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)
- ◯ Discharge
- ◯ Change of Consent Notice (s.221(3))
- ◯ Extension of time (s.125)
- ◯ Other (please specify) _____

**** 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?	

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: West Road Farms Limited C/- David Gray

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: Tohu Consulting Limited (Attn: Nina Pivac)

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: West Road Farms Limited

Property Address/ Location: 81 Kunicich Road, Awanui

Postcode 0486

8. Application Site Details

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

Name/s: West Road Farms Limited

Site Address/ Location: 81 Kunicich Road, Awanui

Postcode

Legal Description: Lot 1 DP 23280 Val Number:

Certificate of title:

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

Site visit requirements:

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

Is there a dog on the property? ☑ Yes ○ No

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

Please contact applicant to arrange site 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 subdivision in Rural Production Zone to create one additional allotment

(containing existing dwelling).

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

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)	As per applicant details
Email:	
Phone number:	**Work** **Home**
Postal address: (or alternative method of service under section 352 of the act)	**Postcode**

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)	David Gray	
Signature: (signature of bill payer)	[redacted] MANDATORY	**Date** 30/10/24

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.

15. Important information continued...

Declaration

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

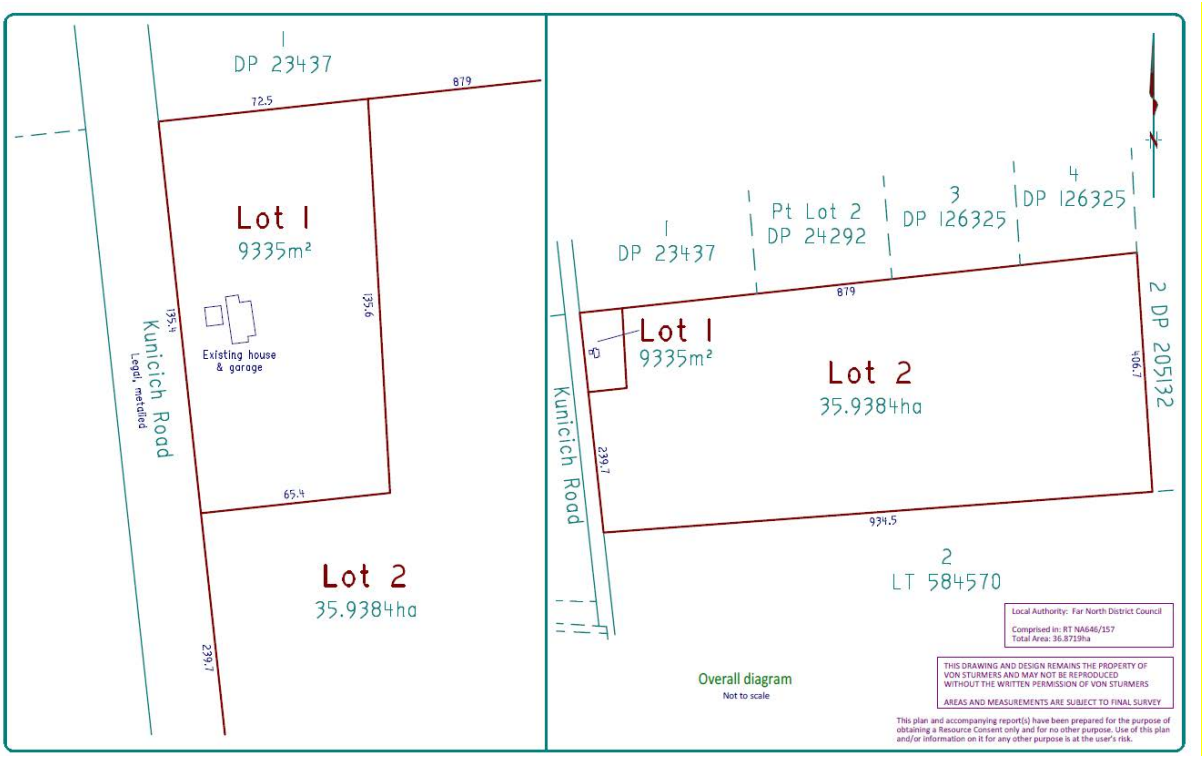
Name: (please write in full)	Nina Pivac	
Signature:	[redacted]	**Date** 30/10/24

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

Checklist (please tick if information is provided)

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

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



SUBDIVISION RESOURCE CONSENT APPLICATION

81 KUNICICH ROAD, AWANUI
LOT 1 DP 23280

ASSESSMENT OF ENVIRONMENTAL EFFECTS

PREPARED FOR:
WEST ROAD FARMS LIMITED
C/- DAVID GRAY

30 October 2024
REV A

TOHU
CONSULTING

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APPENDICES:

1.0 THE APPLICANT AND PROPERTY DETAILS

To:	Far North District Council
Site address:	81 Kunicich Road, Awanui
Applicant's name:	West Road Farms Limited C/- David Gray
Address for service:	Tohu Consulting Limited Attn: Nina Pivac 50-64 Commerce Street Kaitaia 0410
Legal description:	Lot 1 DP 23280
Site area:	36.8719ha
Site owner:	West Road Farms Limited
Operative District Plan zoning:	Rural Production Zone
Operative District Plan overlays/resource areas:	Partially flood susceptible LUC 2 and 3 Soils
Proposed District Plan zoning:	Rural Production Treaty Settlement Area of Interest Partial Coastal Flood Zones 1, 2 and 3 River Flood Hazard Zones – 10 and 100 Year ARI Event
Brief description of proposal:	Proposed subdivision in the Rural Production Zone to create one additional allotment. The proposed subdivision will result in the following allotment areas: • Lot 1 – 9335m^2 (contains existing dwelling) • Lot 2 – 35.9384ha (vacant)
Summary of reasons for consent:	Overall, resource consent is required as a **Restricted Discretionary Activity** in accordance with Rules 13.8.1(b) of the Far North District Plan (Rural Production Zone).

We attach an assessment of environmental effects that corresponds with the scale and significance of the effects that the proposed activity may have on the environment.

AUTHOR

Nina Pivac
Director l BAppSC l PGDipPlan l Assoc. NZPI

Date: 30 October 2024

2.0 PROPOSAL

The applicant, West Road Farms Limited C/- David Gray, proposes to undertake a subdivision in the Rural Production Zone, to create one additional allotment. A copy of the scheme plan has been provided in **Appendix A**. The proposal will result in the following allotments:

- Lot 1 – 9335m^2 (contains existing dwelling)
- Lot 2 – 35.9384ha (vacant)

Overall, the proposal has been assessed as a **Restricted Discretionary Activity** in accordance with Rules 13.8.1(b) of the operative Far North District Plan (District Plan).

A Site Suitability Report has been prepared by Haigh Workman in support of this application which concludes that each existing services within Lot 1 are adequate, and that Lot 2 is able to accommodate multiple suitable building platforms and adequate services. See **Appendix C.**

The following Assessment of Environmental Effects (AEE) has been prepared in accordance with the requirements of Section 88 of and Schedule 4 of the Resource Management Act 1991 (the Act) and is intended to provide the information necessary for a full understanding of the activity for which consent is sought and any actual or potential effects the proposal may have on the environment.

3.0 SITE CONTEXT

The subject site is situated on 81 Kunicich Road, Awanui and is legally described as Lot 1 DP 23280. A copy of the Certificate of Title (CT) is attached as **Appendix B.**

The subject site has a total area of 36.8719ha. Proposed Lot 1 contains an existing dwelling, garage and associated services as per previous Council approvals. Proposed Lot 2 is vacant and in productive use. The use of the site will remain unchanged.

The site is currently accessed via multiple existing vehicle crossings off Kunicich Road which have been formed to an appropriate standard. Given the use of the site will remain unchanged, it is anticipated that no vehicle crossing upgrades will be required.

No easements are required.

Figure 1: Aerial photograph of the subject site (Premise)

In terms of vegetation, the site is largely in pasture with the exception of boundary planting along the northern boundary of the subject site, the eastern boundary of proposed Lot 1 and a portion of the road boundary of proposed Lot 1. There are no significant areas of indigenous vegetation or significant habitats of indigenous fauna. No vegetation clearance is required as part of this application.

The subject site is on the fringe of the Awanui township. The surrounding environment is largely charactarised by production and rural-residential activities.

4.0 DISTRICT PLAN RULES ASSESSMENT

OPERATIVE DISTRICT PLAN

SUBDIVISION:

An assessment of the proposal against the relevant subdivision rules of the Far North District Plan is provided below:

Rural Production Zone	Relevant Standards	Compliance
Rule 13.8.1 Subdivision within the Rural Production Zone	3. A maximum of 3 lots in any subdivision, provided that the minimum lot size is 4,000m2 and there is at least 1 lot in the subdivision with a minimum lot size of 4ha, and provided further that the subdivision is of sites which existed at or prior to 28 April 2000, or which are amalgamated from titles existing at or prior to 28 April 2000;	The proposed subdivision is able to meet this criteria. Resource consent is required for a **Restricted Discretionary Activity**
Rule 13.7.2.2 Allotment Dimensions	A minimum square building envelope of 30m x 30m is required and should not encroach into the permitted activity boundary setbacks for the relevant zones.	Existing built development within proposed Lot 1 will remain compliant with setback requirements. Proposed Lot 2 has sufficient area for multiple building envelopes which have the ability to comply with setback requirements **Controlled Activity**

PROPOSED DISTRICT PLAN

The Proposed Far North District Plan (PDP) was notified on Wednesday 27 July 2022. Rules in a Proposed Plan have legal effect once the council makes a decision on submissions relating to that rule and publicly notified this decision, unless the rule has immediate legal effect in accordance with section 86(3) of the Resource Management Act 1991 (the Act).

As of Monday 4 September 2023, the further submission period on the PDP has closed. However, Council are yet to make a decision on submissions made and publicly notify this decision. Therefore, only rules in the PDP with immediate legal effect are relevant. These rules are identified with a 'hammer' in the plan. Rules that do not have immediate legal effect do not trigger the need for a resource consent under the PDP.

An assessment of the proposal against the rules with immediate legal effect has been undertaken. In this case there are none that are relevant to the proposal. Therefore, no consideration needs to be given to any of the rules under the PDP.

Overall, the proposal requires resource consent as a **Restricted Discretionary Activity.**

5.0 NATIONAL ENVIRONMENTAL STANDARDS FOR CONTAMINATED SOILS (NES CONTAMINATED SOILS)

All applications that involve subdivision, or an activity that changes the use of a piece of land, or earthworks are subject to the provisions of the NES Contaminated Soils. The regulation sets out the requirements for considering the potential for soil contamination, based on the HAIL (Hazardous Activities and Industries List) and the risk that this may pose to human health as a result of the proposed land use.

Based on a search of Council records, historic aerial images and archives, and the documentation provided in support of this application, there is no evidence to suggest that a HAIL activity is, has been, or is more than likely to not have been undertaken on any part of the site. Therefore, the NES Contaminated Soils is not applicable in this instance.

6.0 NATIONAL ENVIRONMENTAL STANDARDS FOR FRESHWATER (NES FRESHWATER)

A review of aerial images, including NRC's wetland maps, reveal no evidence to suggest that there are any wet areas that may be subject to the NES Freshwater provisions. Therefore, no further assessment is required under the NES Freshwater.

7.0 NATIONAL POLICY STATEMENT FOR HIGHLY PRODUCTIVE LAND (NPSHPL)

The subject site contains LUC 2 and 3 soils which are deemed as 'highly productive' under the NPSHPL. Therefore, the NPSHPL is applicable to the site. However, as a restricted discretionary activity, Council's discretion in this case is limited to reverse sensitivity effects. These have been discussed in further detail below.

8.0 NATIONAL POLICY STATEMENT FOR INDIGENOUS BIODIVERSITY (NPS-IB)

As discussed earlier in the report, the subject site does not contain any significant areas of indigenous vegetation or habitats of indigenous fauna. The NPS-IB is therefore not relevant to this application.

9.0 PUBLIC NOTIFICATION ASSESSMENT (SECTIONS 95A, 95C TO 95D)

Step 1: Mandatory public notification is required in certain circumstances

Under Section 95A(3) an application must be publicly notified if:

a) the applicant has requested that the application be publicly notified;
b) public notification is required under Section 95C.

The applicant is not requesting public notification under clause (a). Clause (b) provisions relate to where an applicant does not provide further information formally requested under Section 92, which is not applicable in this case.

Public notification is not required and therefore Step 2 must be considered.

Step 2: If not required by Step 1, public notification precluded in certain circumstances

Under Section 95A (4) an application must not be publicly notified if:

a) the application is for a resource consent for 1 or more activities, and each activity is subject *to a rule or national environmental standard that precludes public notification;*
b) the application is for a resource consent for 1 or more of the following, but no other, activities:
  i. a controlled activity;
  ii. a restricted discretionary, discretionary, or non-complying activity, but only if the activity is a boundary activity:

None of the above apply, therefore public notification is not precluded.

Step 3 must be considered.

Step 3: Public notification required in certain circumstances

Public notification is precluded if:

a) the application is for a resource consent for 1 or more activities, and any of those activities is subject to a rule or national environmental standard that requires public notification;

b) the consent authority decides, in accordance with section 95D, that the activity will have or is likely to have adverse effects on the environment that are more than minor.

The proposal requires consideration under s95D of the Act. An assessment of environmental effects is provided in Section 8.0 below which concludes that any adverse effect will be less than minor.

Step 4: Public notification in special circumstances

Section 95A(9) sets out that the council is required to determine whether special circumstances exist that warrant it being publicly notified.

Special circumstances are those that are:

- exceptional or unusual, but something less than extraordinary; or
- outside of the common run of applications of this nature; or
- circumstances which make notification desirable, notwithstanding the conclusion that the adverse effects will be no more than minor.

If the answer is yes, then those persons are required to be notified.

In this case, the proposal is for a subdivision activity which is provided for as restricted discretionary activity. As such, it is considered that this level of development is anticipated by the Far North District Plan and that there is nothing out of the ordinary that could give rise to special circumstances.

Public Notification Conclusion

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

- Under step 1, public notification is not mandatory;
- Under step 2, public notification is not precluded;
- Under step 3, public notification is not required as effect will be less than minor; and
- Under step 4, there are no special circumstances.

Therefore, this application can be processed without public notification.

10.0 LIMITED NOTIFICATION ASSESSMENT (SECTIONS 95B, 95E TO 95G)

Step 1: Certain affected protected customary rights groups must be notified

Step 1 requires limited notification where there are any affected protected customary rights groups or customary marine title groups, or affected persons under a statutory acknowledgement affecting the land.

The above does not apply to this land.

Step 2: If not required by step 1, limited notification precluded in certain circumstances

Step 2 describes that limited notification is precluded where all applicable rules and NES preclude limited notification; or the application is for a controlled activity (other than the subdivision of land) or a prescribed activity under section 360H(1)(a)(ii).

The above does not apply to the proposal, and therefore limited notification is not precluded.

Step 3: If not precluded by step 2, certain other affected persons must be notified

Step 3 requires that where limited notification is not precluded under step 2 above, a determination must be made as to whether any of the following persons are affected persons:

- In the case of a boundary activity, an owner of an allotment with an infringed boundary;
- In the case of a prescribed activity under s360H(1(b), a prescribed person; and
- In the case of any other activity, a person affected in accordance with s95E.

The application is not for a boundary or prescribed activity as defined in the Act or a prescribed activity under s360H(1)(b), and therefore an assessment in accordance with S95E is required, of which is set out below.

Overall, it is considered that any adverse effects in relation to adjacent properties will be less than minor, and accordingly that no persons are adversely affected.

Step 4: Further notification in special circumstances

In addition to the findings of the previous steps, the council is also required to determine whether special circumstances exist in relation to the application that warrant notification of the application to any other persons not already determined as eligible for limited notification.

In this instance, having regard to the assessment above, special circumstances are not considered to apply to this proposal.

SECTION 95E STATUTORY MATTERS

If the application is not publicly notified, a council must decide if there are any affected persons and give limited notification to those persons. A person is affected if the effects of the activity on that person are minor or more than minor (but not less than minor).

The sections below set out an assessment in accordance with section 95E, and an assessment of potential adverse effects.

Written Approvals

No written approvals have been provided as it is considered that the effects on adjacent properties as a result of this proposal will be less than minor, as outlined below.

Assessment of Effects on the 'Localised Environment'

The matters to which Council shall restrict its discretion, as outlined in Sections 13.8.1 and 13.7.3 of the Far North District Plan, are addressed below:

AMENITY, CHARACTER AND LANDSCAPE EFFECTS

Being on the fringe of the Awanui Township, the subject site and surrounding environment is characterised by a mix of activities including production, commercial, and residential development.

As concluded in the Site Suitability Report, services within proposed Lot 1 are adequate. With an area of 35.9384ha, proposed Lot 2 is of a sufficient size to accommodate suitable building platforms and associated services, whilst maintaining ample pastoral land for production activities to continue.

The use of the site will remain unchanged.

In terms of vegetation, the site is largely in pasture with the exception of boundary planting along the northern boundary of the subject site, the eastern boundary of proposed Lot 1 and a portion of the road boundary of proposed Lot 1. There are no significant areas of indigenous vegetation or significant habitats of indigenous fauna. No vegetation clearance is required as part of this application, and the existing boundary planting will continue to provide effective screening for proposed Lot 1 when viewed from the north and the public road.

No earthworks are required as part of this subdivision.

Based on the above, it is considered that the proposal will maintain the existing amenity, character and landscape values associated with the surrounding rural/coastal environment and any adverse effects on those values are assessed as less than minor.

INDIGENOUS FLORA AND FAUNA

As mentioned above, there are no registered significant sites of indigenous flora or habitats of indigenous fauna within or in proximity to the subject site.

NATURAL AND OTHER HAZARDS

As per NRC Natural Hazards map, the site is partially susceptible to flooding hazards. However, all existing built development is located outside of the flood extent. The Haigh Workman report concludes that proposed Lot 2 is able to accommodate future built development without exacerbating natural hazards.

PROPERTY ACCESS

The site is currently accessed via multiple existing vehicle crossings off Kunicich Road which have been formed to an appropriate standard. Given the use of the site will remain unchanged, it is anticipated that no vehicle crossing upgrades will be required.

SERVICING EFFECTS

Proposed Lot 1 is currently connected to electricity or telecommunications. Proposed Lot 2 has the ability to connect. Though it is noted that new connections are not a requirement in the Rural Production Zone. The applicant has offered a consent notice condition informing any future owners that new connections will be their responsibility.

The Site Suitability Report **(Appendix C)** concludes that proposed Lot 2 is able to accommodate adequate services.

EASEMENTS FOR ANY PURPOSE

No easements are required in this instance.

PRESERVATION OF HERITAGE RESOURCES

The site is not known to contain any heritage resources.

ACCESS TO RESERVES AND WATERWAYS

The subject site has no reserves or waterways nearby.

LAND USE COMPATIBILITY

It is noted that the subject site contains LUC 2 and LUC 3 soils which are classified as highly productive under the National Policy Statement for Highly Productive Land (NPSHPL). As a restricted discretionary activity, Council's discretion in this case is limited to reverse sensitivity effects.

Being on the fringe of the Awanui Township, the subject site and surrounding environment is characterised by a mix of activities including production, commercial, and residential development.

Proposed Lot 1 is currently in residential use, while Lot 2 will remain in production. As a restricted discretionary activity, it is considered that the proposed level of development is anticipated by the District Plan and is consistent with existing development patterns in the immediate surrounding environment. Reverse sensitivity effects are therefore unlikely to result from the proposed subdivision.

The Site Suitability Report prepared by Haigh Workman provides for 30m x 30m building envelopes and concludes that residential development and adequate services can be accommodated within each lot. Provided that future development is located within these investigated building envelopes, which are located near the new lot boundaries, ample unobstructed pastoral land will remain available for production activities.

On the basis of the above, it is considered that the surrounding environment will be able to absorb the proposed rural-lifestyle blocks so as to maintain its rural amenity i.e. the proposed development is considered to be consistent with surrounding development patterns and will not result in any reverse sensitivity effects.

PROXIMITY TO AIRPORTS

The subject site is located at least 9km from the nearest airport. As such, this matter is not relevant to the proposal.

CONCLUSION

Taking the above into account, it is considered that there will be no adverse effects on the wider and localised environment. As such, no parties are considered to be adversely affected.

LIMITED NOTIFICATION CONCLUSION

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

- Under step 1, limited notification is not mandatory;
- Under step 2, limited notification is not precluded;
- Under step 3, limited notification is not required as it is considered that the activity will not result in any adversely affected persons; and
- Under step 4, there are no special circumstances.

Therefore, it is recommended that this application be processed without limited notification.

11.0 CONSIDERATION OF APPLICATIONS (SECTION 104)

Subject to Part 2 of the Act, when considering an application for resource consent and any submissions received, a council must, in accordance with section 104(1) of the Act have regard to:

- any actual and potential effects on the environment of allowing the activity;
- any relevant provisions of a national environmental standard, other regulations, national policy statement, a New Zealand coastal policy statement, a regional policy statement or proposed regional policy statement; a plan or proposed plan; and
- any other matter a council considers relevant and reasonably necessary to determine the application.

As a Restricted Discretionary activity, section 104C of the Act states that:

1) *When considering an application for a resource consent for a restricted discretionary activity, a consent authority must consider only those matters over which-*
    a) *A discretion is restricted in national environmental standards or other regulations:*
    b) *It has restricted the exercise of its discretion in its plan or proposed plan.*
2) *The consent authority may grant or refuse the application.*
3) *However, if it grants the application, the consent authority may impose conditions under section 108 only for those matters over which-*
    a) *A discretion is restricted in national environmental standards or other regulations;*
    b) *It has restricted the exercises of its discretion it its plan or proposed plan.*

12.0 EFFECTS ON THE ENVIRONMENT (SECTION 104(1)(A))

An assessment of effects on adjacent properties has been provided and it was concluded that any adverse effects will be less than minor.

Further, it is considered that the proposal will result in positive effects including the efficient use of rural land while maintaining character and amenity values intrinsic to rural communities.

Overall, it is considered that when taking into account the positive effects, any actual and potential adverse effects on the environment of allowing the activity are appropriate.

13.0 DISTRICT PLAN AND STATUTORY DOCUMENTS (SECTION 104(1)(B))

The following planning documents prepared under the RMA are considered relevant to this application.

Regional Policy Statement for Northland

The Northland Regional Policy Statement (RPS) covers the management of natural and physical resources across the Northland region. The provisions within the RPS give guidance at a higher planning level in terms of significant regional issues, therefore providing guidance to consent applications and the development of District Plans on a regional level. Given the nature and scale of the proposed subdivision, being a restricted discretionary activity, it is considered that this level of development is compatible with the intent of the RPS.

Operative Far North District Plan – Objectives and Policies

The relevant objectives and policies of the District Plan can be found in the Rural Environment, Rural Production Zone, and Subdivision Chapters. As a restricted discretionary activity, the proposal is considered to be generally consistent with the relevant objectives and policies. The site is already in rural production/residential use which will remain unchanged as a result of the proposal. The rural character of the site will therefore not be eroded by the proposed subdivision.

Proposed Far North District Plan – Objectives and Policies

As of Monday 4 September 2023, the further submission period on the PDP has closed. However, Council are yet to make a decision on submissions made and publicly notify this decision. Therefore, the application shall only 'have regard to' the relevant objectives and policies in the PDP.

Relevant objectives and policies in the PDP are contained within the Subdivision and Rural Production Chapters. Based on the AEE, it is considered that the proposal is largely consistent with the anticipated outcome of the relevant objectives and policies, particularly the following:

- SUB-01
- SUB-P1
- SUB-P3
- SUB-P8
- SUB-P11
- RPROZ-01 to RPROZ-04
- RPROZ-P1 to RPROZ-P7

Conclusion

For the reasons outlined above, it is considered that the proposal is consistent with the relevant objectives and policies of the RPS, ODP, and PDP.

14.0 PART 2 MATTERS

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

Section 6 of the Act sets out a number of matters of national importance including (but not limited to) the protection of outstanding natural features and landscapes and historic heritage from inappropriate subdivision, use and development.

Section 7 identifies a number of "other matters" to be given particular regard by Council and includes (but is not limited to) Kaitiakitanga, the efficient use of natural and physical resources, the maintenance and enhancement of amenity values, and maintenance and enhancement of the quality of the environment.

Section 8 requires Council to take into account the principles of the Treaty of Waitangi.

Overall, as the effects of the proposal are considered to be less than minor, and the proposal accords with the relevant objectives and policies of the RPS, and the Operative District Plan provisions. Accordingly, it is considered that the proposal will not offend the general resource management principles set out in Part 2 of the Act.

15.0 OTHER MATTERS (SECTION 104(1)(C)

There are no other matters considered relevant to this proposal.

16.0 CONCLUSION

The proposal involves the subdivision of Lot 1 DP 23280 (NA646/157) to create one additional allotment in the Rural Production Zone.

Based on the assessment of effects above, it is concluded that any potential adverse effects on the existing environment would be no more than minor and can be managed in terms of appropriate conditions of consent.

It is therefore concluded that the proposal satisfies all matters the consent authority is required to assess, and that the application for resource consent can be granted on a non-notified basis.

AUTHOR

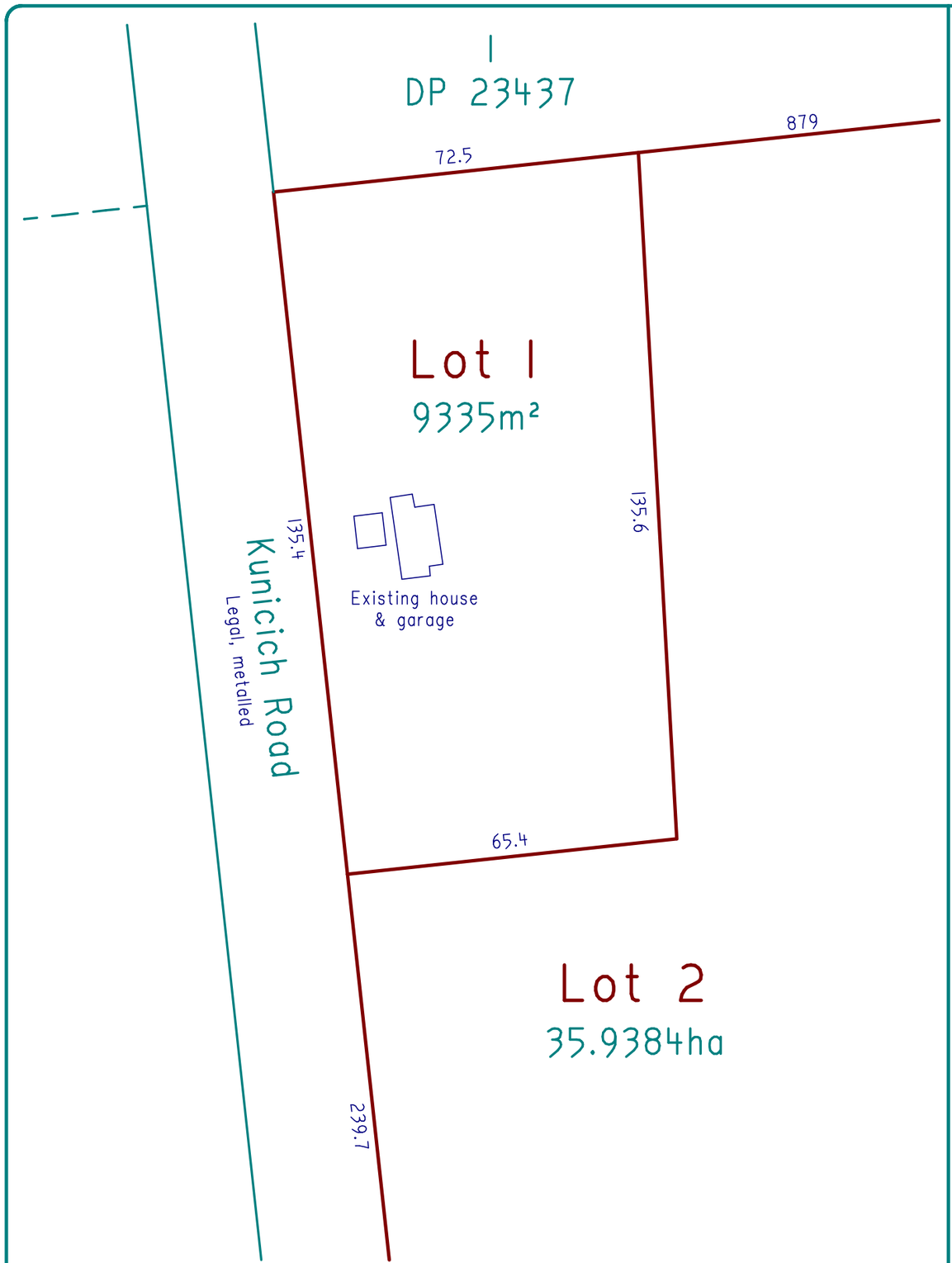
Nina Pivac
Director l BAppSC l PGDipPlan l Assoc. NZPI

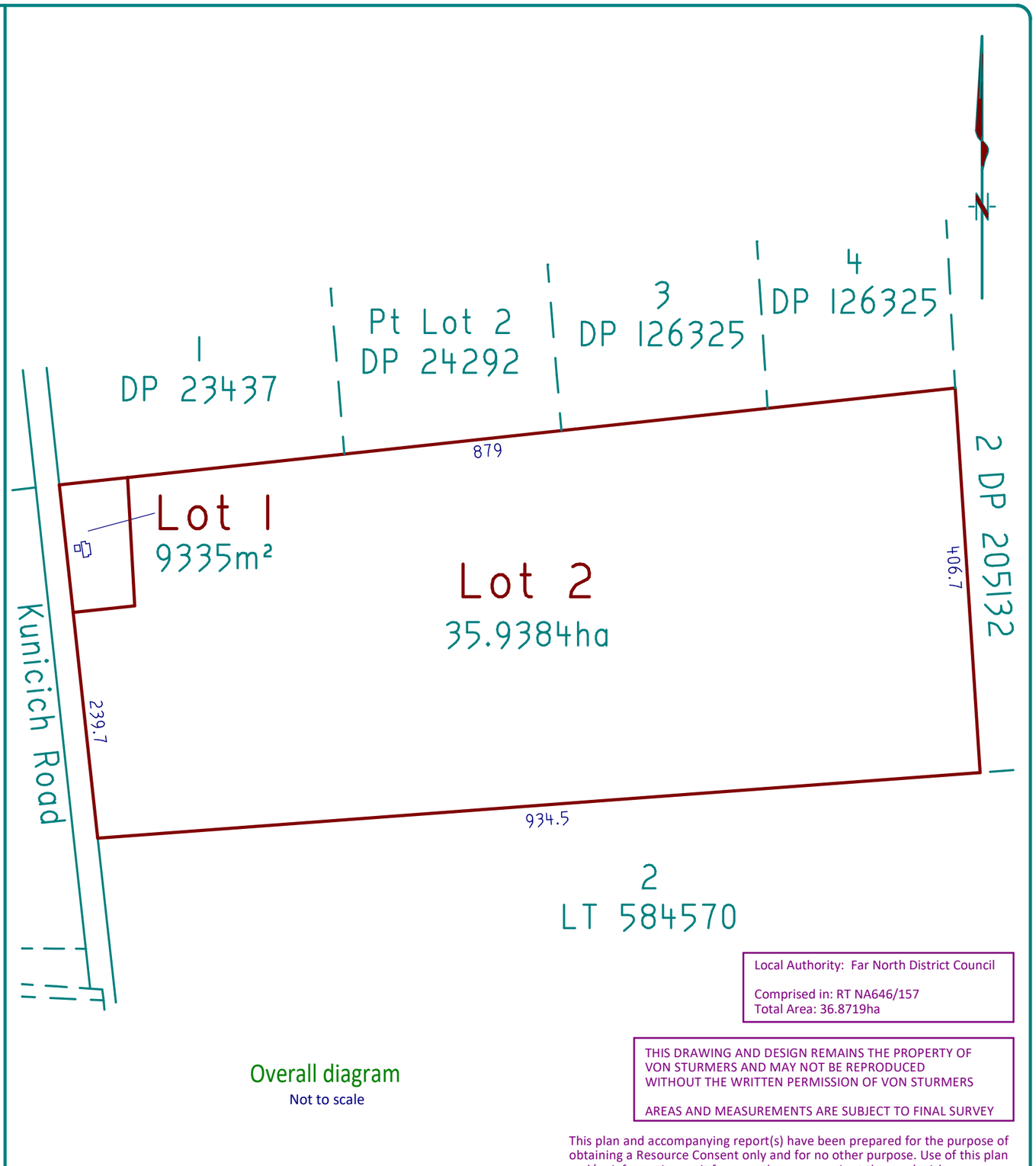
Date: 30 October 2024

APPENDICES:

Appendix A – Scheme Plan
Appendix B – Certificate of Title
Appendix C – Site Suitability Report

Appendix A – Scheme Plan





Overall diagram

Not to scale

Local Authority: Far North District Council

Comprised in: RT NA646/157
Total Area: 36.8719ha

This plan and accompanying report(s) have been prepared for the purpose of obtaining a Resource Consent only and for no other purpose. Use of this plan and/or information on it for any other purpose is at the user's risk.

