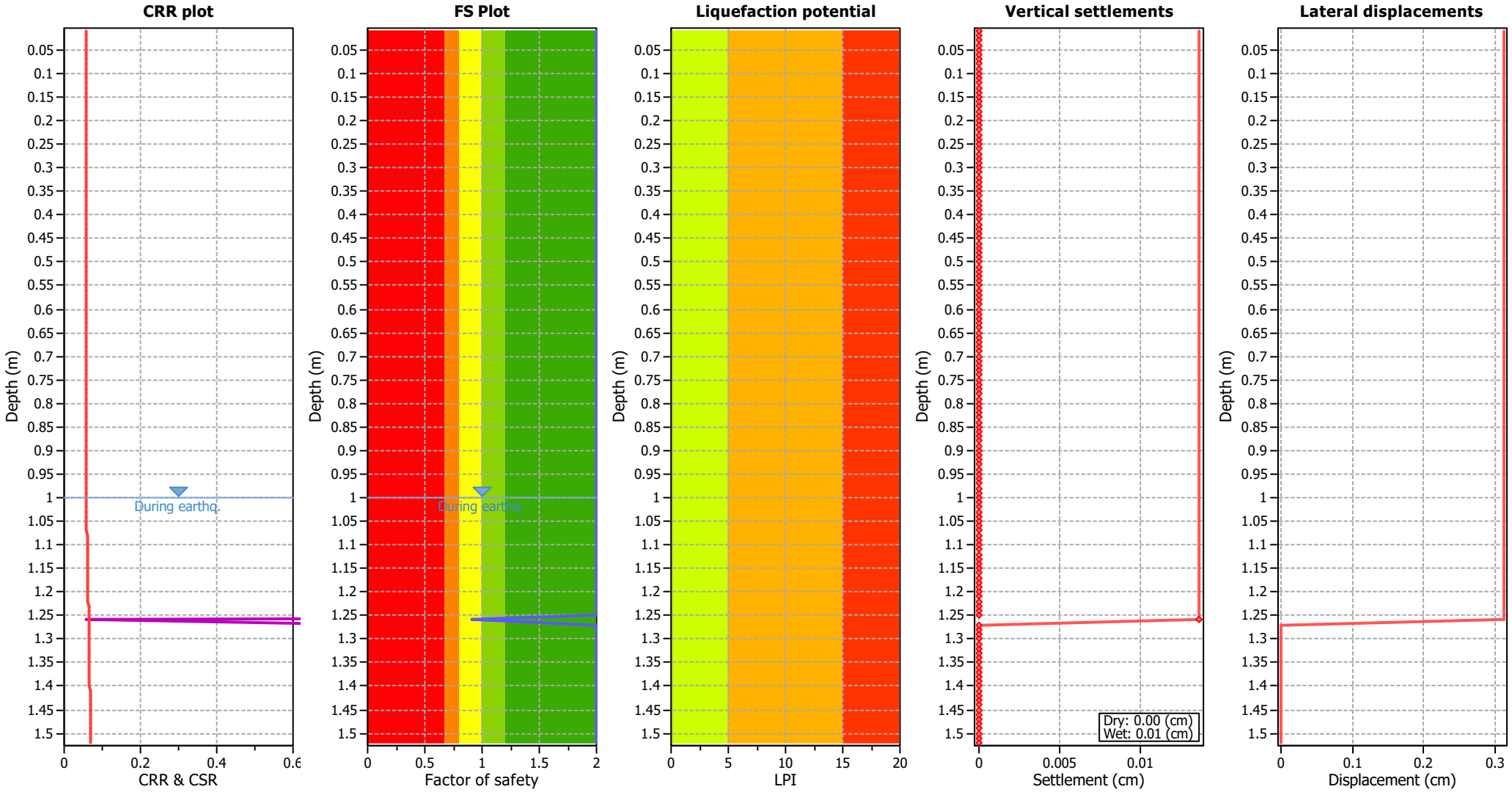
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_o applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.00 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.00 m	Fill height:	N/A	Limit depth:	N/A

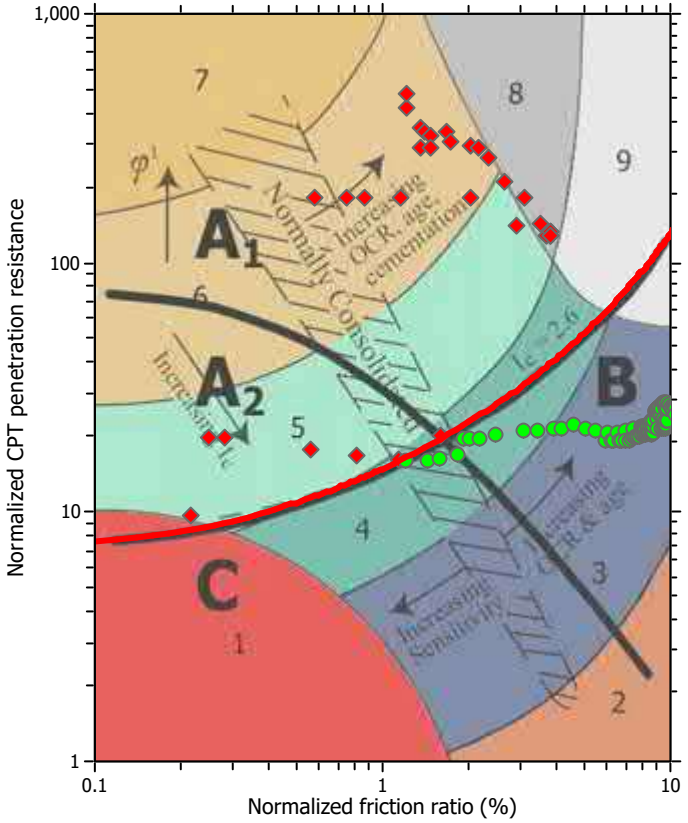
F.S. color scheme

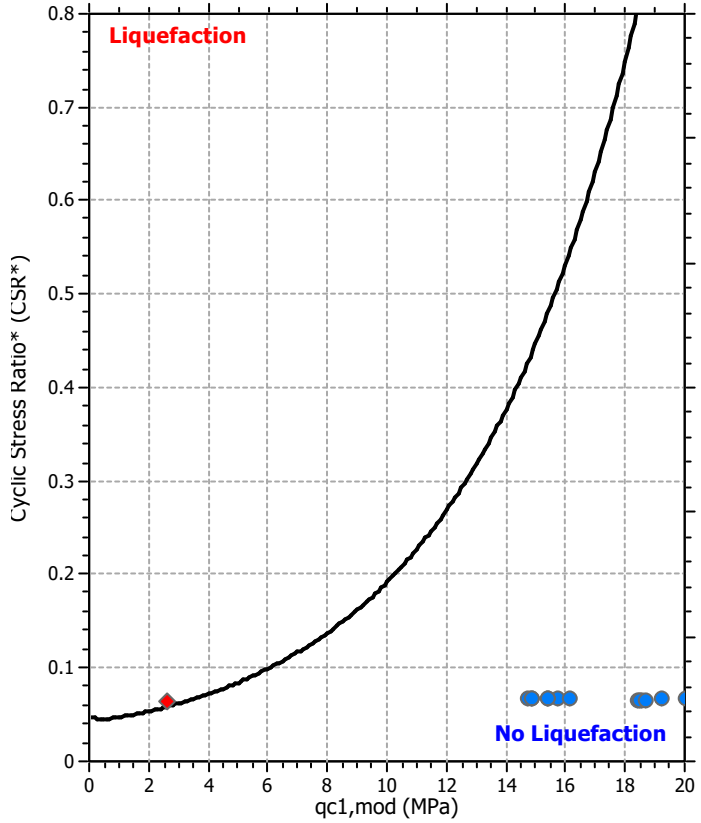
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

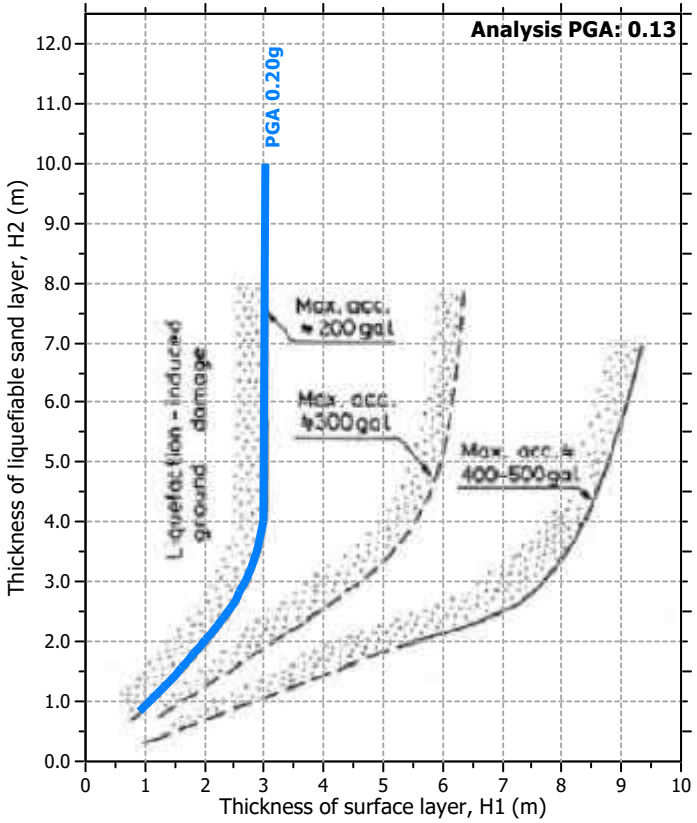
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.00 m	Fill height:	N/A	Limit depth:	N/A

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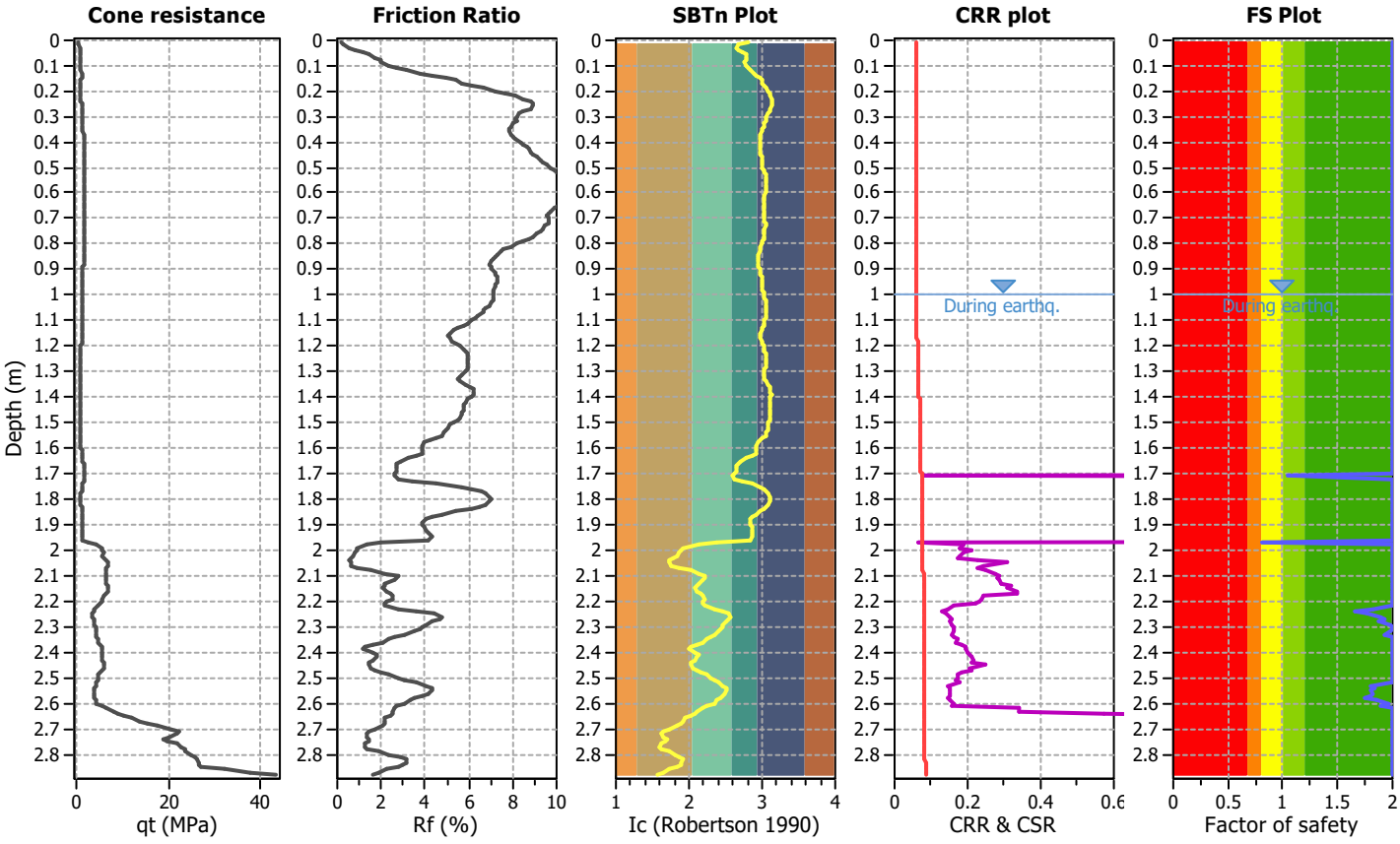
LIQUEFACTION ANALYSIS REPORT

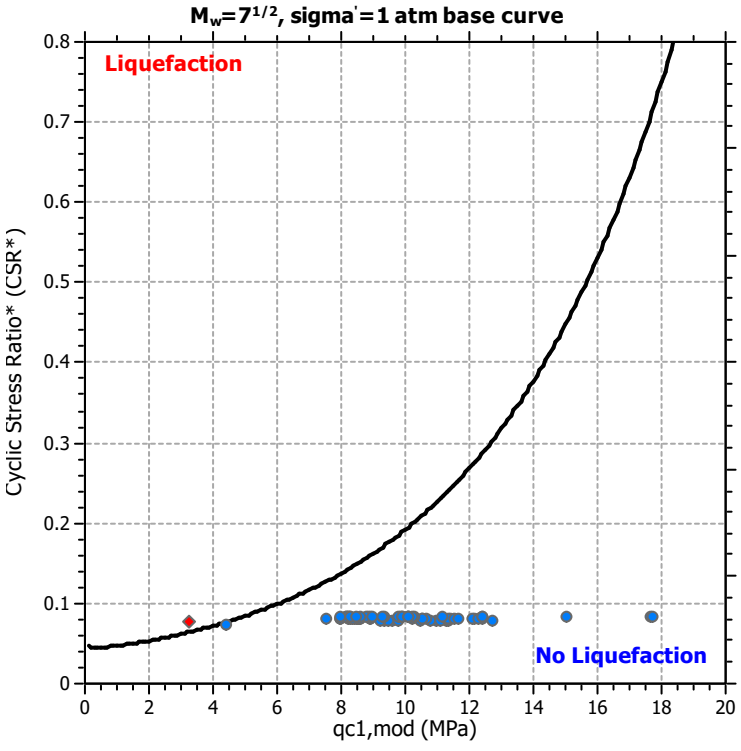
Project title : **Location :**

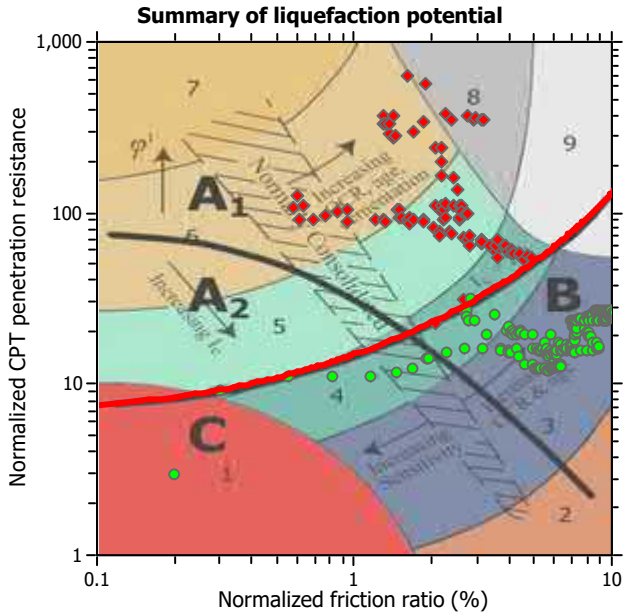
CPT file : CPT02 - 1/500-year (ULS)

Input parameters and analysis data

Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	0.90 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.80	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

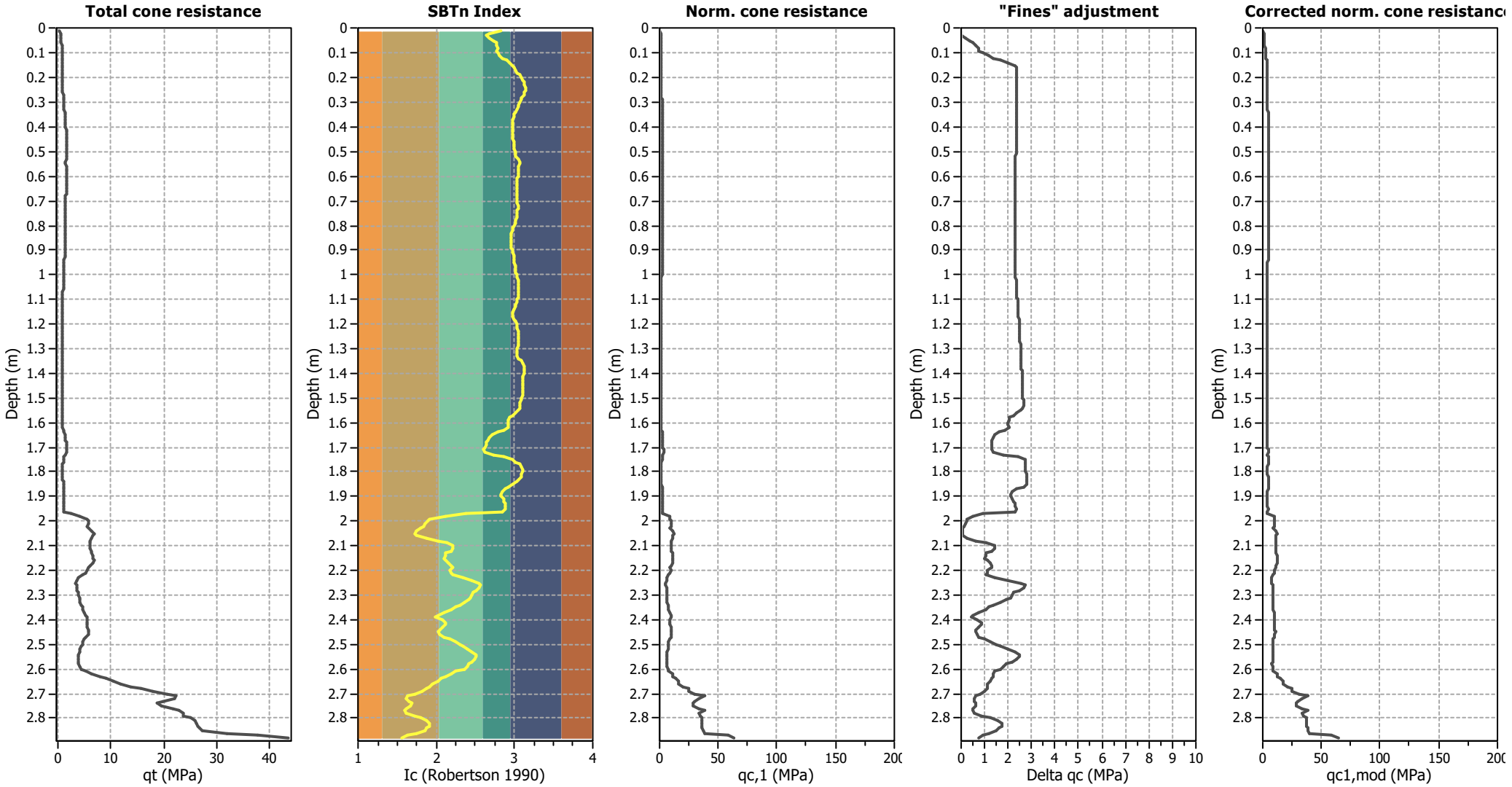






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

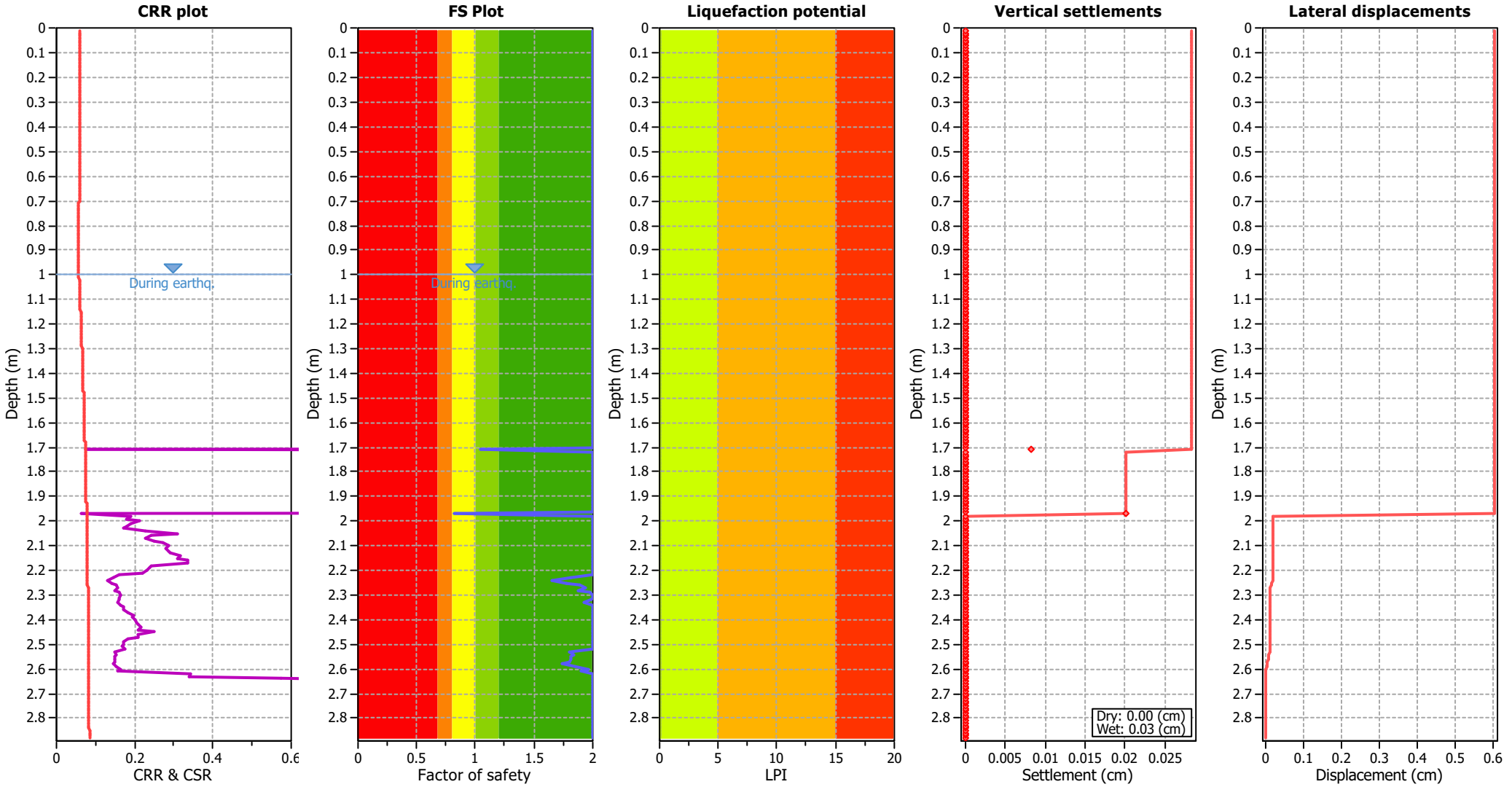
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.90 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.90 m	Fill height:	N/A	Limit depth:	N/A

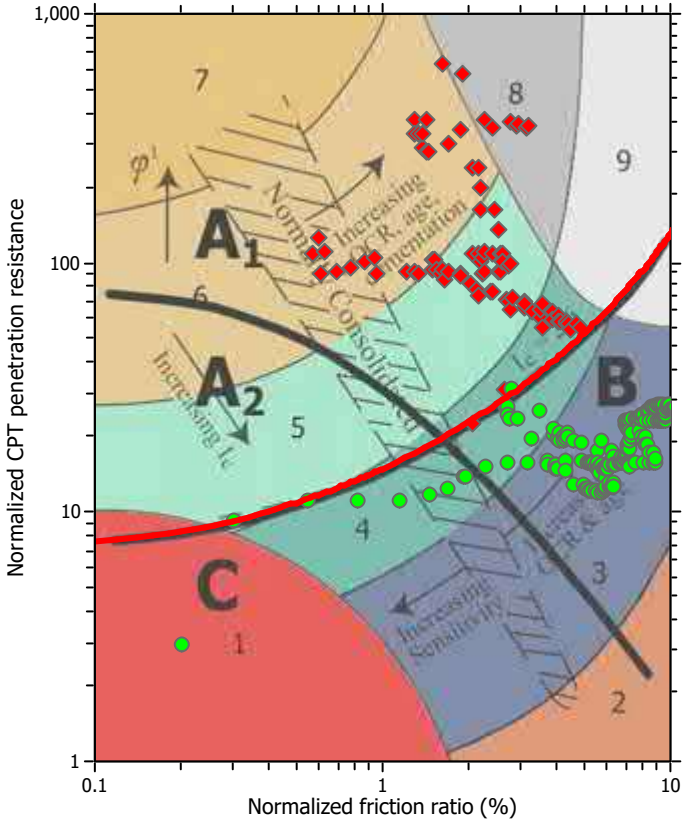
F.S. color scheme

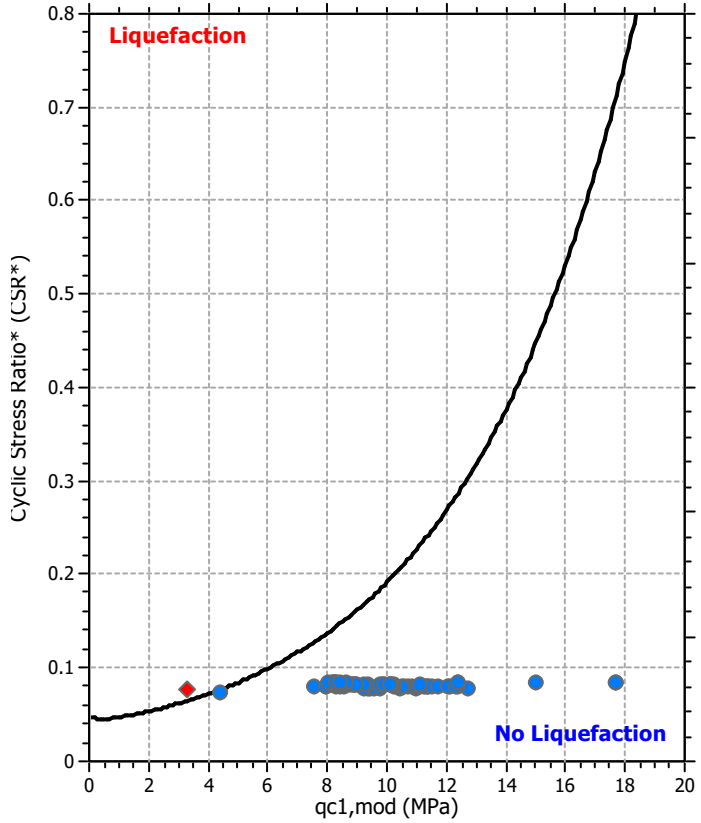
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

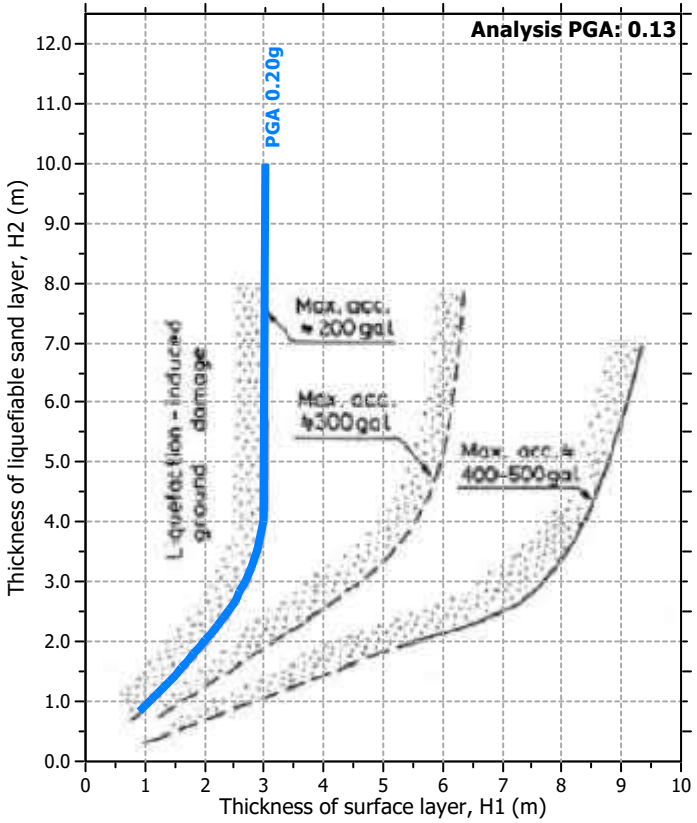
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.90 m	Fill height:	N/A	Limit depth:	N/A

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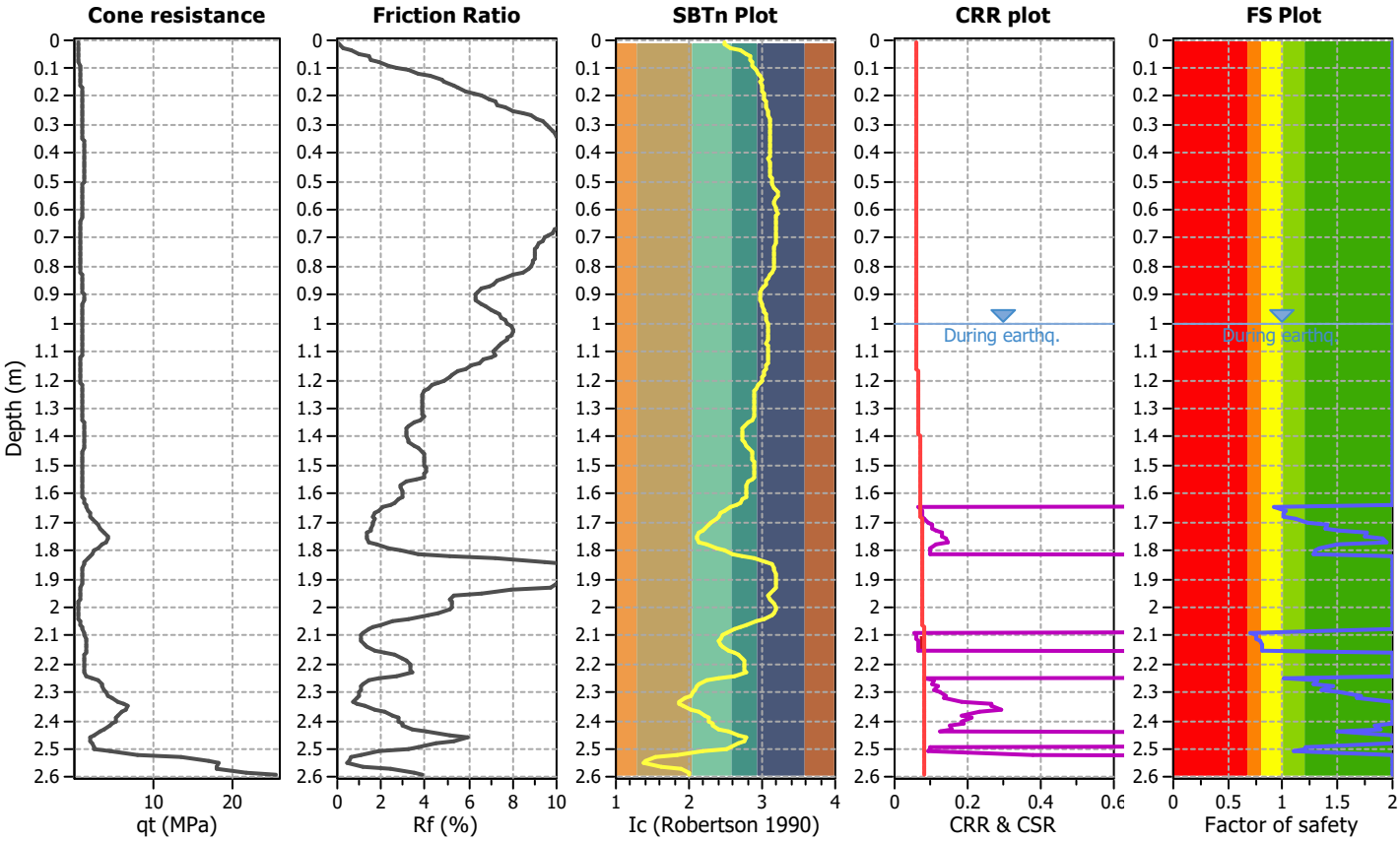
LIQUEFACTION ANALYSIS REPORT

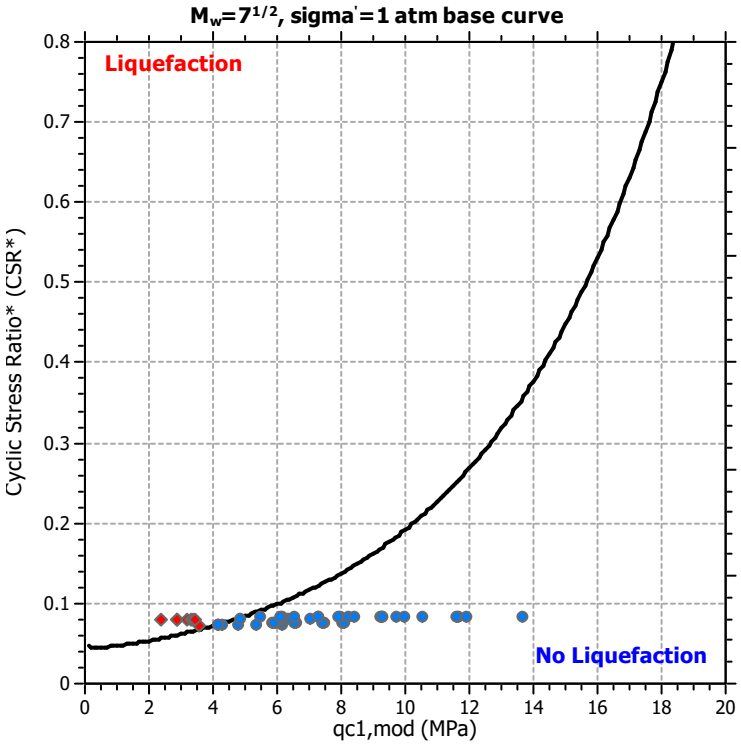
Project title : **Location :**

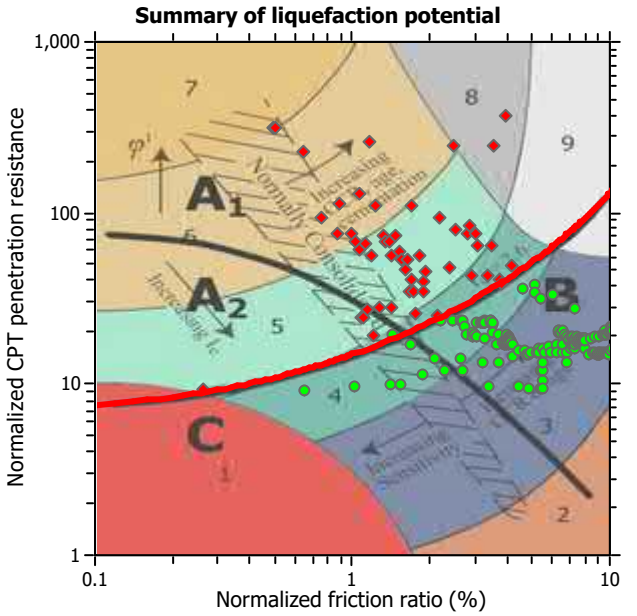
CPT file : CPT03 - 1/500-year (ULS)

Input parameters and analysis data

Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	1.40 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.80	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

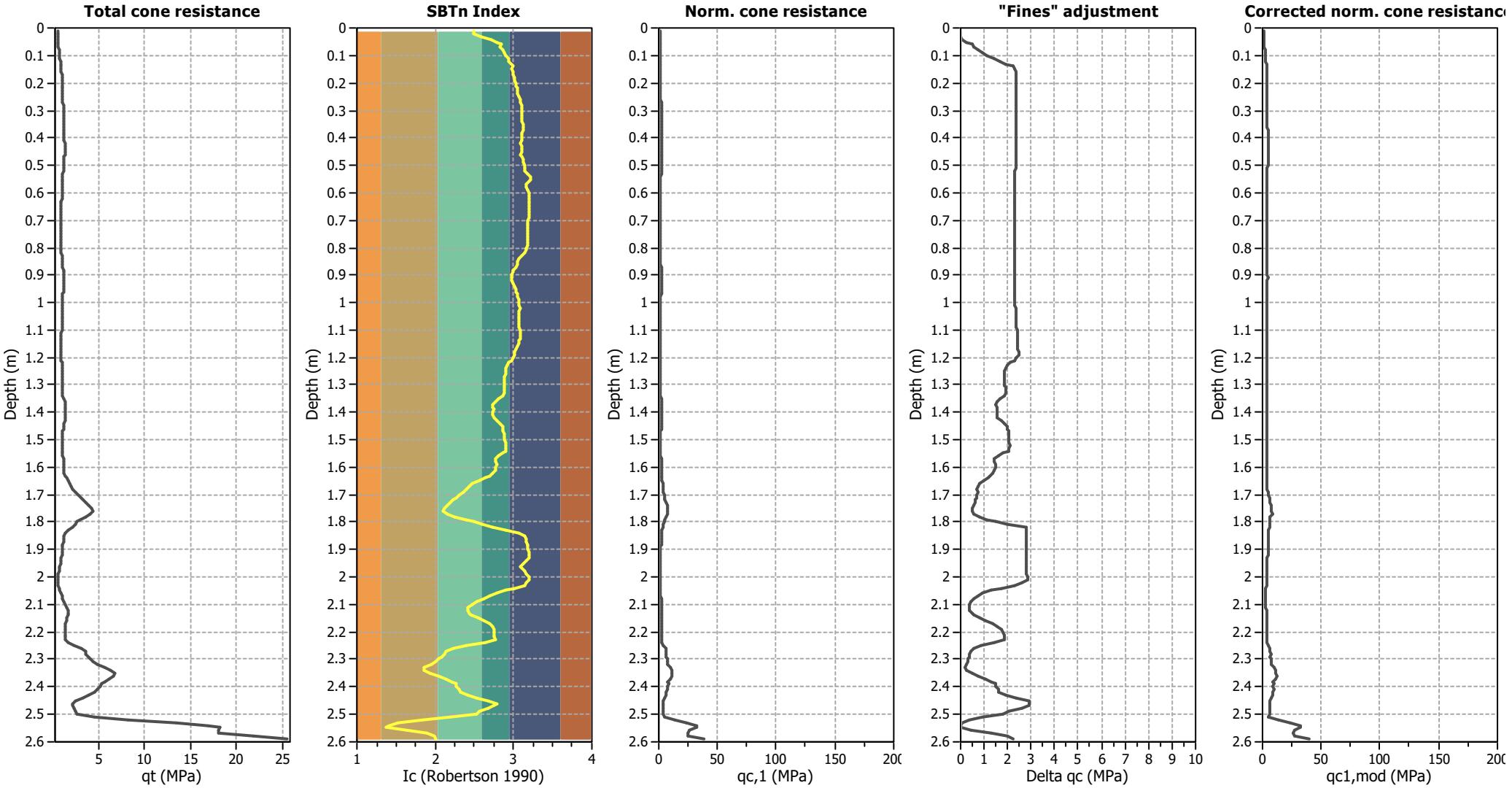






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

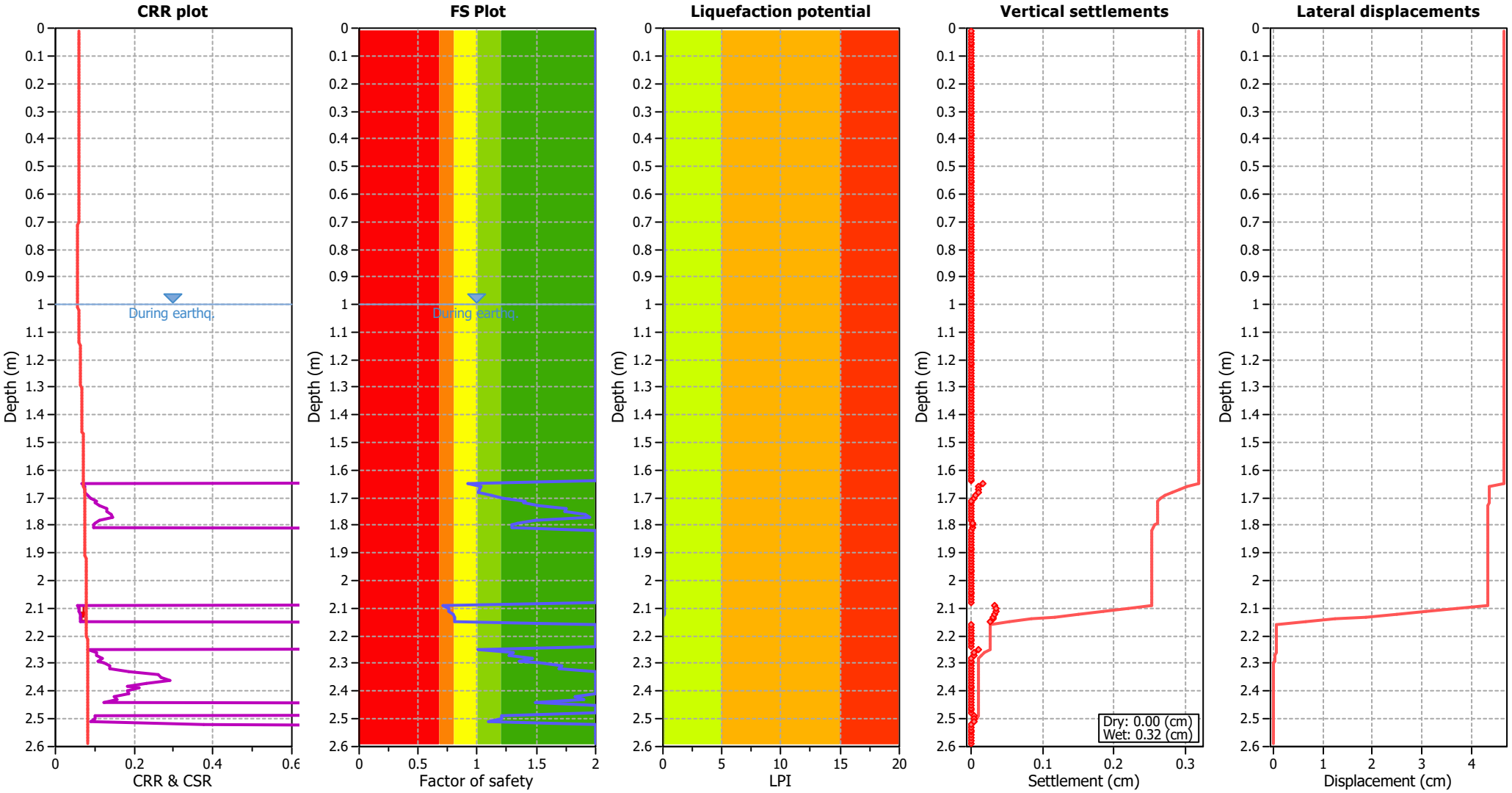
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.40 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.40 m	Fill height:	N/A	Limit depth:	N/A

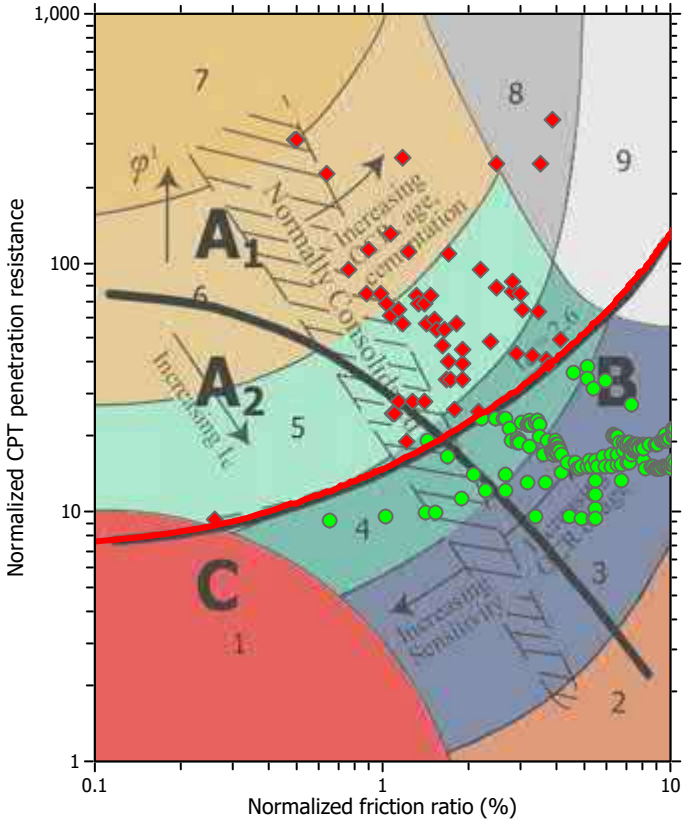
F.S. color scheme

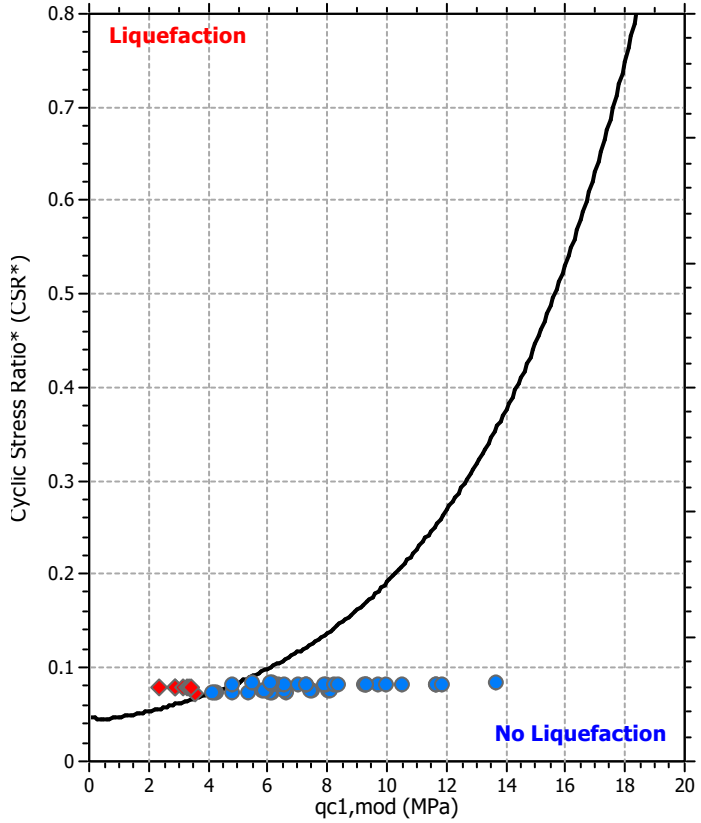
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

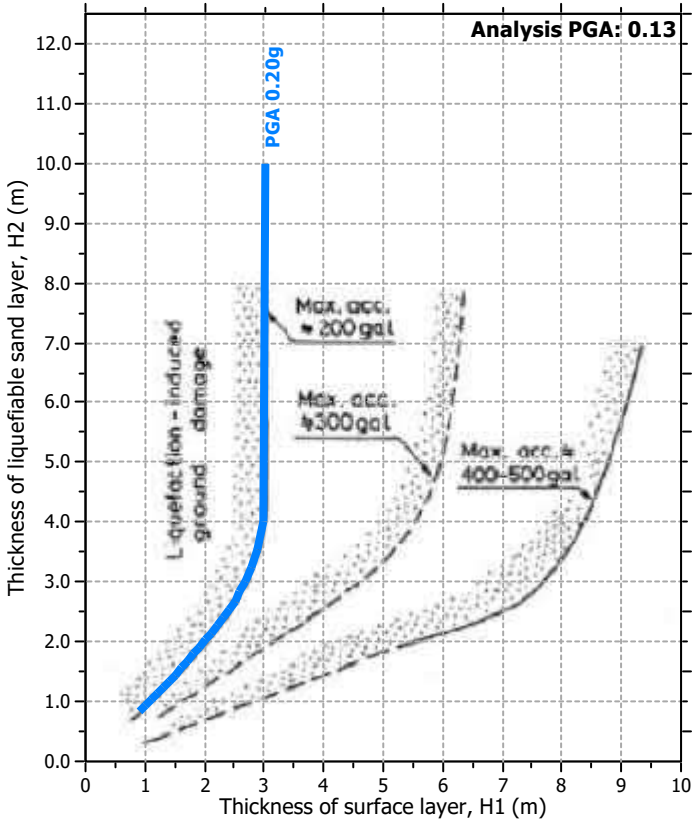
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.40 m	Fill height:	N/A	Limit depth:	N/A

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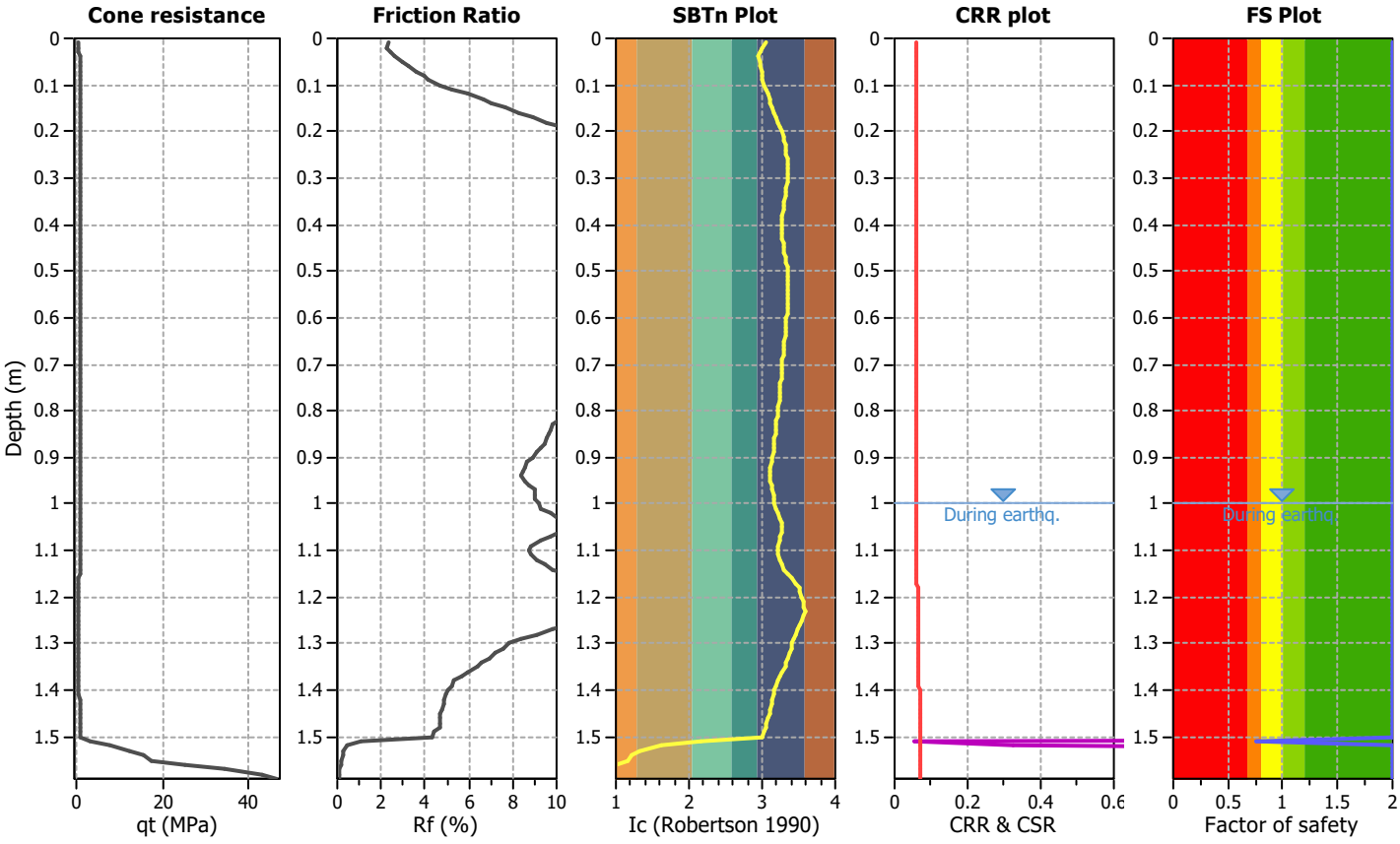
LIQUEFACTION ANALYSIS REPORT

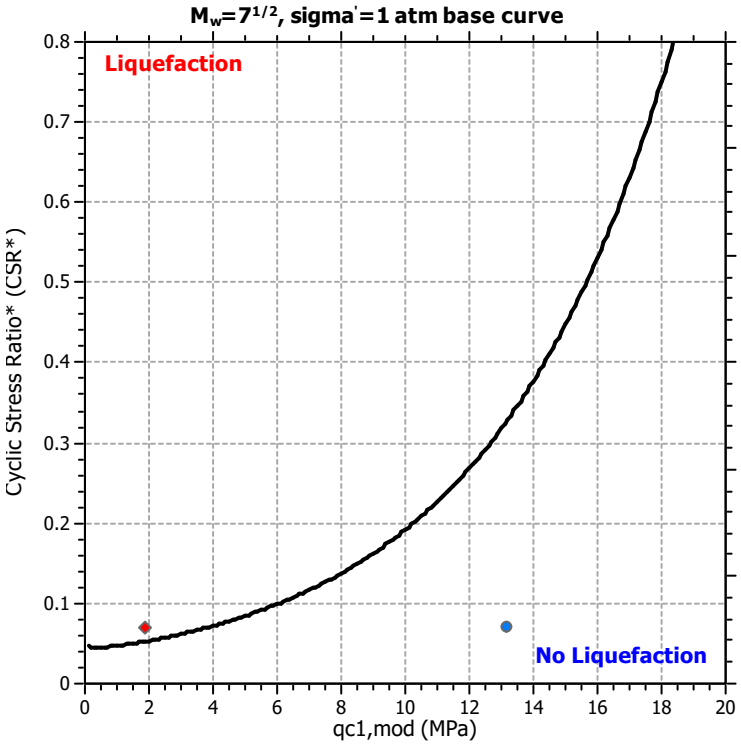
Project title : **Location :**

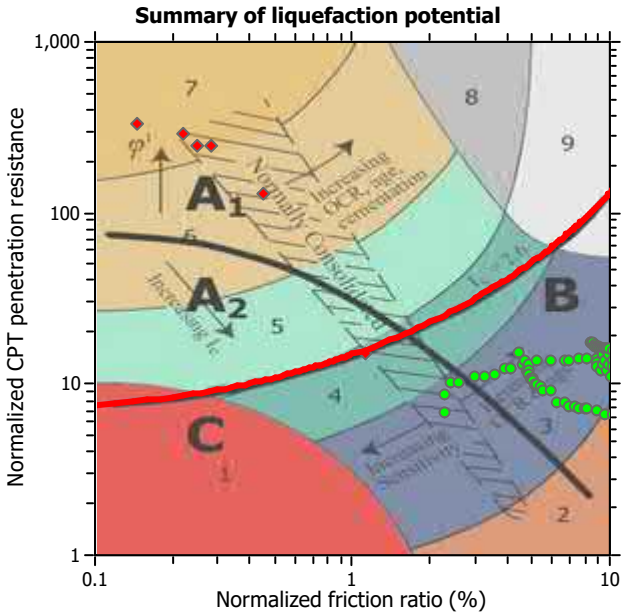
CPT file : CPT04 - 1/500-year (ULS)

Input parameters and analysis data

Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	0.70 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.80	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

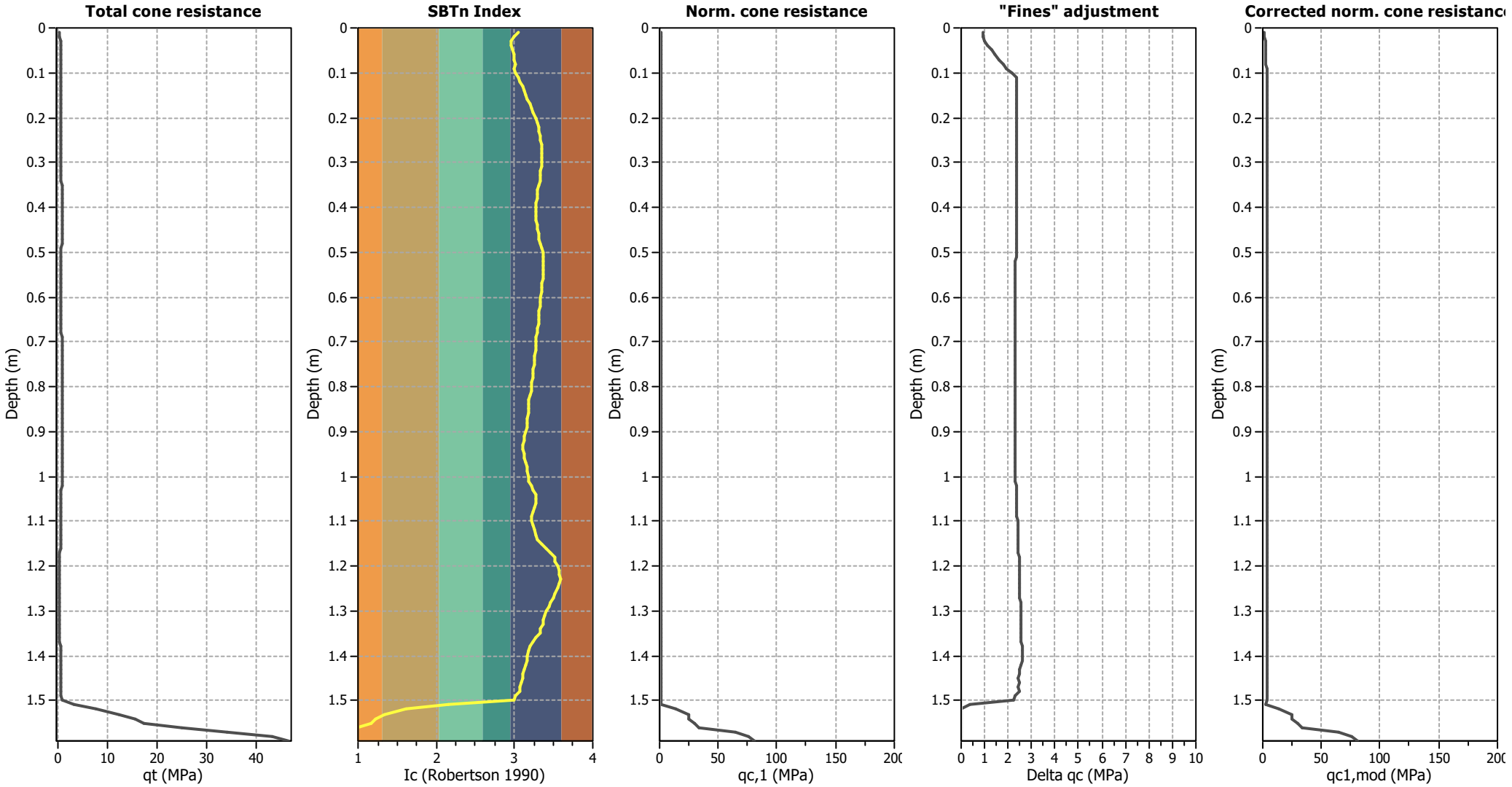






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

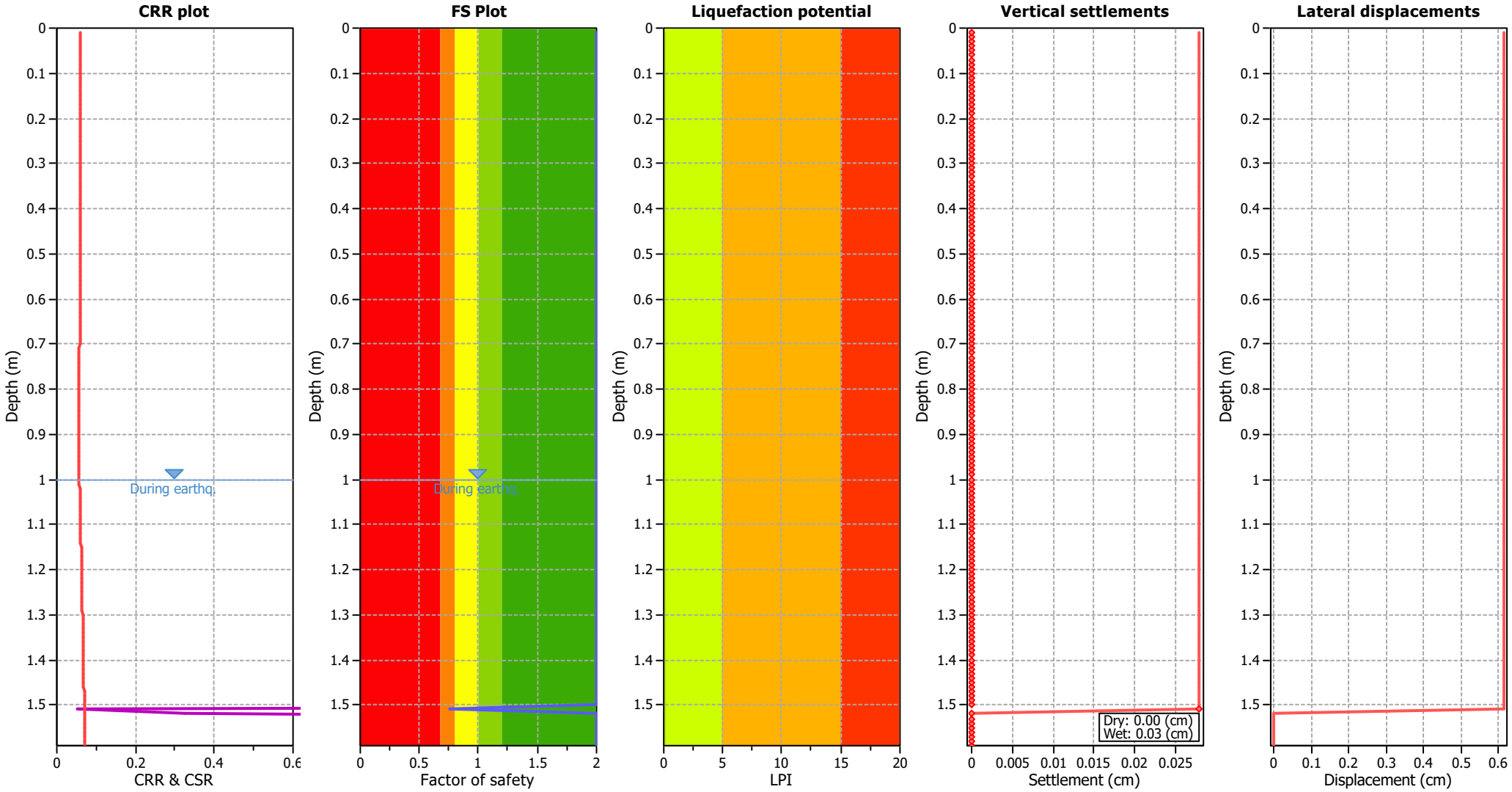
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_o applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.70 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.70 m	Fill height:	N/A	Limit depth:	N/A

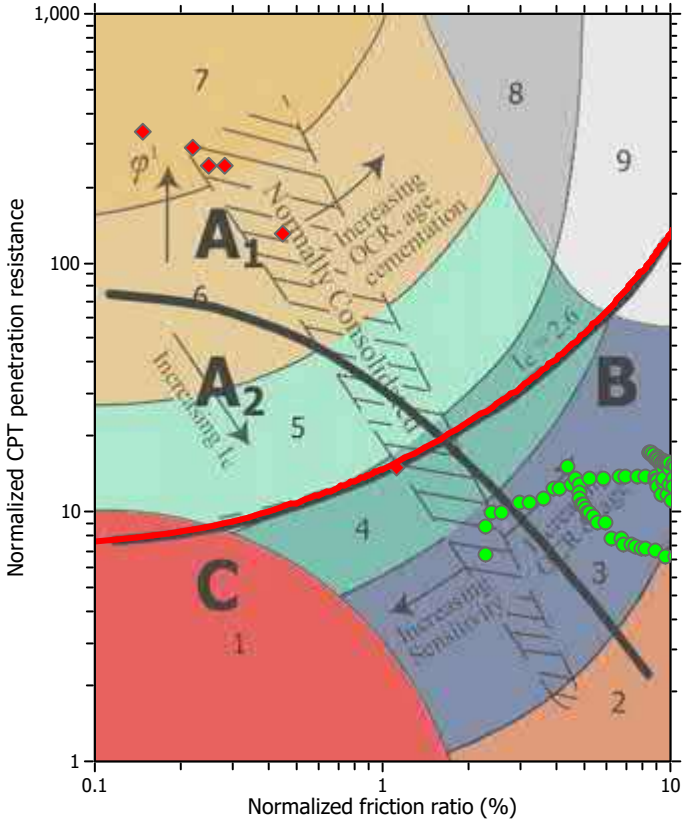
F.S. color scheme

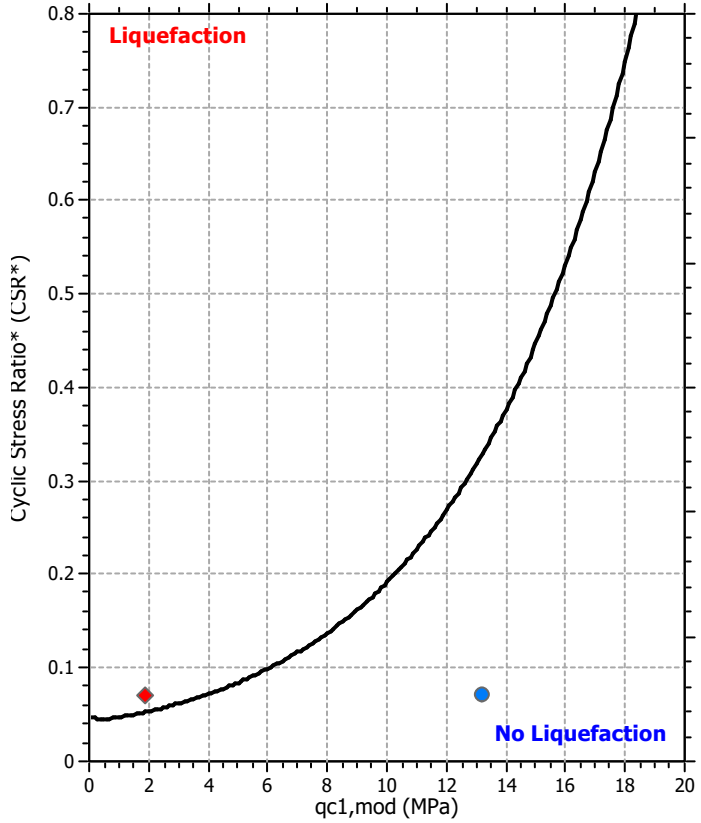
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

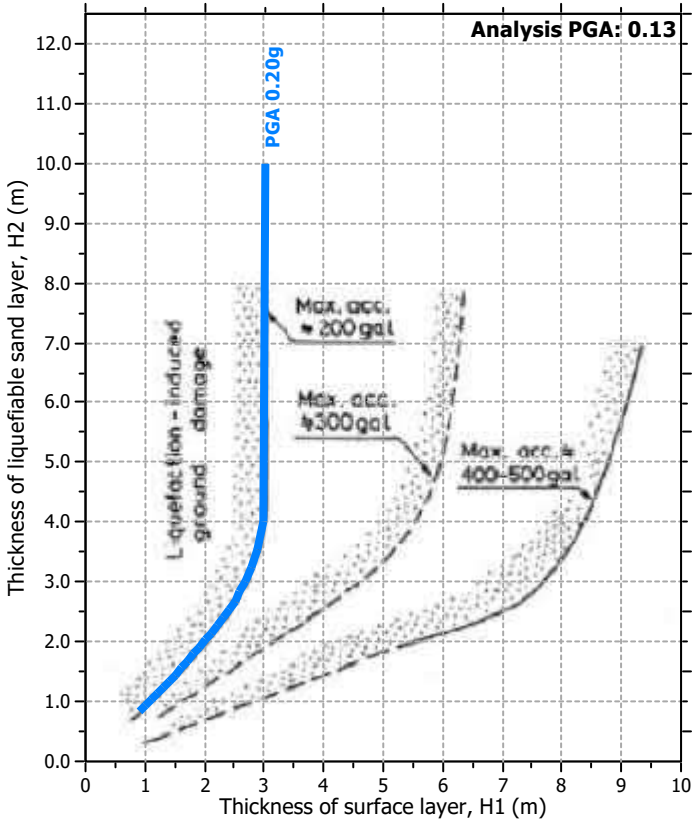
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_o applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.70 m	Fill height:	N/A	Limit depth:	N/A

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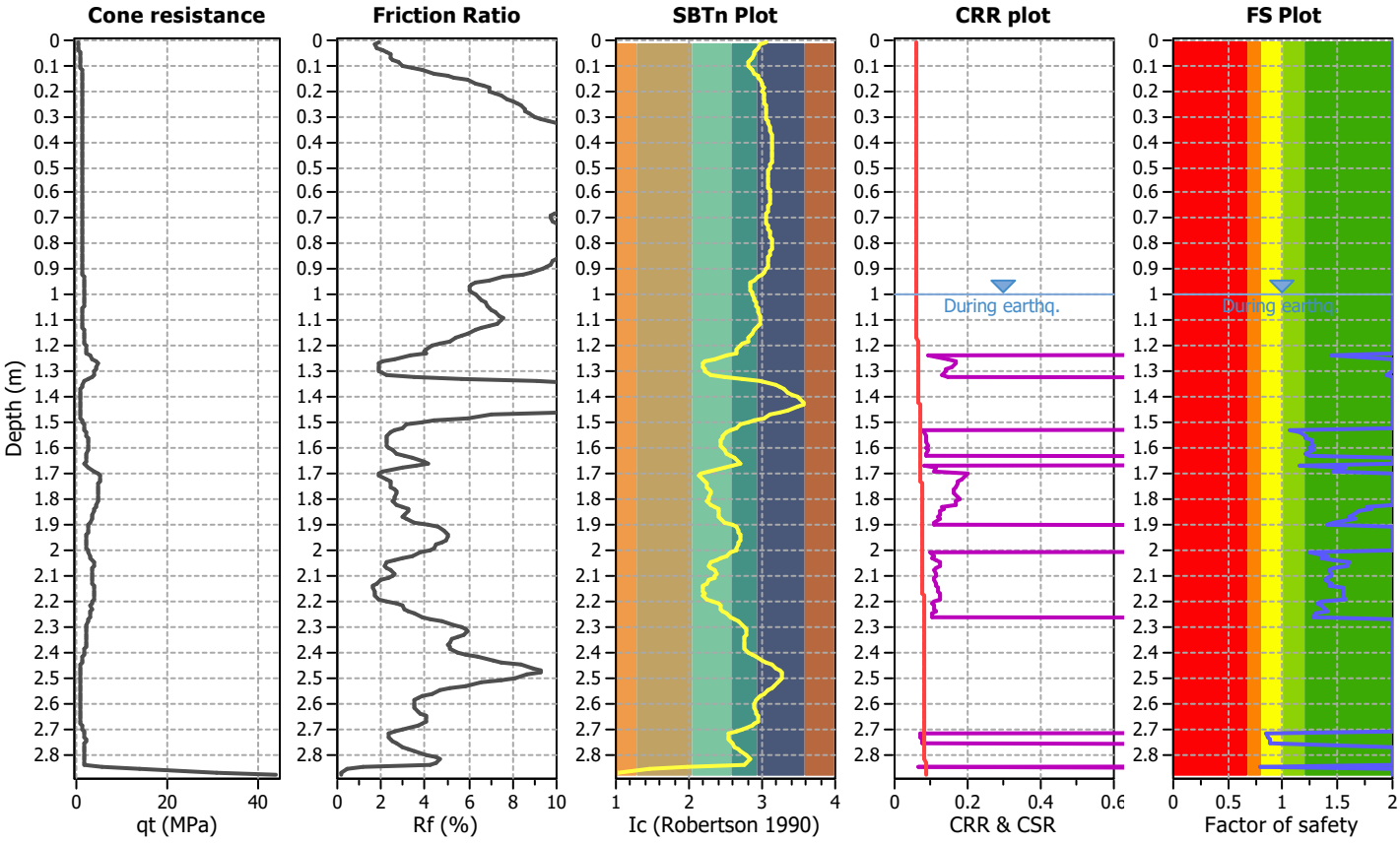
LIQUEFACTION ANALYSIS REPORT

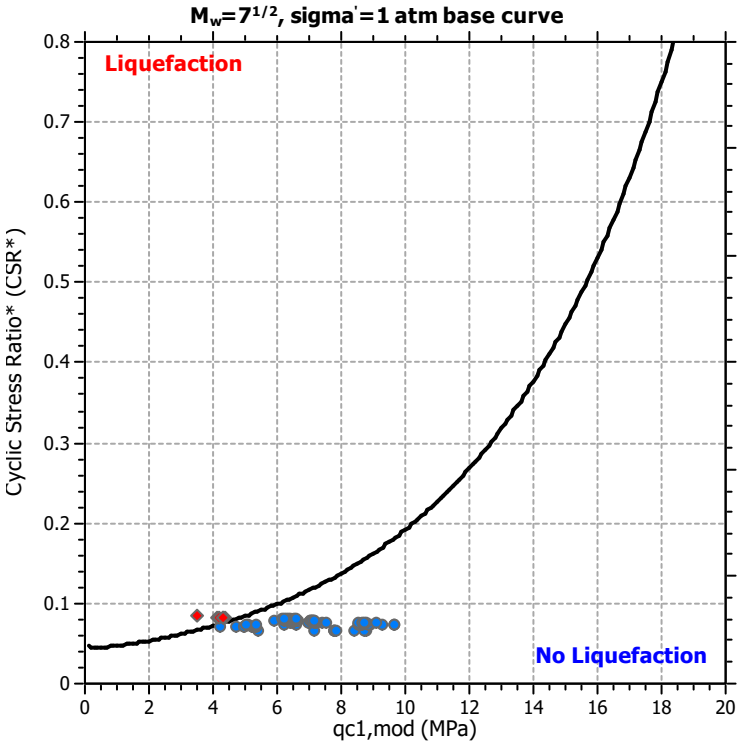
Project title : **Location :**

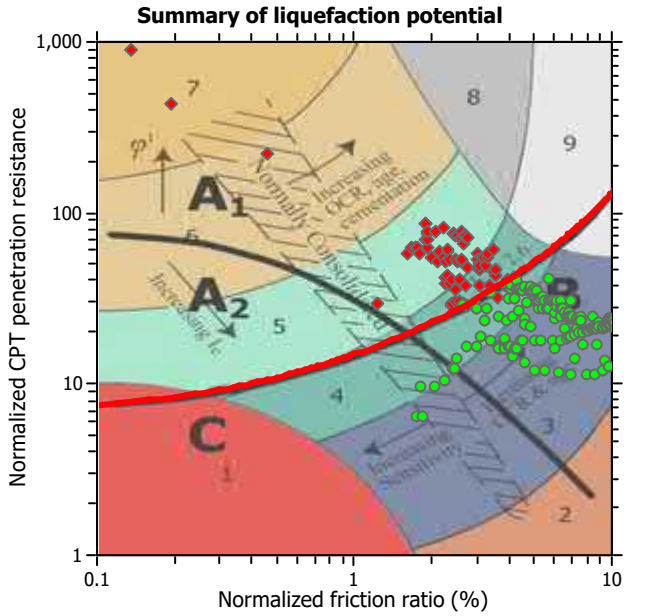
CPT file : CPT05 - 1/500-year (ULS)

Input parameters and analysis data

Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	1.80 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.80	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

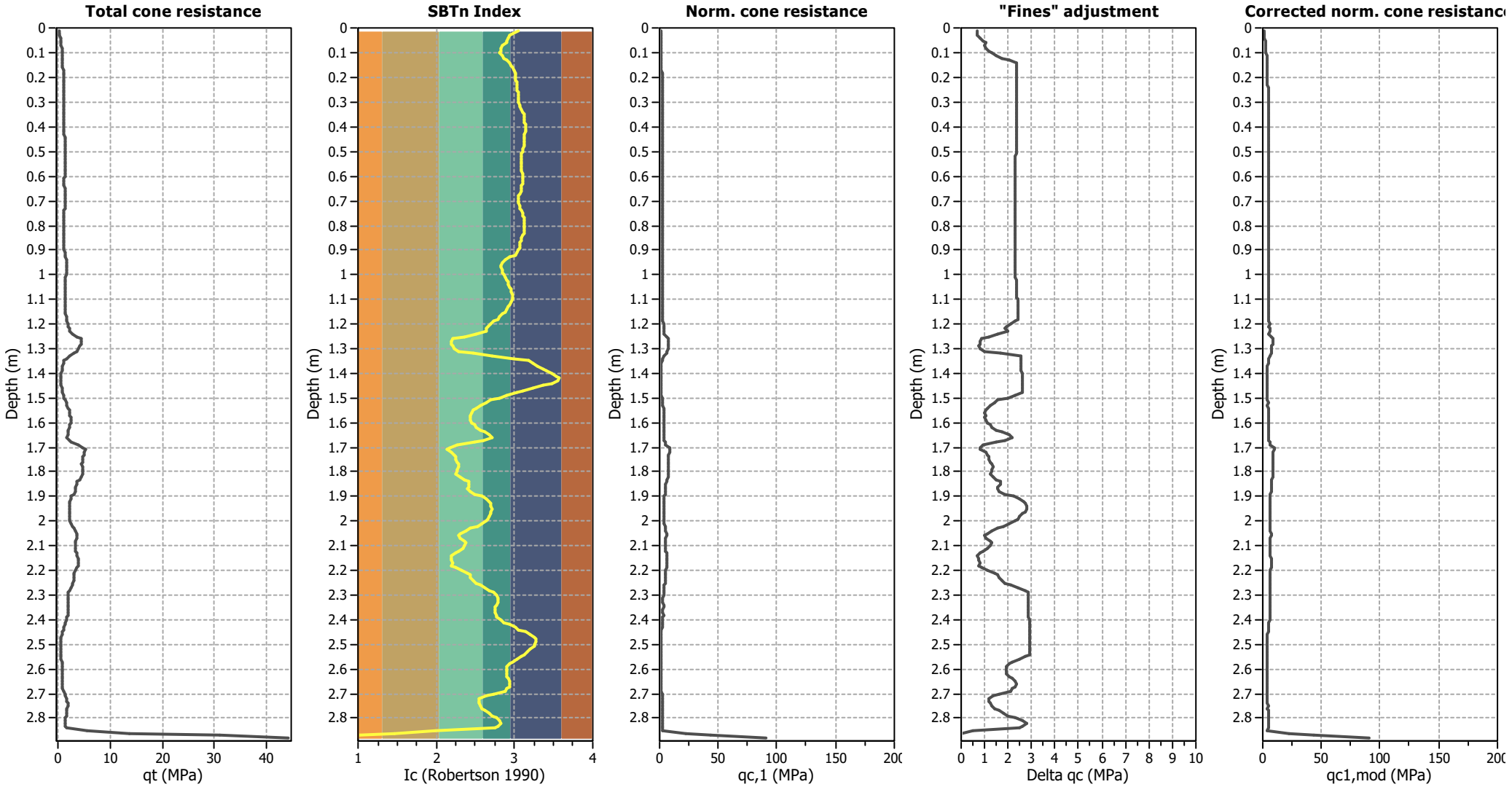






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

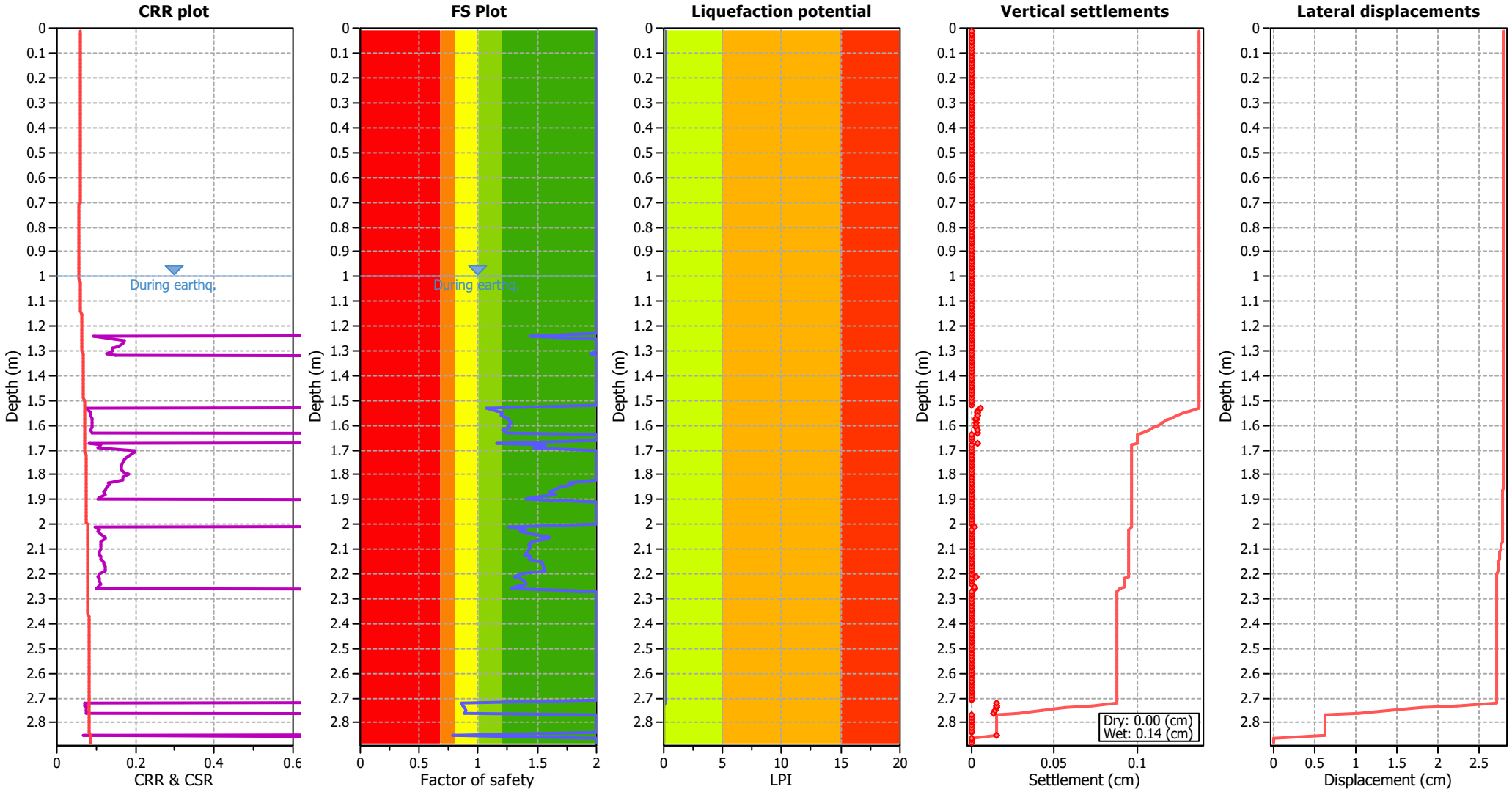
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.80 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.80 m	Fill height:	N/A	Limit depth:	N/A

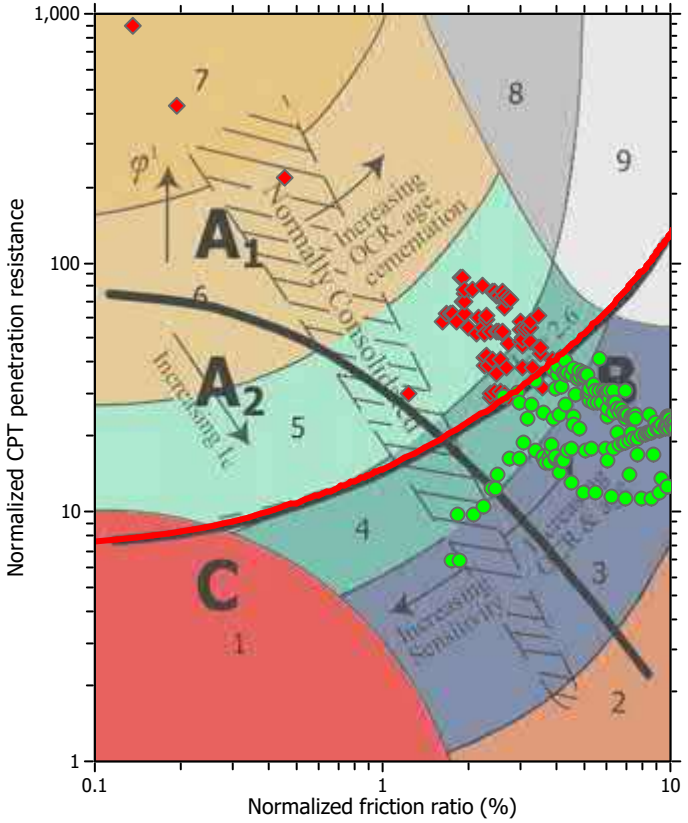
F.S. color scheme

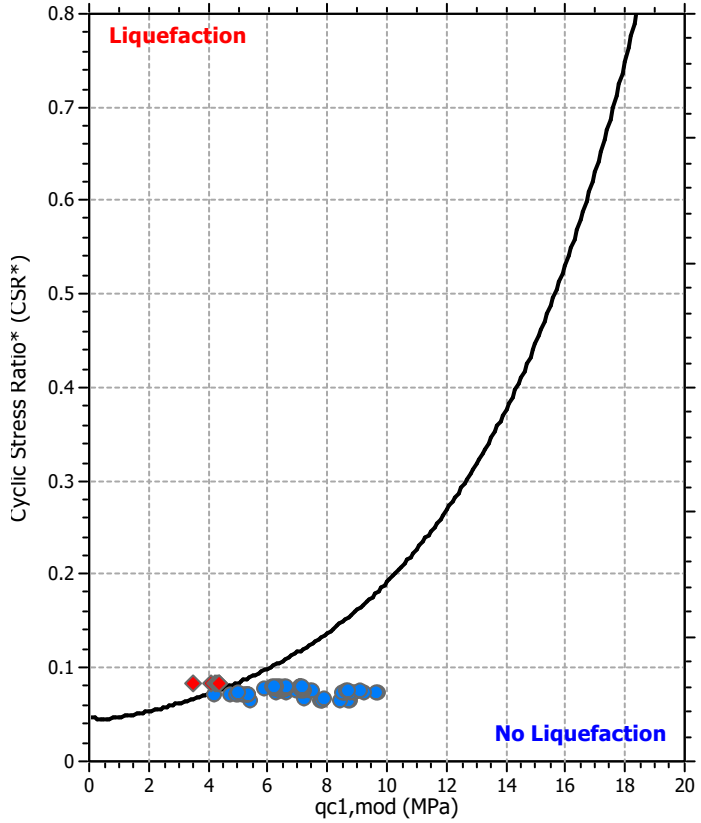
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

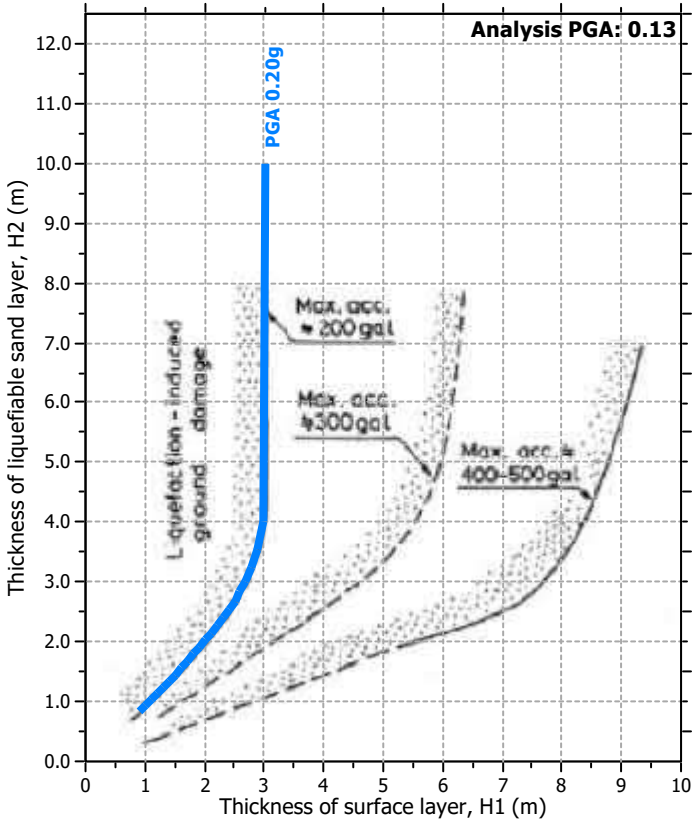
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.80 m	Fill height:	N/A	Limit depth:	N/A

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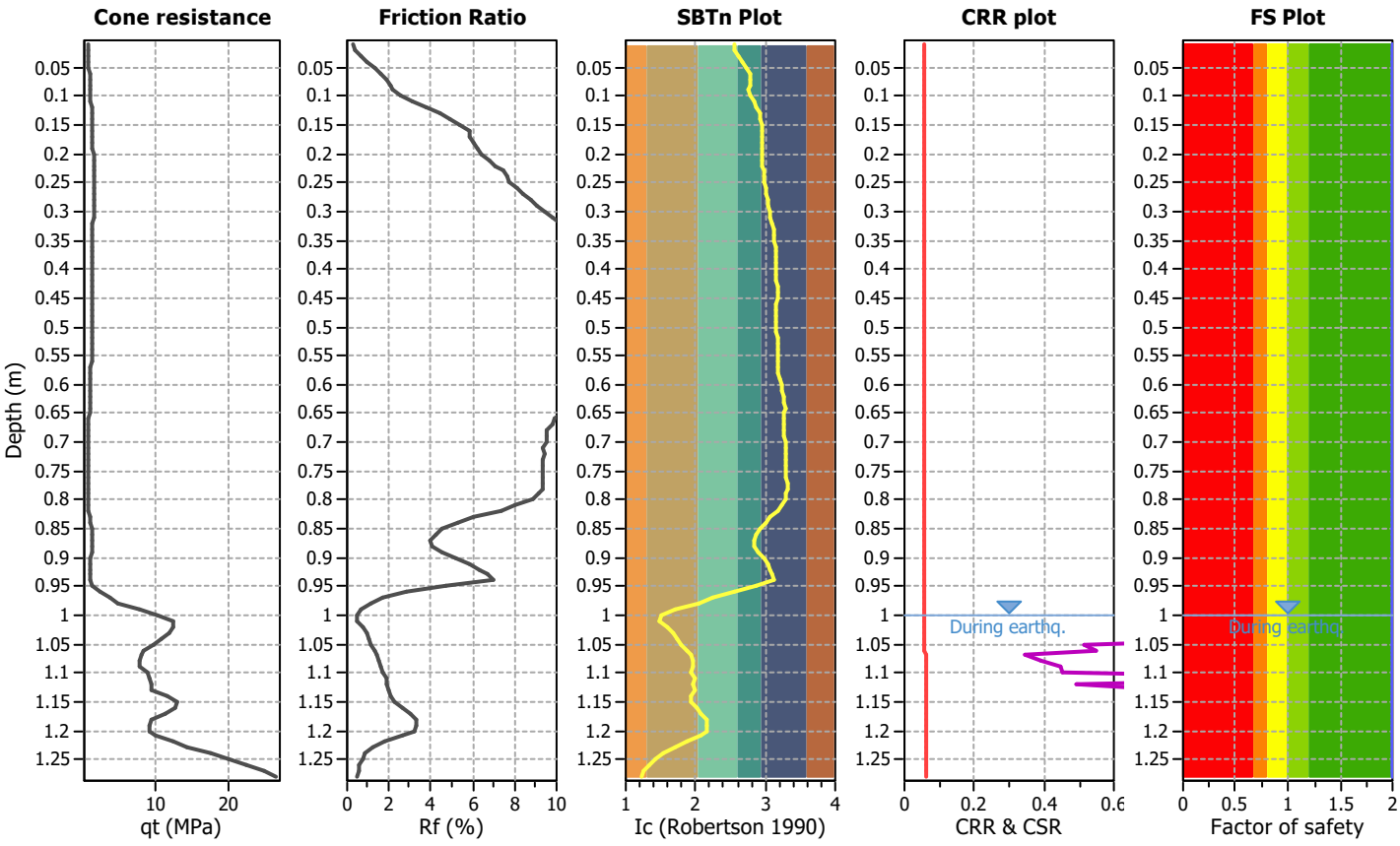
LIQUEFACTION ANALYSIS REPORT

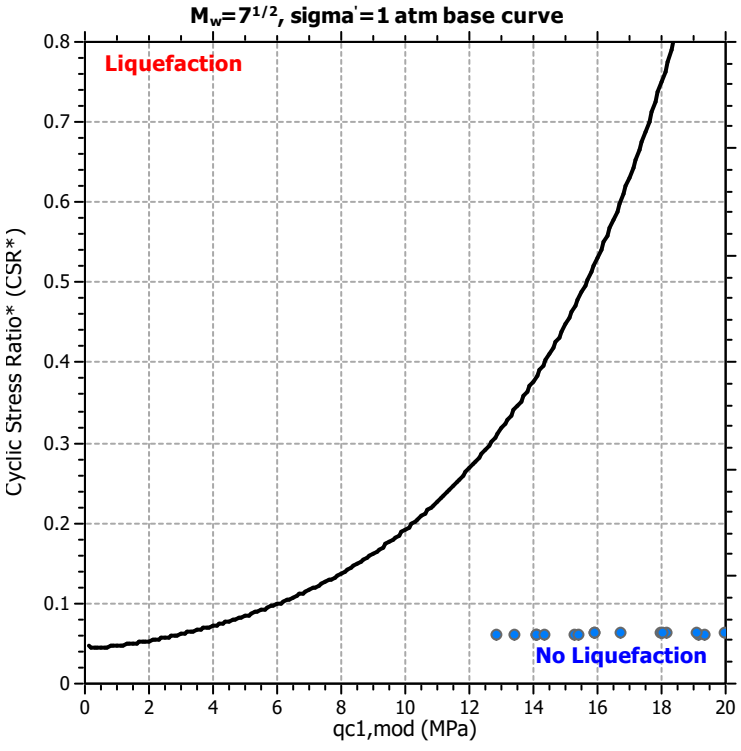
Project title : **Location :**

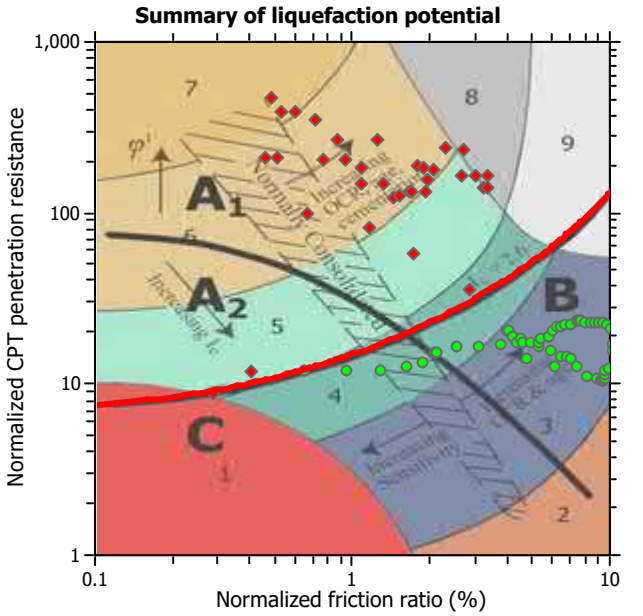
CPT file : CPT06 - 1/500-year (ULS)

Input parameters and analysis data

Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	0.90 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.80	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

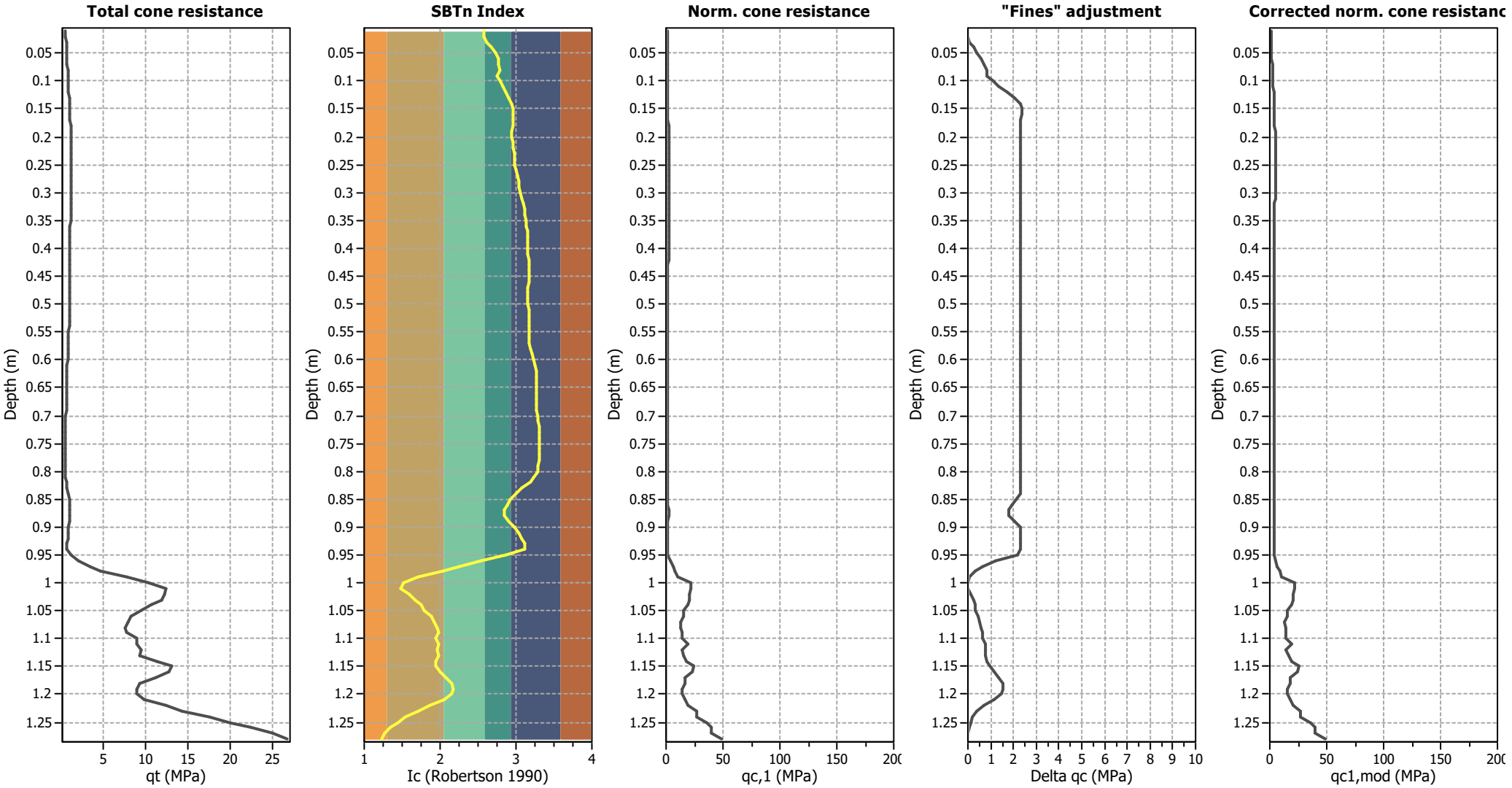






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

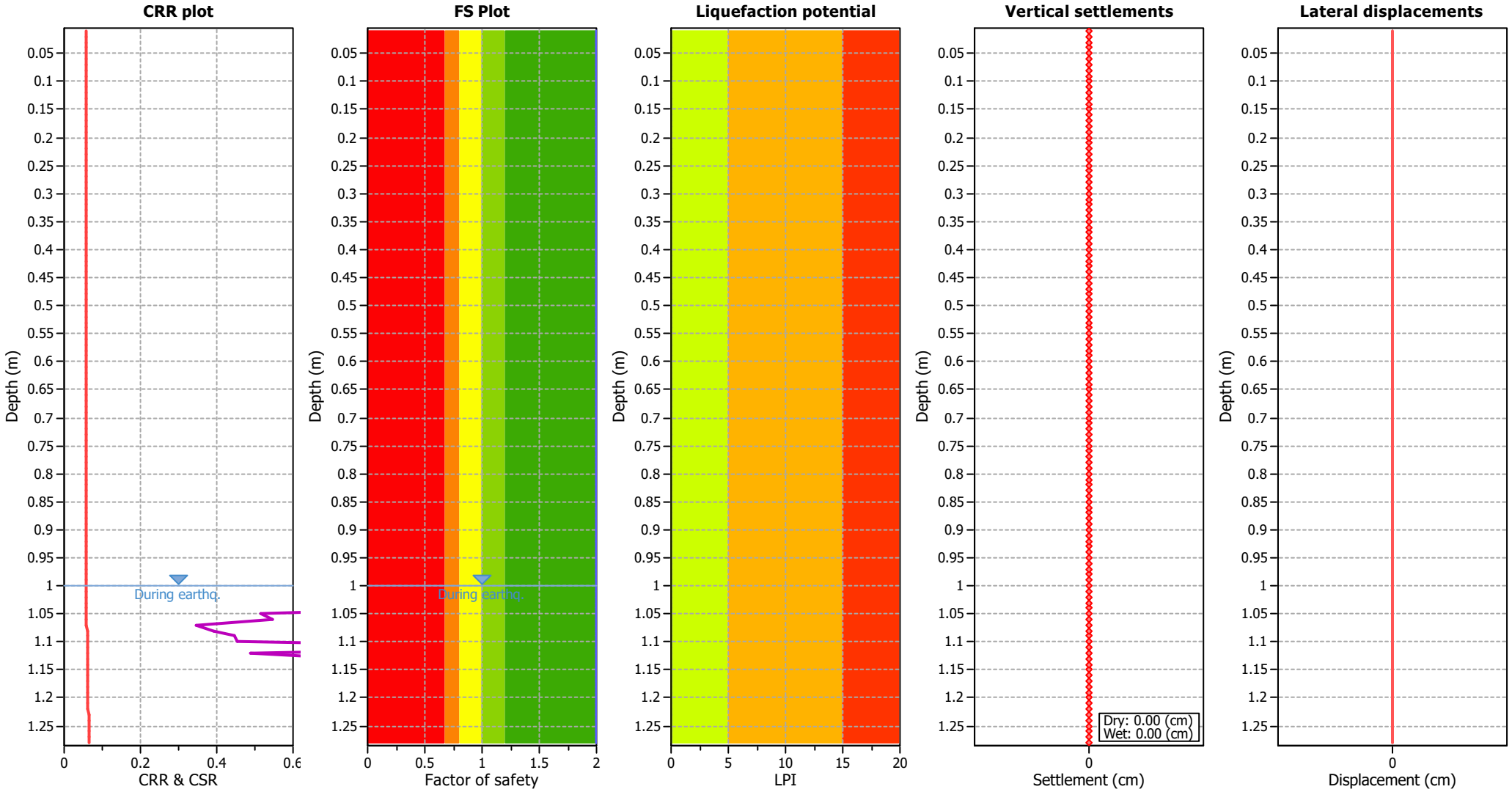
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.90 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.90 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
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- Unlike to liquefy
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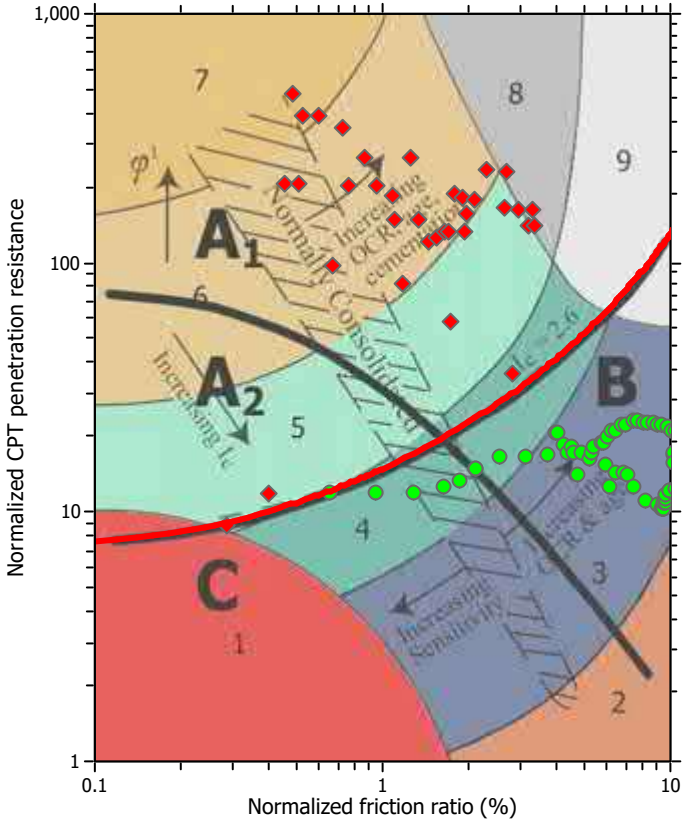
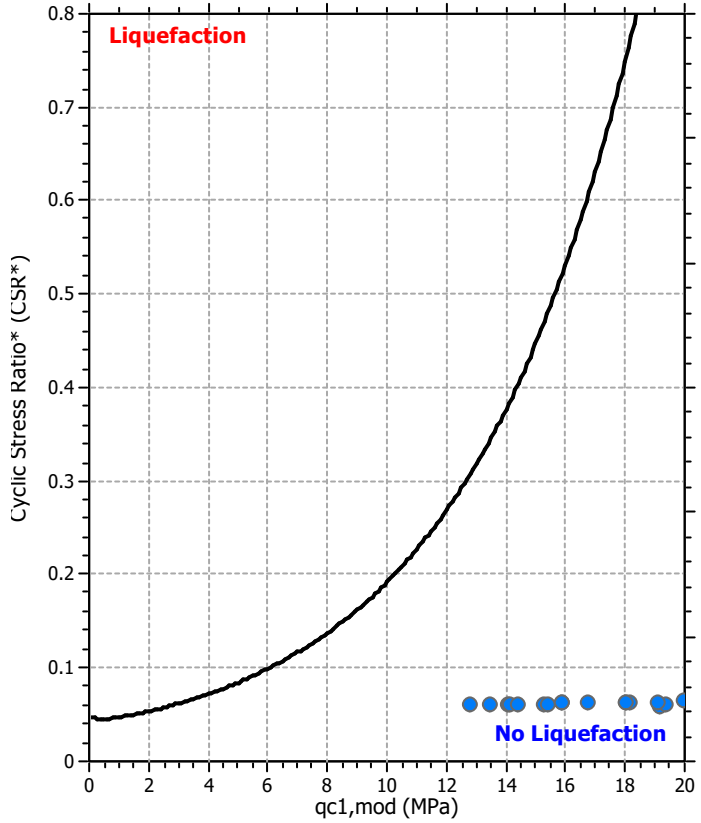
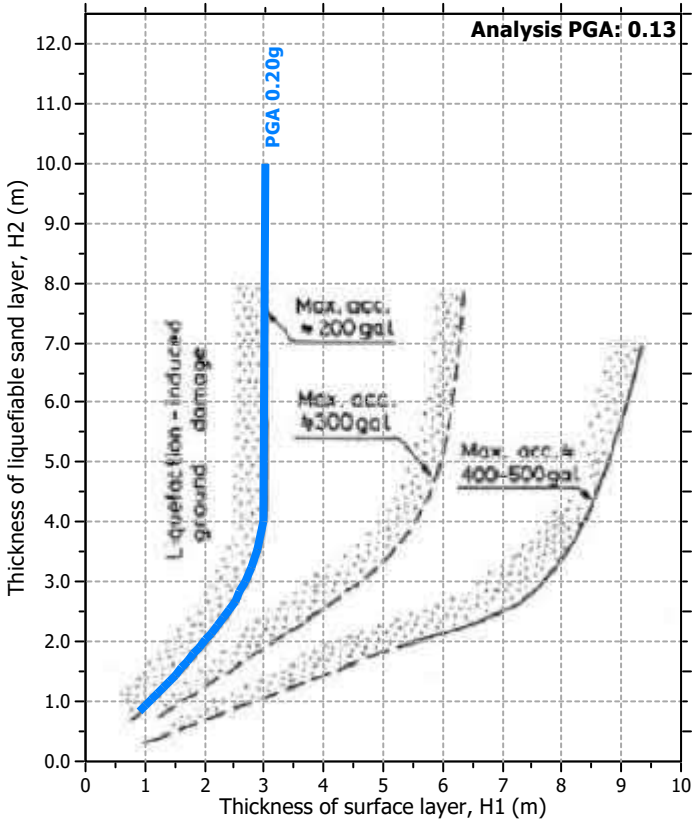
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.90 m	Fill height:	N/A	Limit depth:	N/A

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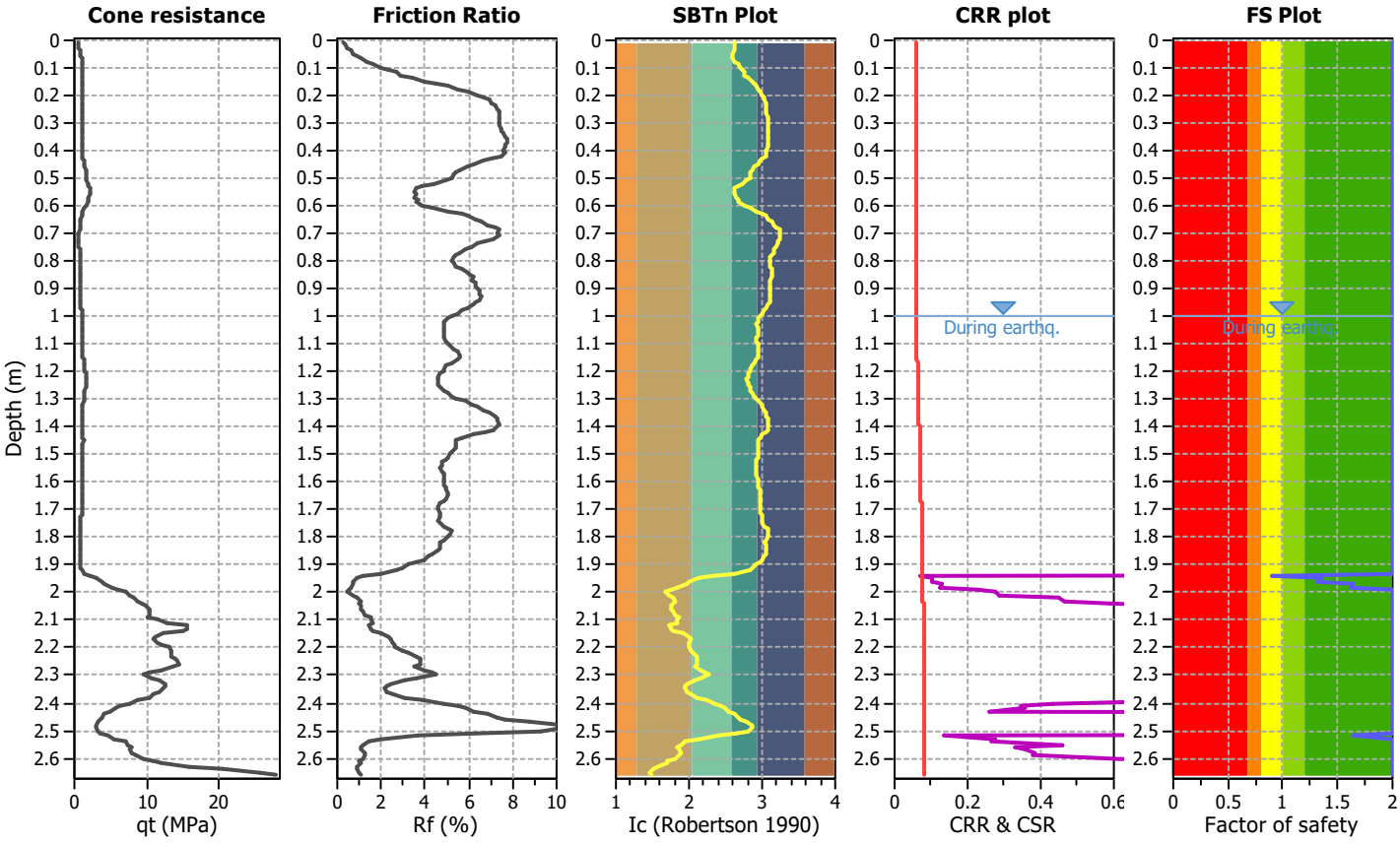
LIQUEFACTION ANALYSIS REPORT

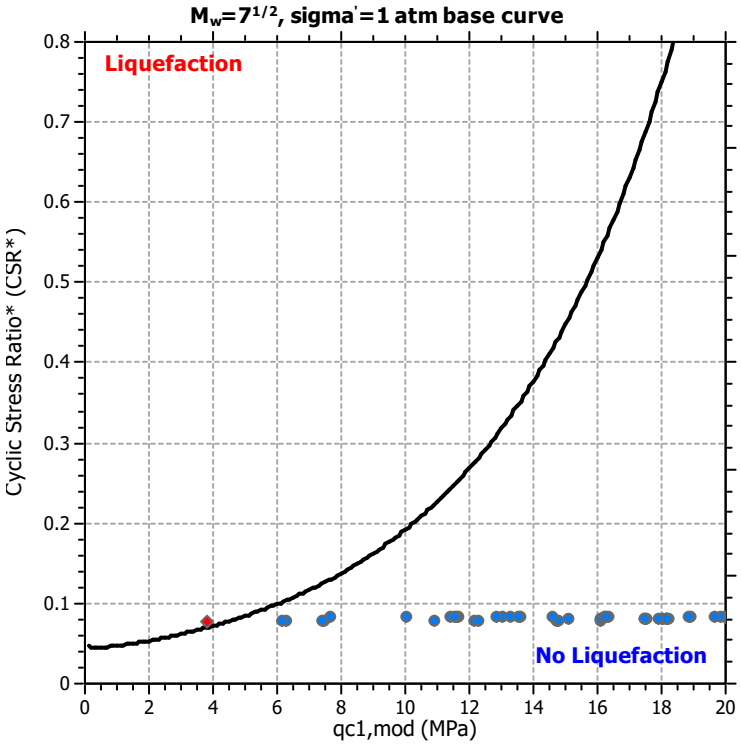
Project title : **Location :**

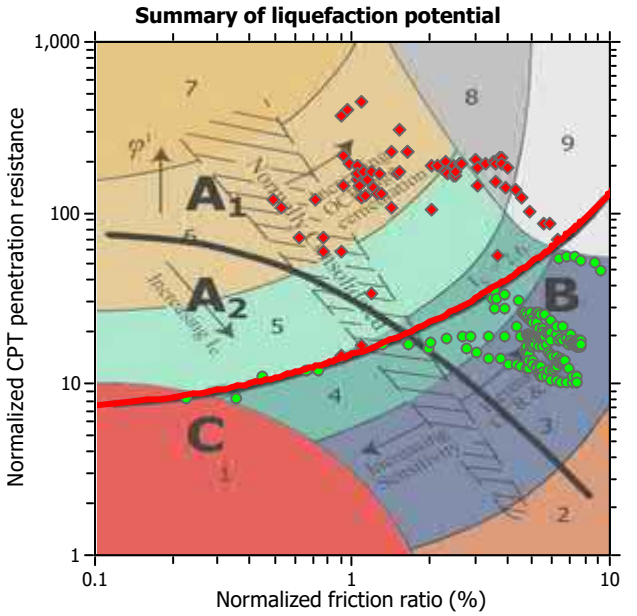
CPT file : CPT07 - 1/500-year (ULS)