VON STURMERS
Registered Land Surveyors, Planners & Land Development Consultants
Ph: (09) 408 6000
Email: kaitaia@saps.co.nz
131 Commerce Street, Kaitaia

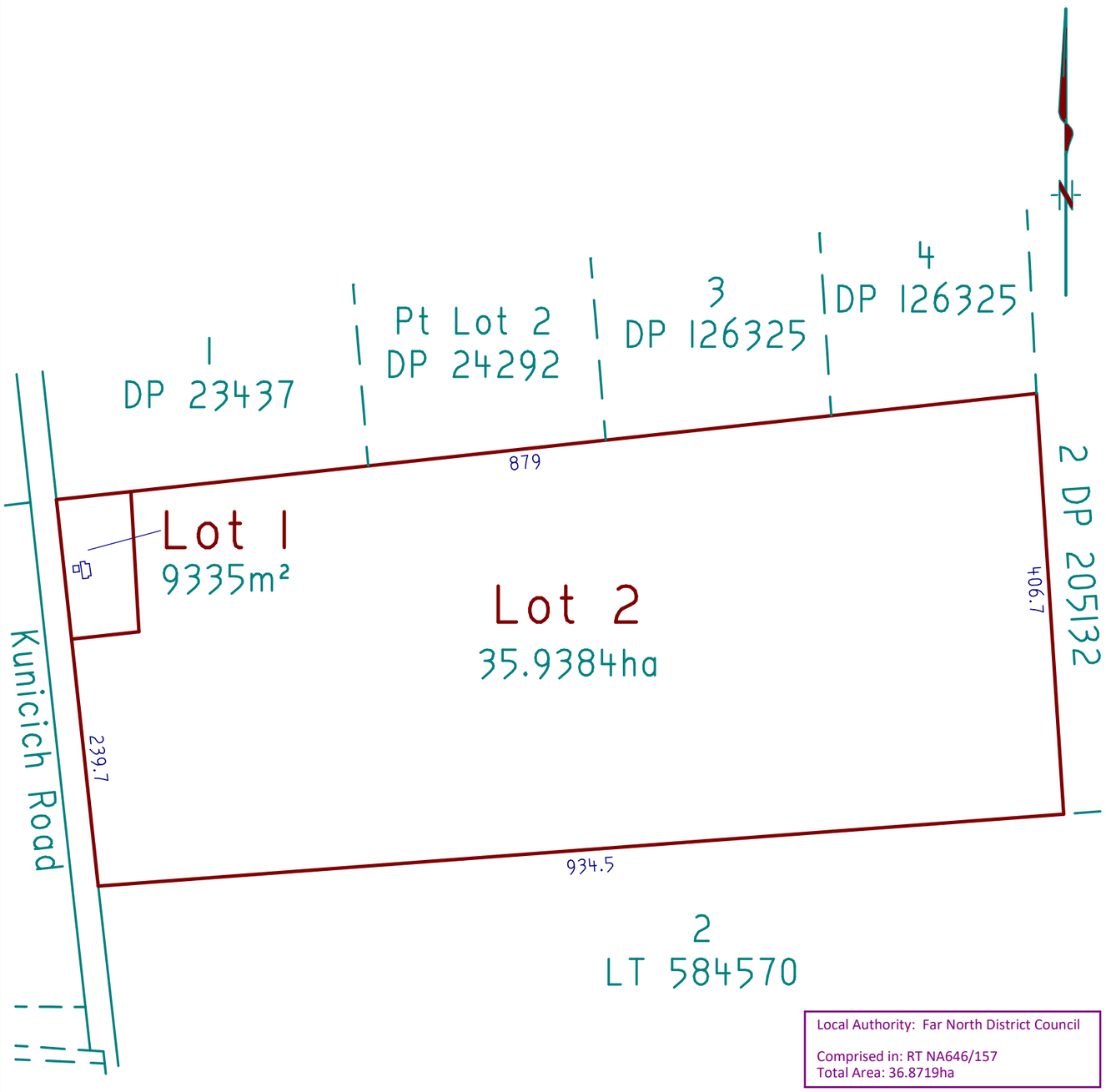
PROPOSED SUBDIVISION OF LOT 1 DP 23280

PREPARED FOR: WEST ROAD FARMS LIMITED

	Name	Date
Survey		
Design		
Drawn	SH	22-10-2024
Rev		

ORIGINAL
SCALE 1:1000
SHEET SIZE A3

Surveyors Ref. No: 15484
Series
Sheet of



2
LT 584570

Local Authority: Far North District Council

Comprised in: RT NA646/157
Total Area: 36.8719ha

Overall diagram

Not to scale

This plan and accompanying report(s) have been prepared for the purpose of obtaining a Resource Consent only and for no other purpose. Use of this plan and/or information on it for any other purpose is at the user's risk.

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PROPOSED SUBDIVISION OF LOT 1 DP 23280

PREPARED FOR: WEST ROAD FARMS LIMITED

	Name	Date
Survey		
Design		
Drawn	SH	22-10-2024
Rev		

ORIGINAL
SCALE 1:1000
SHEET SIZE A3

Surveyors Ref. No: 15484
Series
Sheet of

Appendix B – Certificate of Title

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

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

R.W. Muir
Registrar-General
of Land

Identifier	**NA646/157**
Land Registration District	**North Auckland**
Date Issued	28 August 1933

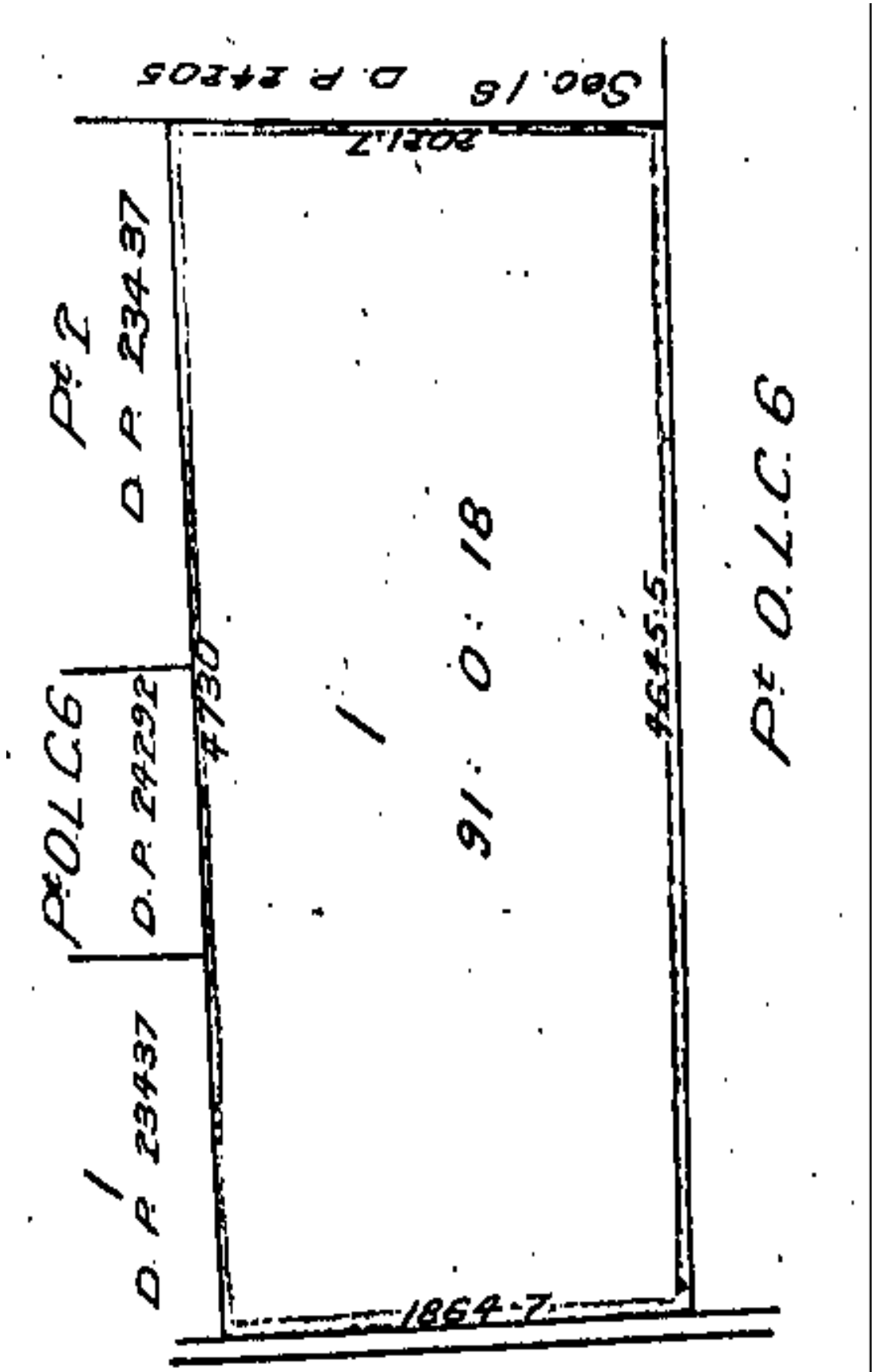
Prior References
NA529/170

Estate	Fee Simple
Area	36.8719 hectares more or less
Legal Description	Lot 1 Deposited Plan 23280
Registered Owners	

West Road Farms Limited

Interests

12058542.3 Mortgage to Rabobank New Zealand Limited - 19.3.2021 at 3:26 pm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Pt 2
D P 23437
Pt O.L.C. 6
D.P. 24292
Pt O.L.C. 6
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Pt O.L.C. 6
1
D. P. 23437
1864.7

Appendix C – Site Suitability Report

Engineering Assessment
For proposed subdivision
81 Kunicich Road, Sweetwater
for
West Road Farms Ltd

Haigh Workman reference 24 118

28 August 2024

Phone: 0800 424 447 • info@haighworkman.co.nz • www.haighworkman.co.nz

Kerikeri • Whangarei • Warkworth

(a) Revision History

Revision Nº	Issued By	Description	Date
A	Alan Collins	Final	28 August 2024

Prepared by	Reviewed by	Approved by
		
Alan Collins	Tom Adcock	John Papesch
Senior Civil Engineer	Senior Civil Engineer	Senior Civil Engineer
MEngSt, BE (Hons)	BE (Civil), MEngNZ	CPEng, IntPE (NZ)

TABLE OF CONTENTS

1 Executive Summary

Haigh Workman Ltd was commissioned by West Road Farms Ltd (the Client) to undertake an Engineering Assessment to support a consent application for the proposed subdivision of 81 Kunicich Road, Sweetwater. The property is 36.9 hectares of flat pasture. There is an existing house in the northwest corner of the property (postal address 81 Kunicich Road). The proposed development would see a 0.9 hectare lot including the existing house (Lot 1), subdivided from the remainder (Lot 2). A suitable building platform in Lot 2 is identified to the south of the existing house.

Access to the proposed Lot 2 will be by the existing vehicle crossing onto Kunicich Road for the existing cattle raceway. The existing vehicle crossing is already compliant with Rule 15.1.6C.1.5 of the district plan and Sheet 21 of the 2023 Engineering Standards for a single vehicle crossing.

The proposed building envelope is slightly elevated from the remainder of the Site and is clear of the 1% AEP flood inundation (priority river model). To achieve a compliant freeboard the minimum freeboard must be 3.46m RL (NZVD 2016) and this is readily achievable.

Stormwater is to be attenuated with detention for the historical 50% and 20% AEP event to 80% predevelopment levels, and the 1% AEP event (RCP 6.0). The design of the attenuation tank is to be addressed at building consent stage. Stormwater can be discharged into the existing swale and follow its predevelopment course to the Awanui River.

The wastewater field design needs to be deferred until building consent stage. However, it is demonstrated that Lot 2 has adequate capacity for a Wisconsin Mound effluent field that is compliant with NZS1547:2012 and Rule C.6.1.3 in the NRC Regional Plan. The soil is predominantly fine SAND and can be classed as Category 2 soil (Table M1, NZS1547:2012).

2 Introduction

Haigh Workman Ltd was commissioned by West Road Farm Ltd (the Client) to undertake an engineering assessment for the proposed development of 81 Kunicich Road, Sweetwater.

The Site has an existing house and flat pasture farmland (36.9 hectares). The proposed development would see a 0.9 hectare lot (Lot 1) including the existing house, subdivided from the main parcel (Lot 2). The report includes the assessment of a future dwelling for Lot 2.

A proposed subdivision plan was not available at time of reporting, however the client provided an indication of the proposed boundaries for Lot 1. The property is zoned Rural Production, and it is understood that the subdivision is a Restricted Discretionary Activity.

2.1 Objective and Scope

The objectives of this investigation were to:

- Assess access requirements
- Conduct a literature review flood hazard assessment and make recommendations on minimum, floor levels
- Determine the necessary stormwater controls and attenuation requirements
- Determine the water supply demand
- Determine the wastewater generation volumes and make connection recommendations as necessary

The scope excludes geotechnical investigations as this is to be covered in a different report.

2.2 Limitations

This report is intended to support the consent application with the Far North District Council. The information and opinions expressed in this report shall not be used in any other context without prior approval from Haigh Workman Ltd.

If at consent application the proposed development diverges from the scheme plan, the engineering assessment will need to be revisited.

Haigh Workman Ltd does not take responsibility for factors that affect the engineering assessment of the proposed development that are not covered in the agreed brief.

3 Site Description

3.1 Site Location

Site Address:	81 Kuncich Road, Sweetwater
Legal Description:	Lot 1 DP 23280
Total Site Area:	36.9 hectares

The site is located 2km to the west of the Awanui town centre.

Figure 1: Site Plan

3.2 Site Features

The Site is flat pasture on the western alluvial plain of the Awanui River. The Site is currently used for grazing.

An existing house with gravel driveway is located in the northwest corner of the Site – postal address, 81 Kunicich Road. The existing house has a suspended floor with a roof area of 165m^2.

A cattle loading ramp is located on the western boundary next to Kunich Road. A 1.1 km cattle raceway runs through the centre of the lot west to east from the loading ramp. It then follows the eastern boundary line to the southeast corner of the Site. A farm shed with 120m^2 roof area is in the centre of the Site adjacent to the cattle raceway.

Drainage ditches are found throughout the Site at the paddock fence lines.

The Site is flat with alluvial soils with altitudes ranging from 2- 3m RL (NZVD 2016)

3.3 District Plan Zoning

According to the Far North District Plan the Site is zoned as 'Rural Production'. The proposed subdivision is understood to be it is understood that the subdivision is a Restricted Discretionary Activity under the Operative Far North District Plan.

3.4 Proposed Development

The proposed subdivision is shown in Figure 2. A rectangular section covering 0.9 hectares and including the existing house and infrastructure is to be subdivided in the northwest corner of the Site, designated as Lot 1. The remaining land is designated as Lot 2. A building platform for Lot 2 was identified to the south of the central cattle raceway adjacent to the loading ramp. The suitability of the proposed Lot 2 building platform was investigated by Haigh workman, refer separate report Ref. 24 118 dated August 2024.

Access to Lot 2 will utilise the existing vehicle crossing onto Kunicich Road for the central cattle raceway.

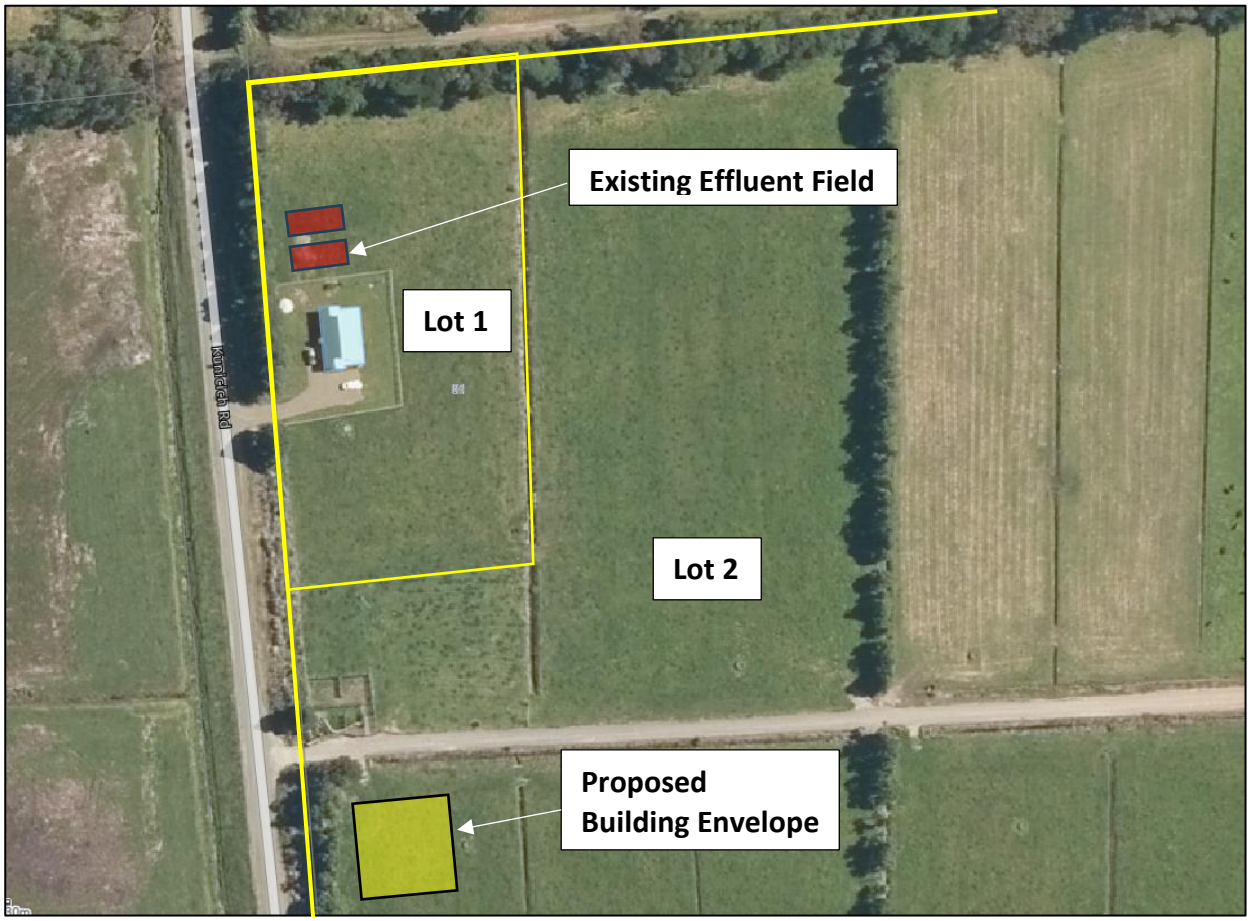


Figure 2: Proposed Subdivision

4 Access

4.1 Vehicle Crossing Details

Lot 1 has a vehicle crossing onto Kunicich Road serving the existing dwelling.

The crossing is formed in gravel with a 300mm culvert and is considered to meet the requirements for a Type 1A Light Vehicles crossing as per Council Engineering Standards 2023 Sheets 21 and 22. The culvert diameter is not large and together with the relatively shallow water table drain, traversable culvert safety ends as per Note 3. are not considered necessary.

The existing vehicle crossing for the cattle raceway is to be utilised for the Lot 2 access. The crossing is formed in gravel with a 300mm culvert and is compliant with Rule 15.1.6C.1.5 of the District Plan for a single vehicle crossing and matches the dimensions specified for a Type 1A – Light Vehicles shown in Sheet 21 and 22.

Figure 3: Existing Vehicle Crossing for Lot 2

4.2 Sighting Distance

The sight distance looking east and west from the Lot 2 vehicle crossing is 200m + in both directions. Kunicich Road is a no exit Access Road with an open speed limit. The site is close to the end of the road and very little traffic passes the site. Sheet 4 of the Engineering Standards 2023 requires a stopping sight distance of 195m for a speed of 100kph on an Access Road. Operating speeds are well below 100kph meaning the crossing achieves adequate sight distance. Refer Figures 4 and 5 below.

Figure 4: Sighting Distance looking South.

Figure 5: Sighting Distance looking North

4.3 Parking and Manoeuvring

Appendix 3C of the FNDC District plan requires two car parks for each household. There is adequate room for compliant parking and manoeuvring within the proposed subdivision.

5 Flood Hazard Assessment

5.1 Regulatory Framework

New Zealand Building Code Clause E1 Surface Water: First Schedule mandatory provisions E1.3.2 specifies that, '*Surface water, resulting from an event having a 2% probability of occurring annually (50-year ARI), shall not enter buildings'*. The Code notes that this Performance Measure applies only to Housing, Communal Residential and Communal Non-residential buildings.

The New Zealand Standard NZS4404:2010 'Land Development and Subdivision Engineering' states:

> **4.3.5.2 Freeboard**
>
> The minimum freeboard height additional to the computed top water flood level of the 1% AEP design storm should be as follows or as specified in the district or regional plan:
>
> | **Freeboard** | **Minimum height** |
> |---|---|
> | Habitable dwellings (including attached garages) | 0.5 m |
> | Commercial and industrial buildings | 0.3 m |
> | Non-habitable residential buildings and detached garages | 0.2 m |
>
> The minimum freeboard shall be measured from the top water level to the building platform level or the underside of the floor joists or underside of the floor slab, whichever is applicable.

In conjunction with NZS4404, the 2023 FNDC Engineering Standards also stipulate a freeboard for habitable building floors of 500mm above the 1% AEP event with allowance for climate change effects (Cl. 4.3.10.7).

5.2 Flood Mapping

NRC flood mapping includes the Awanui Rivier Catchment as a Priority River. The Priority River Model is more accurate than the regionwide model as it can make more localised assumptions on inputs such as infiltration rates and considers the positive effects of the existing stormwater controls within the Awanui River catchment. The Priority River Model has been adopted for this assessment. The decision is supported by NRC's Frequently Asked Questions section on their flood hazard mapping which states.

> *Once you open the maps on the viewer you will see that certain catchments are covered by the 'Priority Rivers' and the new "Regionwide" flood maps. The Priority Rivers flood maps take precedence in these cases.*[*]

[*] https://www.nrc.govt.nz/environment/natural-hazards-portal/river-flooding/river-flood-hazard-maps/

5.3 Inundation Extent

The flood mappings large areas of shallow inundation across the Lot in a 1% AEP event RCP6.0 (2081-2100). However, the proposed building envelope, wastewater field, and access via Kunicich Road, will remain unaffected.

5.4 Recommended Minimum Floor Level

The modelled maximum flood level in a 1% AEP event with climate change effects is 2.96 m RL (NZVD 2016). Refer NRC flood report appended. Hence the minimum habitable floor level shall be 3.46m RL providing 500mm freeboard.

This level also achieves the NRC Regional Policy Statement for Northland requirements that any new habitable dwelling has a minimum floor level of 3.3 m above One Tree Point datum on the east coast. This applies to the coastal environment but is pertinent since the site is mapped as subject to Coastal flooding.

The geology of the site lends itself to a suspend piled foundation so the minimum floor level will be readily achievable. The floor level will be approximately half a metre above the existing ground level.

The Recommended Floor Level assumes that the flood modelling is utilised is current. If the Flood Modelling data is updated at building consent stage, the minimum floor level recommendation is to be revisited.

6 Stormwater Management

6.1 Regulative Framework

The Site is zoned as Rural Production. The relevant permitted activity rule for impermeable surfaces is as follows:

8.7.5.1.5 STORMWATER MANAGEMENT
The maximum proportion or amount of the gross site area covered by buildings and other impermeable surfaces shall be 12.5 % or 3,000 m², whichever is the lesser.

Note: It is recommended that the Low Impact Design principles are used where appropriate to promote the on-site percolation of stormwater to reduce runoff volumes and to protect receiving environments from the adverse effects of stormwater discharges.

Rule C.6.4.2 of the Northland Regional Plan provides for the diversion and discharge of stormwater from outside a public stormwater network provided (amongst other conditions) 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% AEP, or flooding of buildings on another property in a storm event of up to and including a 1% AEP.

The FNDC Engineering Standards 2023 (Table 4-1) states:

- Runoff effects in the area to be developed are to be attenuated to 80% of predevelopment flowrates for the 50% and 20% AEP flood event using historical data.
- Typically, always required in the upper catchment and sometimes not required where development site is located in proximity to the catchment outlet, discharging to a watercourse with sufficient network capacity, and where flow attenuation may worsen flooding hazards due to relative timing of peak flows. This is subject to assessment demonstrating no negative impacts would occur. If the proposed stormwater discharge is into a tidal zone, then no attenuation is required.

The site borders and drains into the Waipapa Kauri Drain to the east. The drain is engineered drainage channel some 10km long extending from Tangonge Lake just outside Kaitaia and outfalling into the tidal waters of the Rangaunu Harbour approximately 2.3 km downstream of the site.

Stormwater attenuation is not appropriate for the following reasons and may even worsen downstream effects;

- The site is located in proximity to the catchment outlet
- The site discharges into the Waipapa Kauri Drain which is an engineered drainage channel and expected to have sufficient network capacity
- The Waipapa Kauri Drain is regularly maintained
- The site is in the lower quarter of the Waipapa Kauri Drain catchment, flow attenuation may worsen flooding hazards due to relative timing of peak flows. The explanation for this is attenuation slows site runoff that would otherwise drain out before the arrival of the peak flood

Residential development is not expected to result in contaminated stormwater runoff. By discharging concentrated flows to ground in a dispersive manner and making use of existing drains and flow paths, stormwater contamination can be avoided.

6.2 Impervious Surface Coverage For Lot 1

As Lot 1 is by far the smallest of the two proposed lots, it is vital to assess the impervious surface coverage for this lot against Council rules, based on the assumed Net Lot area of 9000m^2.

Existing Roof Cover	165m^2
Existing Gravel Access and Parking	200m^2
Total Impervious	**365m^2**
Total Lot Area	**9000m^2**
Impervious Percentage	**4%**

The Proposed development meets the criteria for a permitted activity as per Rule 8.7.5.1.5 in the District Plan. There are no intentions to increase the impervious surface in Lot 1.

6.3 Existing Site Drainage

The site generally slopes to the north-west, north and north-east with slopes up to 8˚ in proposed lots 1-6. Proposed lots 1-6 generally slope to the north-east.

Proposed lots 1-6 drain into a delineated inland wetland . The wetland then drains into the Mangakaraka Stream which is within the catchment of the Waihou River.

A culvert under Signal Road feeds an ephemeral flow path which is located between proposed lots 3 and 4. This flowpath then flows into the wetland.

6.4 Proposed Stormwater Management

For this site Rule C.6.4.1 indicates that it is appropriate to ensure flood levels do not increase for rainfall events up to the 10% AEP. This shall be achieved by attenuating run off.

District Plan and Regional Plan policies and rules require the avoidance or mitigation of adverse effects of stormwater runoff on receiving environments, including downstream properties. To comply with these requirements and the new Council Engineering Standards, attenuation shall be designed to 80% of pre-development peak flow rate for the 2, 5 and 10-year events with no adjustment for climate change.

Residential development is not expected to result in contaminated stormwater runoff. By discharging concentrated flows to ground in a dispersive manner and making use of existing drains and flow paths, stormwater contamination can be avoided.

It is proposed that development is attenuated for 2, 5 and 10-year events at building consent stage. Attenuation can be achieved by roof runoff detention or a combination of roof runoff detention and detention basin.

The mapped wetland along the north-eastern boundary will need to be considered with regard to stormwater design at building consent stage.

6.5 Restricted Discretionary Subdivision

In considering whether or not to grant consent on applications for restricted discretionary subdivision activities, the Council will restrict the exercise of its discretion to the following matters:

(ii) for applications under 13.8.1(b) or (c) (i.e. minimum lot size is 4,000m^2)

Table 1 – FNDC 13.8.1 Subdivision within the Rural Production Zone Exercise of Discretion when Granting Consent

Matter	Comment
effects on the natural character of the coastal environment for proposed lots which are in the coastal environment;	It is not anticipated that this subdivision will have an adverse effect on waterbourne contaminants, litter or sediment.
effects of the subdivision under (b) and (c) above within 500m of land administered by the Department of Conservation upon the ability of the Department to manage and administer its land;	This subdivision is rural so will not impact urban stormwater management plans.
effects on areas of significant indigenous flora and significant habitats of indigenous fauna;	It is proposed that future development on the propose lots will be attenuated for the 2, 5 and 10 year rainfall events at building consent stage.
the mitigation of fire hazards for health and safety of residents.	No stormwater infrastructure is proposed at subdivision stage.
	No catchment management plan has been prepared fr this area.

In considering whether or not to impose conditions on applications for restricted discretionary subdivision activities the Council will restrict the exercise of its discretion to the following matters:

(1) the matters listed in 13.7.3 - refer 13.7.3.4 Table 2 below

(2) the matters listed in (i) and (ii) above – refer Table 1 above

Table 2 – FNDC 13.7.3.4 Subdivision Matters for Control

Criteria	Comment
(i) control of water-borne contaminants, litter and sediments	Residential development is not generally considered to create a long-term impact on water quality. For this development, the nominated building platforms will be surrounded by grass surfaces providing a buffer to run-off, trapping contaminants and sediments. Stormwater run-off from roof tank overflow will be clean rainwater and runoff from driveways will drain via open drains and flow paths.
(ii) the capacity of existing and proposed stormwater disposal systems (refer also to the Council's various urban stormwater management plans and any relevant Northland Regional Council stormwater discharge consents)	The site discharges into the Waipapa Kauri Drain which is an engineered drainage channel and expected to have sufficient network capacity

(iii) the effectiveness and environmental impacts of any measures proposed for avoiding or mitigating the effects of stormwater runoff, including low impact design principles;	Stormwater will be discharged onto flat ground in a dispersive manner, which achieves low impact design
(iv) the location, scale and construction of stormwater infrastructure;	The proposed stormwater infrastructure will be modest in scale and contained within the lot boundaries.
(v) measures that are necessary in order to give effect to any drainage or catchment management plan that has been prepared for the area.	N/A

Figure 6: Stormwater to be discharged into the existing swale at 80% predevelopment flowrate for 50% and 20% AEP flood events.

7 Earthworks

7.1 Framework

As per Operative District Plan Rule 12.3.6.1.1 excavation and/or filling in the Rural Production Zone is permitted, provided it does not exceed 5,000 m^3 in any 12-month period per site; and does not involve a continuous cut or filled face exceeding an average of 1.5 m in height over the length of the face i.e. the maximum permitted average cut and fill height may be 3m.

The Operative Regional Water and Soil Plan allows as a permitted activity volume moved or disturbed not exceeding 5,000 m^3 in any 12-month period.

The Proposed Far North District Plan was notified on 27 July 2022.

The Proposed Plan defines earthworks as:

The alteration or disturbance of land, including by moving, removing, placing, blading, cutting, contouring, filling or excavation of earth (or any matter constituting the land including soil, clay, sand and rock); but excludes gardening, cultivation, and disturbance of land for the installation of fence posts.

The following Proposed Plan rules and standards have legal effect and will be complied with:

- Earthworks Rule EW-R12 (Earthworks and the discovery of suspected sensitive material)
- Earthworks Rule EW-R13 (Earthworks and erosion and sediment control
- Standard EW-S3 Accidental Discovery Protocol
- Standard EW-S5 Erosion and sediment control

7.2 Proposed Earthworks

No earthworks are required at the time of subdivision.

8 Water Supply

8.1 Potable Water Supply

The eventual dwelling on Lot 2 will be dependent on roof run off collected in standard water tanks. The overflow from the water supply tank(s) will feed into the dedicated attenuation tank.

8.2 Fire Fighting

Council Engineering Standards require a water supply that is adequate for firefighting purposes. Where there is currently no reticulated water supply, then each residential lot will be responsible for providing adequate on-site firefighting supply.

For a single family home without a sprinkler system in a non-reticulated supply area, the New Zealand Fire Service (NZFS) Fire Fighting Water Supplies Code of Practice SNZ PAS 4509:2008 recommends for a firefighting supply a minimum water storage capacity of 45m^3 within 90m of the dwelling, fitted with an adequate means for extracting the water from the tank.

8.3 Alternative to Fire Fighting Supply

The Code (SNZ PAS 4509:2008) specifically allows for alternative methods to be used in meeting the Code requirements, as long as there is approval from an appropriate person nominated by the NZFS National Commander. Clause 4.4 of the Code states that:

- Fire engineers or similar competent persons may use alternative methods, such as those detailed in Appendix H and Appendix J to determine firefighting water supplies. To comply with this code of practice, such alternatives must be submitted for approval to the person(s) nominated by the National Commander. The person(s) so nominated will approve these cases on confirmation that the method and calculations used are correctly applied.
- Alternative methods will need to show that the calculated firefighting water supply makes allowances for tactical flow rates (that is, the amount needed above a theoretical amount to absorb the released heat for operational effectiveness).