Input parameters and analysis data

Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	0.90 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.80	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

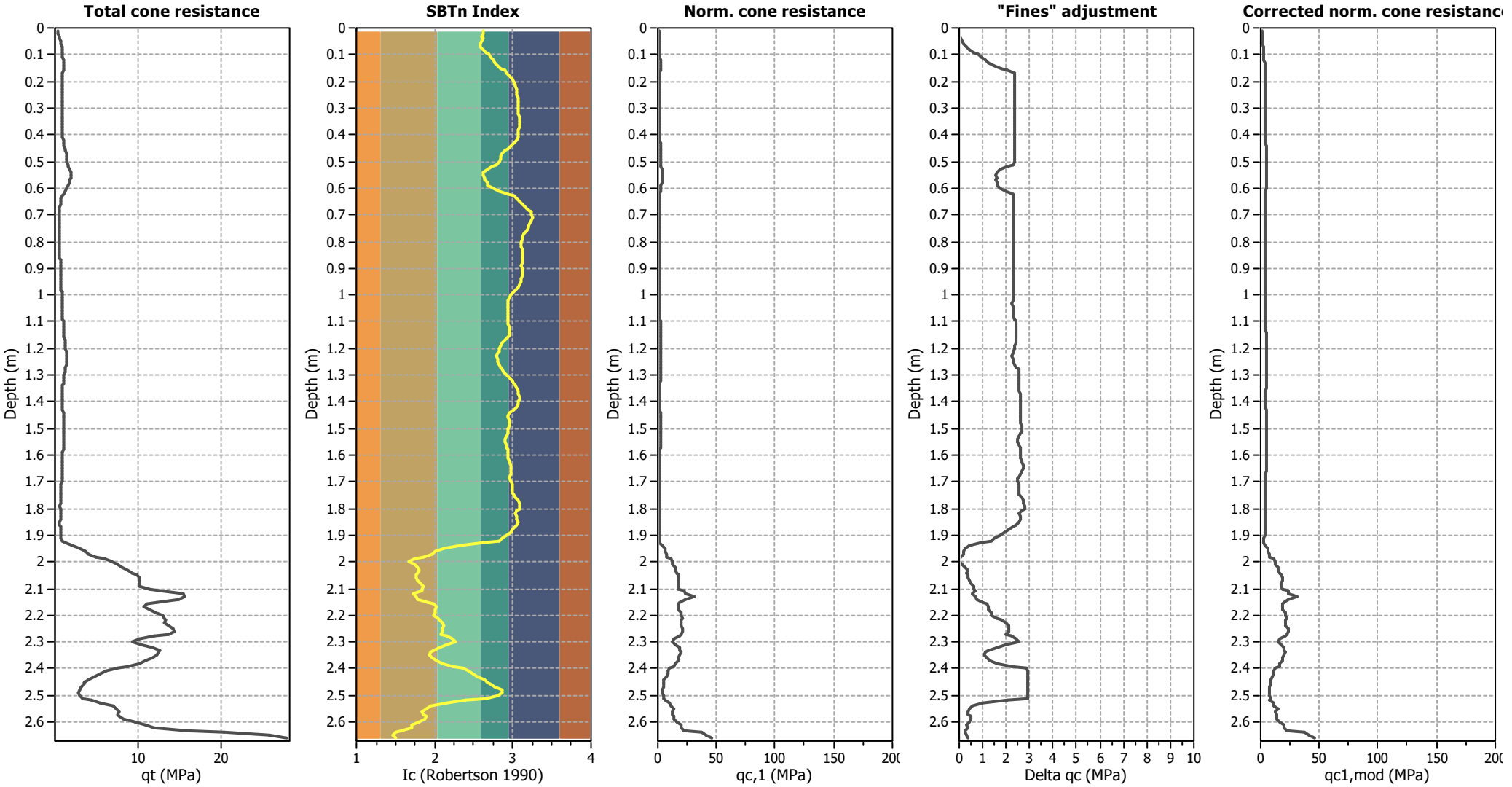






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

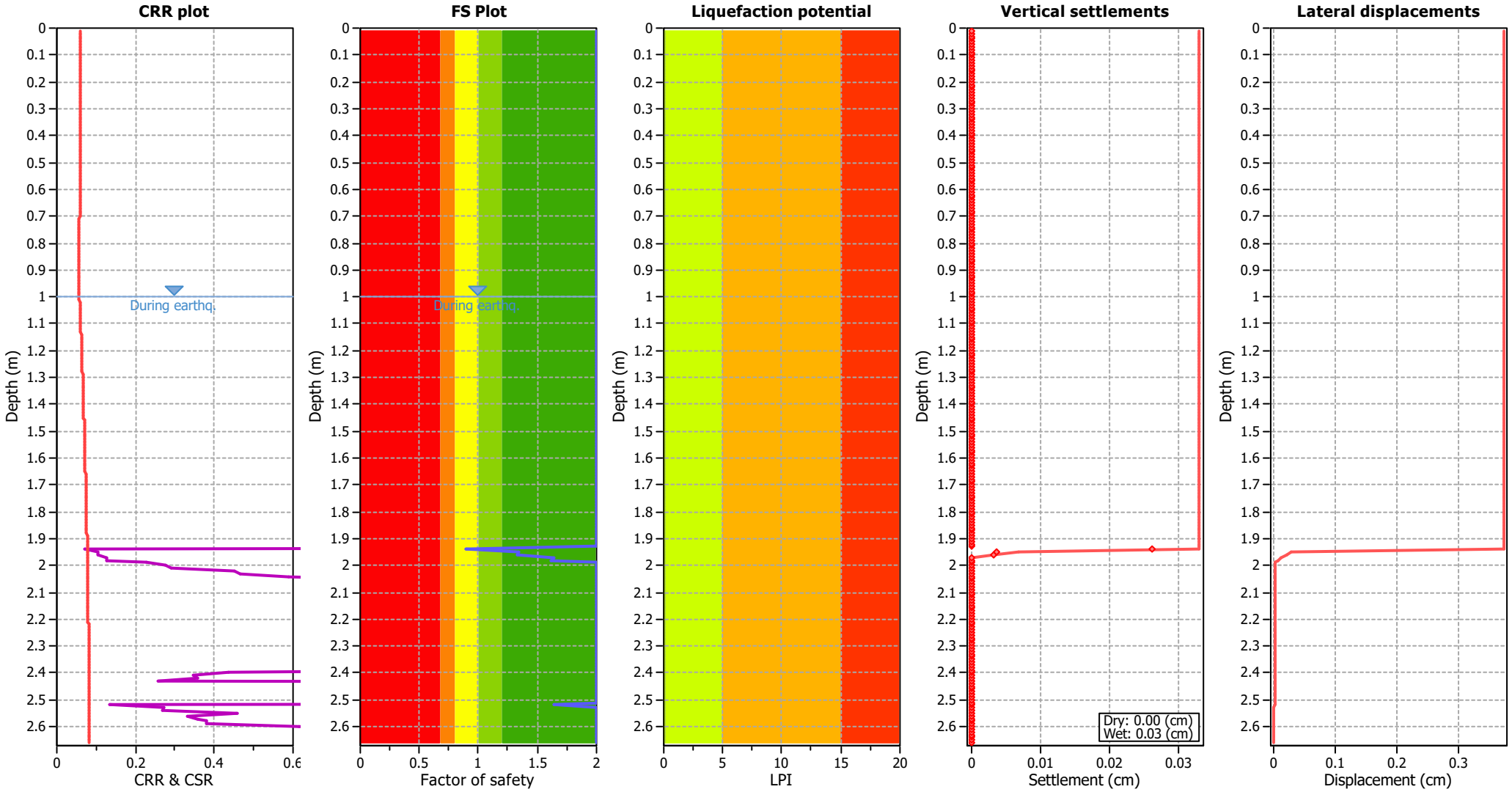
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_o applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.90 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.90 m	Fill height:	N/A	Limit depth:	N/A

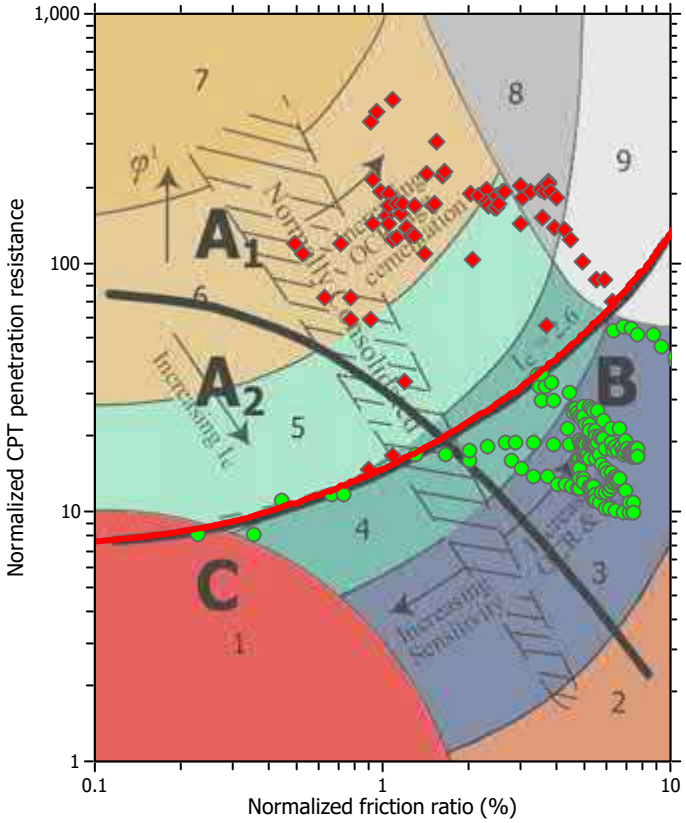
F.S. color scheme

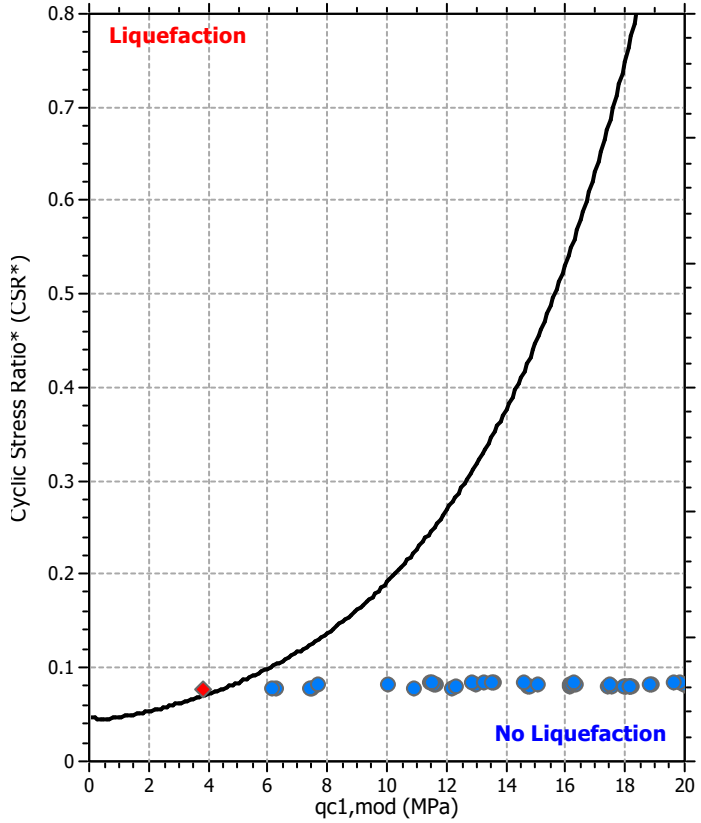
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

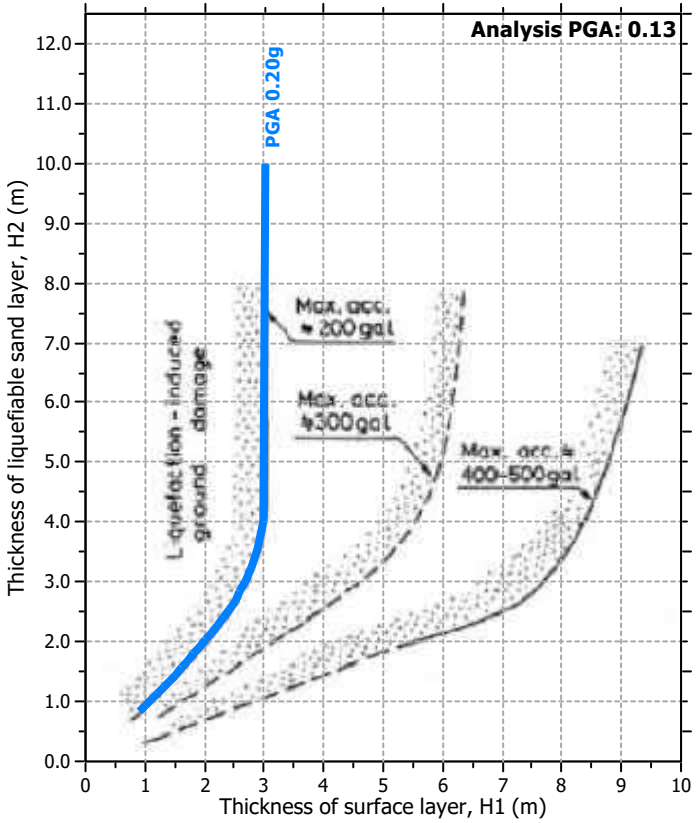
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.90 m	Fill height:	N/A	Limit depth:	N/A

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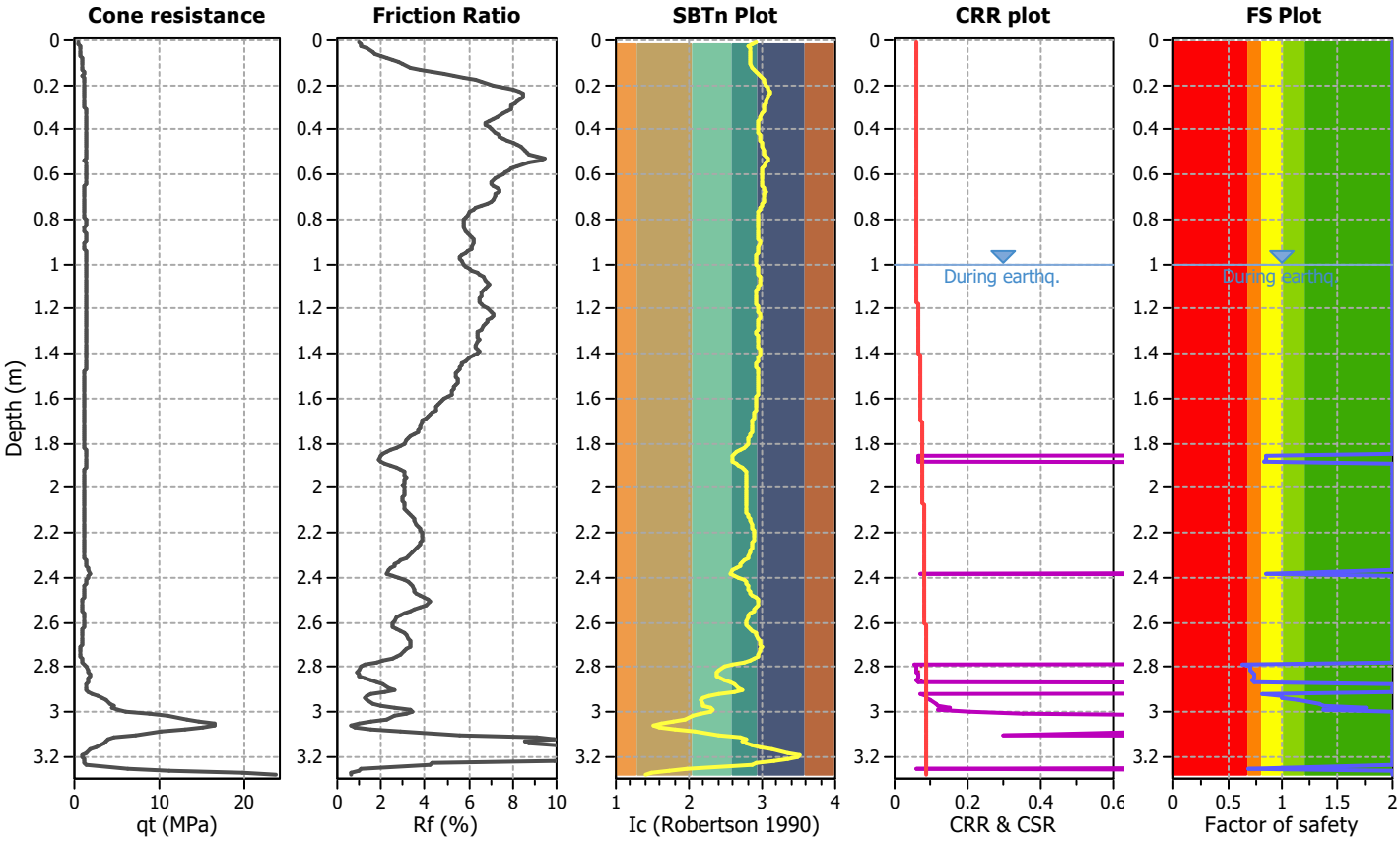
LIQUEFACTION ANALYSIS REPORT

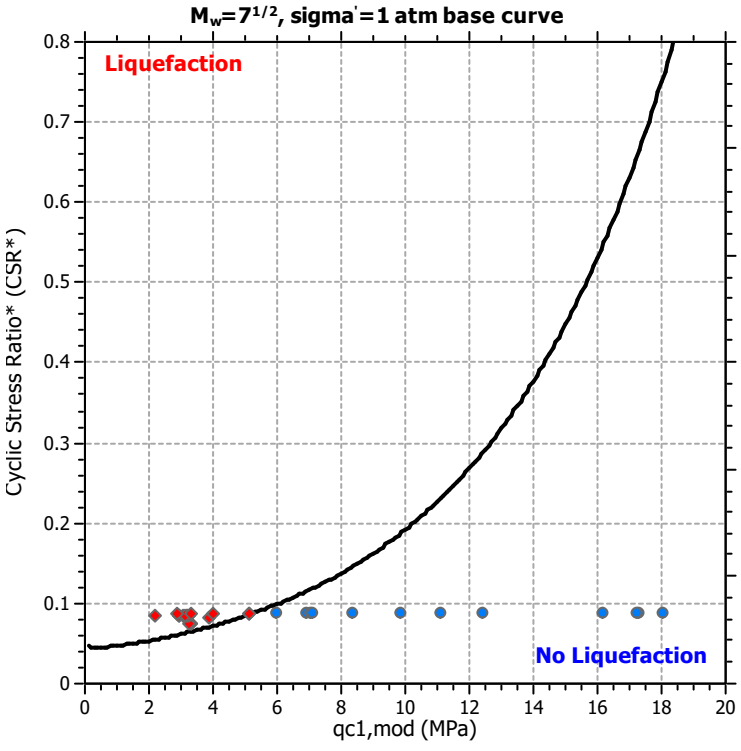
Project title : **Location :**

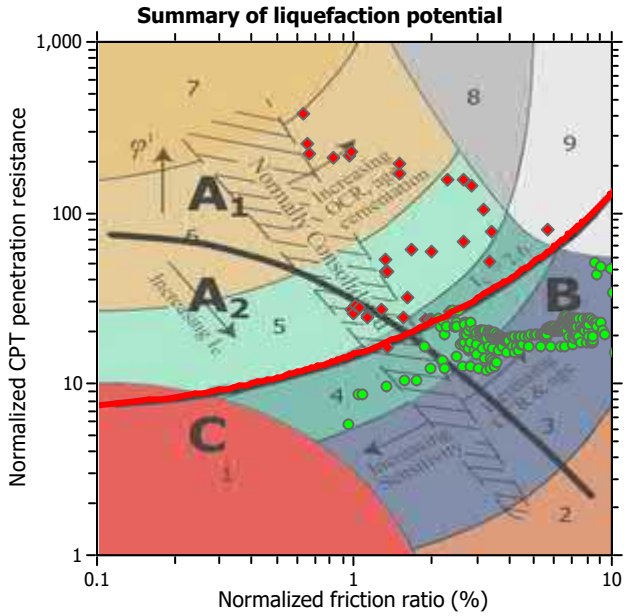
CPT file : CPT08 - 1/500-year (ULS)

Input parameters and analysis data

Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	2.40 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.80	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

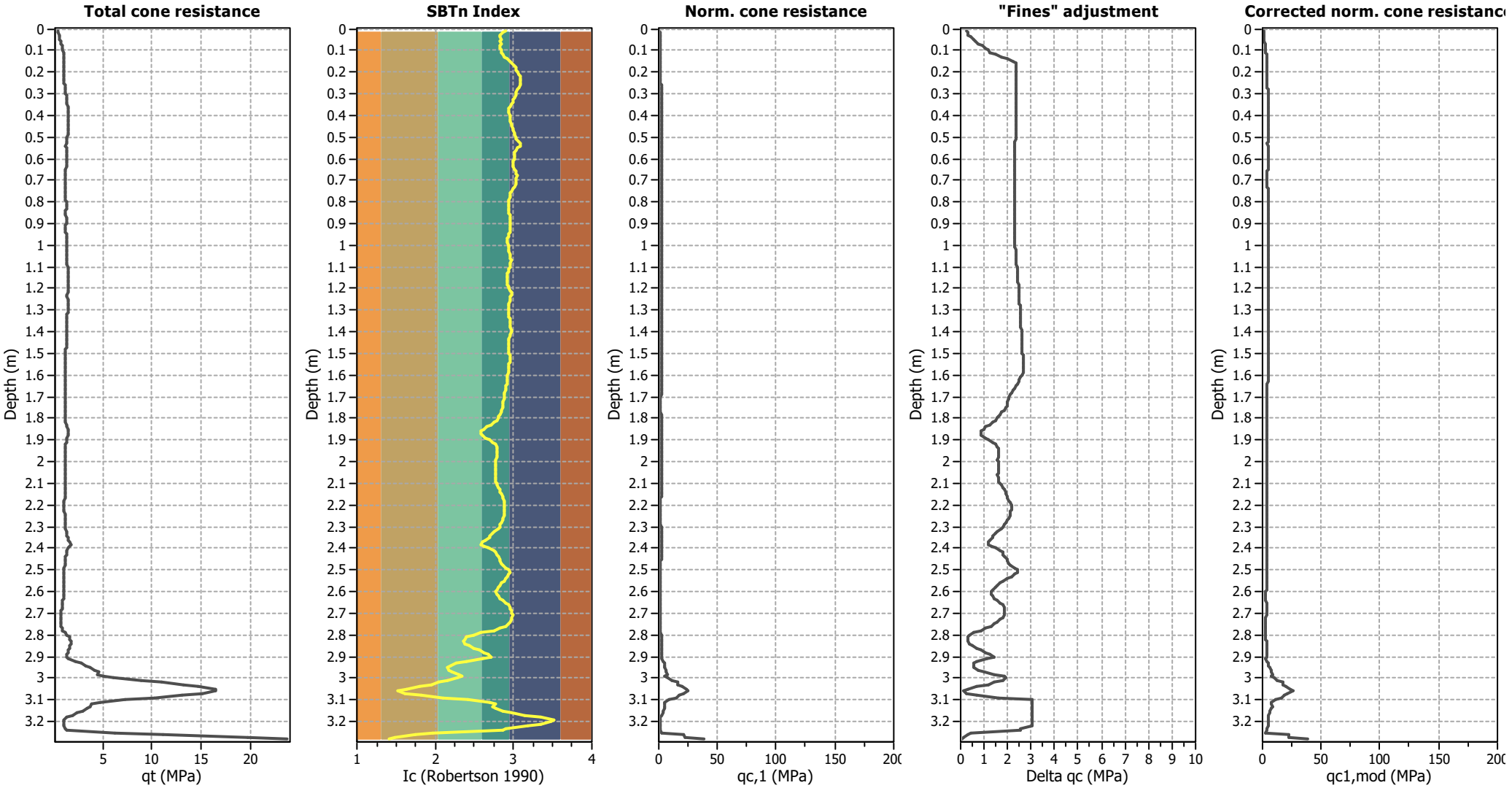






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

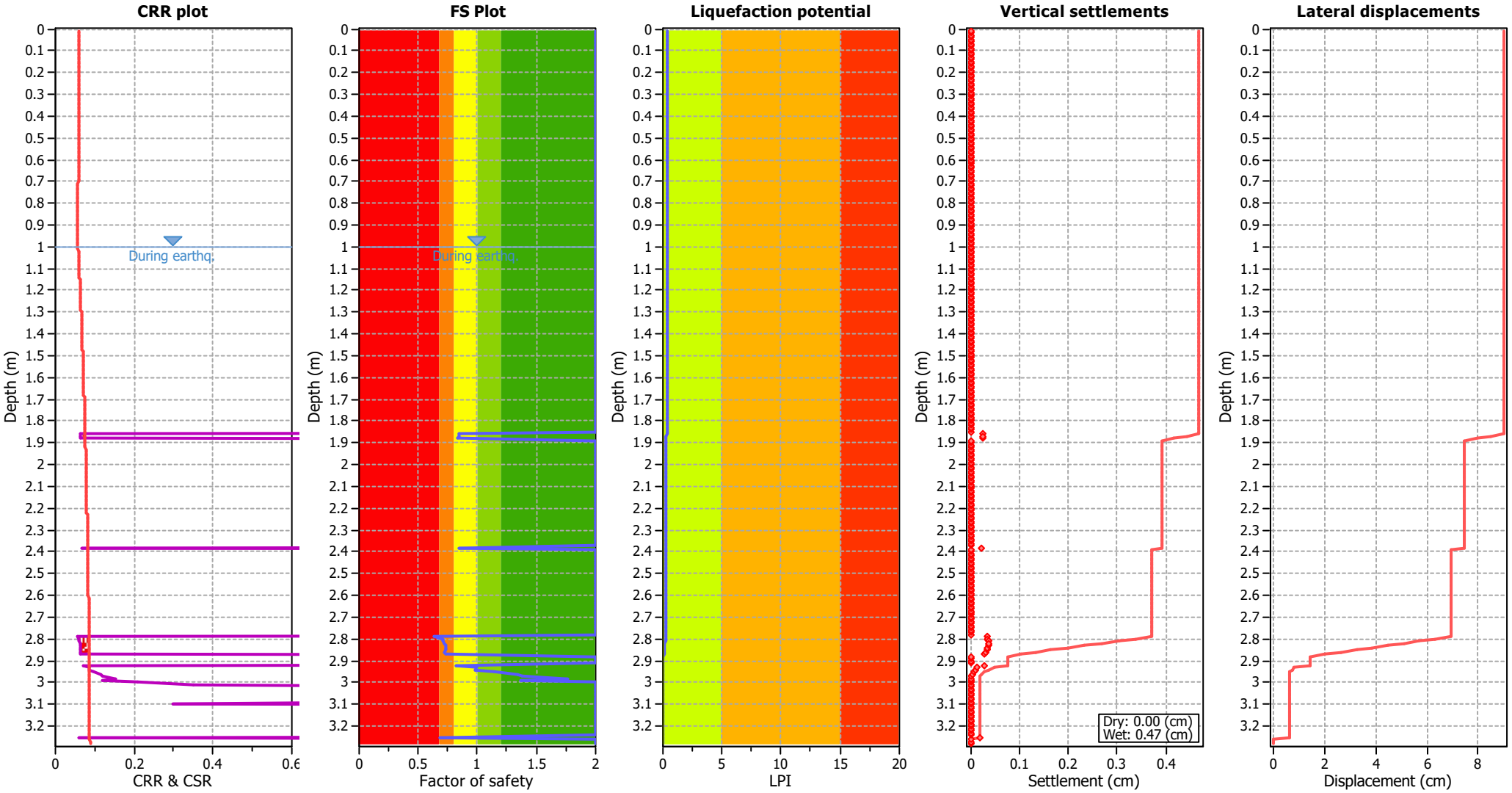
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.40 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.40 m	Fill height:	N/A	Limit depth:	N/A

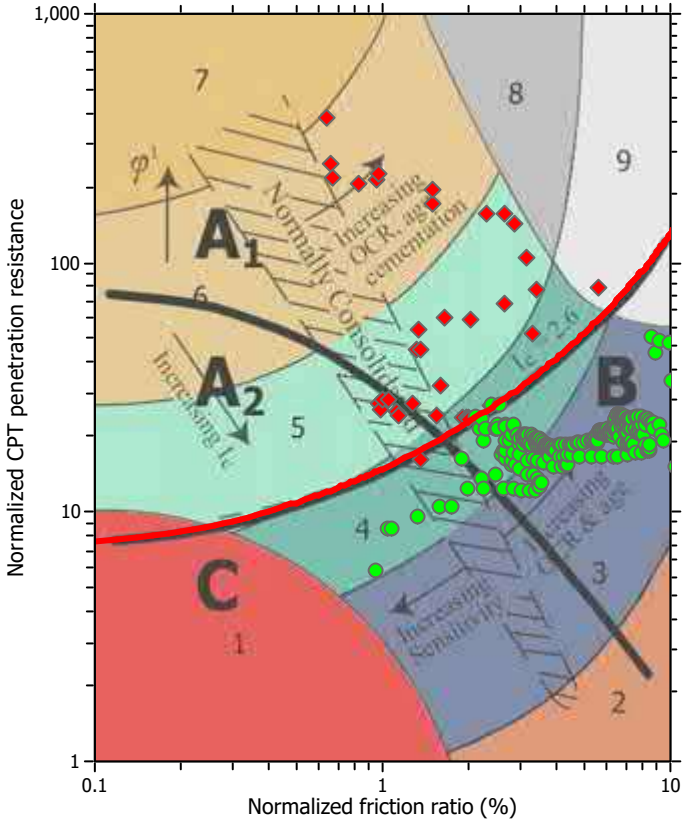
F.S. color scheme

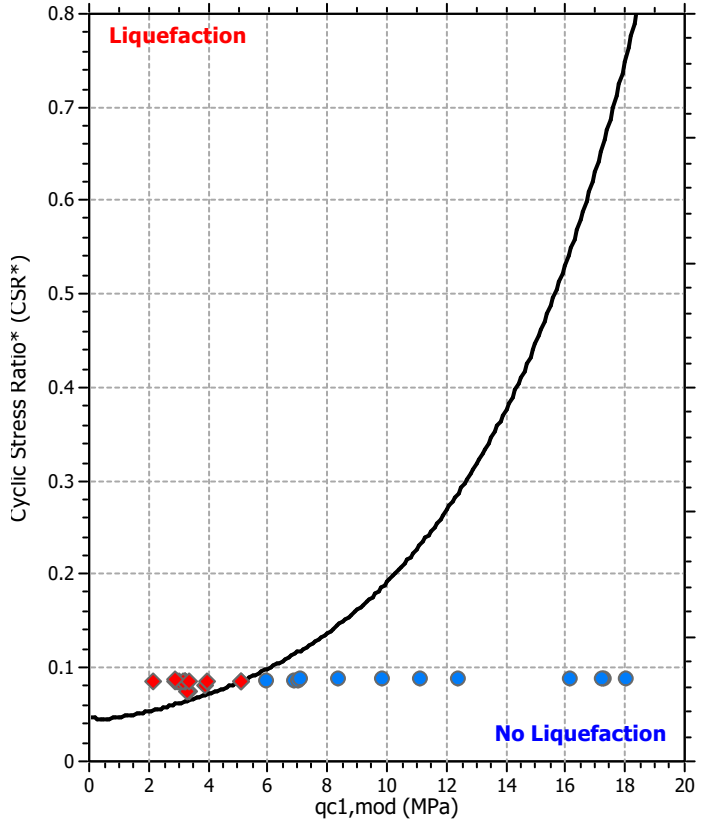
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

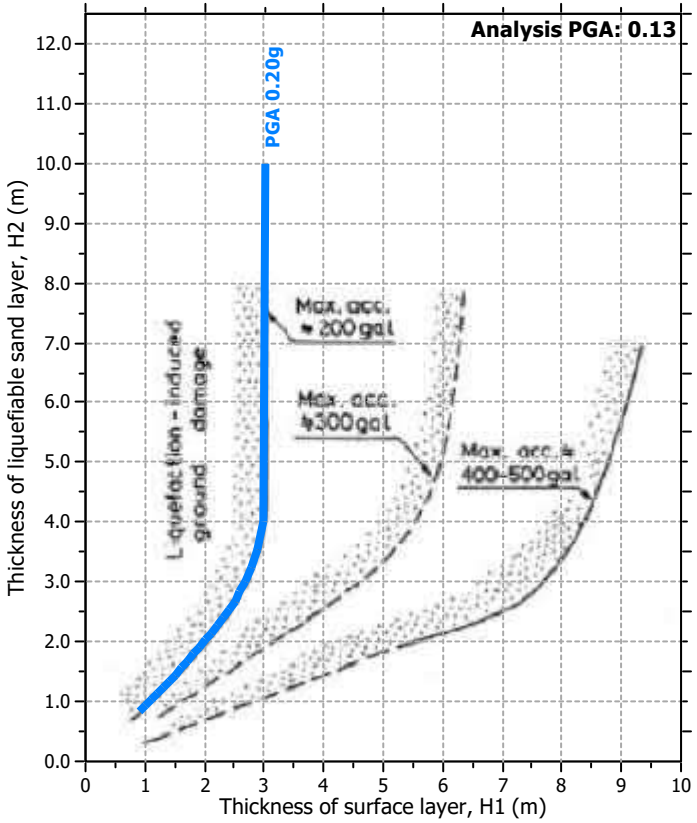
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.40 m	Fill height:	N/A	Limit depth:	N/A

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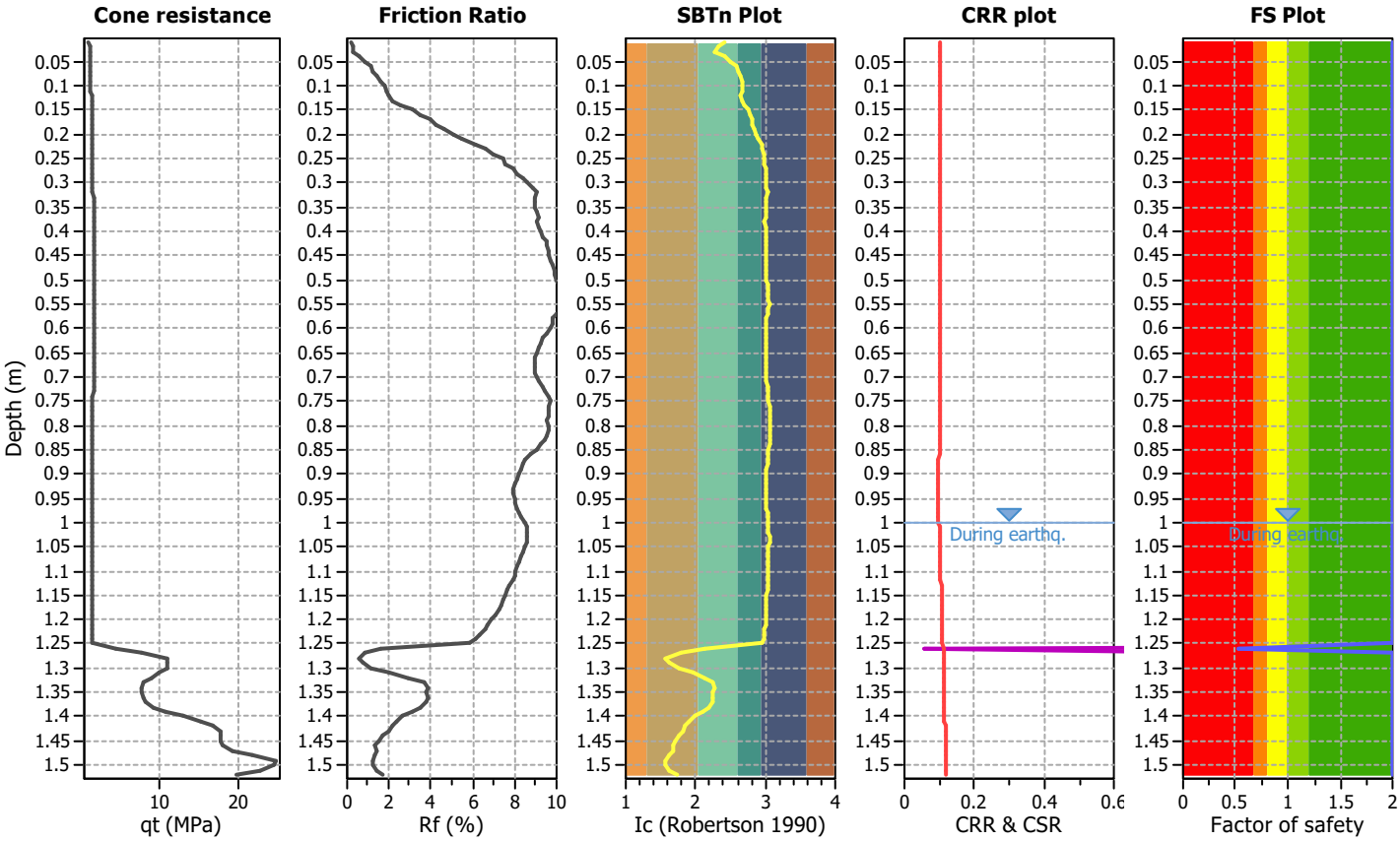
LIQUEFACTION ANALYSIS REPORT

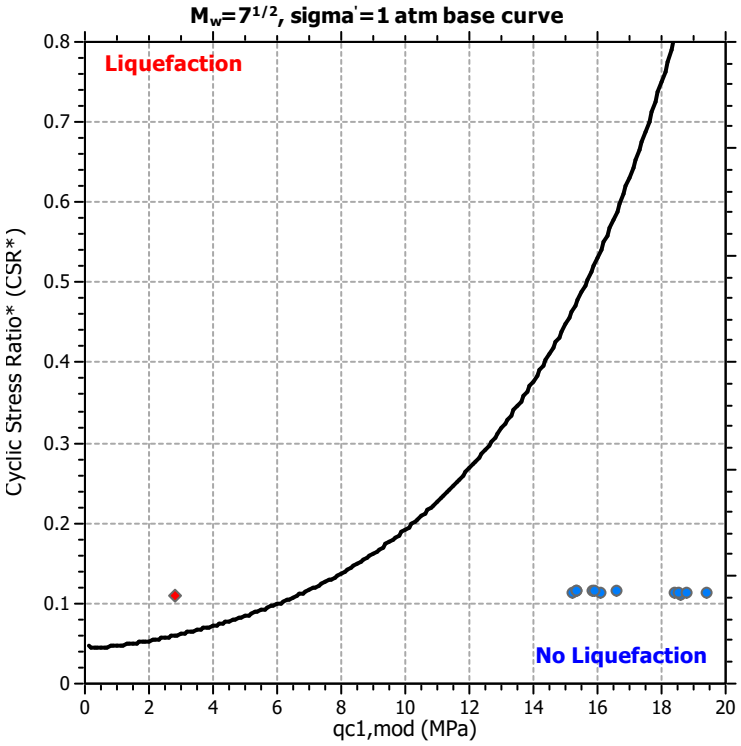
Project title : **Location :**

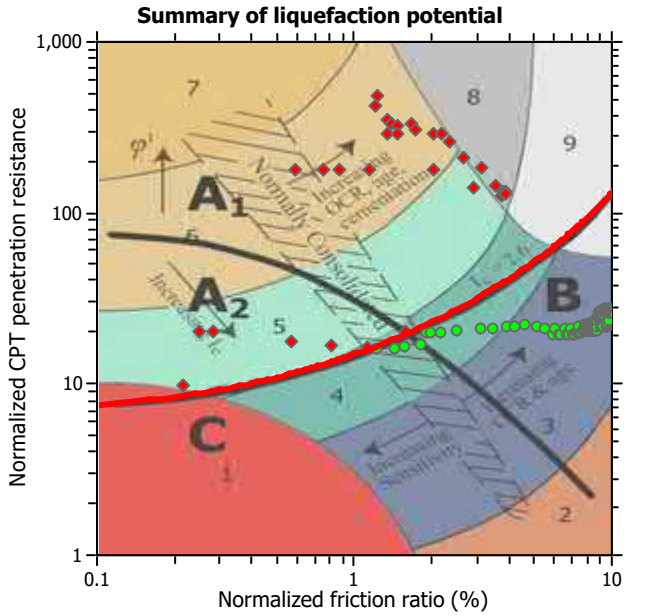
CPT file : CPT01 - 1/1,000-year (DCLS)

Input parameters and analysis data

Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

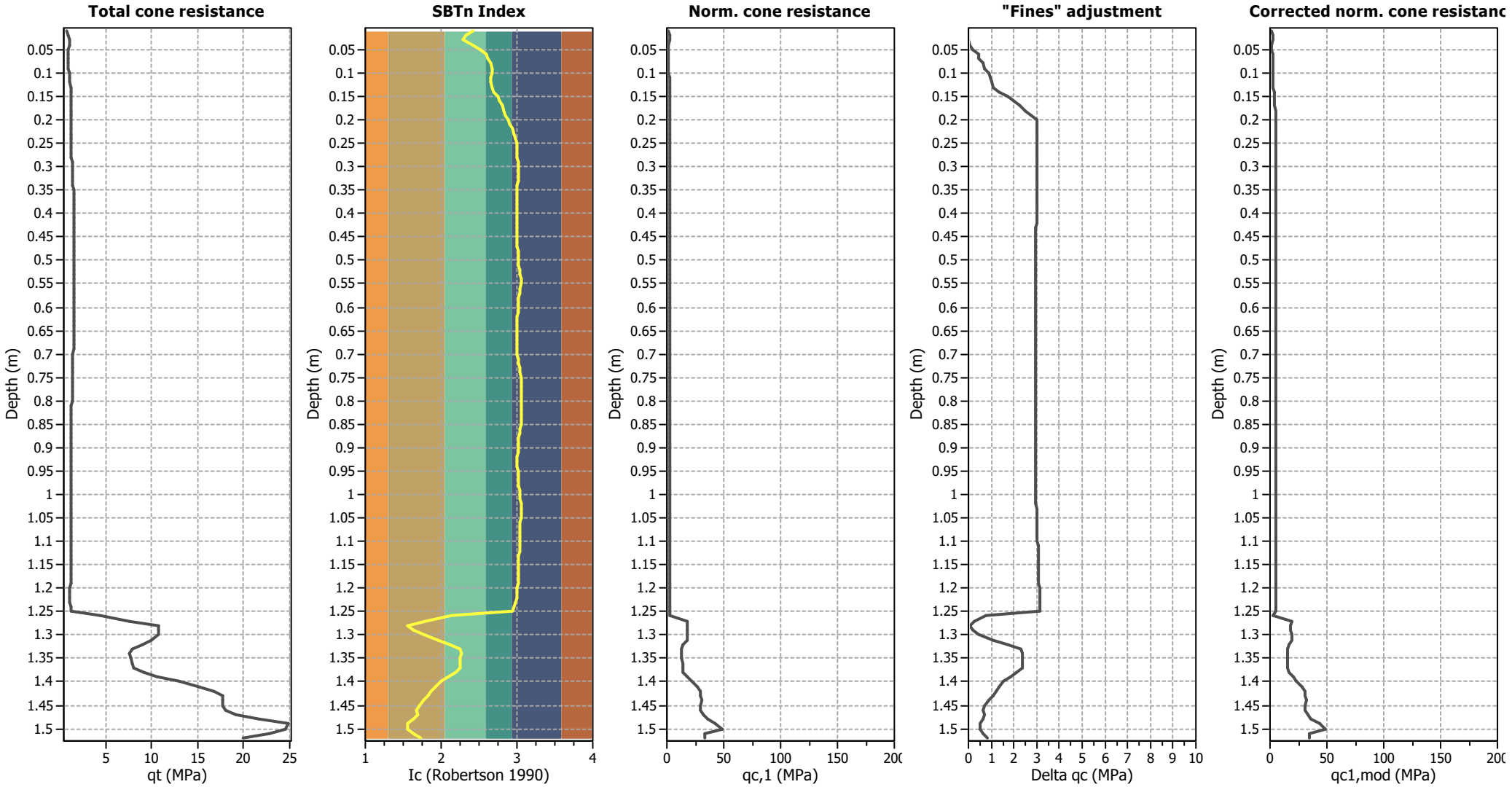






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

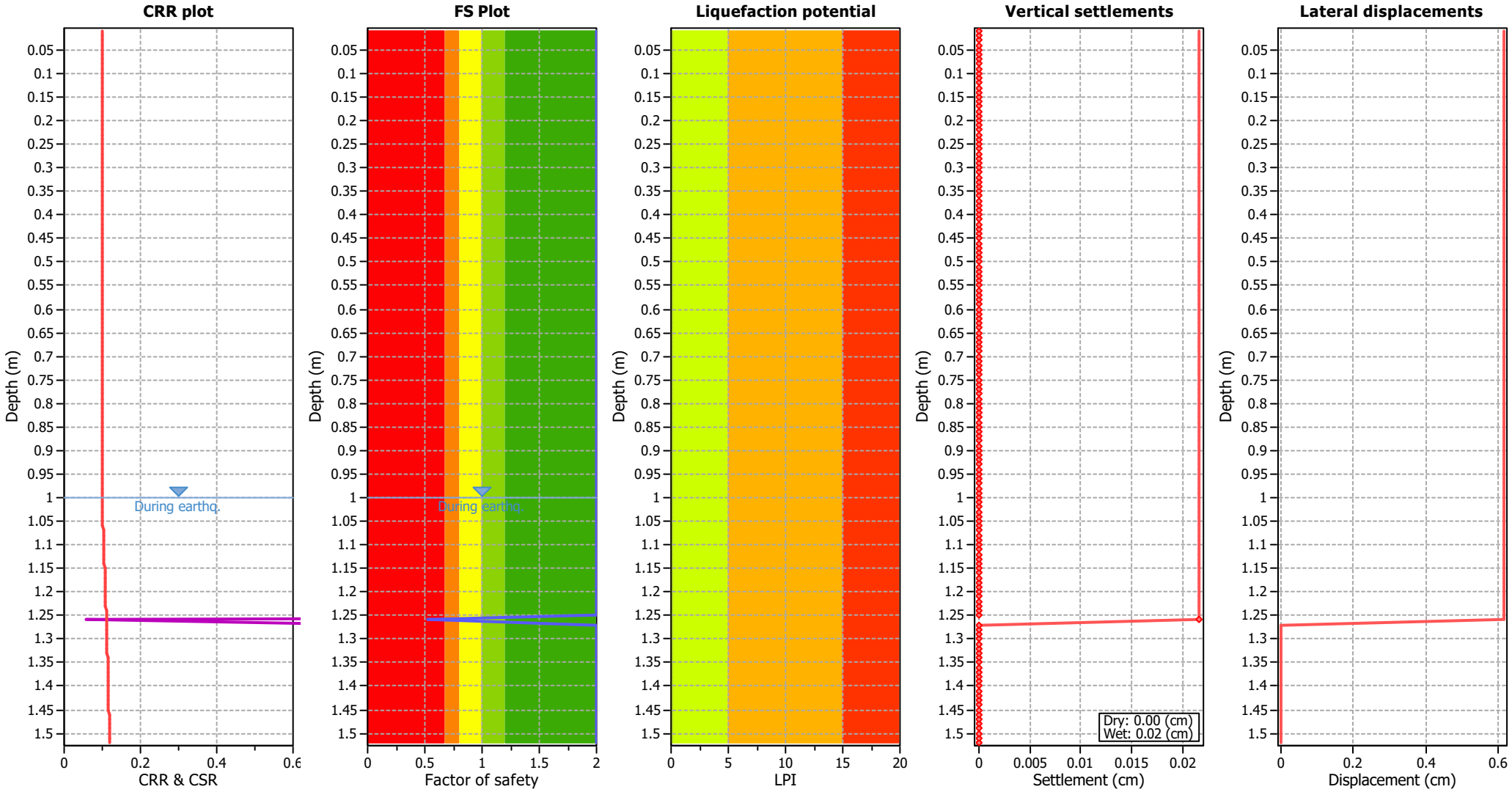
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_o applied:	Yes
Earthquake magnitude M_w:	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.00 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.00 m	Fill height:	N/A	Limit depth:	N/A

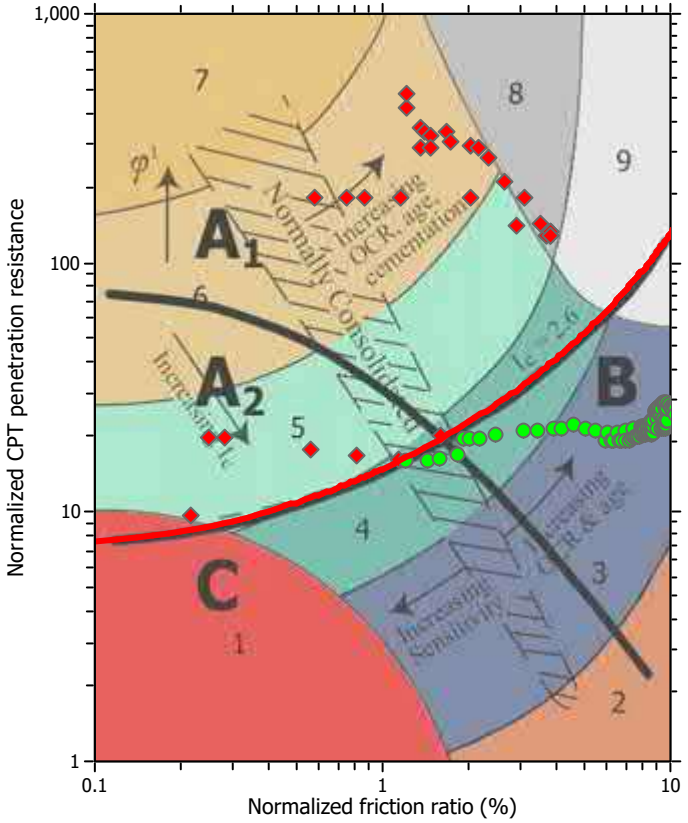
F.S. color scheme

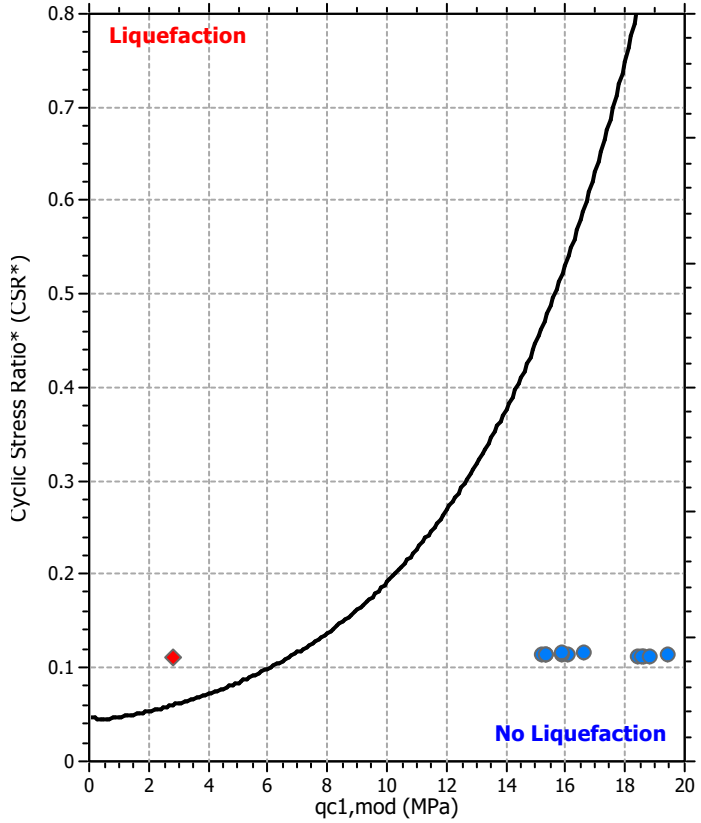
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

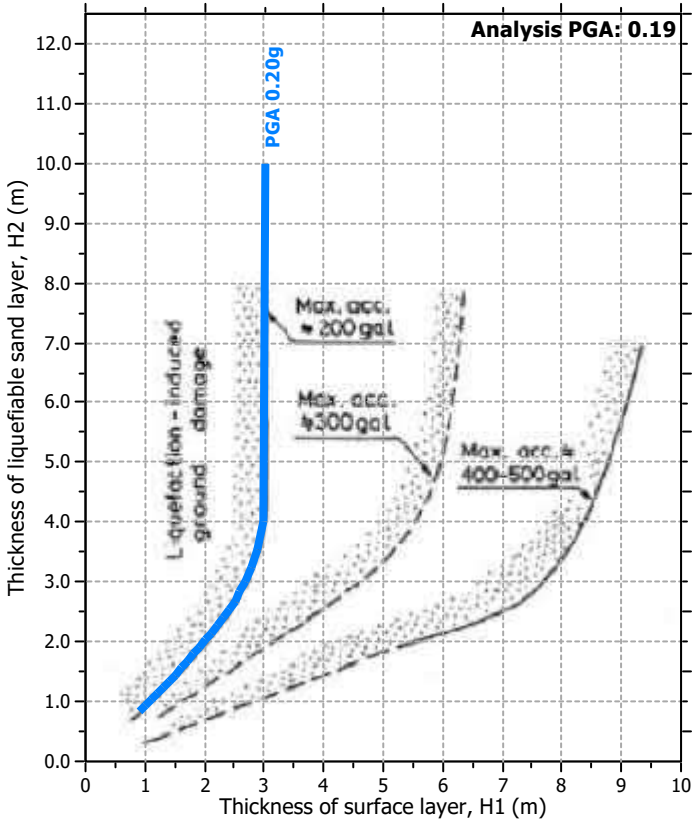
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_o applied:	Yes
Earthquake magnitude M_w:	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.00 m	Fill height:	N/A	Limit depth:	N/A

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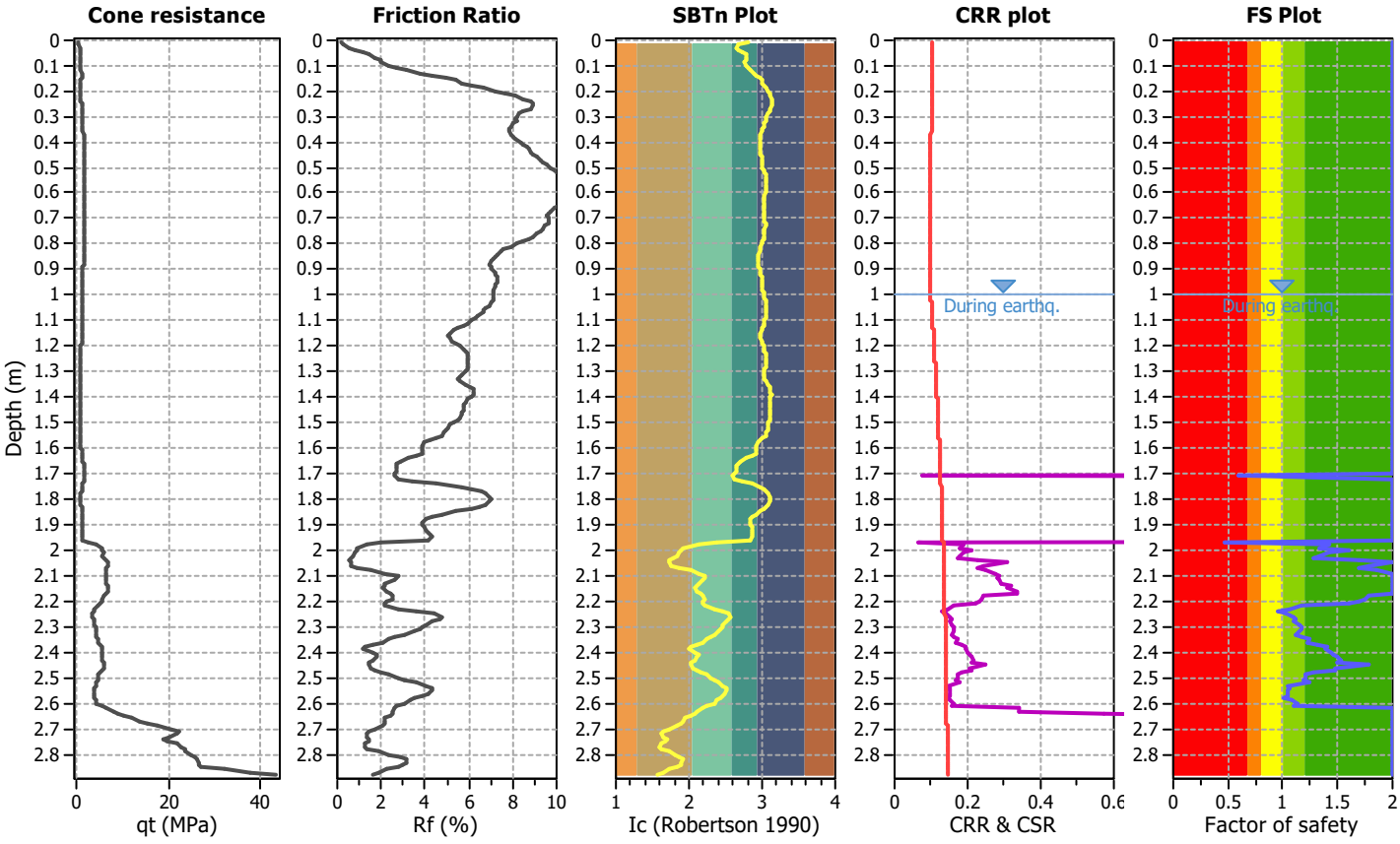
LIQUEFACTION ANALYSIS REPORT