The procedure to be followed in the case of an alternative fire-fighting supply is as follows:

- The competent person should submit a firefighting facilities checklist (FFFC), with a scale site map showing contours and proposed alternatives to Table 2 with rationale for assessment to NZFS

If the proposed supply is approved by a nominated NZFS person, Council will accept the FFFC and compliance with the Code will be achieved.

NZFS considers that a 'one size fits all' volume is not appropriate in all circumstances. There are alternatives to firefighting couplings but firefighters are not expected to lift pumps or hoses onto the top of water tanks.

9 Wastewater

9.1 Regulative Framework

The eventual dwelling is to be serviced with an onsite effluent field. The FNDC Engineering Standards 2023 (5.1.4.2) states that NZS1547:2012 as the appropriate technical standard for sizing onsite effluent disposal fields.

Further to the District standards, the Regional Plan gives the following conditions for permitted wastewater field systems from C.6.1.3 and shown in Table 9 below:

Feature	Primary treated domestic type wastewater	Secondary and tertiary treated domestic type wastewater	Greywater
Exclusion areas			
Floodplain	5 percent annual exceedance probability	5 percent annual exceedance probability	5 percent annual exceedance probability
Horizontal setback distances			
Identified stormwater flow path (including a formed road with kerb and channel, and water-table drain) that is down-slope of the disposal area	5 metres	5 metres	5 metres
River, lake, stream, pond, dam or natural wetland	20 metres	15 metres	15 metres
Coastal marine area	20 metres	15 metres	15 metres
Existing water supply bore	20 metres	20 metres	20 metres
Property boundary	1.5 metres	1.5 metres	1.5 metres
Vertical setback distances			
Winter groundwater table	1.2 metres	0.6 metres	0.6 metres

9.2 Design Population and System Flow Volumes

For the sake of design purposes, it is assumed that the eventual dwelling on Lot 2 will be normal 3 bedroom dwelling with standard fixtures and five occupants. Table H3 of NZS1547:2012 recommends a typical wastewater design flow of 145L/person/day. Assuming an occupancy of five, the wastewater flowrate for design purposes is to be 725L/d.

9.3 Design for Land Application System

9.3.1 Wisconsin Mound System

As a pressure compensating dripper line field will need to be elevated in mounds to provide adequate clearance from the winter water table., a better solution would be the Wisconsin Mound System using the design standard found in Appendix N of NZS1547:2012. The topography and soil profile of the site are well suited to the Wisconsin mound system.

9.3.2 Effluent Field Design Area

Please refer to the Geotechnical Investigation Report for the Site (Haigh Workman, August 2024). Our boreholes indicate that the soil type in the proposed disposal fields can be described as a fine SAND and in accordance with AS/NZS1547 Table E1 it is classed as Soil Category 2. There is more than 250mm topsoil. Table N1 recommends a design loading rate of 24mm/day as being suitable.

Ground water was encountered at between 0.5m and 0.7m depth. The Regional Plan Table 9 requires 0.6m setback from the winter groundwater. It is likely that the disposal area will need to be mounded to ensure adequate vertical setback from the winter groundwater level. This can be achieved using surplus topsoil from the building platform.

On this basis, the proposed Wisconsin mounds with a flow volume of 725 litres/day would require 725/24 = 30.2m² minimum mound area.

To comply with the design parameters of Figure N1 in NZS1547, the Wisconsin mound would need to comply with the following parameters:

The mound is to be 1050mm above ground level.
The lateral distribution lines are to be set 2m apart.
The mound is to be wide at the base with 3h:1v batters on either side.
The length of the mound is to be 6m with 3:1 batters on the end (12m length total at the base.)

With these parameters. The total area of the Wisconsin mound is to be 12m by 6m (72m^2 total)
The effluent field is to be fenced off to protect it from livestock. It is recommended that the area be planted with species suitable for evapotranspiration systems.

9.3.3 Suitable Effluent Field Location

There are multiple areas within the proposed Lot 2 site area that are appropriate for a dripperline disposal field that is compliant with the permitted setbacks of C.6.1.3 of the Regional Plan.

The one condition that needs to be attention to ensure compliance is ensuring the effluent field remains outside the 5% AEP flood plain. The 10% and 2% flood plains are shown in the flood hazard assessment from the Regional Council (Appendix A). There is ample room for a 145m^2 disposal field plus reserve area outside these flood zones.

9.3.4 Reserve Area

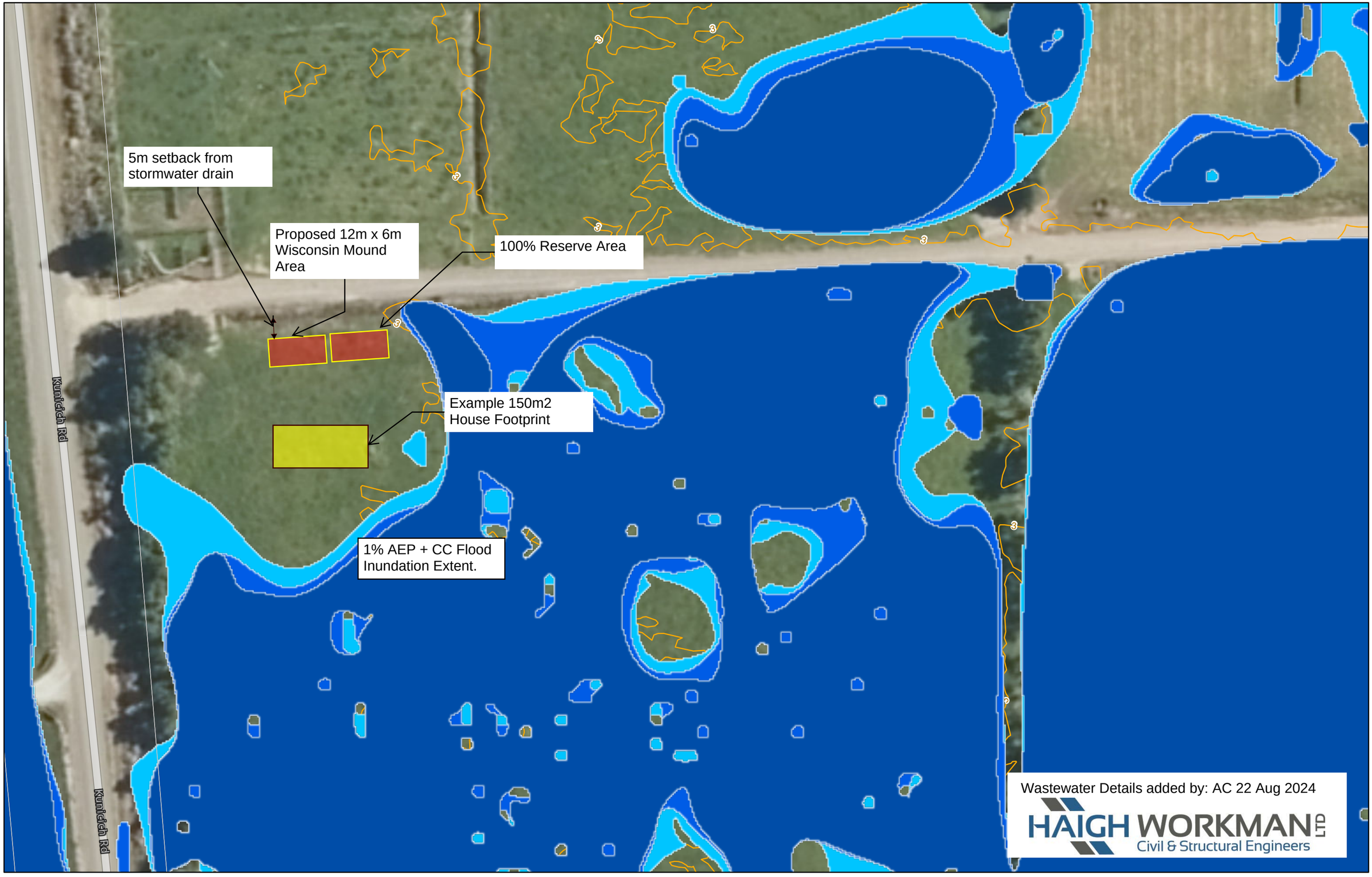
A reserve area of 100% or 145m^2 is required in accordance with 5.5.3.4 from NZS1547:2012.

9.3.5 Treatment Plant Design Sizing

The naming of a proprietary secondary treatment plant will be decided by the new owner at the building consent stage when the position and scale of the building are known. Treatment plants must meet the requirements of AS/NZS 1546.3:2001.

The system is to meet the quality output of AS/NZS 1546.3:2003, producing effluent of less than 20 g/m^3 of 5-day biochemical oxygen demand (BOD_5) and no greater than 30 g/m^3 total suspended solids (TSS), capable of consistently treating 725 litres/day.

Appendix A – NRC Flood Level Report



Northland REGIONAL COUNCIL

Proposed Wastewater Field Location - Proposed Lot 2 Kunicich Road

Projection NZTM. Datum NZTM2000.
DISCLAIMER:
The Northland Regional Council cannot guarantee that the information shown is accurate and should not be reused in any manner without proper consultation with its owner.

N

0 4 8 16 24 32 40 m

August 24 2024

Flood Level Report

Parcel ID: 5032186

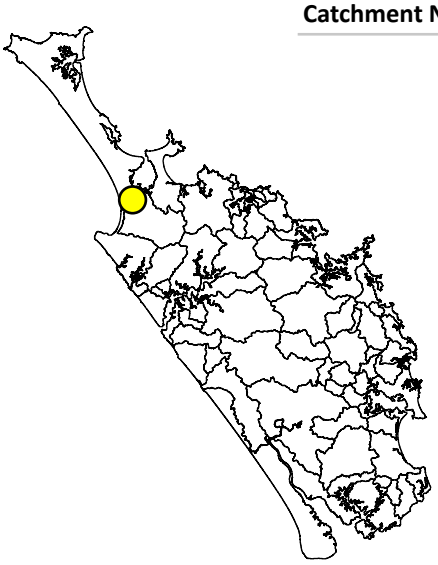
Title: NA646/157

Appellation: Lot 1 DP 23280

Survey Area: 368,719 m²

Catchment Name(s)

Awanui



Date Exported: 24/07/2024

Report Reference: 20240722_140129

Useful Flood Information Definitions

Annual Exceedance Probability (AEP) - The probability of a flood event of a given size occurring in any one year, usually expressed as a percentage annual chance.

1% AEP - A flood of this size or larger has a 1 in 100 chance or a 1% probability of occurring in any year.
2% AEP - A flood of this size or larger has a 1 in 50 chance or a 2% probability of occurring in any year.
5% AEP - A flood of this size or larger has a 1 in 20 chance or a 5% probability of occurring in any year.
10% AEP - A flood of this size or larger has a 1 in 10 chance or a 10% probability of occurring in any year.

NZVD2016 - New Zealand Vertical Datum - The reference level used in our flood models to define ground level.
Flood Levels - Flood levels are used from our modelled flood level rasters. The flood levels are calculated above NZVD 2016 Datum.
Climate Change (CC) - NZCPS (2010) requires that the identification of coastal hazards includes consideration of sea level rise over at least a 100-year planning period. Climate change impacts, such as increased rain intensity, have been included in the flood scenarios. You can read more about the Climate Change forecasts included in each flood model in the technical reports on the NRC website.
Mean high water spring (MHWS) - describes the highest level that spring tides reach, on average.

Coastal Flood Hazard Zones (CFHZ)

Coastal flood hazard zones are derived using a range of data including tide gauge analysis, wind and wave data and models, and use empirical calculations to estimate extreme water levels around the coastline. The calculations include projected sea level rise scenarios based on the latest Ministry for the Environment guidance.

CFHZ 0 Coastal Flood Hazard Zone 0 - area currently susceptible to coastal inundation (flooding by the sea) in a 1-in-100 year storm event
CFHZ 1 Coastal Flood Hazard Zone 1 - an area susceptible to coastal inundation (flooding by the sea) in a 1-in-50 year storm event, taking into account a projected sea-level rise of 0.6m over the next 50 years
CFHZ 2 Coastal Flood Hazard Zone 2 - an area susceptible to coastal inundation (flooding by the sea) in a 1-in-100 year storm event, taking into account a projected sea-level rise of 1.2m over the next 100 years
CFHZ 3 Coastal Flood Hazard Zone 3 - an area susceptible to coastal inundation (flooding by the sea) in a 1-in-100 year storm event, taking into account a projected sea-level rise of 1.5m over the next 100 years (rapid sea level rise scenario)

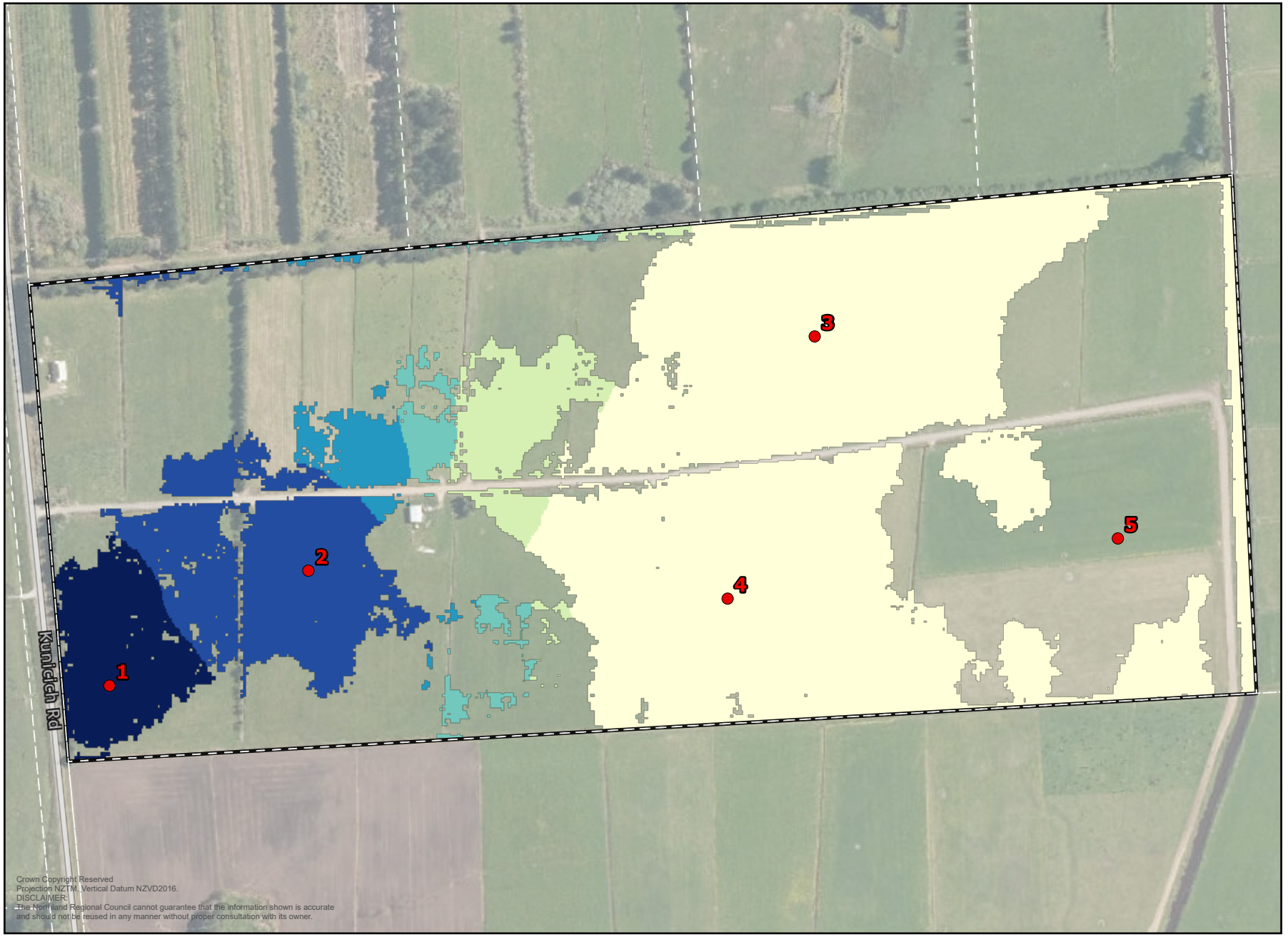
REGIONWIDE and PRIORITY - RIVER FLOOD HAZARD ZONES (RFHZ)

River flood hazard zones are created to raise awareness of where flood hazard areas are identified, inform decision-making and to support the minimisation of the impacts of flooding in our region. The river flood hazard zones have been created using an assessment of best current available information, engaging national and international experts in the field, using national standards and guidelines and has been peer reviewed. This will provide a good indication of the areas at potential risk of flooding from a regional perspective. However, flood mapping is a complex process which involves some approximation of the natural features and processes associated with flooding.

River Flood Hazard Zone 1 – 10% AEP flood extent: an area with a 10% chance of flooding annually
River Flood Hazard Zone 2 – 2% AEP flood extent: an area with a 2% chance of flooding annually
River Flood Hazard Zone 3 – 1% AEP flood extent: an area with a 1% chance of flooding annually with the inclusion of potential Climate Change (CC) impact

River Flooding

10 Year



Maximum	Minimum
2.93 m	1.81 m

Max Min flood levels are for the raster extent shown on the map

10 Year

m NZVD

- 1.81 - 2.01
- 2.01 - 2.21
- 2.21 - 2.41
- 2.41 - 2.61
- 2.61 - 2.81
- 2.81 - 3.01
- Parcel
- Flood Level Point

Label	Level
1	2.9 m
2	2.69 m
3	1.97 m
4	1.98 m
5	0 m

N

0 80 160 320 480 m

Report Reference: 20240724_142704

River Flooding

50 Year

Maximum	Minimum
2.94 m	1.87 m

Max Min flood levels are for raster extent shown on the map

50 Year

m NZVD

- 1.87 - 2.07
- 2.07 - 2.27
- 2.27 - 2.47
- 2.47 - 2.67
- 2.67 - 2.87
- 2.87 - 3.07
- Parcel
- Flood Level Point

Label	Level
1	2.91 m
2	2.71 m
3	2.01 m
4	2.02 m
5	0 m

N

0 80 160 320 480 m

Report Reference: 20240724_142704

River Flooding

100 Year + CC

Maximum	Minimum
2.96 m	2.24 m

Max Min flood levels are for raster extent shown on the map

100 Year + CC

m NZVD

- 2.24 - 2.44
- 2.44 - 2.64
- 2.64 - 2.84
- 2.84 - 3.04
- Parcel
- Flood Level Point

Label	Level
1	2.93 m
2	2.72 m
3	2.34 m
4	2.35 m
5	2.36 m

N

0 80 160 320 480 m

Report Reference: 20240724_142704

Coastal Flooding

CFHZ1

Maximum	Minimum
0.36 m	0.31 m

Max Min flood levels are for raster extent shown on the map

CFHZ1

m NZVD

0.16 - 0.36

Parcel

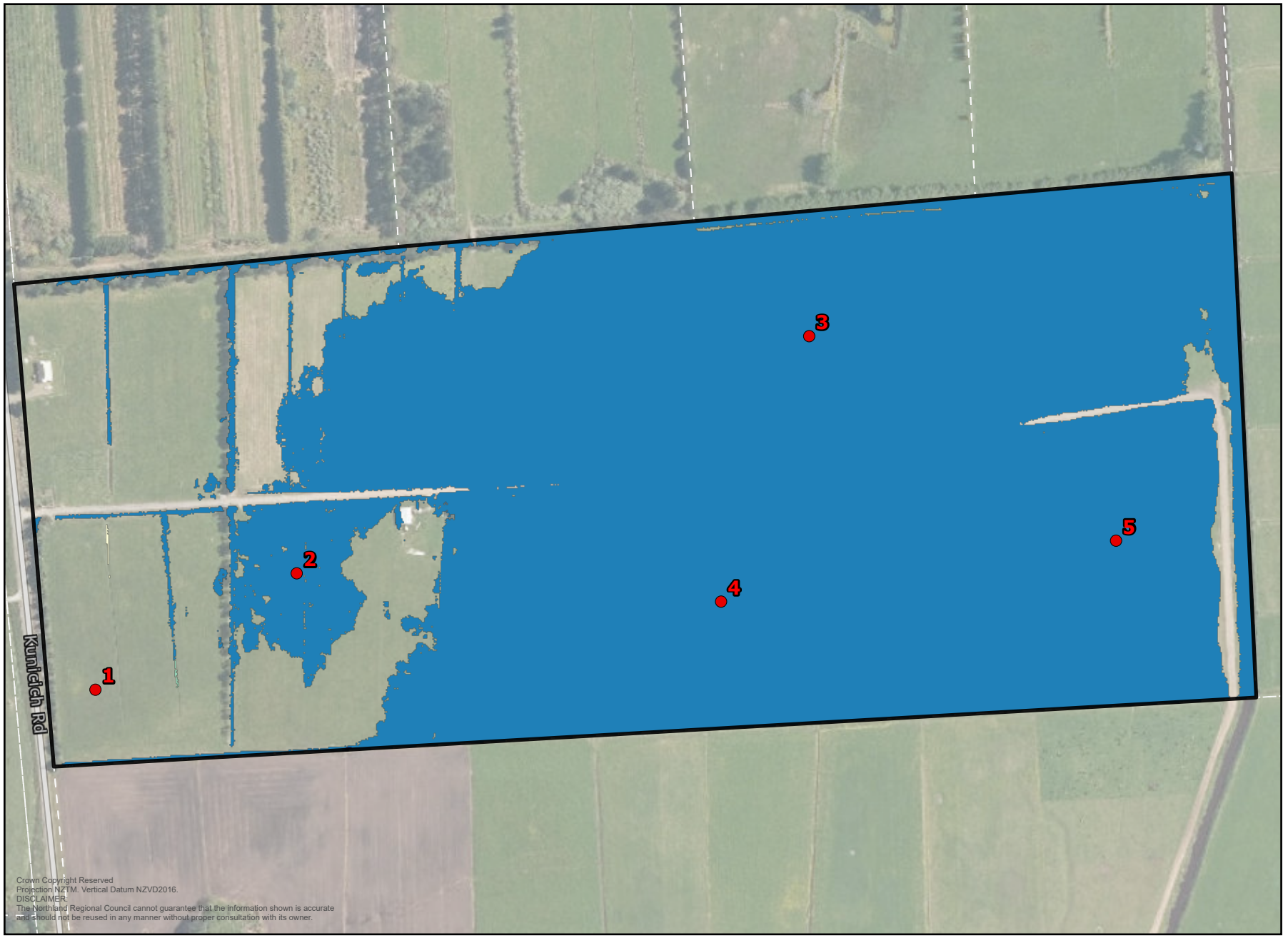
N

0 5 10 20 30 m

Report Reference: 20240724_142704

Coastal Flooding

CFHZ2



Maximum	Minimum
2.52 m	1.92 m

Max Min flood levels are for raster extent shown on the map

CFHZ2

m NZVD

- 1.92 - 2.12
- 2.12 - 2.32
- 2.32 - 2.52
- 2.52 - 2.72
- Parcel
- Flood Level Point

Label	Level
1	0 m
2	2.51 m
3	2.51 m
4	2.52 m
5	2.51 m

N

0 75 150 300 450 m

Report Reference: 20240724_142704

Coastal Flooding

CFHZ3

Maximum	Minimum
3.08 m	3.06 m

Max Min flood levels are for raster extent shown on the map

CFHZ3

m NZVD

2.88 - 3.08

Parcel

Flood Level Point

Label	Level
1	3.07 m
2	3.08 m
3	3.08 m
4	3.08 m
5	3.08 m

N

0 80 160 320 480 m

Report Reference: 20240724_142704

Disclaimers

Our modelling disclaimers are linked below:
https://www.nrc.govt.nz/media/ko2dkgxn/coastal-hazard-maps-disclaimer-june-2017.pdf
https://www.nrc.govt.nz/media/cqnnw12y/flood-map-disclaimer-2021.pdf

Our regionwide modelling reports are linked below:
https://www.nrc.govt.nz/environment/river-flooding-and-coastal-hazards/river-flooding/river-flood-hazard-maps/regionwide-river-catchments-analysis-technical-reports

ARE YOU FLOOD READY?

01

Know your risk

Check what potential flood risks and other hazards that may impact your property.

The Natural Hazards Portal is a great place to start. It's a 'one-stop-shop' of information related to natural hazards within our region: www.nrc.govt.nz/environment/natural-hazards-portal

The Environmental Data Hub provides river level and flow data, as well as warning levels, rainfall data, water quality, and more: www.nrc.govt.nz/environment/environmental-data/environmental-data-hub

02

Have a plan

Make sure you have an evacuation plan, emergency kit and important phone numbers ready. Check out: https://getready.govt.nz/en/prepared/ for tips on how to get ready.

03

Stay up to date

In a civil defence emergency situation, follow the updates on the Northland CDEM Group's Facebook page: www.facebook.com/civildefencenorthland

Or follow updates from the embedded feed on the regional council website: www.nrc.govt.nz/civildefence

04

In an emergency

Remember, if life is threatened dial 111 to contact emergency services.

Engineering Assessment
For proposed subdivision
81 Kunicich Road, Sweetwater
for
West Road Farms Ltd

Haigh Workman reference 24 118

28 August 2024

Phone: 0800 424 447 • info@haighworkman.co.nz • www.haighworkman.co.nz

Kerikeri • Whangarei • Warkworth

(a) Revision History

Revision Nº	Issued By	Description	Date
A	Alan Collins	Final	28 August 2024

Prepared by	Reviewed by	Approved by
		
Alan Collins	Tom Adcock	John Papesch
Senior Civil Engineer	Senior Civil Engineer	Senior Civil Engineer
MEngSt, BE (Hons)	BE (Civil), MEngNZ	CPEng, IntPE (NZ)

TABLE OF CONTENTS

1 Executive Summary

Haigh Workman Ltd was commissioned by West Road Farms Ltd (the Client) to undertake an Engineering Assessment to support a consent application for the proposed subdivision of 81 Kunicich Road, Sweetwater. The property is 36.9 hectares of flat pasture. There is an existing house in the northwest corner of the property (postal address 81 Kunicich Road). The proposed development would see a 0.9 hectare lot including the existing house (Lot 1), subdivided from the remainder (Lot 2). A suitable building platform in Lot 2 is identified to the south of the existing house.

Access to the proposed Lot 2 will be by the existing vehicle crossing onto Kunicich Road for the existing cattle raceway. The existing vehicle crossing is already compliant with Rule 15.1.6C.1.5 of the district plan and Sheet 21 of the 2023 Engineering Standards for a single vehicle crossing.

The proposed building envelope is slightly elevated from the remainder of the Site and is clear of the 1% AEP flood inundation (priority river model). To achieve a compliant freeboard the minimum freeboard must be 3.46m RL (NZVD 2016) and this is readily achievable.

Stormwater is to be attenuated with detention for the historical 50% and 20% AEP event to 80% predevelopment levels, and the 1% AEP event (RCP 6.0). The design of the attenuation tank is to be addressed at building consent stage. Stormwater can be discharged into the existing swale and follow its predevelopment course to the Awanui River.

The wastewater field design needs to be deferred until building consent stage. However, it is demonstrated that Lot 2 has adequate capacity for a Wisconsin Mound effluent field that is compliant with NZS1547:2012 and Rule C.6.1.3 in the NRC Regional Plan. The soil is predominantly fine SAND and can be classed as Category 2 soil (Table M1, NZS1547:2012).

2 Introduction

Haigh Workman Ltd was commissioned by West Road Farm Ltd (the Client) to undertake an engineering assessment for the proposed development of 81 Kunicich Road, Sweetwater.

The Site has an existing house and flat pasture farmland (36.9 hectares). The proposed development would see a 0.9 hectare lot (Lot 1) including the existing house, subdivided from the main parcel (Lot 2). The report includes the assessment of a future dwelling for Lot 2.

A proposed subdivision plan was not available at time of reporting, however the client provided an indication of the proposed boundaries for Lot 1. The property is zoned Rural Production, and it is understood that the subdivision is a Restricted Discretionary Activity.

2.1 Objective and Scope

The objectives of this investigation were to:

- Assess access requirements
- Conduct a literature review flood hazard assessment and make recommendations on minimum, floor levels
- Determine the necessary stormwater controls and attenuation requirements
- Determine the water supply demand
- Determine the wastewater generation volumes and make connection recommendations as necessary

The scope excludes geotechnical investigations as this is to be covered in a different report.

2.2 Limitations

This report is intended to support the consent application with the Far North District Council. The information and opinions expressed in this report shall not be used in any other context without prior approval from Haigh Workman Ltd.

If at consent application the proposed development diverges from the scheme plan, the engineering assessment will need to be revisited.

Haigh Workman Ltd does not take responsibility for factors that affect the engineering assessment of the proposed development that are not covered in the agreed brief.

3 Site Description

3.1 Site Location

Site Address:	81 Kuncich Road, Sweetwater
Legal Description:	Lot 1 DP 23280
Total Site Area:	36.9 hectares

The site is located 2km to the west of the Awanui town centre.

Figure 1: Site Plan

3.2 Site Features

The Site is flat pasture on the western alluvial plain of the Awanui River. The Site is currently used for grazing.

An existing house with gravel driveway is located in the northwest corner of the Site – postal address, 81 Kunicich Road. The existing house has a suspended floor with a roof area of 165m^2.

A cattle loading ramp is located on the western boundary next to Kunich Road. A 1.1 km cattle raceway runs through the centre of the lot west to east from the loading ramp. It then follows the eastern boundary line to the southeast corner of the Site. A farm shed with 120m^2 roof area is in the centre of the Site adjacent to the cattle raceway.

Drainage ditches are found throughout the Site at the paddock fence lines.

The Site is flat with alluvial soils with altitudes ranging from 2- 3m RL (NZVD 2016)

3.3 District Plan Zoning

According to the Far North District Plan the Site is zoned as 'Rural Production'. The proposed subdivision is understood to be it is understood that the subdivision is a Restricted Discretionary Activity under the Operative Far North District Plan.

3.4 Proposed Development

The proposed subdivision is shown in Figure 2. A rectangular section covering 0.9 hectares and including the existing house and infrastructure is to be subdivided in the northwest corner of the Site, designated as Lot 1. The remaining land is designated as Lot 2. A building platform for Lot 2 was identified to the south of the central cattle raceway adjacent to the loading ramp. The suitability of the proposed Lot 2 building platform was investigated by Haigh workman, refer separate report Ref. 24 118 dated August 2024.

Access to Lot 2 will utilise the existing vehicle crossing onto Kunicich Road for the central cattle raceway.

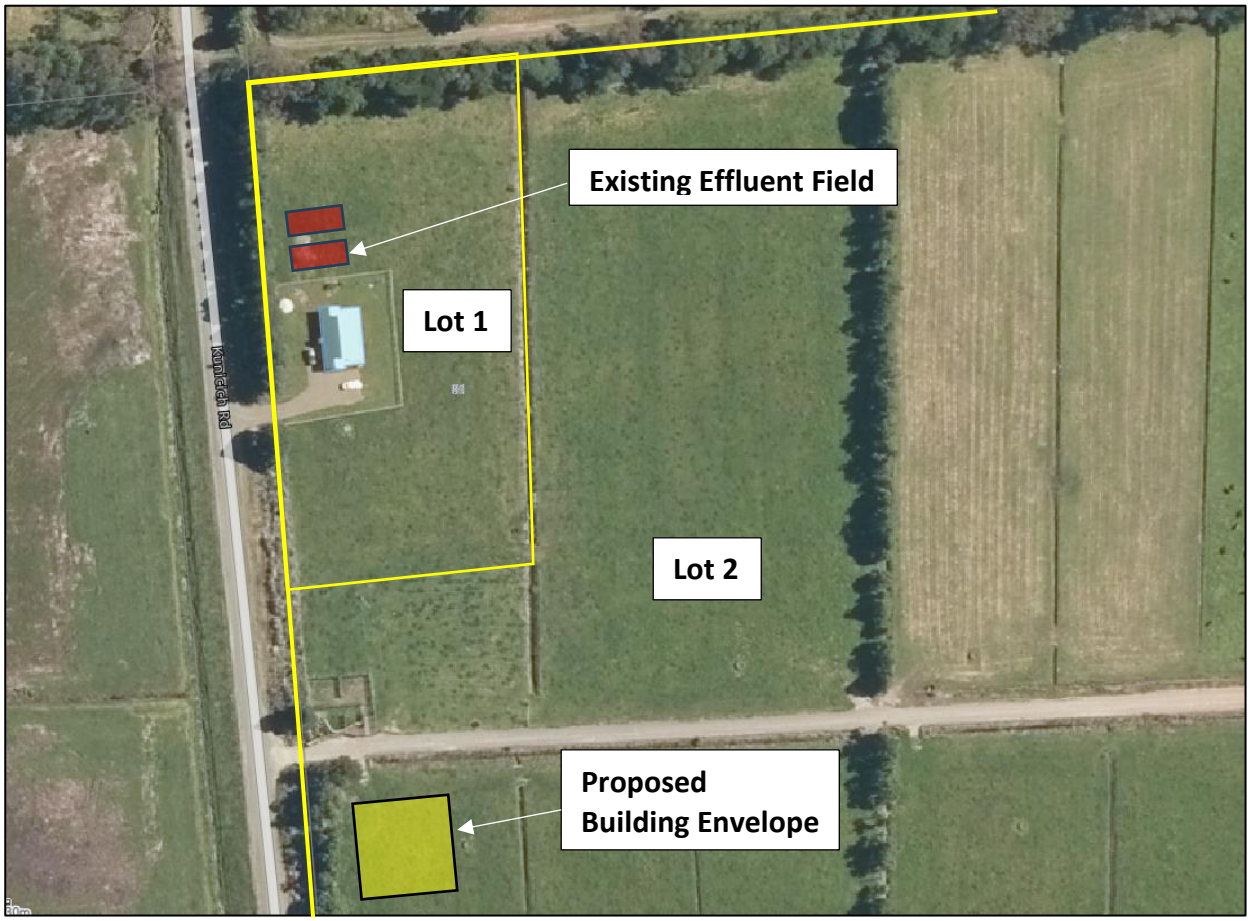


Figure 2: Proposed Subdivision

4 Access

4.1 Vehicle Crossing Details

Lot 1 has a vehicle crossing onto Kunicich Road serving the existing dwelling.