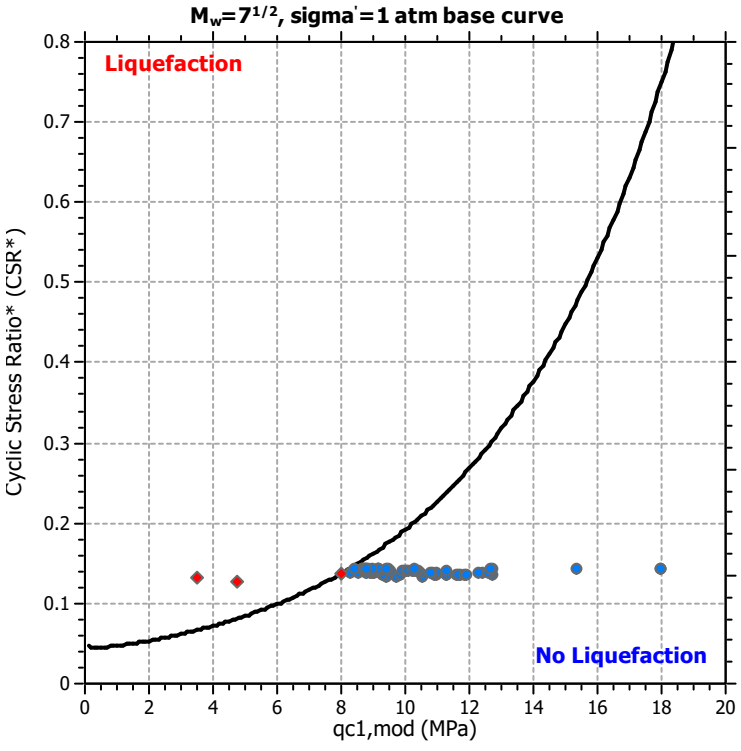
Project title : **Location :**

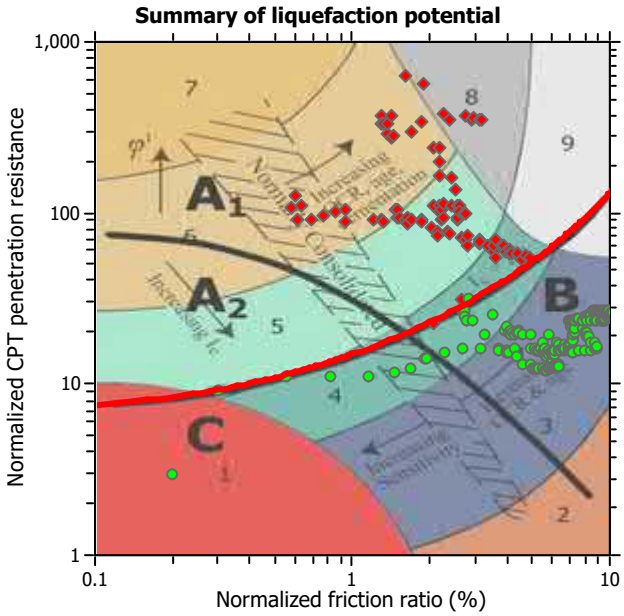
CPT file : CPT02 - 1/1,000-year (DCLS)

Input parameters and analysis data

Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	0.90 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
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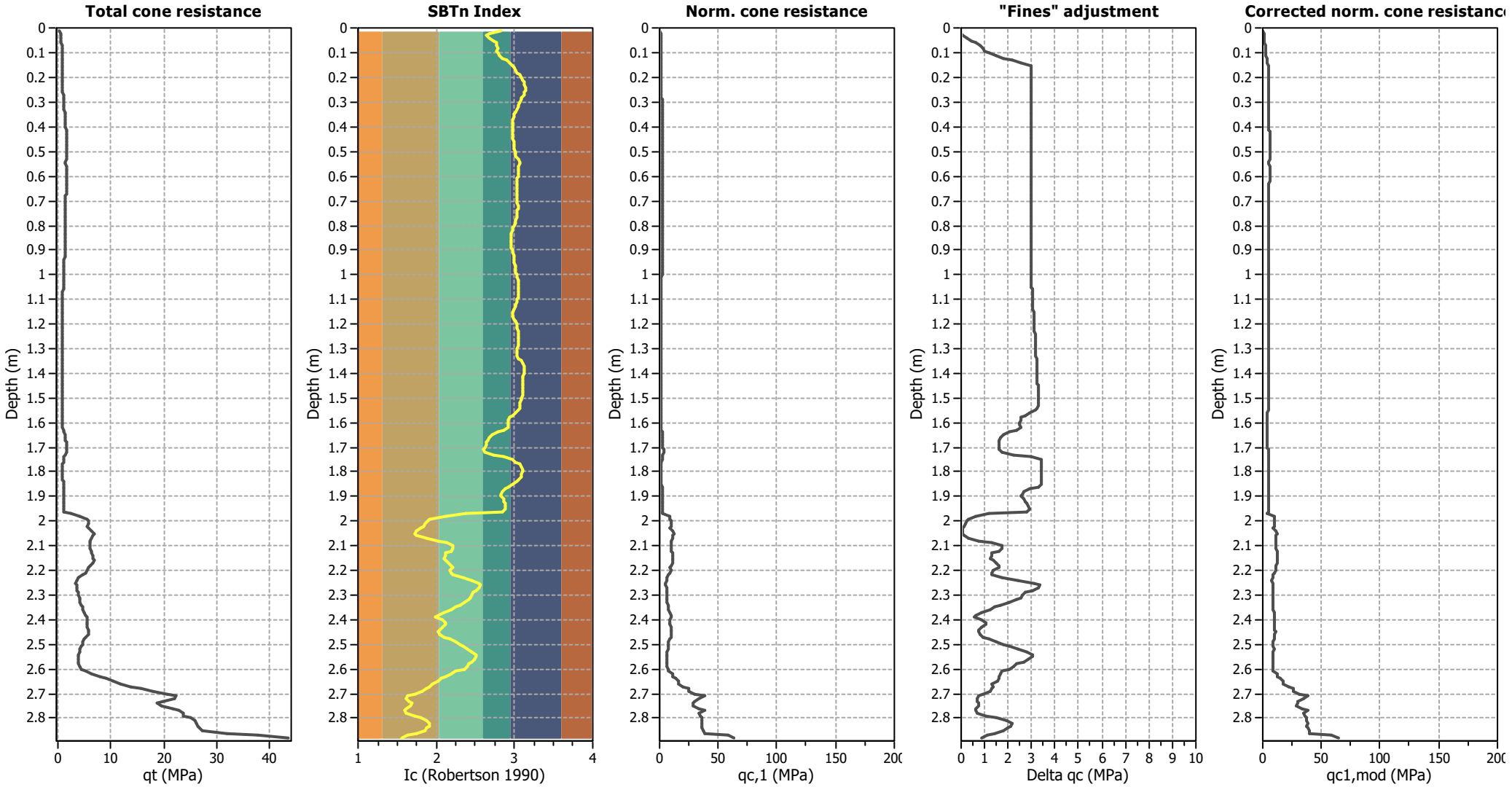
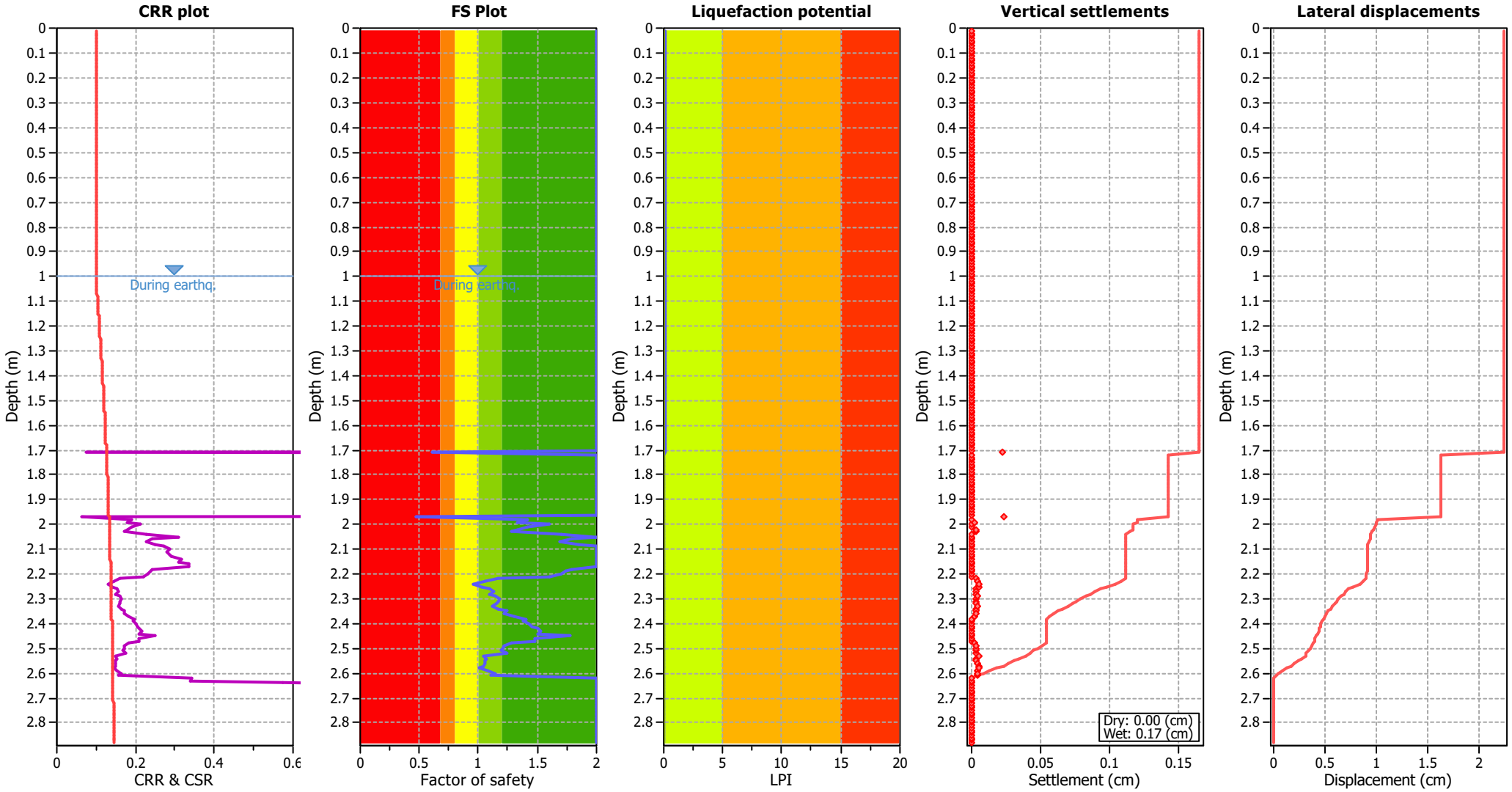
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_o applied:	Yes
Earthquake magnitude M_w:	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.90 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.90 m	Fill height:	N/A	Limit depth:	N/A

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LPI color scheme

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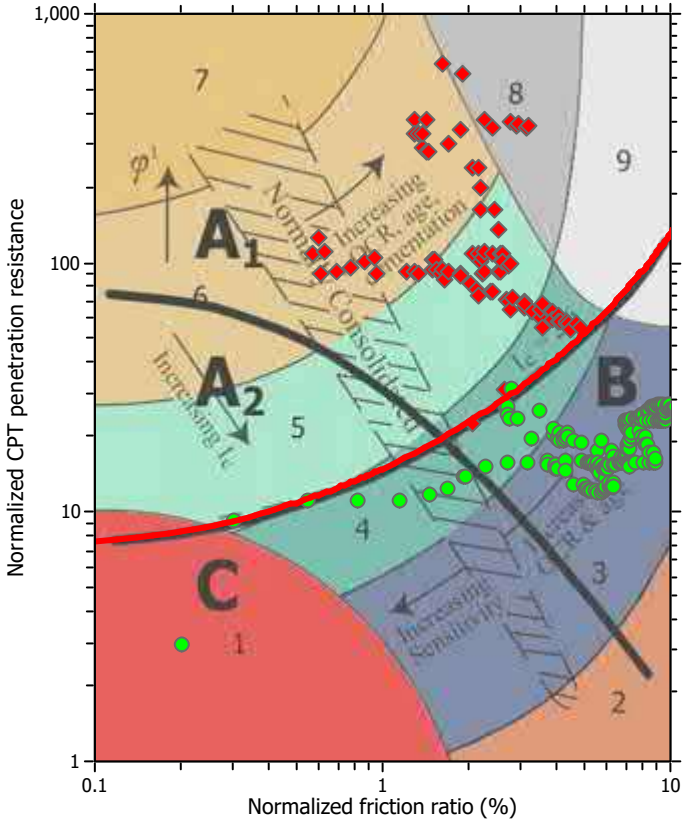
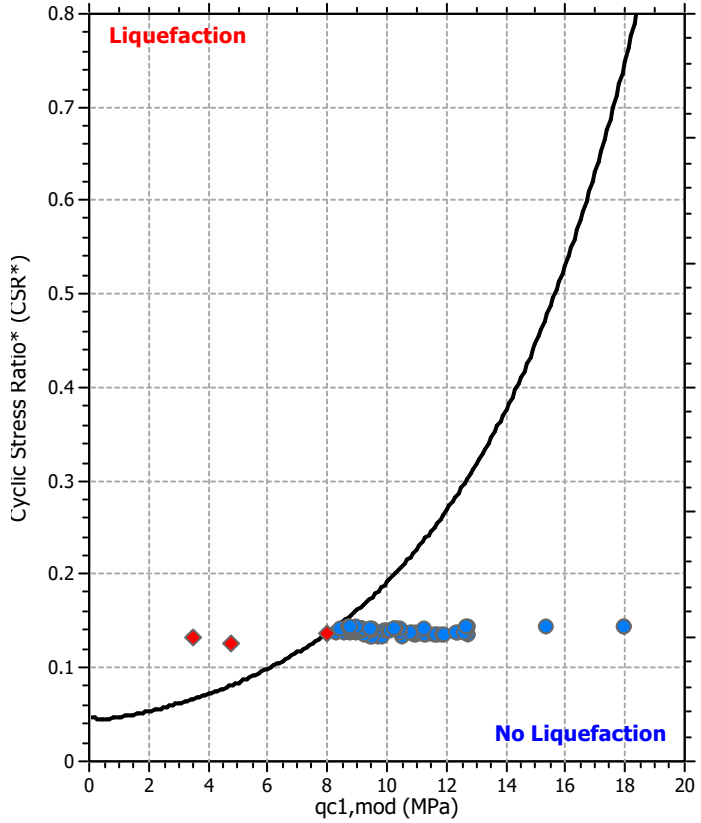
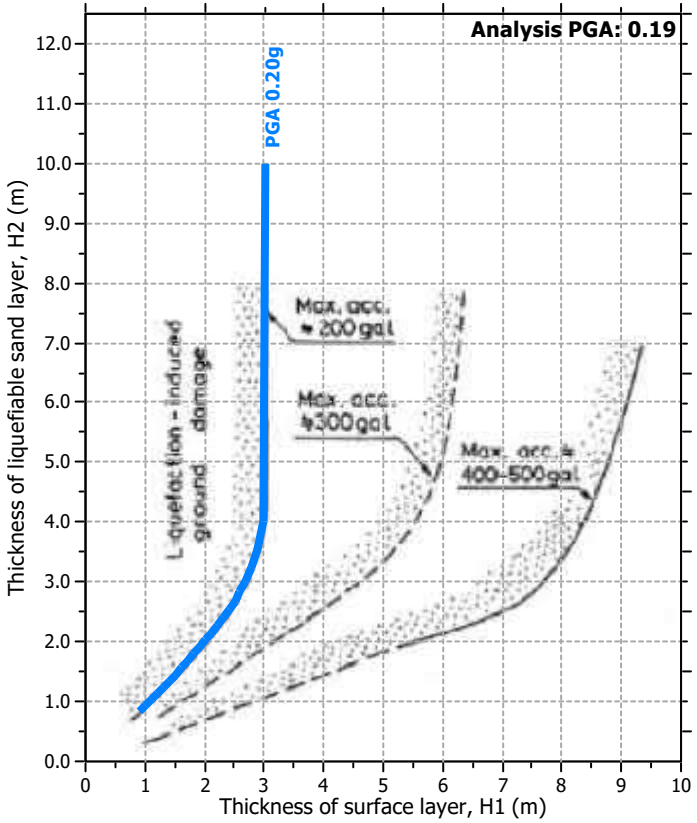
Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_o applied:	Yes
Earthquake magnitude M_w:	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.90 m	Fill height:	N/A	Limit depth:	N/A

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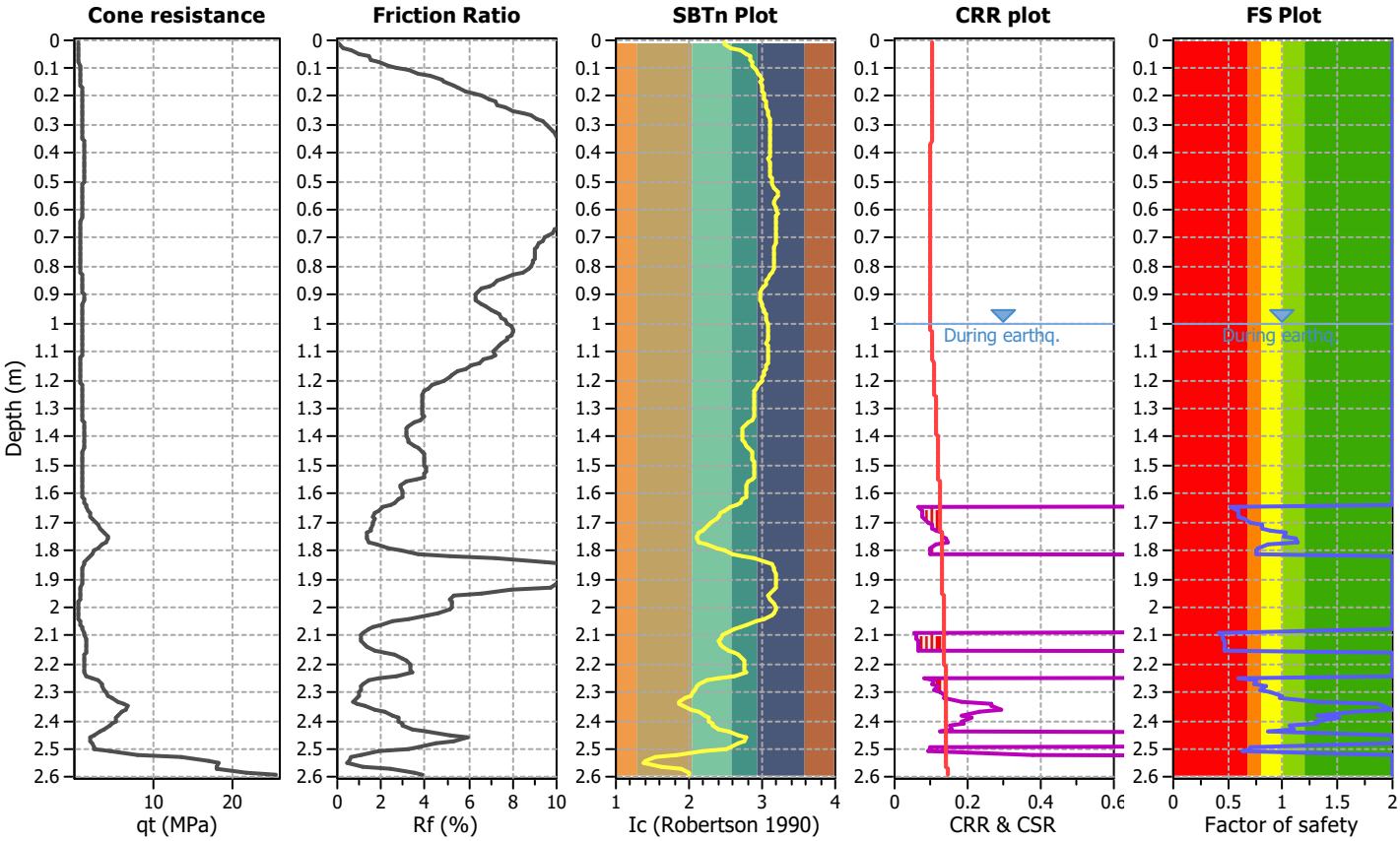
LIQUEFACTION ANALYSIS REPORT

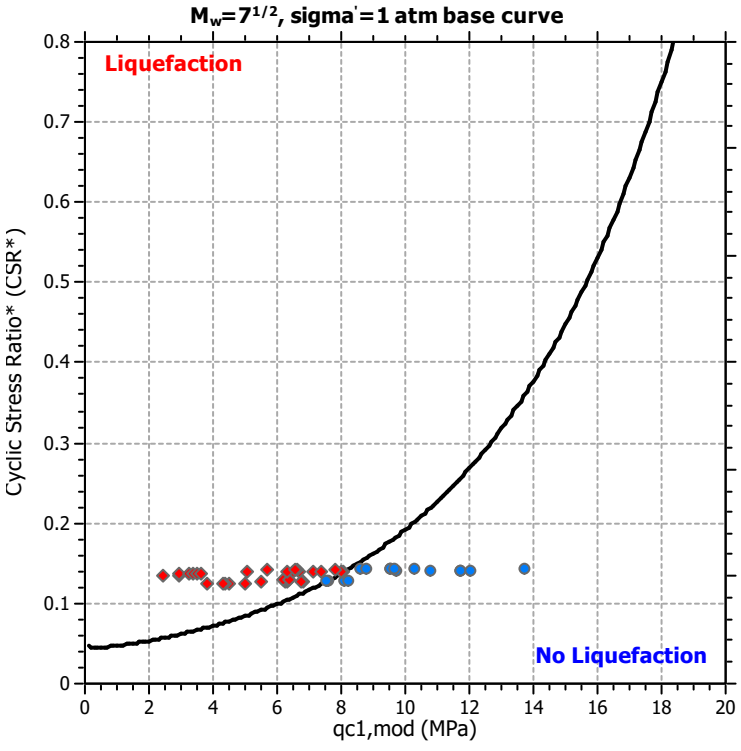
Project title : **Location :**

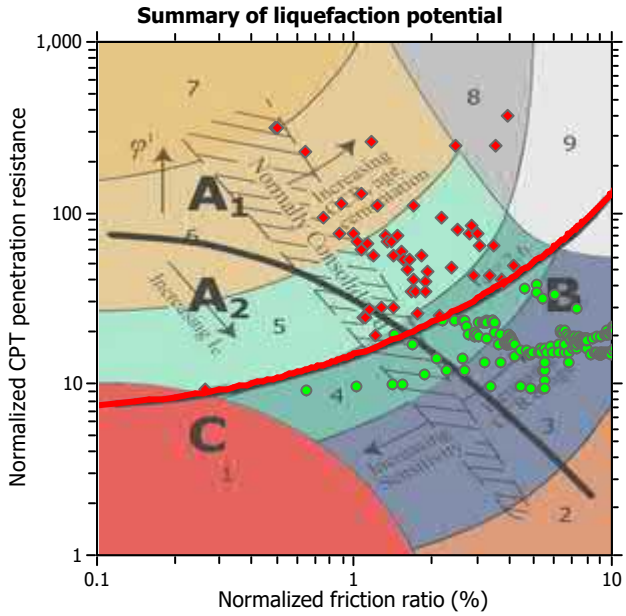
CPT file : CPT03 - 1/1,000-year (DCLS)

Input parameters and analysis data

Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	1.40 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

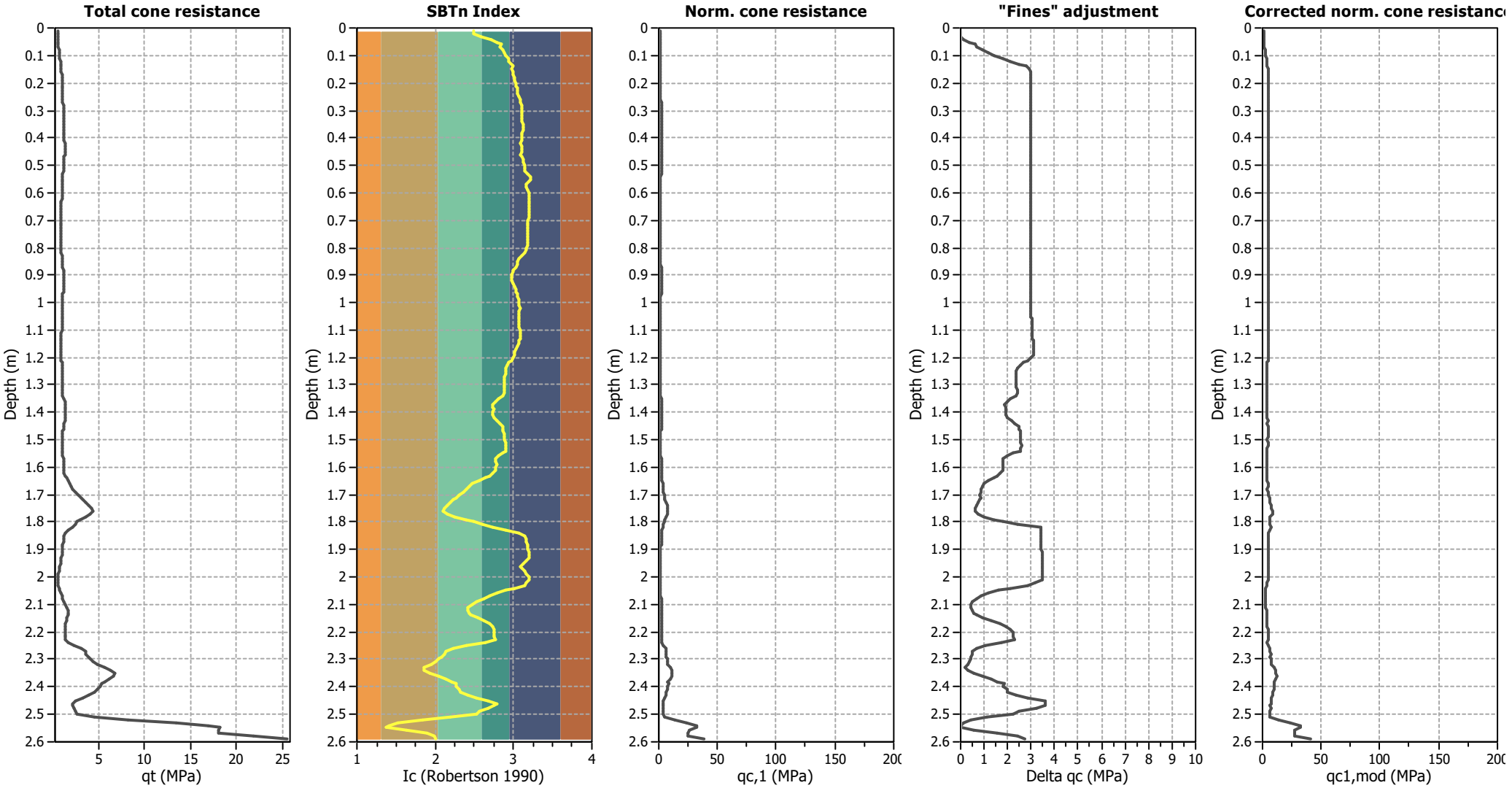






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

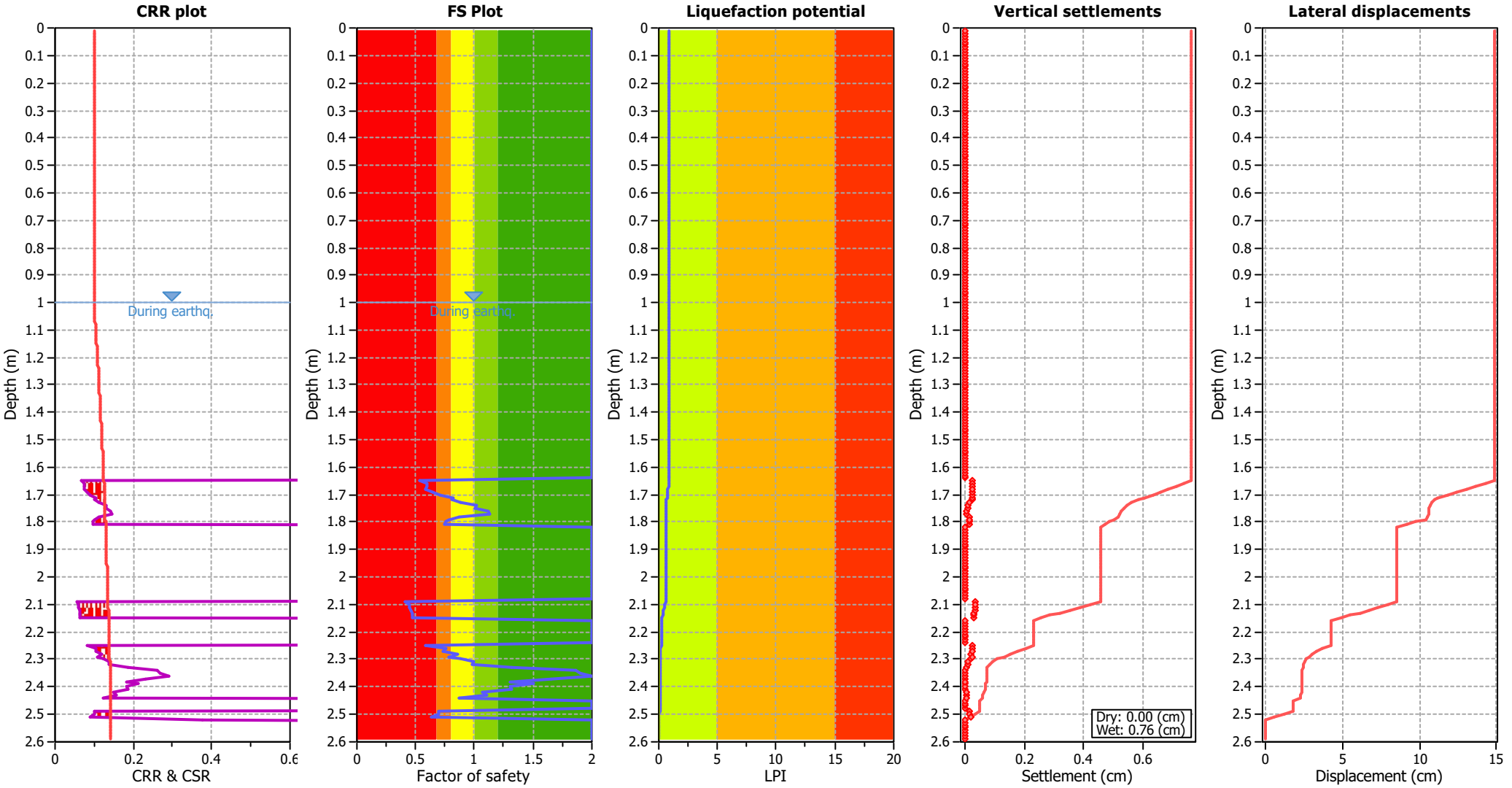
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_o applied:	Yes
Earthquake magnitude M_w:	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.40 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_o applied:	Yes
Earthquake magnitude M_w:	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.40 m	Fill height:	N/A	Limit depth:	N/A

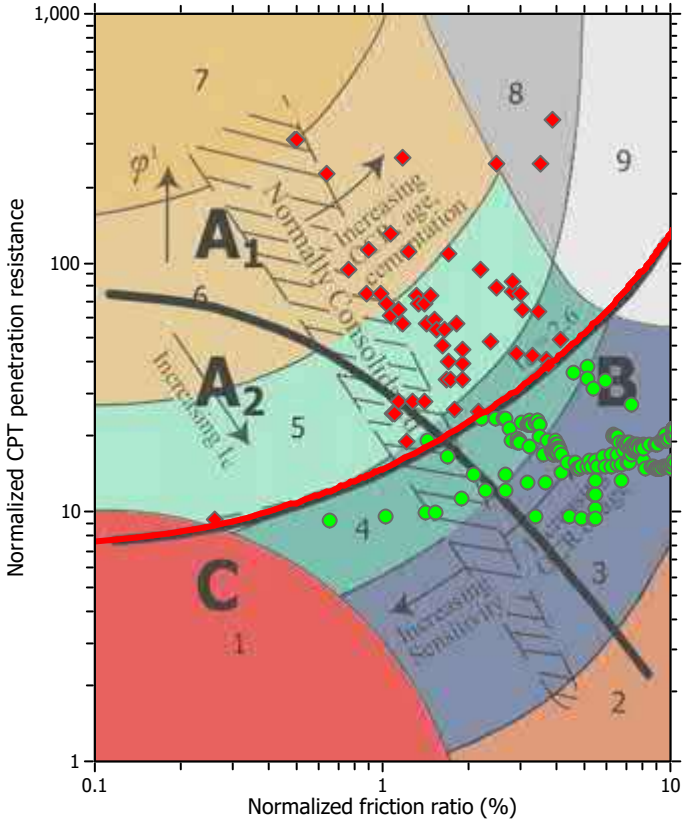
F.S. color scheme

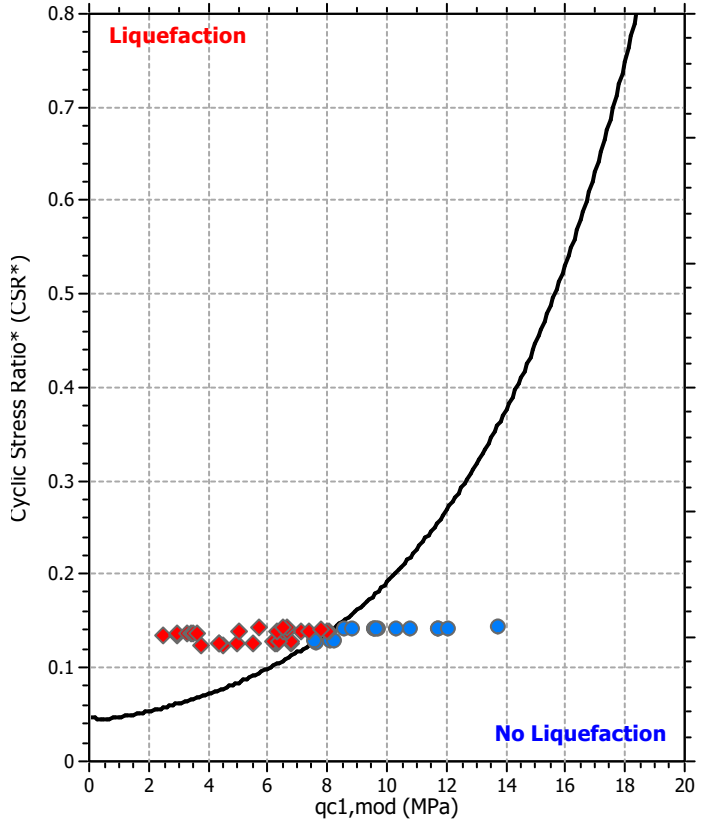
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

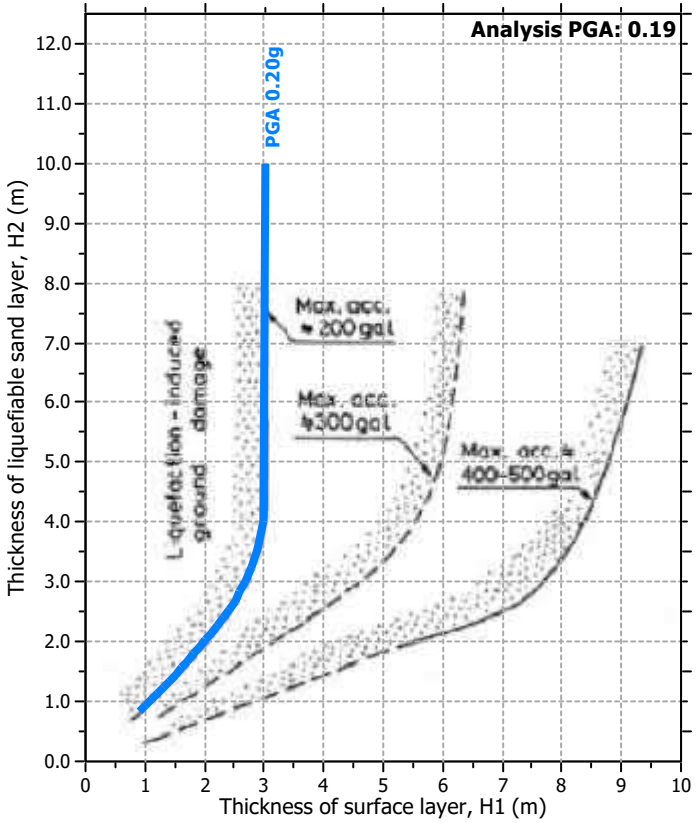
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.40 m	Fill height:	N/A	Limit depth:	N/A

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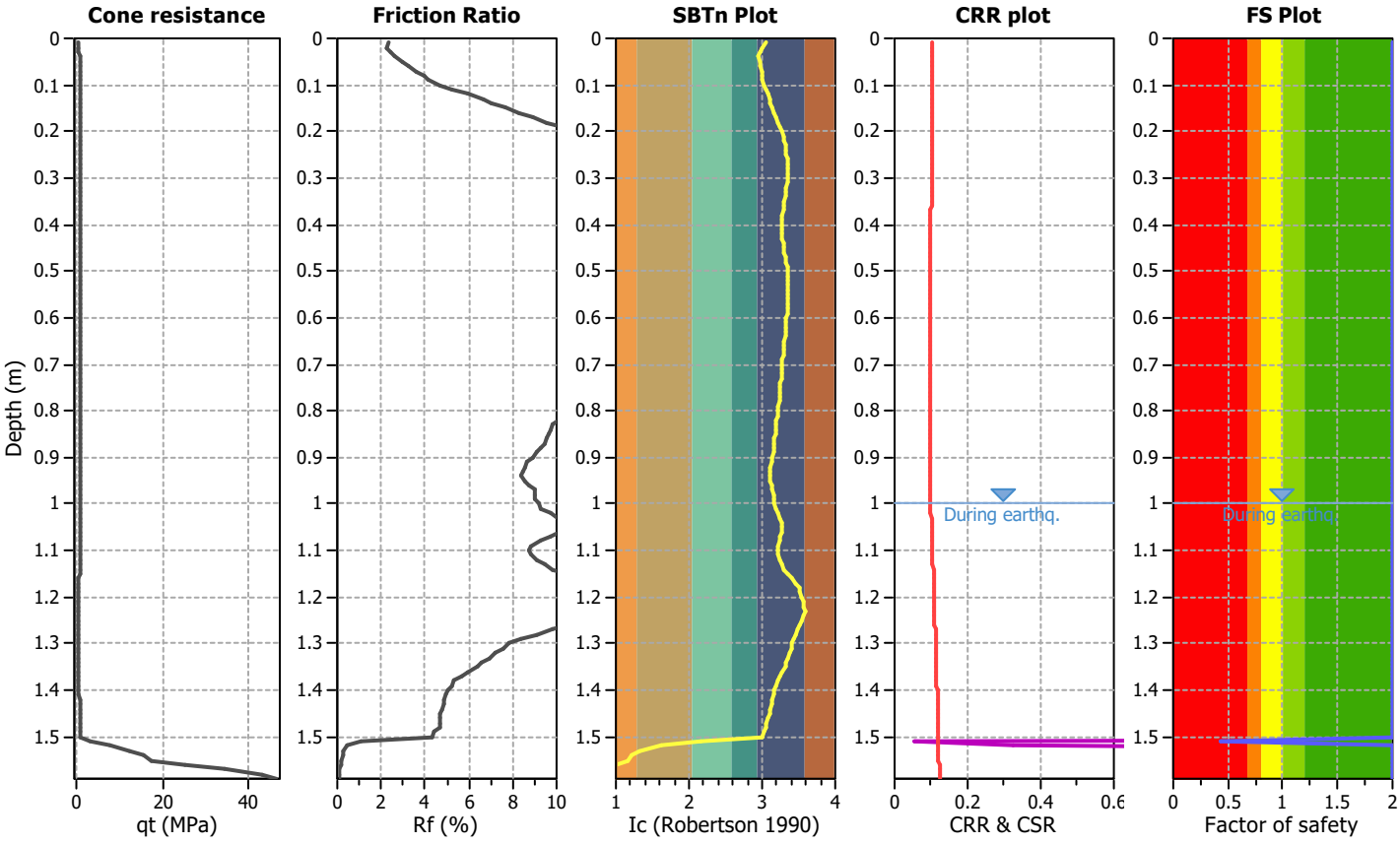
LIQUEFACTION ANALYSIS REPORT

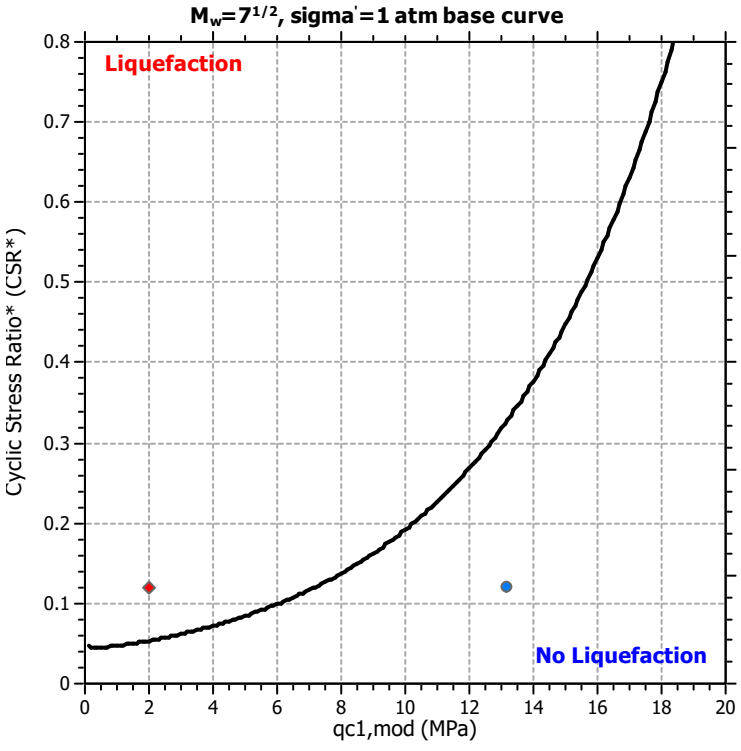
Project title : **Location :**

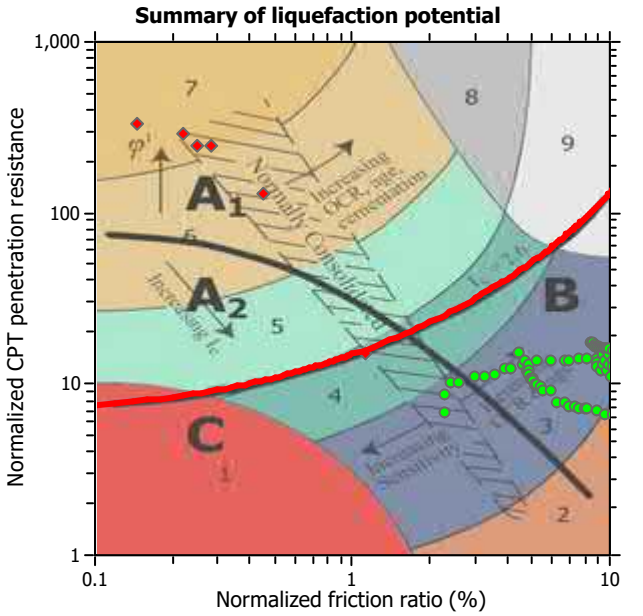
CPT file : CPT04 - 1/1,000-year (DCLS)

Input parameters and analysis data

Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	0.70 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

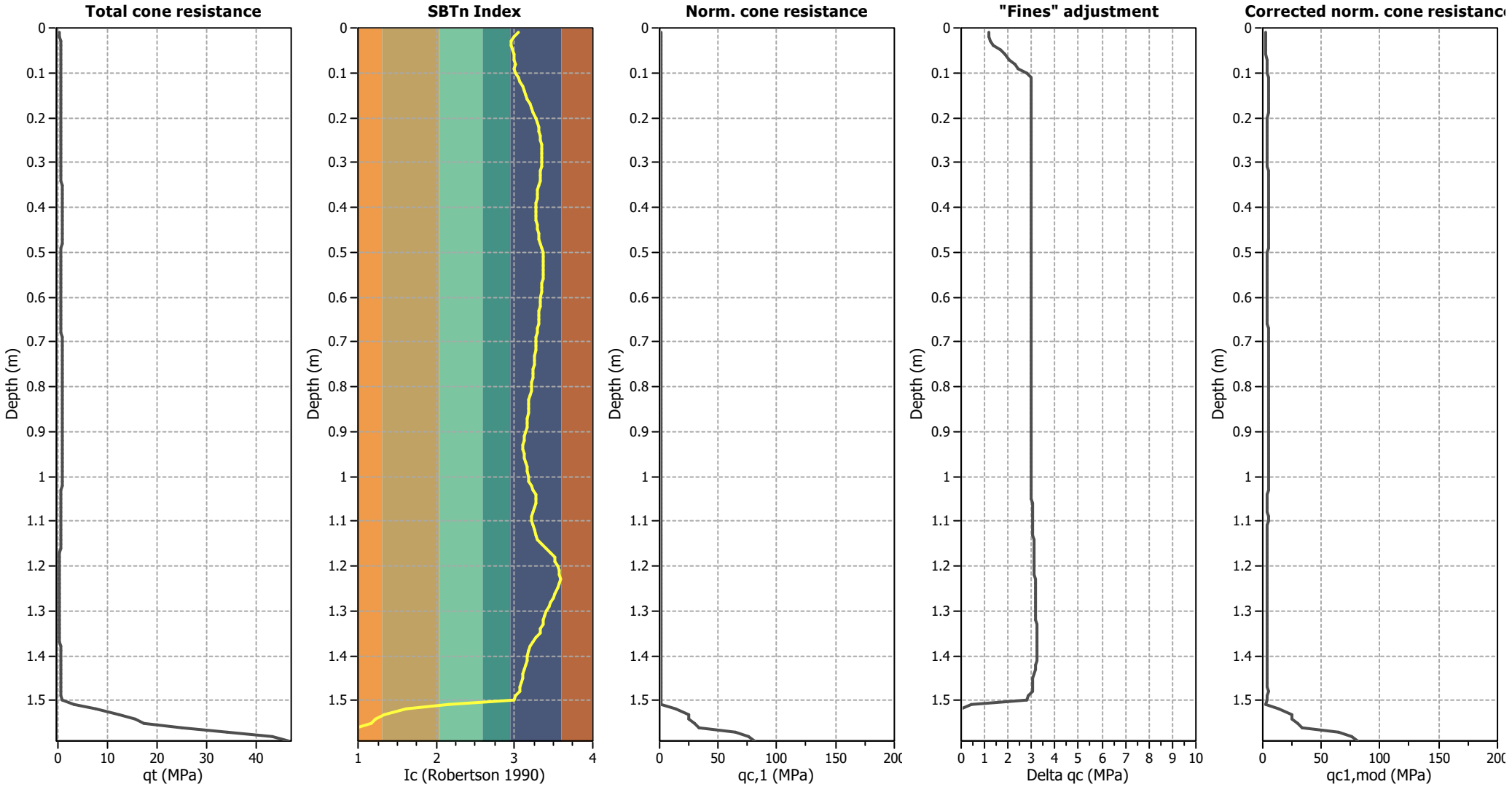






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

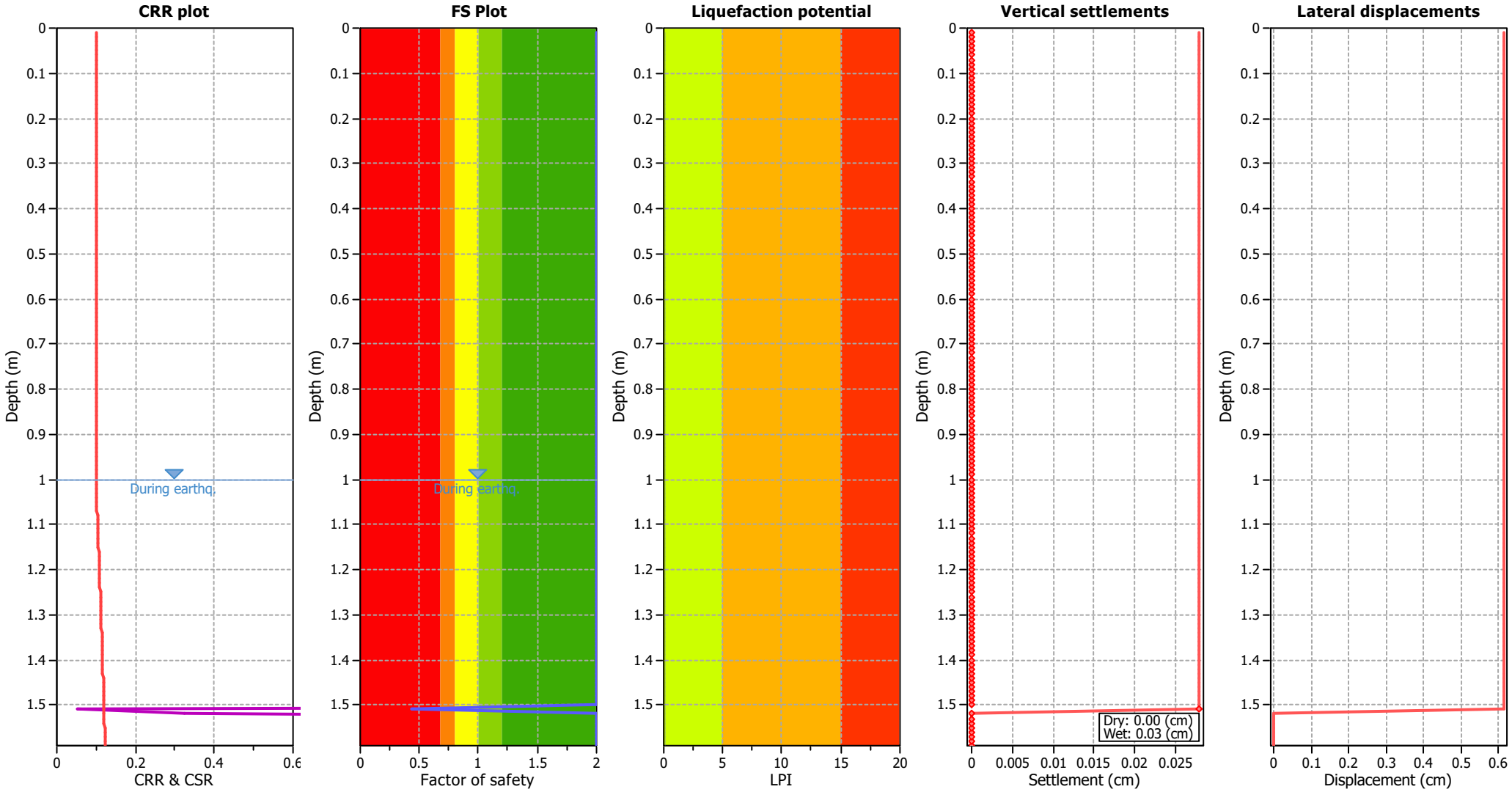
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.70 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.70 m	Fill height:	N/A	Limit depth:	N/A

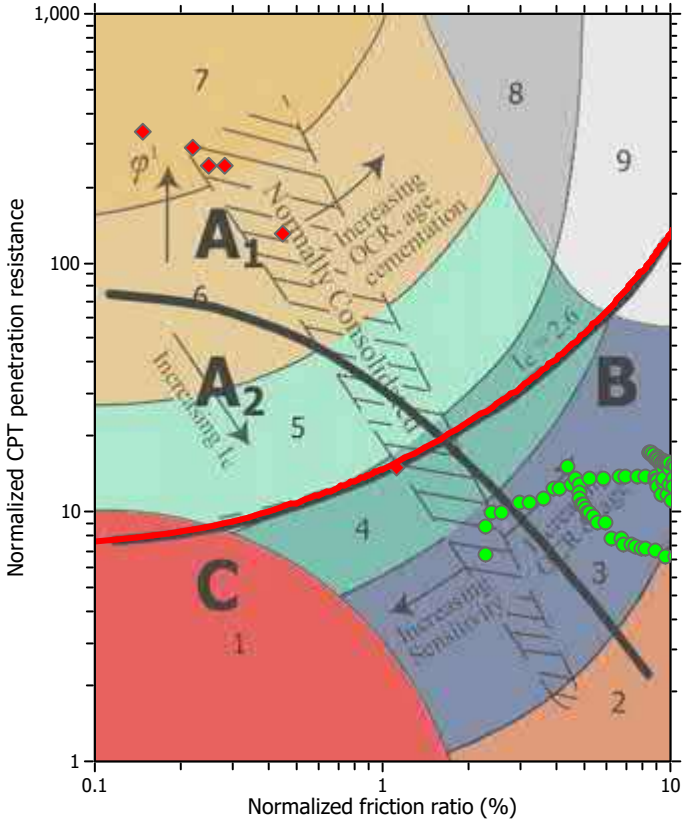
F.S. color scheme

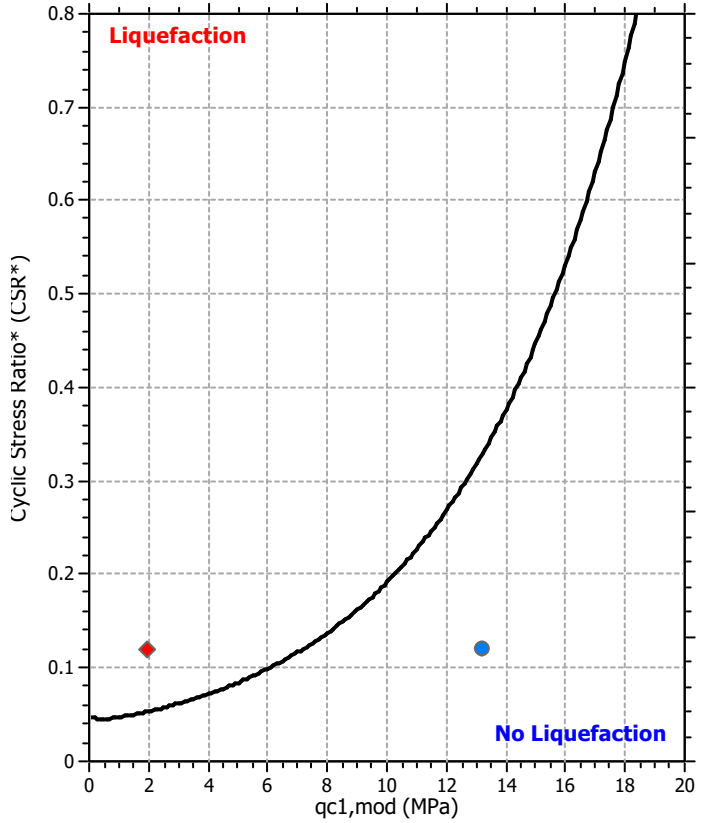
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

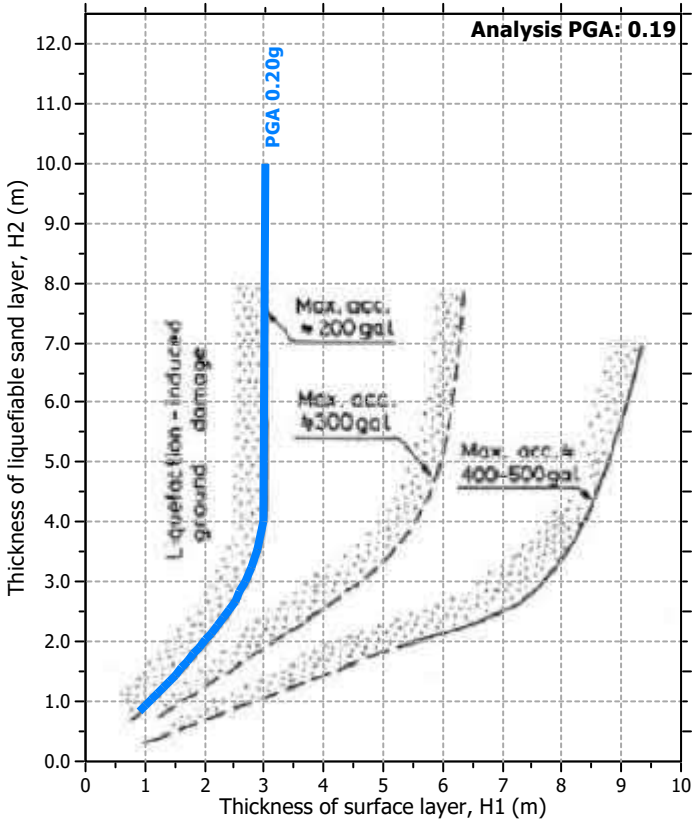
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_o applied:	Yes
Earthquake magnitude M_w:	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.70 m	Fill height:	N/A	Limit depth:	N/A

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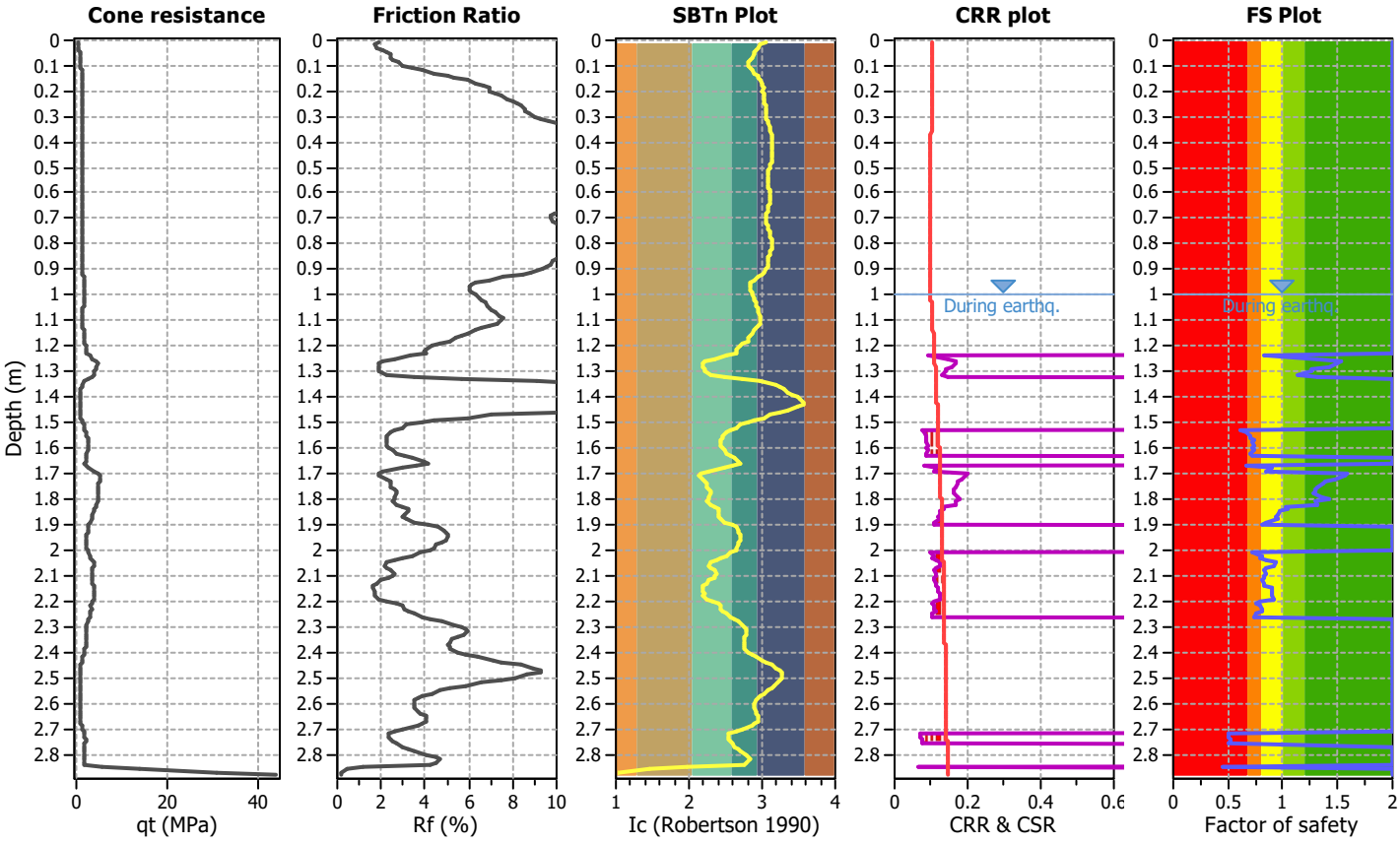
LIQUEFACTION ANALYSIS REPORT

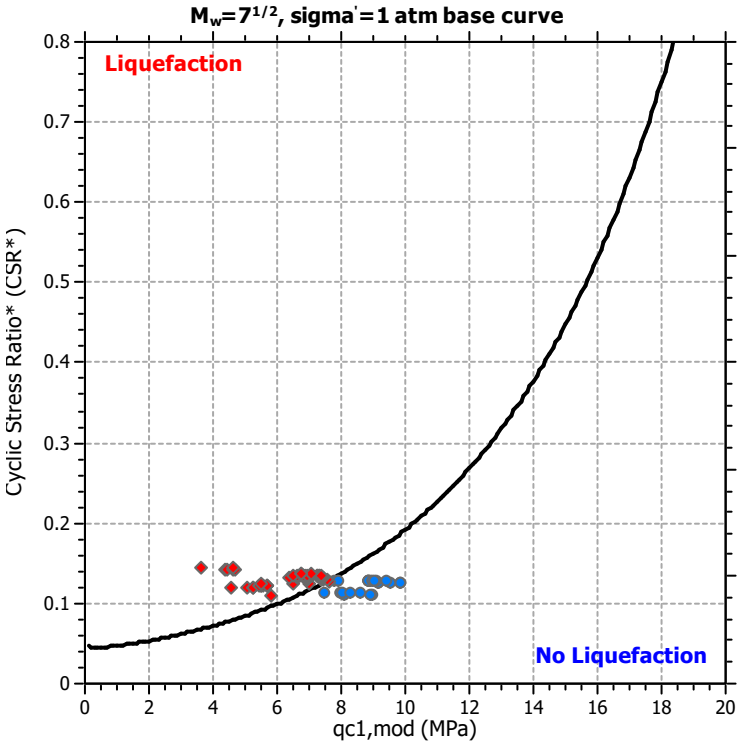
Project title : **Location :**

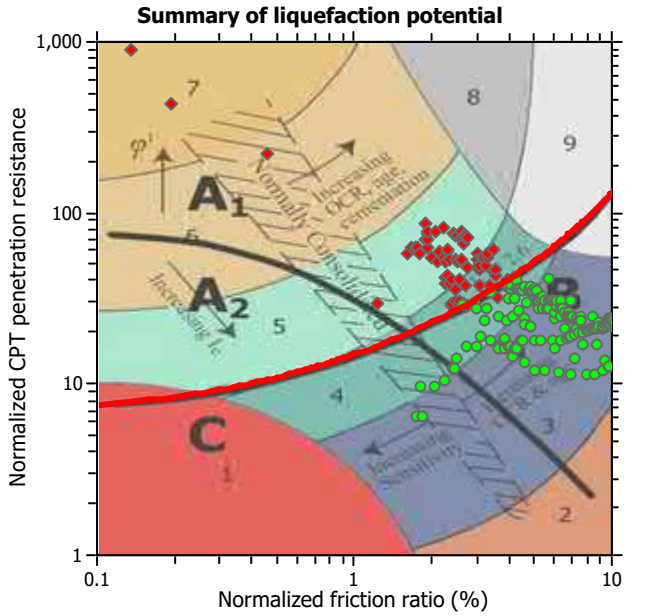
CPT file : CPT05 - 1/1,000-year (DCLS)

Input parameters and analysis data

Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	1.80 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

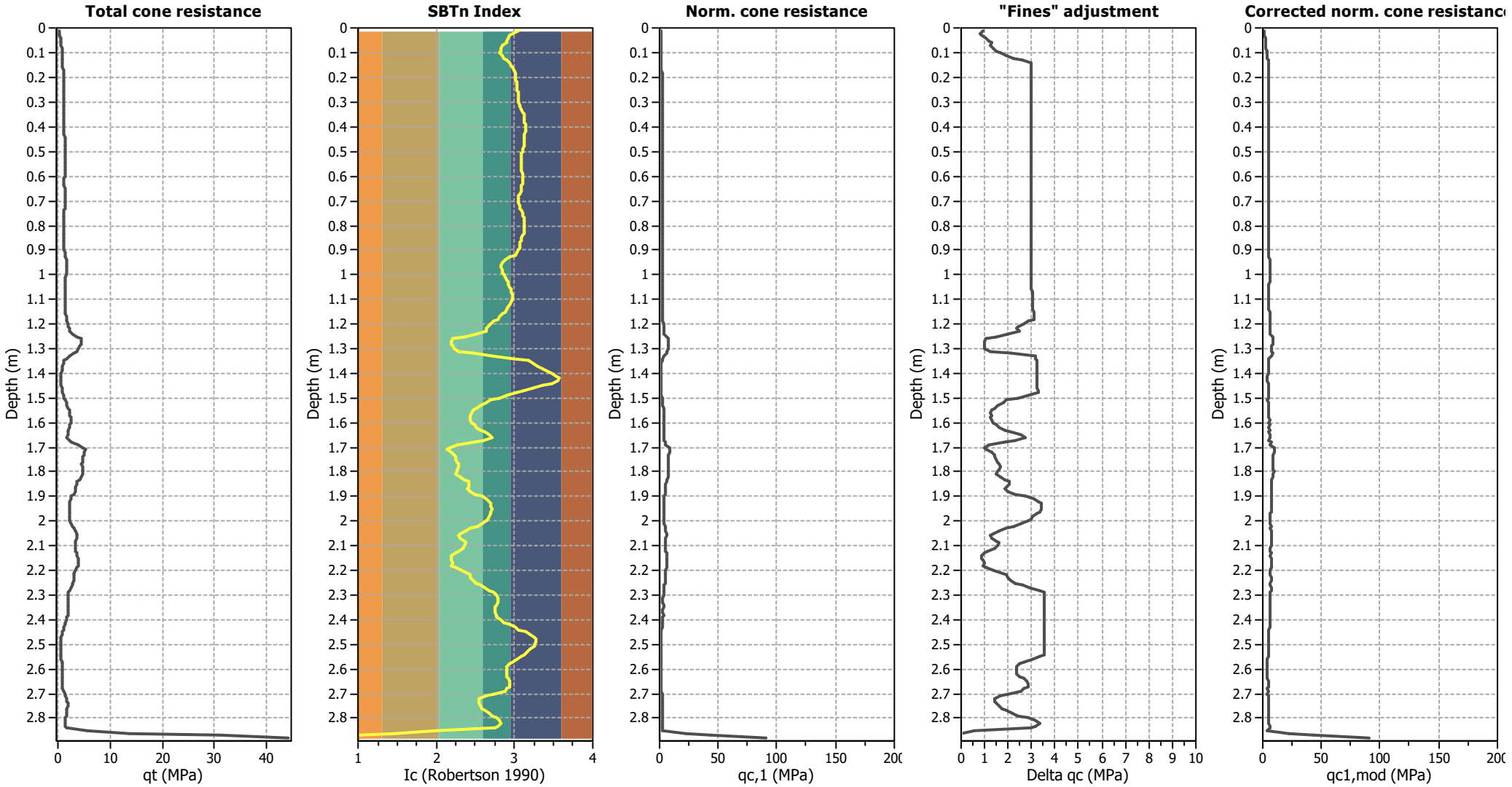






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

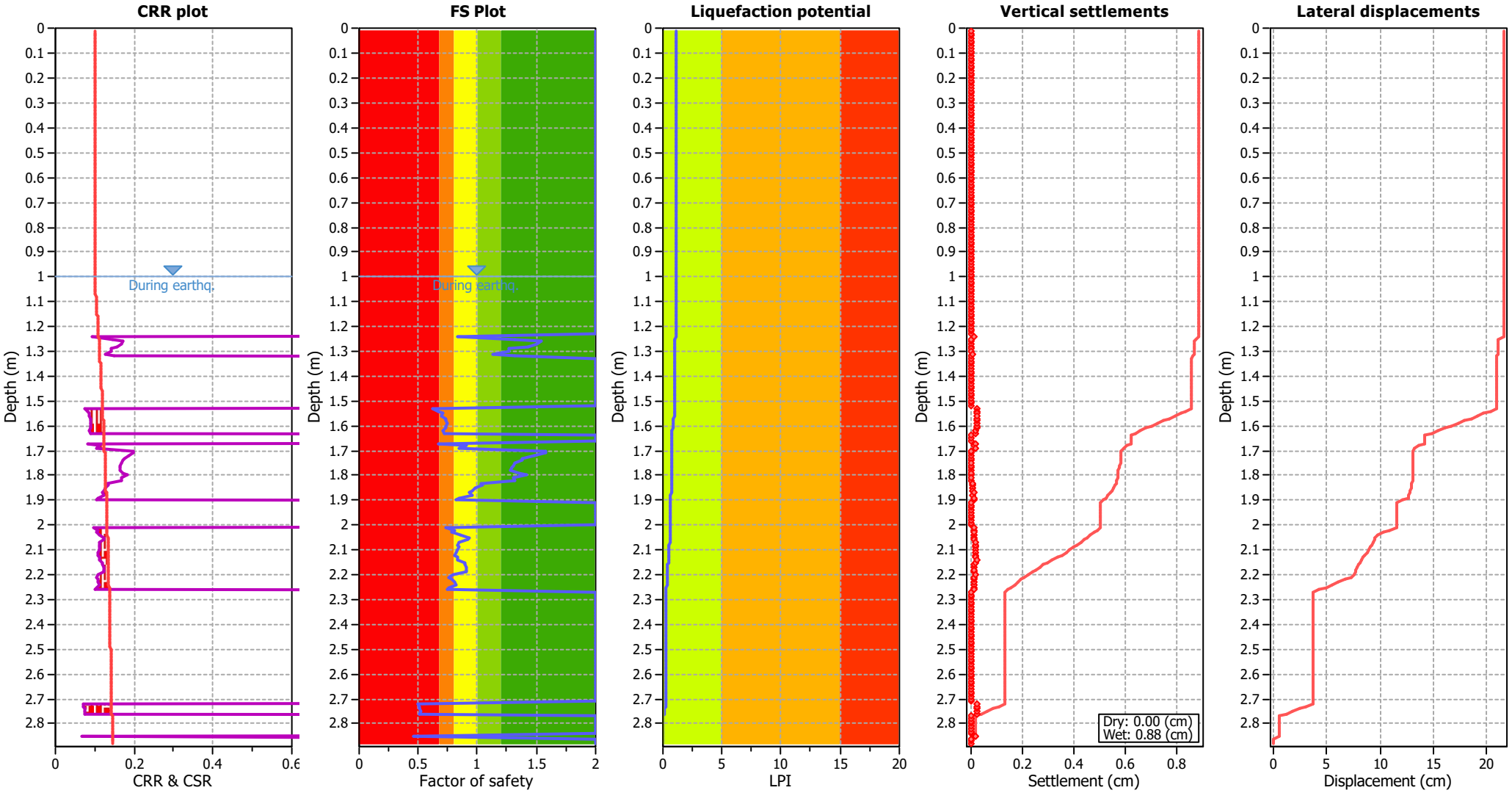
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_o applied:	Yes
Earthquake magnitude M_w:	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.80 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.80 m	Fill height:	N/A	Limit depth:	N/A

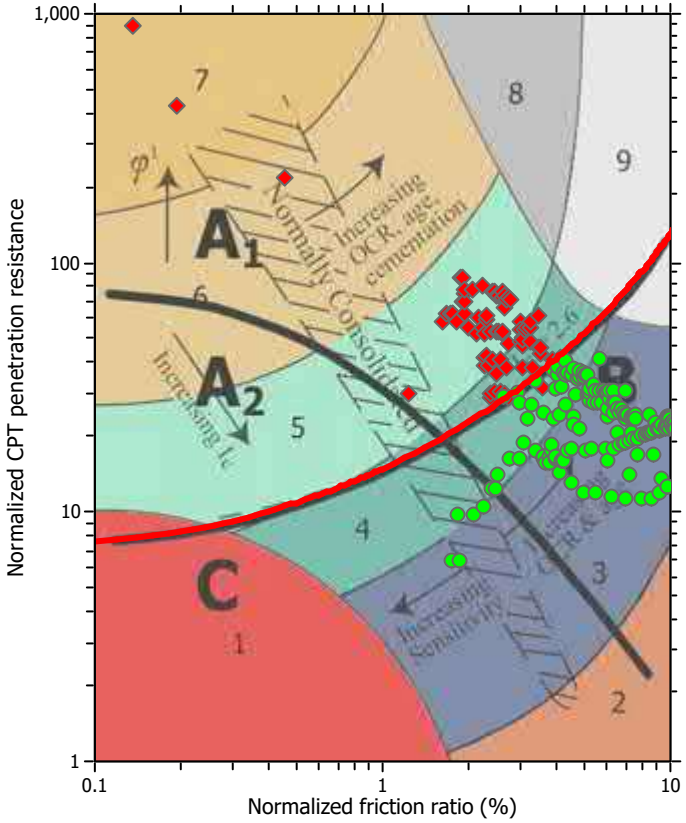
F.S. color scheme

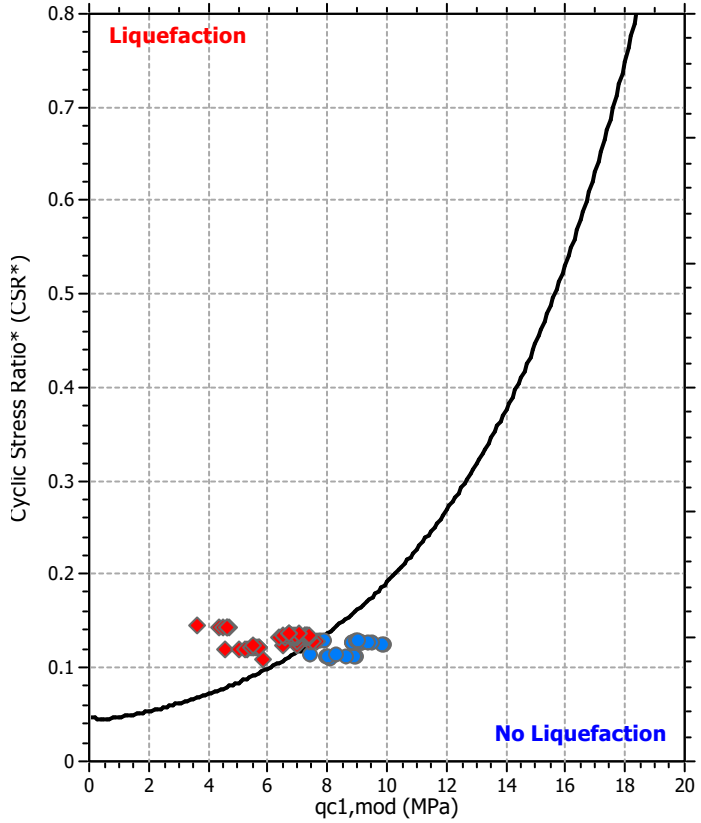
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

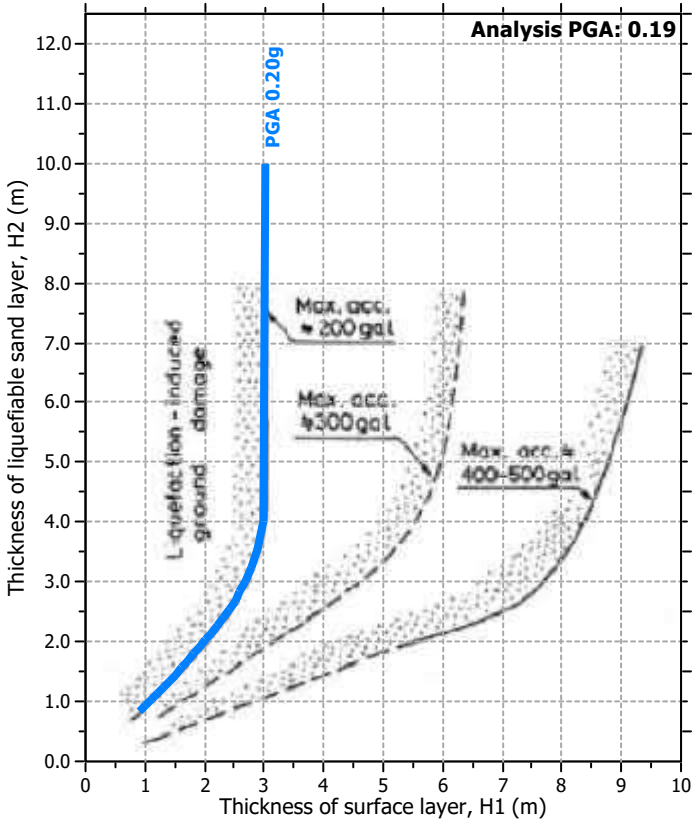
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots







Input parameters and analysis data

Analysis method:	Moss et al. (2006)	Depth to water table (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	Moss et al. (2006)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.80 m	Fill height:	N/A	Limit depth:	N/A

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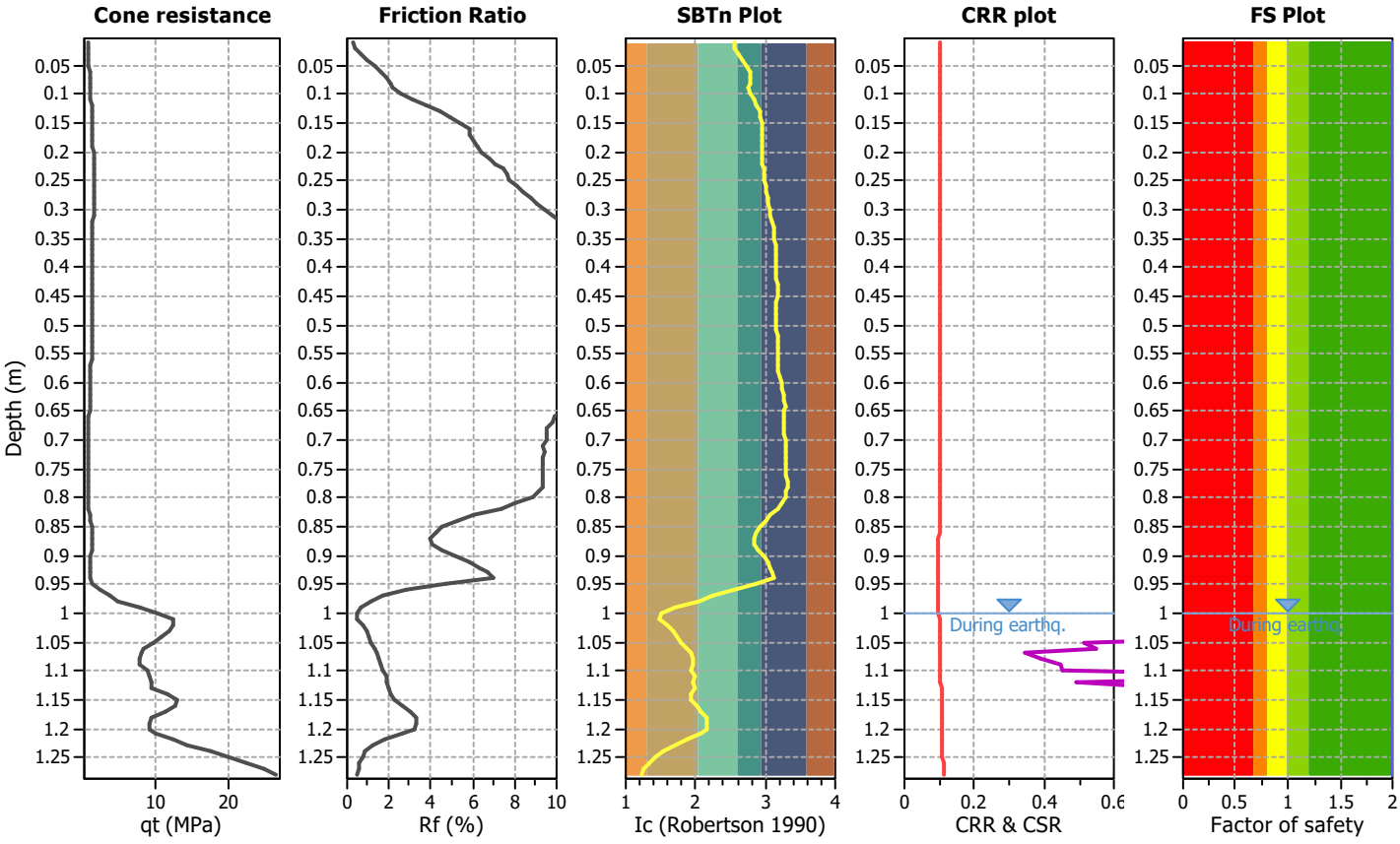
LIQUEFACTION ANALYSIS REPORT

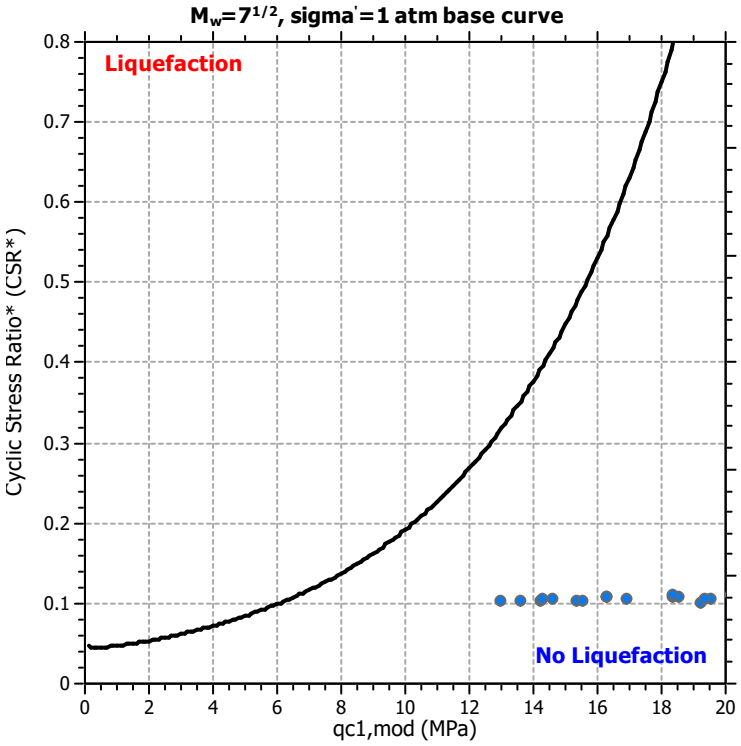
Project title : **Location :**

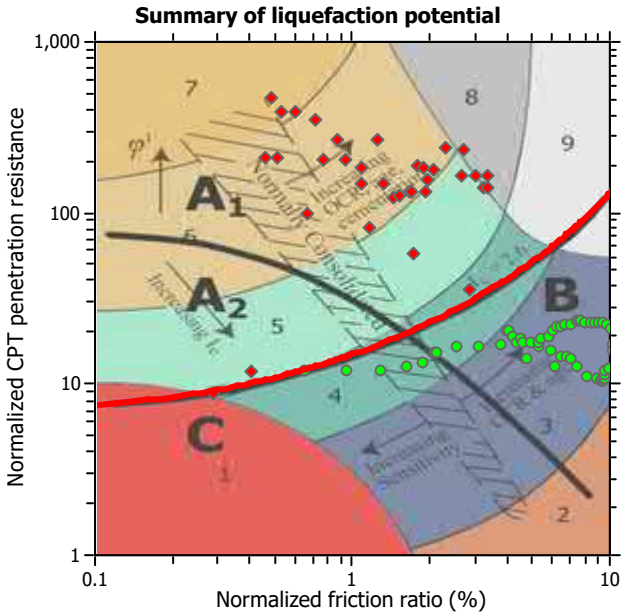
CPT file : CPT06 - 1/1,000-year (DCLS)

Input parameters and analysis data

Analysis method:	Moss et al. (2006)	G.W.T. (in-situ):	0.90 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	Moss et al. (2006)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

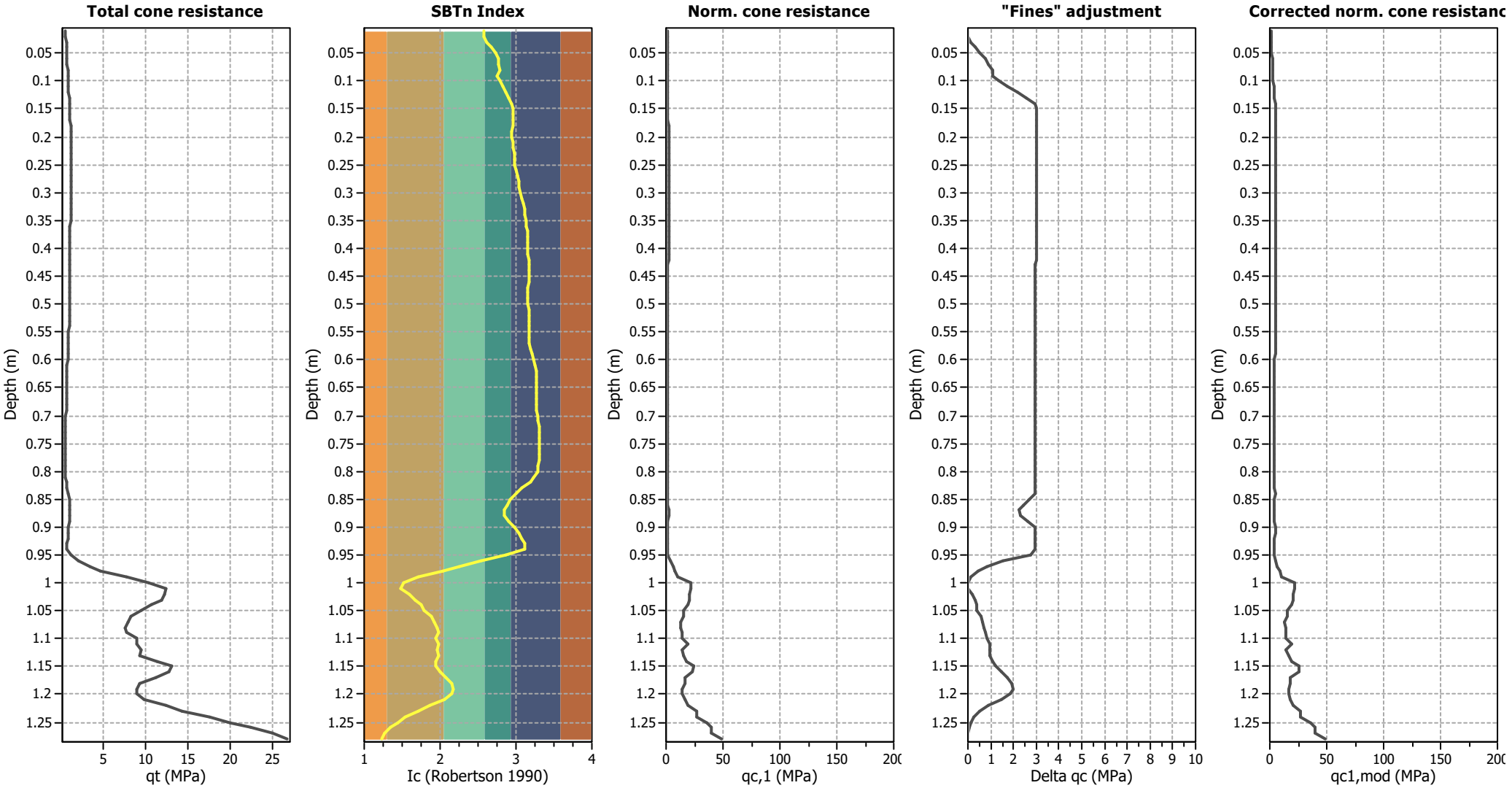






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

Liquefaction analysis overall plots (intermediate results)



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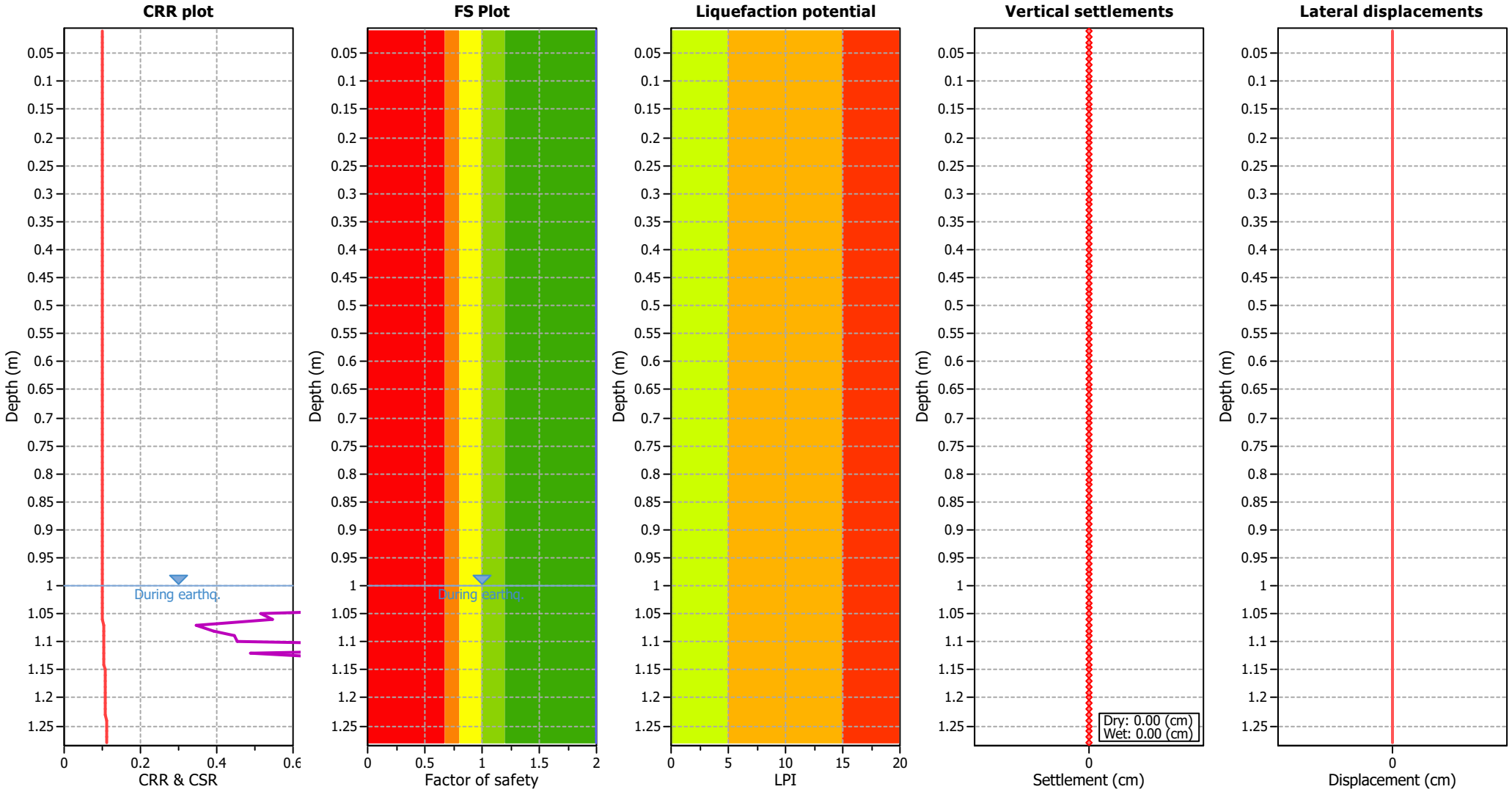
Liquefaction analysis overall plots



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LPI color scheme

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- High risk
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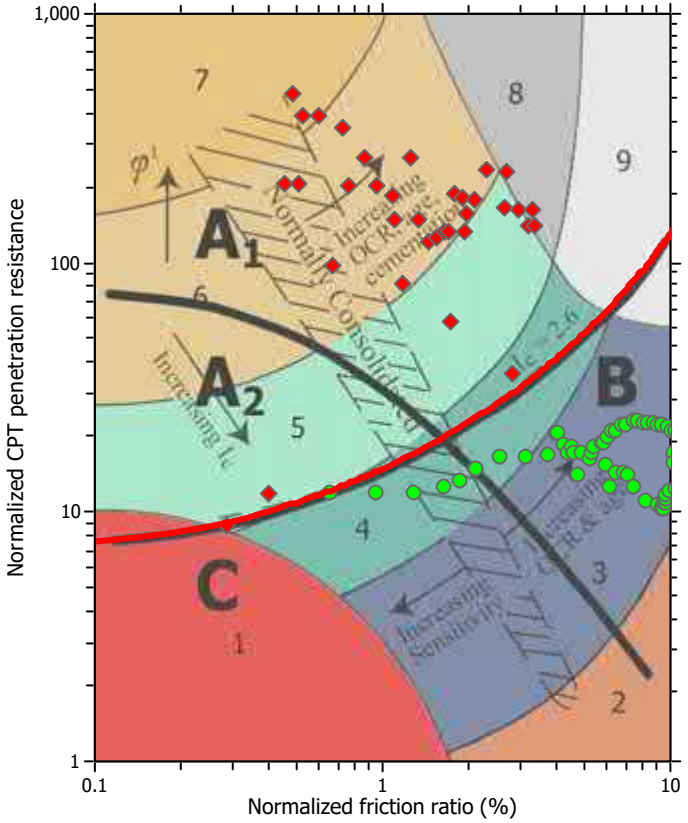
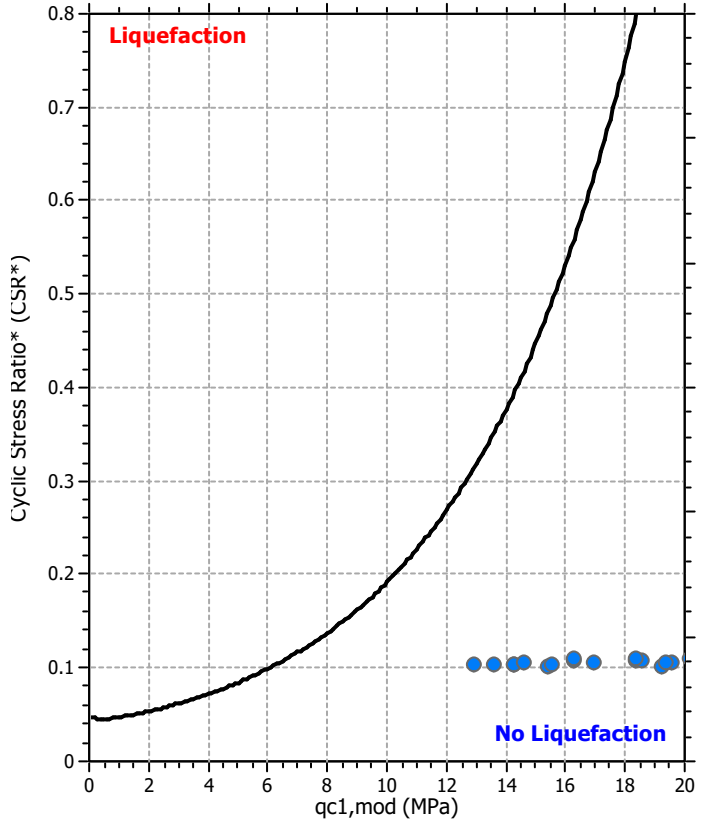
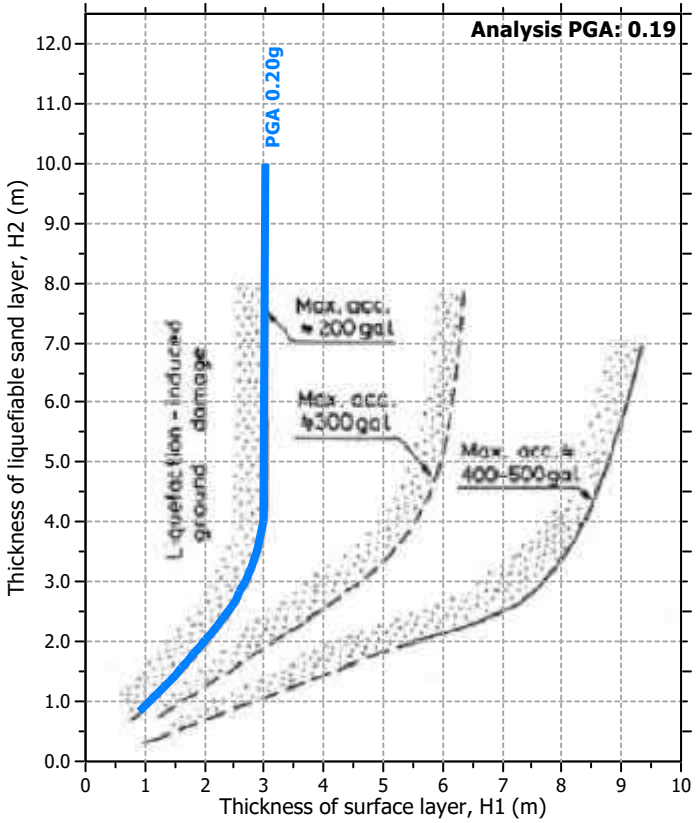
Liquefaction analysis summary plots







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LIQUEFACTION ANALYSIS REPORT

Project title : **Location :**

CPT file : CPT07 - 1/1,000-year (DCLS)

Input parameters and analysis data

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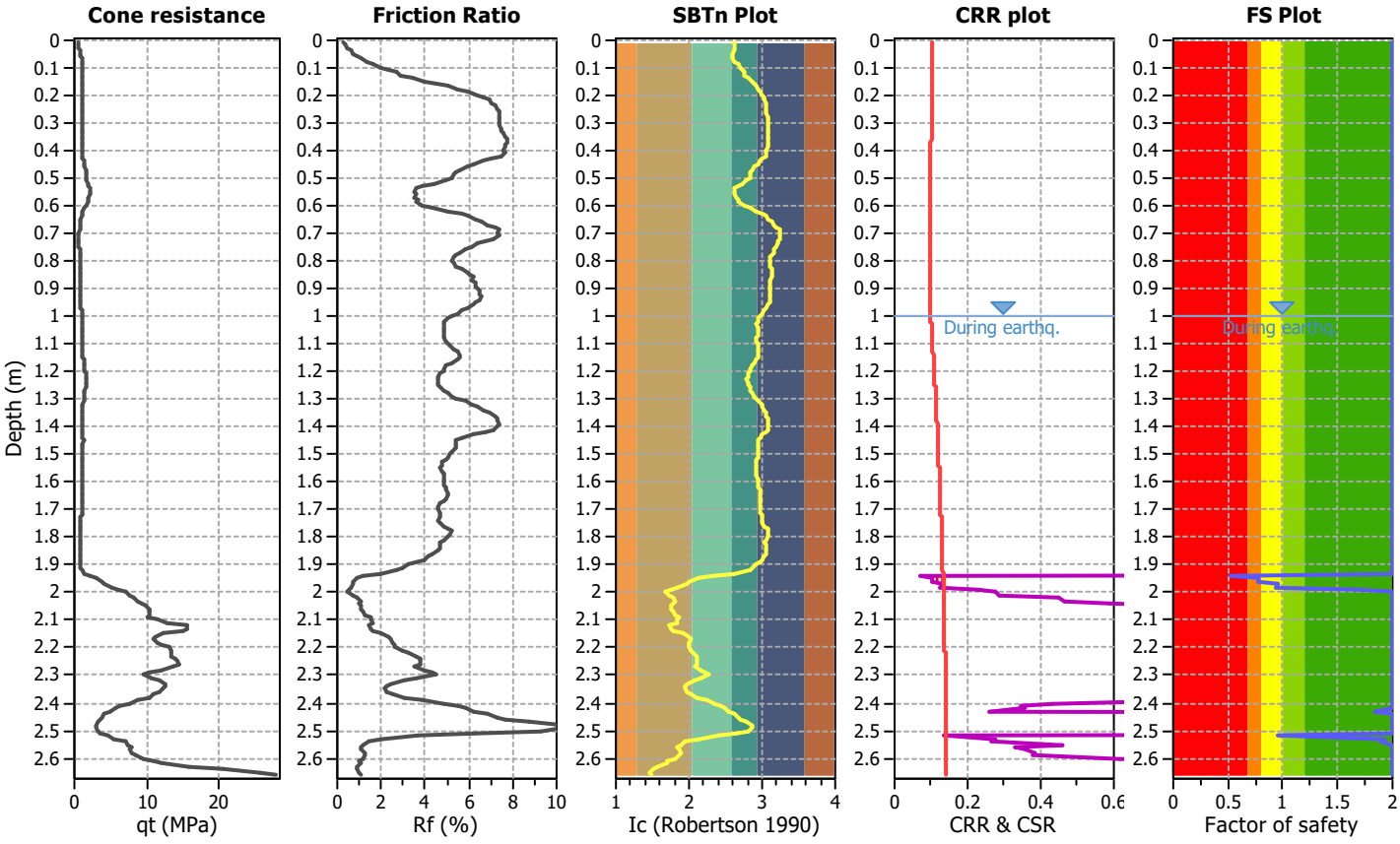

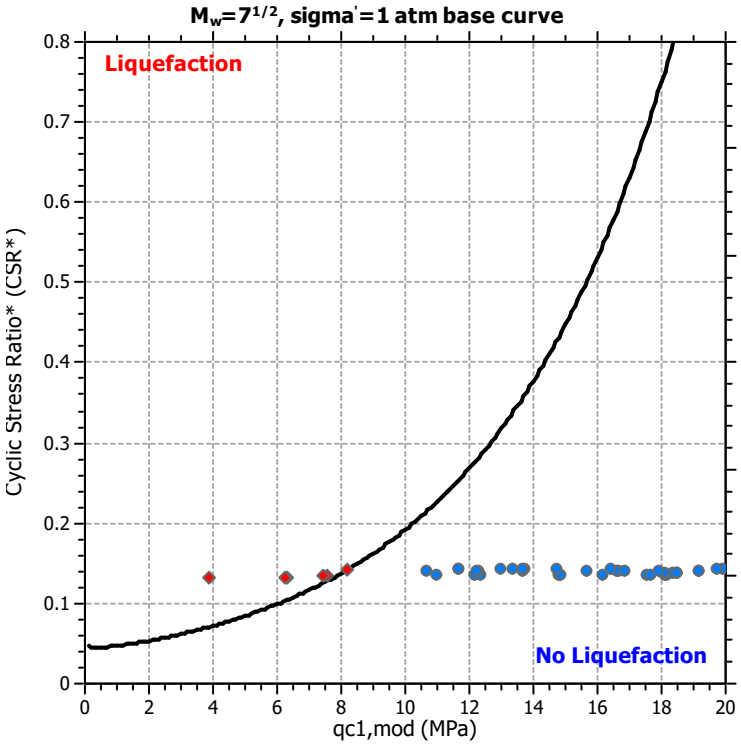

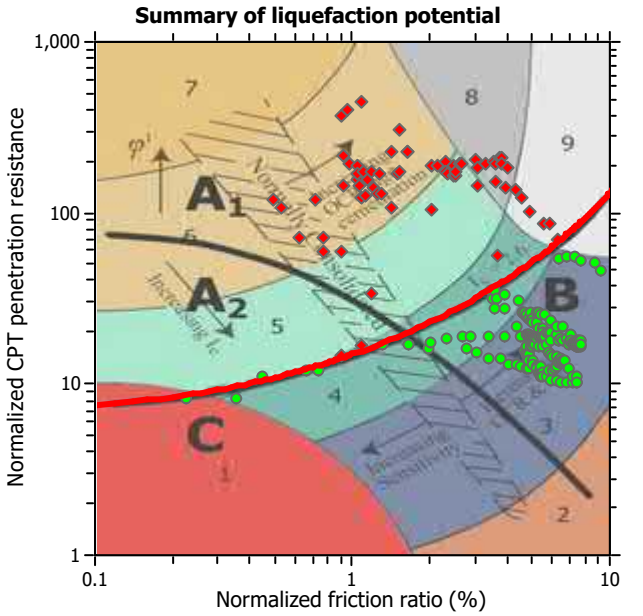

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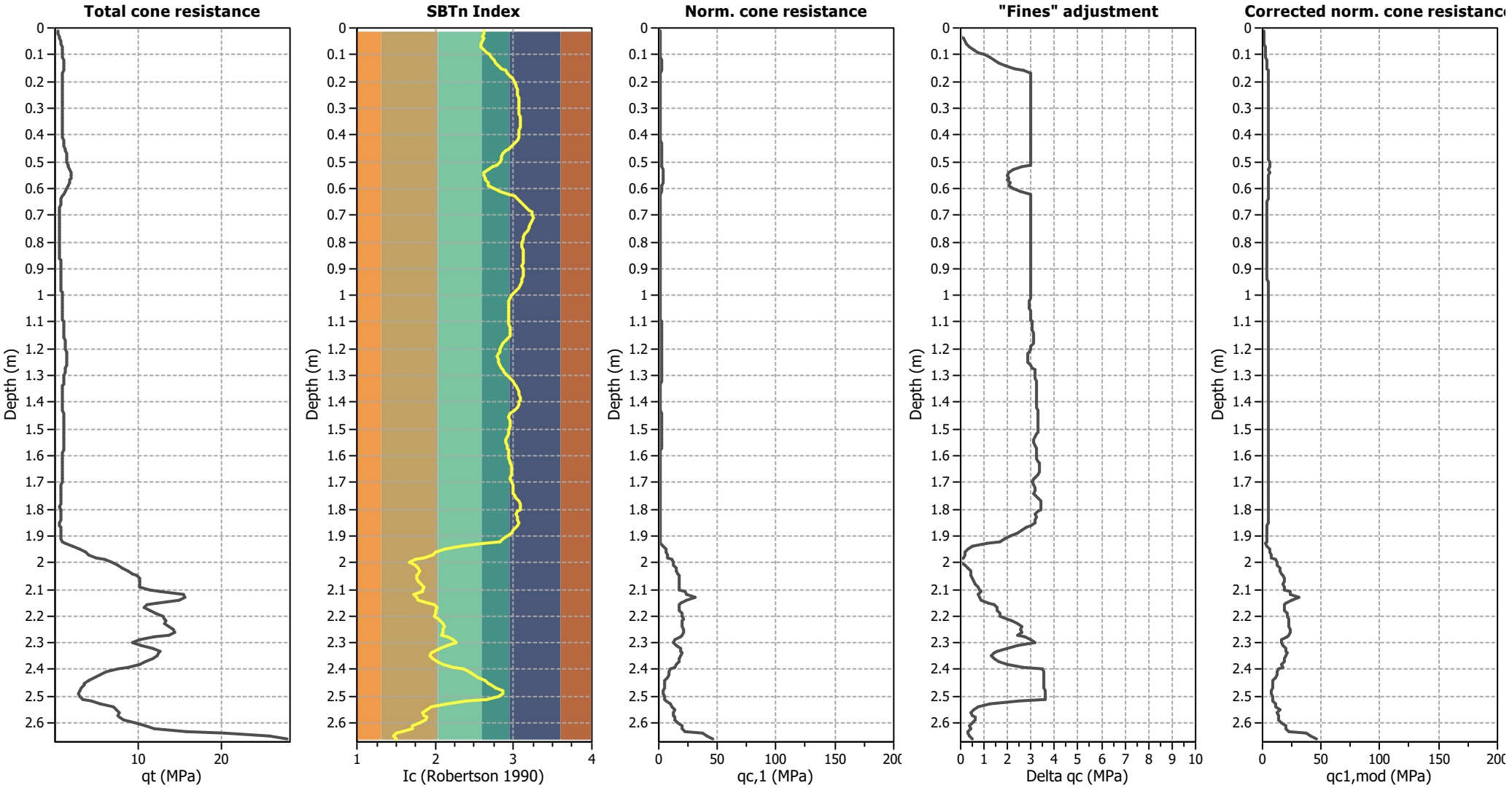
Liquefaction analysis overall plots (intermediate results)



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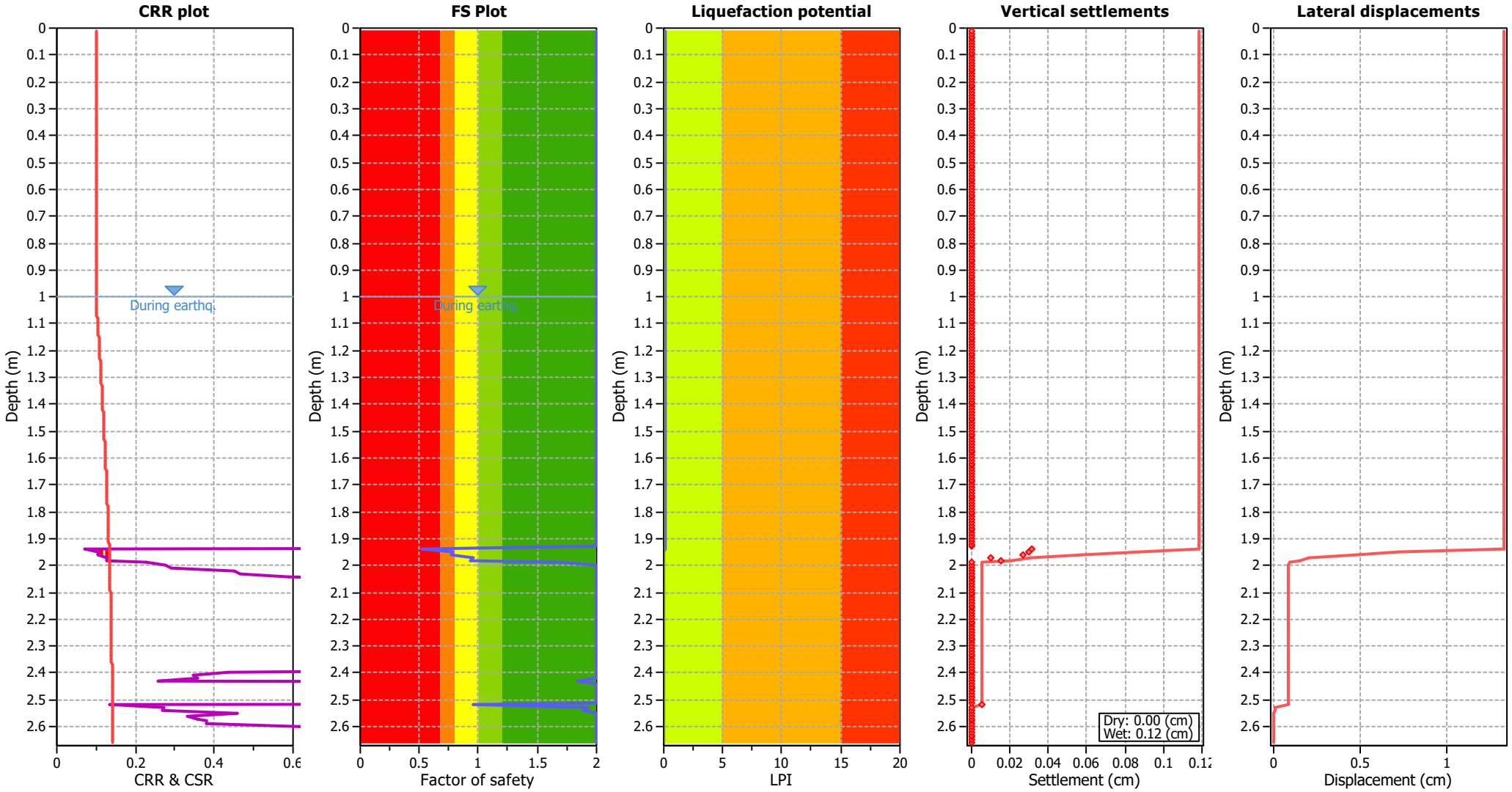

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LPI color scheme

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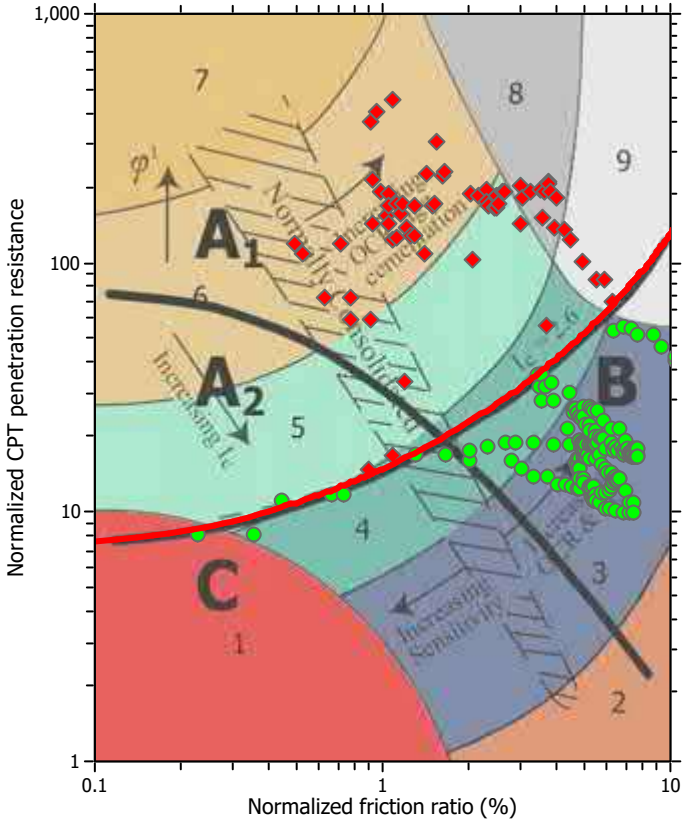
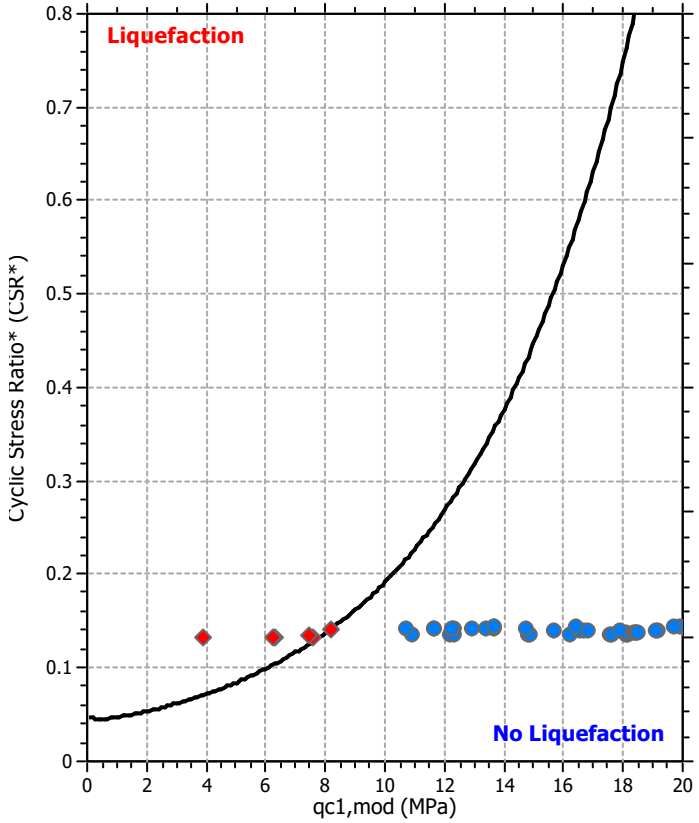
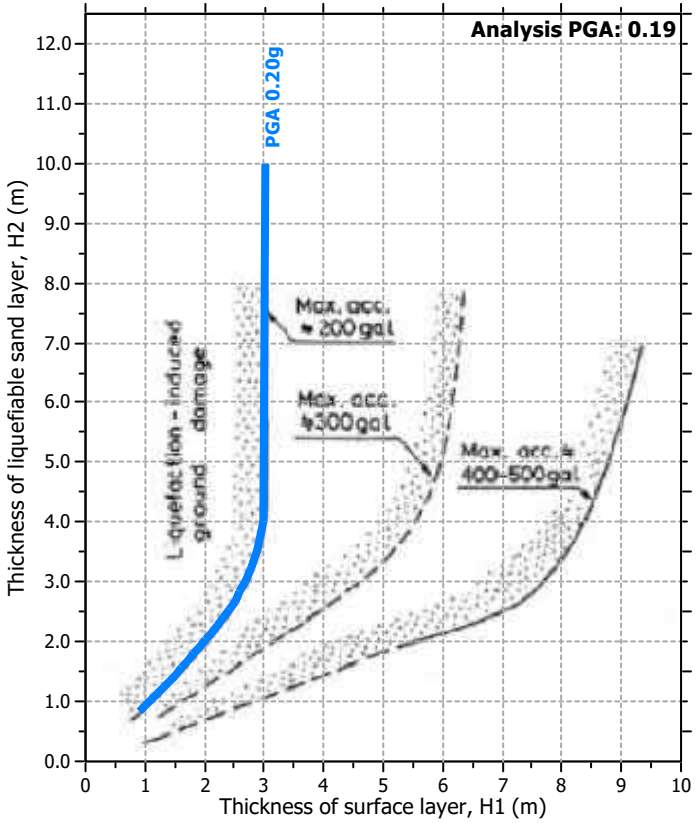
Liquefaction analysis summary plots