The crossing is formed in gravel with a 300mm culvert and is considered to meet the requirements for a Type 1A Light Vehicles crossing as per Council Engineering Standards 2023 Sheets 21 and 22. The culvert diameter is not large and together with the relatively shallow water table drain, traversable culvert safety ends as per Note 3. are not considered necessary.

The existing vehicle crossing for the cattle raceway is to be utilised for the Lot 2 access. The crossing is formed in gravel with a 300mm culvert and is compliant with Rule 15.1.6C.1.5 of the District Plan for a single vehicle crossing and matches the dimensions specified for a Type 1A – Light Vehicles shown in Sheet 21 and 22.

Figure 3: Existing Vehicle Crossing for Lot 2

4.2 Sighting Distance

The sight distance looking east and west from the Lot 2 vehicle crossing is 200m + in both directions. Kunicich Road is a no exit Access Road with an open speed limit. The site is close to the end of the road and very little traffic passes the site. Sheet 4 of the Engineering Standards 2023 requires a stopping sight distance of 195m for a speed of 100kph on an Access Road. Operating speeds are well below 100kph meaning the crossing achieves adequate sight distance. Refer Figures 4 and 5 below.

Figure 4: Sighting Distance looking South.

Figure 5: Sighting Distance looking North

4.3 Parking and Manoeuvring

Appendix 3C of the FNDC District plan requires two car parks for each household. There is adequate room for compliant parking and manoeuvring within the proposed subdivision.

5 Flood Hazard Assessment

5.1 Regulatory Framework

New Zealand Building Code Clause E1 Surface Water: First Schedule mandatory provisions E1.3.2 specifies that, '*Surface water, resulting from an event having a 2% probability of occurring annually (50-year ARI), shall not enter buildings'*. The Code notes that this Performance Measure applies only to Housing, Communal Residential and Communal Non-residential buildings.

The New Zealand Standard NZS4404:2010 'Land Development and Subdivision Engineering' states:

> **4.3.5.2 Freeboard**
>
> The minimum freeboard height additional to the computed top water flood level of the 1% AEP design storm should be as follows or as specified in the district or regional plan:
>
> | **Freeboard** | **Minimum height** |
> |---|---|
> | Habitable dwellings (including attached garages) | 0.5 m |
> | Commercial and industrial buildings | 0.3 m |
> | Non-habitable residential buildings and detached garages | 0.2 m |
>
> The minimum freeboard shall be measured from the top water level to the building platform level or the underside of the floor joists or underside of the floor slab, whichever is applicable.

In conjunction with NZS4404, the 2023 FNDC Engineering Standards also stipulate a freeboard for habitable building floors of 500mm above the 1% AEP event with allowance for climate change effects (Cl. 4.3.10.7).

5.2 Flood Mapping

NRC flood mapping includes the Awanui Rivier Catchment as a Priority River. The Priority River Model is more accurate than the regionwide model as it can make more localised assumptions on inputs such as infiltration rates and considers the positive effects of the existing stormwater controls within the Awanui River catchment. The Priority River Model has been adopted for this assessment. The decision is supported by NRC's Frequently Asked Questions section on their flood hazard mapping which states.

> *Once you open the maps on the viewer you will see that certain catchments are covered by the 'Priority Rivers' and the new "Regionwide" flood maps. The Priority Rivers flood maps take precedence in these cases.*[*]

[*] https://www.nrc.govt.nz/environment/natural-hazards-portal/river-flooding/river-flood-hazard-maps/

5.3 Inundation Extent

The flood mappings large areas of shallow inundation across the Lot in a 1% AEP event RCP6.0 (2081-2100). However, the proposed building envelope, wastewater field, and access via Kunicich Road, will remain unaffected.

5.4 Recommended Minimum Floor Level

The modelled maximum flood level in a 1% AEP event with climate change effects is 2.96 m RL (NZVD 2016). Refer NRC flood report appended. Hence the minimum habitable floor level shall be 3.46m RL providing 500mm freeboard.

This level also achieves the NRC Regional Policy Statement for Northland requirements that any new habitable dwelling has a minimum floor level of 3.3 m above One Tree Point datum on the east coast. This applies to the coastal environment but is pertinent since the site is mapped as subject to Coastal flooding.

The geology of the site lends itself to a suspend piled foundation so the minimum floor level will be readily achievable. The floor level will be approximately half a metre above the existing ground level.

The Recommended Floor Level assumes that the flood modelling is utilised is current. If the Flood Modelling data is updated at building consent stage, the minimum floor level recommendation is to be revisited.

6 Stormwater Management

6.1 Regulative Framework

The Site is zoned as Rural Production. The relevant permitted activity rule for impermeable surfaces is as follows:

8.7.5.1.5 STORMWATER MANAGEMENT
The maximum proportion or amount of the gross site area covered by buildings and other impermeable surfaces shall be 12.5 % or 3,000 m², whichever is the lesser.

Note: It is recommended that the Low Impact Design principles are used where appropriate to promote the on-site percolation of stormwater to reduce runoff volumes and to protect receiving environments from the adverse effects of stormwater discharges.

Rule C.6.4.2 of the Northland Regional Plan provides for the diversion and discharge of stormwater from outside a public stormwater network provided (amongst other conditions) 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% AEP, or flooding of buildings on another property in a storm event of up to and including a 1% AEP.

The FNDC Engineering Standards 2023 (Table 4-1) states:

- Runoff effects in the area to be developed are to be attenuated to 80% of predevelopment flowrates for the 50% and 20% AEP flood event using historical data.
- Typically, always required in the upper catchment and sometimes not required where development site is located in proximity to the catchment outlet, discharging to a watercourse with sufficient network capacity, and where flow attenuation may worsen flooding hazards due to relative timing of peak flows. This is subject to assessment demonstrating no negative impacts would occur. If the proposed stormwater discharge is into a tidal zone, then no attenuation is required.

The site borders and drains into the Waipapa Kauri Drain to the east. The drain is engineered drainage channel some 10km long extending from Tangonge Lake just outside Kaitaia and outfalling into the tidal waters of the Rangaunu Harbour approximately 2.3 km downstream of the site.

Stormwater attenuation is not appropriate for the following reasons and may even worsen downstream effects;

- The site is located in proximity to the catchment outlet
- The site discharges into the Waipapa Kauri Drain which is an engineered drainage channel and expected to have sufficient network capacity
- The Waipapa Kauri Drain is regularly maintained
- The site is in the lower quarter of the Waipapa Kauri Drain catchment, flow attenuation may worsen flooding hazards due to relative timing of peak flows. The explanation for this is attenuation slows site runoff that would otherwise drain out before the arrival of the peak flood

Residential development is not expected to result in contaminated stormwater runoff. By discharging concentrated flows to ground in a dispersive manner and making use of existing drains and flow paths, stormwater contamination can be avoided.

6.2 Impervious Surface Coverage For Lot 1

As Lot 1 is by far the smallest of the two proposed lots, it is vital to assess the impervious surface coverage for this lot against Council rules, based on the assumed Net Lot area of 9000m^2.

Existing Roof Cover	165m^2
Existing Gravel Access and Parking	200m^2
Total Impervious	**365m^2**
Total Lot Area	**9000m^2**
Impervious Percentage	**4%**

The Proposed development meets the criteria for a permitted activity as per Rule 8.7.5.1.5 in the District Plan. There are no intentions to increase the impervious surface in Lot 1.

6.3 Existing Site Drainage

The site generally slopes to the north-west, north and north-east with slopes up to 8˚ in proposed lots 1-6. Proposed lots 1-6 generally slope to the north-east.

Proposed lots 1-6 drain into a delineated inland wetland . The wetland then drains into the Mangakaraka Stream which is within the catchment of the Waihou River.

A culvert under Signal Road feeds an ephemeral flow path which is located between proposed lots 3 and 4. This flowpath then flows into the wetland.

6.4 Proposed Stormwater Management

For this site Rule C.6.4.1 indicates that it is appropriate to ensure flood levels do not increase for rainfall events up to the 10% AEP. This shall be achieved by attenuating run off.

District Plan and Regional Plan policies and rules require the avoidance or mitigation of adverse effects of stormwater runoff on receiving environments, including downstream properties. To comply with these requirements and the new Council Engineering Standards, attenuation shall be designed to 80% of pre-development peak flow rate for the 2, 5 and 10-year events with no adjustment for climate change.

Residential development is not expected to result in contaminated stormwater runoff. By discharging concentrated flows to ground in a dispersive manner and making use of existing drains and flow paths, stormwater contamination can be avoided.

It is proposed that development is attenuated for 2, 5 and 10-year events at building consent stage. Attenuation can be achieved by roof runoff detention or a combination of roof runoff detention and detention basin.

The mapped wetland along the north-eastern boundary will need to be considered with regard to stormwater design at building consent stage.

6.5 Restricted Discretionary Subdivision

In considering whether or not to grant consent on applications for restricted discretionary subdivision activities, the Council will restrict the exercise of its discretion to the following matters:

(ii) for applications under 13.8.1(b) or (c) (i.e. minimum lot size is 4,000m^2)

Table 1 – FNDC 13.8.1 Subdivision within the Rural Production Zone Exercise of Discretion when Granting Consent

Matter	Comment
effects on the natural character of the coastal environment for proposed lots which are in the coastal environment;	It is not anticipated that this subdivision will have an adverse effect on waterbourne contaminants, litter or sediment.
effects of the subdivision under (b) and (c) above within 500m of land administered by the Department of Conservation upon the ability of the Department to manage and administer its land;	This subdivision is rural so will not impact urban stormwater management plans.
effects on areas of significant indigenous flora and significant habitats of indigenous fauna;	It is proposed that future development on the propose lots will be attenuated for the 2, 5 and 10 year rainfall events at building consent stage.
the mitigation of fire hazards for health and safety of residents.	No stormwater infrastructure is proposed at subdivision stage.
	No catchment management plan has been prepared fr this area.

In considering whether or not to impose conditions on applications for restricted discretionary subdivision activities the Council will restrict the exercise of its discretion to the following matters:

(1) the matters listed in 13.7.3 - refer 13.7.3.4 Table 2 below

(2) the matters listed in (i) and (ii) above – refer Table 1 above

Table 2 – FNDC 13.7.3.4 Subdivision Matters for Control

Criteria	Comment
(i) control of water-borne contaminants, litter and sediments	Residential development is not generally considered to create a long-term impact on water quality. For this development, the nominated building platforms will be surrounded by grass surfaces providing a buffer to run-off, trapping contaminants and sediments. Stormwater run-off from roof tank overflow will be clean rainwater and runoff from driveways will drain via open drains and flow paths.
(ii) the capacity of existing and proposed stormwater disposal systems (refer also to the Council's various urban stormwater management plans and any relevant Northland Regional Council stormwater discharge consents)	The site discharges into the Waipapa Kauri Drain which is an engineered drainage channel and expected to have sufficient network capacity

(iii) the effectiveness and environmental impacts of any measures proposed for avoiding or mitigating the effects of stormwater runoff, including low impact design principles;	Stormwater will be discharged onto flat ground in a dispersive manner, which achieves low impact design
(iv) the location, scale and construction of stormwater infrastructure;	The proposed stormwater infrastructure will be modest in scale and contained within the lot boundaries.
(v) measures that are necessary in order to give effect to any drainage or catchment management plan that has been prepared for the area.	N/A

Figure 6: Stormwater to be discharged into the existing swale at 80% predevelopment flowrate for 50% and 20% AEP flood events.

7 Earthworks

7.1 Framework

As per Operative District Plan Rule 12.3.6.1.1 excavation and/or filling in the Rural Production Zone is permitted, provided it does not exceed 5,000 m^3 in any 12-month period per site; and does not involve a continuous cut or filled face exceeding an average of 1.5 m in height over the length of the face i.e. the maximum permitted average cut and fill height may be 3m.

The Operative Regional Water and Soil Plan allows as a permitted activity volume moved or disturbed not exceeding 5,000 m^3 in any 12-month period.

The Proposed Far North District Plan was notified on 27 July 2022.

The Proposed Plan defines earthworks as:

The alteration or disturbance of land, including by moving, removing, placing, blading, cutting, contouring, filling or excavation of earth (or any matter constituting the land including soil, clay, sand and rock); but excludes gardening, cultivation, and disturbance of land for the installation of fence posts.

The following Proposed Plan rules and standards have legal effect and will be complied with:

- Earthworks Rule EW-R12 (Earthworks and the discovery of suspected sensitive material)
- Earthworks Rule EW-R13 (Earthworks and erosion and sediment control
- Standard EW-S3 Accidental Discovery Protocol
- Standard EW-S5 Erosion and sediment control

7.2 Proposed Earthworks

No earthworks are required at the time of subdivision.

8 Water Supply

8.1 Potable Water Supply

The eventual dwelling on Lot 2 will be dependent on roof run off collected in standard water tanks. The overflow from the water supply tank(s) will feed into the dedicated attenuation tank.

8.2 Fire Fighting

Council Engineering Standards require a water supply that is adequate for firefighting purposes. Where there is currently no reticulated water supply, then each residential lot will be responsible for providing adequate on-site firefighting supply.

For a single family home without a sprinkler system in a non-reticulated supply area, the New Zealand Fire Service (NZFS) Fire Fighting Water Supplies Code of Practice SNZ PAS 4509:2008 recommends for a firefighting supply a minimum water storage capacity of 45m^3 within 90m of the dwelling, fitted with an adequate means for extracting the water from the tank.

8.3 Alternative to Fire Fighting Supply

The Code (SNZ PAS 4509:2008) specifically allows for alternative methods to be used in meeting the Code requirements, as long as there is approval from an appropriate person nominated by the NZFS National Commander. Clause 4.4 of the Code states that:

- Fire engineers or similar competent persons may use alternative methods, such as those detailed in Appendix H and Appendix J to determine firefighting water supplies. To comply with this code of practice, such alternatives must be submitted for approval to the person(s) nominated by the National Commander. The person(s) so nominated will approve these cases on confirmation that the method and calculations used are correctly applied.
- Alternative methods will need to show that the calculated firefighting water supply makes allowances for tactical flow rates (that is, the amount needed above a theoretical amount to absorb the released heat for operational effectiveness).

The procedure to be followed in the case of an alternative fire-fighting supply is as follows:

- The competent person should submit a firefighting facilities checklist (FFFC), with a scale site map showing contours and proposed alternatives to Table 2 with rationale for assessment to NZFS

If the proposed supply is approved by a nominated NZFS person, Council will accept the FFFC and compliance with the Code will be achieved.

NZFS considers that a 'one size fits all' volume is not appropriate in all circumstances. There are alternatives to firefighting couplings but firefighters are not expected to lift pumps or hoses onto the top of water tanks.

9 Wastewater

9.1 Regulative Framework

The eventual dwelling is to be serviced with an onsite effluent field. The FNDC Engineering Standards 2023 (5.1.4.2) states that NZS1547:2012 as the appropriate technical standard for sizing onsite effluent disposal fields.

Further to the District standards, the Regional Plan gives the following conditions for permitted wastewater field systems from C.6.1.3 and shown in Table 9 below:

Feature	Primary treated domestic type wastewater	Secondary and tertiary treated domestic type wastewater	Greywater
Exclusion areas			
Floodplain	5 percent annual exceedance probability	5 percent annual exceedance probability	5 percent annual exceedance probability
Horizontal setback distances			
Identified stormwater flow path (including a formed road with kerb and channel, and water-table drain) that is down-slope of the disposal area	5 metres	5 metres	5 metres
River, lake, stream, pond, dam or natural wetland	20 metres	15 metres	15 metres
Coastal marine area	20 metres	15 metres	15 metres
Existing water supply bore	20 metres	20 metres	20 metres
Property boundary	1.5 metres	1.5 metres	1.5 metres
Vertical setback distances			
Winter groundwater table	1.2 metres	0.6 metres	0.6 metres

9.2 Design Population and System Flow Volumes

For the sake of design purposes, it is assumed that the eventual dwelling on Lot 2 will be normal 3 bedroom dwelling with standard fixtures and five occupants. Table H3 of NZS1547:2012 recommends a typical wastewater design flow of 145L/person/day. Assuming an occupancy of five, the wastewater flowrate for design purposes is to be 725L/d.

9.3 Design for Land Application System

9.3.1 Wisconsin Mound System

As a pressure compensating dripper line field will need to be elevated in mounds to provide adequate clearance from the winter water table., a better solution would be the Wisconsin Mound System using the design standard found in Appendix N of NZS1547:2012. The topography and soil profile of the site are well suited to the Wisconsin mound system.

9.3.2 Effluent Field Design Area

Please refer to the Geotechnical Investigation Report for the Site (Haigh Workman, August 2024). Our boreholes indicate that the soil type in the proposed disposal fields can be described as a fine SAND and in accordance with AS/NZS1547 Table E1 it is classed as Soil Category 2. There is more than 250mm topsoil. Table N1 recommends a design loading rate of 24mm/day as being suitable.

Ground water was encountered at between 0.5m and 0.7m depth. The Regional Plan Table 9 requires 0.6m setback from the winter groundwater. It is likely that the disposal area will need to be mounded to ensure adequate vertical setback from the winter groundwater level. This can be achieved using surplus topsoil from the building platform.

On this basis, the proposed Wisconsin mounds with a flow volume of 725 litres/day would require 725/24 = 30.2m² minimum mound area.

To comply with the design parameters of Figure N1 in NZS1547, the Wisconsin mound would need to comply with the following parameters:

The mound is to be 1050mm above ground level.
The lateral distribution lines are to be set 2m apart.
The mound is to be wide at the base with 3h:1v batters on either side.
The length of the mound is to be 6m with 3:1 batters on the end (12m length total at the base.)

With these parameters. The total area of the Wisconsin mound is to be 12m by 6m (72m^2 total)
The effluent field is to be fenced off to protect it from livestock. It is recommended that the area be planted with species suitable for evapotranspiration systems.

9.3.3 Suitable Effluent Field Location

There are multiple areas within the proposed Lot 2 site area that are appropriate for a dripperline disposal field that is compliant with the permitted setbacks of C.6.1.3 of the Regional Plan.

The one condition that needs to be attention to ensure compliance is ensuring the effluent field remains outside the 5% AEP flood plain. The 10% and 2% flood plains are shown in the flood hazard assessment from the Regional Council (Appendix A). There is ample room for a 145m^2 disposal field plus reserve area outside these flood zones.

9.3.4 Reserve Area

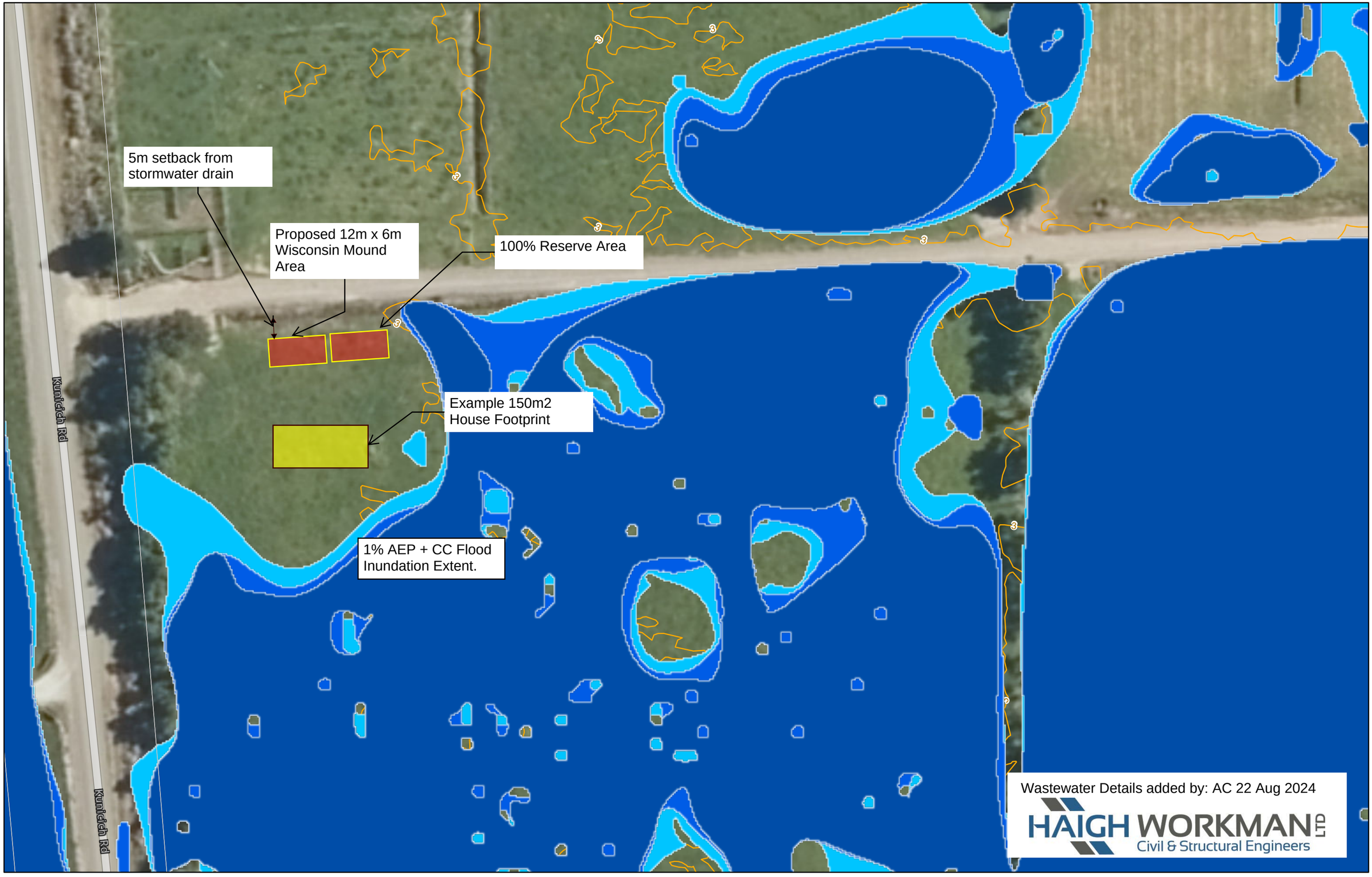
A reserve area of 100% or 145m^2 is required in accordance with 5.5.3.4 from NZS1547:2012.

9.3.5 Treatment Plant Design Sizing

The naming of a proprietary secondary treatment plant will be decided by the new owner at the building consent stage when the position and scale of the building are known. Treatment plants must meet the requirements of AS/NZS 1546.3:2001.

The system is to meet the quality output of AS/NZS 1546.3:2003, producing effluent of less than 20 g/m^3 of 5-day biochemical oxygen demand (BOD_5) and no greater than 30 g/m^3 total suspended solids (TSS), capable of consistently treating 725 litres/day.

Appendix A – NRC Flood Level Report



Northland REGIONAL COUNCIL

Proposed Wastewater Field Location - Proposed Lot 2 Kunicich Road

Projection NZTM. Datum NZTM2000.
DISCLAIMER:
The Northland Regional Council cannot guarantee that the information shown is accurate and should not be reused in any manner without proper consultation with its owner.

N

0 4 8 16 24 32 40 m

August 24 2024

Flood Level Report

Parcel ID: 5032186

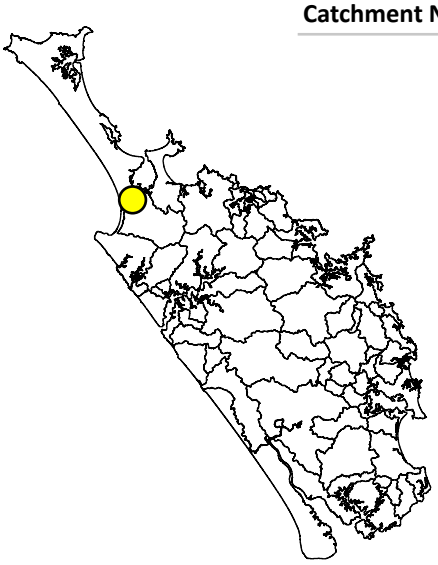
Title: NA646/157

Appellation: Lot 1 DP 23280

Survey Area: 368,719 m²

Catchment Name(s)

Awanui



Date Exported: 24/07/2024

Report Reference: 20240722_140129

Useful Flood Information Definitions

Annual Exceedance Probability (AEP) - The probability of a flood event of a given size occurring in any one year, usually expressed as a percentage annual chance.

1% AEP - A flood of this size or larger has a 1 in 100 chance or a 1% probability of occurring in any year.
2% AEP - A flood of this size or larger has a 1 in 50 chance or a 2% probability of occurring in any year.
5% AEP - A flood of this size or larger has a 1 in 20 chance or a 5% probability of occurring in any year.
10% AEP - A flood of this size or larger has a 1 in 10 chance or a 10% probability of occurring in any year.

NZVD2016 - New Zealand Vertical Datum - The reference level used in our flood models to define ground level.
Flood Levels - Flood levels are used from our modelled flood level rasters. The flood levels are calculated above NZVD 2016 Datum.
Climate Change (CC) - NZCPS (2010) requires that the identification of coastal hazards includes consideration of sea level rise over at least a 100-year planning period. Climate change impacts, such as increased rain intensity, have been included in the flood scenarios. You can read more about the Climate Change forecasts included in each flood model in the technical reports on the NRC website.
Mean high water spring (MHWS) - describes the highest level that spring tides reach, on average.

Coastal Flood Hazard Zones (CFHZ)

Coastal flood hazard zones are derived using a range of data including tide gauge analysis, wind and wave data and models, and use empirical calculations to estimate extreme water levels around the coastline. The calculations include projected sea level rise scenarios based on the latest Ministry for the Environment guidance.

CFHZ 0 Coastal Flood Hazard Zone 0 - area currently susceptible to coastal inundation (flooding by the sea) in a 1-in-100 year storm event
CFHZ 1 Coastal Flood Hazard Zone 1 - an area susceptible to coastal inundation (flooding by the sea) in a 1-in-50 year storm event, taking into account a projected sea-level rise of 0.6m over the next 50 years
CFHZ 2 Coastal Flood Hazard Zone 2 - an area susceptible to coastal inundation (flooding by the sea) in a 1-in-100 year storm event, taking into account a projected sea-level rise of 1.2m over the next 100 years
CFHZ 3 Coastal Flood Hazard Zone 3 - an area susceptible to coastal inundation (flooding by the sea) in a 1-in-100 year storm event, taking into account a projected sea-level rise of 1.5m over the next 100 years (rapid sea level rise scenario)

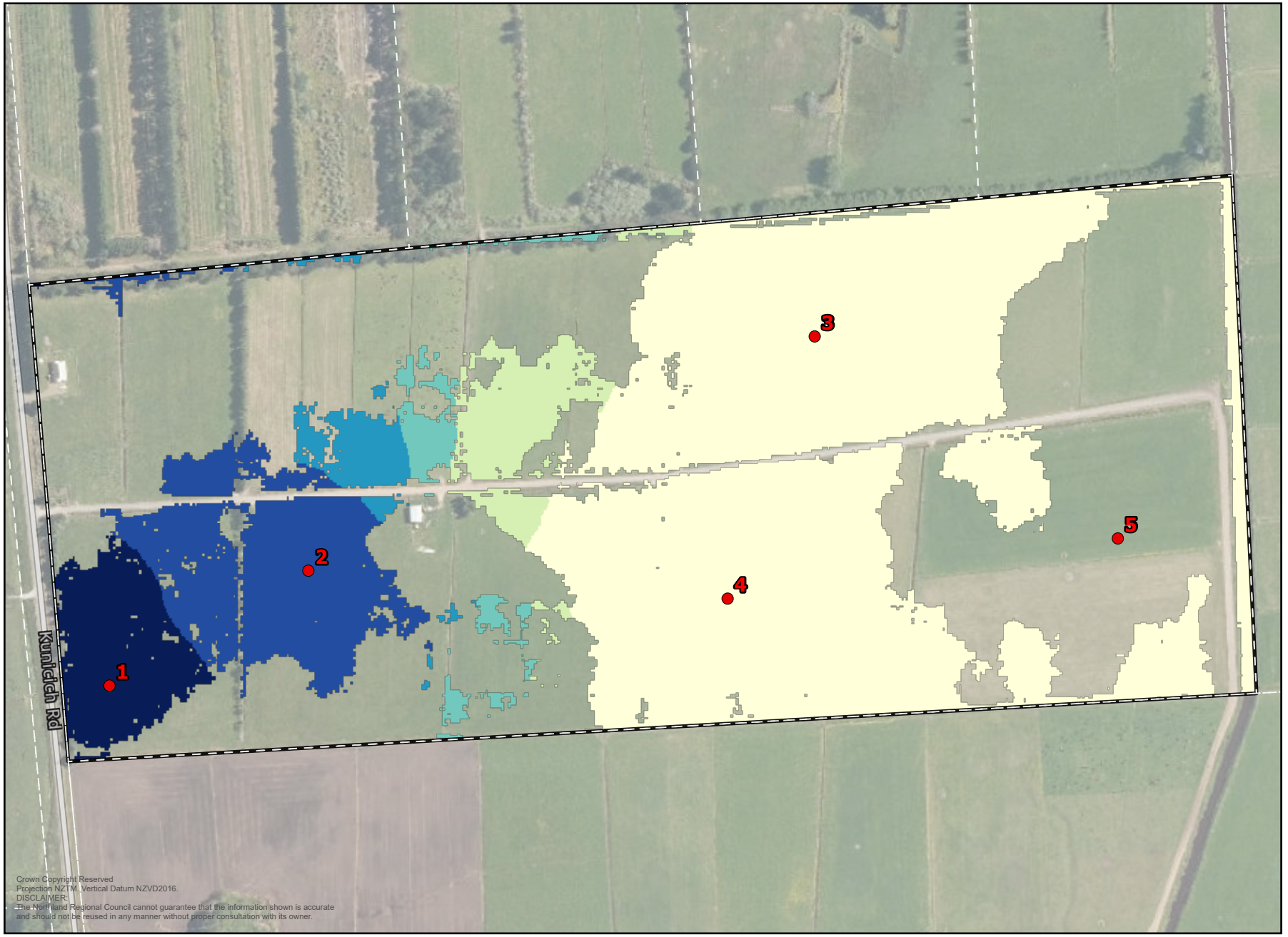
REGIONWIDE and PRIORITY - RIVER FLOOD HAZARD ZONES (RFHZ)

River flood hazard zones are created to raise awareness of where flood hazard areas are identified, inform decision-making and to support the minimisation of the impacts of flooding in our region. The river flood hazard zones have been created using an assessment of best current available information, engaging national and international experts in the field, using national standards and guidelines and has been peer reviewed. This will provide a good indication of the areas at potential risk of flooding from a regional perspective. However, flood mapping is a complex process which involves some approximation of the natural features and processes associated with flooding.