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LIQUEFACTION ANALYSIS REPORT

Project title : **Location :**

CPT file : CPT08 - 1/1,000-year (DCLS)

Input parameters and analysis data

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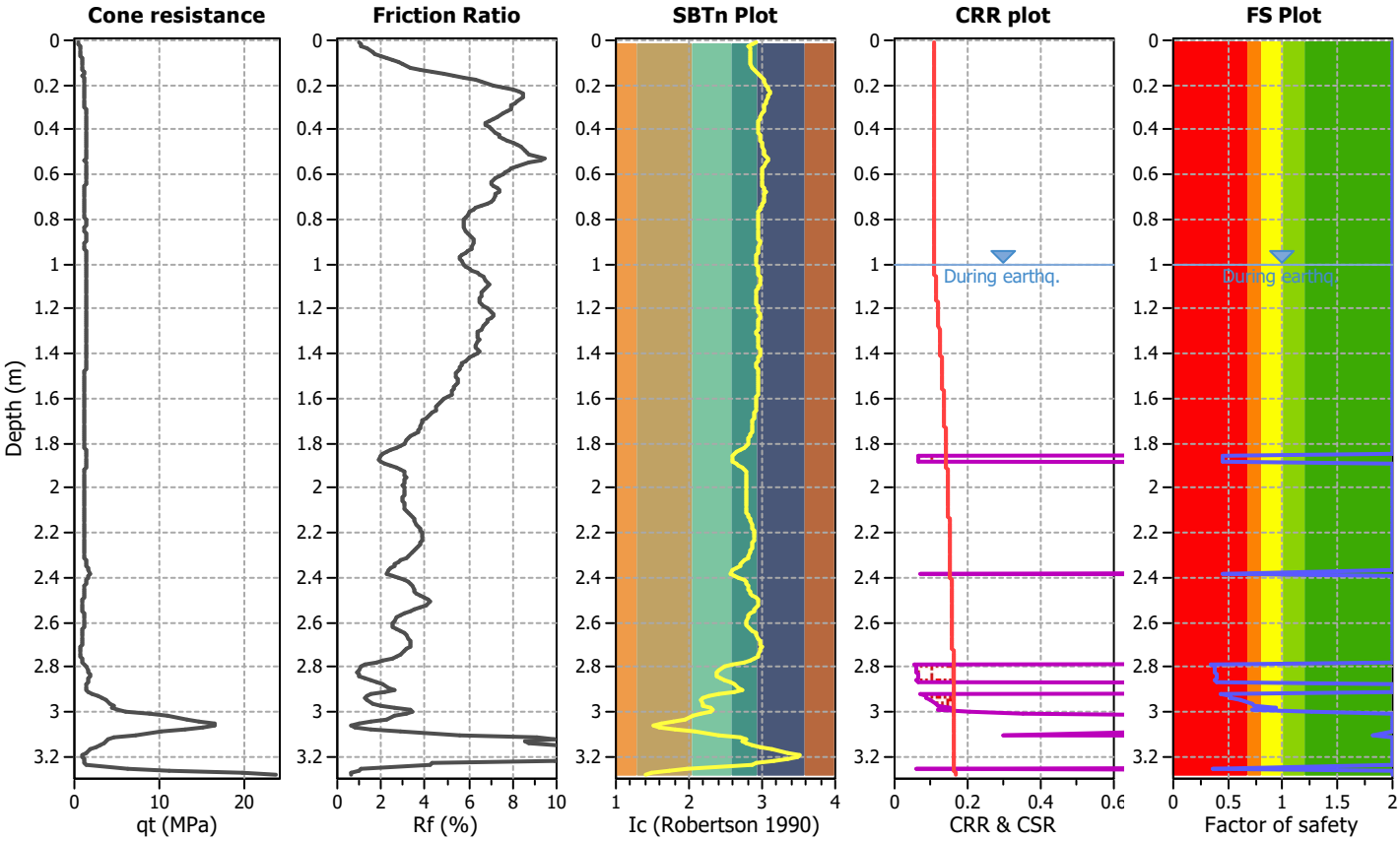

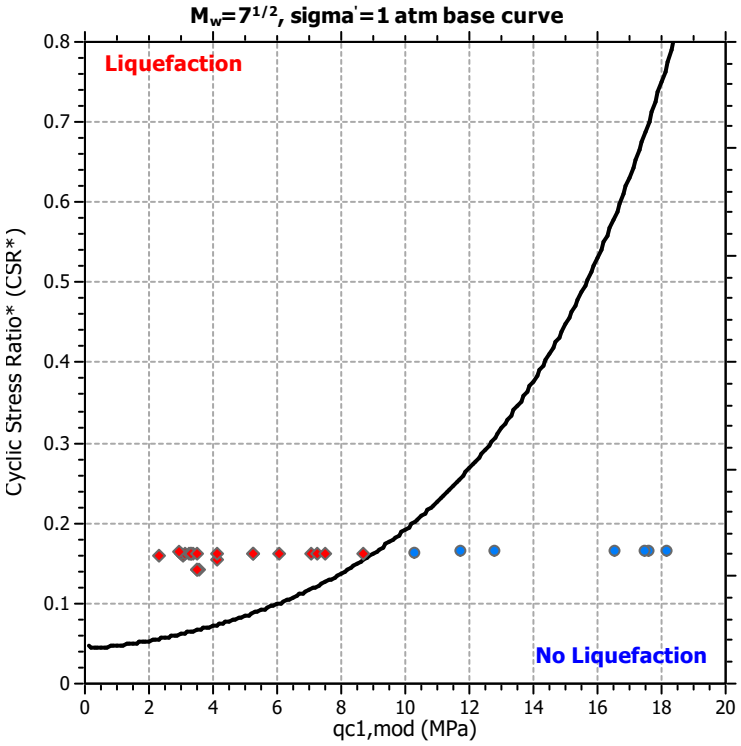

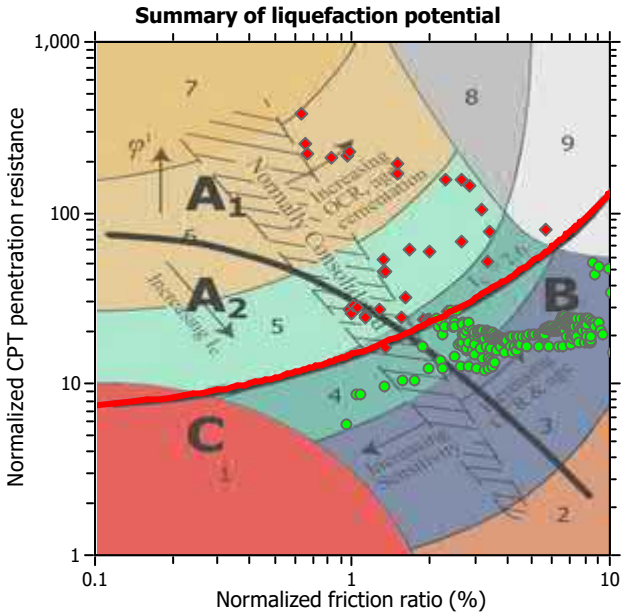

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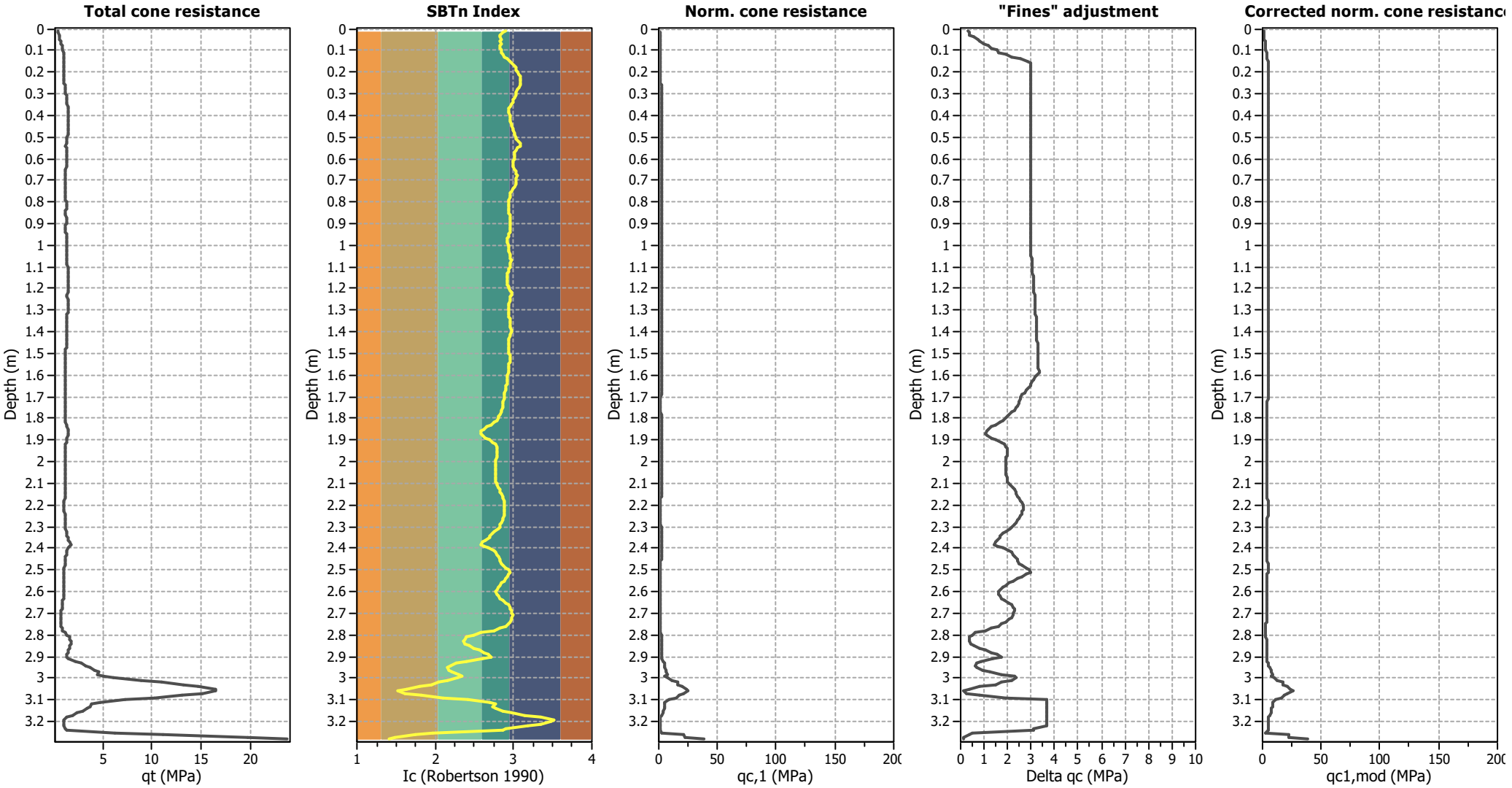

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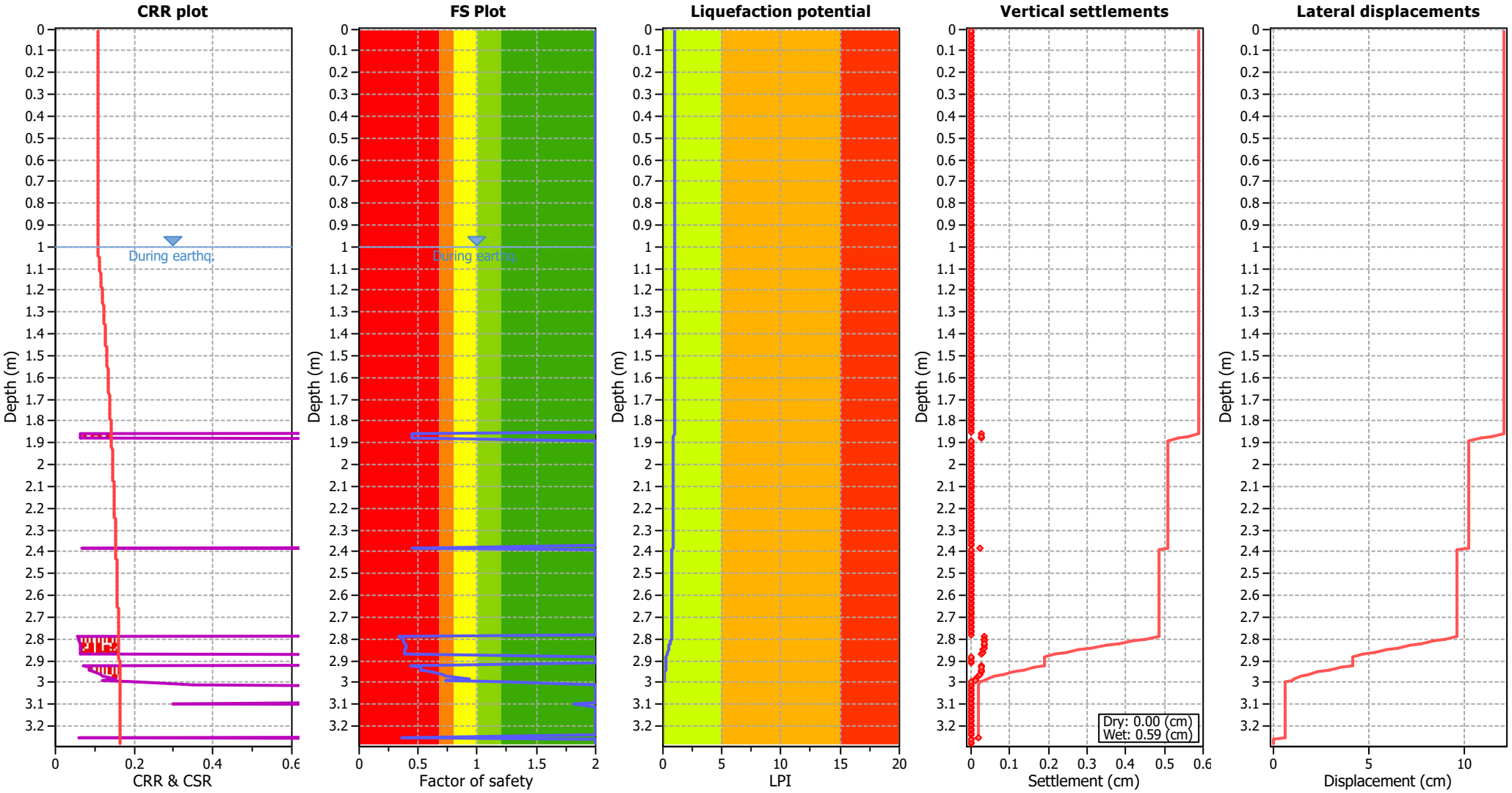

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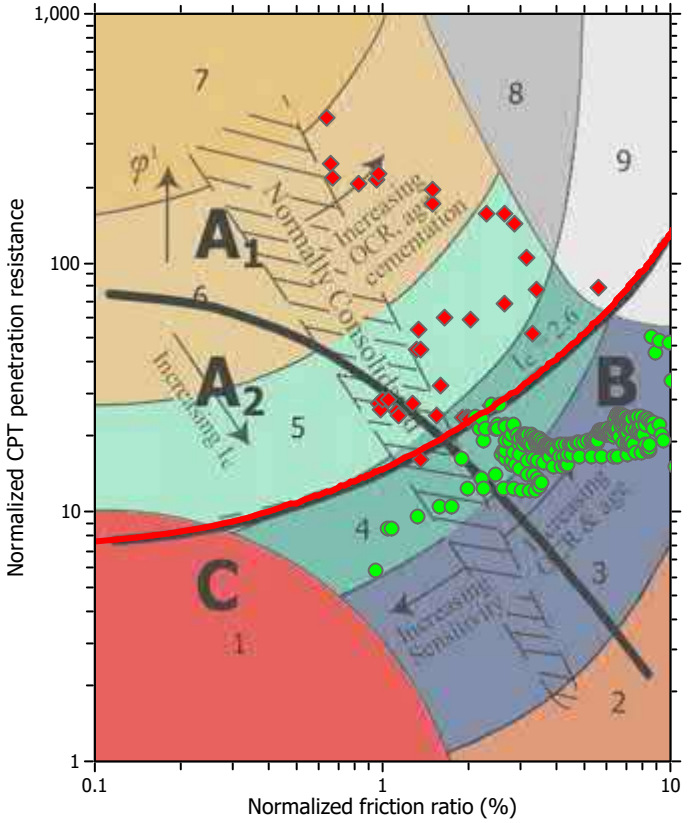

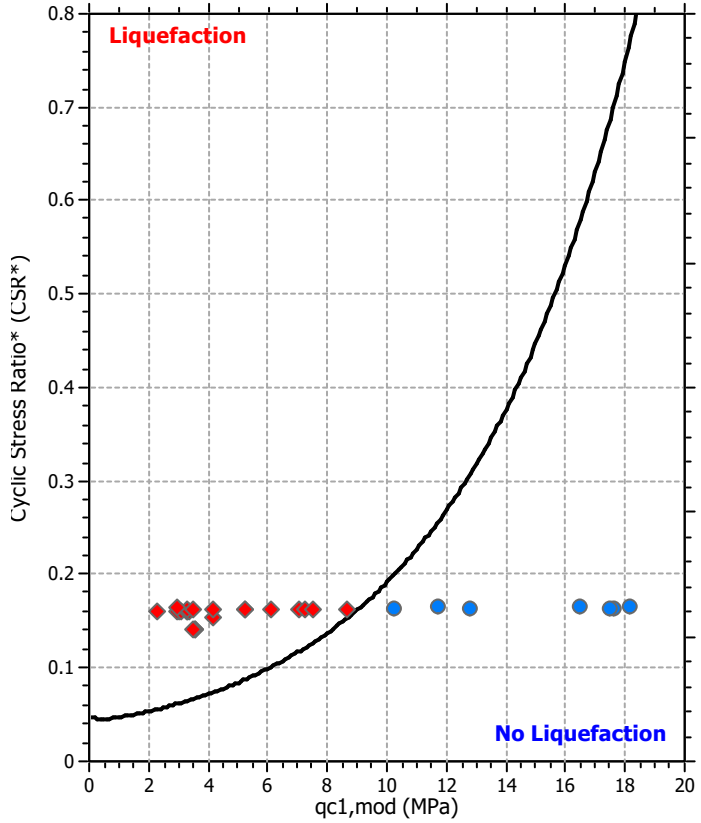

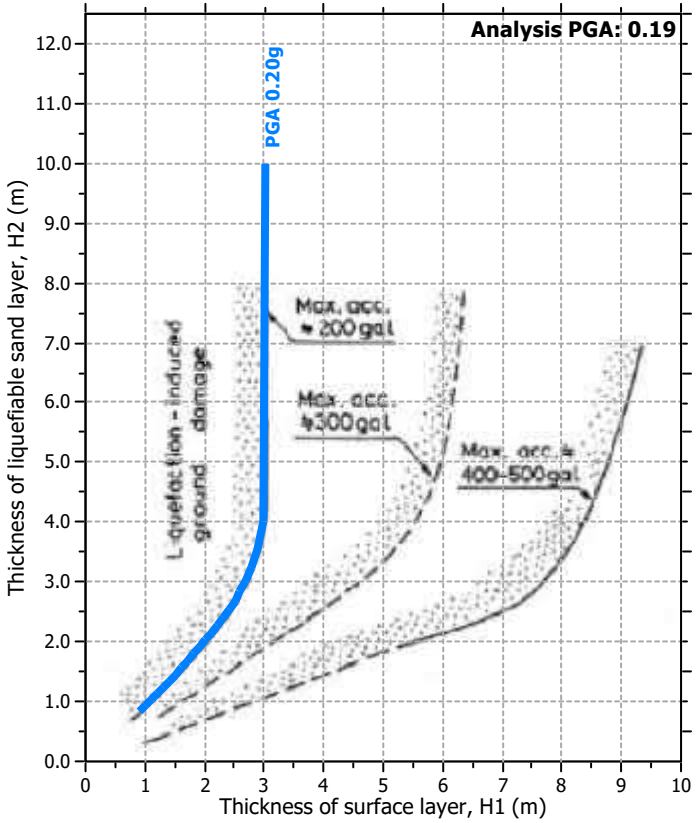

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Depth to water table (insitu):	2.40 m	Fill height:	N/A	Limit depth:	N/A

Management Plan

Te Roroa Development Charitable Trust

7229 State Highway 12

Waimamaku

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August 2025

KPN Consultants Ltd – PO Box 836 | Whangarei 0140 | Phone (022) 076 6471

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1.0 Introduction

The purpose of an Integrated Development is to facilitate the sustainable management of natural and physical resources in a comprehensive way.

This Management Plan is the result of the coordination of work by both technical experts and stakeholders in order to provide a comprehensive strategy for managing the proposed papakāinga development through considering various aspects of the site and surrounds to ensure it results in sustainable environmental management and is consistent with the protection of natural character, landscape, amenity, heritage, and cultural values.

The proposed papakāinga development avoids natural features except where there is no other viable alternative, and care has been taken to minimise the impact on the natural features of the whenua through careful positioning and engineering and to offset any disturbance through active enhancements such as planting and ensuring the infrastructure creates resilient future protection.

The Management Plan should be read in conjunction with the resource consent application including the assessment of environmental effects and accompanying specialist reports AEE and supporting documents (including appendices).

2.0 Te Roroa

Te Roroa are an Iwi of approximately 4,000 members, whose lands were settled with The Crown in 2008 (including the application site).

Te Roroa Development Charitable Trust was established in 2011 and comprises 5 Trustees, who are tasked by Whatu Ora with progressing the social, cultural and environmental.

Transitional housing services using transportable cabins are located at the Te Roroa campgrounds (in Waipoua), enabling Te Roroa to support the short-term housing needs and provide health & social service advocacy to whanau. This proposed papakāinga housing development will provide real opportunities for families to move into affordable long-term tenure (rental or lease), or home ownership supporting the aspirations of Te Roroa and of the people who live within the Rohe of Te Roroa.

Te Roroa also owns the Kaharau Farm Block (317ha) in Waimamaku which is utilised as a beef farm.

The proposed papakāinga development will allow for the sharing and continuation of matauranga Māori through activities such as gardening, gathering of kai and raranga, as well as space within dwellings for intergenerational living and whanau living side by side.

3.0 Description of the Proposal

Built Development

The proposal is a land use consent for the development of a communal nature on ancestral land owned by Maori. The papakāinga will consist of ten (10) units.

The proposed units include two sets of two 3-bedroom duplex dwellings each being 115m^2 in floor area; and six 5-bedroom standalone dwellings each having a floor area of 165m^2.

The proposed units would be single storey in design and constructed on timber piles. Each unit will be provided with its own fenced private area.

The proposed built development will comply with the relevant bulk and location provisions outlined in this District Plan, and will be located on flat land at the northern end of the property in close proximity to the existing built development within the Waimamaku settlement, ensuring that the design, scale and appearance of which would be as anticipated, and in keeping with the character of existing built development in the surrounding environment.

The proposed development is to be undertaken over one stage and the balance area will be retained for the continued undertaking of the existing rural production/grazing activities.

Access

Vehicular access to the units will be via a proposed new vehicle crossing onto State Highway 12 at the western end of the application site, and a shared private. This would involve some localised road widening of the state highway. Consultation is ongoing with the New Zealand Transport Agency/Waka Kotahi in this regard.

As the accessway will serve a total of 11 dwellings, a formed width of 5.0 m is proposed to comply with the relevant standards. At the point where the accessway crosses the existing wetland, it will narrow to a 3.0 m one-way bridge, to minimise disturbance to the wetland environment.

The client has expressed a preference for the accessway to be constructed using a sealed surface, due to its heightened aesthetic characteristics. However, this may be subject to development budget constraints. In the event, sealed surfacing (e.g. chipseal or asphalt) is not financially feasible, a compacted gravel surface will be utilised as an alternative.

Each unit will have car parking space(s) available and an overflow area for guest parking is also provided within the site. Manoeuvring is possible on-site and a truck turning area will be provided towards the end of the access to ensure that there will be adequate space for vehicles, including fire service vehicles, to turnaround such that they would not be required to reverse manoeuvre off the site.

The proposal involves the construction of a culvert and bridge crossing to span an existing natural inland wetland area.

The existing vehicular access to the site, located between two buildings on the state highway is to be closed to vehicles using bollards (or similar) and will be utilised for pedestrian access only.

Vehicular access to the existing farm house will be realigned from the proposed new private accessway.

Servicing

The proposed units will require on-site servicing, with wastewater (secondary) treatment and disposal being in accordance with the recommendations contained within the Land Development and Geotechnical Assessment Reports. A 15m setback from the intermittent stream will be provided with respect to the on-site land-based wastewater disposal area.

Water tanks will provide on-site water supply. Plus, two dedicated fire-fighting water tanks are proposed with the site.

Earthworks

A total approximate volume of earthworks (consisting of 1846m^3 cut and 2162m^3 fill) is proposed over a total approximate area of 17,140m^2. Some of the excavated material may be used onsite as fill.

The works are necessary to establish level building platforms, form the accessway, and manage secondary flows. Due to the site's gentle topography, significant retaining structures or steep batter slopes are not anticipated for the dwelling platforms. However, batter slopes and abutment retaining will be required to construct the bridge abutments where the accessway crosses the wetland.

Maximum cut and fill depths are anticipated to be approximately 1.62m cut and 2.8m fill across the site. The bulk of the cutting is associated with the formation of accessways and swales, while filling is primarily required to establish suitable building platforms and bridge abutments.

A site-specific Erosion and Sediment Control Plan in accordance with best practice will be prepared and is anticipated as a condition of consent prior to works being undertaken, and may include and may include, but not be limited to the following:

- Stabilised Construction Entranceway,
- Silt Fences / Super Silt Fences,
- Clean / Dirty water diversion bunds,
- Decanting earth bunds,
- Progressive site stabilisation.

At works completion, all exposed surfaces will be stabilised and reinstated with landscape planting/grass/driveway surface. At this point any risk of erosion and run off is negated and erosion and sediment control measures can be removed from site.

The proposed earthworks will be carried out over a limited duration (approximately 2-3 months).

Hours of operation will be limited to 7am to 7pm Monday to Saturday with no work on Sundays or public holidays.

Plant machinery will consist of an excavator, bulldozer, grader, dump truck, roller and crane for the bridge installation. be the small digger only. No material will leave the site; therefore, little construction traffic will be generated.

Any uncovered area will be planted upon the completion of construction.

Accidental Discovery Protocols and appropriate sediment controls will be established and maintained during all works on site, with any appropriate authorities from Heritage New Zealand will be sought.

Vegetation / Planting

Approximately 15m^2 of regenerating indigenous native species including mapou (*Myrsine australis*), nīkau palm (*Rhopalostylis sapida*), cabbage tree (*Cordyline australis*), karamu (*Coprosma robusta*), rewarewa (*Knightia excelsa*), and kohekohe (*Dysoxylum spectabile*) will be required to be removed to construct the accessway and bridge. However, in order to offset/mitigate this removal, it is proposed to undertaken an area of 45m^2 of native planting appropriate to the area near the wetland/watercourse as recommended in the Wetland and Watercourse Assessment report prepared by Wild Ecology. An appropriately worded consent condition in anticipated in this regard.

Additionally, landscape planting is proposed throughout the site, including along the rear of the existing residential properties located to the north of the proposed development

Communal Areas/Buildings

Communal spaces such as Kauta, Mara Kai & Papa Takoro have been positioned to the north and centre of the papakāinga, and are positioned so that they can be a meeting point with the Waimamaku community or an internal papakāinga community resource (vehicle free zone).

A communal room / Ruma Maori sits in the centre of the community to provide space for activities such as rongoa/raranga.

At the southern periphery or the development area, rural production oriented communal facilities such as a shared work shed, space for chickens, greenhouses and kai storage, plus composting and refuse station are located closer to the existing farm zone, directly off the main accessway. There is also a dedicated place to clean after hunting/fishing.

A papa Takoro has been located within easy sight from the larger dwellings, and nearer to the Waimamaku community and a little further away from the duplex dwellings, to minimise noise for kuia & kaumatua.

Energy Efficiency & Renewable Energy

Each dwelling will have solar panels installed on the roof, and provision has been made to install ground solar panels over and around the wastewater disposal area with the guidance and requirements from engineers and a landscape architect.

Solar energy will either be stored on site in batteries, or connected to the grid to bolster and give the local community an opportunity to source locally generated renewable energy.

The design of the dwellings has focused on locating living areas to the north facade, and bathroom and laundry areas to the south. The windows on the north facade are larger to let in sunlight for solar gain in wintertime, and the eve overhang keeps the sunlight out during summer to keep the dwellings cool. Providing casement window openings to the living, dining and bedroom areas allows for maximum user control of fresh air ventilation and where the floor plans allow for it windows provide cross ventilation.

Where possible building materials are to be locally sourced, natural and renewable, and timber framed construction will be utilised, with high performing thermal envelope build up. Earthwool insulation material made from recycled glass.

Some of the larger dwellings with bedrooms that could be utilised as home offices.

While there is good vehicular access provided to each unit, the papakāinga has a large vehicle free central community area that provides for easy pedestrian access to the Waimamaku shops and neighbours.

The mare kai aims to provide whanau with food resources to minimise shopping trips.

Heritage

The application site does not contain any known historical or archaeological areas.

Accidental Discovery Protocols and appropriate sediment controls will be established and maintained during all works on site.

Consultation

The proposed development is to be undertaken within Maori land and will provide real opportunities for whanau to move into affordable long-term tenure (rental or lease), or home ownership supporting the aspirations of Te Roroa and of the people who live within the Rohe of Te Roroa.

The site is not known to contain any archaeological features, nor is it identified as a site of significance to Maori, as such no consultation has been undertaken with local iwi.

On-going consultation is being undertaken with New Zealand Transport Agency / Waka Kotahi in respect of the proposed new crossing onto State Highway 12 and the potential increase of traffic movements.

4.0 Site and Locality Description

4.1 Site Description

The 16.063ha application site is legally described as Pt Sec 102 Blk IX Waoku SD (NA51B/943).

Figure 1 – Aerial photograph of application site (Source: FNDC GIS)

Existing Access

Despite having several frontages onto State Highway 12, the application site gains access via one existing vehicle crossing off located between two existing buildings and a driveway which extends through the site to the Waimamaku River.

Topography

As outlined in the Geotechnical Report, the topography of the site typically comprises gentle to moderate slopes that are undulating, with localised areas of steeply graded slopes that trend towards the Waimamakau River or towards intermittent / permanent streambeds which have formed in historic streambeds.

The proposed development is situated over an upper river terrace where the break wraps around from the south – west – north of the development.

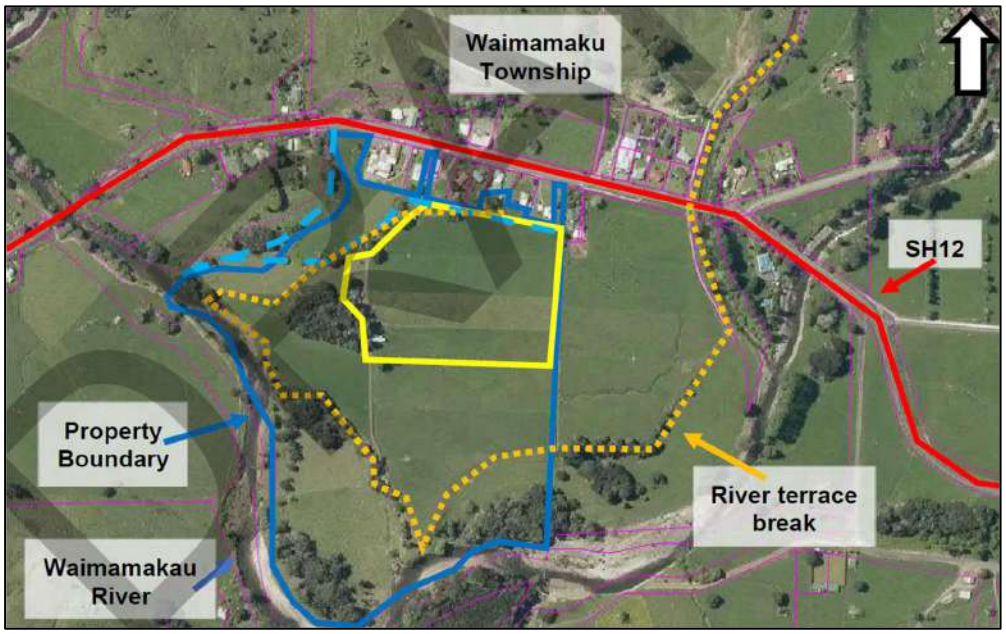


Figure 2 – Topographical map (Source: Geotechnical Report prepared by Hawthorn Geddes)

Geotechnical

A Geotechnical Report has been prepared by Hawthorn Geddes and submitted in support of the application (**Appendix F**), which confirms that the land in respect of which consent is sought, nor any structure on the land, is not, and is not likely to be subject to material damage by subsidence, erosion or slippage from any source. Additionally, the Geotechnical Report concludes that sufficient provision has been made for stable physical access can be provided.

The Geotechnical Report makes recommendations with respect to earthworks and wastewater disposal.

Natural Hazards

The lower portions of the application site, including along the Waimamaku River have been identified as flood hazards.

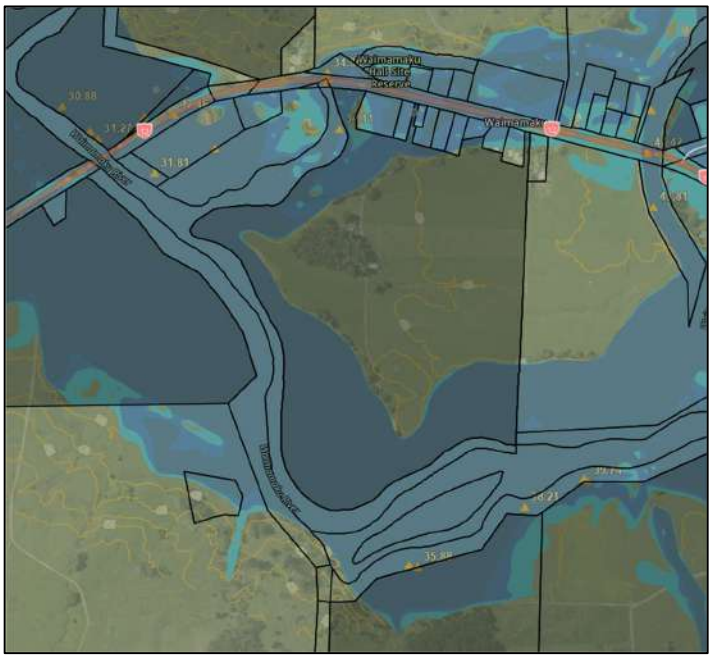


Figure 3 – Identified Flood Hazards the application site and surrounds (Source: NRC GIS)

Soil Types

The soils on the application site have been identified as LUC Class 2 Arable. Very good multiple-use land, slight limitations, suitable for cropping, viticulture, berry fruit, pastoralism, tree crops and forestry.

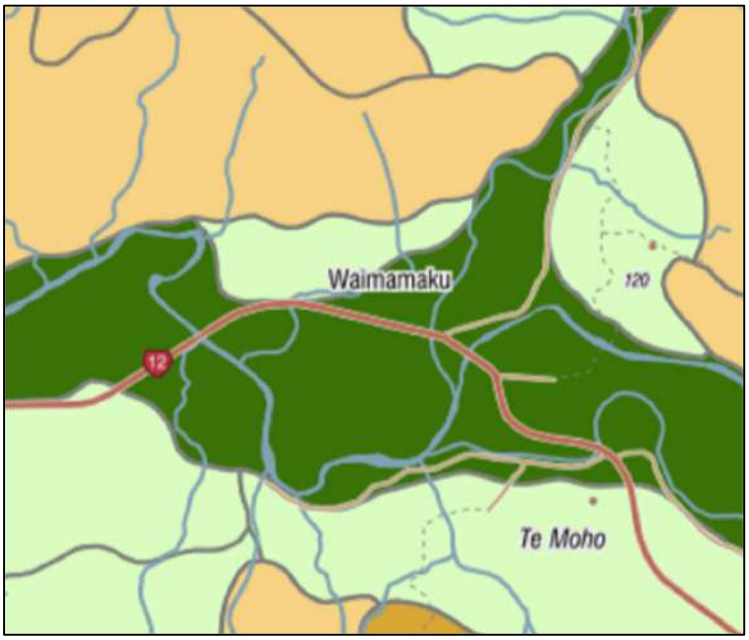


Figure 4 – Land Use Class map (Source: Manaaki Whenua – Landcare Research)

Built Development

The property currently contains the existing farm homestead with some associated accessory buildings and no further built development.

Ecological

The subject site is largely maintained in managed pasture and is drained by a number of watercourses primarily extending along the sites northern and central aspects.

The site forms a lower catchment area of the Waimamaku River which meanders to the south and west of the site.

Parts of the on-site watercourses have been modified through straightening, diversion, and piping, as well as through the redirection of stormwater—and potentially wastewater—from neighbouring properties, and one stream has been modified from a meandering natural stream channel to a straight stream channel with limited original ecological functionality. These interventions have led to a degraded ecological condition.

While the streams may still retain some ecological value, their overall status is best characterised as degraded, primarily due to extensive historical modification and unrestricted grazing access. This has contributed to lack of ecological functionality, increased sedimentation, bank erosion, and a consequent decline in water quality.

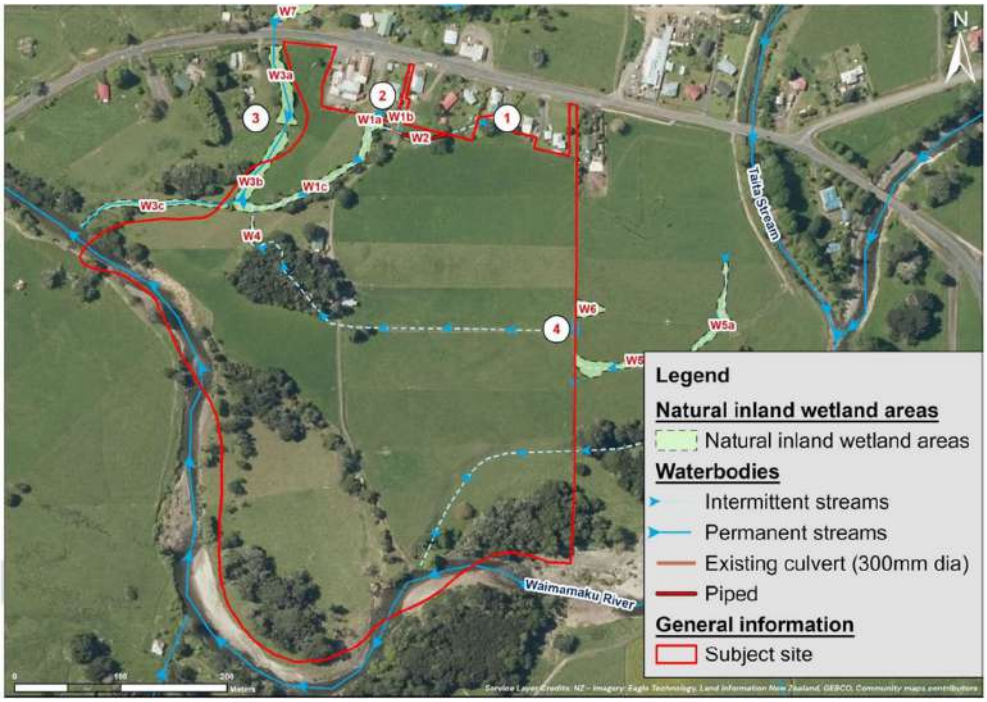


Figure 5 – Watercourse mapping (Source: Wetland and Watercourse Assessment report – Wild Ecology)

4.2 Locality Description

The application site is located approximately 7km east of Whakamaharatanga marae and approximately 10km east of the Waimamaku Beach.

The Waimamaku settlement includes a 4-Square convenience store, a GAS service station, a town hall and a medical clinic. The wider surrounding area is characterised by rural production land use activities.

Te Roroa also owns the Kaharau Farm Block (317ha) in Waimamaku which is utilised as a beef farm.

Public reserve land in Waimamaku primarily consists of the Waimamaku Coastal Track and the Waimamaku Scenic Reserve (and Conservation Areas).

The Waimamaku Coastal Track Arai starts at Te Uru Recreation Reserve and follows the rugged coastline, including beaches, cliffs to the mouth of the Waimamaku River.

The Waimamaku Scenic Reserve, Waimamaku Conservation Area, Brooks and Kokohuia blocks and other QEII covenants land are designated for conservation due to their unique flora and ecological significance.

Additionally, the Arai Te Uru Rescreation reserve is a publicly accessible reserve located at Hokianga Heads at the start of the Waimamaku Coastal Track, which is administered by the Department of Conservation (DOC).

5.0 Planning Requirements

5.1 Operative Far North District Plan (ODP)

The site is zoned within the Rural Production Zone under the ODP. An assessment against the relevant ODP rules has identified the following breaches:

- Rule 8.6.5.2.2 Papakāinga Housing is provided for as a controlled activity, provided it complies with all the standards for permitted activities in this zone and in Part 3 - District Wide Provisions, except for the standards for residential intensity; and (b) each residential unit has at least 3,000m² surrounding the unit for its exclusive use; provided that the amount of land elsewhere on the site, in addition to the 3,000m² surrounding the unit, is not less than that required for the discretionary activity residential intensity standard (Rule 8.6.5.4.1 which is one unit per 2ha of land).

  The application site is approximately 16ha in area, and as 10 units are proposed this is 2 more than allowed density wise, therefore being assessed as a **Discretionary Activity** (refer Rule 8.6.5.4(c)).

- Under Rule 8.6.5.4.2 'Integrated Development', notwithstanding the rules in the Rural Production Zone relating to the management of the effects of activities, an application for integrated development of activities only on Maori freehold land and Maori customary land and Crown land reserved for Maori (as defined in Te Ture Whenua Act 1993) may be made where the proposed development does not comply with one or more of the rules.

  This rule applies to Maori customary land, Maori freehold land and Crown land reserved for Maori for activities including papakāinga housing and marae and associated buildings.

  Integrated development plans will be considered in the context of other whanau and hapu lands in the vicinity, including an acknowledgement of areas of open space, reserve, natural vegetation and other amenities already provided by the land-owning groups concerned.

  This Management Plan is a requirement for integrated development consent applications.

- Consent is required under Rule 12.2.6.3.1 Indigenous Vegetation clearance in the Rural Production and Minerals Zones as 15m^2 of vegetation is proposed to be cleared to make way for the culvert, bridge and vehicular access, within 20m of a wetland, I therefore being assessed as a **Discretionary Activity**.
- Consent is required as a Restricted Discretionary Activity under Rule 12.3.6.2, as while the volume of works will be less than 5,000m3, the maximum average fill height at the right-side bridge abutment is approximately 1.65 m.
- Rule 15.1.6A.2.1 'Traffic Intensity' sets the Traffic Intensity threshold value for a site by Table 15.1.6A.1. The Traffic Intensity Factor for a proposed activity (subject to exemptions) shall be determined by reference to Appendix 3A in Part 4.
- It is estimated that the proposed development will generate between 31-200 one-way traffic movements and access is via a State Highway, therefore being assessed as a Restricted Discretionary Activity.
- Consent is required under Rule 15.1.6C.1.1 as a Discretionary Activity. The private accessway has been designed in accordance with Appendix 3B-1. However, the private access is for 11 household equivalents (including existing farm house), will have a formed width of 5.0m for the majority of its length, and the access will be onto the State Highway.

5.2 Proposed District Plan (PDP)

The proposed development does not require resource consent with respect to any of the rules of the Proposed District Plan with immediate legal effect:

- No pruning or removal is proposed. No works will be undertaken within the rootzone of the notable tree; and
- Any earthworks will be undertaken in accordance with Accidental Discovery Protocol standards EW-S3 and sediment control standards EW-S5.

6.0 Sustainable Management

Sustainable management involves balancing current needs with the need to preserve resources and the environment for future generations, ensuring long-term viability and well-being. It's about making choices that benefit people, the planet, and the economy, rather than just focusing on short-term gains. This approach considers environmental, social, and economic factors, promoting ethical practices and responsible resource use.

This assessment outlines how the proposed papakāinga development aligns with the principles of sustainable management under the Resource Management Act 1991 (RMA). The proposal supports the sustainable use of ancestral Māori land for housing, cultural, and economic purposes, while safeguarding the land, water, and ecosystems for current and future generations.

6.1 Management Objectives

Environmental Protection	Avoid, remedy or mitigate adverse effects on land, water, ecosystems, and biodiversity.
Cultural Sustainability	Enable the use and occupation of ancestral Māori land by whānau in a way that supports tikanga Māori, self-determination and kaitiakitanga.
Efficient Use of Resources	Maximise land utility for both housing and rural activity while minimising reverse sensitivity, waste and reliance on external infrastructure.
Resilience and Self-Sufficiency	Provide for off-grid servicing (e.g., water tanks, on-site wastewater), food gardens, and renewable energy, supporting long-term resilience. Provide pedestrian connectivity.
Ongoing Monitoring & Adaptability	Ensure that construction, ecological restoration, and servicing meet consent conditions, and adapt as necessary.

6.2 Actions

The following environmental protection measures are required to achieve these objectives:

Action	Location	Method	Monitoring
Protect wetland and waterways	Bridge access crossing	Narrow (3.0m) bridge with culvert and retaining walls to minimise earth disturbance.	Wetland buffer zone mapped; contractor briefed on limits of works.
Offset native vegetation removal	Around wetland and stream	45m² of native revegetation using local species to offset 15m² removed.	Planted areas to be inspected post-construction and maintained in perpetuity, with monitoring by Council for 3+ years.

Manage erosion and sediment	All construction areas	Use of silt fences, sediment bunds, stabilised entry points, progressive stabilisation.	Erosion Sediment Control Plan (ESCP) to be implemented and inspected weekly during works.
Earthworks control	Entire site	Reuse fill on-site, limit machinery size, restrict to 2–3 month window.	Site manager to keep earthworks log; council may inspect.

6.3 Monitoring, Management and Review

Governance

- The development will be managed by the whānau trustees or governing rūnanga/committee representing the landowners.
- Responsibilities include overseeing contractors, managing communal infrastructure, and maintaining revegetation and landscaping areas.

Monitoring Plan

- Pre-Development: Site walkover, wetland marking, ecological clearance.
- During Construction: Weekly erosion/sediment control inspections;
- Site manager log; reporting under Accidental Discovery Protocols (ADP).
- Post-Development: Annual wastewater servicing; Replanting maintenance; Annual whānau hui.

Review Triggers

- Environmental non-compliance or complaints.
- Infrastructure failure or safety concerns.
- Requests from whānau to expand development/communal areas.
- Regulatory requirements.

6.4 Conclusion

The proposed papakāinga development reflects a comprehensive commitment to sustainable management, balancing the development needs of the community with the protection and enhancement of the natural environment. Through best-practice design, Māori cultural frameworks, and ongoing monitoring, the proposal provides a strong model for holistic, enduring development on ancestral Māori land.

7.0 Proposed Integrated Development Measures

The following sections detail the Integrated Development Measures for the proposed Papakāinga Development:

7.1 Protection and Enhancement of Natural Features and Indigenous Biodiversity

- Native vegetation clearance minimised to 15m²; offset by 45m² of replanting near wetland using eco-sourced indigenous species.
- Long-term pest plant control through regular manual removal and community education.
- Dog and cat control policy to be adopted for development: No free-roaming pets; restrictions on pet ownership; awareness signage.
- Riparian margins to remain vegetated with native plants

7.2 Protection of Sites of Significance to Māori

- Accidental Discovery Protocol (ADP) adopted, to be included in all contractor briefings.
- Pre-construction site blessing (karakia) undertaken by kaumātua.
- Ongoing oversight by kaitiaki from the land-owning whānau to identify and protect unknown waahi tapu if discovered.

7.3 Stormwater and Effluent Management

- On-site wastewater and stormwater systems designed in accordance with geotechnical recommendations, setback 15m from waterways for wastewater disposal.
- Roof water collected via rain tanks; overflow directed to soakage areas.
- Sediment control during construction as per ESCP.
- Annual servicing of wastewater systems with logs retained by the papakāinga management committee.

7.4 Integrated Catchment Management

- Stormwater and planting designs align with wider catchment hydrology to support healthy downstream flow.
- No discharge into waterbodies; emphasis on retention and onsite soakage.
- Consultation with Wild Ecology to ensure revegetation planting enhances ecological connectivity.

7.5 Placement and Visual Appearance of Dwellings and Structures

- Single-storey dwellings with low-profile timber construction to reduce visual impact.
- Buildings clustered to minimise land disturbance and maintain open space for communal use and ongoing rural production activities.
- Consistent material palette and landscaping to integrate with existing built character.
- Water tanks located to rear or side of buildings; painted or screened to blend with surroundings.

7.6 Internalisation of Effects and Avoidance of Reverse Sensitivity

- Development sited away from boundaries with operational farmland as much as possible to avoid nuisance effects.

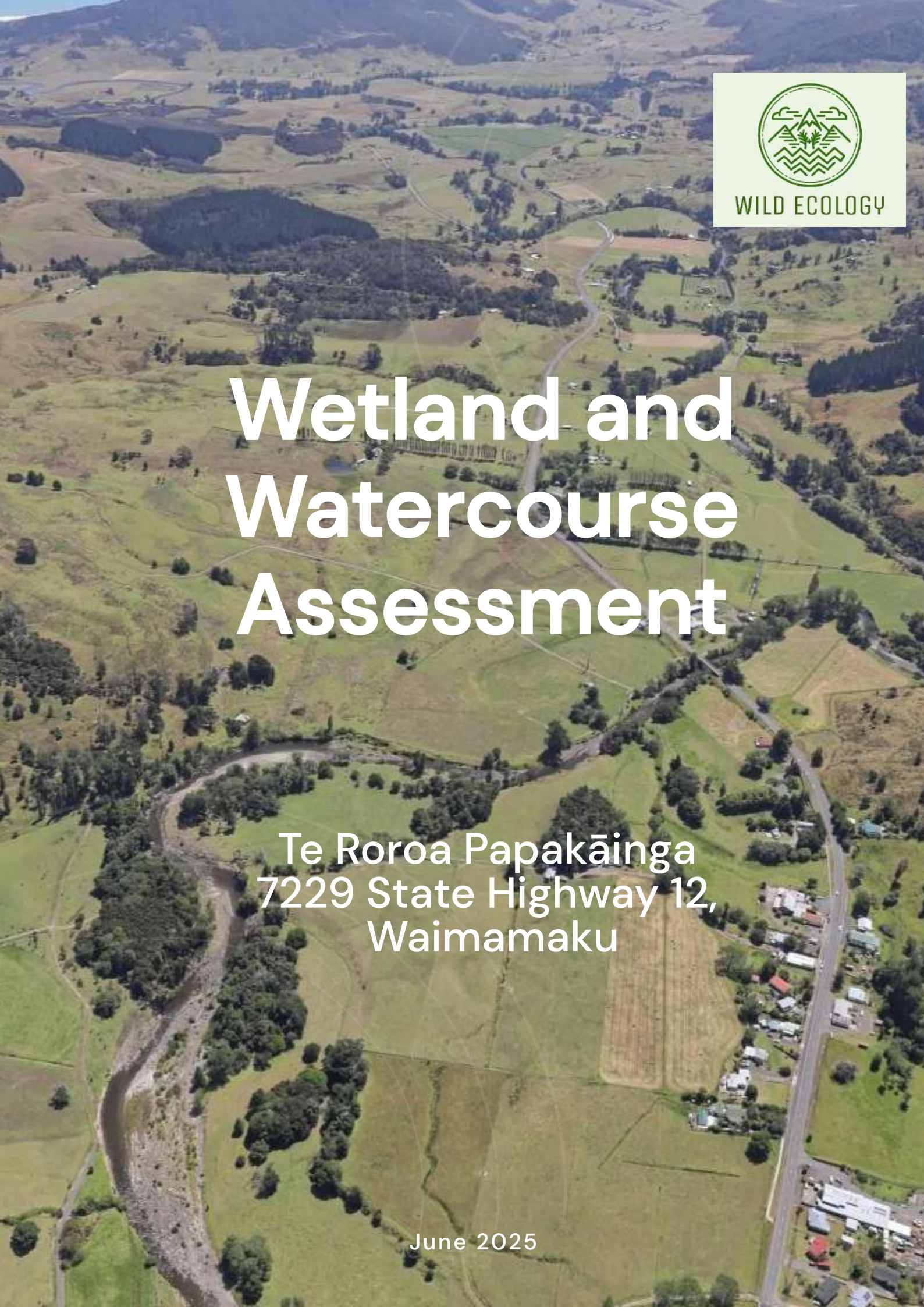
- Communal areas centrally located to reduce noise/light effects near neighbours.
- Continued use of balance land for grazing; physical separation and planted areas buffering between houses and rural use.

7.7 Transport and Access Measures

- New 5.0m wide accessway with adequate parking, on-site manoeuvering and sight lines.
- One-way bridge with give-way signage and trimmed vegetation for visibility.
- Pedestrian-only access retained for original entry to minimise vehicle conflict.
- Ongoing consultation with Waka Kotahi to ensure SH12 safety and compliance.

7.8 Consultation and Community Engagement

- Engagement with NZ Transport Agency regarding traffic safety and access.
- On-site hui with whānau and trustees to confirm layout, communal priorities and servicing.
- No formal iwi consultation undertaken (site not identified as a site of significance), but cultural oversight provided by landowners.
- Consideration of privacy and visual amenity for nearby neighbours through landscape planting.



WILD ECOLOGY

Wetland and Watercourse Assessment

Te Roroa Papakāinga
7229 State Highway 12,
Waimamaku

June 2025

DOCUMENT QUALITY ASSURANCE

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1.0 INTRODUCTION

1.1 Project overview

Te Roroa Development Charitable Trust ("the Applicant") engaged Wild Ecology to conduct a Watercourse and Wetland Assessment for the proposed papakāinga development at 7229 State Highway 12, Waimamaku.

A site visit was conducted on May 30th, 2025, to classify the watercourses within the site boundaries based on their definitions in the Proposed Regional Plan for Northland (February 2024) and to determine whether the site contained any habitats meeting the definition of a 'natural inland wetland' under the National Policy Statement for Freshwater Management (NPS-FM) (2020).

This report focuses on the delineation of wetlands and assessment of watercourses within the proposed development footprint. It evaluates the activity against the requirements of the National Environmental Standards for Freshwater (NES-FW 2020) and assesses whether the proposed development can proceed without adversely affecting existing aquatic features on-site. Where applicable, mitigation recommendations are provided to address potential impacts.

2.0 METHODOLOGY

2.1 Desktop review

The desktop investigation included a review of relevant ecological site overlays and information. Ecological databases were also accessed including Retrolens historic aerial imagery, Oblique aerial imagery, LIDAR aerial imagery and contours, and LINZ river centrelines 1:50000 scale.

2.2 Watercourse classification

Watercourses on site and immediate surrounds were classified in general accordance with criteria outlined in the Proposed Regional Plan for Northland (February 2024). Classification was made in general accordance with the decision tree outlined under Table 1.

Table 1: Proposed Regional Plan for Northland criteria for permanent, intermittent rivers and streams, ephemeral streams and artificial watercourses

Criterion	Definition
Permanent river or stream	
1	Evidence of continuous flow.
Intermittently flowing river or stream	
1	Evidence of natural pools
2	Well defined channel. Banks and bed can be distinguished.
3	Surface water present (more than 48hrs after a rain event).

4	Rooted terrestrial vegetation not present across the entire cross-sectional width of channel.
5	It appears as a blue line on topographical maps at 1:50,000 scale.
Ephemeral stream	
1	Stream bed above the water table at all times.
2	Water present only during and shortly after rain fall.
	Does not meet classification of an intermittently flowing river or stream.
Artificial watercourse	
1	A man-made channel constructed in or over land for carrying water and includes an irrigation canal, roadside drains and water tables, water supply race, canal for the supply of water for electricity power generation and farm drainage canals.
2	It does not include a channel constructed in or along the path of any historical or existing river, stream or natural wetland.

2.4 Wetland delineation

For wetland delineation protocols in the field the NPS-FM refers to the Ministry for the Environment (MfE) Wetland delineation protocols (2022) which are generally based on following the four main steps outlined in Figure 1. The primary step is based on the Vegetation tool for wetland delineation in New Zealand (Clarkson 2013) to determine the status of wetlands. This step relies on the presence or absence of hydrophytic vegetation as being the dominant vegetation type. The list of hydrophytes used in this assessment are as per the most recently revised list (Clarkson *et al.* 2021). The results from the vegetation tool provided conclusive results and therefore dominance - prevalence hydrophytic vegetation test (Step 2) and hydric soils tool (Step 3) and wetland hydrology tools (Step 4) were not utilised for this site.