River Flood Hazard Zone 1 – 10% AEP flood extent: an area with a 10% chance of flooding annually
River Flood Hazard Zone 2 – 2% AEP flood extent: an area with a 2% chance of flooding annually
River Flood Hazard Zone 3 – 1% AEP flood extent: an area with a 1% chance of flooding annually with the inclusion of potential Climate Change (CC) impact

River Flooding

10 Year



Maximum	Minimum
2.93 m	1.81 m

Max Min flood levels are for the raster extent shown on the map

10 Year

m NZVD

- 1.81 - 2.01
- 2.01 - 2.21
- 2.21 - 2.41
- 2.41 - 2.61
- 2.61 - 2.81
- 2.81 - 3.01
- Parcel
- Flood Level Point

Label	Level
1	2.9 m
2	2.69 m
3	1.97 m
4	1.98 m
5	0 m

N

0 80 160 320 480 m

Report Reference: 20240724_142704

River Flooding

50 Year

Maximum	Minimum
2.94 m	1.87 m

Max Min flood levels are for raster extent shown on the map

50 Year

m NZVD

- 1.87 - 2.07
- 2.07 - 2.27
- 2.27 - 2.47
- 2.47 - 2.67
- 2.67 - 2.87
- 2.87 - 3.07
- Parcel
- Flood Level Point

Label	Level
1	2.91 m
2	2.71 m
3	2.01 m
4	2.02 m
5	0 m

N

0 80 160 320 480 m

Report Reference: 20240724_142704

River Flooding

100 Year + CC

Maximum	Minimum
2.96 m	2.24 m

Max Min flood levels are for raster extent shown on the map

100 Year + CC

m NZVD

- 2.24 - 2.44
- 2.44 - 2.64
- 2.64 - 2.84
- 2.84 - 3.04
- Parcel
- Flood Level Point

Label	Level
1	2.93 m
2	2.72 m
3	2.34 m
4	2.35 m
5	2.36 m

N

0 80 160 320 480 m

Report Reference: 20240724_142704

Coastal Flooding

CFHZ1

Maximum	Minimum
0.36 m	0.31 m

Max Min flood levels are for raster extent shown on the map

CFHZ1

m NZVD

0.16 - 0.36

Parcel

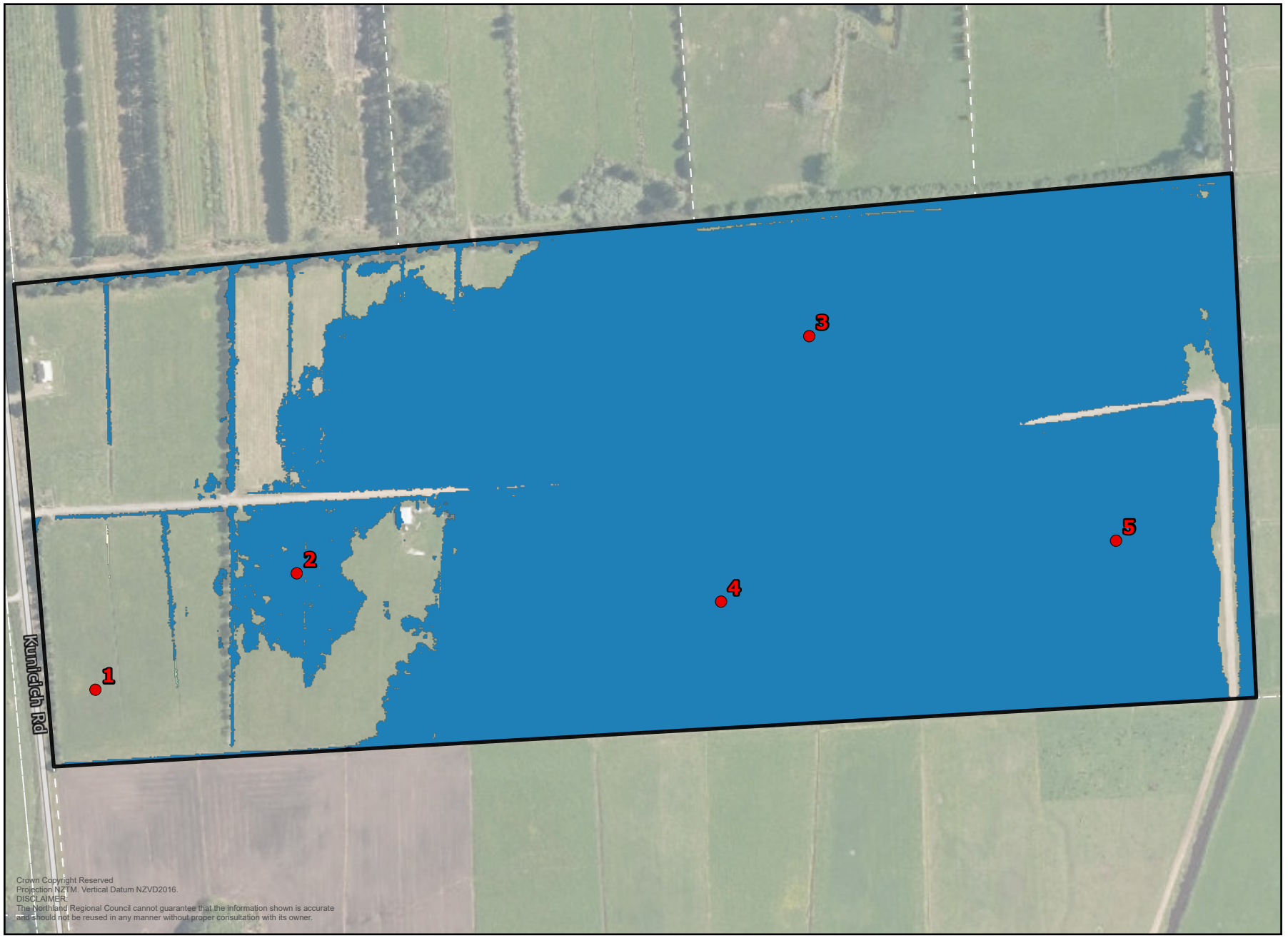
N

0 5 10 20 30 m

Report Reference: 20240724_142704

Coastal Flooding

CFHZ2



Maximum	Minimum
2.52 m	1.92 m

Max Min flood levels are for raster extent shown on the map

CFHZ2

m NZVD

- 1.92 - 2.12
- 2.12 - 2.32
- 2.32 - 2.52
- 2.52 - 2.72
- Parcel
- Flood Level Point

Label	Level
1	0 m
2	2.51 m
3	2.51 m
4	2.52 m
5	2.51 m

N

0 75 150 300 450 m

Report Reference: 20240724_142704

Coastal Flooding

CFHZ3

Maximum	Minimum
3.08 m	3.06 m

Max Min flood levels are for raster extent shown on the map

CFHZ3

m NZVD

2.88 - 3.08

Parcel

Flood Level Point

Label	Level
1	3.07 m
2	3.08 m
3	3.08 m
4	3.08 m
5	3.08 m

N

0 80 160 320 480 m

Report Reference: 20240724_142704

Disclaimers

Our modelling disclaimers are linked below:
https://www.nrc.govt.nz/media/ko2dkgxn/coastal-hazard-maps-disclaimer-june-2017.pdf
https://www.nrc.govt.nz/media/cqnnw12y/flood-map-disclaimer-2021.pdf

Our regionwide modelling reports are linked below:
https://www.nrc.govt.nz/environment/river-flooding-and-coastal-hazards/river-flooding/river-flood-hazard-maps/regionwide-river-catchments-analysis-technical-reports

ARE YOU FLOOD READY?

01

Know your risk

Check what potential flood risks and other hazards that may impact your property.

The Natural Hazards Portal is a great place to start. It's a 'one-stop-shop' of information related to natural hazards within our region: www.nrc.govt.nz/environment/natural-hazards-portal

The Environmental Data Hub provides river level and flow data, as well as warning levels, rainfall data, water quality, and more: www.nrc.govt.nz/environment/environmental-data/environmental-data-hub

02

Have a plan

Make sure you have an evacuation plan, emergency kit and important phone numbers ready. Check out: https://getready.govt.nz/en/prepared/ for tips on how to get ready.

03

Stay up to date

In a civil defence emergency situation, follow the updates on the Northland CDEM Group's Facebook page: www.facebook.com/civildefencenorthland

Or follow updates from the embedded feed on the regional council website: www.nrc.govt.nz/civildefence

04

In an emergency

Remember, if life is threatened dial 111 to contact emergency services.

Geotechnical Investigation Report

81 Kunicich Road, Awanui

Lot 1 DP 23280

For

West Road Farms Ltd

Haigh Workman reference 24 118

August 2024

Phone: +64 9 407 8327 • Fax: +64 9 407 8378 • info@haighworkman.co.nz • www.haighworkman.co.nz

PO Box 89 • 6 Fairway Drive • Kerikeri 0245 • New Zealand

Revision History

Revision Nº	Issued By	Description	Date
A	Josh Curreen	First Issue	August 2024

Prepared By

Josh Curreen

Senior Geotechnical Engineer
MEngNZ

Reviewed By

Wayne Thorburn

Senior Geotechnical Engineer
CPEng, CMEngNZ

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TABLES

FIGURES

Executive Summary

Haigh Workman Ltd. (Haigh Workman) has been commissioned by West Road Farms Ltd (the Client) to undertake a geotechnical investigation at 81 Kunicich Road, Awanui (Lot 1 DP 23280). We understand that the client intends to subdivide to create 1 new lot and construct a single level light weight dwelling on the western side of the property.

Based on the results of the geotechnical investigation conducted by Haigh Workman and review of published geological maps, it is considered that the soils directly underlying the site comprise recently deposited Karioitahi Group alluvial soils. All boreholes encountered a surface layer of non-cohesive sandy soils (1.0 to 1.8m depth), underlain by soft organic soils (amorphous peat) to the termination of the boreholes. CPT soundings indicate soft to firm soils underlie the site to approximately between 4.8 and 5.3 mbgl, where medium dense sand was encountered. The sand gradually increases in density with depth, becoming dense near the termination depth of the CPTs.

The soft organic soils are not considered suitable for supporting building loads and any changes in vertical effective stress will result in consolidation settlement. Consequently, deep pile foundations will be required for any future buildings.

The thickness of the underlying soft soils is around 5.0 m, and friction piles are likely more suitable to support building loads. Piles should be driven to a minimum depth of 8.0 m below ground level, subject to specific design. Preliminary pile design values are given in Table 7 (using CPeT-IT for 200 SED poles). Foundation design will require specific geotechnical and structural engineering at building consent stage.

We recommend that the consent drawings are submitted for review to either ourselves, or another professional geotechnical engineer who is familiar with the contents of this report, once they are ready for submission to Council for approval. We recommend this review is carried out in order to check the compatibility of the design with the recommendations given within this report. Recommended construction observations, but not limited to, are outlined in Section 6.

1 Introduction

1.1 Project Brief and Scope

Haigh Workman Ltd. (Haigh Workman) has been commissioned by West Road Farms Ltd (the Client) to undertake a geotechnical investigation at 81 Kunicich Road, Awanui (Lot 1 DP 23280). This report presents the information gathered during the site investigation, interpretation of data obtained and site-specific geotechnical recommendations relevant to the site.

The scope of this report encompasses the geotechnical suitability in the context of the proposed development as defined in the signed Short Form Agreement dated 11th June 2024. This appraisal has been designed to assess the subsoil conditions for foundation design and identify geotechnical constraints for the proposed development.

This report provides the following:

- A summary of the published geology with reference to the geotechnical investigations undertaken;
- Analysis of the data obtained from site investigations and a geological ground model;
- Foundation recommendations;
- Identification of any additional geotechnical risks and/or hazards.

1.2 Site Description

The subject property (legally described as Lot 1 DP 23280) is located on the eastern side of Kunicich Road, comprising a rectangular shaped property with a total land area of 36.8719 ha.

There is an existing dwelling situated in the north-western corner of the lot and the proposal is to subdivide and provide 1 new building platform approximately 120 m south of the existing dwelling.

Overall the property is near flat and used for agricultural purposes. There is a farm track that runs through the centre of the lot (from west to east) and the proposed building site will be on the southern side of this track, adjacent to Kunicich Road. There is a shelterbelt along the road boundary and the remainder of the site is in pasture. There are also a series of shallow open drains around the property to aid drainage given the flat nature of the site.

1.3 Proposed Development

Concept drawings for the proposed development were not available at the time of writing this report. However, an indicative building platform location was provided to us by the client.

This geotechnical investigation and report considers the geotechnical aspects of the proposed development, with particular reference to the proposed development location (refer to Figure 1 and Appendix A).

Should the proposed development vary from the proposals described above and/or be relocated outside of the investigated area, further investigation and/or amendments to the recommendations made in this report may be required.

Figure 1: Site Location

2 Geology

2.1 Published Geology

Sources of Information:

- Institute of Geological & Nuclear Sciences 1:250,000 Geological Map 1, 1996: "*Kaitaia*";
- NZMS 290 Sheet O 04/05, 1: 100,000 scale, 1982: *"Kaitaia-Rawene" Rock Types;*
- NZMS 290 Sheet O 04/05, 1: 100,000 scale, 1980: *"Kaitaia-Rawene" Soil.*

The published geology shows the site to be underlain by the Karioitahi Group Alluvium (Q1a) of Late Pleistocene to Holocene age. The alluvial deposits are expected to be underlain at depth by Northland Allochthon Taipa Mudstone (Emt).

An extract of the geological map is shown in Figure 2. below, with geological units presented in Table 1.

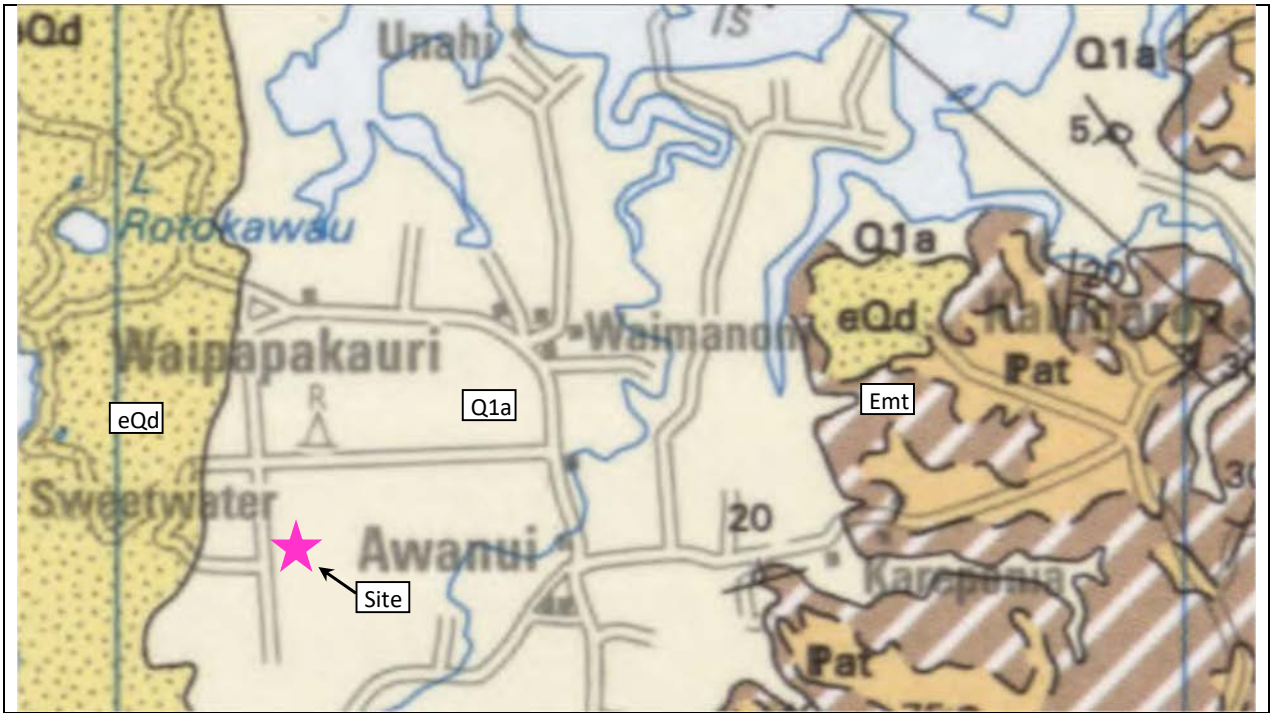

Figure 2: Published geology map (1:250,000)

Table 1: Geological Legend

Symbol	Group Name	Description
Q1a	Karioitahi Group (Alluvium)	Unconsolidated to poorly consolidated mud, sand, gravel and peat deposits of estuarine, lacustrine, swamp, alluvial and colluvial origins. (Holocene age)
eQd	Karioitahi Group (Parabolic dunes)	Weakly cemented and partly consolidated sand in fixed parabolic dunes. Clay-rich sandy soils. Minor sand, mud and peat or lignite in inter-dune lake and swamp deposits. (Pleistocene age)
Emt	Taipa Mudstone – Motatau Complex (Northland Allochthon)	Weakly to moderately indurated grey to blue-grey calcareous mudstone, commonly with redeposited glauconitic sandstone beds. (Eocene age)

Further reference to the published New Zealand Land Inventory maps (Kaitaia – Rawene), indicates the site is underlain by *'soils of the undulating terraces and lowlands, imperfectly to very poorly drained Otonga loamy peat (OGd)'*.

3 Ground Investigation

3.1 Subsurface Investigations

Haigh Workman undertook geotechnical investigations on 26 June 2024. The investigations comprised the drilling of three hand auger boreholes (BH01 to BH03) and five Cone penetrometer tests (CPT01 to CPT05).

3.1.1 *Hand Auger Boreholes*

Hand augers were advanced to a target depth of 5.0 metres below ground level (mbgl). Vane shear tests were undertaken at regular intervals during the advancement of the hand augers. Investigation hand auger logs are included in Appendix B.

Investigations were logged in accordance with The New Zealand Geotechnical Society, "Guidelines for the Field Classification and Description of Soil and Rock for Engineering Purposes" (2005). Investigation locations are shown on the drawings in Appendix A. All shear strengths shown on the appended logs are Vane Shear Strengths in accordance with the NZGS; "Test Method for determining the Vane Shear Strength of a Cohesive Soil using a Hand-held Shear Vane", 2001.

3.1.2 *Cone Penetrometer Tests (CPTs)*

Five cone penetration tests (CPTs) were undertaken by Underground Investigation Ltd. Testing was undertaken to refusal (anchors pulling out of the ground). A maximum depth of 15.0 m was achieved at CPT01 location. Underground Investigation Ltd provided a cone penetration rig attached to a remote controlled, rubber tracked machine to test and record ground information. CPT soundings are presented in Appendix C.

3.2 Ground Conditions

Based on the results of the geotechnical investigation conducted by Haigh Workman and review of published geological maps, it is considered that the soils directly underlying the site comprise recently deposited Karioitahi Group alluvial soils. All boreholes encountered a surface layer of non-cohesive sandy soils (1.0 to 1.8m depth), underlain by soft organic soils to the termination of the boreholes. The organic soils recovered comprised amorphous peat, with very poor sample recovery below approximately 1.5 to 2.0 mbgl.

CPT soundings indicate soft to firm soils underlie the site to approximately between 4.8 and 5.3 mbgl, where medium dense sand was encountered. The sand gradually increases in density with depth, becoming dense near the termination depth of the CPTs.

Subsoil conditions on the site have been interpolated between the boreholes, therefore some variation between test positions are likely. Detailed hand auger logs are presented within Appendix B. The tables below summarise the materials encountered in both the hand auger boreholes and CPTs.

Table 2: Hand Auger Borehole Summary

Geological Unit	Test I.D.		
	BH01	BH02	BH03
Topsoil, *Sandy TOPSOIL; dark brown, loose, wet*	0.0 to 0.25 m	0.0 to 0.2 m	0.0 to 0.3 m
Karioitahi Group Alluvium (Surface layer), *Fine SAND and sandy SILT, some peat, light brown and black, loose, wet to saturated*	0.25 to 1.8 m	0.2 to 1.2 m	0.3 to 1.0 m
Karioitahi Group Alluvium (Organic soils) *Amorphous PEAT, black, saturated. Very poor recovery below 1.5 – 2.0mbgl*	1.8 to >5.0 m*	1.2 to >5.0 m	1.0 to >5.0 m
Groundwater Level**	0.7 m	0.5 m	0.5 m

**BH01 became harder to drill and felt sandy at 4.8 mbgl however, no sample was recovered.*
***Groundwater depths measured below existing ground level.*

Table 3: CPT Results Summary

Inferred Geological Unit		Test I.D.				
		CPT01	CPT02	CPT03	CPT04	CPT05
KARIOITAHI GROUP	**SAND and Silty SAND, loose**	1.2 m	1.2 m	1.8 m	1.0 m	1.2 m
	Organic soils, soft	4.6 m	4.8 m	4.8 m	5.0 m	5.3 m
	SAND and silty SAND *Medium dense (ϕ 32 to 34°)*	14.2 m	13.0 m	13.2 m	13.5 m	13.2 m
	SAND and silty SAND *Dense (ϕ > 34°)*	>15.0 m	>13.8 m	14.4 m	14.0 m	14.4 m
Groundwater Level		1.1	0.6	0.7	0.3	0.65

Depth denotes bottom of each geological layer.
Groundwater levels measured after completion of all tests.

All CPTs were pushed to refusal (inferred to be dense sands of the Karioitahi Group) at depths of between 13.8 m and 15.0 m.

3.2.1 *Groundwater Conditions*

Groundwater was encountered during the investigations, with depth to groundwater given in Tables 2 and 3 above. Groundwater level has been recorded on the logs at the depth where groundwater was encountered, no further monitoring has been undertaken. Groundwater level was also measured within the CPT holes at the completion of testing. Groundwater standpipes were not installed in the hand auger boreholes or CPTs. No further groundwater monitoring has been undertaken. Groundwater levels measured are considered to be representative of typical winter conditions.

4 Geotechnical Assessment

4.1 General

The site is located in a low-lying area underlain by recent (Holocene age) deposits. As such, Cone Penetration Testing (CPT) was carried out to assess the liquefaction potential for the site. The site investigation revealed soft organic soils to between 4.6 m and 5.3 mbgl. These soils are not considered suitable for supporting building loads and any changes in vertical effective stress will result in consolidation settlement. Consequently, deep pile foundations will be required for any future building.

We recommend that filling around driven piles be avoided as this could cause down-drag on the piles and damage the building. If any filling is required for flood hazard purposes, ground improvement coupled with deep foundation design would be required to mitigate down-drag effects.

4.2 Geotechnical Design Parameters

Geotechnical design parameters recommended in this report are based on in-situ test results, empirical relationships and local experience. Refer Table 4 for recommended design parameters.

Table 4: Geotechnical Design Parameters

Soil Unit	Depth * (mbgl)	Bulk Unit Weight – γ (kN/m^3)	Peak undrained shear strength - S_u (kPa)	Effective cohesion – c' (kPa)	Effective friction angle - ϕ' (degrees)
Loose sand [Karioitahi Group]	1.0	16	N/A	0	28
Soft organic soils [Karioitahi Group]	5.3	14	10	1	20
Medium dense sand [Karioitahi Group]	14.2	18	N/A	0	34
Dense sand [Karioitahi Group]	>15.0	18	N/A	0	36

**Depth (m) measured below existing ground level.*

4.3 Seismic Subsoil Classification

In the absence of site-specific seismic data, based on our site investigation results and the known geology of the area. We recommend that a seismic subsoil Class D (Deep or soft soil sites) is adopted for derivation of design seismic actions for structural applications in accordance with New Zealand Standard for Structural Design Actions NZS1170.5:2004.

4.4 Liquefaction Potential

4.4.1 *General*

Liquefaction is the process where, during earthquake shaking, sand and silt grains in wet soil are rearranged and the water in the spaces between the grains is squeezed. Pressure builds up in the water until the silt and sand grains 'float' in the water and the soil behaves more like a liquid than a solid. Buildings, roads, pipes and tanks on or in liquefied soil are often damaged by tilting or sinking into the ground. The underlying alluvial soils comprise recent, unconsolidated to poorly consolidated, non-cohesive alluvial soils with a high groundwater table and are susceptible to liquefaction triggering during a significant seismic event.

The Northland region is considered to be one of the least seismically active regions of New Zealand, and we consider the liquefaction potential at this site is low.

4.4.2 *Analysis Methodology*

The liquefaction risk assessment for the identification, assessment and mitigation of liquefaction hazard has been conducted based on the recommendations of the New Zealand Geotechnical Society Inc. stated in Module 1 and Module 3 and the guidance document from MBIE (Planning and engineering guidance for potentially liquefaction-prone land, 2017).

The liquefaction susceptibility was analysed using CPT data imported into the GeoLogismiki software package CLiq (Version 3.0). The following assessment methodologies have been applied:

- Analysis Methods - Boulanger & Idriss (2014)
- Fines Correction Method – Robertson and Wride (1998)
- Settlement Estimates – Zhang at al (2002)

The following design cases have been considered for the liquefaction assessment:

Serviceability Limit State (SLS) – loads a building or structure is likely to be subjected to more frequently during its design life. A building should be readily repairable when subjected to SLS loads. SLS loads are based on a one in 25-year earthquake.

Ultimate Limit State (ULS) - loads a building or structure may be subjected to during a large (severe), relatively rare event. A building should be designed to lower the risk of collapse, and therefore minimise the risk or protect life safety to human life when subjected to ULS loads. ULS loads are based on a one in 500-year earthquake.

The seismic coefficients for design are based on the NZTA Bridge Manual (NZBM), calculated based on the following formula: $PGA = C0.1000 * \frac{Ru}{1.3} * f * g$

Table 5: Earthquake Design Scenarios

Design Case	Return Period	Magnitude (M)	Peak Groud Acceleration
SLS	25 year (Ru 0.25)	5.8	0.03 g
ULS	500 year (Ru 1.0)	5.8	0.13 g

A lower bound ULS case (0.19 g, Mw 6.5 earthquake) was also used to analyse any step-change behaviour (based on Module 1, NZGS & MBIE). Results are summarised in Table 6, with detailed results presented in Appendix C. The liquefaction severity number has been used to indicate the potential for surface manifestation, with all tests recording a LSN less than 10 (little to no expression of liquefaction, i.e., negligible risk).

Table 6: Liquefaction Results Summary

Test No.	SLS Design Case			ULS Design Case (0.13 g)		
	LPI	LSN	Vertical Settlement (mm)	LPI	LSN	Vertical Settlement (mm)
CPT01	Low risk	0	0	Low risk	4.5	33
CPT02	Low risk	0	0	Low risk	4.2	32
CPT03	Low risk	0	0	Low risk	6.4	39
CPT04	Low risk	0	0	Low risk	5.6	40
CPT05	Low risk	0	0	Low risk	4.5	36

4.4.3 *Liquefaction Induced Settlement*

The results indicate that during a SLS earthquake event, negligible settlement is predicted. The Liquefaction Potential Index (LPI) for the SLS design case is classified as low risk with the Liquefaction Severity Number (LSN) showing little to no expression of the liquefaction (i.e. sand boils or ejecta) expected at the surface.

For the ULS earthquake event, up to 40 mm of free field settlement due to liquefaction is predicted, with the majority of the settlement occurring within the upper 5 to 6 m of the soil profile. The liquefaction potential index for ULS is classified as low risk with little to no expression of liquefaction (i.e. sand boils or ejecta).

The CPT results were all reasonably uniform across the site, therefore the free field settlement is likely to be relatively uniform. Some degree of liquefaction induced differential settlement at the ground surface is expected, however the risk of liquefaction damage to the site is low and unlikely.

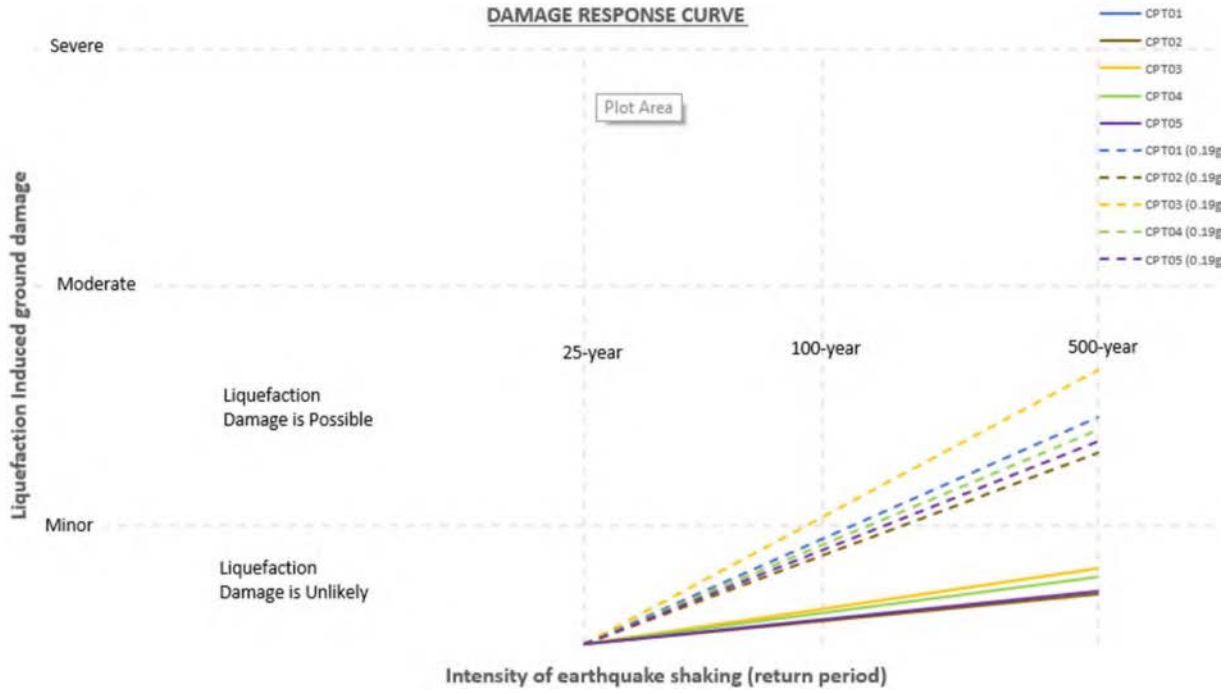

Figure 3: Damage Response Curve

Based on our assessment we consider liquefaction induced ground damage for (ULS 0.13 g) is minor and liquefaction damage is unlikely based on 'Planning and engineering guidance for potentially liquefaction-prone land, MBIE, September 2017). Based on the assessment, we consider the effects from excess pore pressure and liquefaction to be between insignificant (L0) to mild (L1) in accordance with Table 5.1 (Module 3), with relatively small differential settlements across the site due to limited excess pore water pressures.

The liquefaction potential and free field settlement for the lower bound PGA = 0.19 g case indicates minor to moderate expression of liquefaction, however, unlikely to result in collapse of light-framed, flexible clad residential buildings should this event ever occur. Deep driven piles would be required for any future dwelling, which will also mitigate any liquefaction damage in the lower bound 0.19 g event.

The surrounding area is near flat and there are no free faces nearby, other than the shallow open drains which are approx. 1.0 to 1.5m deep. The risk of lateral spreading is therefore negligible.

5 Foundation Recommendations

5.1 General

At the time of writing, no concept drawings for the proposed development were available. However, the approximate location of the proposed building site options was indicated by our client.

Based on our findings, we consider driven piles the most suitable foundation option for this site due to the presence and depth of soft organic soils. Specific design recommendations are outlined below.

Filling should not be carried out beneath or near the pile foundations as this could cause down-drag on the piles resulting in damage to the building.

5.2 Shallow Foundations

Due to the compressible nature of the soft underlying soils, shallow foundations are not considered appropriate for this site.

5.3 Piled Foundations

Due to the depth of soft organic soils beneath the site, deep piled foundations are required to support all building loads. The soft organic material is around 5.0 m thick and underlain by medium dense sand to around 14.0 mbgl. Consequently, friction piles are likely more suitable to support building loads.

Friction piles should be designed using the geotechnical design parameters provided in Table 4, ignoring the upper 5.0 m of soft organic material.

A preliminary assessment of the shaft capacity has been undertaken using the CPT data, adopting driven timber piles (Group II), with a constant diameter of 200 mm. Results are tabulated below; the values are not design values and will be subject to a detailed pile analysis at building consent stage.

The upper 5.0 m has been excluded from providing any skin friction due to the soft compressive nature of the soils. A geotechnical strength factor of 0.45 has been applied for limit state design (factor may be changed if proof or static load testing is carried out in accordance with B1/VM4). Minimum pile spacing to be 3 x pile diameter due to pile interaction.

Table 7: Shaft Resistance (200 mm diameter timber poles)

Pile embedment Length (mbgl)	Circumference (m) (For 200 SED pole)	Pile Capacity from CPT Method (kN) *(Strength reduction of 0.45)*
5.0	0.628	0
6.0	0.628	5
7.0	0.628	10
8.0	0.628	18
9.0	0.628	27
10.0	0.628	37
11.0	0.628	53
12.0	0.628	66
13.0	0.628	82

The following skin friction values can be adopted for preliminary design only. Detailed assessment and design must be carried out at building consent stage (between geotechnical and structural engineer).

The following foundation recommendations are listed below:

- Driven piles should be embedded to a minimum depth of 8.0 m below existing ground level, or until the required design set has been achieved. Final design depths will be subject to structural design and load breakdown.
- Driving of test piles should be undertaken to determine the likely driving depth before ordering all materials. These piles should be spaced around the structure and will provide an indication of the pile lengths required for the remainder of the foundations.
- Due to the natural variability of soil strengths and depths to a suitable founding stratum, the actual founding depth across the building platform is likely to vary.
- A calculation using the Hiley Formula should also be carried out for the specified pile size and depth to determine an appropriate driving set to be used as a check during construction. A factor of safety of 4 should be applied. Set to be checked only once the minimum penetration depth has been achieved.
- No filling around the foundation piles should be undertaken as this could result in negative skin friction acting on the foundation piles resulting in angular distortion across the structure.

6 Construction

6.1 Earthworks

Due to the relatively flat grade across the site, we expect minimal earthworks will need be undertaken. If any filling is to be undertaken, Haigh Workman will need to be consulted as the underling soils are susceptible to consolidation settlement. If filling is completed after piles have been installed, the risk of down-drag on the piles could result in excessive pile settlement.