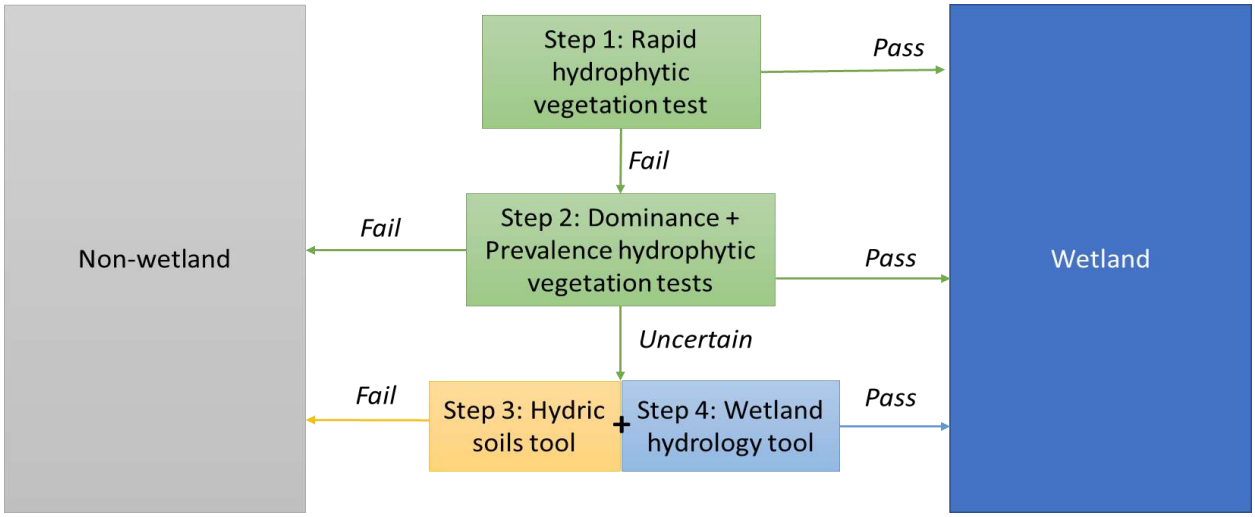

Figure 1: Four steps for delineating wetlands using the hydrophytic vegetation, hydric soils and wetland hydrology tools

3.0 SITE CHARACTERISTICS AND ANALYSIS

3.1 Site location

The site is zoned as 'Rural Production' under the oFNDP and is legally described as Part Section 102 Block IX Waoku SD with a total site area of approximately 16.40 ha (Figure 2). Please note that the focus of this report is the area which covers the proposed papakāinga development footprint and additional information regarding the wider site which has been provided in this report is for information purposes only. The subject site is largely maintained in managed pasture and is drained by a number of watercourses primarily extending along the sites northern and central aspects (Figure 3) – these are the primary focus areas of this report.

Figure 2: Showing the zoning of the site under Far North District Plan (Operative)

Figure 3: Site aerial overview – flat to gently sloping generally in grazed pasture with streams draining the site along its northern and central aspects (Photo: Photoblique 2023)

3.2 Watercourse classification and delineation

All features described within this report were delineated at part using topographical information obtained from LIDAR and further classified during a site visit on May 30th, 2025 with their status determined in accordance with PRPN watercourse definitions. Where there was uncertainty about the classification of a watercourse or waterbody, historic aerial imagery analysis (Retrolens) and professional judgement was utilised.

3.2.1 Historic analysis

The site forms a lower catchment area of the Waimamaku River which meanders to the south and west of the site. Analysis of historical imagery from 1961 (Figure 4), 1980 (Figure 5) through to the most recent aerial imagery from 2024 (Figure 6) reveals that the watercourses on the site have undergone significant modification for agricultural and/or nearby residential development purposes. The northern stream catchment has been extensively altered to accommodate nearby residential expansion, with modifications including piping, culverting, and the redirection of stormwater and wastewater discharges into the stream. Several existing farm crossings are present; however, some lack formal infrastructure such as culverts or bridges, with access occurring directly across the stream. The central stream catchment originally featured a naturally meandering course, but between the 1980s and 2024, it appears to have been dredged and straightened, eliminating its natural form. As a result, while these watercourses are of natural origin, they are now considered highly modified.

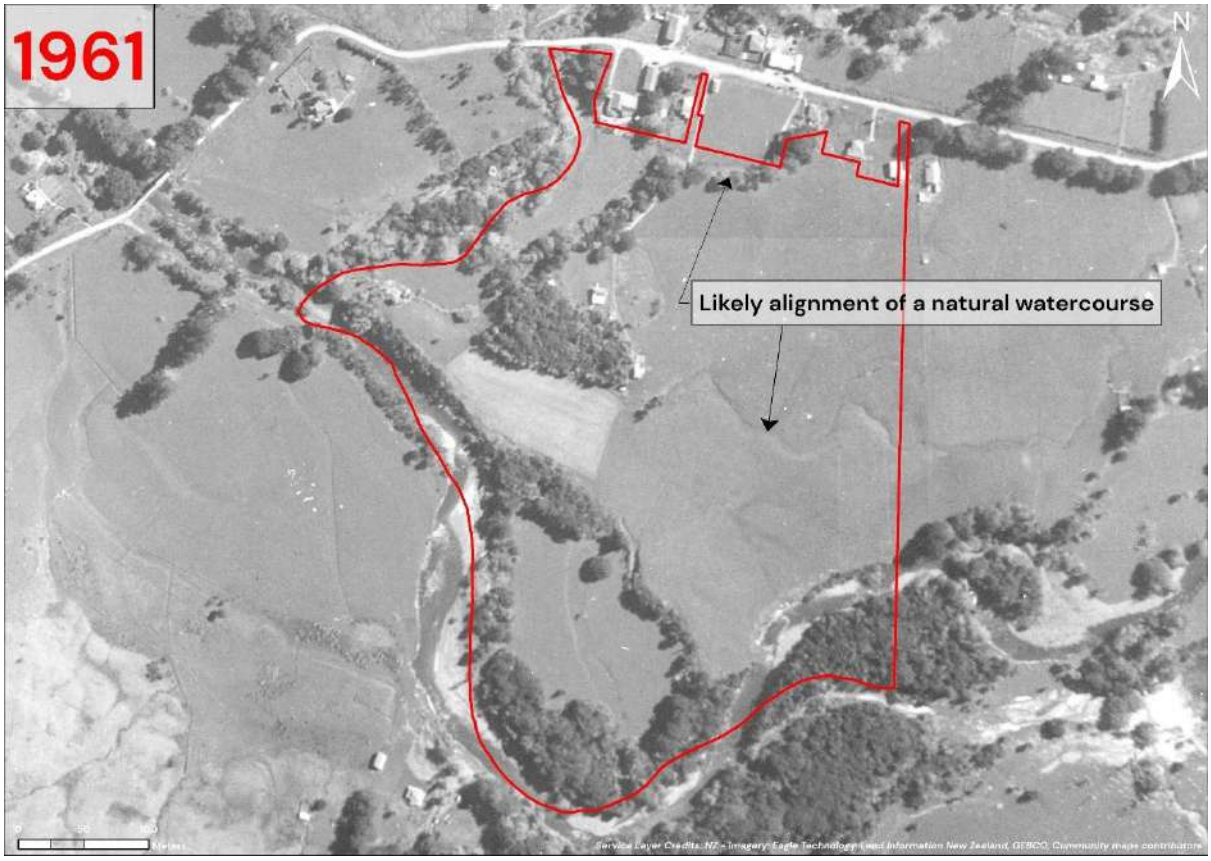

Figure 4: Showing the site boundaries in 1970 (Source: Retrolens)

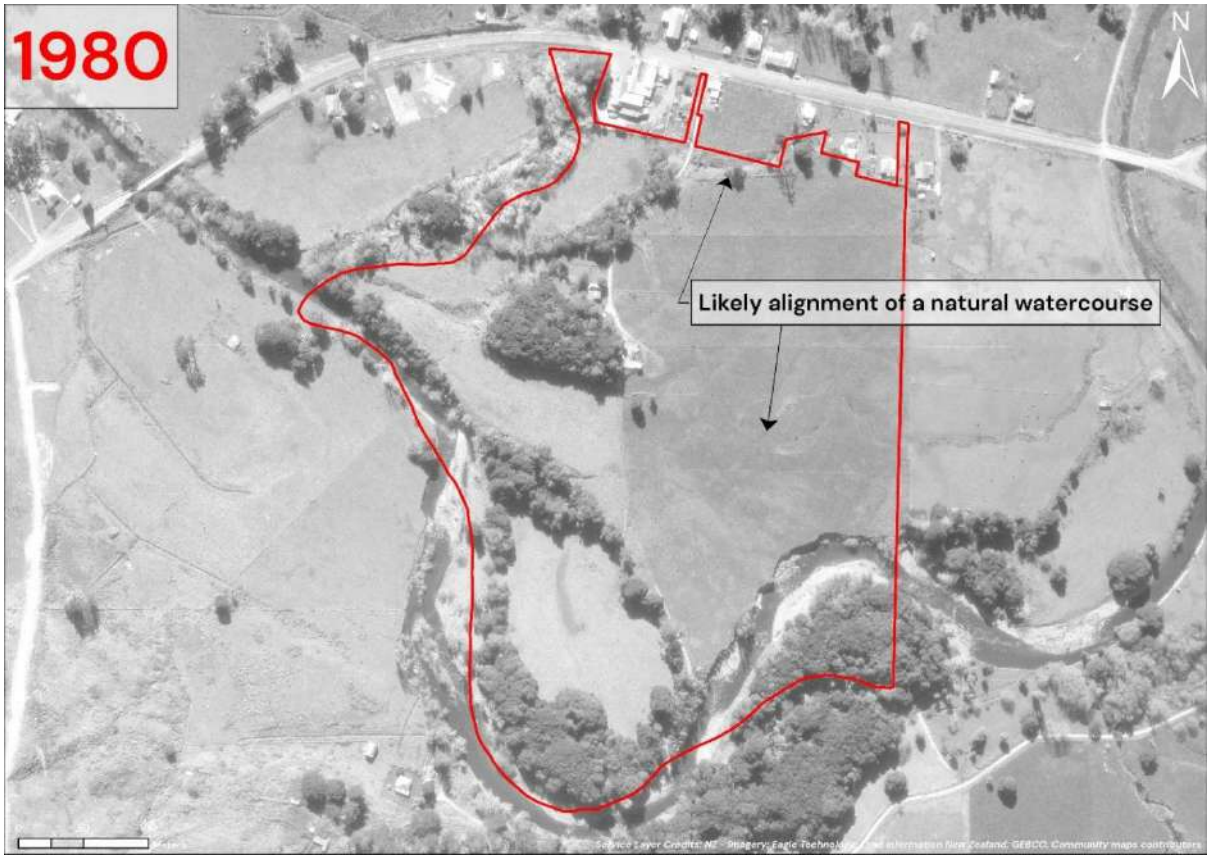

Figure 5: Showing the subject site boundaries in 1980 (Source: Retrolens)

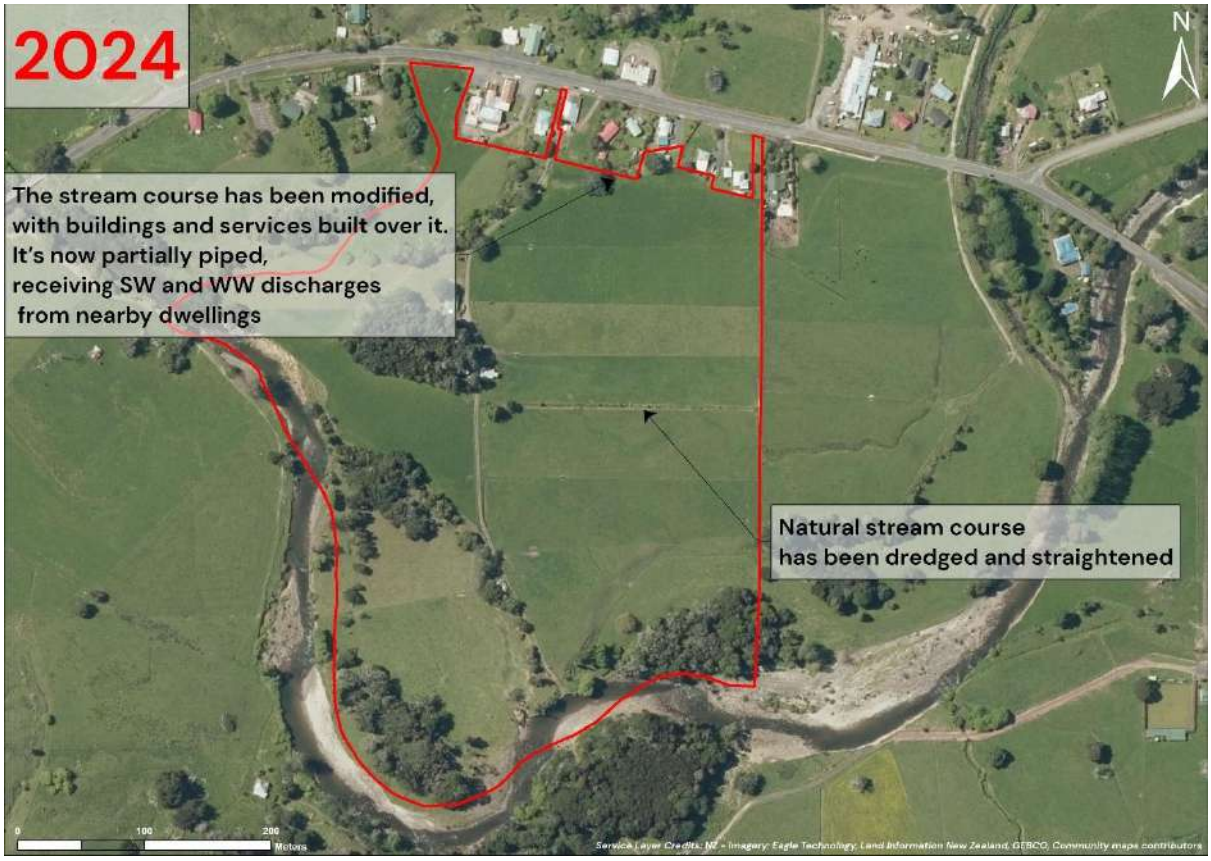

Figure 6: Showing the subject site boundaries in 2024 (Source: LINZ)

3.2.2 Current watercourse status

The site forms a lower catchment area of the Waimamaku River which meanders to the south and west of the site. Based on the on-site observations and historic aerial imagery analysis described under Section 3.2.1, it is deemed that the onsite watercourses that could be affected by the development (identified as watercourses 1, 2 and 4 under Figure 7) meet the definition of a 'intermittent stream' as defined under PRPN (February 2024). A stream (identified as watercourse 3 under Figure 7) is a permanently flowing stream and largely flows offsite. The northern, western and southern aspect of the site and associated riparian margins have been mapped by NRC as a River Flood Hazard Zone 10, 50 and 100-year extent. All onsite streams generally flow in a westerly direction towards Waimamaku River. The majority of the watercourses on site were encompassed by planes of hydrophytic vegetation encompassing the stream bed and their margins. Table 2 below provides brief description of each watercourse.

Parts of the on-site watercourses have been modified through straightening, diversion, and piping, as well as through the redirection of stormwater—and potentially wastewater—from neighbouring properties, particularly into Streams 1 and 2. Stream 4 has been modified from a meandering natural stream channel to a straight stream channel with limited original ecological functionality. These interventions have led to a degraded ecological condition. While the streams may still retain some ecological value, their overall status is best characterised as degraded, primarily due to extensive historical modification and unrestricted grazing access. This has contributed to lack of ecological functionality, increased sedimentation, bank erosion, and a consequent decline in water quality.

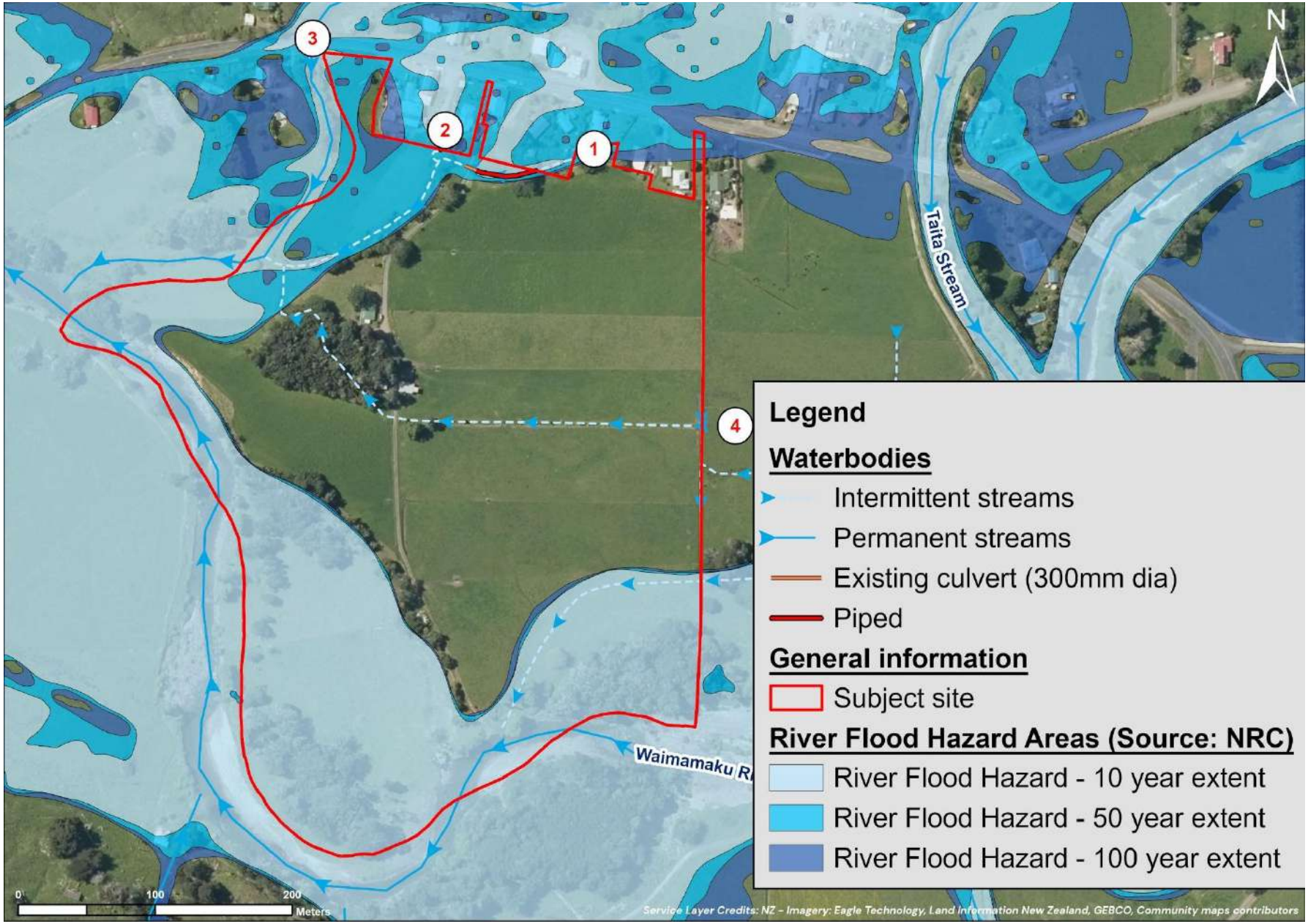

Figure 7: Showing the watercourse classification assessment with NRC River Flood Hazard Zones overlay

Table 2: Watercourse description within site boundaries

ID	Definition (PRPN)	Reasoning	Characteristics	Ecological value	Representative photo
1	Intermittent stream	Bed and banks can be easily distinguished, is visible in historic aerial imagery, some minor surface flows observed	This highly modified watercourse is located within the bed of a naturally occurring stream. It has been piped almost in its entirety above ground in small pipe running roughly along the bed of the stream The surrounding stream bed is dominated primarily by exotic wetland species. The stream was wet underfoot, with some surface water present, and had an average bankfull width of 1.4m. Multiple stormwater pipes were observed to discharge into this stream from the neighbouring properties. Poor condition, with no riparian vegetation cover and minimal ecological value. Unlikely to provide habitat for any fish species.	Low	
2	Intermittent stream	Bed and banks can be easily distinguished, is visible in historic aerial imagery, some minor surface flows observed	As with the other watercourses on site, this watercourse retains some natural characteristics, although it has been previously modified by the establishment of a farm track crossing (noting that no formal stream crossing is present). It also appears to receive ongoing discharges of stormwater—and possibly wastewater—from neighbouring properties to the north. The majority of the watercourse is overgrown with hydrophytic species such as arum lily, elephant's ear, with scattered *Cyperus ustulatus*, while the stream margins have historically been planted with willow (*Salix x fragilis*). The area is entirely accessible to grazing stock. While the bed and banks are distinguishable, the water largely seeps across a broad, wetland-like floodplain. In areas where the channel is more defined, the average bankfull width is approximately 1.5m-2 metres. The stream is likely to provide habitat for some fish species	Moderate	

ID	Definition (PRPN)	Reasoning	Characteristics	Ecological value	Representative photo
3	Permanent stream	Wide open channel, likely maintain permanent all year-round flows.	A permanent stream habitat which largely flows through the neighbouring site to the west. Encompassed by a wetland habitat place comprised of taro and willow. Fenced from stock through temporary electric fencing. Water quality appeared to be poor during site visits, but the stream has a direct connection to the Waimamaku River so potential fish fauna habitat is likely.	Moderate	
4	Intermittent stream	Bed and banks can be easily distinguished, is visible in historic aerial imagery, some minor surface flows observed.	Highly modified intermittent stream. Historically had a widely meandering channel and the stream has been straightened sometime between 1980s and 2024. The stream margins are largely in exotic pasture with some scattered mature tree cover. Waterway is fenced off from stock with electric fencing. Overall condition appeared to be poor. Stream average bankfull width was approximately 1.2-1.5m. Unlikely to provide habitat for fish fauna due to modifications further down the catchment (i.e culverted crossings).	Low	

3.3 Wetland classification and delineation

Based on a desktop assessment and site walkover survey visit conducted on May 30th, 2025 it was deemed that the site contains and directly abounds areas of 'wetland' habitats as defined under the RMA. Wetland delineation was carried in general accordance with MfE (2022) Wetland delineation methodology. The boundary of a wetland area was recorded as the interface between wetland and non-wetland (i.e. pasture vegetation) by establishing a random 2m x 2m plot and recording the species assemblages. All pasture interface plots contained >50% of exotic pasture species (dominated by primarily kikuyu) as described under National List of Exotic Pasture Species (MfE 2022).

Please note that any wetland areas identified outside the site boundaries have been mapped solely through desktop and aerial imagery analysis, with vegetation composition assessed during site visits or from vantage point observations. Since these areas are located on private properties, their exact extent and classification have been estimated where applicable. However, this information has been included to help guide the development layout and facilitate any necessary consent applications.

The results of this assessment are presented under Figure 12 and Appendix 1. Wetland areas that met the definition of a 'natural inland wetland' as defined under NPS-FM (2020) have been identified to ensure that appropriate consideration can be given to relevant NES-FW (2022) regulations.

The majority of the identified wetland areas on site are associated with the direct stream channel or stream margins, gullies or natural depressions in the land. The majority of wetland areas on site (W1a, W2, W3b, W3c, W4, W5a, W5b, W6 and W7) and immediately adjacent are dominated by 'facultative wetland' mercer grass (*Paspalum distichum*) and soft rush (*Juncus effusus)* interspersed at about equal quantity with and obligate' fools' watercress (*Apium nodiflorum*). Other species such as water pepper (*Persicaria hydropiper*), jointed rush (*Juncus articulatus*) and 'obligate' fools' watercress (*Apium nodiflorum*) with scattered pastoral species such as 'upland' kikuyu (*Cenchrus clandestinus*), 'facultative' Lotus (*Lotus pedunculatus*), and buttercup (*Ranunculus repens*) are interspersed throughout. Wetland unit W1c is dominated by species such as arum lily (*Zantedeschia aethiopica*) and elephant's ear (*Alocasia brisbanensis*), with occasional native sedges including *Cyperus ustulatus* and *Carex lessoniana*. W4 is predominantly comprised of taro (*Colocasia esculenta*), a 'facultative wetland' wetland species.

None of the wetland areas present on the site or immediately adjacent are considered to meet the relevant ecological significance criteria outlined in Appendix 5 of the Regional Policy Statement (RPS). These wetlands are currently assessed as having low ecological value. This is primarily attributed to extensive historical modification of the associated watercourses, which has significantly altered their natural structure and function. Additionally, the ecological integrity of these areas is further diminished by the dominance of exotic plant species. Native vegetation is largely absent, with only a few isolated patches supporting indigenous species such as *Cyperus ustulatus* and *Carex lessoniana*.

Table 3: Natural inland wetland description on site

Identifier	Size	Dominant species	RMA wetland?	Natural inland wetland	Significant under RPS Appendix 5?
W1a	31 m^2	A.nodiflorum – P. distichum – P. hydropiper	Yes	Yes	No
W1b	76 m^2	Z.aethiopica – P. distichum – P. hydropiper	Yes	Yes	No
W1c	1,221 m^2	Z.aethiopica – A. brisbanensis – C. ustalatus - J. effusus - P. distichum – P. hydropiper	Yes	Yes	No
W2	134 m^2	A.nodiflorum - P. distichum	Yes	Yes	No
W3a	911 m^2	C. esculenta – Z.aethiopica – S. fragilis	Yes	Yes	No
W3b	849 m^2	P. distichum – J.effusus - A.nodiflorum	Yes	Yes	No
W3c	Offsite – 741 m^2	P. distichum – J.effusus - A.nodiflorum	Yes	Yes	No
W4	106 m^2	P. distichum – J.effusus - A.nodiflorum	Yes	Yes	No
W5a	Offsite – 434 m^2	J. effusus – P. distichum	Yes	Yes	No
W5b	Offsite – 1,114 m^2	J. effusus – P. distichum	Yes	Yes	No
W6	Offsite – 324 m^2	J. effusus – P. distichum	Yes	Yes	No
W7	Offsite – 1,423 m^2	J. effusus – P. distichum	Yes	Yes	No

Figure 8: Showing part of wetland area W1a dominated by a mixture of fool's watercress and mercer grass

Figure 9: Showing part of wetland area W1c dominated by a mixture of Arum lily, elephants' ear, *C. flagellifera* and *C. ustalatus* and watercourse 2 flowing in a westerly direction

Figure 10: Showing part of wetland area W2 which is dominated by fools watercress and mercer grass

Figure 11: Showing part of wetland area W3a dominated by Taro and encompassed by crack willow

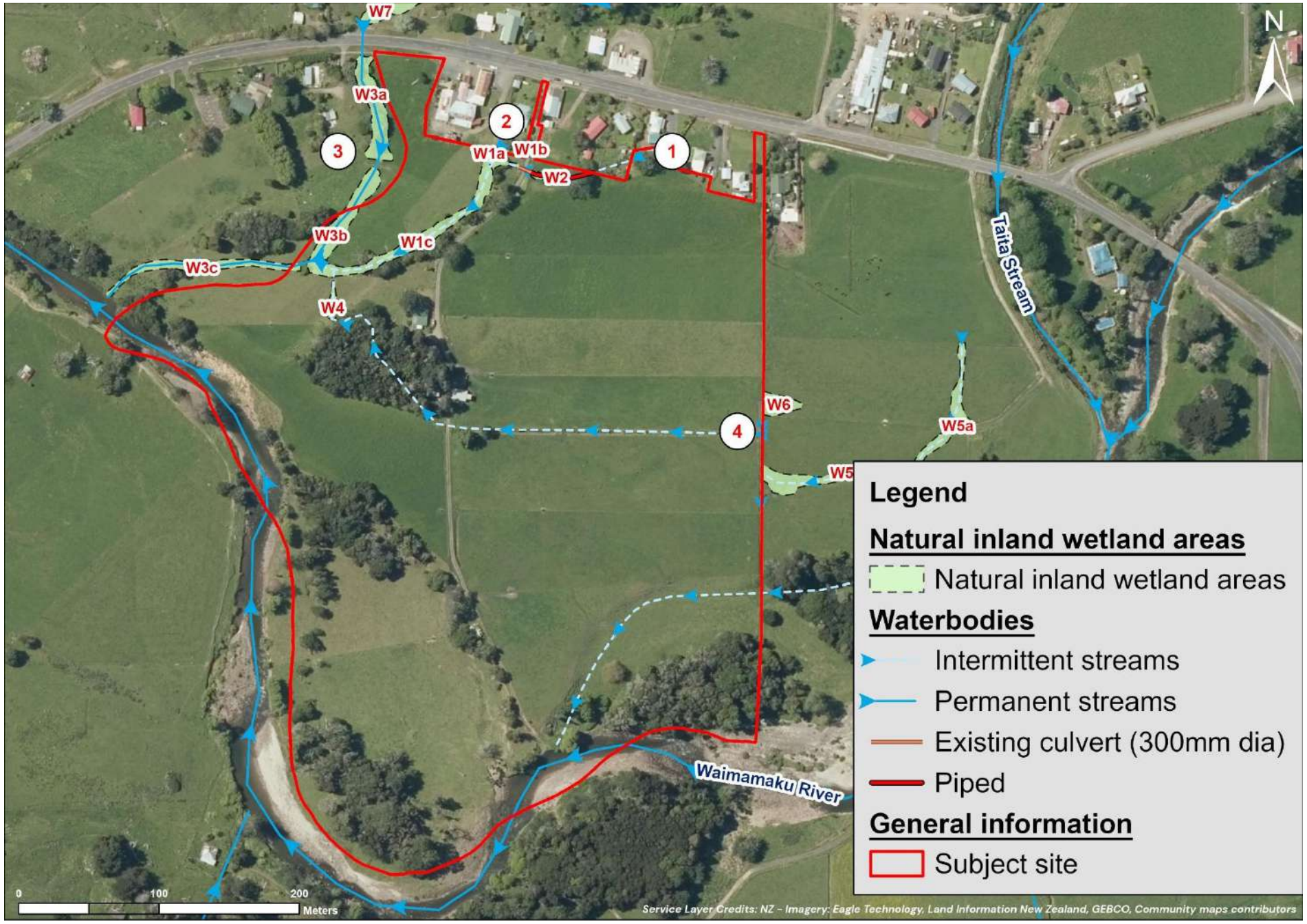

Figure 12: Showing the identified natural inland wetland areas within the site's northern aspect and immediately adjacent (number indicates the associated watercourse numbering)

4.0 POTENTIAL ECOLOGICAL EFFECTS AND MITIGATION

The watercourse and wetland mapping exercise revealed that the proposed accessway construction will encroach within a 10m setback of mapped natural inland wetlands(W3a and W1c) and require a new bridge crossing to be installed over intermittent stream 2 (Figure 13). To align with the NPS-FM and NES-FW, Wild Ecology recommended that all built development be located entirely outside the identified natural inland wetland areas (W1-W7). This would prevent triggering the prohibited activity status under Regulation 53 of the NES-FW, which applies to earthworks that would result in partial or complete drainage of a natural inland wetland.

Following Wild Ecology's preliminary ecological input, changes were made to the proposed accessway design to minimize, as far as practicable, potential impacts on natural inland wetlands and stream habitats within the proposed accessway and wider associated earthworks footprint. Following the input from Wild Ecology the initial stream crossing design was updated to include a bridge crossing to avoid and minimise potential adverse effects. The subsequent sections of this report outline the potential ecological effects of the proposal and provide recommendations for mitigation measures. Given the proximity of the works to natural inland wetlands, comprehensive sediment and erosion controls will have to be implemented around wetland features before construction begins to avoid potential adverse effects.

The site has sufficient land area to enable most built development to occur outside the 10m wetland setback. However, the access road will need to be constructed within a 10m setback of wetlands W3a, and W1c, as no other practical alternative access is possible within the site boundaries. It is important to note that the accessway will be constructed within an area that is subject to least ecological constrains with multiple design options explored at preliminary stages and this design having been assessed as the most feasible both in terms of ecological constraints and practical engineering matters. The access road will also require a new bridge crossing spanning over wetland area W1c and associated watercourse 2. It is noted that some vegetation clearance will be required within a 10-metre setback from wetland W1c. The existing terrestrial vegetation in this area primarily consists of regenerating (ricker) native species including mapou (*Myrsine australis*), nīkau palm (*Rhopalostylis sapida*), cabbage tree (*Cordyline australis*), karamu (*Coprosma robusta*), rewarewa (*Knightia excelsa*), and kohekohe (*Dysoxylum spectabile*). As a result, consent under Regulations 54(a) and 54(b) of the NES-FW (2020) will be required.

A summary of consenting obligations under the NES-FW (2020) related to the accessway construction is provided in Table 2. This assessment does not include the proposed building platform locations or the stormwater and wastewater infrastructure, as these are not deemed to trigger any relevant NES-FW (2020) consenting obligations.

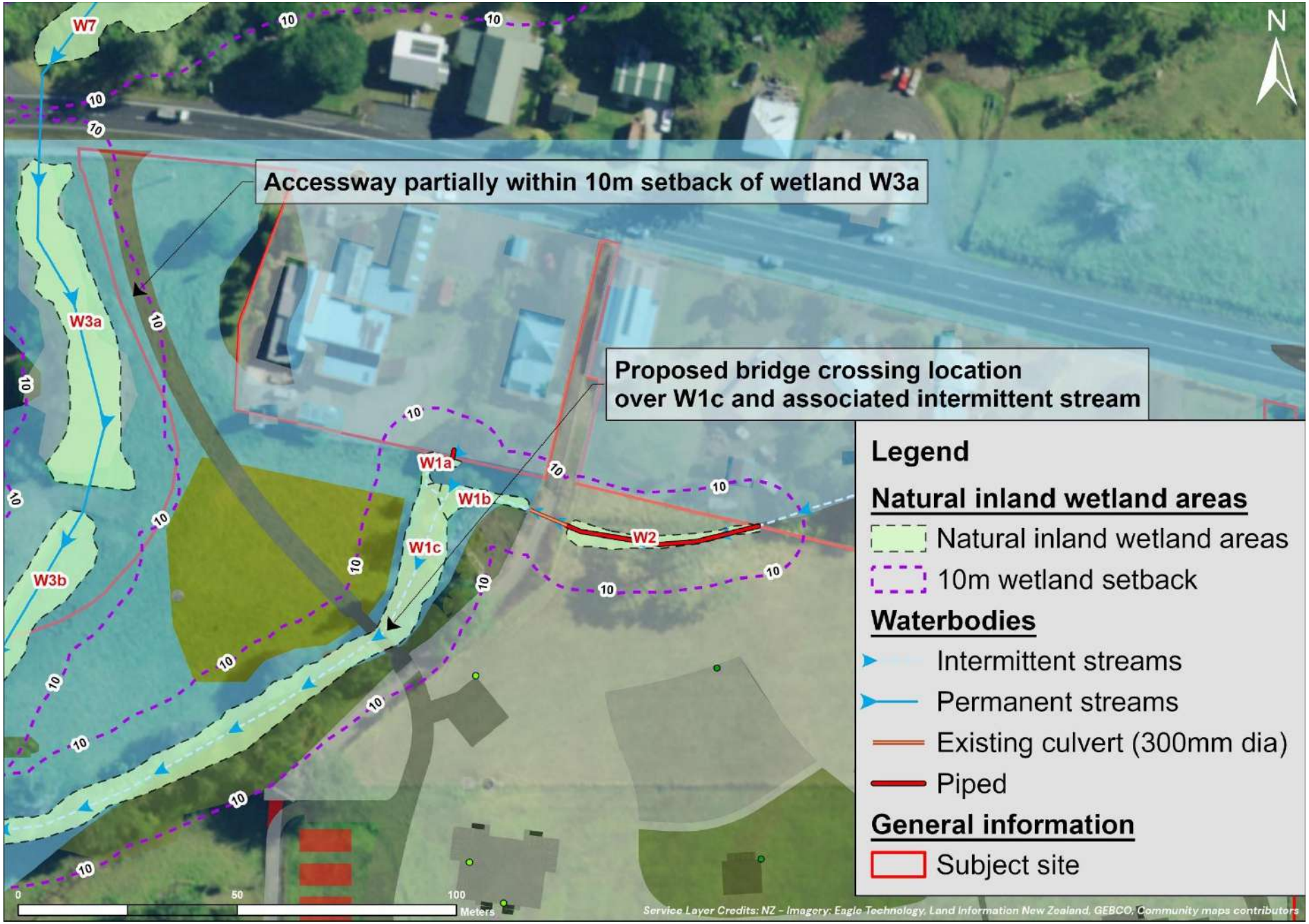

Figure 13: Showing the proposed development overlay with mapped watercourses, natural inland wetland areas and 10m wetland setbacks

Table 4: Assessment of NES-FW consenting obligations

NES-FW (2020) Regulation	Comment/assessment
Drainage of natural wetlands 52 Non-complying activities 52(1) Earthworks outside, but within a 100 m setback from, a natural inland wetland is a non-complying activity if it— (a) results, or is likely to result, in the complete or partial drainage of all or part of a natural inland wetland; and (b) does not have another status under any of regulations 38 to 51.	Consent under condition 52(1) is not required/applicable. While earthworks associated with the site development will take place within a 100m setback of the identified natural inland wetland areas on site, it will not result or is not likely to result in complete or partial drainage of the natural inland wetland feature identified on site and immediate boundaries should appropriate erosion and sediment control measures are constructed and maintained in accordance with the principles outlined in relevant expert reporting prepared for the proposal and best practice. Site earthworks should be undertaken during suitable weather conditions and dry periods when the wetland area and watercourses are likely to be naturally dry to avoid any potential residual risk to aquatic organisms during the construction of the accessway. All sediment and erosion controls to be installed as per GD05 and associated technical reporting prepared for the site development.
52(2) The taking, use, damming, diversion, or discharge of water outside, but within a 100 m setback from, a natural wetland is a non-complying activity if it— (a) results, or is likely to result, in the complete or partial drainage of all or part of a natural wetland; and (b) does not have another status under any of regulations 38 to 51.	Consent under Regulation 52(2) is not required/applicable. The diversion of water and discharge of water outside but within a 100m setback from the natural inland wetland area associated with stormwater discharges and diversions as part of the accessway construction will not result or are not likely to result in complete or partial drainage of the natural inland wetland features identified. Due to the incremental increase in impervious surface associated with the site's development, the overall volume of water entering the aquatic features is not expected to increase to a quantifiable level. These discharges are not likely to change the water level range or hydrological function of the wetland areas.
Other activities Regulation 54 amended (Non-complying activities) 54(a) vegetation clearance within, or within a 10 m setback from, a natural inland wetland:	Consent under Regulation 54(a) is required as the proposal will result in the disturbance and clearance of pastoral exotic vegetation and scattered terrestrial indigenous vegetation within a 10m setback of a wetland areas as part of access road construction and bridge installation. It is recommended that the indigenous vegetation cleared is off-set through revegetation planting following the construction of the

	accessway, with the recommended offset ration of 1:3 (i.e. 3 new trees planted for each tree removed).
54(b) earthworks within, or within a 10 m setback from, a natural inland wetland	Consent under Regulation 54(b) is required as the proposal will result in the installation of a new bridge crossing wetland area W1c and watercourse 2, and establishment of accessway within a 10m setback of 'natural inland wetland' areas (W3a and W1c). The new bridge will be located completely outside the wetland boundaries and will span the wetland, and therefore the existing wetland will not be affected. Site earthworks should be undertaken during suitable weather conditions and dry periods when the wetlands and watercourses are likely to be naturally dry to avoid any potential residual risk to aquatic organisms during the construction of the accessway. All sediment and erosion controls to be installed as per GD05 and associated technical reporting prepared for the site development.
54(c) the taking, use, damming, or diversion of water within, or within a 100 m setback from, a natural inland wetland if— (i) there is a hydrological connection between the taking, use, damming, or diversion and the wetland; and (ii) the taking, use, damming, or diversion will change, or is likely to change, the water level range or hydrological function of the wetland.	Consent under Regulation 54(c) is not required as while the stormwater diversions associated with the accessway construction and wider site cosnutrction work will occur within a 100m setback from the identified wetland areas and may have a hydrological connection with these areas, they will not change or are unlikely to change the water level range or hydrological function of the wetland, due to relatively incremental scale of the proposal.
54(d) the discharge of water into water within, or within a 100 m setback from, a natural inland wetland if— (i) there is a hydrological connection between the discharge and the wetland; and (ii) the discharge will enter the wetland; and (iii) the discharge will change, or is likely to change, the water level range or hydrological function of the wetland	Consent under Regulation 54(d) is not required because, although stormwater discharges will likely be directed overland towards low lying points in topography such as the onsite streams and wetlands with a hydrological connection to the discharge points, the incremental increase in impervious surfaces from the site's development is not expected to result in a measurable increase in the overall volume of water entering these aquatic features. Consequently, these discharges are unlikely to alter the water level range or hydrological function of the wetland areas.

4.1 Potential impacts on wetland extent

Construction activities have the potential to cause direct physical impacts on wetland features, including the removal or alteration of habitats. Works such as excavation, grading, and infrastructure placement can encroach upon wetland margins, potentially leading to a reduction in their natural extent, degradation of ecological function, and long-term hydrological disturbance.

However, the design of the proposed accessway has been carefully developed—and amended where necessary—to avoid any direct loss of natural inland wetlands. A key feature of the revised design is the replacement of standard culvert crossing with bridge structure at location where the accessway intersects with a wetland area W1c or associated intermittent stream 2. The use of bridges offers significant ecological advantages. Unlike culverts, which often require excavation within wetland beds and margins, bridges can span sensitive areas entirely, maintaining hydrological connectivity and minimising disturbance to wetland soils, vegetation, and aquatic habitats. This approach reduces the risk of habitat fragmentation, preserves ecological processes such as water flow and nutrient exchange, and supports the continued functioning of the wetland ecosystem.

As a result of these engineering modifications, no loss of natural inland wetland extent is anticipated, as all construction activities will occur outside the mapped boundaries of the natural inland wetland areas. Although some earthworks will be required within the 10-metre statutory setback from these wetlands, the potential for adverse effects can be effectively managed through the implementation of a comprehensive Erosion and Sediment Control Plan (ESCP). This plan will include robust sediment and erosion control measures—such as silt fences, sediment retention ponds, and staged earthworks—to minimise runoff and prevent sedimentation of adjacent wetlands.

Through this combination of sensitive design and best-practice construction management, the accessway development will avoid the physical loss of both natural inland wetlands and intermittent streams, while maintaining the ecological integrity of these important natural features.

4.2 Potential effects of buffer/terrestrial vegetation clearance

It is noted that some vegetation clearance will be required within a 10-metre setback from wetland W1c (Figure 14). The existing terrestrial vegetation in this area primarily consists of regenerating (ricker) native species including mapou (*Myrsine australis*), nīkau palm (*Rhopalostylis sapida*), cabbage tree (*Cordyline australis*), karamu (*Coprosma robusta*), rewarewa (*Knightia excelsa*), and kohekohe (*Dysoxylum spectabile*).

It is recommended that the indigenous vegetation cleared is off-set through revegetation planting following the construction of the accessway, with the recommended offset ration of 1:3 (i.e. 3 new trees planted for each tree removed). The estimated terrestrial vegetation clearance area is approximately 15 m², so the offset area require is approximately 45 m².

Clearing approximately 15 m² of regenerating indigenous vegetation within 10m of wetland W1c may result in minor habitat loss and reduced buffer function for the wetland. However, with

appropriate offset planting at a 3:1 ratio (45 m²), these effects are considered low and manageable. Offset planting near wetland W1c and watercourse 2 will help maintain ecological values and support long-term restoration.

Figure 14: Showing the terrestrial vegetation encompassing wetland W1c at the approximate location of the proposed bridge crossing

4.3 Potential effects of sediment discharges

Sediment discharges near wetland areas and streams can disrupt habitats by covering aquatic plants, reducing sunlight, and degrading water quality through increased turbidity, which can harm aquatic life. Sediment may also carry nutrients like phosphorus, causing eutrophication, algal blooms, and oxygen depletion. Additionally, sediment deposits can alter water body hydrology, increasing flooding risks and changing wetland water distribution. These effects can reduce biodiversity by favouring sediment-tolerant species, leading to shifts in ecosystem structure and function.

In respect to the proposal, the potential adverse effects associated with sediment discharges are primarily linked to earthworks within the 10m setback from the mapped natural inland wetland areas. To mitigate these impacts, it is recommended that robust sediment control measures be implemented and maintained throughout the construction phase.

It is recommended that all construction works are to abide by the project specific Engineering Design and Erosion and Sediment Control Plan (ESCP). This plan should include detail regarding erosion and sediment control measures, stormwater management strategies, and contingency provisions for high-intensity rainfall events. The ESCP should been developed in accordance with Auckland Council Guideline Documents 2016/005: Erosion and Sediment Control Guidelines for

Land Disturbing Activities in the Auckland Region and Section C.8.3 of the NRC Proposed Regional Plan for Northland (February 2024).

Thus, on the assumption that the accessway construction is designed and constructed in accordance with recommendations provided within the relevant engineering reporting, and all earthworks be managed in accordance with a site specific ESCP which is based on best practice measures outlined under GD05 and other relevant specifications, it is considered the potential effect associated with sediment discharges as part of construction works are 'low'.

4.4 Potential effects of hydrological change

Construction activities have the potential to alter local hydrological patterns. These changes can include modifications to flow rates, increased surface runoff, accelerated erosion, and potential disruptions to groundwater recharge processes. Such alterations can result in increased sedimentation, the disruption of natural hydrological functions, and an increased risk of localized flooding.

The proposed accessway construction is expected to generate additional stormwater runoff, which will be directed towards the natural inland wetland areas. While this will result in an increase in stormwater entering these wetlands, the additional runoff is not anticipated to significantly impact the existing water level range or the overall hydrological dynamics of the wetland system. The wetlands on-site are primarily fed by surface and rainwater, and their capacity to absorb and manage the increased flow is considered sufficient. Any potential effects on water levels are expected to remain within the natural fluctuations typical of these wetland systems.

Therefore, the impact of the proposed construction activities on the mapped wetlands is considered to be low, with no expected long-term disruption to their hydrological regime, ecological health, or natural processes. Carrying out earthworks during extended dry periods when the wetland areas are naturally dry, along with the implementation of appropriate erosion and sediment control measures, will effectively mitigate any potential risks. This ensures that the wetlands continue to function within their natural seasonal variability, maintaining their ecological balance.

4.5 Effects on aquatic fauna (fish)

Construction activities have the potential to adversely affect aquatic fauna through habitat disturbance, sediment runoff, and chemical contamination. Such impacts can result in the loss of riparian vegetation, alteration of stream morphology, and increases in suspended sediment that reduce water clarity and smother habitats. These effects can disrupt aquatic life processes, including feeding, migration, and spawning, even in systems that are only periodically wet. Chemical contaminants from construction machinery and materials also pose toxic risks to aquatic species, particularly during rainfall events that mobilize pollutants.

The proposed accessway will cross Watercourse 2, an intermittent stream that traverses Wetland W1c. To avoid direct impacts on this sensitive aquatic environment, a bridge structure

is proposed in lieu of a culvert or ford crossing. The use of a bridge at this location significantly reduces ecological and hydrological disruption by spanning the watercourse entirely, thereby eliminating the need for in-stream works, excavation, or alteration of the natural channel and wetland margins.

While intermittent streams such as Watercourse 2 do not support permanent aquatic communities year-round, they often provide important ecological functions during flow periods, including temporary habitat for aquatic invertebrates and passage routes for transient fish species. They also contribute to the hydrological connectivity and water quality of downstream environments. The bridge design ensures that these ecological values are preserved by maintaining unimpeded water flow, natural sediment transport, and the structural integrity of the streambed and riparian zone.

All construction works associated with the bridge will be carried out in accordance with a site-specific Erosion and Sediment Control Plan (ESCP). This plan will include measures to prevent sediment-laden runoff from entering Watercourse 2 or Wetland W1c during construction.

By avoiding in-stream disturbance and adopting best-practice sediment control methods, the bridge installation is not expected to result in any significant adverse effects on aquatic fauna. The approach protects both the intermittent stream and the associated natural inland wetland, maintaining their ecological function and hydrological connectivity. Accordingly, the overall level of ecological effect is assessed as low, with any residual impacts being minor, temporary, and manageable through the proposed mitigation measures.

4.6 Effects of wastewater run-off

The site does not have a connection to public wastewater infrastructure and therefore requires onsite wastewater dispersal. All wastewater infrastructure and dispersal fields will be designed by a qualified engineer in accordance with best practice standards. Wherever feasible and practicable, the design will adhere to the relevant setback requirements outlined in the Proposed Regional Plan for Northland (PRPN, February 2024), specifically 15m setback from identified waterbodies (including wetlands) (Figure 15).

It is recommended that primary wastewater dispersal fields are planted with low-growing native species—such as sedges and shrubs—to enhance system performance, promote nutrient absorption, and assist in managing surface water flow.

Provided that all wastewater systems are installed and maintained according to manufacturer instructions and the recommendations in the associated technical reports, no significant adverse effects on freshwater habitats from the new effluent disposal fields are anticipated.

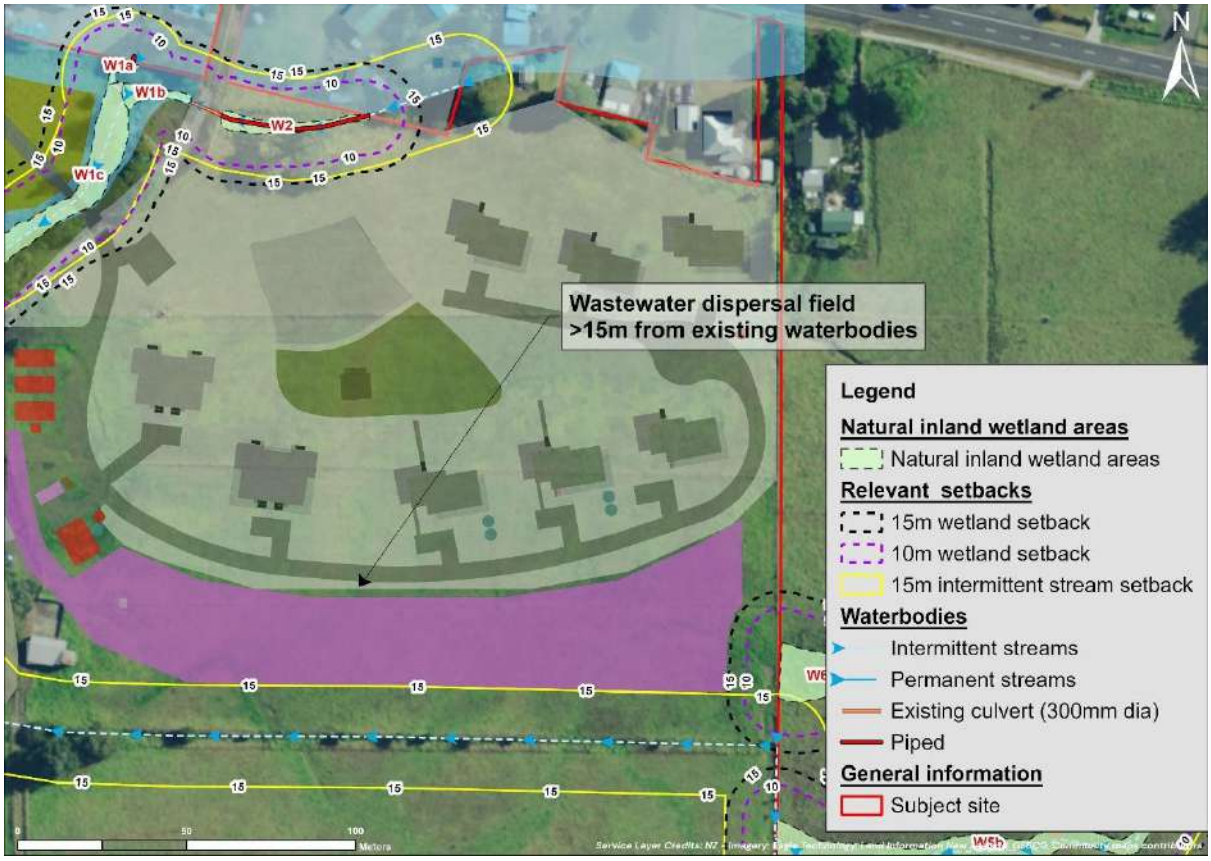

Figure 15: Proposed wastewater dispersal field location

5.0 CONCLUSION AND RECOMMENDATIONS

The proposed papakāinga development at 7229 State Highway 12, Waimamaku—specifically the construction of the accessway—has been assessed with respect to its potential ecological effects on mapped natural inland wetland areas and watercourses. This report, prepared for Te Roroa Development Charitable Trust ("the Applicant"), summarises findings from the watercourse and wetland assessment conducted by Wild Ecology, focusing on the northern section of the site where access construction is proposed.

The accessway design has undergone modifications following ecological input to avoid direct impacts on natural inland wetland areas (W1–W7), and to ensure compliance with the National Environmental Standards for Freshwater (NES-FW, 2020). Notably, the design now includes a bridge crossing over intermittent stream Watercourse 2, which also traverses wetland W1c, to maintain hydrological connectivity and avoid direct disturbance to the wetland feature.

While portions of the accessway will be constructed within 10 metres of wetland features W1c, and W3a, no works will occur within the mapped wetland areas themselves. Accordingly, consent under Regulations 54(a) and 54(b) of the NES-FW is required due to vegetation clearance and earthworks within the 10 m wetland setback. These effects are anticipated to be of low effect and manageable, particularly with the proposed offset planting (recommended at a 1:3 ratio for indigenous vegetation loss) and implementation of robust sediment and erosion control measures.

A comprehensive, site-specific Erosion and Sediment Control Plan (ESCP) will be adopted and will include controls such as silt fences, sediment retention ponds, stabilised entry points, and appropriate staging of works. Provided the ESCP is implemented in accordance with best practice (GD05 and relevant regional guidance), the risk of sediment discharges adversely affecting wetland or stream habitats is considered low.

Based on the proposed design it is assessed that no loss of natural inland wetland extent will occur, and the hydrological functions of wetlands and intermittent streams will be maintained. The use of a bridge rather than a culvert eliminates the need for in-stream/wetland disturbance, reducing potential ecological impacts to a very low level.

In conclusion, with the adoption of sensitive design, best-practice mitigation measures, and compliance with regulatory requirements, the ecological effects associated with the proposed accessway construction are expected to be low. Provided that all ecological and engineering recommendations are implemented, the works can proceed with confidence that the long-term ecological health and hydrological function of the site's natural watercourses and wetlands will be retained.

Recommendations:

1. Obtain resource consent under NES-FW Regulations 54(a) and 54(b) for vegetation clearance and earthworks within the 10 m setback from natural inland wetlands.
2. Implement offset planting at a 1:3 ratio for indigenous vegetation cleared within the 10 m setback – ideally the location of the off-set planting should be located encompassing wetland W1c and/or watercourse 2.
3. Finalise and adhere to a project-specific ESCP, consistent Proposed Regional Plan for Northland (PRPN) requirements.
4. Undertake works during dry weather conditions to further reduce risk of sediment discharges or hydrological disturbance.
5. Monitor construction activities to ensure compliance with consent conditions and ecological mitigation measures.
6. Design, install, and maintain onsite wastewater dispersal systems in accordance with the Proposed Regional Plan for Northland (PRPN) setback requirements, ensuring wastewater fields are planted with appropriate low-growing native species to minimize effects on nearby watercourses.

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APPENDIX 1 – WETLAND DELINEATION RESULTS

Vegetation plots utilised in wetland delineation

Site	7229 SH12, Waimamaku																	
Date	May 30th, 2025																	
			Vegetation plots															
Species	Common name		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18
Apium nodiflorum	Fool's watercress			80%		90%		5%										60%		
Carex lessoniana	Cutty grass, Rautahi											15%		10%						
Cenchrus clandestinus	Kikuyu		95%		95%	2%	95%		90%		95%		92%		94%	5%	93%		97%	
Colocasia esculenta	Taro							6%		25%		25%		15%						25%
Cyperus ustulatus	Giant umbrella sedge											20%		15%						
Holcus lanatus	Yorkshire fog		2%				1%		2%				3%		1%			2%	1%	
Juncus effusus	Soft rush			5%												70%		4%		
Lotus pedunculatus	Lotus		2%		2%			4%			2%						4%	4%		
Paspalum distichum	Mercer grass			5%	1%	6%		10%	1%	2%			2%		3%	20%		20%		
Persicaria hydropiper	Water pepper			10%		2%		5%		1%						2%				
Ranunculus repens	Creeping buttercup		1%				4%		8%	1%	6%		3%		2%	3%	1%	10%	2%	
Rumex acetosa	Sorrel				2%					1%							2%			
Salix xfragilis												5%		10%						10%
Zantedeschia aethiopica	Arum lily							70%		70%		35%		50%						65%
Total cover			100%	100%	100%	100%	100%	100%	101%	100%	103%	100%	100%	100%	100%	100%	100%	100%	100%	100%
% pasture species (MfE 2022)			99%	0%	97%	2%	96%	4%	92%	0%	97%	0%	95%	0%	95%	5%	97%	6%	98%	0%
Excluded from NPSFM - artificial or improved pasture species >50%?			Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Rapid test			No	Yes	No	Yes	No	No	No	Yes	No	Yes	No	No	No	Yes	No	Yes	No	Yes
Dominance test			No	No	No	No	No	Yes	No	Yes	No	Yes	No	No	No	Yes	No	No	No	Yes
PI			3.95	1.20	3.94	1.14	3.95	2.69	3.88	2.72	3.92	2.35	3.90	2.50	3.91	2.13	3.93	1.56	3.97	2.65
NPSFM wetland (Yes or No)			No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

Matakohe
Architecture
+ Urbanism

CONFIDENTIAL

Design Statement for Resource Consent

Te Roroa Waimamaku Papakāinga

Masterplan

.

The proposed masterplan is guided by three core themes, which were developed through an aspiration and masterplan design wānanga with Te Roroa whānau. These three themes are: Sustainability, Intergenerational Planning, & Community

Sustainability:

Te Taiao

An important part of our design brief is caring for and enhancing the existing natural features of the whenua through the papakāinga development. The masterplan avoids natural features except where there is no other viable alternative, and then care has been taken to minimise the impact through careful positioning and engineering and to offset any disturbance through active enhancements such as planting and ensuring the infrastructure creates resilient future protection..

A holistic landscape design ties together the masterplan, site infrastructure (stormwater and wastewater), dwellings and community spaces. The landscaping will use locally sourced native species from Te Roroa nursery, provide dedicated areas for māra kai, protect and enhance the wetlands and native bush areas.

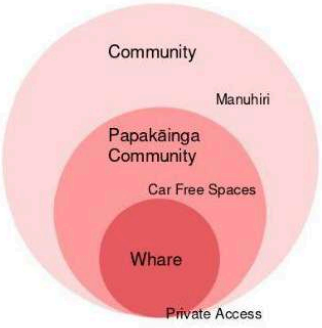
On Site Renewable Energy & Three Water Management

Each dwelling will have solar panels installed on the roof, and provision has been made on the masterplan to install on ground solar panels over and around the wastewater dripfield (following the guidance and requirements of the geotech engineer, civil engineer and landscape designer).

The energy will either be stored on site in batteries, or connected to the grid to bolster and give the local community an opportunity to source locally generated renewable energy.

Rainwater harvesting for potable water, as well as stormwater management and on site wastewater disposal for the development provides the papakāinga with resilient and sustainable infrastructure.

Community:



Activities

Communal spaces such as kāuta, māra kai & papa tākaro have been positioned to the north and centre of the papakāinga, and are positioned so that they can be a meeting point with the Waimamaku community or an internal papakāinga community resource (vehicle free zone). A communal room / rūma Māori sits in the center of the community to provide space for activities such as rongoā/raranga. At the southern periphery or the development area, production oriented communal facilities such as a shared workshed, space for chickens, greenhouses and kai storage, composting and refuse station)

Pathways are all a minimum or 1200mm wide for easy use for individuals, parents with prams, tamariki on bikes etc. Maximum greenspace, dedicated manuhiri carparking at the entrance to the papakāinga, in easy view to and from the dwellings.

Play

A papa tākaro has been located within easy sight from the larger dwellings, and nearer to the Waimamaku community and a little further away from the duplex dwellings, to minimise noise for kuia & kaumātua.

are located closer to the existing farm zone, directly off the main driveway.

Rural production activities are given space on the periphery, close to the existing working farm such as space for chickens, greenhouses, a shared workshed, composting and waste station, a dedicated place to clean after hunting.

Connections

All whare have vehicle free access via pathways to the Waimamaku community, as well as the central communal spaces of the papakāinga.

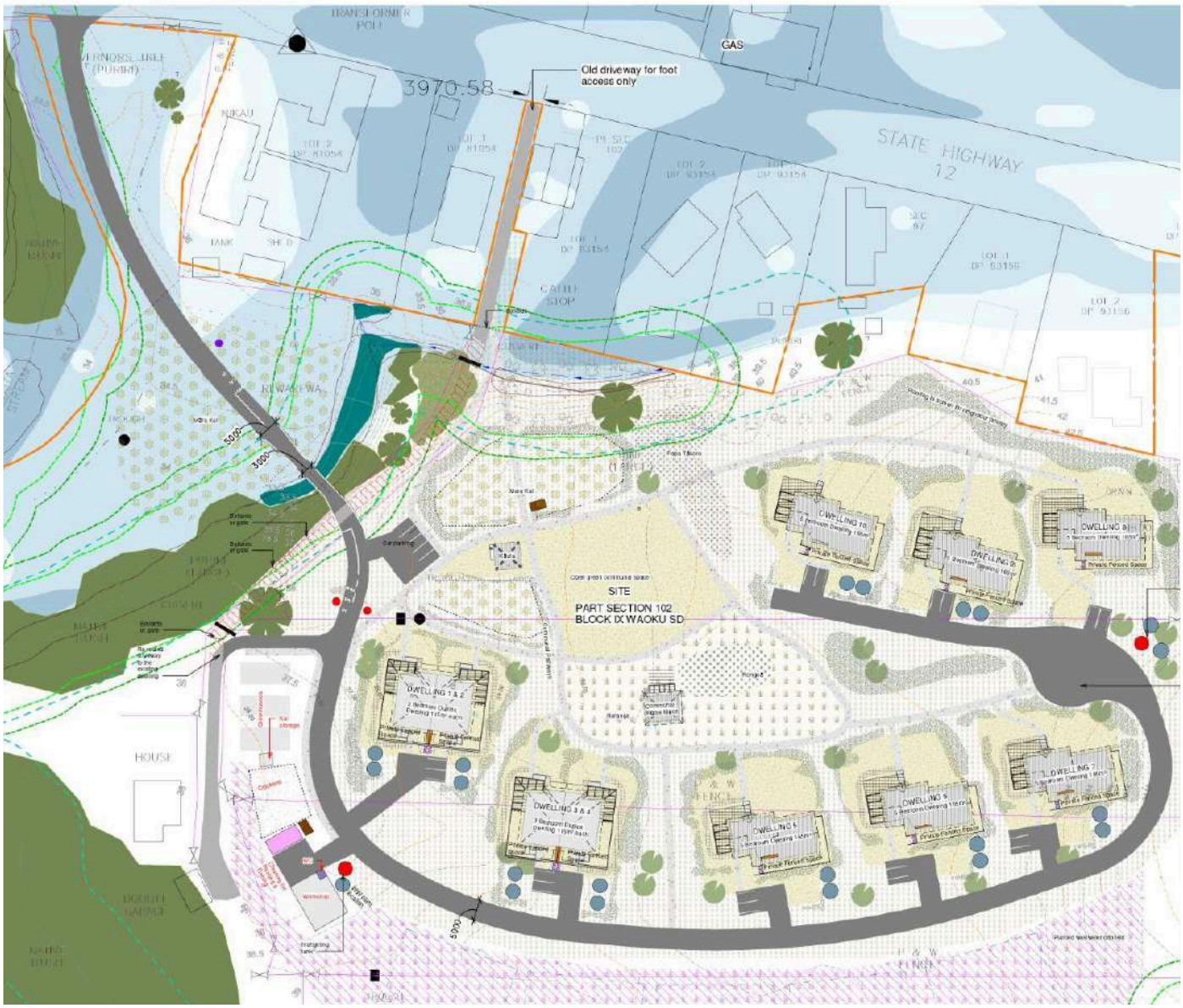
Reduced travel requirements & pedestrian accessibility

While there is good practical vehicle access for each dwelling, there is also provision of more bedrooms, and bedrooms that could be used as at home offices. The papakāinga has a vehicle free central community space, that also provides easy pedestrian access to the Waimamaku shops, as well as to neighbours. It also provides a safe communal space away from vehicles where tamariki can play.

The māra kai aims to provide whānau with food resources and stability on their doorstep, to minimise shopping trips.

Intergenerational Planning:

Allowance for the sharing and continuation of mātauranga Māori through activities such as gardening, gathering kai, cooking, raranga, as well as space within the dwellings for intergenerational living, and whānau living side by side.



Building Design

Orientation & Passive Design Strategies.

The design of the dwellings has focused on locating lining areas to the roth facade, and bathroom and laundry areas to the south. The windows on the north facade are larger to let in sunlight for solar gain in wintertime, and the eve overhang keeps the sunlight out during summer to keep the dwellings cool. Providing casement window openings to the living, dining and bedroom areas allows for maximum user control of fresh air ventilation and where the floor plans allow for it windows provide cross ventilation.

All dwellings have been oriented on the site plan to make the most of the northern aspect, while also looking to provide views to the surrounding maunga, and to the papakāinga shared spaces for passive security.

Main entrances are located on the north side, towards the papakāinga community space, and to welcome manuhiri via the pedestrian paths. Second entrances also provide easy and practical entry from the private carparking.

All dwellings have been designed to allow for accessible access, with ramps, level entry thresholds, wide doorways and hallways, and one bedroom and bathroom in each dwelling that is sized to meet accessibility standards. The kitchens and lining areas are configured to allow for accessible use and wheel chair users.

3 Bed Duplex, Entrance on Northern Facade. Sunlight, midwinter, midday.

3 Bed Standalone, Entrance on Northern Facade

3 Bed Standalone,

5 Bed Standalone, Entrance on Northern Facade & Side Deck (western)

5 Bed Standalone, Western Deck and rear entrance

Cultural Design Considerations:

A glazed overlight, or glazed inset panel in the front entrance door will also be used to give each whare an individual artwork that references a local maunga. This will be locally made stained glass work, or a locally designed glazing manifestation

A shared whare, or rūma Māori, has been designed to provide space for activities such as rongoā and raranga. While a communal kāuta has been provided to create space for communal kai preparation.

Materials

Dwellings:

The design focuses on low embodied carbon materials that are also functional, and suit the surrounding landscape. Where possible the materials specified are locally sourced, natural and renewable.

For example Macrocarpa timber cladding, that is sourced from shelterbelts in Te Tai Tokerau.

Timber framed construction, with high performing thermal envelope build up.

Low VOC materials for a healthy internal air environment. Mechanical HRV ventilation systems have been costed in to provide year round ventilation and high indoor air quality.

Linoleum flooring provides a durable surface that is made from natural materials (cork, stone and marble waste and natural resins).

Earthwool insulation: A batts insulation material made from recycled glass, that does not contain any formaldehyde in the binder so it is safer and more comfortable to handle for installers.

Ruma Maori, Kai Storage & Kauta:

These auxiliary non habitable buildings will be LEM (light earth method) construction, or Hemp crete with geobind. These will use locally sourced natural waste materials such as hemp shiv, straw, or wood fibres and clay or lime binder, and have natural clay plaster lining internally and lime plaster externally.

Resource Consent Application

Te Roroa Whatu Ora Custodian Limited

7229 State Highway 12

Waimamaku

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August 2025

KPN Consultants Ltd – PO Box 836 | Whangarei 0140 | Phone (022) 076 6471

Application and Property Details

Applicant:	Te Roroa Whatu Ora Custodian Limited
Site Address:	7229 State Highway 12, Waimamaku
Agents Details:	KPN Consultants Limited PO Box 836 Whangarei 0140 Attention: Kim Nathan Phone: 022 076 6471 Email: kim@kpnc.co.nz
Submission Date:	
Legal Description and C/T:	Pt Sec 102 Blk IX Waoku SD (NA51B/943)
Site Area:	16.063ha
Consent Authority	Northland Regional Council

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1.0 Introduction

This application has been prepared in support of an application to undertake vegetation removal, earthworks, and associated diversion of water as part of a proposed Papakāinga housing development on the application site within an identified flood hazard area and in proximity to a natural inland wetland.

The application has been prepared in accordance with Section 88 and the Fourth Schedule of the Resource Management Act, 1991 (RMA). Section 88 of the RMA requires that resource consent applications be accompanied by an Assessment of Environmental Effects (AEE) in accordance with the Fourth Schedule.

The report also includes an analysis of the relevant provisions of the district, regional and national planning documents that are pertinent to the assessment and decision required under s104 of the RMA.

2.0 Site and Locality Description

2.1 Site Description

The 16.063ha application site is legally described as Pt Sec 102 Blk IX Waoku SD (NA51B/943).

Figure 1 – Aerial photograph of application site (Source: FNDC GIS)

The application site is irregular in shape, with three frontages onto State Highway 12 and bounded to the south and south-west by the Waimamaku River.

The land is generally flat in topography.

The property currently contains the existing farm homestead with some associated accessory buildings and no further built development. The application site gains access via an existing vehicle crossing off State Highway 12 and a driveway which extends through the site to the Waimamaku River.

The site is not connected to any reticulated services.

The majority of the site is maintained in pasture, however, there are pockets of native vegetation throughout, the majority of which surrounds the existing dwelling and along the banks of the river.

The lower portions of the application site, including along the Waimamaku River have been identified as flood hazards.

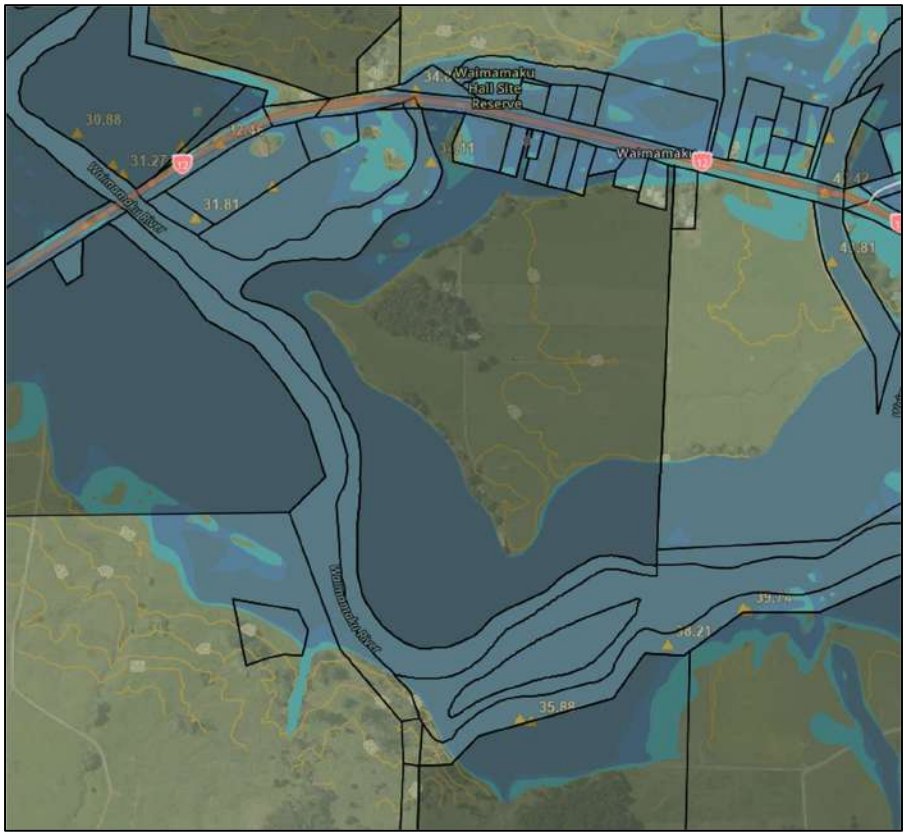

Figure 2 – Identified Flood Hazards the application site and surrounds (Source: NRC GIS)

A number of watercourses, including permanent and intermittent streams, as well as natural inland wetland areas run through the site, the majority of which have been highly modified by previous land use.

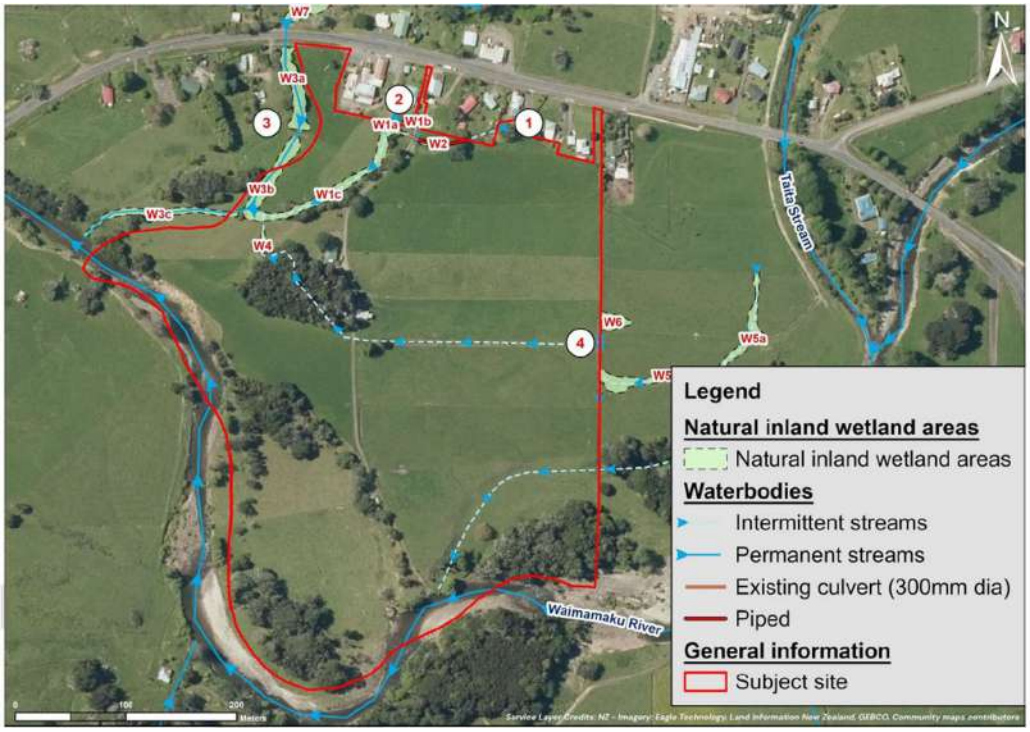

Figure 3 – Watercourse mapping (Source: Wetland and Watercourse Assessment report – Wild Ecology)

2.2 Locality Description

The application site is located approximately 7km east of Whakamaharatanga marae and approximately 10km east of the Waimamaku Beach.

The Waimamaku settlement includes a 4-Square convenience store, a GAS service station, a town hall and a medical clinic. The wider surrounding area is characterised by rural production land use activities.

3.0 Proposal / Background

3.1 Relevant Background

The site is held in one record of title (NA51B/943) which contains no legal restrictions which would affect any consent application for a papakāinga housing development. A copy of the record of title is included in **Appendix B.**

There are no legal restrictions listed on the title that would adversely impact this application.

Te Roroa are an Iwi of approximately 4,000 members, whose lands were settled with The Crown in 2008 (including the application site).

Te Roroa Development Charitable Trust was established in 2011 and comprises 5 Trustees, who are tasked by Whatu Ora with progressing the social, cultural and environmental.

Transitional housing services using transportable cabins are located at the Te Roroa campgrounds (in Waipoua), enabling Te Roroa to support the short-term housing needs and provide health & social service advocacy to whanau. This proposed papakāinga housing development will provide real opportunities for families to move into affordable long-term tenure (rental or lease), or home ownership supporting the aspirations of Te Roroa and of the people who live within the Rohe of Te Roroa.

3.2 The Proposal

The proposal is to undertake vegetation removal. earthworks, and associated diversion of water as part of a proposed Papakāinga housing development on the application site within an identified flood hazard area and in proximity to a natural inland wetland, the plans of which are included in **Appendix A**.

Earthworks

Earthworks are proposed across the site to establish level building platforms, form the accessway, and manage secondary flows. Due to the site's gentle topography, significant retaining structures or steep batter slopes are not anticipated for the dwelling platforms. However, batter slopes and abutment retaining will be required to construct the bridge abutments where the accessway crosses the wetland.

A total approximate volume of earthworks (consisting of 1846m^3 cut and 2162m^3 fill) is proposed over a total approximate area of 17,140m^2. Some of the excavated material may be used onsite as fill.

A site-specific Erosion and Sediment Control Plan in accordance with best practice will be prepared and is anticipated as a condition of consent prior to works being undertaken, and may include and may include, but not be limited to the following:

- Stabilised Construction Entranceway,
- Silt Fences / Super Silt Fences,
- Clean / Dirty water diversion bunds,
- Decanting earth bunds,
- Progressive site stabilisation.

At works completion, all exposed surfaces will be stabilised and reinstated with landscape planting/grass/driveway surface. At this point any risk of erosion and run off is negated and erosion and sediment control measures can be removed from site.

The proposed earthworks will be undertaken in accordance with best practice guidelines.

Vegetation Clearance

Approximately 15m^2 of regenerating indigenous native species including mapou (*Myrsine australis*), nīkau palm (*Rhopalostylis sapida*), cabbage tree (*Cordyline australis*), karamu (*Coprosma robusta*), rewarewa (*Knightia excelsa*), and kohekohe (*Dysoxylum spectabile*) will be required to be removed to construct the accessway and bridge.

In order to offset/mitigate this vegetation removal, it is proposed to undertaken an area of 45m^2 of native planting appropriate to the area near the wetland/watercourse as recommended in the Wetland and Watercourse Assessment report prepared by Wild Ecology (**Appendix D**).

Stormwater Diversion

The construction work associated with, in addition the proposed built development will involve the diversion of stormwater, which will be within 100m of a wetland.

In addition, the proposed culvert crossing(s) is proposed to underly the new accessway and will result in stormwater diverted and discharged within a 10m setback of the wetland.

4.0 Resource Consents Required

4.1 Proposed Regional Plan

There are no outstanding appeals on the earthworks rule of the PRP. Accordingly, these rules can be treated as operative under Section 86F of the RMA and the equivalent rules in the Regional Water and Soil Plan ('RWSP') are no longer relevant.

Consent is required under the following rules of the PRP:

Rule C.6.1.3 'Other on-site treated domestic wastewater discharge' requires that the volume of wastewater discharged does not exceed two cubic metres per day. The maximum daily design flow volume for the development is 12.24m^3 per day, exceeding this volume and being assessed as a **discretionary activity**.

Rule C.8.3.4 'Earthworks' – Consent is required as a **discretionary activity** under this rule for the proposed earthworks as:

- Earthworks of 305 m^2 and 260 m^3 of fill are proposed, exceeding the 200 m^2 and 50 m^3 thresholds within 10m of a natural wetland; and
- 117m^3 of cut is proposed in an identified flood hazard area, which is more than 100m^3 permitted standard; and
- A total area of 16,644m^2 of earthwork is proposed, which is more than 5000m^2 permitted standard.

It is considered that consent is not required under Rule C.3.1.9 of the Proposed Regional Plan as outlined in the Land Development Report (**Appendix C**), as the access will follow existing ground profile and enable flood water to sheet flow across during significant rain fall events ensuring less than minor effect to flood levels within neighbouring properties; and given the flood plan and width of the overall cross section the effect of the proposed fill and bridge structure (including culvert) will have less than minor effect on flood levels.

The ongoing diversion and discharge of stormwater from the impervious surfaces associated with the developed site is deemed to be a permitted activity in accordance with Rule C.6.4.2 of the PRP.

4.2 National Environmental Standard - Freshwater

Consent is also required under the following provisions of the NES-F:

- Consent under Regulation 54(a) is required as the proposal will result in the disturbance and clearance of pastoral exotic vegetation and scattered terrestrial indigenous vegetation within a 10m setback of a wetland areas as part of access road construction and bridge installation – **non-complying activity.**
- Consent under Regulation 54(b) is required as the proposal will result in the installation of a new bridge crossing wetland area W1c and watercourse 2, and establishment of accessway within a 10m setback of 'natural inland wetland' areas (W3a and W1c) - **non-complying activity.** It is noted that the new bridge will be located completely outside the wetland boundaries and will span the wetland, and therefore the existing wetland will not be affected

As per the findings of the Wetland and Watercourse Assessment report prepared by Wild Ecology dated (**Appendix D**), no further consent is required under the NES-F.

4.3 Overall Activity Status

Overall, the proposal is a non-complying activity.

4.4 Other Approvals Required

As outlined previously in this report, the proposed activities are required to complete the physical works associated with a proposed Papakāinga housing development on the application site. A concurrent land use consent application has been lodged with the Far North District Council.

No other approvals are required to give effect to this proposal.

5.0 Application Assessment

5.1 Statutory Considerations

5.1.1 Relevant Section of the RMA

When considering an application for a Restricted Discretionary activity the Council as consent authority must have regard to Part 2 of the RMA ("Purposes and Principles" – sections 5 to 8), and sections 104, 104B, 104D and 108 of the RMA.

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

After considering an application for a resource consent for a discretionary activity or noncomplying activity, a consent authority—

(a) may grant or refuse the application; and

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

Section 104D sets out restrictions for non-complying activities.

104D Particular restrictions for non-complying activities

(1) Despite any decision made for the purpose of section 95A(2)(a) in relation to adverse effects, a consent authority may grant a resource consent for a non-complying activity only if it is satisfied that either-

(a) The adverse effects of the activity on the environment (other than any effect to which section 104(3)(a)(ii) applies) will be minor; or

(b) The application is for an activity that will not be contrary to the objectives and policies of—

(i) The relevant plan, if there is a plan but no proposed plan in respect of the activity;

or

(ii) The relevant proposed plan, if there is a proposed plan but no relevant plan in respect of the activity; or(iii)Both the relevant plan and the relevant proposed plan, if there is both a plan and a proposed plan in respect of the activity.

Subject to Part 2 of the RMA, when considering an application for resource consent and any submissions received the Council must, in accordance with section 104(1) of the RMA have regard to the matters addressed in 5.2 – 5.7 below.

5.2 Section 104(1)(a) Actual and Potential Effects on the Environment

Section 104(1)(a) of the RMA requires that a council have regard to any actual and potential effects on the environment of allowing the activity.

5.2.1 Earthworks

A wetland has been identified running through part of the property. Some of the proposed earthworks will be located within 10m of the wetland. The earthworks will be carried out in accordance with best practice, which will include the implementation of sediment control measures in general accordance with AC GD05.

A site-specific Erosion and Sediment Control Plan in accordance with best practice will be prepared and is anticipated as a condition of consent prior to works being undertaken.

The earthworks will be completed over a relatively short period of time. Any areas not covered by the driveway/shared access will be revegetated upon completion to mitigate any ongoing discharge of sediment/runoff into the wetland, and to ensure that any potential adverse visual effects will be mitigated.

The hours of work on site will be restricted to between 7am to 7pm Monday to Saturday with no work on Sundays or public holidays, therefore reducing the potential effects of construction activities.

The works will be carried out using modern earthmoving equipment which will minimise any potential for adverse noise effects.

Having regard to the above, any adverse effects associated with the proposed earthworks will be less than minor.

5.2.1 Flooding/Diversion of Water

The lower portions of the application site, including along the Waimamaku River have been identified as flood hazards for 10-year, 50-year and 100-year events. However, the majority of the proposed development (including all of the proposed units) are located within the centre of the elevated portion of the site and are not subject to flood hazard, other that the proposed access. As such no finished floor levels (FFL) are proposed.

The Land Development Report (**Appendix C**) notes that the proposed accessway within the flood plain will follow the existing ground profile and have a low-profile cross section to enable flood water to sheet flow across the road during significant rainfall event, thus ensuring less than minor effect to the flood levels within the neighbouring properties.

Further, noting that localised fill will be introduced within the flood plain to construct the proposed bridge abutments, however, given the extent of the flood plain and the width of the overall flood cross section, the effect of such fill in relation to the flood level is considered less than minor.

All earthworks will be required to be designed by a suitably qualified engineer taking into account the findings of the Land Development Report (**Appendix C**).

The Land Development Report (Appendix E) recommends that:

- Signs must be erected at the eastern side of bridge advising users not to cross during flooding.
- An evacuation management plan must be developed and implemented that advises occupants of the flooding risk, noting that this section of State Highway 12 through Waimamaku township will also be flooded during a 1% AEP (100-year) flood event, therefore, to identify an emergency access route to the state highway can be difficult. However, if possible, an alternate emergency access route or other means of evacuation from the development area should also be investigated.

Provided the recommendations contained within the Land Development Report are followed, it is considered that any adverse effects from flood hazards can be mitigated such that they would be less than minor.

5.2.2 Vegetation Removal

in addition to the proposed earthworks, an area of 15m2 of indigenous vegetation will be required to be removed to facilitate the construction of the accessway which has been redesigned following input from an ecologist to avoid any direct loss of natural inland wetlands.

The clearance requirements have been kept to a practicable minimum and are required to facilitate the construction of a culvert crossing and bridge structure, an no works will be undertaken within the mapped boundaries of the wetland.

The assessment contained within the Wetland and Watercourse Assessment report prepared by Wild Ecology (**Appendix D**). considers that there will be no loss of natural inland wetland extent as a result, and any potential adverse effects can be mitigated through the development of a site-specific Erosion and Sediment Control Plan ('ESCP') to minimise runoff and prevent sedimentation of the wetland(s). Concluding that through this combination of sensitive design and best-practice construction management, the accessway development will avoid the physical loss of both natural inland wetlands and intermittent streams, while maintaining the ecological integrity of these important natural features.

As discussed previously, in this report, the vegetation removal will be mitigated through the proposed relegation of a 45m2 appropriate to the area, an appropriately worded consent condition in anticipated in this regard. The offset planting near the wetlands/watercourse will help maintain ecological values and support long-term restoration.

Earthworks are to be managed in accordance with a site-specific ESCP which is based on best practice measures outlined under GD05 and other relevant specifications, it is considered the potential effect associated with sediment discharges as part of construction works are less than minor.

The following summarises the findings of the Wetland and Watercourse Assessment report prepared by Wild (**Appendix D**):

The proposed accessway construction is expected to generate additional stormwater runoff, which will be directed towards the natural inland wetland areas. While this will result in an increase in stormwater entering these wetlands, the additional runoff is not anticipated to significantly impact the existing water level range or the overall hydrological dynamics of the wetland system. The wetlands on-site are primarily fed by surface and rainwater, and their capacity to absorb and manage the increased flow is considered sufficient. Any potential effects on water levels are expected to remain within the natural fluctuations typical of these wetland systems.

Therefore, the impact of the proposed construction activities on the mapped wetlands is considered to be low, with no expected long-term disruption to their hydrological regime, ecological health, or natural processes. Carrying out earthworks during extended dry periods when the wetland areas are naturally dry, along with the implementation of appropriate erosion and sediment control measures, will effectively mitigate any potential risks. This ensures that the wetlands continue to function within their natural seasonal variability, maintaining their ecological balance.

The proposed accessway will cross Watercourse 2, an intermittent stream that traverses Wetland W1c. To avoid direct impacts on this sensitive aquatic environment, a bridge structure is proposed in lieu of a culvert or ford crossing. The use of a bridge at this location significantly reduces ecological and hydrological disruption by spanning the watercourse entirely, thereby eliminating the need for in-stream works, excavation, or alteration of the natural channel and wetland margins.

By avoiding in-stream disturbance and adopting best-practice sediment control methods, the bridge installation is not expected to result in any significant adverse effects on aquatic fauna. The approach protects both the intermittent stream and the associated natural inland wetland, maintaining their ecological function and hydrological connectivity. Accordingly, the overall level of ecological effect is assessed as low, with any residual impacts being minor, temporary, and manageable through the proposed mitigation measures.

It is recommended that primary wastewater dispersal fields are planted with low-growing native species—such as sedges and shrubs—to enhance system performance, promote nutrient absorption, and assist in managing surface water flow.

Provided that all wastewater systems are installed and maintained according to manufacturer instructions and the recommendations in the associated technical reports, no significant adverse effects on freshwater habitats from the new effluent disposal fields are anticipated.

In light of the above, it is considered that the proposed works can be undertaken as per recommendations such that any adverse ecological effects can be mitigated such that they will be less than minor.

5.2.3 Cultural Effects

The proposed development is to be undertaken within Maori land and will provide real opportunities for whanau to move into affordable long-term tenure (rental or lease), or home ownership supporting the aspirations of Te Roroa and of the people who live within the Rohe of Te Roroa.

The site is not known to contain any archaeological features, nor is it identified as a site of significance to Maori and minimal earthworks are required.

Accidental Discovery Protocols and appropriate sediment controls will be established and maintained during all works on site.

In light of the above, it is considered that any adverse cultural effects can be mitigated.

5.2.4 Stormwater and Wastewater

The construction work associated with, in addition the proposed built development will involve the diversion of stormwater, which will be within 100m of a wetland.

In addition, the proposed culvert crossing(s) is proposed to underly the new accessway and will result in stormwater diverted and discharged within a 10m setback of the wetland.

While the stormwater diversions associated with the site development will occur within a 100m setback from the identified wetland area and may have a hydrological connection with these areas, they will not change or are unlikely to change the water level range or hydrological function of the wetland.

The Land Development Report (**Appendix C**) recommends the use of a secondary treatment system loading surface pressure compensating drip irrigation line and has identified an area within the site suitable for disposal. A detailed design will be provided at building consent stage.

It is proposed to service the development via an on-site wastewater treatment and land disposal system in accordance with ASNZS1547:2012. The design flow volume is greater than 2m3/day, therefore a regional discharge consent is required. Otherwise, the proposed activity meets all the relevant performance criteria set out in Proposed Regional Plan for Northland.

Based on the Geotechnical Investigation by Hawthorn Geddes (**Appendix E**), elevated groundwater levels are anticipated to occur no shallower than 0.5 m below ground level. To maintain the required vertical separation from the winter groundwater table and to avoid surface runoff from the upslope catchment, a 200 mm layer of fill is proposed over the wastewater disposal and reserve areas.

Both wastewater and stormwater will be discharged to land (not water). Due to the incremental increase in impervious surfaces associated with the site's development, the overall volume of water entering the aquatic features is not expected to increase to any quantifiable level. These discharges are not likely to change the water level range or hydrological function of the wetland areas.

5.2.5 Adverse Effects Conclusion

In summary, it is considered that subject to compliance with conditions, the adverse effects of the activity on the environment would be less than minor.

5.3 Section 104(1)(b)(vi) Relevant Provisions of the Proposed Regional Plan - Objectives and Policies

The PRP includes 15 individual objectives and 103 policies. While the policies are split across 6 sections, the 15 objectives are separate and are not specific to those groups.

Given the nature of the proposal, the policies from the following sections are considered to be relevant to the application:

- D1 'Tangata whenua'; and

- D2 'General'; and

- D4 'Land and water'.

The policies from these sections that are relevant to this application are identified and assessed below. The relevant objectives have also been grouped and assessed with the policies.

Assessment

D1 'Tangata whenua'

- Policies: D.1.1 and D.1.2.

- Objectives: F.1.9.

As discussed previously in this report, the site is not known to contain any archaeological features, nor is it identified as a site of significance to Maori. Accidental Discovery Protocols and appropriate sediment controls will be established and maintained during all works on site, with any appropriate authorities from Heritage New Zealand will be sought.

The proposed development is to be undertaken within Maori land and will provide real opportunities for whanau to move into affordable long-term tenure (rental or lease), or home ownership supporting the aspirations of Te Roroa and of the people who live within the Rohe of Te Roroa.

Notwithstanding the above, it is anticipated that NRC will circulate the application to the relevant iwi groups.

D2 'General' and D4' Land and water'

- Policies: D.2.18, D.4.9, D.4.22, D.4.23, D.4.24 and D.4.27.

- Objectives: F.1.2, F.1.3 and F.1.11.

The recommendations of the Wetland and Watercourse Assessment report prepared by Wild Ecology (**Appendix D**). will ensure that any effects on the wetland and its associated indigenous flora and fauna species can be mitigated such that they would be less than minor. This is in accordance with the policy direction under D.2.18, D.4.22, D.4.23 and D.4.24.

The earthworks will be undertaken in accordance with a site-specific Erosion and Sediment Control Plan in accordance with best practice will be prepared and is anticipated as a condition of consent prior to works being undertaken. The ESCP will be prepared in accordance with GD05 and best practice. The focus of the plan will be to avoid sediment run-off to the wetland on the site. This will ensure that any adverse effects associated with the proposed earthworks are avoided, remedied or mitigated to be appropriate in accordance with the policy direction under D.4.27.

It is proposed to service the development via an on-site wastewater treatment and land disposal system in accordance with ASNZS1547:2012, via a secondary treatment system loading surface pressure compensating drip irrigation line. A detailed design will be provided at building consent stage.

As discussed previously, in this report, elevated groundwater levels are anticipated to occur no shallower than 0.5 m below ground level. To maintain the required vertical separation from the winter groundwater table and to avoid surface runoff from the upslope catchment, a 200 mm layer of fill is proposed over the wastewater disposal and reserve areas.

The discharges are not anticipated to change the water level range or hydrological function of the wetland areas.

▪ Policy: D.6.5.

- *Policy D.6.5 Flood hazard management – development within floodplains Development in flood hazard areas and continually or intermittently flowing rivers (including high risk flood hazard areas) must not increase the risk of adverse effects from flood hazards on other property or another person's use of land or property.*

As discussed previously in this report, it Is considered in the flood assessment contained within the Land Development Report (**Appendix C**) submitted in support of the application that the proposed units are clear of the 1% AEP design flood extent and the proposed works will not worsen flooding on neighbouring properties.

Conclusion

Overall, the proposal is consistent with the relevant objectives and policies of the PRP.

5.4 Section 104(1)(b)(v) Relevant Provisions of the Regional Policy Statement

The Operative Regional Policy Statement ("RPS") for Northland contains high level policy guidance for development. The subject site does not contain any significant features as defined by the RPS and therefore consideration of the RPS provisions is limited to matters under the following objectives:

- Objective 3.2 Region-Wide Water Quality
- Objective 3.11 Regional Form
- Objective 3.13 Natural Hazard risk

Several underpinning policies are also relevant to this application, including:

Policy 5.1.1 - Planned and coordinated development

Subdivision, use and development should be located, designed and built in a planned and co-ordinated manner which:

(a) Is guided by the 'Regional Form and Development Guidelines' in Appendix 2;

(b) Is guided by the 'Regional Urban Design Guidelines' in Appendix 2 when it is urban in nature;

(c) Recognises and addresses potential cumulative effects of subdivision, use, and development, and is based on sufficient information to allow assessment of the potential long-term effects;

(d) Is integrated with the development, funding, implementation, and operation of transport, energy, water, waste, and other infrastructure;

(e) Should not result in incompatible land uses in close proximity and avoids the potential for reverse sensitivity;

(f) Ensures that plan changes and subdivision to / in a primary production zone, do not materially reduce the potential for soil-based primary production on land with highly versatile soils10, or if they do, the net public benefit exceeds the reduced potential for soil-based primary production activities; and

(g) Maintains or enhances the sense of place and character of the surrounding environment except where changes are anticipated by approved regional or district council growth strategies and / or district or regional plan provisions.

(h) Is or will be serviced by necessary infrastructure.

Note: in determining the appropriateness of subdivision, use and development (including development in the coastal environment – see next policy), all policies and methods in the Regional Policy Statement must be considered, particularly policies relating to natural character, features and landscapes, heritage, natural hazards, indigenous ecosystems and fresh and coastal water quality.

Policy 5.1.3 - Avoiding the adverse effects of new use(s) and development

Avoid the adverse effects, including reverse sensitivity effects of new subdivision, use and development, particularly residential development on the following:

(a) Primary production activities in primary production zones (including within the coastal marine area);

(b) Commercial and industrial activities in commercial and industrial zones;

(c) The operation, maintenance or upgrading of existing or planned regionally significant infrastructure; and

(d) The use and development of regionally significant mineral resources

It is considered that the proposal will be in keeping with the character of the immediate locality and that the development would not result in adverse character and amenity effects.

Policy 7.1.1 – General Risk Management Approach

Subdivision, use and development of land will be managed to minimise the risks from natural hazards by:

(a) Seeking to use the best available information, including formal risk management techniques in areas potentially affected by natural hazards;

(b) Minimising any increase in vulnerability due to residual risk;

(c) Aligning with emergency management approaches (especially risk reduction);

(d) Ensuring that natural hazard risk to vehicular access routes and building platforms for proposed new lots is considered when assessing subdivision proposals; and

(e) Exercising a degree of caution that reflects the level of uncertainty as to the likelihood or consequences of a natural hazard event.

Policy 7.1.2 – New subdivision and land use within 10-year and 100- year flood hazard areas

New subdivision, built development (including wastewater treatment and disposal systems), and land use change may be appropriate within 10-year and 100-year flood hazard areas provided all of the following are met:

(a) Hazardous substances will not be inundated during a 100-year flood event.

(b) Earthworks (other than earthworks associated with flood control works) do not divert flood flow onto neighbouring properties, and within 10-year flood hazard areas do not deplete flood plain storage capacity;

(c) A minimum freeboard above a 100-year flood event of at least 500mm is provided for residential buildings.

(d) Commercial and industrial buildings are constructed so as to not be subject to material damage in a 100-year flood event.

(e) New subdivision plans are able to identify that building platforms will not be subject to inundation and / or material damage (including erosion) in a 100-year flood event;

(f) Within 10-year flood hazard areas, land use or built development is of a type that will not be subject to material damage in a 100-year flood event; and

(g) Flood hazard risk to vehicular access routes for proposed new lots is assessed.

As discussed previously in this report, the proposed accessway within the flood plain will follow the existing ground profile and have a low-profile cross section to enable flood water to sheet flow across the road during significant rainfall event, thus ensuring less than minor effect to the flood levels within the neighbouring properties.

Further, noting that localised fill will be introduced within the flood plain to construct the proposed bridge abutments, however, given the extent of the flood plain and the width of the overall flood cross section, the effect of such fill in relation to the flood level is considered less than minor.

All earthworks will be required to be designed by a suitably qualified engineer taking into account the findings of the Land Development Report (**Appendix C**), which also recommends that:

- Signs must be erected at the eastern side of bridge advising users not to cross during flooding.
- An evacuation management plan must be developed and implemented that advises occupants of the flooding risk, noting that this section of State Highway 12 through Waimamaku township will also be flooded during a 1% AEP (100-year) flood event, therefore, to identify an emergency access route to the state highway can be difficult. However, if possible, an alternate emergency access route or other means of evacuation from the development area should also be investigated.

Provided the recommendations contained within the Land Development Report are followed, it is considered that earthworks will not divert flood flow onto neighbouring properties nor deplete flood plain storage and flood hazard risk to vehicular access routes is minimised.

5.5 National Policy Statement – Freshwater Management

The NES-F does not contain specific objectives and policies. Therefore, given the hierarchical nature of plan making in New Zealand, the NES-F must give effect to the National Policy Statement for Freshwater Management 2020 (NPS-FM).

Policy 6 of the NPS-FM considers the values of natural wetlands.

Policy 6: *There is no further loss of extent of natural inland wetlands, their values are protected, and their restoration is promoted.*

As per the recommendations contained within the Wetland and Watercourse Assessment report prepared by Wild Ecology (**Appendix D**), the proposal has been sensitively re-designed to have the least impact on natural inland wetlands and watercourses, and with the adoption of sensitive design, best-practice mitigation measures, and compliance with regulatory requirements, the ecological effects associated with the proposed accessway construction are expected to be low. Provided that all ecological and engineering recommendations are implemented, the works can proceed with confidence that the long-term ecological health and hydrological function of the site's natural watercourses and wetlands will be retained.

In consideration of the above and the conclusions reached in Section 5 of this report, the adverse effects of the proposed activities on freshwater resources are less than minor. Therefore, the proposal is not contrary to and sits comfortably within the policy direction of the NPS-FM.

5.6 National Policy Statement – Indigenous Biodiversity

National Policy Statement for Indigenous Biodiversity (NPS-IB) came into force on August 4th, 2023 (commencement date) and applies to indigenous biodiversity in the terrestrial environment throughout Aotearoa New Zealand. The objective of NPS-IB is to maintain indigenous biodiversity across Aotearoa New Zealand so that there is at least no overall loss in indigenous biodiversity after the commencement date.

Although some vegetation clearance is required to provide for functional access to the development, this clearance has been minimised as far as practicable and will be offset at a 1:3 ratio to achieve no net loss—and ideally a net gain—of indigenous biodiversity, consistent with the biodiversity effects management hierarchy outlined in the NPS-IB (2023).

5.7 Section 104(1)(c) Any other matters considered relevant and reasonably necessary to determine the application

There are no other matters that are considered necessary to determine the application.

6.0 Notification

Public Notification

Having undertaken the s95A public notification tests, the following conclusions are reached:

- Public notification is not mandatory as the applicant has not requested it, there are no outstanding or refused requests for further information, and the application does not involve any exchange of recreation reserve land under s15AA of the Reserves Act 1977.
- Public notification is not precluded due to certain circumstances.
- Public notification is not required as the proposed development will have less than minor adverse effects on the environment as assessed in Section 5.2 of this report.
- Under step 4, there are no special circumstances that warrant the application being publicly notified because there is nothing unique or unusual about the proposal or subject site that gives rise to special circumstances.

Limited Notification

Having undertaken the s95B limited notification tests, the following conclusions are reached:

- Limited notification is not mandatory.
- There is no rule of NES that specifically precludes limited notification of the activities, and the application is for an activity other than those specified in s95B(6)(b).
- Limited notification is not required as it is considered that the activity will not result in any adversely affected persons, as assessed in Section 5.2 of this report.

- There are no special circumstances that warrant the application being limited notified to any other persons.

It is therefore considered that this application can be processed without public or limited notification.

7.0 Consideration of Part 2 (Purpose and Principles) of the RMA

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

In considering the provisions of Section 5, the proposal would use and develop the physical resources of the site in a manner that would continue to enable the applicant to provide for the future social and economic wellbeing of Te Roroa whanau. At the same time the proposal sufficiently avoids, remedies or mitigates adverse effects on the roading network, sensitive receiving environments, amenity and character of the surrounding environment.

Section 6 of the Act sets out a number of matters of national importance which need to be recognised and provided for and includes among other things and in no order of priority, the protection of outstanding natural features and landscapes, the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna, and the protection of historic heritage.

Section 7 identifies a number of "other matters" to be given particular regard by a council in the consideration of any assessment for resource consent and includes the efficient use of natural and physical resources, and the maintenance of amenity values.

Pursuant to Section 7(b) particular regard shall be had to the efficient use and development of natural and physical resources. In this case, it is considered that the proposed development would not compromise the environment or generate any adverse effects, allowing for the efficient use of the physical resources of the site while avoiding adverse effects on the environment.

Pursuant to 7(c) particular regard shall be had to the maintenance and enhancement of amenity values. In this case, the proposal is consistent with, and would maintain the character and amenity values of the surrounding environment.

Pursuant to 7(g) particular regard shall be had to maintenance and enhancement of the environment. In this case, the proposed development has been designed such that the health of the surrounding environment will be maintained.

Section 8 requires a council to take into account the principles of the Treaty of Waitangi. The proposed development does not raise any Treaty of Waitangi issues. The proposal is considered to be an efficient use of resources, providing further residential living opportunities. Overall, it is considered that the application meets the relevant provisions of Part 2 of the RMA, achieving the purpose of the RMA being sustainable management of natural and physical resources.

8.0 Conclusion

This application has been prepared for the Te Roroa Development Charitable Trust in support of an application to undertake vegetation removal, earthworks, and associated diversion of water as part of a proposed Papakāinga housing development on the application site within an identified flood hazard area and in proximity to a natural inland wetland.

It is concluded that any actual or potential effects on the surrounding environment will be less than minor; and that the proposed development would be consistent with the relevant objectives and policies of the Proposed Regional Plan.

Overall, it is considered that the proposed development achieves the purpose and principles of the RMA and that the consent sought should be granted.

Prepared by:

Kim Nathan
SENIOR PLANNER

Appendix A: Plans

Appendix B: Record of Title

Appendix C: Land Development Report

Appendix D: Ecological Assessment

Appendix E: Geotechnical Assessment

LANDFORM
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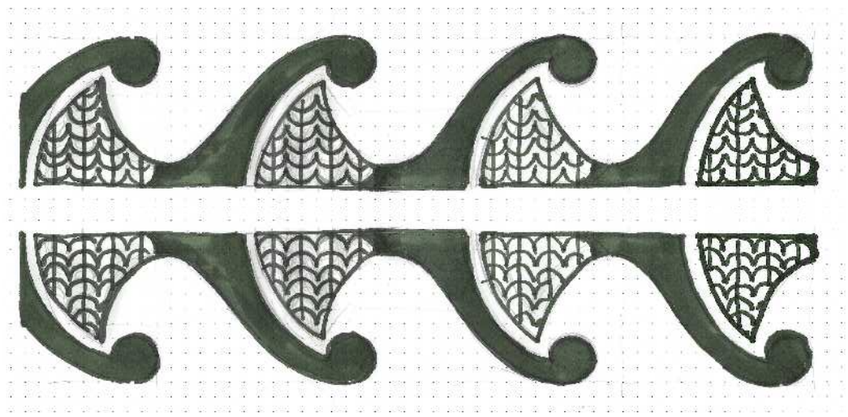
LANDSCAPE CONCEPT PLAN

Te Roroa Iwi
Papakainga
JOB ID: DO773
DATE: JUNE 2025

Sheet No.	Drawing No.	Sheet Title
01	L001	INDEX
02	L002	DESIGN THEMES
03	L003	INSPIRATION PALETTE
04	L101	MASTER CONCEPT PLAN
05	L102	DESIGN THEMES APPLIED
06	L004	MATERIALS PALETTE
07	L005	PLANTING PALETTE

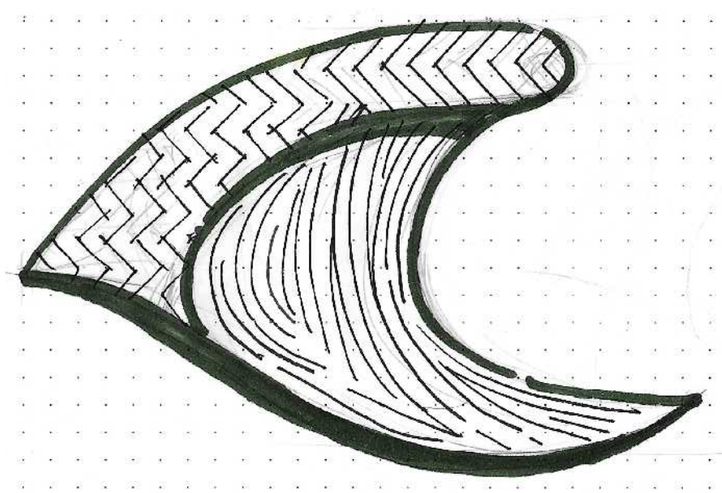


This Master Concept Landscape Plan has been prepared to support the aspirations of Te Roroa for a Papakāinga development within the Waimamaku Valley. The plan seeks to reflect the Te Ao Māori uara and honour the unique whakapapa and taiao of this takiwā.

Waimamaku is nestled between two significant taiao pou: Te Wahapū o Hokianga to the north and Te Ngāhere o Waipoua to the south. These places are deeply embedded in Te Roroa's whakapapa and whanaungatanga to their takiwa.

Flowing gently westward through the valley is the Waimamaku Awa, often interpreted as the “river of lamentation” or “water of the mamaku fern.” This name evokes memories of the tūpuna who arrived aboard the ancestral waka Māhuhu-ki-te-rangi, under the command of Rongomai, landing at Kawerua—just south of the confluence of Waimamaku Awa and Moana Tāpokopoko a Tāwhaki. In their search for kāinga, the descendants of these tūpuna continue to live in the area, including on the whenua at Waimamaku.

Visual themes for this landscape concept plan have been drawn from the surrounding taiao which includes the meandering course of the Waimamaku Awa, the sensuous form of the surrounding puke in the Waimamaku Valley, and the waves that bought our tupuna ashore on Māhuhu-ki-te-rangi. Each element has helped shape the conceptual tirohanga of this landscape design.



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PROJECT TITLE

LANDSCAPE CONCEPT PLAN

Sheet Title

DESIGN THEMES

DRAWING TITLE

Project Manager: Project Manager	Project Number: DO773
Drawn By: J McLean	Sheet Size: A3
Approved By: G Olsen	Sheet: 02 of 7
Date: JUNE 2025	

File Name

D0773 Waimamaku Verson 2.vwx

Drawing Number

L002

General Notes:

Revision Number :	Revision Date :

Contact

Mara Kai, Ngāti Whātua Ōrākei, Auckland

Te Ara Awataha project Northcote, Auckland

Papa takaro, Mangere, Auckland

Pacific Plaza, Dallas, Texas, USA

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PROJECT TITLE

LANDSCAPE CONCEPT PLAN

Sheet Title

INSPIRATION PALETTE

DRAWING TITLE

Project Manager	Project Number
Project Manager	DO773
Drawm By: J McLean	Sheet Size: A3
Approved By: G Olsen	Sheet: 03 of 7
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File Name

D0773 Waimamaku Verson 2.vwx

Drawing Number

L003

General Notes:

Revision Number :	Revision Date :

Contact

LEGEND

- LAWN / GRASS / OPEN PRIVATE SPACE
- LOW PLANTING (0-1m HIGH)
- PLANTED WASTE WATER DRIPPER FIELD
- SCREEN PLANTING (1.5-3m HIGH)
- PROPOSED MEDIUM TREE (<10m IN HEIGHT)
- PROPOSED LARGE TREE (>10m IN HEIGHT)
- PROPOSED FRUIT TREE
- FEATURE PLANTING
- ROAD AND PARKING AREAS (FINISH TO CIVIL ENGINEER RECOMENDATIONS)
- CONCRETE PATH (5kg OXIDE)
- CONCRETE PATH (8kg OXIDE)
- EXISTING NATIVE VEGETATION
- RAINWATER COLLECTION TANK
- DEDICATED FIREFIGHTING WATER TANK
- INDICATIVE STRUCTURES (AS LABELED)
- SHELTER STRUCTURE
- BENCH SEAT
- FENCING LOW PERMEABLE
- FENCING HIGH PERMEABLE

MARA KAI
MARA KAI
MARA KAI
PAPA TAKORO
OPEN GREEN COMMUNAL SPACE
RARANGA
RONGOA
Communal Bama Maori
DWELLING 1 & 2
3 Bedroom Duplex Dwelling 115m² each
DWELLING 3 & 4
3 Bedroom Duplex Dwelling 115m² each
DWELLING 5
5 Bedroom Dwelling 165m²
DWELLING 6
5 Bedroom Dwelling 165m²
DWELLING 7
5 Bedroom Dwelling 165m²
DWELLING 8
5 Bedroom Dwelling 165m²
DWELLING 9
5 Bedroom Dwelling 165m²
DWELLING 10
5 Bedroom Dwelling 165m²
PLANTED WASTE WATER DRIPPER FIELD

PROPOSED GLASS HOUSES
PROPOSED CHICKEN RUN
EXISTING HOUSE
EXISTING DOUBLE GARAGE
PROPOSED WORKSHOP
EXISTING DAIRY SHED (INOPERABLE)

1 MASTER CONCEPT PLAN
Scale: 1:1000

LANDFORM CONSULTING LIMITED

Project Title
LANDSCAPE CONCEPT PLAN

Sheet Title
MASTER CONCEPT PLAN

Drawing Title

Project Manager	Project Number
Project Manager	DO773
Drawn By	Sheet Size
J McLean	A3
Approved By	Sheet
G Olsen	04 of 7
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JUNE 2025	

File Name
D0773 Waimamaku Verson 2.vwx

North	Drawing No.	Scale
	L101	1:1000

General Notes:

Revision Number :	Revision Date :
1	17/07/2025

Contact

2 DESIGN THEMES APPLIED
Scale: 1:1000

WAVE

WAIMAMAKU RIVER

LANDFORM
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Project Title
LANDSCAPE CONCEPT PLAN

Sheet Title
DESIGN THEMES APPLIED

Drawing Title

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D0773 Waimamaku Verson 2.vwx

North	Drawing No.	Scale
	L102	1:1000

General Notes:

Revision Number :	Revision Date :

Contact

CHARCOAL COLOURED CONCRETE (5%)
RESULTS MAY VARY FROM EXAMPLE SHOWN

CHARCOAL COLOURED CONCRETE (8%)
RESULTS MAY VARY FROM EXAMPLE SHOWN

BOUNDARYLINE- DURAPANEL AXIS FENCE
OTHER COLOURS AVAILABLE

WINTER GARDENZ: GLASS HOUSE SELECTION

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PROJECT TITLE

LANDSCAPE CONCEPT PLAN

Sheet Title

MATERIALS PALETTE

DRAWING TITLE

Project Manager: Project Manager	Project Number: DO773
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Approved By: G Olsen	Sheet: 06 of 7
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File Name

D0773 Waimamaku Verson 2.vwx

Drawing Number

L004

General Notes:

Revision Number :	Revision Date :

Contact

TREES

Agathus australis
Kauri
HEIGHT: 50.0m
SPREAD: 20.0m
EVERGREEN
NATIVE

Alectryon excelsus
Titoki
HEIGHT: 4.0m
SPREAD: 4.0m
EVERGREEN
NATIVE

Cyathea medullaris
Mamaku, Black tree fern
HEIGHT: 20.0m
SPREAD: 5.0m
EVERGREEN
NATIVE

Dacrycarpus dacrydiodes
Kahikatea
HEIGHT: 50m
SPREAD: 4.0m
EVERGREEN
NATIVE

Metrosideros excelsa
Pohutukawa
HEIGHT: 10.0m
SPREAD: 10.0m
EVERGREEN
NATIVE

GROUND COVERS AND SHRUBS

Apodasmia similis
Oioi
HEIGHT: 1.0m
SPREAD: 1.0m
EVERGREEN
NATIVE

Asplenium bulbiferum
Hen and Chicken Fern
HEIGHT: 0.8m
SPREAD: 0.8m
EVERGREEN
NATIVE

Carex virgata
Swamp sedge, Pukio
HEIGHT: 1.0m
SPREAD: 0.5m
EVERGREEN
NATIVE

Carpodetus serratus 'Prostrata
Creeping Putaputaweta, Marble Leaf
HEIGHT: 0.5m
SPREAD: 1.0m
EVERGREEN
NATIVE

Coprosma repens
Taupata, Mirror Plant
HEIGHT: 3.0m
SPREAD: 2.0m
EVERGREEN
NATIVE

Coprosma repens 'Poor Knights'
Poor Knights Coprosma
HEIGHT: 0.5m
SPREAD: 1.0m
EVERGREEN
NATIVE

Dodonaea viscosa
Akeake
HEIGHT: 7.0+m
SPREAD: 2.5m
EVERGREEN
NATIVE

Phormium tenax
Harekeke, New Zealand Flax
HEIGHT: 2.5m
SPREAD: 2.0m
EVERGREEN

Piper excelsum
Kawakawa
HEIGHT: 3.0m
SPREAD: 3.0m
EVERGREEN
NATIVE

Pseudopanax lessonii
Five Finger
HEIGHT: 4.0m
SPREAD: 2.5m
EVERGREEN

LANDFORM
CONSULTING LIMITED

PROJECT TITLE

LANDSCAPE CONCEPT PLAN

Sheet Title

PLANTING PALETTE

DRAWING TITLE

Project Manager: Project Manager	Project Number: DO773
Drawm By: J McLean	Sheet Size: A3
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L005

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Contact