Groundwater level across the site is shallow. We recommend excavations be kept to a minimum. The only excavations required should be for installation of services and pile installation, depending on the method chosen. Excavations should not go any deeper than the groundwater level to reduce the risk of any groundwater drawdown induced settlements.

6.2 Geotechnical Review

We recommend that the consent drawings are submitted for review to either ourselves, or another professional geotechnical engineer who is familiar with the contents of this report, once they are ready for submission to Council for approval. We recommend this review is carried out in order to check the compatibility of the design with the recommendations given within this report.

6.3 Stormwater Disposal

Stormwater from paved areas, roofs, driveways and water storage tanks should be collected in sealed, flexible pipes and discharged in such a manner to not cause any instability or erosion. It is essential for the long-term stability of this site, that all storm water be piped well away from any proposed building platform to avoid over saturation of the underlying natural soils. It is recommended that concentrated stormwater flows be discharged in a controlled and dispersive manner, preferably into one of the existing open drains.

6.4 Construction Observations

Specific engineering inspections of building platform preparation and/or foundation construction with certification by a Producer Statement, PS4, are often required by Council and outlined in the Building Consent documents. These observations are generally required to ensure that the foundation soils exposed at the time of construction are consistent with the assumptions made in this geotechnical report.

As piled foundations are recommended for the proposed development foundations, it is strongly recommended that the contractor for the foundation works provide a Producer Statement - PS3 - Construction, upon completion of the piled foundations. The PS3 document may then be accepted as verification that the particular works they have constructed are in full compliance with the recommendations contained within this report, any amendments and instructions given onsite, and also with Building Consent drawings and documents. The PS3 from the foundation contractor must be supplied to the engineer who carried out the site observations of the exposed ground conditions during construction before they prepare and submit their PS4.

We also point out that provision should be allowed for modifying the foundation solution at this time, should unforeseen ground conditions be encountered.

We consider the following specific items will need to be observed at the time of construction to ensure the foundation soils are consistent with the assumptions made in this geotechnical report:

1. Geotechnical drawing review to confirm the foundation design is as per the geotechnical recommendations;
2. Observe driven pile operations during construction to confirm adequate driving sets (to be calculated by structural engineer).

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

7 Limitations

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

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

Appendix A – Drawings

Drawing No.	Title
G01	Site Locality Plan
G02	Site Investigation Plan
G03	Geological Cross Section A-A’

NOTES:

1. LOT BOUNDARIES AND AERIAL PHOTO INFORMATION TAKEN FROM LAND INFORMATION NEW ZEALAND (LINZ).

Issue	Date	Revision
A	7/08/2024	FIRST ISSUE

DWG: Site Location Plan

Scale 1:10000 @A3 | Date AUG 2024

Drawn JMC | Checked WT | Approved JP

File T:\CLIENTS\WEST ROAD FARMS LTD\24 118 - 81 KUNICICH ROAD, AWANUI\ENGINEERING\GEOTECH\DRAWINGS\GEO\24 118_GEO DRAWINGS.DWG

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Project: Geotechnical Investigation
81 Kunicch Road, Sweetvater, Awanui(Lot 1, Deposited Plan 23280)

Client: West Road Farms Ltd.

Project No. 24 118 | RC no. N/A

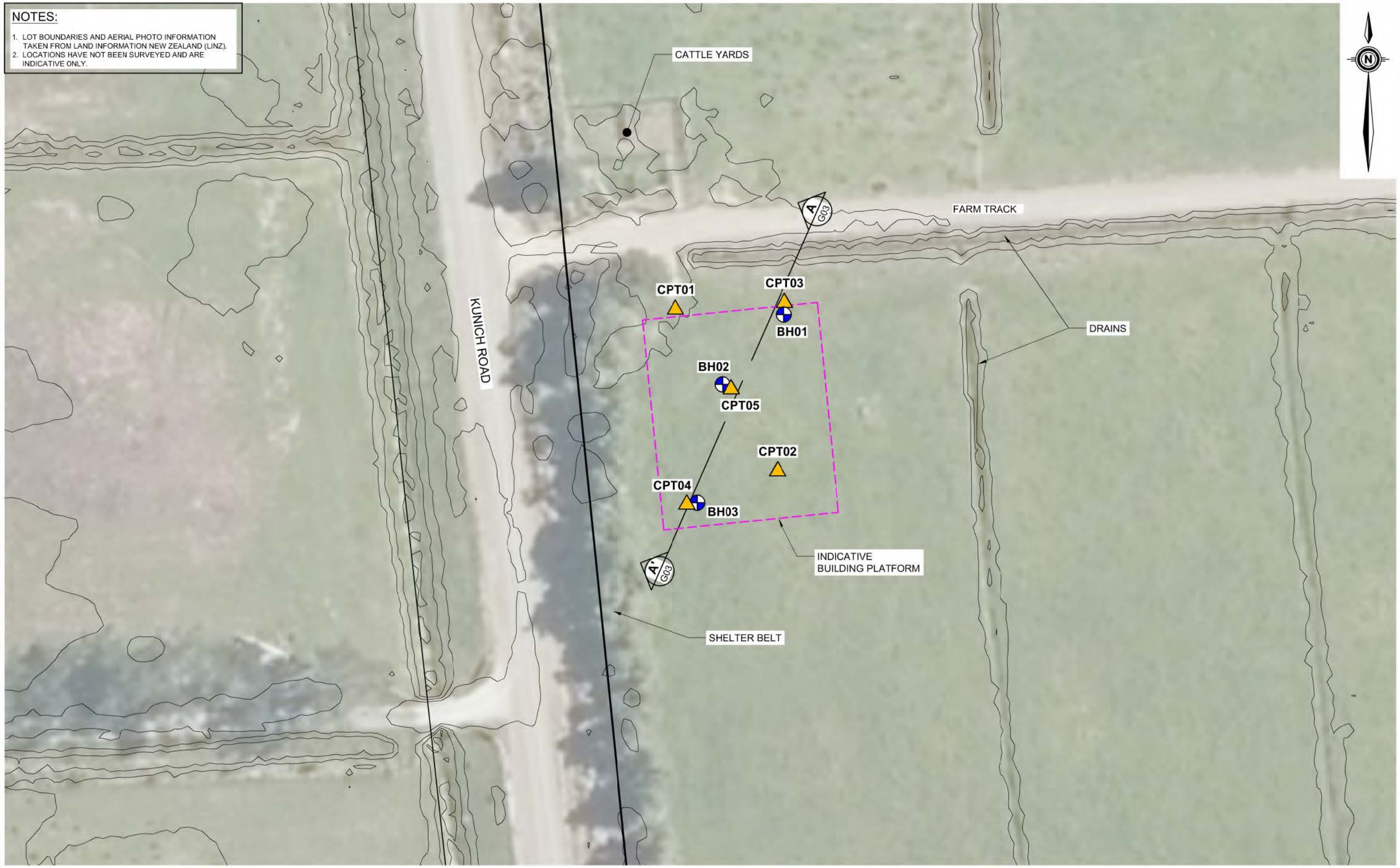
DWG No. **G01**

Sheet No. **1** of **3**

Plotted By Josh Curreen at 15/08/2024 3:37:31 pm

NOTES:

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



Issue	Date	Revision
A	7/08/2024	FIRST ISSUE

DWG: Site Investigations Location Plan

Scale 1:250 @A3 | Date AUG 2024

Drawn JMC | Checked WT | Approved JP

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Client: West Road Farms Ltd.

Project No. 24 118 | RC no. N/A

DWG No. G02

Sheet No. 2 of 3

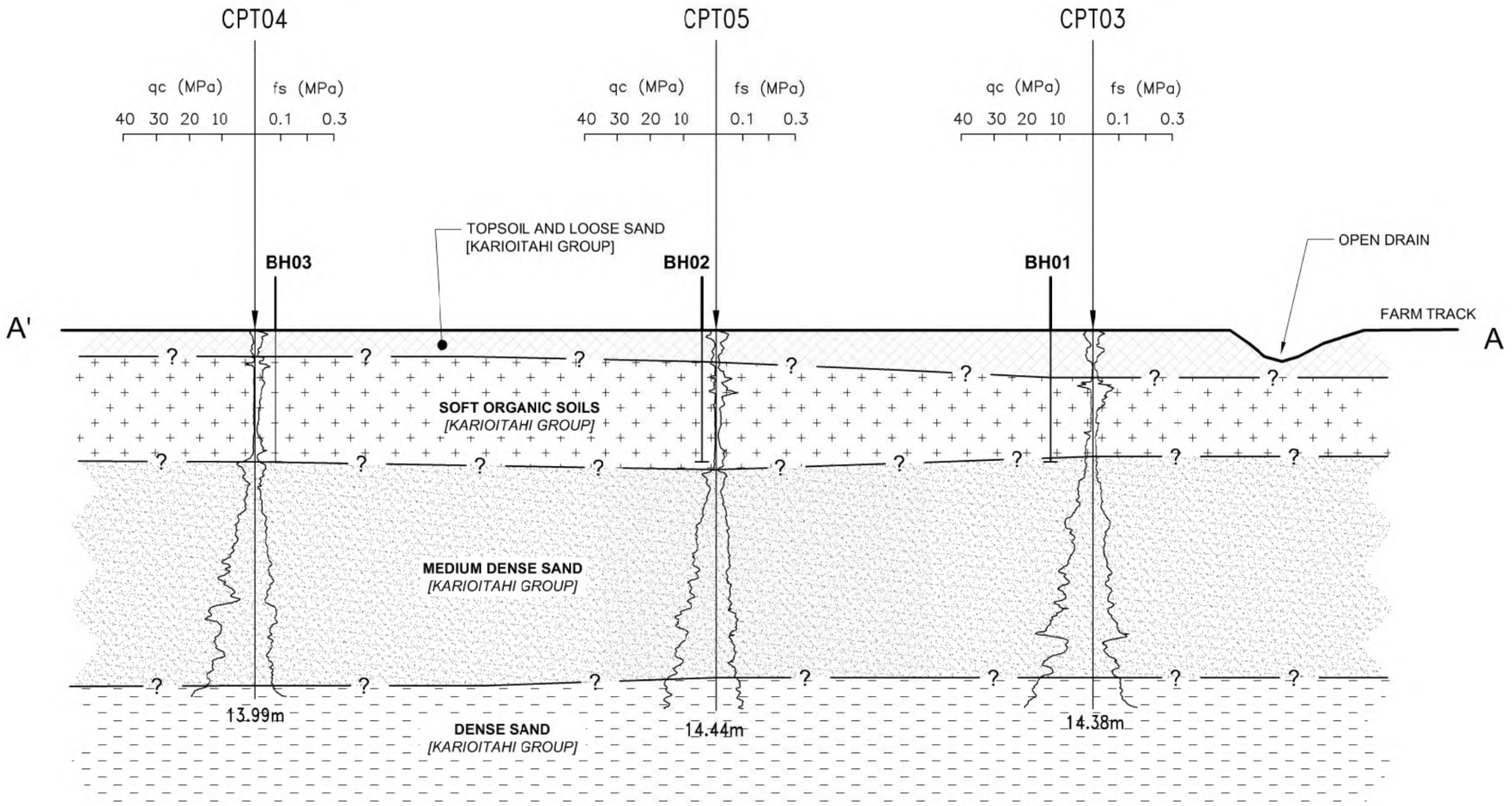
Plotted By Josh Curreen at 15/08/2024 3:38:25 pm

NOTES:

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

KEY:

- **LOOSE SAND** *[KARIOITAHI GROUP]*
- **SOFT ORGANIC SOILS** *[KARIOITAHI GROUP]*
- **MEDIUM DENSE SAND** *[KARIOITAHI GROUP]*
- **DENSE SAND** *[KARIOITAHI GROUP]*



Issue	Date	Revision
A	7/08/2024	FIRST ISSUE

DWG: Geological Cross Section A-A'

Scale 1:200 @A3 | Date AUG 2024 | Drawn JMC | Checked WT | Approved JP

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Project: Geotechnical Investigation
81 Kunicch Road, Sweetvater, Awanui(Lot 1, Deposited Plan 23280)

Client: West Road Farms Ltd.

Project No. 24 118 | RC no. N/A

DWG No. **G03**

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

Plotted By Josh Curreen at 15/08/2024 3:38:44 pm

Appendix B – Hand Auger Logs

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Borehole Log - BH01

Hole Location: Refer to Site Plan

JOB No. 24 118

CLIENT:	West Road Farms Ltd.	**SITE:**	81 Kunicich Road, Sweetwater, Awanui (Lot 1, Deposited Plan 23280)		
Date Started:	26/06/2024	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	JMC
Date Completed:	26/06/2024	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

Sandy TOPSOIL; dark brown. Wet, no plasticity. Rootlets. [*TOPSOIL*]

Fine SAND, some peat; light brown and black. Loose, wet no plasticity. [*KARIOITAHI GROUP*]

0.6m: becomes some fibrous material.

Sandy SILT, trace clay; light brown. Saturated, low plasticity.

Fine SAND; light brown. Loose, saturated, no plasticity, Poor recovery.

Amorphous PEAT; dark brown. Saturated, no plasticity.

2.1m: becomes black. Very poor recovery and hole collapsing.

4.8m: becoming harder to drill, feels sandy but no recovered material.

End of hole 5.0mbgl (Target Depth)

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

Geology: TS; KARIOITAHI GROUP

Graphic Log

Water Level: Groundwater at 0.7mbgl

Sensitivity: 14; 4

Vane Shear and Remoulded Vane Shear Strengths (kPa): 112; 8; 64; 16

Unable to test below 2.0mbgl due to hole collapse.

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

LEGEND

TOPSOIL | CLAY | SILT | SAND | PEAT | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable To Penetrate. T.S. = Topsoil.
Scala penetrometer testing not undertaken.
Hand Held Shear Vane S/N: 1617

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Borehole Log - BH02

Hole Location: Refer to Site Plan

JOB No. 24 118

CLIENT:	West Road Farms Ltd.	**SITE:**	81 Kunicich Road, Sweetwater, Awanui (Lot 1, Deposited Plan 23280)		
Date Started:	26/06/2024	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	JMC
Date Completed:	26/06/2024	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

Sandy TOPSOIL; dark brown. Loose, moist. Trace rootlets.
[*TOPSOIL*]

Fine SAND; brown. Loose, wet, no plasticity.
[*KARIOITAHI GROUP*]

Amorphous PEAT; black. Saturated.

Sandy SILT; light brown. Stiff, saturated, no plasticity.

1.1m: becomes bluish grey.

Amorphous PEAT; black. Saturated. Occasional fibrous organic material.

From 1.6m: very poor recovery.

From 3.0m: hole collapsing.

End of hole 5.0mbgl (Target Depth)

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

Geology: TS; KARIOITAHI GROUP

Groundwater at 0.5mbgl

Sensitivity	Vane Shear (kPa)	Remoulded Vane Shear (kPa)
4	77	19
8	189	22
5	42	8
3	32	10
3	56	19
6	48	8

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

Unable to test below 3.0mbgl due to hole collapse.

LEGEND

TOPSOIL | CLAY | SILT | SAND | PEAT | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable To Penetrate. T.S. = Topsoil.
Scala penetrometer testing not undertaken.
Hand Held Shear Vane S/N: 1617

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Borehole Log - BH03

Hole Location: Refer to Site Plan

JOB No. 24 118

CLIENT:	West Road Farms Ltd.	**SITE:**	81 Kunicich Road, Sweetwater, Awanui (Lot 1, Deposited Plan 23280)		
Date Started:	26/06/2024	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	JMC
Date Completed:	26/06/2024	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description

Based on NZGS Logging Guidelines 2005

Sandy TOPSOIL; dark brown. Loose, moist. Trace rootlets.
[*TOPSOIL*]

Fine SAND; brown, mottled light orangish brown.
[*KARIOITAHI GROUP*]
0.4m: trace tree gum.

Silty SAND; light brown. Saturated. Dilatent.

Amorphous PEAT; black. Saturated. Occasional fibrous organic material.

From 2.0m: very poor recovery and hole collapse.

End of hole 5.0mbgl (Target Depth)

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

Geology: TS; KARIOITAHI GROUP

Graphic Log

Water Level: Groundwater at 0.5mbgl

Sensitivity: 6, 5, 3

Vane Shear and Remoulded Vane Shear Strengths (kPa): 56, 10; 32, 6; 10, 3

Unable to test below 2.0mbgl due to hole collapse.

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

LEGEND

TOPSOIL | CLAY | SILT | SAND | PEAT | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable To Penetrate. T.S. = Topsoil.
Scala penetrometer testing not undertaken.
Hand Held Shear Vane S/N: 1617

Appendix C – CPT Soundings

Underground Investigation Ltd
Cone Penetration Testing
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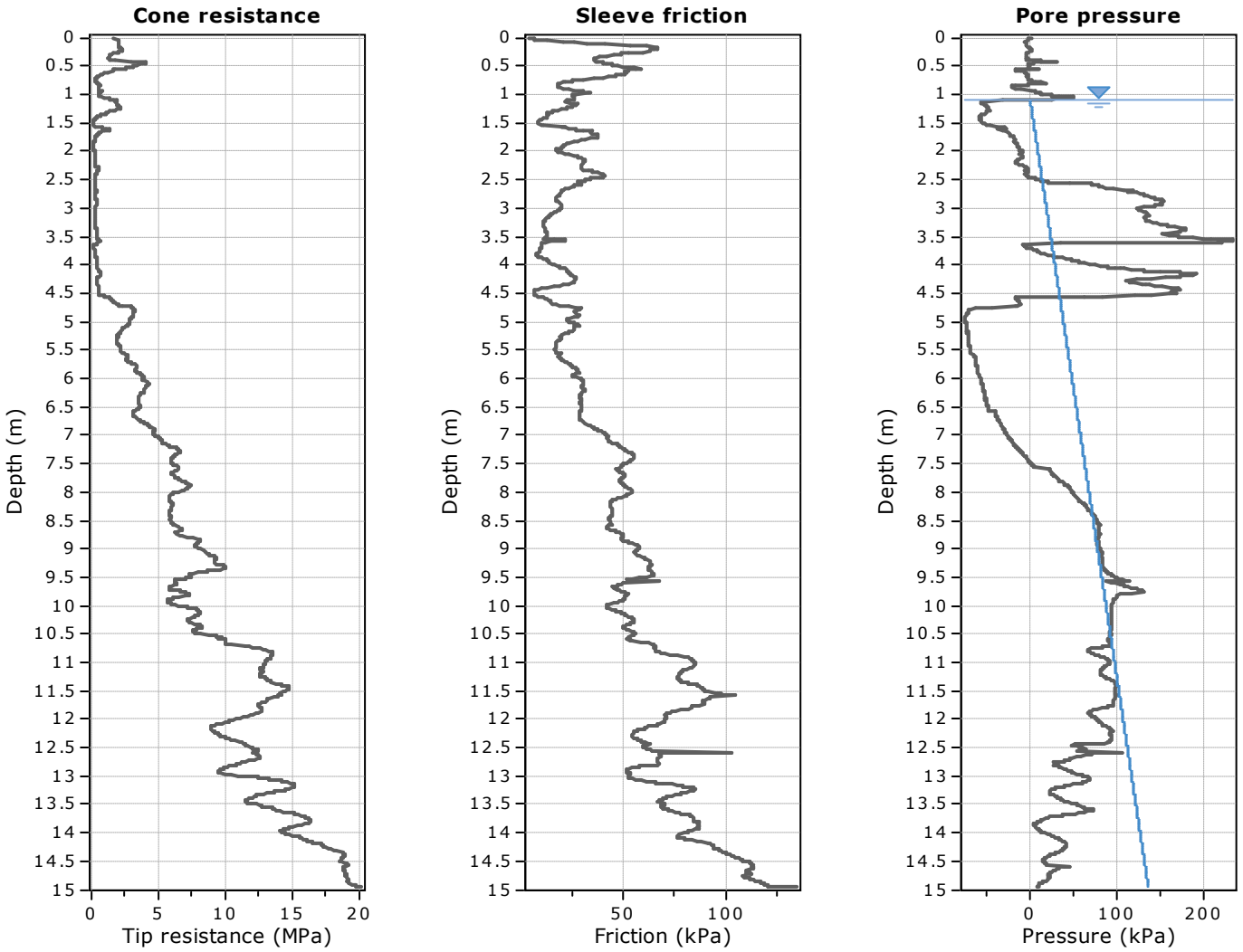
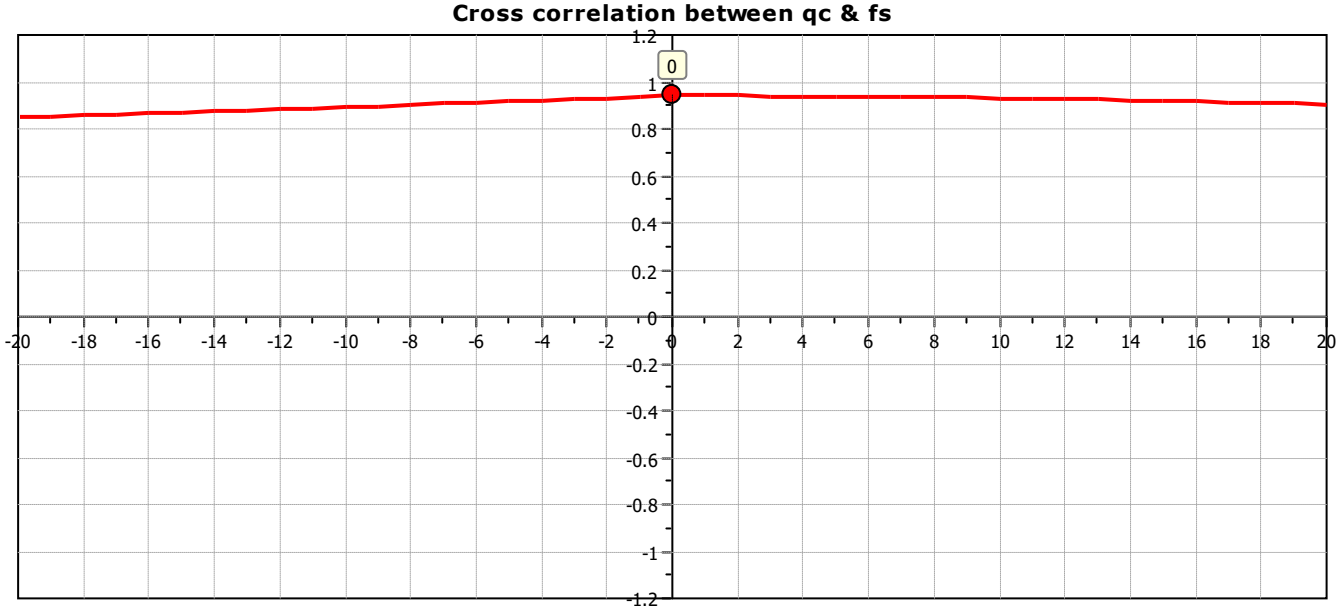
Project: **West Road Farms Ltd** **CPT: CPT01**

Location: **81 Kunicich Road, Awanui** Total depth: 14.95 m, Date: 28/06/2024



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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Cone Penetration Testing
craig@undergroundinvestigation.co.nz
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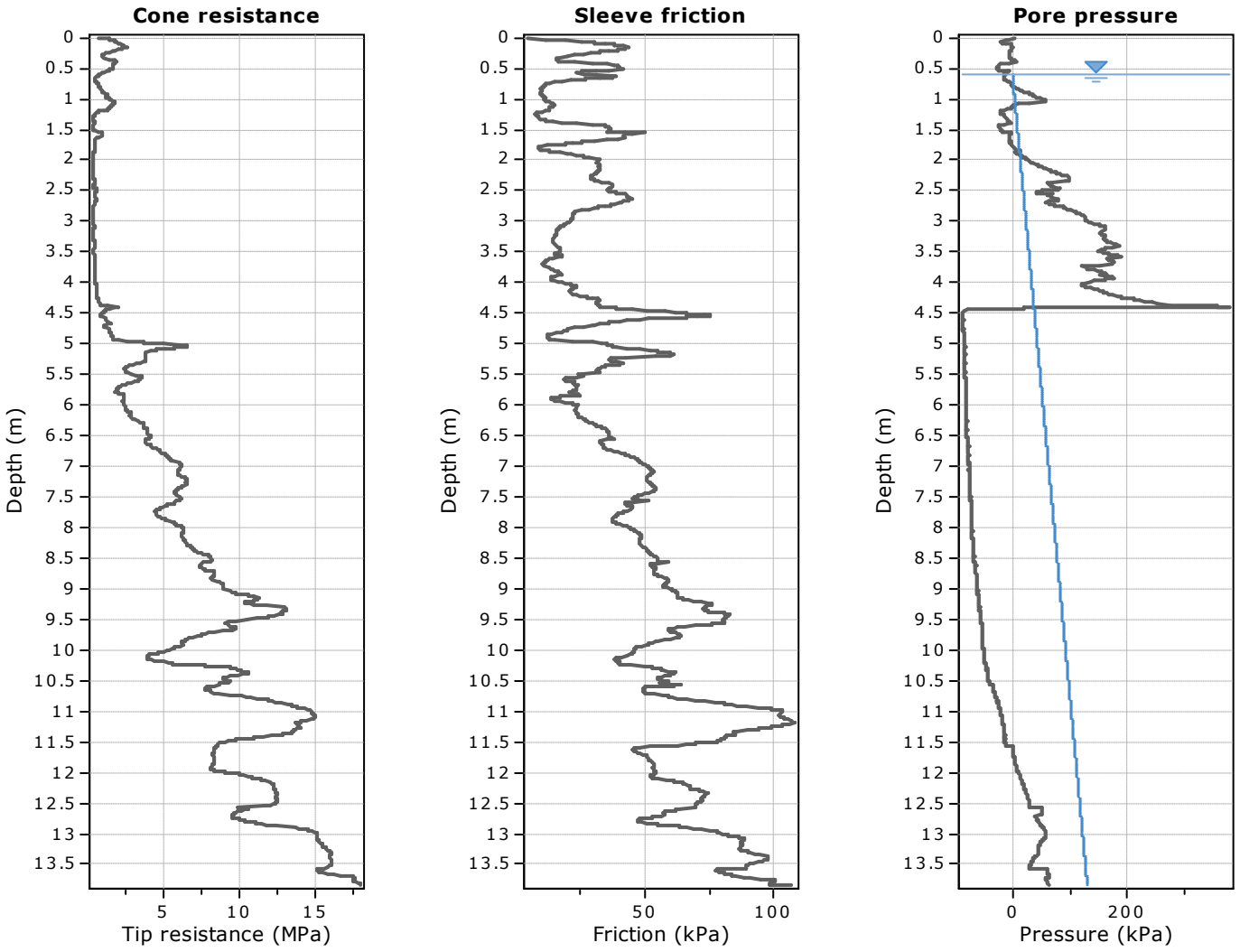
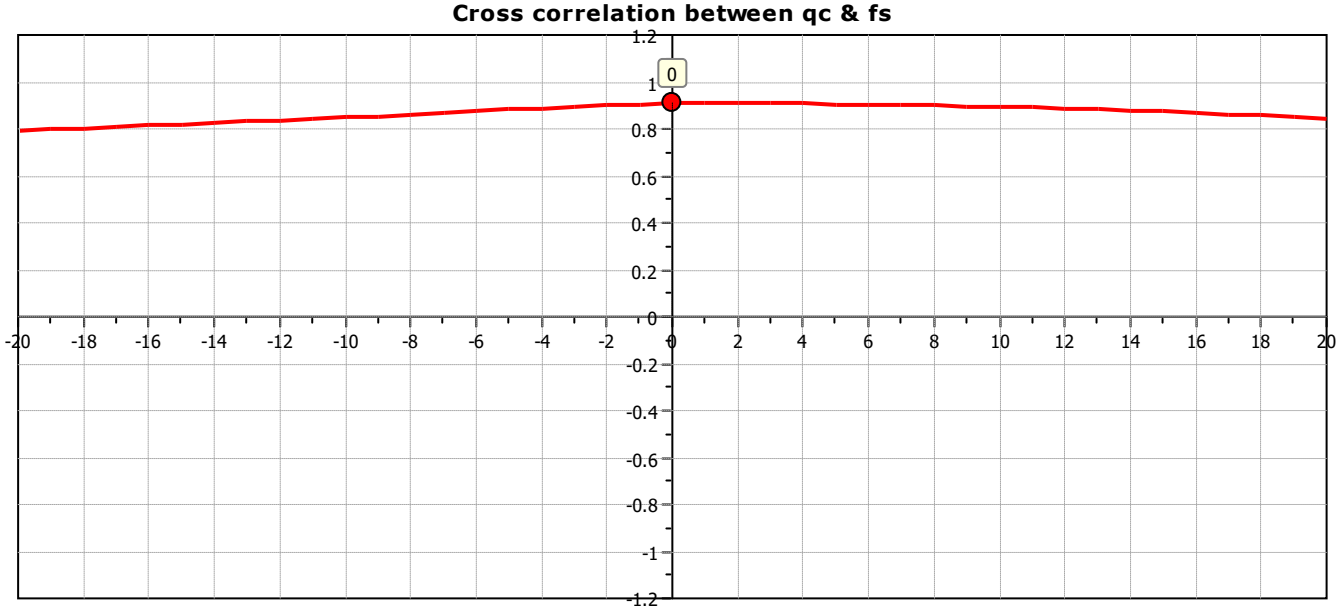
Project: **West Road Farms Ltd** **CPT: CPT02**

Location: **81 Kunicich Road, Awanui** Total depth: 13.84 m, Date: 28/06/2024



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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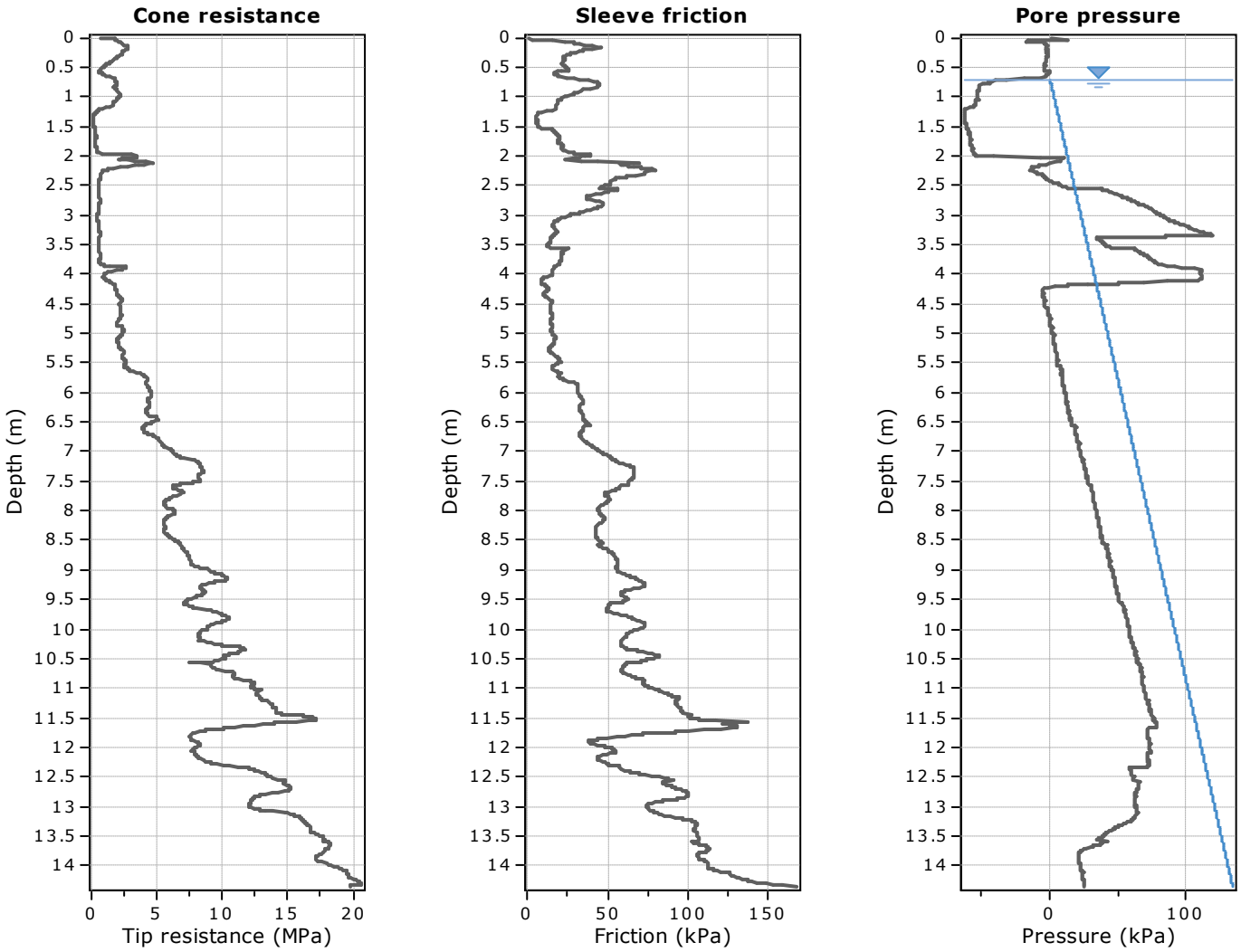
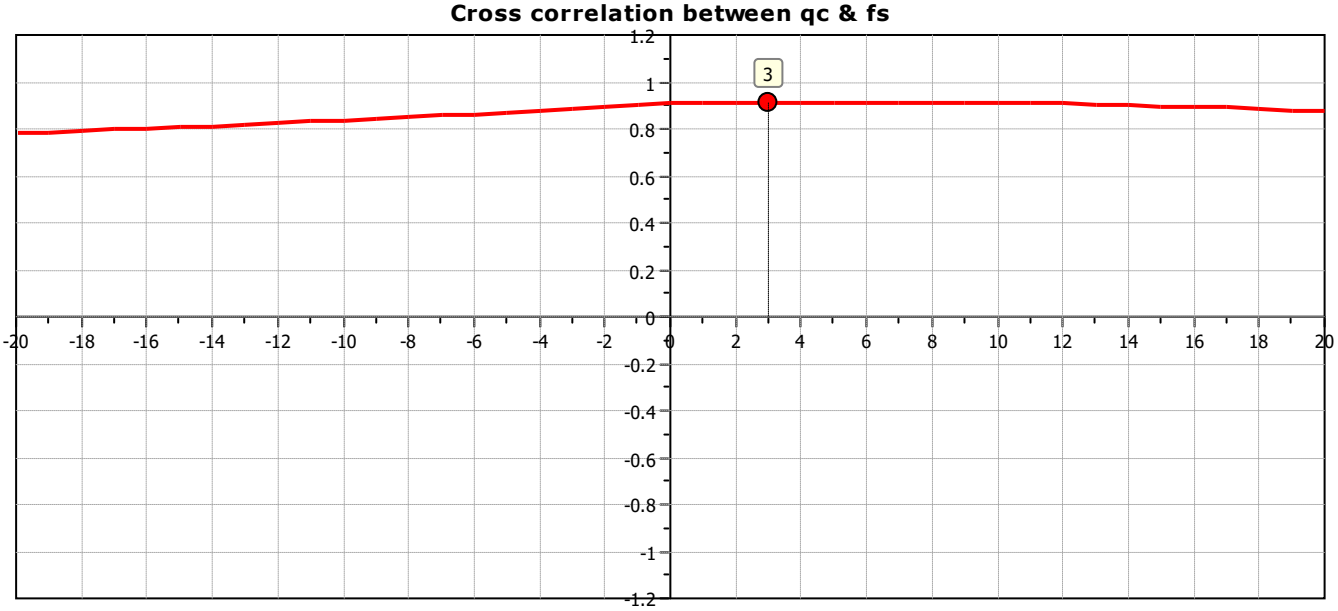
Project: **West Road Farms Ltd**
Location: **81 Kunicich Road, Awanui**

CPT: CPT 03
Total depth: 14.36 m, Date: 28/06/2024



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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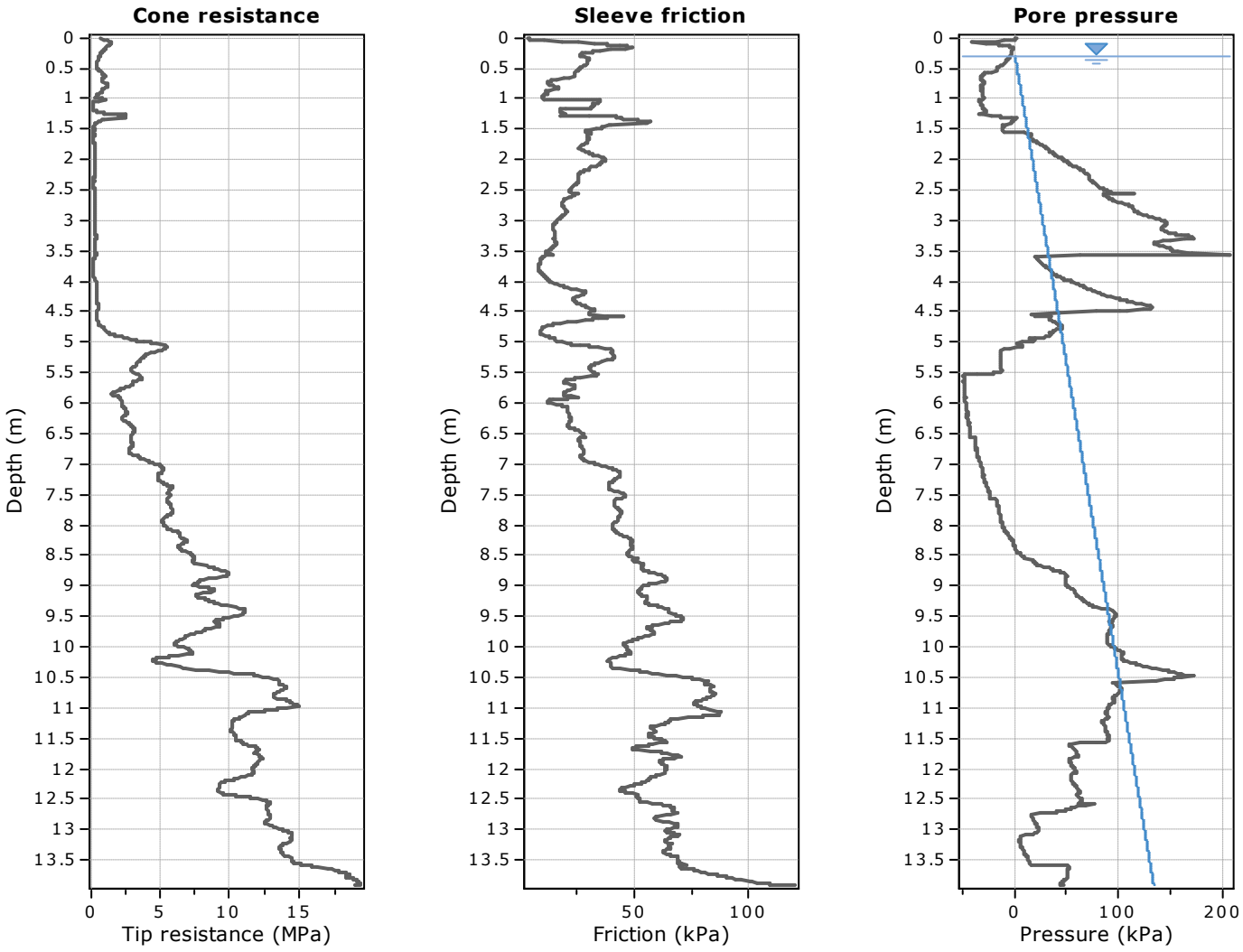
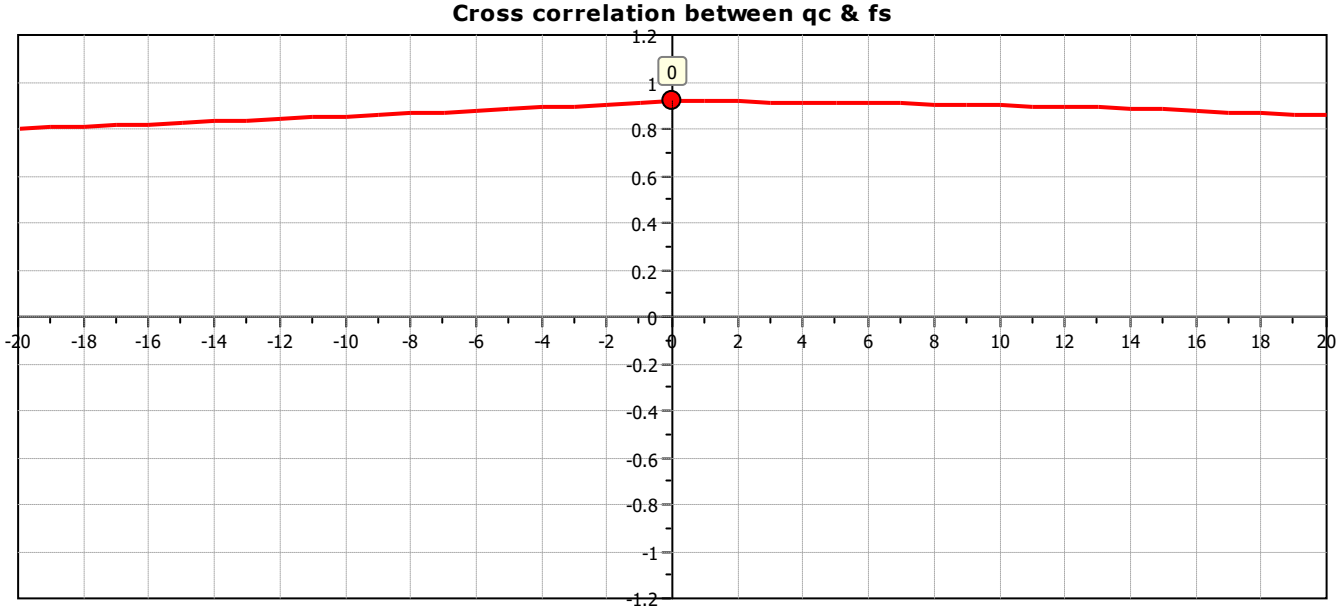
Project: **West Road Farms Ltd** **CPT: CPT04**

Location: **81 Kunicich Road, Awanui** Total depth: 13.91 m, Date: 28/06/2024



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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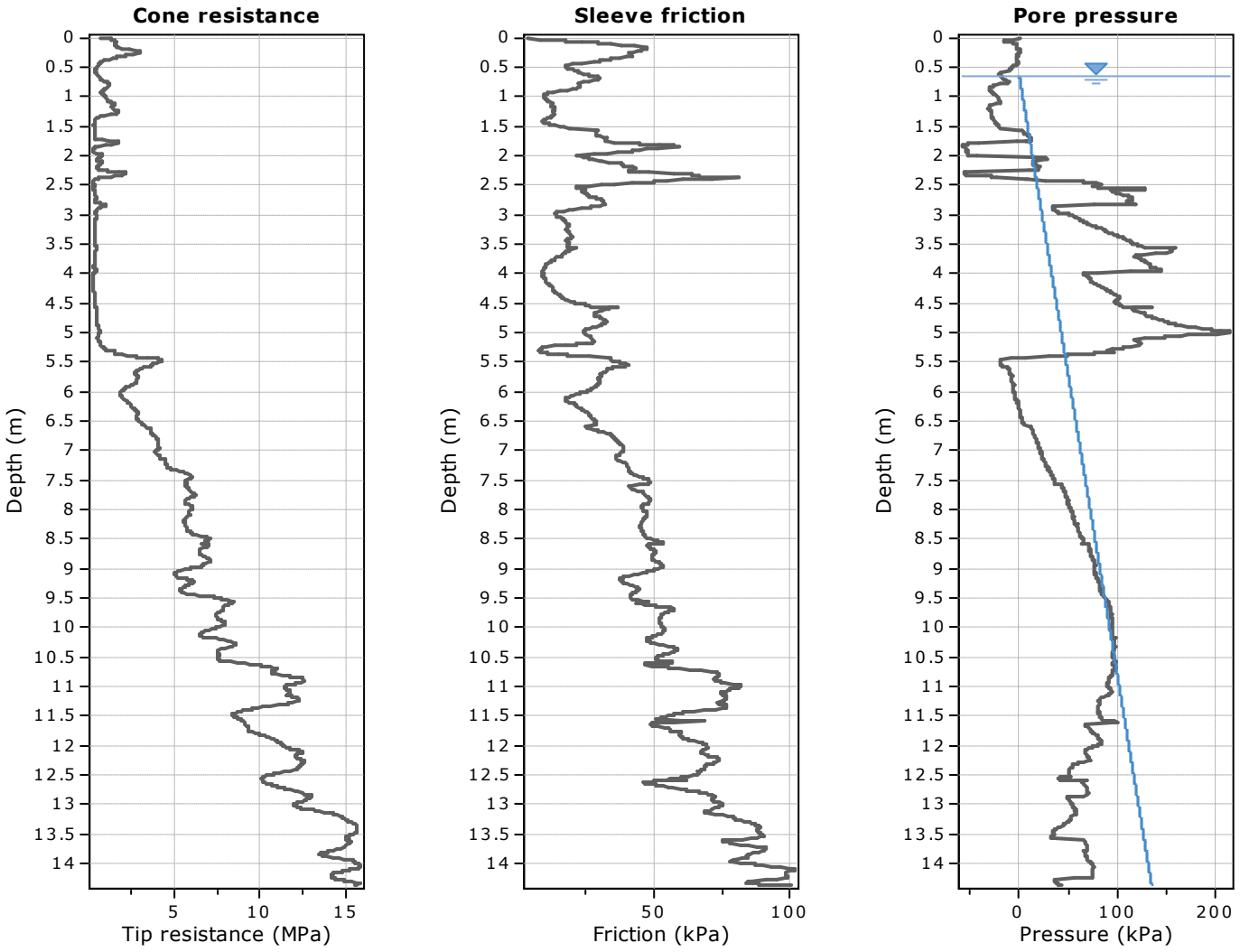
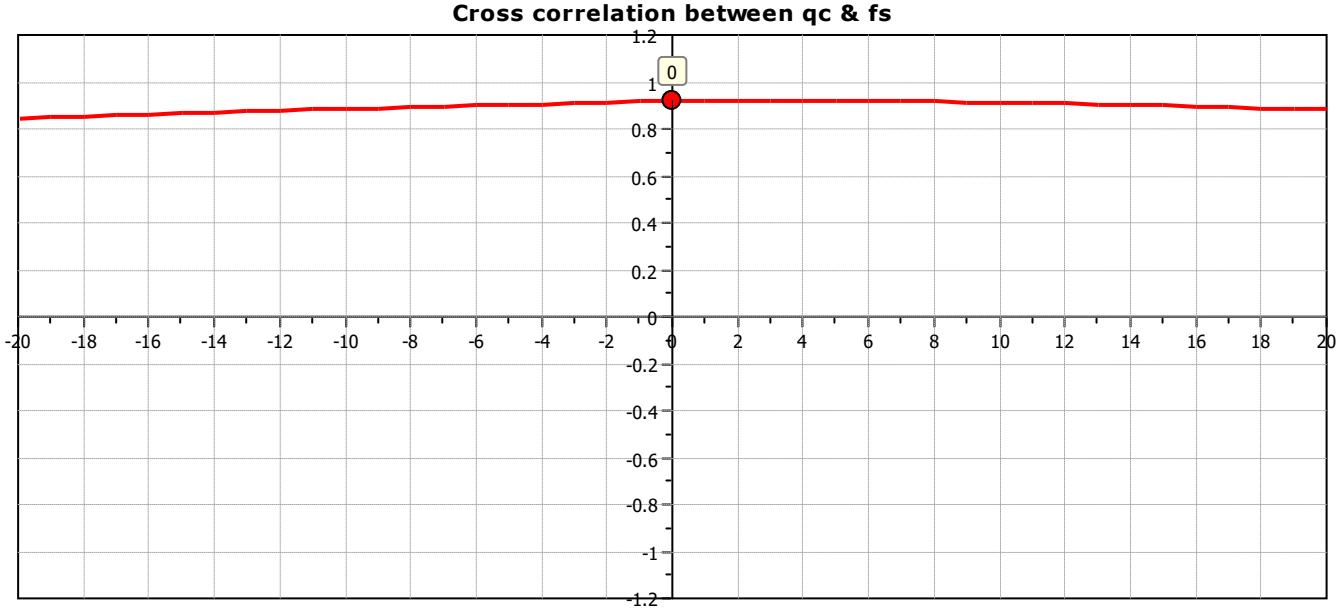
Project: **West Road Farms Ltd**
Location: **81 Kunicich Road, Awanui**

CPT: CPT05
Total depth: 14.37 m, Date: 28/06/2024



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).



CPT Client Engagement / Quote Request

Project Details		Date	26/06/2024
Project Name	Proposed Development	Job Identifier	HW 31 Kunicich Rd Awanui
Project Address	31 Kunicish Rd, Awanui		
Engineering Consultant Company Name	Haigh Workman Ltd	Engineering Project Manager	Josh Cureen
Email		Mobile	
Client Name		Client Contact Details	

Test Requirements - CPT		Preferred Job Completion Date	
Target No of CPT Tests Required	5	Maximum Test Depth Required	Refusal
No of CPT Tests Required Through Pavement or Other Hard Surface		Type and Thickness of Hard Surface	
Other Requirements Outside Standard Greenfield Testing			

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

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

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

Any Other Site Requirements

UNDERGROUND INVESTIGATION

CPT Equipment Information

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

UNDERGROUND INVESTIGATION

CPT Test Information

Test Hole Number	CPT01	Job Identifier	HW 31 Kunicich Rd Awanui
Test Date	26/06/2024	Operator	Craig Greenfield
Cone Serial Number	5801	Battery Voltage Start	5.89
Cone Area Ratio	0.842	Start Recording	8:22:00 AM
Probe Radius	0.0179	Finish Recording	8:48:00 AM
Date of First Push Current Calibration	9/01/2024	Measured Ground Water Depth	1.1
Metres To Next Calibration	991	Total Penetration Depth (m)	15.017
Depth of Predrill	0	Test ended due to:	☐ High Tilt ☐ High Tip Pressure ☐ High Friction ☐ High Pore Pressure ☐ High Total load ☐ Danger of Rods Buckling ☐ Target Depth ☑ Anchor Failure
Depth at Start of Test	0		
Anchor Depth (Left)	1.5		
Anchor Depth (Right)	1.5		

Zero Value Change % FSO

	Point Resistance	Pore Pressure	Sleeve Friction
Zero Shift Since First Push Current Calibration	0.02%	0.03%	1.24%
End of test with tip loosened	0.08%	0.03%	0.76%

Dissipation Testing

Test No	Depth (m)	Duration (secs)	Comments

Notes and Comments

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

CPT Test Information

Test Hole Number	CPT02	Job Identifier	HW 31 Kunicich Rd Awanui
Test Date	26/06/2024	Operator	Craig Greenfield
Cone Serial Number	5845	Battery Voltage Start	5.84
Cone Area Ratio	0.85	Start Recording	9:23:00 AM
Probe Radius	0.0179	Finish Recording	9:48:00 AM
Date of First Push Current Calibration	13/03/2024	Measured Ground Water Depth	0.6
Metres To Next Calibration	1274	Total Penetration Depth (m)	13.86
Depth of Predrill	0	Test ended due to:	☐ High Tilt ☐ High Tip Pressure ☐ High Friction ☐ High Pore Pressure ☐ High Total load ☐ Danger of Rods Buckling ☐ Target Depth ☑ Anchor Failure
Depth at Start of Test	0		
Anchor Depth (Left)	1.5		
Anchor Depth (Right)	1.5		

Zero Value Change % FSO

	Point Resistance	Pore Pressure	Sleeve Friction
Zero Shift Since First Push Current Calibration	0.04%	0.08%	0.16%
End of test with tip loosened	0.09%	0.00%	0.94%

Dissipation Testing

Test No	Depth (m)	Duration (secs)	Comments

Notes and Comments

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

UNDERGROUND INVESTIGATION

CPT Test Information

Test Hole Number	CPT03	Job Identifier	HW 31 Kunicich Rd Awanui
Test Date	26/06/2024	Operator	Craig Greenfield
Cone Serial Number	5959	Battery Voltage Start	5.85
Cone Area Ratio		Start Recording	10:24:00 AM
Probe Radius	0.0179	Finish Recording	10:48:00 AM
Date of First Push Current Calibration	26/06/2024	Measured Ground Water Depth	0.7
Metres To Next Calibration	1500	Total Penetration Depth (m)	14.382
Depth of Predrill	0	Test ended due to:	☐ High Tilt ☐ High Tip Pressure ☐ High Friction ☐ High Pore Pressure ☐ High Total load ☐ Danger of Rods Buckling ☐ Target Depth ☑ Anchor Failure
Depth at Start of Test	0		
Anchor Depth (Left)	1.5		
Anchor Depth (Right)	1.5		

Zero Value Change % FSO

	Point Resistance	Pore Pressure	Sleeve Friction
Zero Shift Since First Push Current Calibration	0.00%	0.00%	0.00%
End of test with tip loosened	0.05%	0.02%	0.02%

Dissipation Testing

Test No	Depth (m)	Duration (secs)	Comments

Notes and Comments

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

Note - wrong calobration certificate supplied with new cone. Cone parameters entered into data aquasition software are incorrect. Problem was not identified until processing data.

CPT Test Information

Test Hole Number	CPT04	Job Identifier	HW 31 Kunicich Rd Awanui
Test Date	26/06/2024	Operator	Craig Greenfield
Cone Serial Number	5801	Battery Voltage Start	6.47
Cone Area Ratio	0.842	Start Recording	11:21:00 AM
Probe Radius	0.0179	Finish Recording	11:46:00 AM
Date of First Push Current Calibration	9/01/2024	Measured Ground Water Depth	0.3
Metres To Next Calibration	976	Total Penetration Depth (m)	13.99
Depth of Predrill	0	Test ended due to:	☐ High Tilt ☐ High Tip Pressure ☐ High Friction ☐ High Pore Pressure ☐ High Total load ☐ Danger of Rods Buckling ☐ Target Depth ☑ Anchor Failure
Depth at Start of Test	0		
Anchor Depth (Left)	1.5		
Anchor Depth (Right)	1.5		

Zero Value Change % FSO

	Point Resistance	Pore Pressure	Sleeve Friction
Zero Shift Since First Push Current Calibration	0.02%	0.06%	1.14%
End of test with tip loosened	0.07%	0.00%	0.72%

Dissipation Testing

Test No	Depth (m)	Duration (secs)	Comments

Notes and Comments

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

CPT Test Information

Test Hole Number	CPT05	Job Identifier	HW 31 Kunicich Rd Awanui
Test Date	26/06/2024	Operator	Craig Greenfield
Cone Serial Number	5845	Battery Voltage Start	6.35
Cone Area Ratio	0.85	Start Recording	12:49:00 PM
Probe Radius	0.0179	Finish Recording	1:13:00 PM
Date of First Push Current Calibration	13/03/2024	Measured Ground Water Depth	0.65
Metres To Next Calibration	1260	Total Penetration Depth (m)	14.445
Depth of Predrill	0	Test ended due to:	☐ High Tilt ☐ High Tip Pressure ☐ High Friction ☐ High Pore Pressure ☐ High Total load ☐ Danger of Rods Buckling ☐ Target Depth ☑ Anchor Failure
Depth at Start of Test	0		
Anchor Depth (Left)	1.5		
Anchor Depth (Right)	1.5		

Zero Value Change % FSO

	Point Resistance	Pore Pressure	Sleeve Friction
Zero Shift Since First Push Current Calibration	0.04%	0.06%	0.00%
End of test with tip loosened	0.06%	0.02%	0.82%

Dissipation Testing

Test No	Depth (m)	Duration (secs)	Comments

Notes and Comments

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

Appendix D – Liquefaction Analysis

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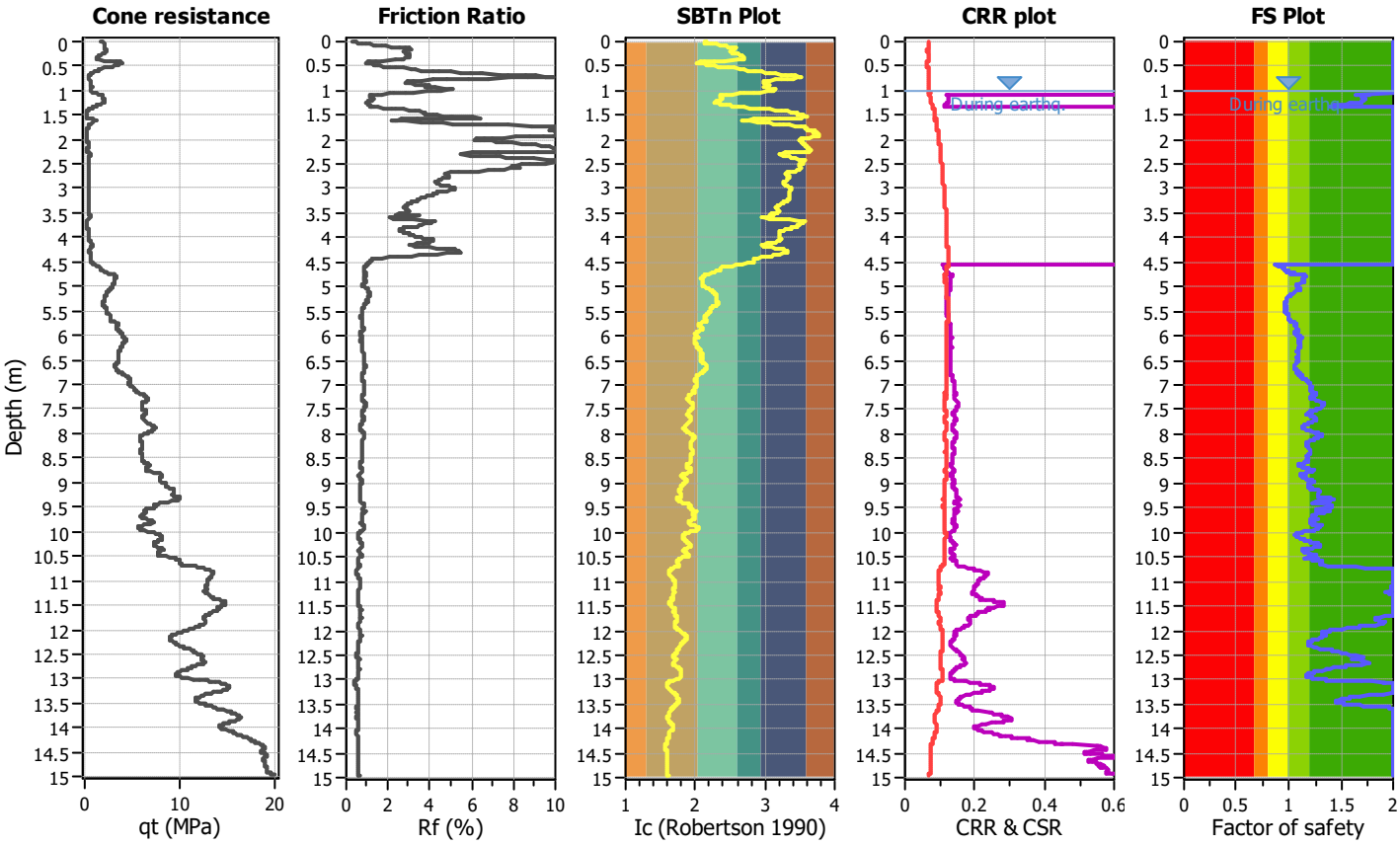
LIQUEFACTION ANALYSIS REPORT

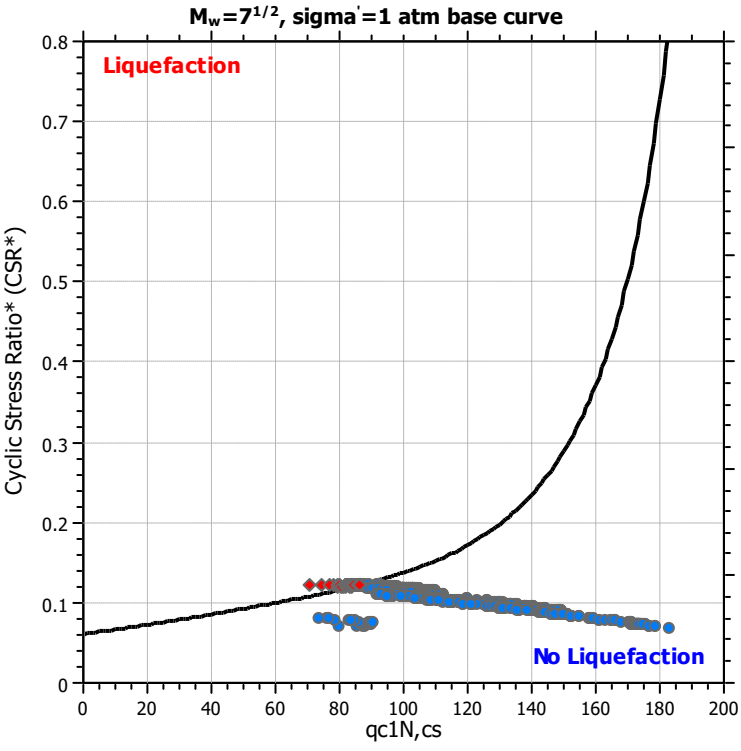
Project title : West Road Farms Ltd **Location : 81 Kunicich Road, Awanui**

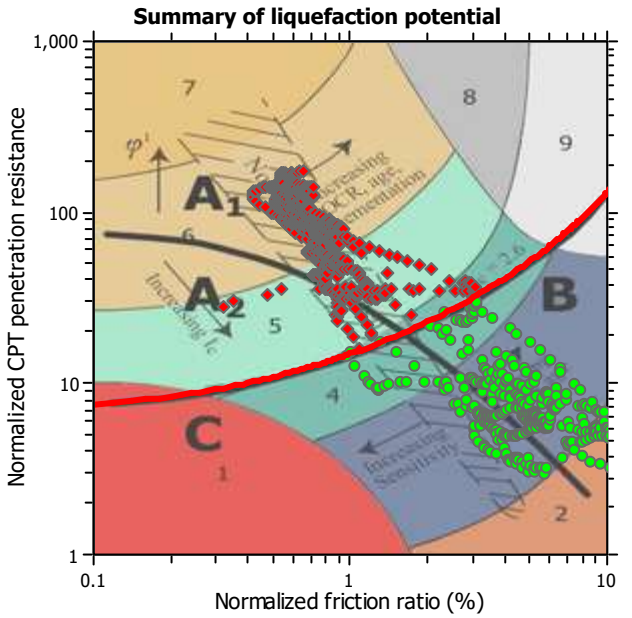
CPT file : CPT01_ULS

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.10 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	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
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

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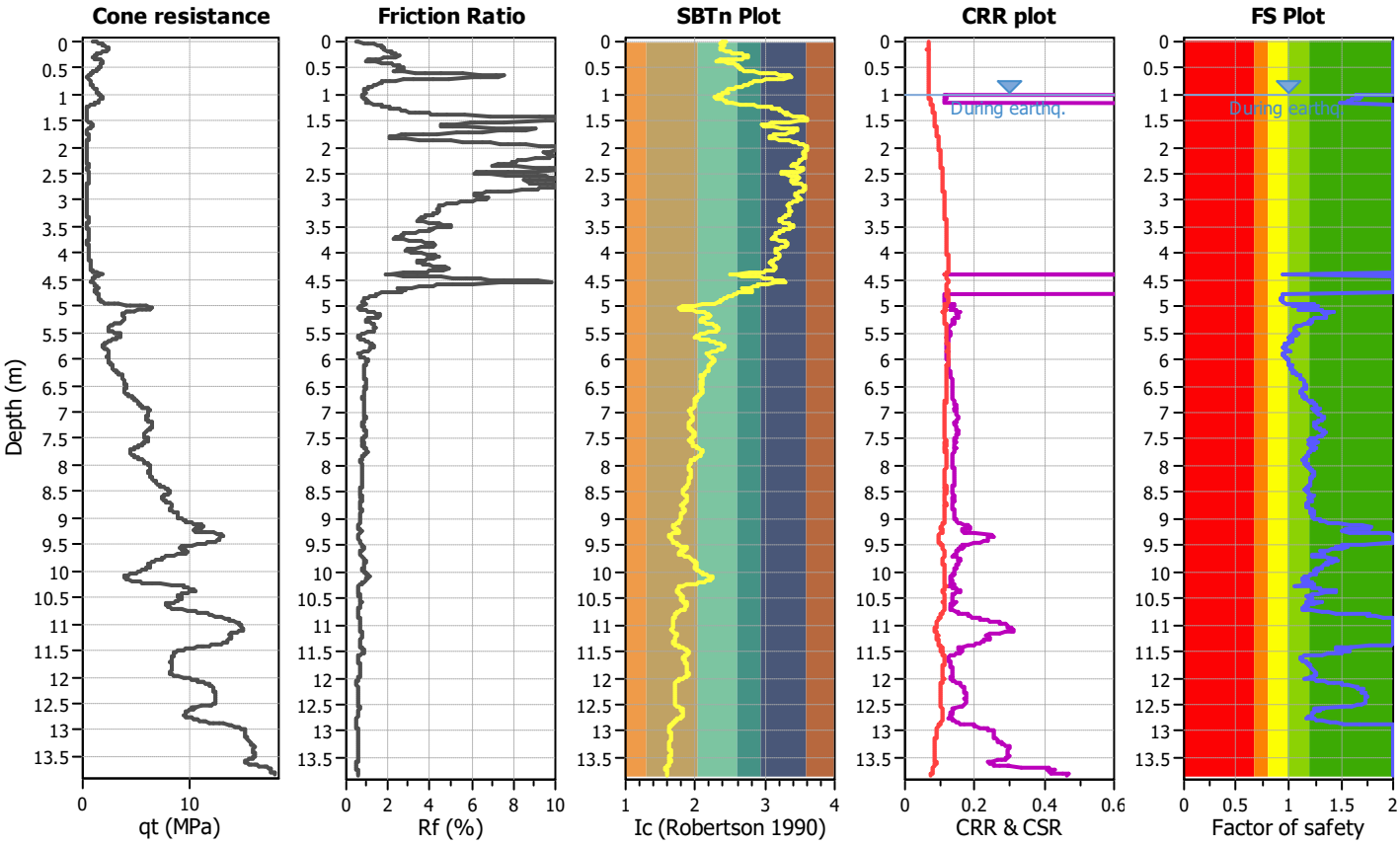
LIQUEFACTION ANALYSIS REPORT

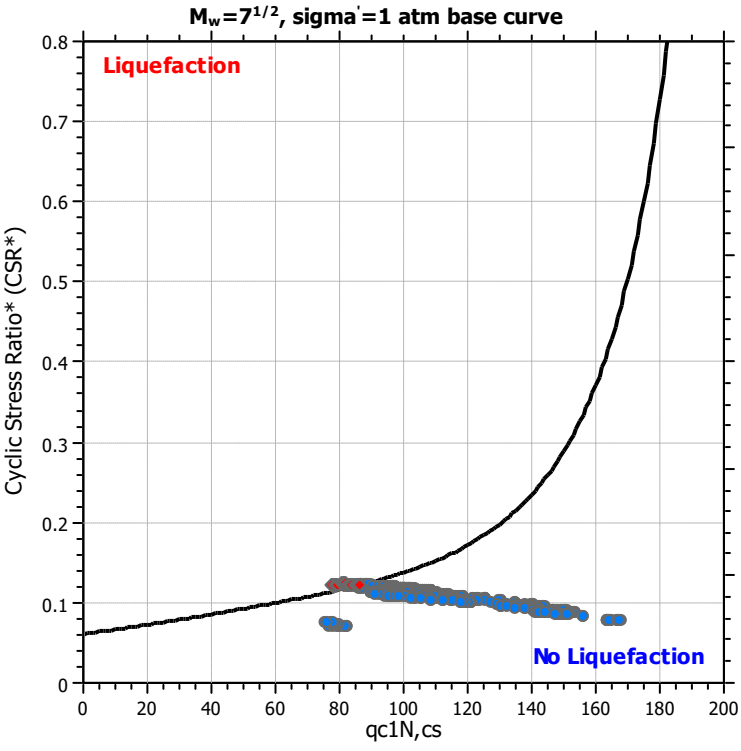
Project title : West Road Farms Ltd **Location : 81 Kunicich Road, Awanui**

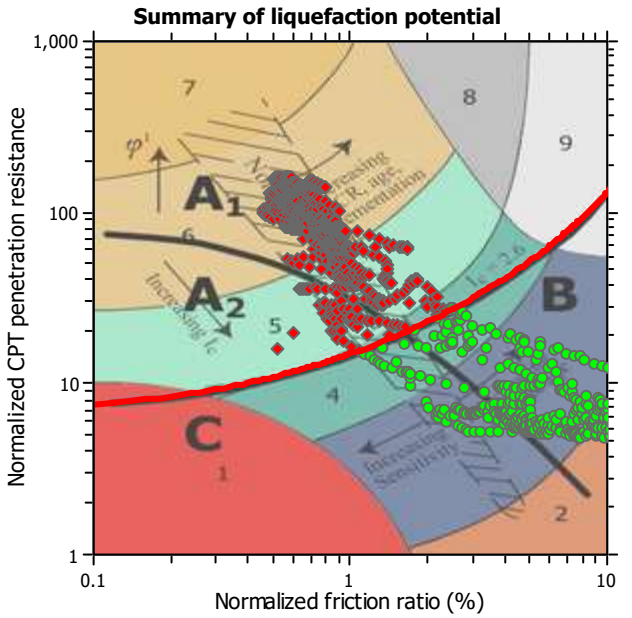
CPT file : CPT02__ULS

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.10 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	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
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

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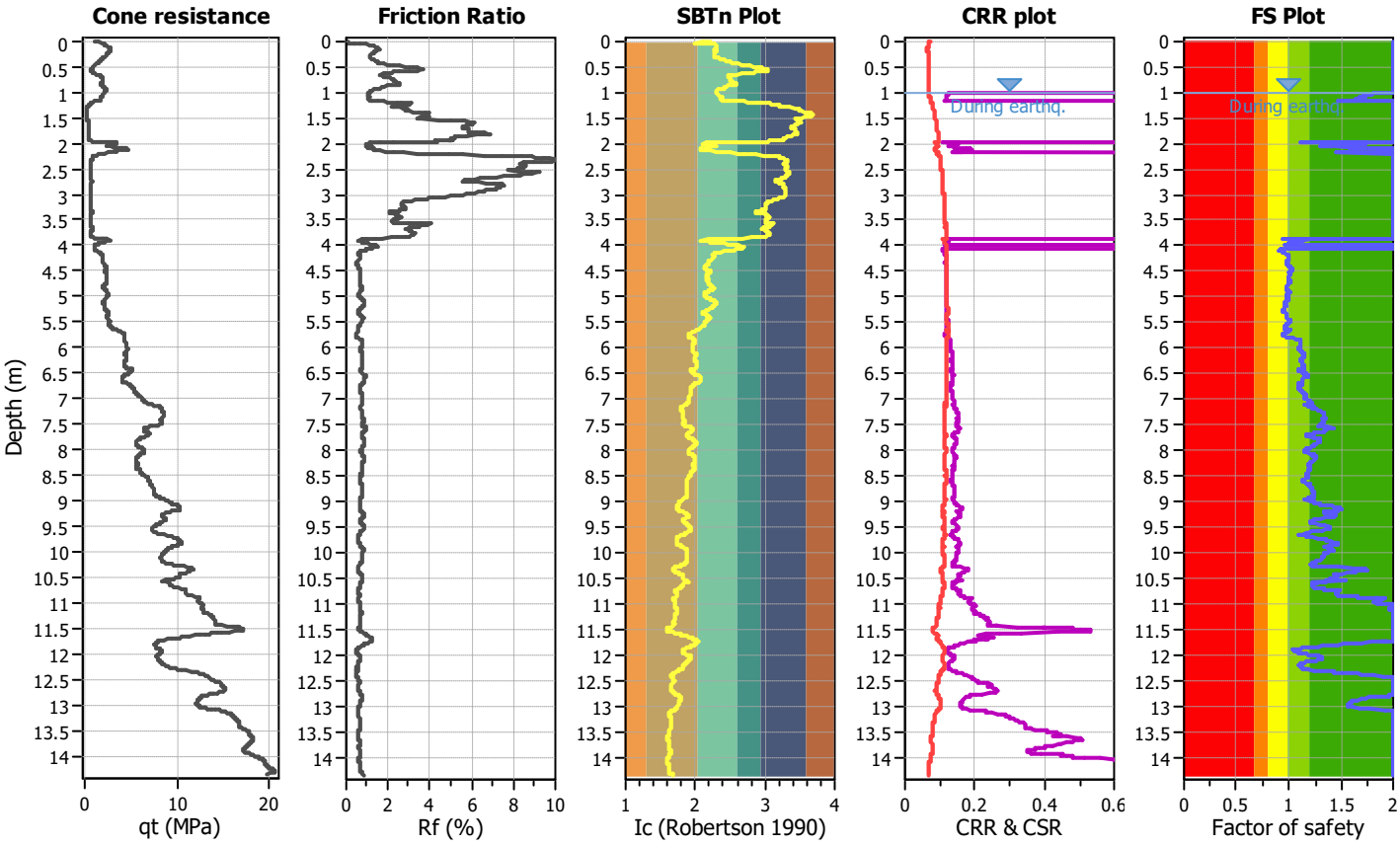
LIQUEFACTION ANALYSIS REPORT

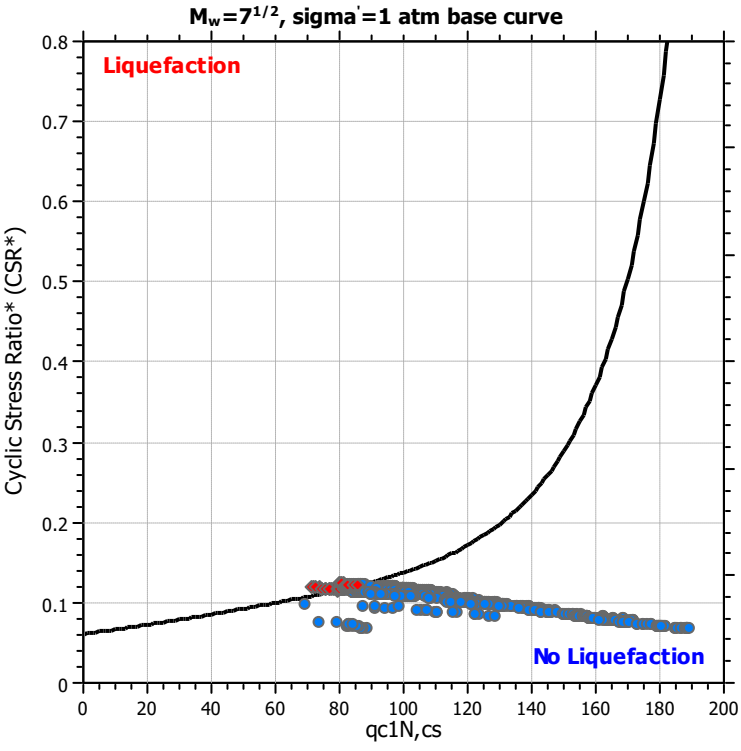
Project title : West Road Farms Ltd **Location : 81 Kunicich Road, Awanui**

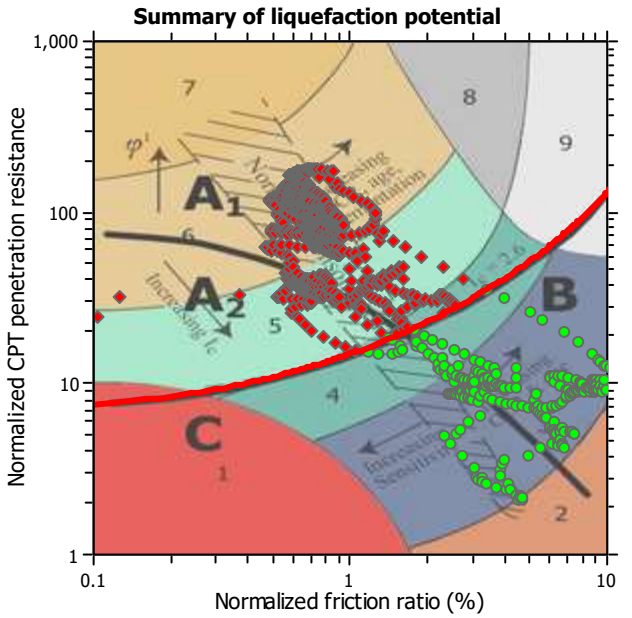
CPT file : CPT 03__ULS

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.10 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	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
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

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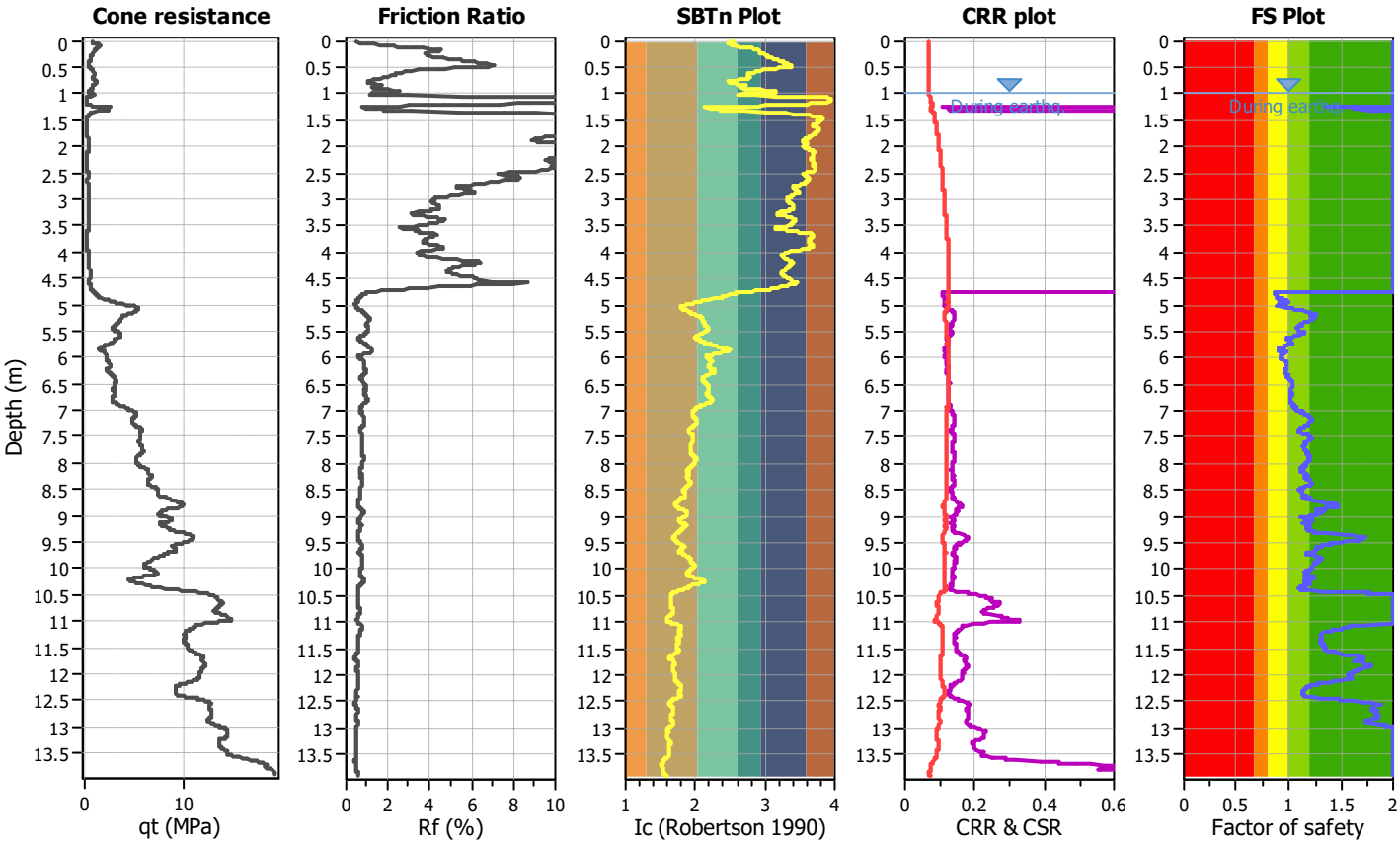
LIQUEFACTION ANALYSIS REPORT

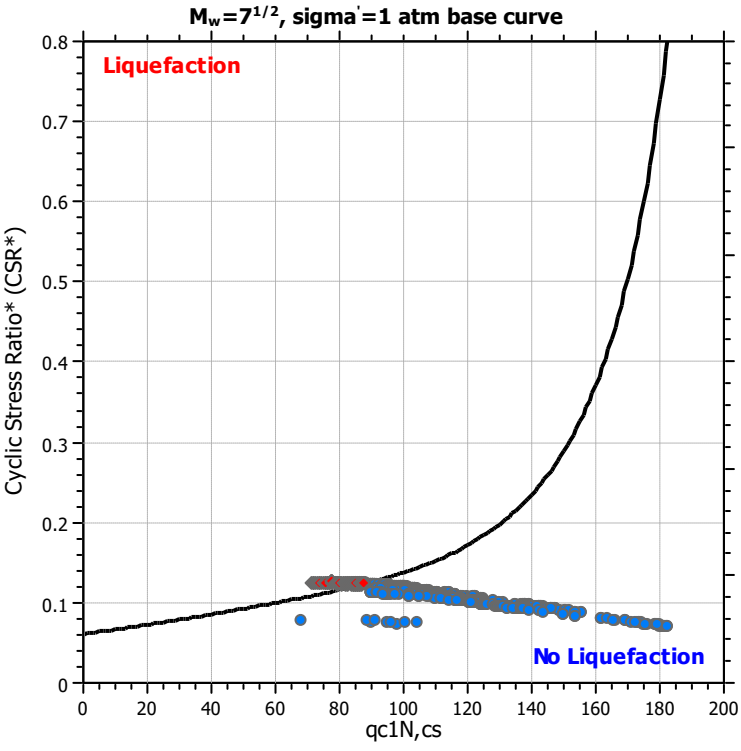
Project title : West Road Farms Ltd **Location : 81 Kunicich Road, Awanui**

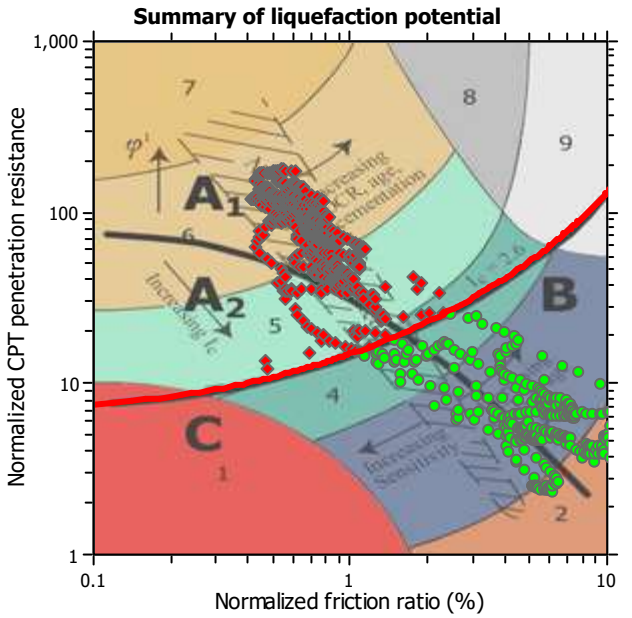
CPT file : CPT04__ULS

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.10 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	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
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

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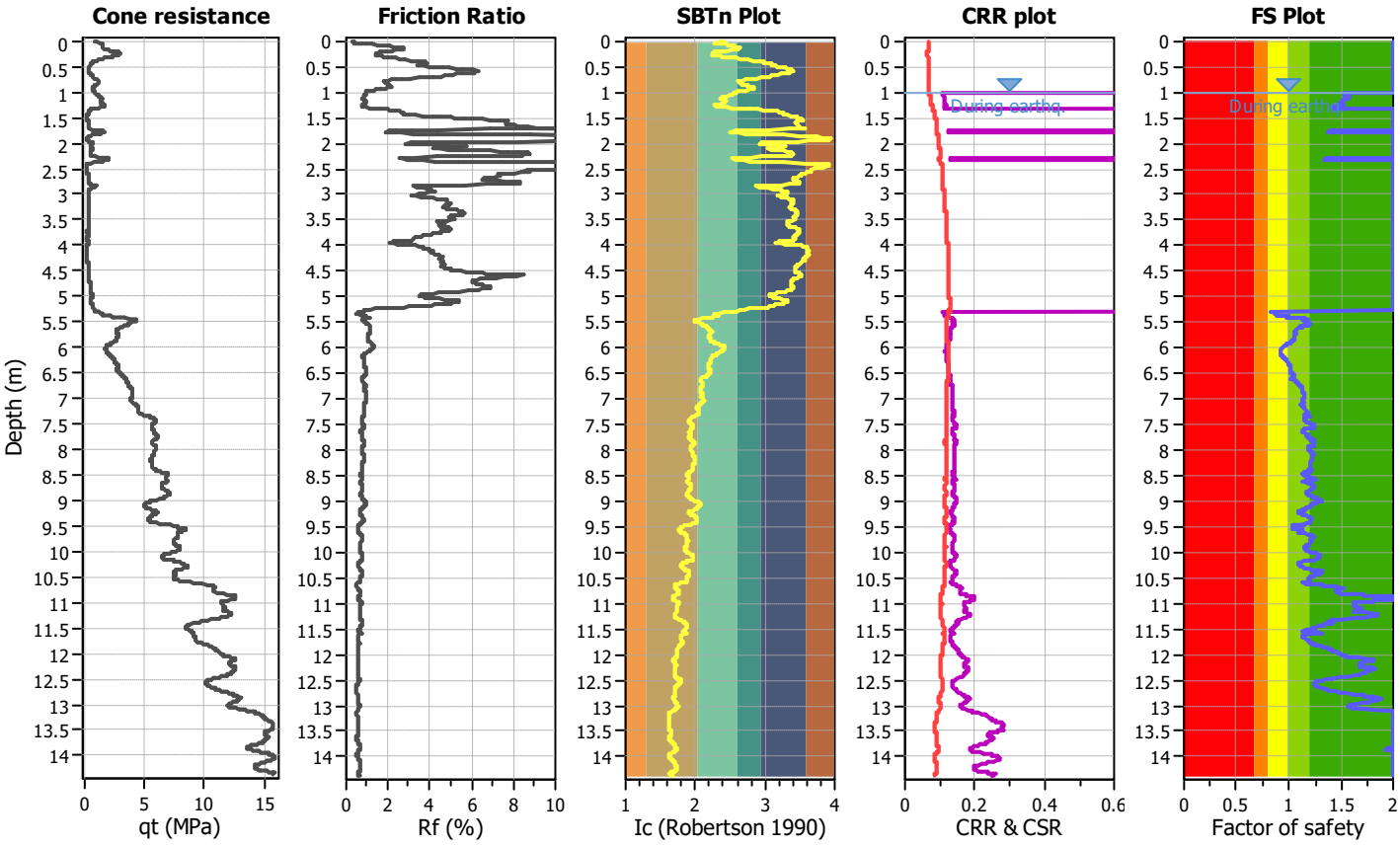
LIQUEFACTION ANALYSIS REPORT

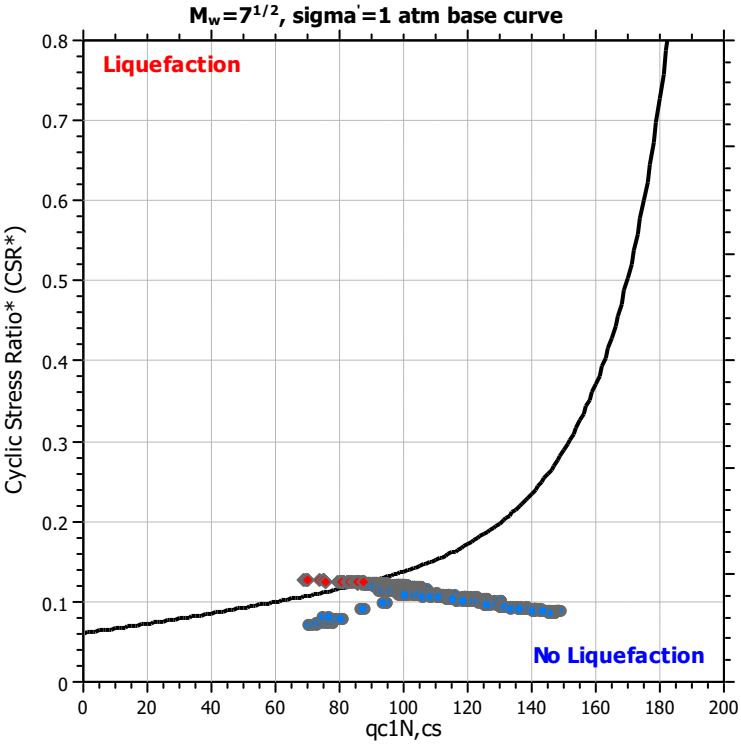
Project title : West Road Farms Ltd **Location : 81 Kunicich Road, Awanui**

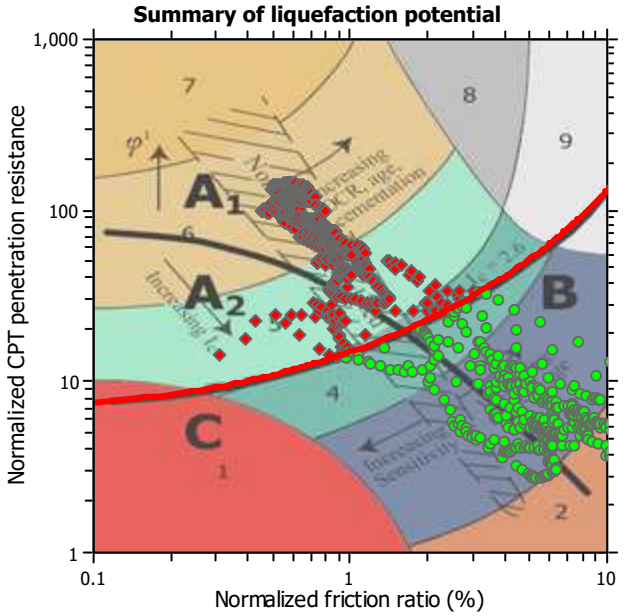
CPT file : CPT05__ULS

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.10 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	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
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
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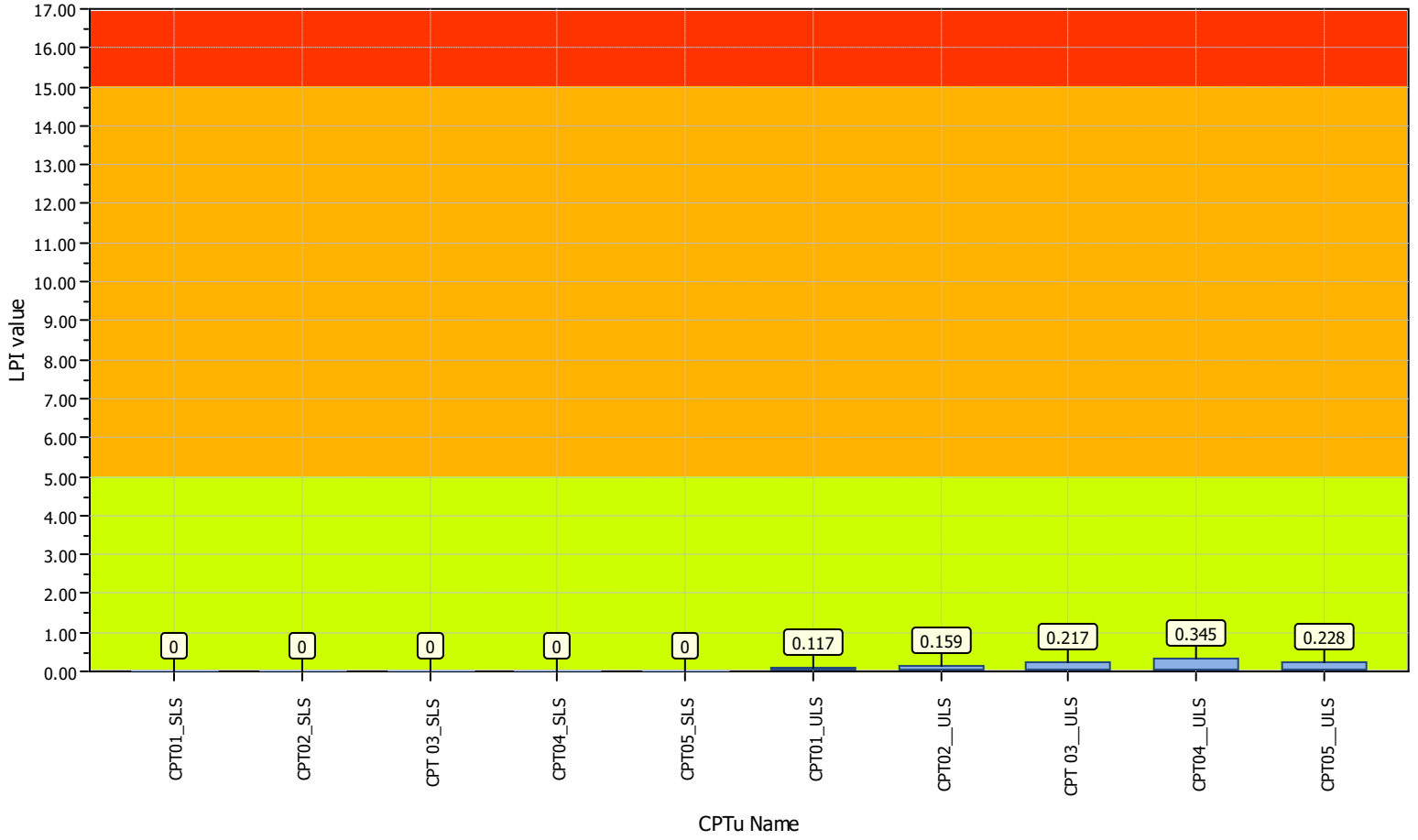
Project title : West Road Farms Ltd

Location : 81 Kunicich Road, Awanui

Overall Liquefaction Potential Index report



LPI color scheme

- Very high risk
- High risk
- Low risk

Basic statistics

Total CPT number: 10
100.00% low risk
0.00% high risk
0.00% very high risk

Underground Investigation Ltd
Cone Penetration Testing
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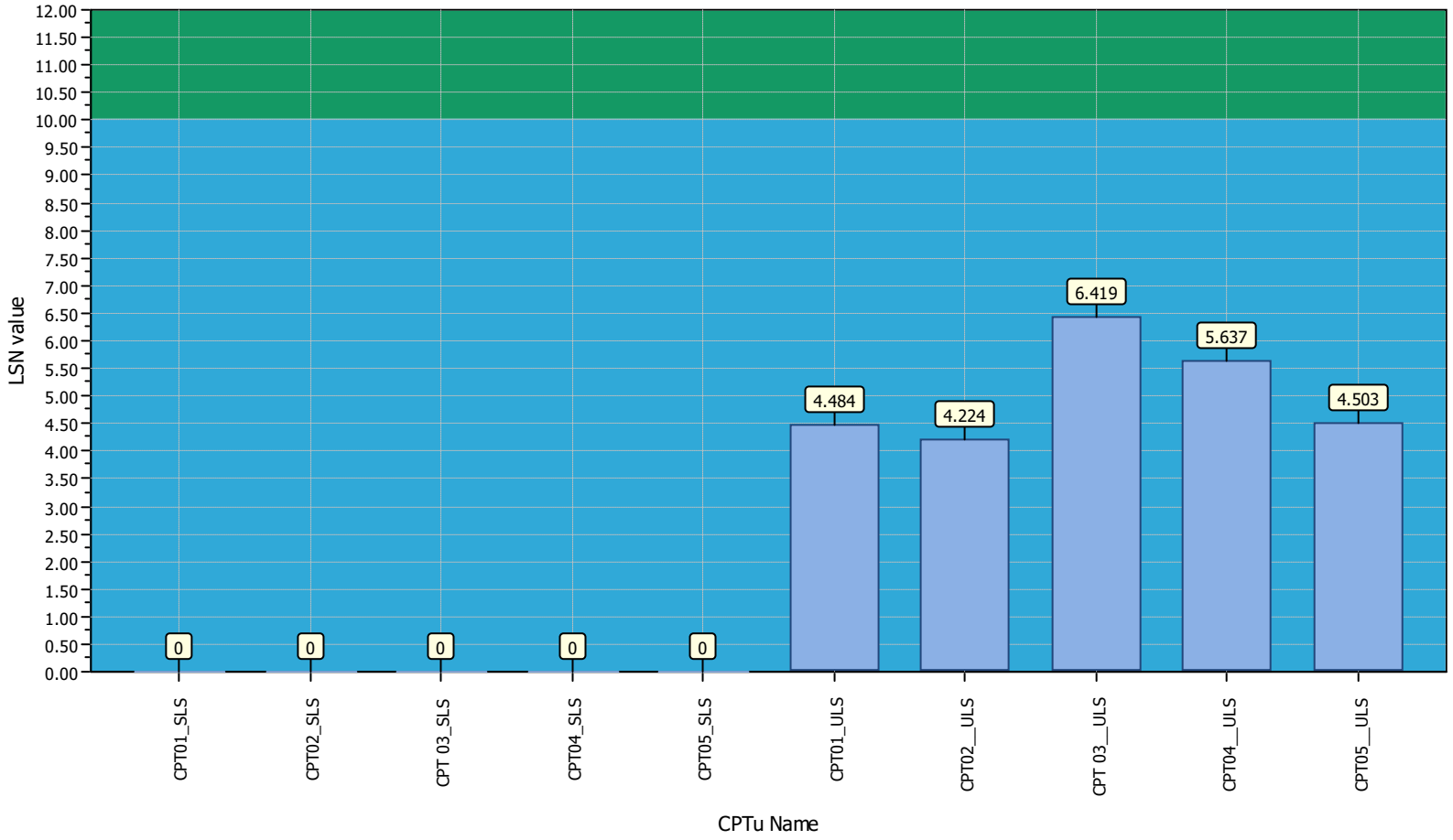
+64211473249

Project title : West Road Farms Ltd

Location : 81 Kunicich Road, Awanui

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: 10

100.00% little liquefaction

0.00% minnor liquefaction

0.00% moderate liquefaction

0.00% moderate to major liquefaction

0.00% major liquefaction

0.00% severe liquefaction

Appendix E – PS4 Advisory Note

IMPORTANT ADVISORY NOTE

PRODUCER STATEMENT – CONSTRUCTION REVIEW (PS4)

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

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

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

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

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